Volume 4

Final

Responsiveness Summary for the Environmental Assessment of the Proposed Longhorn Pipeline System

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ACRONYMS/ABBREVIATIONS OF COMMONLY USED TERMS

ACRONYMS/ABBREVIATIONS

AA/M	Aquifer Avoidance/Minimization Route
ACP	Area Contingency Plan
ANSI	American National Standards Institute
API	American Petroleum Institute
APL	Amoco Pipeline Company
ASME	American Society of Mechanical Engineers
BA	Biological Assessment
BACT	Best Available Control Technology
bbl	Barrel(s)
bpd	Barrel(s) per day
bph	Barrel(s) per hour
bpy	barrel(s) per year
B&C	Boots & Coots
BEG	The University of Texas - Bureau of Economic Geology
BEI	Biological Exposure Indice
BFZ	Balcones Fault Zone
BLM	U.S. Bureau of Land Management
BO	Biological Opinion
BS/EACD	Barton Springs/Edwards Aquifer Conservation District
BTEX	Benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CHARM®	Chemical Hazardous Air Release Model
CIS	Close Interval Survey
CO	Carbon monoxide
COE	US Army Corps of Engineers
Contractor	URS (formerly Radian International)

CP	Cathodic protection
CWA	Clean Water Act
DAMQAT	Damage Prevention Quality Action Team
DEM	Digital Elevation Model
DOT	US Department of Transportation
DRASTIC	D = Depth to ground water; R = (net) Recharge; A = Aquifer media; S = Soil media; T = Topography (slope); I = Impact of vadose-zone media; and C = Conductivity (hydraulic) of the aquifer.
DVMAV	Percent minority population factor
DVECO	Percent low-income population factor
EA	Environmental Assessment
EFW	Electric flash weld
BFZ	Edwards Aquifer-Balcones Fault Zone
EIS	Environmental Impact Statement
EJ	Environmental justice
EJI	EJ Index
EPA	US Environmental Protection Agency
EPC	Exxon Pipeline Company
ERP	Emergency Response Plan
ERW	Electric resistance weld
ESA	Environmentally Sensitive Area
ºF	Degrees Fahrenheit
FDWBC	Fluor Daniels Williams Brothers Company
ft	Feet
FM	Farm-to-Market
FNSI	Finding of No Significant Impact
FR	Federal Register
FRP	Facility Response Plan
FWS	US Fish and Wildlife Service
g	Gravity
GAC	Granular activated carbon
GATX	Galena Park, Texas (where pipeline begins)

GIS	Geographic information system
gpm	Gallon(s) per minute
HAPs	Hazardous air pollutants
HAZMAT	Hazardous Material
HAZOPS	Hazard and Operability Studies
HAZWOPER	Hazardous Waste Operations and Emergency Response
HL&P	Houston Lighting & Power
IBWC	International Boundary and Water Commission
ICS	Incident Command System
ILI	In-line inspection
IR	Current and resistance
IRA	Initial Response Action
ISD	Independent School District
ISO	International Standards Organization
kg	Kilogram(s)
kw/m^2	Kilowatt per square meter
LAER	Lowest Achievable Emission Rate
LCRA	Lower Colorado River Authority
LIF	Leak Impact Factor
LIMS	Longhorn Integrity Management System
LMC	Longhorn Mitigation Commitment
LMP	Longhorn Mitigation Plan
Longhorn	Longhorn Partners Pipeline, L.P.
LPSIP	Longhorn Pipeline System Integrity Program
LUFT	Leaking Underground Fuel Tank
MAOP	Maximum Allowable Operating Pressure
MASP	Maximum allowable surge pressure
mg	Milligram(s)
mg/L	Milligram(s) per liter
MCL	Maximum contaminant level
MOC	Management of change
MOP	Maximum operating pressure
MOV	Motor operated valve

MP	Milepost
mph	Mile(s) per hour
MSDS	Material Safety Data Sheets
MTBE	Methyl tertiary-butyl ether
MUD	Municipal Utility District
NAAQS	National Ambient Air Quality Standards
NACE	National Association of Corrosion Engineers
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NNSR	Non-attainment New Source Review
NO_x	Nitrogen oxides
NRC	National Research Council
NRDA	Natural Resource Damage Assessment
NSPS	New Source Performance Standards
NTSB	National Transportation Safety Board
NWI	National Wetland Inventory
O&M	Operations & Maintenance
OASyS	Open Architecture System Software
OD	Outside diameter
OGJ	*Oil & Gas Journal*
OJT	On-the-Job Training
ORNL	Oak Ridge National Laboratory
OPA '90	Oil Pollution Act of 1990
OPS	Office of Pipeline Safety
ORA	Operational Reliability Assessment
OSHA	Occupational Safety and Health Administration
Oxyfuels	Winter Oxygenated Fuels
PA	Programmatic Agreement
PAO	Polyalphaolefins
P&ID	Piping and instrumentation drawings
PCM	Pollution control measures
PCV	Pressure control valve

PE	Probability of Exceedance
PGA	Peak ground acceleration
PHA	Process Hazard Analyses
PIA	Pipeline Integrity Analysis
PLC	Programmable Logic Controller
$PM_{2.5}$	Particulate matter 2.5 microns or less
POE	Probability of Exceedance
POF	Probability of Failure
POP	Population density factor
ppb	Parts per billion
psi	Pound(s) per square inch
ppm	Parts per million
PSD	Prevention of Significant Deterioration
psi	Pounds per square inch
psig	Pounds per square inch gauge
PSM	Process Safety Management
PWS	Public water supply
RCBV	Remote-controlled block valves
RCRA	Resource Conservation and Recovery Act
REMM	Riverine Emergency Management Model
REI	Resource Economics, Inc.
RFG	Reformulated Gasoline
ROD	Record of Decision
ROW	Right-of-way
RR	Railroad
RRC	Railroad Commission of Texas
RS	Responsiveness summary
RVP	Reid Vapor Pressure
RWPG	Regional Water Planning Group
RSPA	Research Special Programs Administration
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SCC	Stress-corrosion cracking

SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Officer
SIP	System Integrity Plan
SO_2	Sulfur dioxide
SOF	Statement of Findings
SPCC	Spill prevention, control and countermeasure
STEL	Short-Term Exposure Limit
TAC	Texas Administrative Code
THC	Total hydrocarbons
THPO	Tribal Historic Preservation Officer
TLV	Threshold Limit Value
TNRCC	Texas Natural Resource Conservation Commission
TNRIS	Texas Natural Resources Information System
TPWD	Texas Parks and Wildlife Department
tpy	Ton(s) per year
TRP	Technical Response Plan
TSV	Thermal safety valve
TTTI	Texaco Trading & Transportation Inc.
TWA	Time-weighted average
TLV-C	Threshold Limit Value – Ceiling
TWDB	Texas Water Development Board
UDST	Ultramar Diamond Shamrock Terminal
USA	Unusually Sensitive Area (DOT term)
USC	United States Code
UST	Underground storage tanks
USGS	US Geological Survey
UTSI	UTSI International Corporation
UV/IR	Ultraviolet/infrared
VOC	Volatile organic compound
WES	Williams Energy Services
WilCall	WES One-Call Services, Inc.
WSRP	Work Site Response Plan
Y2K	Year 2000 Compliance Plan

INTRODUCTION

The US Environmental Protection Agency (EPA) and the US Department of Transportation (DOT) have completed their review of comments from the public comment period (October 29, 1999 to January 14, 2000) for the proposed Longhorn Partners Pipeline project. The proposed project would convert the former Exxon Pipeline Company (EPC) pipeline transporting crude oil from Crane to Baytown, Texas, combined with new construction from Crane to El Paso, into a refined petroleum products pipeline transporting fuels from Houston to El Paso.

The Lead Agencies (EPA and DOT) held six public meetings to receive oral and written comments on the adequacy of the Environmental Assessment (EA) and preliminary Finding of No Significant Impact (FNSI). Public meetings were held in Houston, Austin (twice), Fredericksburg, Bastrop, and El Paso, Texas. The Lead Agencies extended the public review and comment period to January 14, 2000, beyond the original closing date of November 29, 1999.

EPA organized the meetings and published a notice in the Federal Register with meeting places, dates, and times. Copies of the EA and the meeting notices were provided to congressional offices in Washington, D.C. and distributed to the County Clerk in each county the pipeline crosses as well as to all the officials, agencies, groups, and individuals on the NEPA project mailing list. Both EPA and DOT published the meeting notice on their Internet web sites and distributed over 200 copies to citizens, local/state/federal agencies, and tribes with a stated interest in the project. In addition, a press advisory was issued to the media with meeting notice information.

The format for the public meetings was designed to provide a compromise between the need of a few to explain at length and the need of many to be heard; therefore, oral comments were limited to three minutes. The format was consistent in all venues so that all communities were treated equally.

Attendance at all six public meetings included elected local and federal officials or their representatives, interested parties including residents and businesses, environmental organizations, and members of the news media. Estimated attendance at each of the six public meetings are as follows:

Houston - November 9, 1999	80
Austin - November 16, 1999	1,000*
Fredericksburg - November 17, 1999	100
Bastrop - November 18, 1999	100
El Paso - November 22, 1999	250
Austin - January 10, 2000	2,000

The Lead Agencies also received over 6,000 cards, letters, and electronic-mail (e-mail) messages representing a wide range of comments on the proposed project and its alternatives, the predicted impacts, and the decision-making process.

All written statements received, and oral comments made at the public meetings, were reviewed and divided into three basic groups. One group included personal opinions expressed as form letters, cards, and e-mail messages, in opposition to or support of the proposed project. The second group included conclusory personal opinions or questions not germane to the EA/FNSI. The majority of comments received were in these first two groups and did not require individual written responses. The third group included substantive comments on the EA/FNSI. In the following pages, EPA and DOT provide responses to these comments. The comments are paraphrased and combined as appropriate to include all similar comments. The responses are organized by topic under the nine sections corresponding with each of the nine EA chapters. A tenth section contains miscellaneous comments that do not fit well into any EA chapter categorization.

Based on these comments, additional baseline information was developed (e.g., inventory of wetlands), additional analyses were conducted (e.g., more modeling of surface water impacts from spills of the Highland Lakes), and additional mitigation measures were developed (e.g., elimination of MTBE from the gasoline shipped by the Longhorn pipeline).

This Responsiveness Summary (RS) contains comments and responses. Nine appendices provide additional details.

*Meeting closed due to overcrowding prior to receipt of public input.

1.0 COMMENTS AND RESPONSES RELATED TO CHAPTER 1 "INTRODUCTION"

1.1 APPROPRIATENESS OF THIRD-PARTY EA APPROACH

1.1.1 Comment

Several commentors raised questions regarding the "third-party EA approach"—the role of the EA contractor, the Lead Agencies, and Longhorn Partners Pipeline, L.P. (Longhorn) in the preparation of the EA. Some of the commentors stated that Longhorn's role in funding for the EA gave Longhorn undue influence in the EA preparation.

Response

Third-party approach. Under the National Environmental Policy Act (NEPA) of 1969 Environmental Assessments (EAs) and Environmental Impact Statements (EISs) are generally the responsibility of the federal agency that has legal jurisdiction and expertise in the proposed action. At times, the federal responsibility/expertise is split to the extent that the conduct of the NEPA process involves more than one Lead Agency. Pursuant to the Settlement Agreement, this EA was prepared by joint Lead Agencies. The US Department of Transportation (DOT) has regulatory authority and technical expertise over the operation of the Longhorn Pipeline System, and the US Environmental Protection Agency (EPA) has expertise in NEPA and potential environmental impacts.

In the third-party approach, the Lead Agency selects an environmental contractor to assist with the technical analyses and to prepare drafts of the NEPA document. When the project proponent is a private enterprise, it is common for the Lead Agency to require the project proponent—in this case, Longhorn—to fund the technical analysis performed by the contractor. This process is specifically authorized in NEPA regulations at 40 CFR §1506.5(c). Because of agency staff and budget limitations, the third-party concept puts the cost burden on the project proponent while ensuring that the study direction and decision-making remains solely in the control of the federal government.

EPA and DOT involvement. Under the NEPA third-party approach, the Lead Agency directs the preparation of the document, which is the product of the Agency. EPA and DOT (Lead Agencies) selected URS Radian as the EA contractor (Contractor) because of its experience and expertise in both DOT pipeline risk assessments and NEPA projects.

As required by the Settlement Agreement, the Lead Agencies conducted a public meeting in Austin on March 28, 1999 to gather information and hear concerns from the public and various groups opposed to the pipeline. Although not required by the Settlement Agreement, the Lead Agencies issued a detailed work plan for the EA to which there were detailed written comments. The meeting and work plan comments were helpful in gaining a better understanding of public concerns and issues associated with the EA.

The Lead Agencies directed the details of the study and the EA process. In a series of one- and two-day meetings held in Dallas at the EPA office, in Houston at the DOT office, and in Austin at the Radian office, Lead Agency staff met to review and modify the work plan for the EA and, over the course of several months, each chapter of the EA. There were several iterations of the chapter drafts and substantial interaction between Lead Agencies and Radian through almost daily telephone contact between meetings. Project communications were carefully controlled by the Lead Agencies, so that no outside parties (including Longhorn) had undue influence on the technical work performed. Decision-making (e.g., EA conclusions) was performed solely by the Lead Agencies. EPA and DOT staffs have spent thousands of hours reviewing contractor work products and interacting with the public and various interested parties.

Longhorn's Role. The Lead Agencies established a communications protocol in a memorandum of agreement between the Lead Agencies, Longhorn, and Radian that defined a process to ensure that Longhorn's role as the funding source of the work and as a primary source of information about the pipeline system did not unduly influence the EA. Contact between Radian and Longhorn was only allowed for purposes of obtaining technical data on the system and for administering Radian's and Longhorn's contract and budgetary changes for the work. As an example, Longhorn was not provided a copy of the draft EA until it was printed and available for public distribution.

The most intense communication between Longhorn and the Lead Agencies and Radian occurred during the preparation of the mitigation measures. The Lead Agencies prepared a general set of objectives and quantitative goals based on risk modeling that the mitigation measures should accomplish in order to reduce the probability of (and improve the response to) spills to a level of insignificance. These objectives and goals were presented to Longhorn on August 5, 1999 and to the Plaintiffs on August 10, 1999. Those attending the August 10 meeting included the staff, attorneys, and consultants for each of the following: the City of Austin, the Lower Colorado River Authority, the Barton Springs/Edwards Aquifer Conservation District, and the individual private plaintiffs. The purpose of these presentations was to inform both

Longhorn and the Plaintiffs of the direction that the study was taking and the Lead Agencies' views regarding mitigation.

Following the presentation, Longhorn and its contractors began to develop a detailed plan for implementing each of the mitigation measures that the Lead Agencies had developed. This Longhorn Mitigation Plan (LMP), located in Appendix 9C in Volume 2 and all of Volume 3 in the draft EA went through five iterations before its publication in the draft EA.

Based on public input and further analysis, the LMP has been further amended and is contained in Appendix 9C of the final EA.

1.2 LONGHORN AND LEAD AGENCY INVOLVEMENT IN THE ENVIRONMENTAL ASSESSMENT

1.2.1 Comment

A few commentors stated that Longhorn had undue influence on the outcome of the study because it supplied the data upon which much of the analysis is based. A commentor stated that the EA contractor should have conducted, or at least participated in, the pipeline testing that was done to address pipeline integrity.

Response

Many volumes of data logs, inspection results, analyses, and reports were provided by Longhorn, Williams Energy Services (WES), and Exxon Pipeline Company (EPC) and are available for public review in the project "reading room" in Radian's Austin office. These documents include results from the most recent in-line inspections (ILI), hydrostatic pressure testing, cathodic protection surveys, and other inspections. The "raw data" as well as the final reports from these inspections were reviewed by the Contractor for use in the EA, and sometimes by additional independent reviewers.

1.2.2 Comment

Similarly, a commentor questioned Longhorn's role in providing technical data, including inspection results, and questioned the Contractor's and Lead Agencies' role in accepting these results rather than conducting their own independent testing and inspections.

Response

In assessing the pipeline integrity, the Lead Agencies did not repeat such inspections for the following reasons:

- Use of well-documented, recent inspections, even if conducted by the company being audited, is a well-established protocol in regulatory auditing.
- Although funded by Longhorn, specialized, independent, and often "certified" third-party pipeline test companies often prepared inspections. There is no reason to suspect that such professional companies would not produce fair and unbiased reports, and many legal and ethical reasons why they would produce only such reports.
- Additional tests and inspections are to be done prior to startup and immediately after startup to verify pipeline integrity, independent of previous inspections.
- As a means of "spot checking" several aspects of the pipeline condition, the Contractor also conducted on-site visual inspections (on the ground and in the air) and accompanied DOT staff in conducting DOT site visits on the pipeline.

1.2.3 Comment

One commentor claimed EPA had opposed having to be involved in the NEPA process on this project, adding that the EA showed EPA "was in error in at least 32 instances."

Response

This appears to be an assertion that, in Spiller v. Walker, EPA claimed the proposed project could have no potentially significant environmental effects, but in the draft EA admitted there are potentially significant effects which warrant mitigation. In Spiller v. Walker, however, neither EPA nor any other federal defendant claimed the proposed project could have no potentially significant effects on the environment. Each of the federal defendants instead claimed that there was no "major federal action" involved with the project which would require preparation of the EIS which plaintiffs were seeking.

EPA's position in Spiller v. Walker was that its only action relating to Longhorn's proposal, i.e., receiving notices of intent to be covered by a Clean Water Act general permit authorizing discharges of storm water from construction sites, had been statutorily exempted from NEPA's requirements by Congress in Clean Water Act section 511(c)(1). When he issued a preliminary injunction in the case on August 25, 1997, US District Judge Sparks agreed with that position, stating at page 24 of his opinion:

> Longhorn argues the EPA permitting under the Clean Water Act at issue in this case is exempt from NEPA. 33 U.S.C. §1371(c)(1) ("No action of the Administrator taken pursuant to [Chapter 26 of Title 33] shall be deemed a major federal action significantly affecting the quality of the human environment

> within the meaning of [the NEPA]). The plaintiffs have failed to cite authority contradicting this plain statutory statement. Therefore, although any reasonable citizen untainted by the handicap of a juris doctor would believe the EPA is the proper agency to investigate the environmental impact of a pipeline across Texas, the legal conclusion is that the EPA has no duty to conduct an EIS based on its involvement under the Clean Water Act."

In the same opinion, however, Judge Sparks also found DOT had an obligation to prepare an EIS on the proposed project and the injunction he issued forbade Longhorn from operating its pipeline to transport refined petroleum products until that EIS had been prepared. Without further explanation, the injunction allowed EPA to prepare that EIS on DOT's behalf. While the injunction was on appeal, the parties to the litigation entered, and Judge Sparks approved, the Settlement Agreement reproduced as Appendix 1A to the EA.

1.3 CURRENT BODY OF FEDERAL REGULATIONS, COMPLIANCE AND NONCOMPLIANCE

1.3.1 Comment

Several commentors questioned the adequacy of current federal regulations governing pipelines.

Response

The adequacy of current federal regulations is not in the scope of the Settlement Agreement. The principal issue is whether the Longhorn pipeline poses significant impacts to public safety or the environment. The LMP exceeds regulatory requirements and the current practices of most pipeline companies operating today. The LMP would become part of the operating procedures of the company and be enforceable by DOT.

2.0 COMMENTS AND RESPONSES RELATED TO EA CHAPTER 2 "PURPOSE AND NEED FOR THE PROPOSED PROJECT"

2.1 ROLE OF COSTS AND BENEFIT ANALYSES IN THE EA

2.1.1 Comment

Several commentors addressed the issue of the costs and benefits associated with the project, and the role of cost/benefit or risk/benefit analysis in the EA. Several commentors noted that the central Texas area, in particular Barton Springs and the Edwards Aquifer, is of "incalculable value" and concluded that the risks to the environment "far outweigh any presumed

Response

The Lead Agencies carefully considered the role and appropriateness of using cost/benefit or risk/benefit analyses. Such analyses are allowed (but not required) in EISs (40 CFR §1502.23). Lead Agencies' legal staff concluded that cost/benefit analyses in the NEPA regulations may be relevant to EISs, but should not be addressed in EAs because the purpose of EAs is to determine whether there are significant impacts posed by the proposed action following mitigation. If there are significant impacts after mitigation, then an EIS must be prepared. Thus, the central question in an EA is level of significance, whereas an EIS requires that the Lead Agencies evaluate alternatives and specify the environmentally preferred alternative. In the selection of the environmentally preferred alternative, the Lead Agencies may take into account "economic and technical considerations" [40 CFR 1505.2(b)]. In short, at the EIS stage of the NEPA process, significance of impacts is not the issue and therefore economic and technical considerations may be part of the decision-making process.

The EA did present some economic factors because these were required under the Settlement Agreement—evaluation of impacts of the Proposed Project on minority populations. This, too, was summarized and based upon studies that had been done by an economic consultant to Longhorn (The Perryman Group, June 1998) and reviewed for accuracy and methodology by an economics subcontractor to Radian (Resource Economics, Inc., April 1999). This one-paragraph summary is at the end Chapter 8 that deals with environmental justice. This RS contains a report, and update, of the REI study (see Appendix A).

The Lead Agencies agree with the commentor who described natural resource values as "incalculable." However, there are means of monetizing aesthetic features and natural resources that are not easily quantifiable. As a result, these predicted impacts are more subjective and subject to various interpretations.

2.2 WEIGHING RISK AND BENEFITS

2.2.1 Comment

Several commentors stated or inferred that the purpose of an EA is to weigh the benefits of a proposed action against the adverse impacts and then to render a judgement based on this risk/benefit analysis. The commentors stated that the potential impacts of the Longhorn Pipeline System outweigh the benefits of reduced gasoline prices in El Paso, New Mexico, and Arizona and the improvement in air quality from cleaner burning fuel as stated in the EA (Chapter 2, "Purpose and Need for the Proposed Project"). Therefore, the commentors concluded that the EA decision should be to deny Longhorn the right to operate as planned.

Response

The purpose of an EA or an EIS is not to determine whether a proposed action is justified or results in overall net benefits or net adverse impacts. Instead, the purpose of an EA or an EIS is to objectively evaluate the beneficial and adverse impacts of the proposed project and reasonable alternatives, including the no action alternative. In an EA, the Lead Agencies must decide whether or not to require an EIS.

2.2.2 Comment

Several commentors challenged the statements in Chapter 2 of the EA that lower pump prices and cleaner air would result from the project.

Response

Chapter 2 in the final EA states that the purpose of the proposed project is to allow Longhorn to compete in the El Paso Gateway Markets through use of its existing pipeline. The revised purpose and need statement no longer includes the proposed project impacts directly to lower fuel prices or air quality improvements. Although competition generally benefits consumers, there is no guarantee that pump prices would be lower. The link between the proposed project and reduced concentrations of various pollutants is not clear, given the uncertainties regarding the future use of methyl tertiary-butyl ether (MTBE), the control strategies used by various non-attainment areas to reduce mobile and stationary source emissions, and other factors.

2.2.3 Comment

A commentor disputes in Chapter 2 of the draft EA claims that the Longhorn pipeline will increase competition in growing markets that have traditionally been isolated from any significant competition. It also claims that the El Paso Gateway Market (i.e., El Paso; Juarez, Mexico; Phoenix, Arizona; and Albuquerque, New Mexico) has traditionally endured materially higher prices because they did not have access to more efficient and lower-cost refineries such as those in Gulf Coast area. A commentor said that this is incorrect because Equilon delivers Gulf Coast products to the El Paso Gateway Market.

The commentor goes on to state that on the one hand, the draft EA claims that the prices in the El Paso Gateway Market are so high that Longhorn's entry will break up the market power and thereby lower gasoline prices. On the other hand, in the very next paragraph, the draft EA claims that the only way Longhorn can compete is by using an existing pipeline, implying that prices are so low that sellers are barely breaking even. The commentor concludes that the EA can't have it both ways—El Paso's prices are too high, or El Paso's prices are too low.

Response

The purpose of the proposed project, as stated in Section 2.1 of the final EA, is to respond to Longhorn's request to compete in the "El Paso Gateway Markets" for gasoline and other refined products. As stated in Section 2.2, the project would increase competition. Section 2.2 notes, and Appendix A of the RS demonstrates, that historically motor fuel consumers in this region have "endured materially higher gasoline prices because they have not had access to more efficient and lower-cost refineries such as those located in the Gulf Coast areas." It is not necessary for the EA to evaluate the extent to which Longhorn's commercial venture would be a success nor what future prices would be. Section 2.2 of the final EA specifically states that lower prices are not guaranteed as a result of this project.

2.2.4 Comment

A commentor stated that El Paso's petroleum product prices are competitive, the local market is not isolated, and price differences between Houston and El Paso are almost entirely accounted for by the transportation tariff. Therefore, the commentor concluded, Longhorn will probably not lower prices in the El Paso Gateway Market, and therefore, Longhorn could be under enough competitive pressure to be tempted to cut corners on pipeline maintenance and safety. The commentor went on to state that Longhorn could cause a petroleum product glut in the El Paso area because of the limited pipeline capacity to transport product to points beyond, and this could drive many local competitors out of business. Finally, the commentor stated that Longhorn is unlikely to create a net increase of jobs in El Paso, but rather will mostly displace jobs from competitors it forces out of business, and as a result, the projected wages for Hispanics will be at poverty levels.

Response

Limited economic analysis was conducted by an energy and economics consultant to evaluate the effect of the proposed project on minority employment (required under the Settlement Agreement) and to evaluate Longhorn's statement of purpose and need. This limited economic analysis provided in Appendix A of this Responsiveness Summary (RS) generally contradicts the commentor's arguments. The enforcement of DOT regulations and the enforcement of the Longhorn Mitigation Plan (LMP) by DOT would preclude Longhorn's alleged temptation to "cut corners." Also, the LMP provides for public access to the periodic mitigation monitoring reports thereby creating more accountability.

2.2.5 Comment

A commentor said that economic benefits to southwestern fuel markets served by Longhorn pipeline beyond El Paso (e.g., Phoenix and Albuquerque) should not be included unless an EA of the transportation involved is also performed.

Response

Transportation from El Paso to other southwestern markets would occur via existing modes of transportation, mainly operating pipelines. Because these transportation systems are currently in refined product service and because the connecting pipelines in El Paso are not covered by the Settlement Agreement, a separate new EA is not necessary. However, Appendix A of this RS discusses other refined product pipelines supplying the El Paso market.

2.2.6 Comment

Several commentors stated or implied that the purpose of an EA is to weigh the benefits of a proposed action against the adverse impacts and then to render a judgement based on this risk/benefit analysis. The commentors stated that the potential impacts of the Longhorn Pipeline System outweigh any benefits of reduced gasoline prices in El Paso, New Mexico, and Arizona and any improvement in air quality from cleaner burning fuel as stated in the draft EA (Chapter 2, "Purpose and Need for the Proposed Project").

Response

Generally, EAs are conducted to determine whether a proposed action may significantly affect the quality of the human environment. If the Lead Agency determines that the potential impacts of the proposed action would significantly affect the human environment, an EIS would be conducted to enable the Lead Agency to comparatively evaluate the alternatives. Although considered by the decision-makers, in this EA, the potential benefits are not used to negate or reduce the potential adverse impacts.

2.2.7 Comment

Commentors questioned the draft EA's "uncritical acceptance" of Longhorn's description of project purposes and needs in draft EA Chapter 2, Purpose and Need for the Proposed Project.

Response

Longhorn's description of purpose and need was not uncritically accepted by the EA Contractor or Lead Agencies. A Ph.D. economist, with long experience in Texas and US energy economics, was hired as a subcontractor to review the analyses used by Longhorn to describe the project purpose and need. That review is contained in Appendix A of this RS. The Lead Agencies are not to determine whether the proposed project is economically viable. However, economic factors affecting alternatives and mitigation are considered in the EA process.

2.2.8 Comment

Several commentors stated that the need for more competition and therefore reduced fuel prices in the El Paso and other markets to be served by the Longhorn pipeline justify the pipeline and that delays associated with the EA process are only hurting consumers.

Response

The commentors are correct in their premise that the Longhorn pipeline would bring more competition to the El Paso Gateway Markets (El Paso; Juarez, Mexico; New Mexico and Arizona) and the Odessa-Midland area. More competition would tend to benefit the consumer and may result in lower fuel prices (see Appendix A of this RS). The EA process has taken much longer than expected due to an extremely high level of public interest and public participation generating a large number of comments (both written and oral from public meetings) and resulting new analyses conducted following publication of the draft EA.

2.3 INTRASTATE VERSUS INTERSTATE PIPELINE

2.3.1 Comment

A few commentors stated that the Longhorn pipeline should be classified as an intrastate pipeline rather than as an interstate pipeline because the beginning of the pipeline (Houston) and the terminus of the pipeline (El Paso) are in Texas as is all of the pipeline between these points. Therefore, the commentors contend that the proper jurisdiction for the pipeline is the Railroad Commission of Texas, not the DOT.

Response

Because the Longhorn pipeline would carry product that would be connected to the interstate pipeline system for ultimate deliveries to New Mexico and Arizona, the 695 miles from Houston to El Paso is considered interstate, not intrastate. However, the 28-mile Crane-to-Odessa lateral is considered intrastate because the products are shipped from Houston, Texas to Odessa, Texas, without subsequent shipments to out-of-state markets. The Odessa Terminal provides product for local users only, whereas the El Paso Terminal serves both local users and users in other states through connections to interstate pipelines west of the El Paso Terminal.

2.4 PURPOSE AND NEED

2.4.1 Comment

A commentor stated that the purpose and need chapter of the EA should not have addressed the purpose and need for the proposed project but rather should have addressed the purpose and need for the EA.

Response

The purpose and need section of a National Environmental Policy Act (NEPA) document addresses the underlying need for the proposed action, not the NEPA document itself. As explained in Section 1.1 of the draft EA, the key purpose of conducting this EA is to satisfy the Settlement Agreement and NEPA.

2.4.2 Comment

Several oral comments were made at the El Paso public meeting that questioned why Longhorn was being required to go through this EA process, when other liquid pipelines change direction of flow and from crude oil to gasoline without the studies and delays associated with this process.

Response

The need for the EA stems from the lawsuit and subsequent Settlement Agreement (see Appendix 1A in the draft EA). The parties to the Settlement Agreement, including Longhorn, agreed to conduct the EA as a means of settling the lawsuit. The need for the EA in this instance does not reflect a change in NEPA law, regulations, or policy, nor does it constitute a precedent or change in either DOT or EPA policy toward future circumstances involving pipelines changing direction of flow or contents to be shipped.

3.0 COMMENTS AND RESPONSES RELATED TO EA CHAPTER 3 "DESCRIPTION OF PROPOSED PROJECT AND ALTERNATIVES"

3.1 APPROPRIATENESS OF THE DEFINITION OF NO-ACTION ALTERNATIVE

3.1.1 Comment

Commentors objected to the draft EA's description of the No-Action Alternative, i.e., resumption of crude oil transport from West Texas (Crane Station) to the Houston area for west-to-east shipments, i.e., the historic use of the pipeline for more than 40 years. They suggested the No-Action Alternative should be no use of the pipeline for various reasons, including:

- The pipeline has been out of service for over five years;
- The pipeline has been substantially modified;
- OPS would have to review and approve a new response plan before Longhorn could resume crude oil shipments;
- No project is normally the No-Action alternative in NEPA review; and
- Resumption of crude oil shipments would be economically infeasible.

Response

The final EA describes the No-Action Alternative as non-use (idling or abandonment) of the pipeline.

The final EA also evaluates use of the pipeline for crude oil shipment as an independent "action" alternative available to Longhorn. Under that alternative, Longhorn would use the entire pipeline (not just the Crane to Houston portion) for delivery of crude oil from West Texas to Houston area refineries. That alternative would be generate far less revenue for Longhorn, but it appears likely Longhorn would pursue it were it denied the ability to use the pipeline for transport of refined products. If it used the pipeline to transport crude oil, however, Longhorn would not (and probably could not, given economic constraints) implement many of the mitigation measures developed for transporting refined products.

3.1.2 Comment

A commentor noted that the Shell Rancho pipeline is currently used to transport crude oil from West Texas to the Houston area. If the Longhorn pipeline is returned to crude oil service, it will reduce volumes and operating pressures in the Shell Rancho pipeline, which in turn reduces the potential for leaks or spills. This commentor claimed the draft EA failed to take this benefit of the former "No-Action" alternative into account.

Response

If Longhorn were to use its pipeline for crude oil service, it might possess a competitive advantage over the operators of the Shell Rancho Pipeline because the smaller diameter of the Longhorn pipeline could be more efficient and less costly to operate than the Shell Rancho pipeline given a limited supply of crude oil for shipment. This could result in the Longhorn crude oil pipeline capturing some or all of the current shipments on the Shell Rancho pipeline and might ultimately result in its closure. See Appendix 3A of the final EA.

The Lead Agencies have not assessed the risks currently posed by operation of the Shell Rancho pipeline, but agree that those risks would likely be reduced by reduced operating pressures. It is moreover reasonable to conclude that a single crude oil pipeline would generally pose less risk than two pipelines, one transporting crude oil and the other gasoline. However, that general conclusion is subject to significant doubt because some Longhorn mitigation measures also reduce potential environmental risk from other nearby pipelines, especially risks associated with third-party damage (the most common cause of pipeline failure). If the incremental risk posed by the Longhorn pipeline were smaller than the risk reduction on the Shell Rancho pipeline, overall risk to the environment would be reduced by operation of both lines.

3.2 NEED TO ADD OTHER ALTERNATIVES

3.2.1 Comment

Several commentors stated that the EA should have identified alternative means of getting refined products to El Paso, including potential new pipelines other than Longhorn that have not yet been announced, construction of a new El Paso refinery, or other modes of transportation between the Gulf Coast refineries and El Paso.

Response

The EA did not include an analysis of possible new pipelines from other sources of refined products or considered the development of other new refineries closer to El Paso because these alternatives are speculative. New refineries and pipelines from other regions are alternatives that would not satisfy the project purpose and need, which is to respond to Longhorn's proposal to operate a refined petroleum product pipeline to participate in the market for refined products in the El Paso Gateway Market through use of an existing pipeline. Although commentors have mentioned possible new pipeline projects that have been discussed since the development of the Settlement Agreement, it is not appropriate to expand the EA analyses to evaluate the viability of other means of transporting refined products.

With respect to other modes of refined product delivery, this Responsiveness Summary (RS) does provide information on truck and rail transport of refined product. See Section 9.4 of this RS.

3.3 ALTERNATIVE ROUTE DESCRIPTIONS

3.3.1 Comment

Several commentors stated that route alternatives other than those presented in the EA should be considered.

Response

The Settlement Agreement specified three alternative routes to be considered: one in El Paso (alternative to passing through Fort Bliss), one that would avoid several listed aquifers primarily in central Texas, and a third that would avoid populated areas in and around Austin. No other routes were recommended for study by the commentors, nor do the Lead Agencies believe additional route considerations would have contributed to the analysis.

3.3.2 Comment

Some commentors stated that the Austin Re-route, which was developed to avoid populated areas in and around Austin, was laid out in such a manner as to make it environmentally unacceptable and, therefore, exclude it from serious consideration as a route that Longhorn must accept as a condition for going forward with the proposed project.

Response

Although there are an infinite number of routes to connect areas east of Austin with the areas west of Austin, a potential Austin Re-route is practically limited from going any further north or south. The re-route alignment must avoid areas north of the existing route, which would require two more crossings of the Colorado River and encounter higher population density, and avoid areas south of the existing routes, which would overlie the portion of the Edwards Aquifer that supplies the City of San Marcos with a large portion of its water supply.

The Austin Re-route accomplishes its goal of avoiding populated areas in and around Austin, but even this route lies in the path of future development, as would any alignment between Austin and the City of San Antonio.

3.3.3 Comment

A commentor asked why Appendix 3C of the draft EA discussed pipeline construction techniques for the new sections of the pipeline when most of the pipeline was built in 1949 under different techniques and standards.

Response

The reason for including new construction techniques and standards was because there are 274 miles of newly constructed pipeline built to these standards and 8 more miles are planned to be built to these standards in El Paso.

4.0 COMMENTS AND RESPONSES RELATED TO EA CHAPTER 4 "AFFECTED ENVIRONMENT"

4.1 APPROPRIATENESS OF POPULATION ESTIMATES

4.1.1 Comment

A commentor stated that the draft EA failed to consider data on land drainage conditions when estimating the number of homes and persons that could be significantly affected by spills. The commentor also stated that the 2,500-ft pipeline corridor used as the basis for classifying population densities along the pipeline "significantly underestimates the number of potentially

Response

As stated in the draft EA, there is no defined corridor width along liquid pipelines to be used in estimating potential damages. The 2,500-ft corridor (1,250 ft on each side of the pipeline) was selected as the zone in which assessment of most receptors would be conducted. This was based on preliminary simulations of spills with resulting fire and heat effect impact diameters. The range of homes potentially impacted by a spill is discussed in Chapter 7.

4.1.2 Comment

A commentor asked for an explanation regarding the EA's method for growth projections for the Austin metropolitan area.

Response

Population estimates were derived from Texas State Data Center statistics, and information pertaining to future development was acquired from City of Houston and City of Austin planning departments. Twenty-five or more residential units per planned subdivision were selected to be a threshold to tabulate those areas that are expected to be developed in the known future. Variables in the real estate marketplace, potential land development constraints (i.e., development moratoriums and restrictions), economic influences, and other factors preclude the ability to make broad assumptions regarding specific future land uses and future housing densities. Population projections related to future water supplies are discussed in Appendix B of this RS.

4.1.3 Comment

Commentors indicated that the methodology used to identify housing density and population numbers was not appropriate and resulted in inaccurate estimates. Commentors also indicated that the data source used to determine numbers per household was unclear and that use of electrical hook-ups leads to inaccurate estimates of household numbers. Commentors also said that tax records are "usually most accurate" for the identification of population numbers.

Response

The identification of dwelling units and population numbers was carried out in a uniform manner throughout the entire length of the pipeline corridor. To ensure uniformity, data sources used in the analysis relied on average numbers of individuals per household, as published in the 1990 Census and the use of recent (1998) aerial photography of the pipeline corridor. When appropriate, field studies were carried out to augment dwelling unit counts that were derived from aerial photointerpretation. The accuracy of dwelling unit counts in Austin was evaluated by overlaying geo-referenced (Geocoded) electric utility meter locations within a 1,250 ft buffer from the pipeline (similar data were not available for the Houston area). Results of the analysis showed that 3,672 dwelling units were identified by aerial photointerpretation and 3,786 meters were identified using City of Austin Electric Utility Department data. Although both methods have inherent variables that would affect dwelling unit counts, the difference between the two methods (114 dwelling units) represents a variance of approximately 3 percent.

Information received from Ryan Robinson of the City of Austin on April 26, 1999, indicates that City of Austin population estimates that were derived from meter location counts were based on estimates of household density that ranged from "... a low peak at around 1.8 for general multifamily and a high swell that approaches 3.7 for single family units that tend to contain families." Robinson further explained that "Because the pipeline swath takes in such a sizable chunk of families, many of which are Hispanic, we [the City of Austin] chose a household figure on the upper end of the continuum to reflect these larger households."

As previously stated, numbers of residents per household used to estimate population numbers in the draft EA were based on county-wide census data which included 2.39 persons per household in Travis County. The applicability of the use of county-wide household numbers was further substantiated when compared to census data for the City of Austin as a whole (2.33 persons per household) and census data for the Metropolitan Statistical Area as a whole (2.48 persons per household). Additional demographic data are provided in Chapter 8 (Environmental Justice).

4.1.4 Comment

Commentors indicated that the Travis County housing estimate of 3,887 units is low and that geocoded Austin utility connections (as of 9-01-99) within a 2,500-ft buffer resulted in a dwelling unit count of 4,571. Commentors also indicated that "... several hundred single units [are] outside and to the west of the City's utility service area but are within Travis County."

Response

Housing estimates in the draft EA were based on a 1,250-ft distance from either side of the pipeline, and not a 2,500-ft distance from either side of the pipeline. Aerial photointerpretation, augmented by field reconnaissance, was used as the basis for housing density estimates, including the area west of the City of Austin, because utility connection data were not uniformly available throughout the corridor length. Therefore, single family housing units that are not within the City's utility service area were counted and identified in the draft EA.

4.1.5 Comment

Commentors indicated that "DOT's highest density single family designations is 46 homes or greater" which is greater than that in the draft EA. The density and sensitivity classification schemes should be adjusted to more closely match the DOT density levels.

Response

As stated in Section 4.4.4.3.1 of the draft EA, there are no defined corridor width requirements for liquid pipelines relative to potential damages. DOT applies the concept of class locations based on building counts within a distance of 660 ft on either side of natural gas pipelines. The application of low, moderate, and high housing density numbers within 1,250 ft of the pipeline is similar to those used for natural gas pipelines, but more realistically represents a potential zone of impact from a large gasoline spill and fire.

4.1.6 Comment

Commentors indicated that the demographic (racial, age, etc.) composition of potentially impacted populations are not included in the draft EA and that such data are necessary to address human health risk.

Response

Human health risk assessment, as a function of population characteristics, is not a part of the draft EA; therefore, inclusion of demographic data was not appropriate. Demographic data were included and applied to address environmental justice issues (draft EA, Section 8.1).

4.2 CONCERNS REGARDING SPECIFIC SENSITIVE RECEPTORS ALONG THE PIPELINE ROUTE

4.2.1 Comment

Commentors indicated that the term "sensitive receptors" is not clearly identified, but does include "residences, schools, day care centers, parks, health care facilities, correctional facilities, and overnight lodging facilities." Commentors indicated that "... areas of high concentrations of elderly and immuno-compromised peoples, such as rest homes, long-term care facilities, hospices, etc...." also should be included.

Response

Health care facilities such as Greenway Manor Personal Care, Gulf Bank Medical Center, Medical Center of East Houston, and The Brown Schools Rehabilitation Center were identified in the draft EA on Tables 4-4 and 4-7. Considerable attention was given to The Brown Schools Rehabilitation Center due to the proximity to the pipeline and the presence of non-ambulatory patients that are dependent upon life-support systems. Specific mitigation measures in the vicinity of the Brown Schools call for lowering, replacing or reconditioning the pipeline prior to startup.

4.2.2 Comment

A commentor pointed out that Kids Network day care center is near the Longhorn pipeline at 9607 Brodie Lane in Austin, but was not noted in the draft EA.

Response

The Kids Network day care center opened in April 1999 after the survey of the pipeline was completed for inclusion in the draft EA. This center is located approximately 3,700 ft from the Longhorn pipeline and outside of the 1,250-ft corridor considered for impacts.

4.3 CONCERNS REGARDING INCOMPLETE TABULATION OF WATER USES

4.3.1 Comment

A commentor requested that the list of public water supplies potentially impacted by a pipeline accident should be expanded to include all communities within 25 miles of the pipeline, in the absence of specific well location data.

Response

This EA is intended to provide guidance for the Lead Agencies to determine the range of potentially impacted resources, relying on available data sets, and to determine if additional assessment may be required. In addition, communities and water supply companies have had a substantial amount of time to review the draft EA and comment, as is evidenced by the additional data provided by other sources that were incorporated into the analysis. Some sources were added; some were eliminated. Areas have been reclassified to sensitive in response to this data (see Chapter 7 of this Responsiveness Summary [RS]).

The tabulation of public water supplies that may be impacted by releases from the Longhorn Pipeline System was based upon geospatial data provided by the Texas Natural Resource Conservation Commission (TNRCC). Small community water systems that are not listed in the TNRCC database of public water supplies and that did not provide data as comment to the draft EA were not evaluated as part of this EA. However, as described in Appendices 9F and 9G of the final EA, mitigation measures are being implemented for non-public water supplies, and Longhorn would be wholly responsible for providing water supply to parties whose water wells are impacted from a spill.

4.3.2 Comment

The commentor requested that downstream water users include more than those with water rights registered with the TNRCC.

Response

Two sources of data were used to identify downstream water users: the TNRCC water rights database and the TNRCC public water supply database. The latter includes a number of users who purchase and use water owned by others. The identification of downstream users presented in Chapter 4 of the draft EA includes users identified from both databases.

Users with riparian rights, not included in either of the above databases, were not identified in the draft EA analyses. These users would typically divert lower volumes of water serving the needs of significantly fewer people than would the users identified from the two databases above.

4.3.3 Comment

Commentor provided data to demonstrate that a number of public drinking water wells listed as "sensitive" in the EA would not be impacted by the pipeline. These include:

City of Bastrop
Aqua Water Supply Corporation
Travis County MUD #2
Manville Water Supply Corporation
Garfield Water Supply Corporation
River Timber
The Colony
Manor
City of Big Lake
City of Grandfalls

Response

EA Contractor staff reviewed the document provided by LBG-GUYTON ASSOCIATES entitled "Contingency Plan for Groundwater Supply Systems Along the Longhorn Pipeline" (see Appendix 9F of the final EA).

The EA has defined a set of evaluation criteria with respect to ground water and surface water that can be used as public water supplies along the Longhorn pipeline route. These evaluation criteria (explained in detail in Section 4.2.1.2.2 of the draft EA) are applied uniformly to all portions of the study area. In keeping with this uniformity of evaluation, the eleven public water supplies listed in the plan were identified as sensitive to potential releases from the Longhorn Pipeline System.

After reviewing the plan, two of the supplies listed were removed from the list as they no longer acquire water resources from supplies that could be affected by a release from the Longhorn Pipeline System. These water supplies are the City of Big Lake (Reagan County) and the city of Grandfalls (Pecos County). The additionally listed water supplies all meet the criteria described in Section 4.2.1.2.2 of the draft EA. These would remain classified as originally published.

In regards to the public water supplies that occur within the Colorado River Alluvium, Carrizo-Wilcox Aquifer, Sparta Aquifer, and Queen City Aquifer in Travis and Bastrop counties, these water supplies have met the evaluation criteria and would be classified. These water supplies are: City of Bastrop, Aqua Water Supply Corporation, Travis County MUD #2, Manville Water Supply Corporation, Garfield Water Supply Corporation and River Timbers; the Colony; and the City of Manor. In response to data presented by other commentors, additional sections of the pipeline over the Carrizo-Wilcox Aquifer and the Colorado Alluvial were uprated to sensitive for potential impacts (see RS 7.14.8).

Many of the public water supplies listed above may not be at risk from releases from the Longhorn pipeline. In many cases, there are insufficient data (i.e., modeling) to conclude that there is not a risk. The evaluation criteria are also intended to be conservative and err (if such error does occur) on the side of caution.

The public water supplies for the City of Eldorado and Upton County Water Supply Corporation are on the Edwards-Trinity Aquifer and meet the evaluation criteria. These supplies are considered potentially at risk to releases from the Longhorn pipeline. The City of Sunset Valley is also potentially at risk to releases from the Longhorn pipeline and is considered sensitive. No changes are made with respect to these supplies.

4.3.4 Comment

Commentor claimed that complete tabulation of private wells along the pipeline is necessary.

Response

This issue is covered in detail in Section 7.12 of this RS.

4.3.5 Comment

A commentor noted that Figure 4-13b of the draft EA did not show any water rights for the western portion of the Longhorn pipeline and questioned the accuracy of the figure.

Response

The databases reviewed (the Texas Water Development Board [TWDB] water rights database and TNRCC public water supply database) show surface water rights in the area covered by Figure 4-13b. None of these rights, with the potential exception of three rights on the Rio Grande near El Paso, are within 60 miles downstream of the Longhorn pipeline. For clarity, rights not downstream of the pipeline are included in the final EA version of Figure 4-13b. In the El Paso area, no continuous streamlines flow from the pipeline to the Rio Grande (roughly 20 miles distant), and it is not clear whether a spill could be transported that distance.

4.4 APPROPRIATENESS OF SUBJECTIVE SCORING METHODS FOR RANKING SENSITIVITIES OF GROUND WATER AND SURFACE WATER RESOURCES

4.4.1 Comment

A commentor asserted that the subjective scoring methods for ranking sensitivities of ground water and surface water resources are misleading, arbitrary, and insufficient.

Response

Prior to project initiation, the study that was generally referenced as the model for this study was the Environmental Impact Statement (EIS) for the proposed All-American Pipeline, performed in 1987. The All-American Pipeline EIS uses almost exclusively qualitative reasoning for the assessment of potential project impacts. Since the date of that study, there has been a radical increase in the amount of potentially relevant spatial data available through public sources (notably Texas Natural Resource Information System, TWDB, and TNRCC). The methodology for this study uses these available datasets.

The basic goals of the developed methodology had to be:

- Efficient with use of all readily available data sources;
- Within the limits of detail imposed by the data sources, differentiate between pipeline reaches in terms of factors typically relevant in human/ecological risk methodology: identification and ranking of receptors in terms of importance, characterization of potential exposure pathways, estimation of duration of exposure;
- Impartial when differentiating, not weighted for or against the proposed action, and readily applied when additional data are considered; and
- Careful and prudent during qualification of report conclusions to not give the impression that the conclusions derive from a level of analysis not performed. Ranking pipeline reaches using traditional terms used in human risk assessment would have been misleading.

The methodology used for ranking sensitivities for ground water and surface water involved essentially the following steps:

- The available data were reviewed and placed within a common spatial database. Technical information relating to the sources and relative importance of the data were reviewed;
- Factors were chosen which were indicative of typical risk study elements. These included,
  - For ground water:
    Hydrogeologic sensitivity: an indirect indicator of rate of transport through an exposure pathway, and of duration of exposure (how easy to remediate?);
    Public water supply: the distance to public water wells, coupled with consideration of the importance of the well field (sizes? sole source?) were indicators of the likelihood of receptor exposure, and of receptor importance.
  - For surface water:
    Ability to transport spill: the size of each stream was used as an indirect indicator of rate of transport along an exposure pathway;
    Ability to isolate the spill for cleanup: location over karst, distance to a lake or river main stem were used as indirect indicators of the potential for blocking the exposure pathway upstream of a receptor;
    Importance as a water source: presence, distance from pipeline and size of downstream public water supply diversions were used as indicators of the likelihood of receptor exposure, and of receptor importance.

Again, these factors were chosen to use the best (most detailed, readily available, most reliable) data to represent the main elements of environmental risk.

In general, the universe of data considered was defined to include relevant receptor data within a conservative distance from the pipeline: 60 miles downstream for surface waters, 25 miles downgradient, and 2.5 miles upgradient for ground waters.

Numerical values were assigned to identify relation sensitivity levels of various river reaches. The lower the assigned valve, the greater the sensitivity. The values were then combined to show aggregations of relative values of overall surface and ground water resources. Since the relative sensitivity values and the aggregate numbers are ordinal and do not reflect quantifiable differences among values (a value of 2 is not necessarily twice as sensitive as that of 1), evaluations cannot be made that would rank any river segment as “twice as sensitive” to another segment.

No relative weight was assigned to compare factors associated with receptors to factors associated with exposure pathways. Reaches with equal scores are assumed of equal sensitivity whether a reach had a higher sensitivity due to exposure path or a higher sensitivity due to receptor characteristics. The most sensitive reaches in the draft EA Chapter 4 rankings had high relative sensitivities in all the chosen factors. For these reaches, assignment of relative weighting (within reason) between factors would likely have had little effect; the same reaches would be defined as the most sensitive intervals.

The rankings arising from the values assignments had to be consistent with the qualitative comments made within the materials reviewed and during public meetings; reaches near sensitive karst and near major public water supply sources needed to be identified as highly sensitive. The process used supported those concerns where data was provided to demonstrate that these sensitive conditions existed. The process has been validated in the comment process, where new data has been provided for some reaches, resulting in changes to sensitivity rankings.

It should be noted that the methodology does not limit the defined extent of sensitive reaches; for example, if karst features were identified near reaches not currently identified as sensitive, the affected reaches would be ranked more sensitive and included in groupings of more sensitive reaches. In other words, the length of reaches defined as more sensitive would expand. In another example, if public water supply wells defined as potentially downgradient were shown by provision of additional data to be clearly upgradient (or otherwise not potentially impacted by a release), then the reach rendered more sensitive by these wells would be downgraded in sensitivity, reducing the length of reaches in the higher sensitivity grouping.

4.4.2 Comment

Several commentors indicated that the text of Chapter 4 (Affected Environment) of the draft EA did not describe how the results are integrated with information provided in other chapters. The commentors also requested clarification of the ranking score sums that were expressed for ground water (aquifers) and surface waters. Specific reference was made to the usefulness of the sum of ranks provided in Table 4-24 of the draft EA.

Response

Chapter 4 of the draft EA provides environmental baseline data from which potential impacts associated with pipeline operations and maintenance (O&M) can be derived, as indicated in Chapter 7. Information in Chapter 4 also directly applies to pipeline segments that are within proximity to sensitive receptors. Those sections of the pipeline route that are in proximity to sensitive receptors were included in the development of mitigation plans that are addressed in Chapter 9. Some of the linkages between Chapter 4 and the rest of the draft EA are described below.

Section 4.1 in the draft EA states that "... human resource analysis identifies segments of the pipeline that were determined to be environmentally sensitive areas due to population density and/or proximity to sensitive land uses and receptors." Section 4.2.1.1 states "Parameters/conditions for each aquifer were investigated to assess the relative sensitivity of each aquifer to contamination from a release of refined petroleum product. Sensitivity is defined both in terms of the relative ability of aquifers to transport contaminants to potential receptors ... and the relative importance of the aquifer as a usable resource…." Section 4.2.2.2 states that "The purpose of this section is to identify sensitive surface water resources along the pipeline route." Section 4.2.3.1 states "For the purposes of this EA, earthquake/seismic hazards are defined as those seismic events that can potentially degrade the capabilities of the System or can cause sufficient damage to the System that may result in a release of petroleum product." Section 4.3 states "Ecological resources pertain to biomes, flora and fauna, and protected species that could be affected by pipeline operations, maintenance, or an accidental release of product."

Information pertaining to ranking of aquifers (Section 4.2.1 and Tables 4-14 and 4-15) and surface waters (Section 4.2.2 and Tables 4-22, 4-23, and 4-24) are explained at length in Sections 4.2.1.2.2 (Identification of Sensitive Intervals), 4.2.1.2.3 (Identification of Sensitive Ground Water Intervals for the Odessa Lateral), 4.2.1.2.4 (Identification of Sensitive Ground Water Intervals for the Austin Re-route Alternative), 4.2.2.2.2 (Identification of Surface Water Sensitivity in Terms of Vulnerability to Spills), and 4.2.2.2.5 (Identification of Sensitive Surface Water Intervals for the Austin Re-route Alternative).

4.4.3 Comment

A commentor stated that the use of the word "significant" in the title of Section 4.2.2.1 of the draft EA was confusing, given the use of the word later, in Section 4.2.2.2.

Response

Section 4.2.2.1 of the draft EA, as noted in the first sentence of the section, is a brief description of "individual major streams" crossed by the pipeline. These qualitative descriptions were intended to provide a brief survey of major channel shapes and bank vegetation along the pipeline route. The streams chosen for description had no effect on the sensitivity rankings developed in Section 4.2.2.2 of the draft EA. A better title for Section 4.2.2.1 would have been “Description of Selected Major Stream Crossings Along the Pipeline Route.” This title is used in the final EA.

4.4.4 Comment

A commentor stated that travel time and dilution ratios are more important for assessing potential impact of a pipeline spill on downstream users than is distance along a river or stream between the pipeline crossing and the water user.

Response

Travel time and dilution ratios were taken into consideration when assessing potential impacts to surface water users in Chapter 7 of the draft EA.

4.4.5 Comment

A commentor contended that DRASTIC is an inappropriate tool for evaluating ground water vulnerability. The DRASTIC score of 110 was an inappropriate threshold for evaluating aquifer contamination potential.

Response

DRASTIC was used not in a strict quantitative manner, but as a guideline on which the evaluation of aquifers was based. DRASTIC was supplemented with published resources (listed in the References section of the draft EA) expert opinion from the Contractor’s staff, consideration of expert opinion from consultants for both the Plaintiffs and Defendants in the Settlement Agreement, and opinion provided during public comment.

The DRASTIC screening value of 110 was chosen because of its foundation in Texas Administrative Code, Title 30, Section 210.23. This value is reasonable, given both the legal precedent and its use to identify ground water resources most vulnerable to contamination. However, the threshold for an aquifer’s relative vulnerability was also based upon other available information and not solely the DRASTIC score.

4.4.6 Comment

A commentor stated the draft EA did not show how the DRASTIC hydrogeologic factors may significantly affect the susceptibility of the aquifer to contamination, and the rate of contamination migration within the aquifer.

Response

The aquifers are described only briefly in Chapter 4 of the draft EA using the EPA (DRASTIC) method for non-karst aquifers and using other means for karst aquifers. Appendix 7A of the draft EA addressed the specifics of aquifer contaminant modeling. It is acknowledged that many variables account for the degree of potential contamination in aquifers and identifies the Edwards Aquifer (BFZ) as the most susceptible aquifer.

4.4.7 Comment

A commentor requested that the description of ground water resources be expanded to include depth of water beneath the pipeline and that depth should be considered in assessing sensitivity.

Response

The ground water depths for aquifers traversed by the pipeline were addressed qualitatively in the individual aquifer descriptions within Chapter 4 of the draft EA. The comment refers to depth-to-ground water data used by the EPA in each aquifer DRASTIC analysis.

The depth-to-ground water within each aquifer varies across each aquifer. The mapping of aquifer depths along the pipeline length would require extensive review of well data and would be unlikely to change the relative sensitivity between different aquifer units. The additional analysis would allow for better identification of sensitivity within aquifer units. Given that the ultimate aggregation of pipeline reaches into three "tiers" of sensitivity used in determining levels of mitigation measures, the real issue is whether the additional resolution in sensitivity is needed. The Lead Agencies do not believe that this additional resolution is needed.

4.4.8 Comment

A commentor requested that inventory data provided by LCRA and others on wells and springs be included in the discussion on affected environment.

Response

These data were considered when studying ground water and aquifers for the EA.

4.4.9 Comment

A commentor wanted to know if the Texas Hill Country, including the Hill Country Priority Groundwater Management area, warranted consideration of risk under criteria more sensitive than Tier 1.

Response

According to the Hill Country Underground Water Conservation District (HCUWC) (Gillespie County), the pipeline traverses karst formations within the Edwards Trinity Aquifer area. Based on data from the best available geologic maps, these areas are defined as karst in the sensitivity rankings presented in Table 4-14. Areas having known karst features in the vicinity of the pipeline were assigned the highest level of sensitivity. Where new information on karst or other aquifer features has been provided, the final EA is being updated.

A designation of the area as Priority Groundwater Management Area (PGMA) by the Texas Water Development Board does not change the sensitivity of the area per the method applied in the draft EA. This PGMA designation is part of the Senate Bill 1 planning process that is currently in process. The PGMA designation deals primarily with water supply issues in rural areas or areas of rapidly growing population. The designation is an indicator of the importance of the aquifer in the region, but this importance is assessed independently within the EA analysis by proximity of the pipeline to existing public water supply wells.

4.4.10 Comment

A commentor stated that the qualitative discussion of the magnitude and time scale of ground water contamination in the draft EA is insufficient and “idle speculation.”

Response

What may appear to have been “idle speculation” represents conservative judgments regarding the transport, contaminant concentrations, and duration of contamination that may occur from a gasoline spill. For example, numerous assumptions regarding volume of spill entering a formation, hydraulic characteristics of formations, volumes of ground water and ground water gradients in specific portions of aquifers, generic locations of recharge and discharge features, and other gross oversimplifications can be made.

Attempts to further quantify these factors could imply a false level of certainty without detailed site specific testing being performed at every point of possible concern along the pipeline. Therefore, the draft EA relied on the conservative statements such as, "karst terrain is very sensitive to long-term impacts to ground water quality from large leaks…," "In karst, a larger leak is judged to have potentially serious long-term consequences…," "contamination is likely to remain in the aquifer for a considerable period of time, and be resistant to treatment or removal by mechanical means."

For this reason, the potential for impact to public water supplies (PWS) along the pipeline, requires more specific mitigation measures where PWS wells are as far as 25 miles in karst areas.

4.4.11 Comment

A commentor stated that failure to provide quantitative information on the potential migration of gasoline and crude oil from a pipeline spill in vadose and saturated zones made it impossible to assess the effects of the proposed pipeline operation.

Response

As discussed in Chapter 7 of the draft EA, accidental gasoline spills from the pipeline could pass through the vadose and saturated zones and migrate in ground water bearing aquifer formations. Once it has been determined that it is possible that ground water supplies could be rendered non-potable from a pipeline spill, it was not necessary to quantify the degree of contamination for all possible locations and spill scenarios.

4.4.12 Comment

A commentor noted that the comparison of aquifers crossed by the proposed pipeline alignment and the Aquifer Avoidance/Minimization (AA/M) route does not include the total mileage of each aquifer crossed.

Response

The commentor is correct. This omission does not affect the comparative analyses of the AA/M Route versus the existing route. It is noted in the draft EA that the AA/M Route poses less potential for major impacts to sensitive aquifers.

4.5 CONCERNS REGARDING SPECIFIC AQUIFER DELINEATION AND AQUIFER SENSITIVITY RANKINGS BASED ON TECHNICAL CRITERIA

4.5.1 Comment

Commentors questioned the accuracy and resolution of the aquifer delineation and aquifer sensitivity rankings in the draft EA.

Response

In general, the aquifers were delineated based upon geospatial data provided by the TWDB and the University of Texas - Bureau of Economic Geology (BEG). In the case of the Edwards Aquifer (BFZ) area, the aquifer recharge zones were delineated based upon geospatial data provided by the US Geological Survey (USGS) and the Barton Springs/Edwards Aquifer Conservation District. The methodology used for determination of aquifer sensitivity rankings is presented in Section 4.2.1 in the draft EA.

4.5.2 Comment

A commentor stated the draft EA was inadequate because Section 4.2.1.1.3 did not contain a discussion about the uses of specific aquifers listed by the commentor.

Response

Section 4.2.1.1.3 of the draft EA is not intended to be an in-depth description of all the aquifers along the Longhorn pipeline route. This section lists only the more sensitive ones. Hueco-Mesilla Bolson is not listed because this aquifer system is minimally susceptible to contamination by the Longhorn pipeline.

4.5.3 Comment

A commentor stated that the draft EA is flawed because different methodologies were used to determine aquifer sensitivities at different points in the pipeline.

Response

The EPA DRASTIC model for assessing sensitivity of ground water resources was applied to the assessment of all non-karst hydrogeologic environments crossed by Longhorn. DRASTIC is not an applicable tool for use in areas of karst geology. In areas of karst geology, an assessment method designed to deal appropriately with the unique hydrogeologic properties was used. The DOT method for assessing sensitivity of ground water resources, by identifying

Unusually Sensitive Areas, is based upon an EPA publication previously referenced in the draft EA as "Pettyjohn and others, 1991."

4.5.4 Comment

Commentors stated an intuitive belief that the Hueco-Mesilla Bolson Aquifer should be considered highly sensitive.

Response

The draft EA classification of the Hueco-Mesilla Bolson Aquifer is consistent with the ranking protocol. The Mesilla Bolson Aquifer that lies in the Mesilla Valley west of the Franklin Mountains in El Paso County is not a consideration in this EA as the Longhorn pipeline route does not overlie it. The Hueco Bolson Aquifer, while underlying the Longhorn pipeline route, is not considered particularly sensitive to the pipeline because the pipeline does not traverse the Mesilla valley and underlying bolson deposits, and the Hueco Bolson Aquifer is minimally susceptible because the pipeline terminates some 10 miles east of the foot of the Franklin Mountains (the principal recharge zone of the Hueco Bolson Aquifer) in El Paso County. The portion of the Hueco Bolson Aquifer occurring under the Longhorn pipeline route is under artesian conditions and is protected by at least 300+ ft of overlying playa deposits. A release of refined petroleum product in this area could quickly be remediated before any significant risk to the aquifer occurs.

4.5.5 Comment

A commentor contended that the statement in the draft EA concerning the development of deep soils as a factor in retarding the migration of contaminants from a pipeline accident to the Simsboro Formation of the Carrizo-Wilcox Aquifer is unfounded.

Response

The nature of soils over the Simsboro Formation of the Carrizo-Wilcox Aquifer is discussed in detail in Appendix 7A of the draft EA. It is not necessary to quantify the retarding effects of soil on gasoline transmissivity through physical process simulation in order to qualitatively note that deep soils would reduce the risk of significant contamination of the aquifer.

4.5.6 Comment

A commentor requested an evaluation of potential impacts on Carrizo-Wilcox Aquifer and future water supply wells located downdip of the recharge area for the Simsboro Formation. The commentor also addressed the appropriateness of the recommendation that Tier 2 mitigation is warranted for the area adjacent to pipeline as well as the installation of control valves where the pipeline crosses the Simsboro Formation recharge area and main distribution lines.

Response

The additional data provided with comments received include an inventory of over 900 privately-owned wells along the pipeline route (supplied by the Lower Colorado River Authority [LCRA]) and a modeling study of the Carrizo-Wilcox Aquifer. This recent modeling study, conducted by BEG for the TWDB is entitled "Assessment of Groundwater Availability in the Carrizo-Wilcox Aquifer in Central Texas-Results of Numerical Simulations of Six Groundwater-Withdrawal Projections (2000-2050)."

These additional data were reviewed in the context of the sensitivity ranking factors for ground water presented in Table 4-14 of the draft EA. Based on this review and the additional changes, some changes to Table 4-14 are warranted.

- In the reach from Milepost (MP) 125.6 to MP 157.7, a series of public water supply wells owned by the Aqua Water Supply Corporation were identified within 2.5 miles of the pipeline. This information raised the proximal (to water supply) sensitivity rankings of these reaches to sensitive.
- In the reach from MP 127.5 to MP 128.9, there is an apparent outcrop of the Sparta Aquifer. This information raised the hydrogeologic sensitivity ranking of this reach, which had previously not been characterized as associated with an aquifer, to sensitive.

These changes are reflected in the revised Table 7-1 in Appendix C of this RS and the final EA.

4.5.7 Comment

A commentor stated that the Hickory Aquifer is not "generally associated with the Cap Mountain Limestone," but with the Hickory Limestone.

Response

The sentence has been changed to read: "The Hickory Sandstone outcrops are also generally associated with the hydraulically connected Cap Mountain Limestone Member of the Riley Formation."

4.5.8 Comment

A commentor considered a spill anywhere in the Barton Creek watershed as a risk to the Edwards Aquifer and stated that the draft EA did not provide information regarding methods to identify areas with the highest potential for contamination.

Response

Appendix 7D of the draft EA provided an explanation of the methodology used to identify areas with the highest potential for contamination of the Edwards Aquifer through overland flow to a creek in the contributing zone. A spill of refined product is more likely to flow to a creek, and thereby to the recharge zone, if one of the following criteria is present: the distance from the pipeline to a surface water body is short; the gradient between the pipeline and the surface water is steep; or the spill occurs in an urbanized area where streets and storm drains could more rapidly transport the spill to a stream.

In addition, the distance from where the spill enters the stream to the point where Barton Creek enters the recharge zone and the flow characteristics of the stream and of Barton Creek would both affect the amount of contamination that could eventually reach the recharge zone in the case of a spill. All of these factors are reflected in the overland flow ranking in Appendix 7D.

4.5.9 Comment

Outcrops in Boggy Creek under the pipeline, in the Georgetown Formation, represent another segment of highly vulnerable recharge features for the Edwards Aquifer (BFZ).

Response

Investigation shows a portion of Georgetown Formation outcropping east of Davis Hill, but in an area to be covered by newly installed pipeline meeting standards for aquifer protection approved by FWS.

4.6 NEED FOR ADDITIONAL DATA COLLECTION OR GREATER CONSERVANCY WITH RESPECT TO KARST TERRAIN

4.6.1 Comment

A commentor asserted that in order to fully understand the sensitivity of specific portions of the Edwards Aquifer, there is a need for additional data collection or greater conservancy with respect to karst terrain. The commentor further stated that it is impossible to adequately characterize transport without site specific data and to be fully aware of all potential environmental receptors and pathways including springs, caves, recharge features.

Response

A conservative approach is adopted with respect to evaluating the sensitivity of karst terrains (or potential karst terrains).

However, additional inventories and modeling of water supply receptors (wells, springs, and surface water) could aid in providing focus for assigning the most appropriate sensitivity classification to each interval along the Longhorn pipeline route by providing a quantitative assessment of the potential level and duration of contamination possible for each receptor. In the case of karst terrain, this would likely result in the need for detailed site specific study of each location, because very conservative assumptions would need to be made to assess the potential for impacts to a wide range of features. This loss of resolution would provide data which is not more valuable than the qualitative assessment provided. In the absence of these models, the draft EA preferred to extend the potential zone of impact to a 25-mile wide band, which was considered to be a conservative approach to the analysis.

4.6.2 Comment

A commentor said that localized aquifer porosity and known cave and karst feature location data should have been catalogued as criteria for rating karst aquifer sensitivity.

Response

The data of known cave and karst features were used as a guideline for supporting existing knowledge of potentially karsted areas. A lack of data was not taken to mean that the area was not sensitive. The evaluation was based on published data, and not a field study to collect new data on karst features.

4.6.3 Comment

A commentor stated that modeling of ground water velocities developed by the USGS for Edwards-Trinity Aquifer as part of the Regional Aquifer-Systems analysis program is unsuitable for karst flow in the recharge and discharge zones of the aquifer. The commentor said the draft EA should determine or estimate potential flow rate ranges in these areas.

Response

Ground water velocities from USGS modeling were used to reflect the potential for long-term movement of refined product and contaminated ground water within the Edwards-Trinity Aquifer. It was not intended as a guarantee that no wells would be impacted more rapidly than the time period implied by the velocity estimates. Determination of this velocity and travel time for any specific point along the pipeline would require localized dye testing. Where available, dye-testing results were incorporated into the draft EA. In the absence of the specific dye testing results, it is assumed that wells within a 2.5-mile band could be impacted by a pipeline release.

4.6.4 Comment

A commentor contended that Section 4.2.1.2.2 of the draft EA provided incorrect hydrogeologic criteria for rating karst aquifer sensitivity, and that the approach to identifying sensitivity by proximity to known karst features in the draft EA biases the sensitivity downwards.

Response

The draft EA utilized cave and karst feature location data provided by the Plaintiffs, by Longhorn consultants, and independently from the Texas Speleological Society. All potential karst areas were treated very conservatively for assessing potential ground water quality impacts in the impacts assessment portion of the draft EA (see Chapter 7 of the draft EA).

4.6.5 Comment

A commentor said that the draft EA should not have delineated sensitivity across the Edwards Aquifer (BFZ). The entire Edwards Aquifer Recharge Zone should be considered hypersensitive and not just the limited sections identified in the draft EA.

Response

The evaluation criteria in this EA are designed to assess the ground water resource sensitivity and rank them accordingly. Even within the Edwards Aquifer (BFZ) Recharge Zone, some portions, based upon their hydrogeologic characteristics, are more sensitive than others (for example, Kirschberg Evaporite Member as opposed to Basal Nodular Member). All possess a high degree of sensitivity, but some of these hydrogeologic units are more sensitive than others. The evaluation criteria are defined in Section 4.2.1.2.2 of the draft EA.

4.6.6 Comment

A commentor stated that the draft EA does not provide sufficient information to support the position that the Trinity Aquifer is non-sensitive. Additional study is needed before deciding that the area is not sensitive.

Response

In evaluating the Trinity Aquifer, it is not intended that the aquifer be characterized as not sensitive. This aquifer is simply not as sensitive as areas within the Edwards Aquifer (BFZ) and Edwards-Trinity (Plateau) aquifers that exhibit karst terrain. Although an area may be hydrogeologically sensitive, the "lack of proximal water supplies" was used as a criteria for determining overall sensitivity of the aquifer with respect to drinking water impacts. Areas where public water supplies could be impacted are viewed as having higher sensitivity than areas where only a limited number of privately owned wells may be impacted.

4.6.7 Comment

A commentor was concerned that the source and reasoning for the draft EA considering the Washita Group Limestones as karst areas was not provided.

Response

Identification of potentially karsted areas is based upon previously listed sources as the best available information at the time of the preparation of this EA. The reference to the Washita Group Limestones is provided by Barker and Ardis, 1996. For the purposes of this EA and for the sake of providing a conservative evaluation, it was decided to include the Washita Group Limestones as potentially karsted units, although little karst feature data was available.

4.6.8 Comment

A commentor requested clarification of the scoring of karst vulnerability in the draft EA.

Response

The draft EA recognized the uncertainty associated with these types of aquifers. For this reason, the karst aquifers were assigned the most sensitive ratings.

Pipeline intervals were assigned sensitivities appropriate to the hydrologic characteristics of the area (both surface water and ground water) and the proximity of the Longhorn pipeline to public water supplies.

These scoring criteria ranked the hydrogeologic sensitivity of ground water resources relative to each other, not as an absolute value. As such, they were used to assist in identifying where along the pipeline a release could cause a significant impact, including contamination of public drinking water supplies to levels that exceed standards and advisory levels.

4.7 NEED TO DELINEATE WELLHEAD PROTECTION AREAS

4.7.1 Comment

A commentor contended that delineation of wellhead protection areas is necessary to completely assess potential environmental and human health effects of the pipeline.

Response

A wellhead protection area is designated by state resource agencies to indicate protective zones around water wells. They are usually only a few hundred feet. Delineation of wellhead protection areas along the pipeline is unnecessary. The draft EA relied on use of conservative distances for the potential travel of contaminants from a pipeline spill to identify public water supplies which may be impacted by an accident. Wellhead protection areas could provide additional resolution as to which private well users could be impacted by an accident. Mitigation measures have been designed (Appendix 9C of the final EA) to address impacts to private well owners.

4.8 GENERAL COMMENTS RELATED TO SURFACE WATERS

4.8.1 Comment

A commentor questioned a statement in the draft EA and asked if tributary flow and lakes were considered with regard to downstream water users.

Response

The commentor is correct. The statement in the draft EA that said, "Where a creek is tributary to a water right, the downstream water right does not appear on the table" is incorrect. This is corrected in the final EA. Tributary flows into a stem were considered as can be seen by a review of the water rights tabulations for creeks tributary to rights along the Pedernales River and to the Llano River. Lakes were considered in the right two columns of the table, and the distances to these lakes (and their rights) have a prominent place in the assignment of sensitivities to these creeks.

4.8.2 Comment

A commentor said that transport modeling should be performed on all streams crossed by the Longhorn pipeline including those in west Texas.

Response

The more detailed modeling was performed for selected streams where a spill was deemed a potential threat to a surface public water supply source. As shown in Table 4-20 of the draft EA, there were no major surface water rights or surface public water supply sources identified downstream of stream crossings west of Antelope Draw (MP 334.3).

4.8.3 Comment

A commentor said that additional factors should have been considered with respect to stream isolation potential.

Response

The factors chosen for ranking ability to isolate a spill include (1) location over sensitive aquifers, (2) whether the stream is perennial or intermittent, and (3) distance to a river main stem. These last two factors are highly related to the factors used for the ability to transport a spill. The use of a separate category for "ability to isolate a spill" was intended as a recognition that the relative probability of a contaminant reaching a receptor is a function not only of relative locations of the source and receptor, relative speeds of travel, but also of the relative probability of being able to isolate the spill prior to its reaching the receptor. The necessity for the two factors is highlighted by the following: if ability to transport a spill alone were considered, then relative differences in threats to surface waters between spills on small tributaries 20 miles from a river main stem (or lake) would not be differentiated from spills on similarly small tributaries 500 ft from a river main stem (or lake).

4.8.4 Comment

A commentor observed that identification of sensitive surface water resources in Section 4.2.2.2 relied on criteria which were somewhat modified by modeling studies and impact analyses documented in Chapter 7 and the Chapter 7 appendices of the draft EA. The commentor questioned if this modification required a reassessment of stream sensitivities presented in this section.

Response

Information presented in Chapter 4 of the draft EA represented a cataloguing of the available data on environmental conditions and potential receptors. The actual assessment of impacts was conducted in Chapter 7. The commentor is mixing the concept of stream sensitivity and impacts analysis. Assessment of potential impacts to ecology along streams is included in Chapter 7.

4.9 CONCERNS REGARDING SPECIFIC SURFACE WATER RESOURCES

4.9.1 Comment

A commentor questioned why some of the streams discussed in Chapter 4 are not discussed in terms of natural regions within the area and why White Oak Bayou is listed as one of the 10 most ecologically sensitive crossings, but not included in summary tables in Chapter 4 with the other 68 stream crossings.

Response

Major streams that are crossed by the pipeline and natural regions along the pipeline corridor are depicted on Figure 4-15 and noted on a table of "Ecologically Important River Crossings and Associated Natural Regions" on Page 4-57 of the draft EA. As noted on the map and in the table, many rivers cross more than one natural region.

White Oak Bayou was included as an ecologically important surface water feature (page 4-57) because it represents one of three major rivers in the Gulf Prairies and Marsh Natural Region. The water feature was not noted on Table 4-17 (Summary of Pipeline Stream Crossings and Upland Watersheds) because the crossing, which is within an urban area, has been channelized and because the surrounding watershed is minimal.

4.9.2 Comment

A commentor said that the draft EA should have considered factors such as type of soil and water table conditions as well as differing wind, temperature, and climactic conditions for contaminant plume spread on the Colorado River and its tributaries.

Response

Conservative assumptions were made for each of these factors in order to screen for the highest potential impacts from a pipeline accident. In assessing potential runoff from soils, it was assumed that high water tables and rocky soils, where no contradictory data were available, would exacerbate runoff of gasoline from a spill. In assessing the potential for ground water contamination, it was generally assumed that the spill could be transported to an aquifer. For modeling the transport of a contaminant plume on the Colorado River and its tributaries in order to simulate winter conditions when volatilization of gasoline constituents would be retarded, water temperatures were set at 50°F; air temperatures at 40°F; and wind velocities at 10 mph. During the rest of the year, higher temperatures in the water and air would cause a more rapid loss of benzene and MTBE from the water column to the air.

4.9.3 Comment

A commentor noted that distances of 40 and 75 miles were used to rank sensitivity of municipal surface water diversions. The commentor also claimed that the modeling in Appendix 7D of the draft EA indicated that significant impacts would occur more than 100 miles downstream from a major pipeline accident on the Colorado River.

Response

Appendix 7D of the draft EA indicated that concentrations of MTBE in surface waters could exceed the advisory limit of 20 parts per billion (ppb) for a period of 20 hours at distances of 100 miles downstream from the pipeline crossing of the Colorado River. Because of its short-term effects, this was not considered potentially significant.

4.10 NEED TO TAKE INTO ACCOUNT THE CITY OF AUSTIN WATERSHED PROTECTION LAND

4.10.1 Comment

A commentor expressed concerns that the newly announced City of Austin Watershed Protection Land purchases and easements were not identified in the draft EA.

Response

The location of the City of Austin watershed protection purchases and easements were not available at the time the draft EA data were being collected. It is appropriate to specify these locations along the pipeline as sensitive and require Tier 2 levels of mitigation.

Using geospatial data provided by the City of Austin, the existing pipeline and the proposed Austin Re-route Alternative were plotted to determine the location of watershed protection parcels with respect to the pipeline. Three separate parcels of land purchased for watershed protection are crossed by the current pipeline alignment. These segments are between MP 173.33 - MP 173.63, MP 176.34 - MP 177.03, and MP 177.90 - MP 178.41, for a total of 1.5 miles. However, most of this was already defined as sensitive leaving only 0.5 miles of pipeline corridor changing from Tier 1 to Tier 2. Four separate parcels are crossed by the Austin Re-route Alternative routing, between MP 15.25 - MP 16.40, MP 16.56 - 16.60, MP 17.95 - MP 18.75, and MP 20.33 - MP 21.04.

4.11 NEED TO DELINEATE WETLANDS ALONG THE PIPELINE

4.11.1 Comment

Commentors asked why wetlands along the pipeline corridor were not addressed in the draft EA.

Response

The final EA includes an inventory of wetlands present within 1,250 ft of the pipeline from Houston to El Paso. This inventory shows that 951 wetlands, consisting of nearly 4,420 acres are present within the corridor. None would be affected by planned future construction or normal pipeline operations. The wetland analysis is provided in Appendix 4G of the final EA.

4.11.2 Comment

Commentors indicated that wetlands along the pipeline ROW should have been delineated and designated as sensitive. Commentors also wanted to know whether emergency plans are in place if a spill were to affect a wetland.

Response

Wetlands along the pipeline corridor were not identified (other than designated river and stream crossings) in the draft EA. For the final EA, wetlands were inventoried and analyzed in

Appendix 4G. Potential impacts to wetlands associated with new facilities construction (i.e., pump station development) would be addressed on a case-by-case basis and carried out in accordance with Section 401 of the Rivers and Harbors Act and Section 10 of the Clean Water Act. If an accidental release of product were to impact a wetland, cleanup and restoration would be carried out in accordance the US Army Corps of Engineers, US Fish and Wildlife Service (FWS), Texas Parks and Wildlife Department, TNRCC, and other agency requirements and oversight. See also draft EA Section 2.5.8 for discussion of emergency response preparedness plans.

4.12 NEED TO DELINEATE FLOODPLAINS ALONG THE PIPELINE

4.12.1 Comment

Commentors wanted to revise the EA's evaluation of floodplain impacts as a result of mitigation modifications to the pipeline in accordance with applicable floodplain requirements.

Response

In carrying out the mitigation commitments, Longhorn or its contractors may require floodplain permitting. The mitigation commitments proposed for select portions of the pipeline include pipeline replacement, upgrading of pipeline spans, removal of encroachments, clearance of the ROW, placement of new control valves, and other new construction that could potentially impact a federal or local regulatory floodplain. Flood issues related to threats to the pipeline, including scour, erosion, and buoyancy, are addressed in Chapters 6 and 9 of the final EA.

4.13 ISSUES RELATED TO AMBIENT WATER QUALITY

4.13.1 Comment

Commentors contended that their trend analyses of nutrient inflows to the Gulf of Mexico conflicts with the study quoted in the draft EA, which states that flow adjusted nitrogen and phosphorus concentrations in the lower Colorado River (at Wharton) are increasing. LCRA's trend analysis states that some downstream tributaries—Cummins, Gilleland, Bull, and Barton creeks, show an increase in nutrients.

Response

The data source cited in regard to water quality trend analyses (Schertz et al., 1994) was a USGS study for water years 1974 - 1989. In this regard, the draft EA was referencing trend analyses that did not cover the years in question by LCRA (1988 - 1998). Because these data are not critical for assessing significance of identifying sensitive areas, they would not be updated.

4.13.2 Comment

A commentor said that although useful in characterizing the nature of the stream, the information in draft EA Section 4.2.2.1.3, Water Quality Downstream of Pipeline Crossings, is not relevant to impacts from a petroleum pipeline. The commentor suggested that the section should include natural or ambient concentrations of petroleum compounds in streams affected by the Longhorn pipeline and regulatory maximum allowable levels of these compounds.

Response

Natural or ambient concentration values for petroleum products are difficult to define without conducting extensive sampling due to the fact that there are many components that contribute to a concentration of "total petroleum hydrocarbons (TPH)." For example, the USGS has established "background" or "naturally occurring" concentrations of inorganic compounds, but this has not been accomplished for many organics.

The TNRCC has recently published its new Texas Risk Reduction Program rule that addresses potentially contaminated sites via risk-based cleanup standards. Within that rule, there are several examples of risk-based concentrations for the various fractions making up what could be reported as TPH. However, individual components within gasoline, for example, may have risk-based cleanup levels established. There are, however, no regulatory levels for naturally occurring petroleum products other than the EPA's drinking water standards which cannot be applied in all situations.

4.13.3 Comment

A commentor suggested that the EA expand and modify Section 4.2.2.1.3 of the draft EA to take into account existing petroleum contamination of streams and water bodies.

Response

The estimation of the ambient baseline condition of the relevant streams in terms of petroleum-related contamination is difficult, given the available data. A search of the EPA STORET database for the pump stations presented in Table 4-18 of the draft EA does not identify analyses for the constituents associated with gasoline or other petroleum products. No analyses were identified for benzene, polynuclear aromatic hydrocarbons, total petroleum hydrocarbons, or methyl tertiary-butyl ether (MTBE). There are data for these pump stations for total organic carbon (TOC). TOCs are a measurement of organically bound carbon and include sewage and other organic effluent-related carbon compounds in addition to compounds associated with petroleum products.

A summary of TOC analyses for the STORET stations is provided in Chapter 4, Table 4-18b of the final EA. The contamination sources of the TOCs for the stations with higher values cannot be estimated without further testing to differentiate between petroleum hydrocarbon-related sources and other sources.

Sources other than the EPA STORET database may be available for petroleum-related analyses of select streams within the study area. It is unlikely that such data exist for the full range of streams crossed by the pipeline, making relative evaluation of existing ambient condition difficult to perform for the full length of the pipeline.

4.14 NEED FOR DETAILED SCOUR DATA

4.14.1 Comment

Commentors stated the Settlement Agreement requires that stream scour be addressed as part of the EA rather than after the EA decision.

Response

The Lead Agencies agree. Longhorn commissioned a scour study that was completed in February 2000 and is summarized in Appendix 9E of the final EA.

4.14.2 Comment

Commentors contended that scour estimates in Table 4-17 were insufficient for judging stream sensitivity.

Response

The purpose for the presentation of scour estimates in Table 4-17 of the draft EA was to provide some information as to the likely relative depth of flood scour at stream crossings for the numerous crossings along the pipeline route. The estimates were intended to aid the identification of crossings for further study, and not presented or intended as an absolute estimate of scour (i.e., an estimated depth of scour in feet). The table addresses relative risk of scour only, not the risk of pipeline exposure, because the depth of pipeline at each of the crossings was unknown. The inadequacy of these estimates for evaluation of acceptable risk at individual crossings was recognized by the addition of Longhorn Mitigation Commitment 19 to study in more detail scour and erosion along the pipeline.

The "Scour Risk" per United States Bureau of Reclamation estimates in the table were derived from a combination of empirical equations in two references (Pemberton, 1984; and Hedman and Osterkamp, 1982). Both equations were themselves derived from data collected on western alluvial streams, not strictly applicable to the range of conditions present at Longhorn pipeline crossings. Essentially, relative risk is estimated as a power function of the flood flow rate, which was deemed reasonable for development of "first-cut" relative scour rankings.

The flood flow rate at each crossing was derived using recently derived empirical relations (Asquith, et. al, 1997; Asquith, 1998; Asquith, et. al, 1996; Rines, 1998) that generally use such inputs as basin area, shape factor, and basin slope. Two empirical equations were combined to estimate scour from the flood flow rate:

From Hedman and Osterkamp, 1982:

$Q_2 = 7.8W_{AC}^{1.7}$, where Q_2 is the 2-year flood, and W_{AC} is the active channel width

$Q_{100} = 370W_{AC}^{1.5}$, where Q_{100} is the 100-year flood

From Pemberton, 1984:

$d_s = 2.45\ (Q/W_{AC})^{0.24}$, where d_s is the estimated depth of scour

The combined equation:

$d_s = 3.3\ Q^{0.1}$ for the 2-year flood
$d_s = 9.1\ Q^{0.08}$ for the 100-year flood

Units of scour depth were not presented in Table 4-17 and are not appropriate to present, given the rough nature of method used.

The relative scour estimates in Table 4-17 were not used in the ranking of sensitive areas for surface water presented in Chapter 4 of the draft EA. It was clear that scour needed to be addressed in more detail in future studies as part of mitigation (see Appendix 9D of the final EA for the Longhorn Scour Study). The EA and its recommended mitigation show agreement with the commentors that "the risk potential [of scour at tributaries, to include those in the Hill Country] should be well understood and actions taken to mitigate such."

4.14.3 Comment

Commentor stated that statements about trees lining the stream bank "which help to prevent erosion" are misleading; stream bank erosion in this section of the river is a significant problem, drawing the attention of the US Army Corps of Engineers at Smithville.

Response

The description of the Colorado River environment in the EA states that "River banks are lined with willow, cottonwood, elm, and sycamore which aid in bank stability and provide cover for fish." This is a general statement meant to illustrate the nature of river conditions. The riparian habitat described is typical of various regions along the Colorado River.

4.15 NEED TO ASSESS ALL FLORA AND FAUNA THAT MAY BE IMPACTED BY A PIPELINE ACCIDENT OR BY CONSTRUCTION OR MAINTENANCE

4.15.1 Comment

The commentor, referring to page 9 of the draft EA Executive Summary, said that the draft EA should address species on an ecosystem-wide basis, rather than addressing only threatened or endangered species. The commentor also suggested that the potential adverse effects should include flora, fauna, and human inhabitants.

Response

Ecological resources are briefly addressed on page 9 of the Executive Summary. This section highlights ecological regions crossed by the pipeline and addresses the threatened and endangered species evaluated in the draft EA. Additional information pertaining to terrestrial and aquatic resources that could be affected by a release of product is provided in draft EA Chapter 4, Section 4.3.1 and Section 4.3.2, respectively. Potential impacts to flora and fauna, associated with ROW clearing and new construction, are addressed in draft EA, Section 7.6.

A release of product to a river would likely affect fish. Potential impacts to predator species that are related to bioaccumulation are addressed in Section 7.5.2. Although not expressly stated in the draft EA, it is acknowledged that the loss of game or non-game species would directly and indirectly affect the food web of the region and ultimately, possibly, human populations.

4.15.2 Comment

Commentors indicated that rare species (also known as "other species of concern") were not given sufficient attention in the draft EA or the Biological Assessment (BA).

Response

The draft EA lists all species of concern that are known to be within counties that are crossed by the pipeline. The list (provided as Table 4E-1) includes approximately 215 species of concern. Although state-listed threatened or endangered species are protected under state regulations, discussions with Texas Parks and Wildlife Department personnel during initial project phases indicated that a matrix listing (as presented in Table 4E-1) would meet project needs. Species of concern that were evaluated in detail were originally limited to those that have been listed by the FWS as either threatened or endangered. This has been updated in the Phase I and II BAs to meet FWS concerns over additional species which may be impacted.

4.15.3 Comment

Commentors stated that there are only five fish species listed under aquatic organisms that could be affected by a release of product and that environmental damage resulting from a spill would be greater than the limited number of fish species listed.

Response

Table 4-29 of the draft EA identifies species that are common to the Colorado River and other rivers. A discharge of gasoline to surface waters could affect a wide variety and number of species, as described in Section 7.4.2.1 of the draft EA. The extent of such impacts that could result from a gasoline spill could affect a wide variety of species within the food web.

4.15.4 Comment

A commentor inferred that the designation "Critical Habitat" automatically means that management of those areas within the designated area is vital to the enhancement of the subject species (in this case, the Houston Toad). The commentor also stated that habitat that is "fragmented and marginal" may deserve greater protection, because it could be more sensitive to impacts associated with a pipeline release. Commentors indicated that consultation should be underway with the FWS to address potential impacts to threatened and endangered species and mitigation measures that can be implemented to alleviate the severity of such impacts.

Response

The draft EA provided insights into impacts on threatened and endangered species which are the responsibility of the FWS. Protection for threatened and endangered species was determined by FWS, which is included as part of the Phase I Biological Opinion (BO) and Phase II Concurrence Letter.

4.16 COMMENTS REGARDING SPECIFIC ECOLOGICAL RESOURCES THAT COULD BE AFFECTED ALONG THE PIPELINE

4.16.1 Comment

A commentor believed that potential impacts to threatened and endangered species was understated in the draft EA and the BA.

Response

A 100-ft-wide "buffer zone" was used to analyze potential impacts to the Golden-cheeked Warbler and Black-capped Vireo to represent a reasonable distance from which equipment-generated noise would disturb nesting pairs. However, such impacts could only occur during the spring and early summer. Potential numbers and sizes of spills are addressed in Chapter 6.0 (Overall Pipeline Risk Assessment) of the draft EA. Potential loss of habitat that would result from an accidental release of product cannot be estimated due to the large number of variables associated with location, local topography, local geology and soils, and release volumes. Potential flow pathways that would be associated with crude oil or gasoline would be similar. Technical data developed for the revised BA have been sufficient to satisfy requirements of the FWS to enable the agency to issue a Phase I BO for construction and maintenance and a Phase II Concurrence Letter related to potential pipeline accidents.

4.16.2 Comment

Commentors indicated that insufficient attention was given to the unique habitat and resources that are present in the Lost Pines subregion and that the area is the extreme range of several species of birds. Commentors also believe that insufficient information and attention was given to address the importance of the Colorado River to migratory waterfowl and raptors.

Response

The Lost Pines subregion provides unique habitat for numerous rare endemic species, and the Colorado River is important to the Bald Eagle, Osprey, and numerous other avian species. A release of product contaminating the subregion or the river could adversely impact avian, terrestrial, and aquatic species.

Species of concern that could be affected were compiled from listings provided by Texas Parks and Wildlife Department (TPWD). Federally-listed and state-listed threatened or endangered species that are known to occur in Bastrop County and may be affected by a release of product are listed in the draft EA in Table 4-30, and habitat requirements are provided in Table 4-31. As reported in Table 4-30 of the draft EA, TPWD records indicate that three federally-listed species are known to occur in the county. A total of 16 species of concern that are known to occur in the county are listed in Appendix Table 4E-1. Although such species as the Pine Warbler, Pine Siskin, Pileated Woodpecker, Black-bellied Whistling Duck, Green Kingfisher, and Osprey may be present in Bastrop County, they are not listed on the TPWD Annotated County List of Rare Species for the county.

4.16.3 Comment

Commentors expressed concern that potential impacts associated with a fire within Bastrop State Park and/or Buescher State Park were not addressed. The unique biological resources of the parks and their dependence on ground water also was not addressed.

Response

A fire associated with an accidental release of product from Longhorn pipeline could result in far reaching detrimental impacts to Buescher State Park. The potential for fire in the Lost Pines subregion currently exists due to many human and natural factors. A major gasoline release from a pipeline accident could obviously increase the risk and potential magnitude of a fire until remediation takes place.

As reported in the draft EA, TPWD records indicate 16 species of concern to be within the county. Although the following species may be present in Bastrop County, they are not listed on the TPWD Annotated County List of Rare Species: Pineywoods Dropseed; Hairyawn Muhly; Cliff Chirping Frog; Pileated Woodpecker; Pine Warbler; Kentucky Warbler; Hooded Warbler; Swainson's Warbler; Southern Short-tailed Shrew; Elliot's Short-tailed Shrew; and several Tiger Beetles. These and other species were not listed in the draft EA because they were not federally listed by the FWS as either threatened or endangered.

4.16.4 Comment

Commentors indicated that the BA does not address specific species recovery plans and that additional surveys are needed for Texas Prairie Dawn, Navasota ladies'-tresses, and Houston Toad.

Response

Consistency with species recovery plans is addressed in FWS consultation requirements, as defined in the Endangered Species Act. The FWS has concluded that the Phase I and II BA's address these issues.

4.16.5 Comment

A commentor indicated that information provided in the draft EA and the BA is conflicting and inconsistent. Furthermore, the commentor said the text should describe the evaluation for each species and include quantitative information for calculating the percentage of species and habitat affected along pipeline segments. Specific examples cited relate to potential effects to the Barton Springs Salamander, the Pecos Pupfish, and the Devil's River Minnow.

Response

The BA that was provided in the draft EA represented an initial review of species that potentially could be affected by Longhorn pipeline operations, maintenance, or a release of product. The BA was revised subsequent to issuing the draft EA on October 15, 1999, and the FWS issued a BO on February 17, 2000, for construction and maintenance purposes only (Phase I). Species that are addressed in the BA are the Texas Prairie Dawn, Navasota Ladies'-tresses, Tobusch Fishhook Cactus, Golden-cheeked Warbler, Black-capped Vireo, Bald Eagle, Interior Least Tern, Barton Springs Salamander, and Houston Toad. This final EA has been revised to reflect the FWS' Phase I BO and Phase II Concurrence Letter.

4.16.6 Comment

Commentors stated that mitigation measures to avoid a spill to Barton Springs should have been addressed as mitigation commitments to avoid impacts to the Barton Springs Salamander.

Response

Mitigation plans to avoid a spill to the Barton Springs aquifer and potential impacts to the Barton Springs Salamander are addressed in the BA. The FWS has issued a Concurrence Letter regarding potential impacts to the species. As a result of consultation with FWS, Longhorn developed a plan that incorporates: spill probability reduction through installation of 19 miles of new pipe and concrete cover; leak detection system improvements; spill control measures including secondary containment within the pipeline trench, grouting of porous media, and berms to direct aboveground flow from recharge features and surface waters. These are detailed in the Phase II BA and the Concurrence Letter.

4.16.7 Comment

A commentor requested documentation of a source indicating a decrease in salamander numbers during the 1970s at Barton Springs (Table 4-31 of the draft EA).

Response

The statement in the EA originated, in part, from Texas Parks and Wildlife Department information that describes the Barton Springs Salamander and the Barton Springs habitat. However, the statement should be expanded and re-phrased as follows. "Surveys in the early 1970s showed that the Barton Springs Salamander was quite abundant, and many could be found by searching through submerged leaves in Eliza Springs. From 1970 to 1992, the population of [the] species dropped sharply. We now know that certain pool maintenance practices, such as the use of high-pressure hoses, hot water, and chemicals were harmful to the salamanders and the aquatic plants in the pool and nearby spring outlets that provide their habitat" (TPWD, undated literature entitled: Barton Springs Salamander).

4.16.8 Comment

Commentors inquired about criteria that were used to select ecologically important streams. In addition, issues were raised regarding the omission of Cummins Creek and the James River, which are EPA and TNRCC reference streams and are crossed by the pipeline, from consideration as ecologically important (although they represent the minimally disturbed, best-case condition). Commentors noted that Cummins Creek could potentially be designated as an exceptional aquatic life used stream segment based upon data at TNRCC and LCRA.

Response

Streams and rivers that are crossed by the pipeline route are listed in Table 4-17 of the draft EA. Twenty-six of the rivers and streams including Cummins Creek and James River are classified as major, large, Class 3 or Class 4 non-urban bodies of water. Rivers and streams identified in the draft EA as ecologically important (Section 4.3.2) "were selected because they reflect …natural regions (crossed by the pipeline)." The listed rivers do not represent all of those that would be considered to be ecologically important.

4.16.9 Comment

Commentors expressed concern that rankings of stream crossings for importance do not appear to take into account ecological sensitivity. For example, the pipeline crosses the Colorado River in Segment 1434 which is designated by the TNRCC as exceptional for aquatic life and also contains habitat for the Blue Sucker, a state-listed threatened species. The rankings in Tables 4-21, 4-22, 4-23, and 4-24 should be revised, or a new table should be added which addresses environmental sensitivity.

Response

Stream crossings were ranked according to the criteria listed in the draft EA, Section 4.2.2.2. The primary factor taken into account during the ranking was proximity and usage of water supplies, both public and those for irrigation. Water quality and water rights were taken into account and stream crossings were also ranked on their ability to transport a spill and on the ease of isolation and cleanup of a spill.

The rankings did not include an evaluation of the ecological significance of the stream crossing since this was discussed along with recreational and cultural resources in other sections of the draft EA. Note that the listings of threatened and endangered species were limited to those on the Federal lists. Species that are only listed by the State of Texas as threatened or endangered were not included in the determinations. A listing of all species of concern that are within counties crossed by the pipeline is provided in Appendix 4F of the final EA.

4.17 CONCERNS REGARDING TREATMENT OF HISTORIC AND ARCHEOLOGICAL RESOURCES

4.17.1 Comment

Commentors expressed concern that cultural resources in Bastrop County were not adequately addressed. Numerous historical sites that are not listed on the National Register of Historic Places are present near the pipeline, but not addressed in the draft EA.

Response

A review of available data (including Bastrop County) during the preparation of the draft EA indicated that at least 16 cemeteries, numerous unnamed graves, and several churches are within 1,250 ft of the pipeline corridor. No known National Register eligible sites were identified within 1,250 ft of the existing corridor; and nine archaeological sites were found within 2,000 ft of the assumed centerline of the Austin Re-route Alternative.

The EPA, DOT, Texas State Historic Preservation Officer, Tribal Historic Preservation Officer(s) (or other Tribal officer), and the Advisory Council on Historic Preservation have prepared a Programmatic Agreement (PA) regarding the Longhorn pipeline project. Elements of the PA include requirements that Longhorn enter into consultation with the State Historic Preservation Officer/Texas Historic Preservation Officer to identify all National Register or eligible archaeological or historic properties that may be affected directly, or indirectly by subsequent ground disturbing activities. Where adverse impacts cannot be avoided, resource recovery plans are to be developed and implemented. A copy of the PA can be found in Appendix 7J of the final EA.

4.18 NEED FOR PUMP STATION ENVIRONMENTAL AND SITING STUDIES PRIOR TO NEW CONSTRUCTION

4.18.1 Comment

Several commentors asked for more details about future studies to evaluate the impacts of construction and operation of future pump stations. Commentors pointed out that in its "Preliminary Finding of No Significant Impact," the Lead Agencies acknowledged that the draft EA did not evaluate the impacts of future construction and operation of the pump stations that would be added to the Longhorn Pipeline System in order for Longhorn to reach the System's ultimate capacity of 225,000 bpd. The commentors wanted to know more about the process for having these future studies completed.

Response

As stated in Section 9.1.1.2.5 of the draft EA, the exact sites of the future pump stations required for complete build-out of the system are not now known. Locations of new pump stations would be determined based on land availability, site development characteristics, environmental considerations, and engineering characteristics. Discussion of detailed scopes of these future environmental studies associated with the siting of future pump stations is premature. As part of its oversight and enforcement role, DOT would assure that a supplemental EA would be completed prior to construction. The Longhorn Mitigation Plan (LMP) provides assurances that Longhorn would conduct these studies.

4.18.2 Comment

Commentors asked how the recently constructed Longhorn pump station in Hays County came to be located at its present location.

Response

The site selection for the Cedar Valley Station was based on engineering and environmental factors. According to Longhorn, the Cedar Valley Station was sited in its current location (MP 182 near Barton Creek in northern Hays County) in 1998 based on Longhorn's evaluation of the hydraulic profile needed to optimize product shipments to El Paso. Throughput analyses and related decisions regarding pump station locations also were used to minimize pressure requirements across the contributing zone of the Barton Springs Aquifer to levels that would be below those required for the former crude oil pumping operations.

In order to minimize pipe pressures over the recharge zone of the Edwards Aquifer, to the east, Longhorn decided to locate the station somewhere within a "window" of approximately 10 miles. Also, the location of the Cedar Valley Pump Station was determined based on land availability, site development characteristics, environmental considerations, availability of electric power, and the availability of roads. The Cedar Valley Pump Station is located in unincorporated Hays County. Prior to making a siting decision, Longhorn considered the results of the Environmental Analysis performed by 3D/International, dated October 5, 1998. The analysis addressed Wetlands and Threatened and Endangered Species. The analysis noted that "Two endangered species have the potential to occur within the proposed project area; the Golden-cheeked Warbler and the Black-capped Vireo." Field investigations, performed by 3D/International, indicated that no threatened or endangered species were present on the 4.5-acre site, that wetlands or waters of the US are not present, and that construction would not require any Pre-construction Notification or Permit Application from the COE.

4.18.3 Comment

One commentor wanted to know what clearances and approvals Longhorn obtained prior to constructing the Cedar Valley Station.

Response

Documents that were prepared and permits that were obtained for the Cedar Valley Pump station are as follows:

- Hays County Environmental Health Department, Development Permit Application, dated August 28, 1998; and
- Hays County Environmental Health Certificate for a Class “A” Building/Development Permit No. 1038, issued on September 15, 1998.

4.19 MISCELLANEOUS

4.19.1 Comment

A commentor noted that the alternate routes were not shown on Figure 4-1, titled “Crop and Pasture Land Along Longhorn Pipeline and Route Alternatives.” The commentor requested that these routes be included.

Response

The alternate routes are included on Figure 4-1 in the final EA.

4.19.2 Comment

A commentor pointed out a typographic error that occurred in reference to “troglobite species” in Tables 4-30 and 4-31 of the draft EA.

Response

The comment is correct, and tables would be corrected in the final EA.

4.19.3 Comment

A commentor indicated that Sections 4.1.4 and 4.1.5 of the draft EA incorrectly show potential cavernous areas and Golden-cheeked Warbler and Black-capped Vireo habitat are inaccurate.

Response

The text and corresponding maps are modified in the final EA.

4.19.4 Comment

A commentor noted an incorrect figure reference in Section 4.3.1 of the draft EA, and that Figure 4-15 does not include in the legend an identification for natural regions shaded in area north of Houston.

Response

The reference is corrected in the final EA. Regions noted are part of the Piney Woods Region of East Texas. The legend for this shading is included in the figure.

4.19.5 Comment

A commentor noted that the symbols marking locations of water rights were not visible in Table 4-13 of the draft EA.

Response

Table 4-13 of the draft EA is corrected in the final EA.

4.19.6 Comment

A commentor noted that the "TSS" reference in Section 4.2.1.2.1 of the draft EA was incorrect.

Response

The final EA would have the correct citation.

4.19.7 Comment

A commentor said the geographic information system (GIS) methods are poor for determining river mile distances.

Response

The GIS techniques used were to retrace the streamline on the mapping. This method is a considerable improvement in time and accuracy over the more traditional method of using a measuring wheel. The distances were spot-checked by hand calculations/measurements.

5.0 COMMENTS AND RESPONSES RELATED TO EA CHAPTER 5 "PIPELINE INTEGRITY ANALYSES"

5.1 COMPLIANCE WITH FEDERAL REGULATIONS

5.1.1 Comment

Commentors expressed concern that there were instances where Exxon Pipeline Company (EPC) did not comply with federal pipeline regulations, resulting in unsafe conditions on the pipeline. More specifically, a commentor stated that the Houston-to-Crane portion of the Longhorn pipeline may be out of compliance because maintenance activities lapsed between EPC's last use of the pipeline for crude oil transport in late 1994 and when Longhorn Partners Pipeline, L.P. (Longhorn) began its own maintenance activities in 1997.

Response

EPC's compliance is not directly relevant to Longhorn which is a different corporate entity, management, and staff operating under different management systems and procedures. For purposes of this Environmental Assessment (EA) however, past maintenance activities were considered to the extent that they provide limited indirect evidence of current pipeline integrity. Since the integrity is to be verified prior to start up and again during the first months of operations, even this consideration is redundant. Previous maintenance practices are not being relied upon to ensure the current pipeline integrity. Current and future integrity verifications would be done as detailed in the Longhorn Mitigation Plan (LMP).

Examination of possible maintenance lapses is addressed in several sections of the draft EA, including Appendix 3A, a statement from William Lumpkin, who had responsibilities for maintenance during the period when EPC ceased crude oil operations and when Longhorn purchased the pipeline for use in refined product service. Lumpkin stated that EPC "continued normal maintenance operations on this line including, without limitation, aerial surveillance, right-of-way (ROW) monitoring, one-call response, cathodic protection (CP) (corrosion/rust protection), repair and replacement of the pipe (as appropriate), inspections, and documentation required under state and federal laws and regulations as well as EPC's policies."

5.1.2 Comment

Several commentors questioned the adequacy of current federal regulations governing pipelines.

Response

Assessing the adequacy of current federal regulations is not within the scope of the Environmental Assessment (EA). The Lead Agencies are not simply relying on the requirements of those regulations to assure that operation of the pipeline poses no significant impacts to public safety or the environment. The mitigation procedures to which Longhorn has committed exceed the requirements of the regulations and the current practices of most pipeline operators. The pipeline route has been analyzed in detail for potential impacts from accidents and the mitigation plan is designed accordingly. The plan would become part of the operating procedures of the company and would be monitored and enforced by DOT, the agency with jurisdiction over operation of this pipeline. The response to spills of product from the pipeline may also be monitored and enforced by the US Environmental Protection Agency (EPA) and Texas Natural Resource Conservation Commission (TNRCC).

5.1.3 Comment

A commentor stated that the review of operating and maintenance procedures on the Longhorn pipeline were incomplete because record-keeping requirements were not addressed and because procedures in place during EPC operation were not evaluated.

Response

The compliance status of the EPC pipeline is somewhat irrelevant to Longhorn's proposed operation, since Longhorn operates under its own management system and procedure. Furthermore, Longhorn committed to inspections and testing of the EPC parts of the Longhorn pipeline and remediation of deficiencies to ensure the integrity of the pipeline.

5.1.4 Comment

A commentor asked why the draft EA did not address the "fact" that EPC and Williams Energy Services (WES) were in violation of the Texas Engineering Practices Act by using unlicensed personnel to perform engineering tasks for various Longhorn activities.

Response

The commentor offered his interpretation of the Texas Engineering Practices Act which prescribes the practice of engineering in the State of Texas. The legislation has exemptions and provisions for unlicensed graduates from accredited engineering schools and others to perform engineering work under the supervision of licensed engineers. Research into the applicability and current case law regarding compliance with this act is beyond the scope of this EA.

5.2 COMPLIANCE WITH INDUSTRY STANDARDS

5.2.1 Comment

A commentator said that the draft EA does not contain information on how “common industry practices” were determined. Who defines “common industry practices”? What is the difference between “good” and “bad” industry practices?

Response

The EA uses phrases such as “good industry practices” to indicate activities that are common among pipeline operators. Assessing what is “common” is first based on the existence of published standards such as American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), and National Association of Corrosion Engineers (NACE) which recommend certain practices for design, operations, and/or maintenance, sometimes in excess of DOT regulations. Additional evidence of common practices comes from DOT experience in auditing operators as well as from EA contractor’s experience; informal interviews with other pipeline company personnel, industry consultants, and vendors providing services to the industry.

The intent is to identify practices that are considered to be more thorough and more prudent and to label these as “good practices.” Failure to adopt accepted or otherwise prudent practices could be considered to be “bad practice.”

5.2.2 Comment

A commentor criticized the draft EA for not explicitly reviewing and documenting Longhorn compliance with all industry standards.

Response

A sampling of the most prominent and dominant industry standards bearing on pipeline integrity was used as an indicator of Longhorn’s overall adherence to industry best practices. The sampling included standards from ASME and API. Some industry standards, beyond DOT regulations governing pipelines, are required when referenced by DOT regulations. Pipeline operators often participate in the professional organizations that develop such standards and elect to adhere to them. Documents such as Longhorn’s contracts with equipment and service providers indicate that Longhorn requires compliance with those standards in its operations. Moreover, it is the purpose of Longhorn’s Integrity Management System and Operational

Reliability Assessment (ORA) to ensure that proper technical standards and practices are adhered to, as discussed in the description of the LMP to Chapter 9 of the EA.

5.2.3 Comment

A commentor expressed concern that an analysis of Longhorn's compliance with API 1129 was not addressed.

Response

API 1129 is an API recommended practice entitled "Assurance of Hazardous Liquid Pipeline System Integrity." It is a general reference document prepared by members of the pipeline industry and does not purport to make situation-specific recommendations. This reference was consulted in the preparation of the draft EA (see Appendix 5B). Mitigation measures specified in the LMP meet or exceed recommendations in API 1129.

5.2.4 Comment

A commentor stated that Longhorn misrepresented industry and regulatory standards in the LMP (Appendix 9D, Section 1.2 of the draft EA), where Longhorn defines "highest standards" as the "best industry standards and in accordance with all applicable statutes." The commentor stated that the assumption of meeting regulatory and industry standards as equating with "highest standards" has not been proven. In the commentor's opinion, accidents are frequent enough on pipelines that meet the existing standards to justify a review of the adequacy of these standards.

Response

The "highest standards" referred to in Section 1.2 of Appendix 9D of the draft EA are associated with decisions on potential corrective actions such as "remediate," "lower," "repair," etc., to be taken as a result of inspecting and evaluating the pipeline during implementation of the various Longhorn Mitigation Commitments (LMC). In most industries, including the pipeline industry, the corrective actions such as repairing equipment are usually required to be performed using standard procedures that are defined in a variety of codes, standards, and regulations. Some of these standards are common among several industries; others were developed for specific applications. Longhorn has committed to conduct the corrective actions under the best of the standards available for the given actions.

5.3 ADEQUACY OF SUPPORTING DATA IN THE EA

5.3.1 Comment

A commentor stated that WES's surge control analyses on the Longhorn pipeline was inadequate.

Response

Several assessments of surge potential have been conducted. The most recent reflects new valves installed and anticipated future flow rates. Reviews indicate that worst case scenarios were assumed, appropriate calculations are used, and the results are valid. Per the LMP, surge potential would be re-evaluated whenever significant system changes are planned.

5.3.2 Comment

A commentor suggested that reliance on DOT's data on pipeline accidents would not reflect total losses caused by liquid pipeline leaks and ruptures, since costs of externalities (polluted soil, community response costs, costs of fish and waterfowl kill, and others) are not included in statistics.

Response

This statement regarding DOT data is correct since such costs are not routinely captured in that database. However, these damages are qualitatively considered in the impacts analysis in Chapter 7 of the draft EA, which assesses all potential damages from an accident to humans and environmental receptors.

5.3.3 Comment

Several commentors stated that supporting data for various analyses and figures were inadequately presented in the draft EA.

Response

The draft EA describes the Lead Agencies' reasoning and analysis and provides citation to supporting documentation for the reader to use. The detailed supporting information was retained at the Contractor's office in Austin, Texas, for public review. In addition to the references in the body of the draft EA, its Appendices provide further documentation on information sources. The response to public comments and discussions at public meetings were intended to further clarify the analyses and findings of the EA.

5.4 QUALITY AND USE OF INSPECTION AND TESTING DATA

5.4.1 Comment

The commentor requested that pipeline surveillance be better described. Detailed information such as the frequency of ground-based surveillance required and the mode by which this surveillance is accomplished (by foot, by vehicle, by air) should be included in the LMP.

Response

Information regarding the general types of surveillance and the frequencies are described in the draft EA. In general, both helicopters and fixed-wing aircraft would perform surveillance. Helicopters would be used from Galena Park to Cedar Valley. The helicopter would fly approximately 60 miles per hour (mph), flying at an altitude of 400 to 500 ft in urban areas and 200 to 300 ft in rural areas. From Warda to El Paso, surveillance would generally be conducted by fixed-wing aircraft flying at speeds of about 100-110 mph. These aircraft would fly at altitudes of about 500 ft in urban areas and about 300 ft in rural areas.

Ground patrols would be done on a random schedule unless they are utilized to fulfill patrol schedule requirements of the LMP. They would also be conducted to investigate any areas of concern identified in aerial surveillance and when weather conditions or obstructions such a trees and encroachments prevent effective aerial surveillance.

5.4.2 Comment

A commentor suggested conducting a television camera inspection of the pipeline's interior to identify, repair, or replace any damaged sections of the pipeline.

Response

A television camera inspection of the pipeline's interior would identify only large and visible defects. The ILI tools (i.e., smart pigs) used throughout the pipeline industry are much more effective in detecting a variety of both large and small defects in metal pipe.

5.4.3 Comment

A commentor requested further explanation on how the pipe was visually inspected when anomalies were detected by the smart pig. The commentor asked if any systematic "pot-holing" is to be done.

Response

Performance of follow-up "confirmation digs" to verify ILI indications is standard procedure after the ILI data is analyzed. This is a systematic process driven primarily by ILI tool capabilities. "Pot-holing" generally refers to a process of excavating and inspecting the pipe, often on a random basis. There are no reported plans by Longhorn to perform such "pot-holing." This would be an unusual action. Resources are better applied in using inspection methods such as close interval surveys (CIS) or ILI, to show locations where excavation and visual inspection might be productively done.

5.4.4 Comment

A commentor stated that there are over 5,000 joints of old pipe with metal loss/mechanical damage that haven't been excavated and inspected on the Longhorn pipeline. The commentor asked why this was not addressed in the draft EA and not covered in the LMP.

Response

In 1995, the pipeline from Crane to Kemper and from Kemper to Satsuma was inspected by Vetco using a magnetic flux tool. In the Kemper-to-Satsuma segment, approximately 4,000 anomalies (labeled with an "L") were indicated as having an approximate depth of 0 percent to 30 percent wall penetration. About 300 anomalies (labeled M+, M, and M-, with + indicating the greater damage) with 31 to 50 percent penetration and 79 (labeled S) with penetrations of 51 percent or more were also indicated. A contractor, Corrpro, conducted an excavation program for EPC to inspect and repair anomalies as needed in 1996. Initial excavations and inspections indicated that most M- anomalies were caused by minor corrosion damage that did not significantly affect the structural integrity of the pipeline, and these anomalies were not investigated further. By inference, corrosion associated with L-rated anomalies was of even lesser significance. After the inspection of several of the anomalies labeled M (for moderate), the contractor found that they were not serious and did not require repairs. As a result, the inspection of M anomalies was discontinued. However, anomalies labeled M+ or S were excavated, examined, and, if necessary, repaired.

The pipe joints with indications of corrosion or mechanical damage were not individually considered in the LMP's ORA. Those that had significant damage have been repaired. Repairs are considered in the EA relative risk assessment, since they provide evidence of conditions conducive to failure. Potentially significant dents are covered in the LMP. In their 1998 review of the pipeline ILI data, Kiefner & Associates identified 23 potentially significant dents for further analysis. The proposed method of evaluating these dents is described in Longhorn Mitigation Commitment (LMC) 8.

Previous inspections are not being relied upon to demonstrate the current pipeline integrity. Current and future integrity verifications would be done as detailed in the LMP.

5.4.5 Comment

A commentor asked for clarification on the EA statement about inspection limitations on the 8-inch Odessa lateral and whether such limitations also existed elsewhere and what they were.

Response

The statement refers to the near-term availability of ILI tools designed to operate in smaller diameter pipelines. Certain tool types such as the transverse wave "crack tool," are not yet available in all pipe diameters less than 16 inches, but are available for the Longhorn mainline pipe diameters. Since the 8-inch Odessa lateral is new pipe in a relatively benign environment, the use of such specialized inspection tools is not a critical aspect of risk management for that system.

5.4.6 Comment

A commentor produced calculations that suggest that a certain dimension of corrosion can survive a hydrostatic pressure test and still be very susceptible to failure. The commentor wanted to know why this was not included in the draft EA.

Response

A very narrow and deep groove (commentor used 95 percent of pipe wall penetration, 1 to 2 inches long) can theoretically survive a hydrostatic test and, due to very little remaining wall thickness, is more susceptible to failure from any subsequent wall loss. Such defect configurations are rare and their failure potential at a pressure lower than the test pressure would require on-going corrosion or crack growth. The difference between test pressure and operating pressures offers some safety margin. More safety is obtained from the additional integrity verification and re-verification program, including ILIs, specified in the LMP as well as mitigation measures designed to prevent on-going corrosion and crack growth. The existence of any defects that might have survived the hydrostatic test is also considered in calculating integrity re-verifications in the ORA portion of the LMP.

5.5 USE AND INTERPRETATION OF LEAK HISTORY DATA

5.5.1 Comment

Some commentors stated that only DOT database leak history data had been used and that other data on the EPC portion of the Longhorn Pipeline System leaks had been ignored. A commentor stated that Railroad Commission of Texas data on other pipelines in Texas should have been used as an indicator of pipeline performance.

Response

All documented leak data for the EPC pipeline were used. These included data from EPC internal reports, for leaks below the reportable size threshold, as well as those reportable to DOT. The historical accident frequency rate for the EPC pipeline was compared with other crude oil systems and hazardous liquid pipeline systems, in general, to provide a perspective on relative past performance.

As is detailed on draft EA pages 5-64 and 5-65, several sources of data outside of DOT databases were examined in analyzing leak history, including Railroad Commission of Texas data. Railroad Commission of Texas data include leaks on oil field gathering lines as well as transmission lines. Gathering lines are not required to meet the same standards as transmission lines and are likely to reflect a higher failure rate. A more in-depth study of EPC leaks was conducted in May 2000 resulting in a revised and reduced historical leak count. These new data are presented in the final EA.

5.5.2 Comment

A commentor noted that the draft EA did not discuss the decline in crude oil quantities through EPC's old pipeline from west Texas to Baytown that reduced operating pressures and amount of pump station operations. The commentor suggested that this caused recent reductions in leak frequency.

Response

Reduced operating pressures and reduced activities at pump stations might reduce spill frequency. This could be a factor in the observed decline in leak rates under EPC operations in more recent years, but there are many other possible reasons for changes in leak rate. Condition changes such as increasing population might increase spill frequency in the same period. The choice of historical period for leak count and use of such counts for estimating future spill probability considers these influences. The relative risk model similarly considers changing conditions such as these to assess failure probabilities.

5.5.3 Comment

A commentor objected to using the spill size distribution for the former crude oil system as the basis for spill size distribution estimates for the Longhorn pipeline in refined product service. The commentor said that since product flow rates will be higher with refined products, spill volumes will be higher.

Response

Previous spill data on this system is used with other data to estimate a distribution of potential spill sizes. The distribution of spill sizes depends on the causes of the leaks or spills, where they occur, and the hydraulic parameters of the pipeline at that point. Higher flow rates in the proposed operation do not necessarily translate into higher spill volumes because of variables such as: (1) different operating pressure profiles along the line; (2) different valve locations and types; (3) potential differences in leak cause distributions and hence, hole size; and 4) differences in leak detection and shut-down practices. Given the wide range of possibilities of locations and sizes of failures, any distribution estimate would have a degree of uncertainty.

5.6 EFFECTS OF AGE OF PIPE

5.6.1 Comment

A commentor pointed out that arc burns from EPC activities in the old 20-inch pipeline across Houston that are not permitted by 49 Code of Federal Regulations (CFR) Part 195 and ASME B31.4 and were not discussed in the draft EA.

Response

The main concern associated with arc burns is the possibility of tiny cracks forming around the “hard spot” which might be present. EPC reports that their procedure was to remove arc burns, but their documentation might not have reflected this. The process of integrity verification and re-verification would address concerns regarding possible remaining arc burns. Additionally, the LMP ORA considers the possibility of hard spots in determining re-inspection intervals.

5.6.2 Comment

Commentors expressed concerns about the integrity of the older portions of the pipeline. These issues include mechanisms that might threaten the pipe's structural integrity and verifications that weaknesses do not exist. Commentors questioned whether the integrity of the older portions of the pipeline could be adequately measured or predicted.

Response

Age-related pipe-integrity concerns can be addressed through testing, inspection, and more generally, in the context of all the required mitigation measures. Issues related to age of the pipe include corrosion, fatigue, material and construction specifications.

For more discussion of age concerns and related integrity verification options, see Section 9.20 in this Responsiveness Summary (RS) and draft EA Sections 5.3.2, 5.3.3, and 5.8.7.

5.6.3 Comment

Commentors requested clarification of what "ERW" pipe means in terms of defective welds.

Response

A higher susceptibility to certain defects has been identified in older electric resistance welding (ERW) pipe. This applies to pipe manufactured with a low-frequency ERW process, typically seen in pipe manufactured prior to 1970. On the Longhorn pipeline, a large portion of the pipe was manufactured by this low-frequency ERW process.

ERW creates a longitudinal weld seam. It is this weld seam that is more vulnerable to some failure mechanisms, in the case of low-frequency manufacture. These are detailed in Chapter 5, page 5-37, of the draft EA.

Government agencies have issued advisories regarding the low-frequency ERW pipe issue, but did not recommend de-rating the pipe or other special standards. Nevertheless, the draft EA relative risk model "penalized" such pipe as part of the risk assessment. The increased defect-susceptibility of this type of pipe is mitigated through the initial and on-going integrity verification processes described in the draft EA.

Chapter 5 of the draft EA (Sections 5.3.2, 5.3.3, and 5.8.7) includes a complete discussion of age concerns and related integrity verification options.

5.7 EFFECT OF LAND MOVEMENTS

5.7.1 Comment

A commentor asked how water crossings are being analyzed for possible remedial action related to preventing a pipeline spill.

Response

A scour study and span study for the Longhorn pipeline has been conducted and evaluated since publication of the draft EA. These studies gauge the susceptibility of water crossings to scour and other forces and recommend remedial actions where appropriate. See Appendix 9E in the final EA.

5.7.2 Comment

Commentors expressed concern about various earth movements (seismic events, landslides, subsidence, scour, etc.) that might threaten pipeline integrity.

Response

Most of the possible earth movement issues deal with rare threats to this pipeline, compared with other potential failure modes. Longhorn has performed sufficient analyses to verify that there are no significant threats from earth movements to any portion of the pipeline. These analyses were reviewed as part of the EA process. See Appendix 9E in the final EA.

5.7.3 Comment

Commentors expressed concern about the increased risk of pipeline breaks due to changes in temperature and soil conditions. Reference is made to frequent breaks observed in water and sewer lines.

Response

Temperature changes can add longitudinal stress to a pipeline. In this pipeline, temperature changes resulting from changes in the ambient temperature are minimal due to the depth of cover (soil is a good insulator), the relatively constant temperature of the flowing product, and the atmospheric temperature ranges seen in this part of the country. Increased temperature changes and, hence, more stresses could occur with wide variations in product temperatures. Such variations are not anticipated, and if they occur, design protocols have considered these stresses and the effects are normally minor.

Soil movements associated with changing moisture conditions and temperatures can also cause longitudinal stresses to the pipeline, and in extreme cases, can cause a lack of support around the pipe. LMC 9 required Longhorn to perform studies and to take appropriate remediations to ensure that such events pose no threats to the pipeline integrity.

Temperature changes and soil movements can cause coating damages as the pipe moves against the adjacent soil. Coating damages increase the potential for corrosion of the external pipe wall. Coating damages are normally offset by CP currents until such damages are located by CISs, and in extreme cases, by indications of light corrosion in an ILI.

This pipeline differs from most water and wastewater utility pipelines in that it is a welded steel pipeline designed to operate under high internal pressures. Most water and wastewater utility pipelines are not designed for high internal pressures; are often constructed from more brittle materials; and often have joint connectors less structurally strong. All of these factors tend to increase their susceptibility to failure modes not commonly seen in pipelines such as the Longhorn pipeline.

There is no evidence of failures due to the effects of change in temperature or soil conditions on this pipeline while in crude service, or on any other pipelines in similar operations, either crude or gasoline. Related failure initiators such as erosion, subsidence, and other earth movements have caused failures in similar lines. These failure modes are assessed in Chapter 6 and addressed in LMC's 15 and 19.

5.7.4 Comment

One commentor asked how the EA could not suspect metal fatigue-related issues associated with the pipeline if the mitigation measure calling for studies of earth movements had not yet been completed.

Response

While there is no evidence to suspect damages from previous earth movements or any other fatigue-related issues since the last inspections, pipeline integrity is to be verified prior to startup and soon again thereafter. These verifications provide assurances that there are no initial integrity-threatening damages. On-going verifications are required under an approved ORA plan (per LMP in Chapter 9 of the EA).

5.7.5 Comment

Commentors questioned how earthquake potential and other earth movement events are addressed in the risk model.

Response

Earthquake potential, along with other potentially damaging earth movements, is assessed as described in Section 6.4.5 of the draft EA. A higher potential of such events increases the relative probability of pipeline failure. The relative potential is quantified wherever susceptibility factors/conditions can be identified (Appendix 9D in the final EA). A subsequent study performed per LMC 19 supports the initial risk assessment with more site-specific analyses.

5.8 ROW ISSUES

5.8.1 Comment

A commentor stated that Longhorn is in noncompliance with 49 CFR Part 195 on signs and markers.

Response

The LMP was modified to reflect the DOT specific requirements for signs and markers. All signs and markers would comply with DOT 49 CFR §195.410.

5.8.2 Comment

Several commentors asked for an explanation of Longhorn's procedures for ROW marking in a manner that is clearly recognized by those engaged in construction and similar activities.

Response

Longhorn has stated in the LMP that it would (1) clear the ROW of encroachments and have the ROW in excellent condition, and (2) install/maintain pipeline markers to clearly identify the path of the pipeline, both before startup. The cleared and well-marked ROW would form an area that would be obviously distinct from the land on either side of the ROW, in most cases.

Within the ROW, all ground cover would be mowed to a level below that of the pipeline markers, including painted fence posts. Permanent pipeline makers would be installed in Tiers 1, 2, and 3 areas according to the procedures described in Section 3.5.4 of the LMP and summarized below:

- In Tier 1 areas, the markers would be placed within line-of-sight of each other;
- In Tier 1 and 2 areas, marker spacing would be closer, so that if any one marker is removed, the location of the pipeline can still be identified from either direction and from any point in between;
- Pipeline markers would be written in English and where appropriate, Spanish, and would display emergency contact information;
- Missing or damaged markers would be replaced within seven days of discovery; and
- Pipeline markers would be located on each side of each public road crossing, water crossing, and railroad crossing.

5.8.3 Comment

A commentor requested clarification on how routine pipeline O&M activities on the ROW and areas outside of the pipeline might adversely affect the pipeline easement.

Response

A pipeline operator generally has certain rights on the easement which include access to the pipeline or aboveground components; the removal or trimming of vegetation; and the control of drainage and erosion. Access to the ROW is normally described as well as provisions for possible additional work space and related landowner damages. Normal use of the ROW includes vegetation-control to facilitate aerial observation and access for over-line surveys by personnel on foot or in light trucks. The pipeline is designed for such ROW activities. Episodes of erosion, settlement, upheaval, or other impacts to the cover or support of the pipe might warrant excavation and/or grading or other activity to restore the pipeline and ROW to as-designed condition.

5.8.4 Comment

A commentor asked why safety information is only distributed to people/businesses within 660 ft of the pipeline, and not 1,250 ft, which is the distance proposed for study.

Response

In the draft EA, Section 5.2.5, the distance of 660 ft (1/8 mile) on each side of the pipeline is an error; it is corrected in the final EA. Per the LMP, LMC 25 and Section 3.5.4, the brochures would be mailed annually to everybody within ¼ mile (1,320 ft) of the pipeline in metropolitan areas, and to everybody within 1 mile (5,280 ft) in rural areas. Additionally, information would be sent to entities in the region that normally excavate near the ROW.

5.8.5 Comment

A commentor stated that the pipeline ROW presents a relatively clear and straight area that is attractive to deer hunters. Because the ROW could contain areas of exposed pipeline, exposed valves, or other aboveground fixtures that might be hit by bullets, the commentor asks if Longhorn's public education literature will discourage hunting along the ROW.

Response

Depending on the terms of specific easement agreements along the ROW, Longhorn would usually not have any control over activities such as hunting. The control of hunting activities would therefore be the responsibility of the respective landowners along the ROW. At the current time, Longhorn does not plan to include comments regarding hunting in its educational material.

Associated with hunting is the possibility of intentional targeting of pipeline signs and appurtenances. Vandalism of these structures is a violation of federal law.

5.8.6 Comment

A commentor discussed an original easement agreement which stated that the pipeline operators would restore the surface, including grass for the property owner. Commentor noted that this has not occurred with previous operators and asked that Longhorn commit to performing this service after clearing the ROW and that Longhorn re-seed with native grass at appropriate times during the growing season.

Response

Longhorn has stated that it would maintain the ROW in excellent condition, which is considered to be a clear line-of-sight for aerial or ground patrols. Ground cover would be mowed so that all pipeline markers would be visible from the air or the ground. High canopy vegetation would be cleared or trimmed as necessary and all debris would be cleared from the ROW. Reseeding with native grass is an activity specific to easement agreements between Longhorn and property owners except in those areas covered by FWS' BO.

5.8.7 Comment

Commentors questioned the ability of the operator to observe all construction activities by others on or near the ROW.

Response

The following mechanisms would be in place to detect third-party activity near the pipeline:

- Patrol by ground or air, on a frequency tied to potential impacts as well as level of activity, as described in the LMP, System Integrity Plan (SIP), and ORA;
- Under state law, the one-call program requires excavators to notify the one-call center 48 hours prior to activities. The one-call center, in turn, notifies owners of buried utilities in the area; and
- A public education program to alert potential excavators as well as neighbors to the exact pipeline location and to solicit their cooperation in avoiding and reporting all threats to the pipeline.

Once aware of third-party activity, the Longhorn protocol is to mark the line, provide maps, and directly oversee the activity as necessary to protect the pipeline.

5.8.8 Comment

A commentor suggested that Longhorn should utilize its ROW for telecommunications, similar to what Williams Communications is doing with a ROW in Oklahoma.

Response

Longhorn could consider this option, but it is outside the scope of this EA.

5.8.9 Comment

A commentor wanted to know if other government entities need to get involved to assist Longhorn in controlling right-of-ways (e.g., limited county land use controls around this and other pipelines) to reduce risks of third-party damage.

Response

Local land use controls requiring setbacks for new development would reduce risk. In 1988, the Transportation Research Board recommended that setbacks be set for urbanized areas, but did not provide a setback limit. The study by the American Petroleum Institute (API) suggested that two-thirds of all deaths and three-quarters of all injuries along hazardous liquid pipelines occurred within 150 feet of the pipeline. The city of Houston is the only government entity involved in this project that requires a building setback of 15 feet from any pipeline that carries flammable material under pressure, while Harris County has no requirement. Only local governments can establish these limitations.

5.9 DEPTH OF COVER

5.9.1 Comment

A commentor states that the depth-of-cover analyses use erroneous Metro Tech data that overstates the amount of cover by an average of over 12 inches (see draft EA page 6-12).

Response

Page 6-12 of the draft EA actually states that, in assessing the depth of cover, Metro Tech data were ignored in favor of the actual (probed) readings.

5.9.2 Comment

A commentor, referring to Figure 5-7 and Figure 5-8 in the draft EA, noted that distances between probed sites for depth of cover were not included.

Response

Many depth-of-cover readings were taken at a spacing of 2 to 5 ft. The average spacing for all 19,000+ readings is about 190 ft.

5.9.3 Comment

A commentor requested clarification about the depth the pipeline is buried and how this relates to protection for the public. The commentor also wanted an explanation of Longhorn's procedures for checking on uncovered or inadequately covered pipe, both before and after operation begins. A commentor expressed concern about whether the pipeline is buried at a sufficient depth to effectively protect it and whether 49 CFR §195.248 is adequate in all cases.

Response

Depth of cover is one of several actions or conditions available to provide reduction of third-party damage threats to the pipeline and therefore increased safety for the public. Pipelines are not required by law to be buried. However, when companies elect to bury them, depths are specified. DOT regulations (49 CFR §195.248) requires that new pipe in industrial, commercial, and residential areas should be buried to a depth of 36 inches for normal excavation and 30 inches for rocky excavation.

Maintenance of the specified depths is not required by regulation, but the LMP specifies a depth of cover maintenance program. The exact amount of risk reduction achieved by various burial depths is situation specific and is a function of the type of activities that might occur. For example, auguring or boring activities present a different threat than do normal agricultural activities. Longhorn completed a Depth-of-Cover survey in April 1999 and 137 exposed pipe segments were identified. Longhorn's "Span Study," summarized in Appendix 9E of the final EA, indicates that there are intentional exposures, such as at stream crossings.

In LMC 5, Longhorn commits to examine 12 shallow or exposed sites in sensitive (Tier 2) and hypersensitive areas (Tier 3) prior to startup. These areas are sensitive because of population density or the potential for environmental damage. The pipeline at these locations would be buried to a minimum depth of 5 ft (or equivalent) from the top of the pipe. This depth is 2 ft deeper than required by DOT regulations for new pipe, so protection from some types of third-party damage should improve.

In addition to the 12 sites referenced above, exposed/shallow pipe segments at 27 other sites would be lowered to a minimum depth of cover of 5 ft (or equivalent) from the top of the pipe. These 27 sites are located in Tier 1 areas, and according to LMC 18, all pipe lowering would be completed prior to startup.

Depth-of-Cover surveys to locate exposed and shallow pipe segments are not conducted on a fixed schedule. The ORA is conducted annually and provides feedback to Longhorn regarding, for example, the adequacy, need, and frequency of evaluations such as the Depth of Cover survey. Details of the survey are found in Section 3.5.8 of the LMP. Details of remediation prioritization for exposed and shallow pipe is also provided in this section.

5.10 POTENTIAL EXISTING AND FUTURE CORROSION PROBLEMS

5.10.1 Comment

A commentor asked why the physical condition of aboveground piping was not addressed in the draft EA.

Response

Defects in aboveground pipe coating maintenance have been identified. All are addressed as part of the LMP. Per LMP Section 3.5, on-going inspections for atmospheric corrosion would be conducted annually. This exceeds the ASME B31.4 recommended practice of “at least every three years.”

5.10.2 Comment

Commentors questioned the possibility of previous corrosion (given a reportedly suspect corrosion control protocol for certain periods) and asked what is being done to prevent future corrosion.

Response

The possibility of previous corrosion is an integrity concern. Integrity of the entire pipeline would be verified prior to start up with a hydrostatic test as described in LMC 1 and LMC 2 (Chapter 9 of the EA). Integrity is to be further verified within three months of start up, when an internal inspection device could be used to supplement the initial hydrostatic test. The pipeline is to be operating at reduced pressures until the internal inspection is complete. Previous corrosion episodes would be detected through these integrity-verification efforts (Section 5.3.3, Chapter 5 of the draft EA).

Corrosion potential and corrosion control systems are described in Section 5.2.6, Chapter 5 of the draft EA. External corrosion control is achieved through an industry-standard, two-part defense system of external coatings and applied CP currents. Corrosion rates of virtually “zero” are achieved by proper application of this system. Several Longhorn mitigation measures specify enhanced methodologies related to this, including LMC 4, 14, 19, and 32, and various aspects of the LMP, especially the ORA which specifically calls for the careful monitoring of corrosion rates. Through these measures, Longhorn’s external corrosion control activities would exceed current regulatory requirements.

5.10.3 Comment

A commentor questioned whether performing hydrostatic tests with water would promote corrosion and if special cleaning pigs or other activities should be mandated to avoid this problem.

Response

Corrosion from hydrotesting is possible and is commonly addressed in hydrostatic testing procedures. However, appreciable wall loss due to such corrosion would normally not occur unless large quantities of untreated water remain in contact with pipe steel for long periods of time. When properly conducted, hydrostatic testing is thought to present virtually no corrosion threat to pipeline integrity, for the following reasons:

- Longhorn generally uses an inhibitor in hydrostatic test water to eliminate the corrosion concern immediately and/or uses a rust inhibitor following the test.
- Water is immediately removed from the pipeline after the test by using pigs and possibly additional measures. To ensure product purity, the operator must often thoroughly de-water the line, sometimes to the extent that nitrogen-drying techniques are used.
- Water can accumulate in low spots along the line. If the water were untreated, corrosion would progress only until the available oxygen (or other corrosion-promoting component) was used up. Without replenishment of fresh water, corrosion would halt.
- Product movements themselves tend to sweep remaining fluids from the line, especially during start up or changes in flowing conditions.
- Even under a catastrophic event, appreciable wall loss due to such corrosion would normally not occur unless large quantities of untreated water remain in contact with pipe steel for long periods of time.

5.10.4 Comment

Several commentors questioned the effect of other metal structures or pipelines on CP for the Longhorn pipeline.

Response

Other metal in close proximity to a buried pipeline can effect the pipeline. One potential effect of nearby buried metallic structures, especially those with their own CP systems is to divert electric current from the pipeline that is being protected. Such impacts on CP systems from other buried metals or foreign CP systems are referred to as “interferences.” These can be serious and are one key impetus for performing regular CISs. These surveys are to be done per the LMP.

Owners of pipelines whose CP systems have been found to be interfering normally cooperate by installing bonds between the systems. Some of these are termed 'critical bonds' indicating that serious CP system malfunction is possible upon damage to the bond. Such bonds are required to be inspected at regular intervals, as part of compliance with regulations to ensure adequate CP.

Potential interferences can also be inferred by certain ILIs, including those specified in the LMP. The presence of nearby buried metal can be detected in the magnetic flux leakage tool. Such indications normally warrant increased scrutiny from a corrosion-control perspective, if not immediate excavation for further inspection.

5.10.5 Comment

Several commentors questioned the ability of corrosion control methods to effectively combat "corrosion in seams."

Response

It is assumed that the commentor refers to rare special corrosion phenomenon often referred to as “selective seam corrosion.” As discussed in the draft EA Section 5.3.2, some pre-1970 ERW portions of the subject pipeline have an increased susceptibility to this. While CP is thought to be effective in preventing formation of initiators, its effectiveness in stopping on-going corrosion in an existing crevice depends on the current density and the electrolyte in the crevice.

Initial integrity verification and on-going re-verification through a detailed ORA program (see LMP in chapter 9 of the EA) are intended to address integrity threats from any active selective seam corrosion. Corrosion control measures specified in the LMP address the potential for additional crevice corrosion sites appearing.

5.10.6 Comment

A commentor asked why the draft EA excluded a discussion on areas of the pipeline with excessive CP voltage.

Response

A concern related to excessive CP voltages is the liberation of excessive H_2 possibly leading to coating disbondment. Coating surveys are to be done per the LMP. Since disbonded coating is very difficult to detect, measures would be taken as described in LMP Section 3.5.1. Possible instances of previous coating disbondment and subsequent corrosion would be detected and addressed via the integrity verification program.

5.11 ASSESSMENT OF OCTOBER 1998 INCIDENT ON THE LONGHORN PIPELINE IN HARRIS COUNTY

5.11.1 Comment

A commentor requested additional information on Longhorn's diesel fuel spill on October 1998 near Hunting Bayou in the Houston area and on additional studies done on the "health" of the bayou.

Response

The TNRCC Oil or Hazardous Substances Spill or Discharge Report and a letter report with attachments from WES (on behalf of Longhorn) to the TNRCC, were both reviewed for the draft EA. The letter report included an executive summary, a chronology, and a description of studies in progress. Boots & Coots Special Services performed the response, cleanup, and testing. Soils testing identified contaminated areas, which were then excavated and removed from the site. Testing following excavation indicated that all soils left in place met the established level of less than 100 milligrams (mg) of petroleum per kilogram (kg) of soil (1 part per million). Boots & Coots also conducted a National Resource Damage Assessment (NRDA) preliminary review on the day after the spill. The review concluded (based on visual observations and water samples from Hunting Bayou, the creek, and the gully) that there was no evidence indicating an injury to natural resources as a result of the spill. Some water samples from the western-most sampling point in the gully showed high total petroleum hydrocarbons. Oxidation was performed on this area. The TNRCC did an inspection a week following the spill and was satisfied with the cleanup and gave approval to remove booms from the creek. No further information has been received or reviewed concerning the health of the bayou after that period.

5.11.2 Comment

A commentor said that a statement in Section 5.5.3 of the draft EA from the NRDA report that there were no oiled animals or stressed vegetation resulting from the October 1998 Harris County accident is "...hyperbolic, dishonest, and ludicrous. Bayous teem with wildlife and it is inconceivable that no significant damage was done."

Response

The draft EA quotes a report published by Boots & Coots Special Services (Boring 1999). This report is available in the EA Contractor's public reading room in Binder PO68. A review of the report indicates that the NRDA was thorough and professionally conducted. There is no reason to believe that it was inadequate, or the statement inaccurate. The Texas Parks and Wildlife Department's Houston Field Office inspected the site and confirmed the findings on October 8, 1998.

5.11.3 Comment

A commentor questioned why 9.1 miles of pipeline involved in the October 1998 accident in the Houston area was replaced. The commentor wanted to know why the rest of pipeline is not replaced.

Response

The 9.1 miles of new pipe was installed to connect the Galena Park Station located in Houston to the existing Baytown-Satsuma line. This is not replacing an existing pipeline segment. This new pipeline was being inspected at the time of the October 1998 explosion. Pipe in the immediate vicinity of the explosion was removed and replaced. The length of the replaced section was approximately 370 ft. The remainder of the new 9.1-mile section of pipe was not replaced since it was not involved in the accident.

5.11.4 Comment

Commentors expressed concerned that the discussion of the explosion on the Longhorn pipeline, which occurred in Harris County in October 1998, was inadequately addressed and that the effects and significance of that explosion were minimized and biased.

Response

DOT, which investigated the accident, has completed a report on this accident subsequent to the publishing of the draft EA. The accident resulted from a non-operating pipeline. It occurred due to poor judgement, in attempting a non-standard testing method for the pipe.

5.12 ADEQUACY OF THE EMERGENCY RESPONSE PREPAREDNESS AND RESPONSE PLAN

5.12.1 Comment

A commentor, referring to LMCs 23, 24, and 26, stated that the two-hour emergency response required for Tiers 2 and 3 could not be achieved with just two response centers, as proposed in the LMP. The commentor suggested that a minimum of seven locations are needed along the pipeline from Galena Park to El Paso.

Response

Two-hour response times for the Tier 2 and Tier 3 areas would be achieved by using three response companies with six locations. The three response companies are Boots & Coots, Viva, and Eco-Logical. Boots & Coots has four locations (Houston, west of Houston, Austin, and San Antonio) and would be the first responder to sites between Milepost (MP) 0 to MP 276. Eco-Logical, located in Midland, would respond first to emergencies located from MP 276 to MP 527. Viva, with offices in El Paso, would be the first responder to spills that occur from MP 527 to El Paso (MP 694). The locations of these offices would provide two-hour response times in Tier 2 and Tier 3 locations and 2- to 4-hour response times for Tier 1 areas. The first response teams would consist of personnel and light equipment. Heavy equipment, if needed, may take longer to reach the site.

5.12.2 Comment

The commentor was concerned about whether emergency response planning should consider cumulative impacts that result from a fire/explosion on the Longhorn pipeline damaging other pipelines in the ROW.

Response

The emergency response procedures for an accident involving only the Longhorn pipeline would be largely the same as the procedures for an accident that involves multiple pipelines. More personnel and equipment may be required to carry out those response procedures for a multi-pipeline accident. Longhorn has prepared for backup with emergency response contractors and emergency response equipment.

5.12.3 Comment

A commentor raised concern that the Facility Response Plan (FRP) worksites might not be near enough to potential leak sites.

Response

Work site distances from the potential leak areas range from a few tenths of a mile up to 24 miles. The addition of an emergency response center in Austin makes the closer work sites practical. The more distant work sites are selected to allow for secondary containment and capture of any spill that passes through the primary work sites. The FRP calls for consideration of vapor suppressing foam at all urban sites, although this would be much more important at the close work sites. The technical response planning sheets in the FRP specify a single site for collection of spilled product. This would be sufficient for many spills; additional tanks may be brought in as necessary.

5.12.4 Comment

A commentor questioned whether the FRP included sufficient information on the coordination and integration of Longhorn spill response with a large municipal incident command system. Also, the Longhorn FRP includes an organizational structure based on the Incident Command System (ICS) and suggests an integrated ICS when interfacing with a metropolitan fire department.

Response

The Austin Fire Department objected to the use of integrated ICS, which it reserves for shared responsibility with other public agencies in multi-jurisdictional incidents. The Austin Fire Department prefers that Longhorn resources act as a liaison to the Austin Fire Department incident commander. The FRP indicates that the most qualified Longhorn individual on the scene would assume the "Longhorn incident commander" position. It is difficult for the FRP to include detailed coordination plans for all areas along the pipeline. These types of details are better worked out in the annual meetings between pipeline response personnel and the fire departments.

5.12.5 Comment

A commentor requested detailed plans in response to realistic scenarios and specific response equipment needed.

Response

The updated FRP does include much more detailed information than does the draft EA. Section 4.2.4 in Volumes II and Volume III of the FRP describe response to a worst case discharge in the Sugar Land and Hobbs zones, respectively. There is an Initial Response Actions table/checklist in each county section of Volumes II and III. The establishment of a response center in Austin should relieve many of the response time concerns voiced by commentors.

5.12.6 Comment

A commentor stated that the spill response plan will not be updated in the future as required and therefore is inadequate. The commentor suggested that the response plan should be updated annually.

Response

The FRP, Volume I, Core Plan has procedures for updates and revisions to the plan. The plan calls for updates at five-year intervals unless changes to the pipeline trigger an earlier revision. These procedures are consistent with the requirements of 49 CFR §194.121.

5.12.7 Comment

A commentor expressed multiple criticisms of the EPC's Emergency Response Plan. EPC was the former owner/operator of what now comprises most of the Longhorn pipeline.

Response

A new FRP has been prepared by WES for the Longhorn pipeline, and the new emergency plan would govern any future response activities, not the old EPC Emergency Response Plan.

5.12.8 Comment

A commentor requested information on emergency responses for spills to wetlands.

Response

The emergency responses to a spill in wetlands are a compilation of terrestrial and aquatic spill procedures. Booms would be used to contain the spill. Sorbents and mechanical collection would be used to remove spilled oil/gasoline. There may be special issues related to bringing heavy equipment (like vacuum trucks) to the spill site because of the soft ground. In these cases, vacuum lines could be maneuvered from boats or the spill could be diverted to an area accessible to trucks for collection. There would also be issues related to waterfowl in a wetlands environment. All of these issues are addressed in the Longhorn FRP.

5.12.9 Comment

A commentor noted that the draft EA did not include spill volume estimating procedures in the Longhorn pipeline manual and that operating personnel would not be trained in such estimations.

Response

According to Longhorn, after the leak has been repaired, spill volumes are estimated by measuring the volume of product (drainup) needed to refill the pipeline segment that had experienced the leak. Longhorn feels that this method provides the most accurate estimate of the spill volume. The procedure is described in the Operations Control Procedures volume of the Williams System of Operating Manuals. A method for calculating a discharge resulting in a catastrophic event at any location along the pipeline (in accordance with 49 CFR §194) is given in the Facility Response Plan. According to Longhorn, rough estimates would be made immediately by the first responders to determine equipment needed for emergency response. Longhorn has already developed spill estimates resulting from a catastrophic event for any locations in Harris and Travis counties for use in the event resulting from an accident in these areas.

5.12.10Comment

The commentor stated that the full content of 49 CFR §194.121(b) on when oil spill response plans have to be changed and submitted or resubmitted for approval was not included in draft EA. The commentor further said that the draft EA failed to address the requirements 49 CFR §194.121(b) requiring revisions and resubmission of required spill response plans.

Response

In preparation of the draft EA, a table was prepared to show a complete checklist of 49 CFR Part 194 requirements against the corresponding elements of the Longhorn FRP, along with similar checklist tables for other regulations and industry standards pertaining to emergency response. These lengthy tables were used by the Lead Agencies and are maintained in the Public Reading Room and only the summary level tables were presented in the draft EA. The commentor is correct that the full content of 49 CFR §194.121(b) was not included in the draft EA, but the full content was carefully considered, and the Longhorn FRP was found to be in compliance with the requirements. It should be noted that the FRP for the Longhorn pipeline is a first time submittal. The EA does not need to address resubmittals.

5.12.11 Comment

A commentor provided the text for 49 CFR §194.121(b) which clearly states that changes to and submissions of spill response plans are required when: (a) pipeline is extended; (b) changes occur in worse case discharge volumes; (c) substantial relocations and replacements are made to pipeline; (d) type of oil or petroleum transported is changed; e) name of oil spill removal organization is changed; (f) significant changes are made in oil spill response equipment requirements of the National Contingency Plan or the Area Contingency Plan; (g) change in the qualified individual; or (h) changes in other information that may affect full implementation of the plan.

Response

This comment is a quotation of the 49 CFR Part 194 requirements for when a resubmittal is required earlier than every five years.

5.12.12 Comment

A commentor stated that EPC's spill response plan as of the mid-1990s was not adequate for resubmission by Longhorn if the pipeline is returned to crude oil service. The commentor also stated that per 49 CFR §194.121(b), Longhorn will be required to modify and resubmit their spill response plan if it changes to crude oil transport.

Response

The commentor is correct. If the EPC portion of the pipeline was returned to service, the FRP would need to be modified and resubmitted.

5.12.13 Comment

A commentor requested that the detailed procedures and criteria used by DOT and the Railroad Commission of Texas regarding spill response plans need to be added to the final EA.

Response

This is a matter of public record and is available to those interested by contacting the agencies directly.

5.12.14 Comment

A commentor questioned the relevance of Oil Pollution Act of 1990 (OPA '90) and 49 CFR Part 194 requirements, and specifically how the response plan under paragraph §194.107 relates, if any, to the evaluation process for valve spacing.

Response

OPA '90 and 49 CFR Part 194 are the primary regulatory drivers for pipeline emergency response planning. 49 CFR §194.107 is the specific requirement for a pipeline to develop an emergency response plan, and it lays out the minimum contents of the emergency response plan. It is not clear what "this evaluation process" means in the comment. The emergency planning requirements would not have any direct effect on the valve spacing evaluation. The emergency response plan would have to consider valve spacing in assessing a worst-case discharge and provide the staffing and resources to respond to such an event. It is possible that the evaluation of emergency response for a worst-case discharge might indicate that the spill would be too large for effective response. This might suggest the addition of valves to reduce the drain-down component of a worst-case discharge.

5.12.15 Comment

A commentor requested an explanation of the regulatory compliance process for emergency plans (i.e., when compliance is achieved and who makes the determination, etc.).

Response

A pipeline operator must prepare a FRP that complies with OPA '90 and 49 CFR Part 194 prior to starting operation, and that FRP must be updated every five years, or sooner if significant changes occur. The pipeline operator develops the FRP and submits it to DOT Pipelines Response Plans Officer in the Research and Special Programs Administration (RSPA) as well as state and local agencies. RSPA would review the FRP and either approve it or find deficiencies. If the FRP does not meet the requirements of 49 CFR Part 194, the operator would be notified of the deficiencies and given an opportunity to respond. An informal conference may be conducted to discuss the perceived deficiencies. The operator must then modify the FRP to correct the deficiencies or petition Research and Special Programs Administration for reconsideration within 30 days of receipt of notice of deficiencies.

5.12.16 Comment

A commentor stated that the level of action needed can only be determined on a case-by-case basis. The commentor wanted clarification of the types of response resources involved varying from 6 to 60 hours.

Response

As the commentor pointed out, the type of action needed for pipeline emergency response can only be determined for each particular case, however, there are some common stages of actions involved. The first steps are directed towards assessment of the size of the spill and its potential impacts. The first consideration is public safety. Local agencies would set up security around the spill site and the likely path of impacts. If there is a fire, then fire-fighting actions would generally follow. Use of fire-fighting foam may also be considered to reduce evaporation rates to avoid ignition. This phase of activity is likely to involve fire-fighting equipment, such as trucks, hoses, monitors, and foam guns. Once public safety has been addressed, the next concern is containment of the spill, which may be done in a variety of ways depending on the terrain at the spill site. The containment actions may involve heavy earth-moving equipment to construct dams or diversion trenches, or it may involve deployment of booms in aquatic environments. Once the spill is contained, a variety of actions may begin, such as collection/cleanup; evaluation of environmental impacts; sampling of air, soil, and water; and search, rescue, and cleanup of wildlife. The collection/cleanup activities can involve sorbents, pads, excavation, in-situ burning, and many other techniques. It is not possible to address all of these activities in great detail, but this brief summary gives some idea of the range of activities involved.

5.12.17 Comment

A commentor asked how “Superfund” and “the Oil Pollution Act” of 1990 differ.

Response

There are numerous similarities and differences between these two sources of federal authority. Both statutes are long and complex, but some of their important features are summarized below.

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), sometimes referred to as “Superfund,” provides EPA substantial authority to respond to environmental contamination caused by releases (or threatened releases) of hazardous substances and other pollutants to the environment. Depending on circumstances, that authority includes issuance of administrative orders, cleanup of contaminated areas using the Hazardous Substance Superfund, and bringing judicial actions against potentially responsible parties to require them to undertake cleanup actions or reimburse government cleanup costs. Potentially responsible parties include current owners and operators of a facility from which there has been a release, persons who owned or operated the facility at the time of the disposal of hazardous substances, generators of hazardous substances, and transporters of hazardous substances, rendering CERCLA very useful for addressing environmental hazards created by abandoned hazardous waste sites. Because its definition of “hazardous substance” excludes petroleum and fractions of petroleum, however, CERCLA is not generally used for addressing cleanup of spills from gasoline pipelines.

Congress enacted the Oil Pollution Act of 1990 (OPA), which includes amendments to Clean Water Act §311 as well as “stand-alone” provisions, in response to the Exxon Valdez spill. OPA provides the federal government direct authority to address spills of “oil” (including “petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil” as well as spills of other designated hazardous substances 33 U.S.C. §1321(a)(1)). It is thus well suited to addressing oil or refined products pipeline spills. Many OPA provisions are generally analogous to CERCLA provisions, providing the government authority to issue administrative orders, undertake response actions using an Oil Spill Liability Trust Fund, and bring judicial actions to compel response and cleanup actions or recover government costs of such actions and reimbursement for damages to natural resources. Defendants/respondents in such actions are generally owners and operators of the vessels or facilities from which the spills occurred.

5.12.18 Comment

Several commentors questioned the response time necessary to get staff and resources in place to respond to a spill. Those comments included questions about what the response time might be for spills in various areas, as well as questions about whether the response time would be adequate to prevent significant damage from occurring before resources arrived.

Response

A pipeline represents a unique challenge to emergency response compared to stationary facilities. The Longhorn pipeline covers hundreds of miles, sometimes passing through remote territory without close access from paved roads. Achieving quick response to any potential spill site would require a pipeline operator to establish many response centers along the pipeline route. The people and equipment at these response centers would be idle the vast majority of the time.

Any discussion of response time must clarify the type of person responding. The Longhorn FRP calls for a response team that includes the nearest pump station operator, zone supervisors, head office supervisors, offsite response organizations (contractors), and local agencies. It is likely that local fire and law enforcement personnel would be first on the scene, particularly in developed areas. Response times for local agencies are likely to be in the range of 5 to 30 minutes, depending on the specific location of the spill. Only a few of these local agencies are trained and equipped to deal with hazardous materials (HAZMAT) spills and fires, so most would only establish a perimeter and control access to the site. The nearest pipeline operator would generally be on the scene next, typically within the range of 15 minutes to one hour. Zone supervisors and response contractors can reach most spill sites within 1 to 2 hours, and Longhorn would add a response center to facilitate a maximum 2-hour response to Tier 3 areas. This has been accomplished by adding a response center in Austin. The response contractors would bring equipment for fire-fighting, containment, and cleanup. Additional equipment and headquarters personnel would continue to arrive in the range of 2 to 8 hours, along with observers from federal, state, and local agencies. Longhorn has revised the FRP to include example response times to potential leak sites.

5.12.19Comment

One commentor asked how emergency response would be accomplished for spills in remote areas.

Response

It is more challenging to respond quickly and efficiently in remote areas. The heavy equipment used by local agencies and response contractors can be used off road, but there are limits to the types of terrain they can safely cross. It finally ends up to be a time issue, since suitable routes can be found or created given enough time. The first approach to responding to a spill in a remote area would be to identify the nearest spot where a road or street crosses the pipeline ROW. The ROW is kept clear and patrolled by trucks, and this should provide the easiest route to a remote spill site. The approach also has to consider water crossings near the spill site, a safe approach direction for the wind direction, and work sites to begin containment actions. The FRP has pre-planned access and response deployment for critical areas along the pipeline.

5.12.20Comment

Several commentors questioned how fires would be controlled in areas where volunteer fire departments are located.

Response

Few non-metropolitan fire departments have the staff, equipment, and training to respond to a significant HAZMAT spill or fire, whether they are professional fire departments, volunteer fire departments, or a mixture of professional and volunteer fire departments. The draft EA acknowledged this deficiency in HAZMAT response capability in Table 9-2, LMC 24:

> "Longhorn shall revise its facility response plan to better address fire fighting outside of metropolitan areas (Houston, Austin, and El Paso) where HAZMAT units do not exist."

Longhorn has revised its FRP to include HAZMAT and fire-fighting response. The response firm, Boots & Coots, has been added to the emergency response contractor list. Boots & Coots has both HAZMAT spill response and fire-fighting equipment as well as trained personnel. In addition, Boots & Coots has worked with local fire departments to identify and train individuals who are willing to work as part of a local response team.

5.12.21 Comment

There were several comments related to how emergency response would be accomplished if there was a spill near a school. Another commentor asked about evacuation plans for schools near the pipeline.

Response

Table 9-2 in Chapter 9 of the draft EA describes Longhorn's commitments for improvements, including emergency response issues. One of these improvements (LMC 26) requires more detailed response planning for areas where the pipeline crosses school property or passes close to school property (or other areas of high population and sensitive receptors). Longhorn has revised the response plan to include identification of schools near the ROW on FRP maps. The revised FRP also includes school notification numbers.

Evacuation plans are part of a more comprehensive emergency response plan. Many types of accidents besides a spill from the Longhorn pipeline could cause the need for emergency response and/or evacuation, such as severe weather, natural gas leaks, hostage or terrorist activities, etc. Each school or school district is responsible for planning its own emergency response and for carrying out regular drills to make sure that the teachers and students understand what they are expected to do. Longhorn does have the responsibility to plan its own emergency response actions and provide resources to mitigate the effects of a spill. A school can coordinate emergency planning with Longhorn directly or via the Local Emergency Planning Committee for the area.

5.12.22 Comment

One commentor asked how emergency response would be different based on the size of the spill. There were comments that the 10 bbl and 250 bbl thresholds are too high. That comment came from a metropolitan fire department, where high population and sensitive environmental receptors do increase the sensitivity of any size of spill.

Response

The FRP has several categories of spills for which different levels of response may be needed. Minor spills are those with less than 10 barrels (bbl) spilled. Moderate spills are those greater than 10 bbl and less than 250 bbl. The spill size thresholds in the FRP are set for the entire pipeline, and the thresholds are appropriate for the majority of the pipeline. These categories are used for notification purposes within the Longhorn management structure, not the emergency response agencies. Minor spills would still be reported to local agencies and appropriate response actions taken.

5.12.23 Comment

Several comments asked about spill response where soluble chemicals are involved, particularly methyl tertiary-butyl ether (MTBE).

Response

The containment and collection methods set forth in Volume I of the FRP do concentrate on collection of the bulk gasoline, which is not soluble in water. There are few response measures that would be effective on soluble chemicals. Longhorn has made a commitment (LMC 35) to refrain from transporting refined products that include MTBE or other like additives. This exclusion of MTBE should relieve the primary concern about soluble chemicals.

5.12.24 Comment

There were several comments regarding fire and explosion issues. One commentor noted that the Settlement Agreement requires an analysis of "plans to prevent damage from fires and explosions in populated areas and local government input in such plans."

Response

There is no way to totally prevent damage from fires and explosions if they should occur. Many of the mitigation measures deal with lowering the probability of a release and minimizing its size. The FRP deals with minimizing impacts for a spill, fire, or explosion. Longhorn had just begun to coordinate emergency response issues with fire departments when litigation started and that put direct communications on hold. Longhorn and its contractors resumed these coordinating meetings in the early spring of 2000 and have revised the FRP. The comment is correct that local fire departments would usually be first on the scene and would have the biggest effect on public safety. Longhorn recognizes this fact and is ready to coordinate response with local agencies. Longhorn has purchased insurance to cover liability costs arising from emergencies.

5.12.25Comment

There were several comments related to how the Longhorn response team would coordinate activities with local responders.

Response

Longhorn uses the ICS organization, which is the standard for emergency response. The issue is the use of the term “Unified Command,” which fire departments use to describe shared multi-jurisdictional responsibilities with other public agencies. The first responder on the scene is likely to be the local fire department and/or police. If there is a threat to public safety, the local agencies would generally assume command of the situation. The Longhorn response team and contractors would act in a liaison role to the local agency Incident Commander until the threat to public safety has ceased. As the situation transforms from emergency to cleanup operations, command of the situation would be transferred to the Longhorn response team with oversight by public agencies. It is possible that some rural agencies would not feel equipped to take command of the accident and would transfer command to the Longhorn response team on arrival.

5.12.26Comment

There were several comments related to emergency communications. There were comments about the order of notifications to be done when an emergency situation is discovered. There were also comments about the need for population near a spill to be able to access information about the spill and the status of the containment and cleanup operation.

Response

There is a pressing need in an emergency to notify a wide variety of people and agencies, including Longhorn officials, government agencies (federal, state, and local), and local emergency response agencies. The Longhorn FRP includes directories for these notifications. The FRP has been revised and the priority for 911 calls to activate local emergency services has been added. Longhorn maintains a 24-hour, 7-day a week phone number to report emergencies.

5.12.27 Comment

There were several comments related to annual coordination with agencies and to drills.

Response

The Longhorn FRP calls for conducting one deployment exercise per year, which would rotate from one response zone to the other. The comment suggests that a deployment exercise be held each year in each zone. It is also noted that there is a DOT requirement for annual coordination with local response agencies along the pipeline. While this requirement is typically met by sending an annual notice of who to contact if there is a problem, the local agency can request a more substantive coordination effort (such as a tabletop exercise or a deployment exercise). Where there is local sensitivity to emergency response issues, it would be better to request these tabletop or deployment exercises on a local basis rather than changing the FRP.

5.12.28 Comment

A commentor stated that some of the emergency work sites in Volume II of the FRP are too far downstream from the potential spill sites. The commentor indicated that emergency containment operations in an urban environment need to be within 1 to 1.5 miles of the spill site.

Response

The Longhorn FRP has been revised and includes a hierarchy of containment sites at varying distances from each water crossing. The locations of these emergency work sites vary from a few tenths of a mile to many miles away from the pipeline crossing. There are many urban area work sites within 1 to 1.5 miles of the spill site. The number of containment sites available to control spilled material would depend on the location of the spill. The last site in the hierarchy can be located at a considerable distance from the pipeline spill. For example, if spilled material enters Austin's Town Lake, the last containment site in the hierarchy is near

Longhorn Dam, which could be as much as 24 miles away from the pipeline crossing at which the spill occurred.

5.12.29 Comment

One commentor indicated that the FRP should include plans for responding to unexpected developments.

Response

Backup systems and contingency plans are an important part of emergency response planning. The predicted impacts in the draft EA were not based upon a perfect response to a spill or release from the pipeline. The impacts were projected with the assumption that, in the event of a spill or release, some problems in the response would occur and would need to be overcome. For example, at least two (and preferably three) independent communications methods are specified for emergencies, e.g., regular telephone, cellular telephone, radio, etc. Alternate methods of site access are also considered (wherever possible) in the detailed response planning for sensitive areas. In accordance with the OPA, all of Longhorn's response contractors would be appropriately trained and would work together with other response teams. Emergency site work would be handled under the Incident Command System, which would integrate the response teams from local agencies, Longhorn, and response contractors. The Incident Commander would make decisions about major mitigation actions with input from all parties.

5.12.30 Comment

Several commentors raised concerns about the response for specific sites along the pipeline.

Response

One commentor was specific to emergency response at the Browns School Rehabilitation Center, where many of the patients are unconscious or otherwise unable to leave the buildings under their own power. The physical condition of these patients obviously indicates a need for the Browns School Rehabilitation Center to have in place, as it does, an evacuation plan in the event of <u>any</u> emergency, including one associated with the pipeline. The draft EA noted that there is a 6 percent chance that a gasoline spill would ignite; this compares to a 3 percent chance that a crude oil spill would ignite. If a gasoline spill would ignite, it would typically not do so immediately upon release from a vessel (e.g., pipeline); rather, ignition would occur as a result of gasoline vapors migrating slowly from the release point to an open flame or spark. If a gasoline spill should occur from the pipeline, the school should begin evacuating the facility as a precautionary measure as it would in the event of any emergency. Longhorn has added a response center in the Austin area, which should improve the response time to the Browns School Rehabilitation Center. Browns School Rehabilitation Center is within the City of Austin, so the Austin Fire Department would likely be the first responder on the site.

There was also a comment about the potential for serious fire damage to the pine forests near Bastrop before response resources could arrive. Response time is from leak detection, not from ignition. A pipeline spill would not result in a fire unless there is a source of ignition. Most spills may have to travel some distance before (if ever) reaching an ignition source, especially in this sparsely populated area. The new response center in the Austin area should reduce response time. The subsection on fire fighting in rural areas also provides insight on this issue.

5.12.31 Comment

Address applicability of 40 CFR 300 and 40 CFR 112, and a spill prevention, control and countermeasure (SPCC) plan when ground water contamination is possible.

Response

SPCC requirements apply only to stationary facilities and not to the pipeline in general (which is a transportation facility). Only the storage tanks at pipeline terminals would be covered by SPCC requirements.

5.13 MISCELLANEOUS

5.13.1 Comment

A commentor noted that the "Capitol 1999" reference cited in Section 5.5.3 of the draft EA is not listed.

Response

The reference should actually be listed as Boring 1999. The full reference is: Boring, T. H. *Emergency Response Report – Longhorn Pipeline Incident, 11000 Whitewater, Houston,* . January 12, 1999. It is correct in the final EA.

6.0 COMMENTS AND RESPONSES RELATED TO EA CHAPTER 6 "OVERALL PIPELINE RISK ASSESSMENT"

6.1 SUITABILITY OF RISK ASSESSMENT METHODOLOGY

6.1.1 Comment

Commentors objected to the lack of precision in the use of the term "risk" in the draft EA.

Response

The EA relative "risk" model produces an Index Sum which is actually a measure of the relative probability of failure (POF). It is used in the context of the tier categories, which are based on consequences of failure, to reflect total risk. In many cases, the EA uses "risk" and "risk model" rather than "probability of failure" for convenience and in ways that are consistent with common vernacular. Since the POF is directly proportional to risk, this usage is correct, but is perhaps more precisely identified as a portion of total risk. The commentor is correct that the draft EA did not always distinguish between the two. The final EA defines these terms and is more consistent in their use.

6.1.2 Comment

The commentor stated that the EA should better explain how the probabilistic risk assessment compares risk along the pipeline with societal risks. Societal risk elements, as stated in the Settlement Agreement, were requested.

Response

The draft EA made some broad comparisons of probability estimates from the pipeline with common societal risks. These are intended to provide the reader with a basis for understanding the risk numbers. Estimates of injury and fatality probabilities as well as several specific environmental impacts, have also been developed since the draft EA was published. These estimates are shown in Chapters 6 and 9 of the final EA.

6.1.3 Comment

A commentor stated that Table 6-20 of the draft EA incorrectly compared common risks with risks incurred voluntarily and involuntarily.

Response

The table (Table 6-18 in the final EA) is intended to provide an illustration of commonly incurred risks and put them in perspective, not to provide a rigorous comparison. Note also that the difference between voluntary and involuntary risks is often arguable. For example, driving is considered by some to be an involuntary activity and to be a risk in most areas of the US.

6.1.4 Comment

A commentor requested an explanation of the "decision-support" model referred to in Section 6.3.1 of the draft EA.

Response

The term “decision-support” model refers to the EA relative risk model. The model is designed to provide guidance or “decision support,” as well as identification of areas with relatively higher risks. It does this by preserving the evaluation of conditions and activities that are causing the higher risks, thereby indicating specific factors that can be addressed in order to reduce risks. The model, in effect, highlights deficiencies and points to potential remedies.

6.1.5 Comment

A commentor stated that the Exxon Pipeline Company (EPC) and Williams Energy Services (WES) risk assessments should not be included in the draft EA for several reasons including inconsistent models, assessors, and time frames.

Response

It is recognized that previous risk assessments were not directly comparable to the EA risk assessment for several reasons. These include differences in assessors, system configuration, and data availability. However, the previous work is useful for other reasons. These include illustrating that the EA relative risk methodology is used in the industry and that the methodology achieves similar results, even with differences in data specifics and assessors. The previous work also indicates an intent by operators to identify higher risk areas, and presumably, to direct resources accordingly.

6.1.6 Comment

A commentor stated that more information was needed on what was done for hazard identification and that there needed to be more explanation of process hazard assessment such as definition, results, etc.

Response

This comment appears to be associated primarily with Hazard and Operability Studies (HAZOPS) done for the pump stations and briefly discussed in the EA. This is a risk assessment technique commonly seen in the chemical and hydrocarbon processing industry. The HAZOPS technique falls into an assessment category commonly referred to as Process Hazard Analysis (PHA). It relies on a structured and comprehensive question-answer approach and expert participants to identify and remedy potential safety and operability issues. Longhorn conducted formal HAZOPS that appear to have followed accepted practice for such studies. The conduct of such studies exceeds regulatory requirements and is a voluntary effort on the part of the company. Results of these studies turned up some safety and operability issues that did not appear to be highly critical but were identified by Longhorn for subsequent follow-up. The studies were reviewed in the EA to determine whether Longhorn was, in fact, using best practices for managing its system.

6.1.7 Comment

Commentors stated that the risk assessment methods and results, as presented, are difficult to understand and not reproducible.

Response

Additional details supporting the EA methodology are available in the references to the EA. The body of the EA provides decisional information but does not provide complete background information for all concepts. In particular, some details of the EA's relative risk assessment were not fully discussed in the EA but are in EA-referenced documents and are available in the administrative record.

6.2 CORRELATING RELATIVE AND PROBABILISTIC RISK ASSESSMENTS

6.2.1 Comment

Several commentors expressed concern that the Index Sum was not correlated with absolute POF and that improvements from mitigation could not be verified.

Response

The predicted magnitude of potential improvements from mitigation measures, measured by changes in expected leak frequency, is estimated by the difference between unmitigated and mitigated risk scores for the Longhorn pipeline. A correlation between the EA relative risk results and an estimated failure rate is discussed in Appendix 9B of the final EA.

This estimate is not inconsistent with ranges of actual failure rate data differences among different US pipeline companies. The DOT database shows pipeline failure rates, expressed in reportable accidents/mile/year, ranging from a low of 7.4E-05 to a high of 1.8E-03. The average is 6.2E-04 and the median is 3.5E-04. A table of the pertinent data is included as Appendix D of this RS. These data are listed for companies where the total pipeline mileage could be approximated so that the leak experiences could be normalized to a per-mile basis. Data for a total of 56 companies for a period of ten years, corresponding to the period for which the EPC data were used in the EA estimates, were examined. These are DOT reportable events, while the data used in the EA from EPC operations of the subject pipeline is for all known events. Considering only reportable events, the failure rate for the subject pipeline has been around 8.4E-04.

6.3 ADEQUACY OF ASSESSMENT OF FIRE AND EXPLOSION RISKS AND 2,500 FT IMPACT CORRIDOR

6.3.1 Comment

Several commentors questioned the assessment of fire and explosion risks.

Response

Impacts of fires or explosions were a subject of the impacts analysis of Chapter 7 of the EA.

As noted in Chapter 6 of the EA, the probability of an explosion from a gasoline pipeline, even in the event of a large leak or spill, is remote. Although a flash fire and subsequent pool fire can result from a large gasoline spill, the probability of a true explosion with overpressures that cause damage and injury by blast effects is remote.

One explosion has been reported among all gasoline pipeline spills, according to the DOT database. Lack of detail prevents a determination of whether it was a true vapor cloud explosion, which is a phenomenon associated with highly volatile fluids, or rather a flash fire incorrectly reported as an explosion. Ignition of gasoline results in a fire but rarely an explosion. Even ignition is a relatively rare event. Based on a review of experiences with both refined product (including gasoline) and crude oil spills from pipelines, as recorded in the DOT pipeline accident database, only about 4 to 6 percent of gasoline pipeline accidents are accompanied by fire. Therefore, around 94 to 96 percent of the pipeline spills did not ignite, a necessary step towards any explosion.

6.3.2 Comment

Commentors stated that simulation details were not provided for a pool fire and that the way locations were defined was not adequately explained. A commentor stated that the meteorological data in the draft EA failed to represent critical weather conditions likely to be present. A commentor said the draft EA presented little data on the modeling performed with Chemical Hazardous Air Release Model (CHARM®) vapor dispersion and fire computer program. The commentor said the draft EA should have provided a detailed presentation.

Response

CHARM® is a computer modeling program that calculates and predicts the dispersion and concentration of airborne plumes from chemical releases. It can also calculate the heat radiation profiles surrounding a flammable chemical fire and the over-pressure profile for a vapor cloud explosion. CHARM® is among several dense gas simulation models featured in an evaluation published by the EPA, (US Environmental Protection Agency, *Evaluation of Dense Gas Dispersion Models*, Office of Air Quality Planning and Standards, September 1990, EPA-450/4-90). CHARM® is acceptable for use in modeling accidental chemical release effects under EPA regulations pursuant to the Accidental Release Prevention Risk Management Plan rule. In response to concerns that there was insufficient documentation on CHARM®, several documents are being placed among the project documentation files in the public reading room of the Lead Agencies' Contractor ([1] CHARM® User's Manual, Radian International, November, 1997; [2] CHARM® Tutorial, Radian International, November, 1997; and [3] CHARM® Emergency Response System, Technical Reference Manuals, September 1995.)

For modeling purposes, a cloud of flammable material is assumed to be released. Since this cloud is affected by the degree of turbulence, temperature, and other conditions at the time and location of release, results are sensitive to assumed weather conditions. CHARM® is used in the EA to provide estimates of distances affected by fires from gasoline spills in several example spill scenarios. CHARM® was also run in the vapor cloud explosion mode to see if the size of vapor clouds formed might lead to a vapor cloud explosion. It was not the intent of the

CHARM® modeling to examine all possible scenarios, since the impacts analysis was being done in a more qualitative manner for fire or explosion effects, as is explained in Chapter 7 of the EA.

For the draft EA, CHARM® was used in two stages. The first took place early in the EA process as a means of selecting a “reasonable” corridor width to set the geographical boundaries for studying impacts on human health and safety. The second application was to estimate the approximate size of areas likely to be affected by heat radiation from a fire resulting from large spills along the pipeline.

In the first application, data on gasoline to be transported in the pipeline were approximated. The model requires physical, chemical, and transport property data on the substance being modeled to calculate release rates, liquid evaporation rates, air dispersion, and fire and explosion effects. Lacking Longhorn gasoline specifications at the time, hexane was selected as a surrogate substance to use for the CHARM® modeling. Hexane is highly flammable and was considered to be a reasonable representation for gasoline, being one of the mid-range to light-range molecular weight components of gasoline.

Various source conditions for a release can be modeled. A sudden, massive spill of flammable liquid that results in a large pool fire was considered catastrophic from a fire scenario. This case was used for both the initial hexane spill modeling and later, gasoline spill modeling. The second series of modeling runs was made with gasoline as the spilled substance, once gasoline property data were available and entered into the CHARM® chemical properties database. For details of the methodology used in CHARM®, the references cited above can be consulted. Table 6-3 in the final EA is an example data input form used for this modeling. The meteorological data that are used represent an average of more stable conditions (lower turbulence, higher risk of high airborne vapor concentrations and fire) to be found in the Austin area as a basis for modeling. Many permutations of weather conditions are possible, but for purposes of estimating the general magnitude of impact areas from fires the conditions summarized below in Table 6-4 in the final EA are considered to be appropriate.

6.3.3 Comment

Commentors requested more explanation of the basis for modeling the consequences of a fire, how locations were defined, etc.

Response

Modeling of the consequences of fires for the examples in the draft EA is based on the assumption of a pool fire with an area defined by drainage contours at the site location specified. The establishment of these contours is explained in Chapter 7 of the draft EA. It is assumed that the liquid pool would fill the area to the perimeter defined by the contours, including any neck-down point for the drainage. This is believed to be a relatively conservative assumption, as it yields a large flame area and heat radiation flux, compared with smaller single or multiple pools. In a real situation, the assumed large single pool configuration is probably less likely than multiple rivulets or smaller pools that form due to terrain irregularities.

The scenario locations were selected as representative of the kinds of locations that would be of concern for fire impacts. The intent was to provide a sampling of locations and not to provide a detailed analysis of all possible sites along the pipeline. The locations selected have been identified as being of special concern or are considered to be representative of similar locations elsewhere along the pipeline route. Representative sites were chosen in the Austin areas since the Settlement Agreement focused on the Austin area.

6.3.4 Comment

A commentor asserted that the probability of fire in the 12 miles of populated area (in Austin area) is much higher over 50 years than estimated in the draft EA.

Response

This comment is based on the commentor considering only data for a limited portion of the pipeline (Travis County) and using a calculation based only on historical leak rates, while ignoring other pertinent information. The draft EA estimated future leak, and impact rates using historical data, risk assessment results, and proposed mitigation actions. The EA analysis creates more realistic estimates.

6.3.5 Comment

Commentors challenged the use of the 2,500-ft “corridor” width (1,250 ft on each side of the pipeline) as being inadequate. There were comments regarding the possibility of impacts reaching far beyond this area and some commentors cited specific scenarios of concern.

Response

For purposes of the EA, a corridor around the pipeline, in which detailed analysis is to be done, has to be established. The corridor width represents a potential "zone of impact" and was based on mathematical modeling of preliminary dispersion and fire-effects (draft EA page 6-48 and Appendix 6F). The modeling was done with a gasoline component, heptane, to simulate a gasoline fire, and assumptions were made about pool size. Later, modeling using gasoline and taking in account actual terrain features for pooling, confirmed that the original predictions of distances for fire impacts, including heat radiation, were reasonable. The original modeling had predicted impact distance from about 1,000 ft to1,500 ft, from which the 1250-ft distance was derived. Later modeling showed that fire impacts from gasoline were within this range, although generally less (170 to 1400 ft including radiant heat effects from fire). Scenarios can be envisioned where an impact zone could exceed this distance, such as a delayed ignition after a rapid dispersion, but a 2,500-ft corridor is a rational and conservative width for the majority of foreseeable events. This is also conservative compared to a commonly referenced 660-ft corridor used in DOT gas pipeline regulations (49 CFR Part 192) to define class locations for graded regulatory requirements. Class locations are surrogates for population density in that application. The 2,500-ft width also compares conservatively with references reporting that two-thirds of all deaths and three-quarters of all injuries from pipeline accidents occur within 150 ft of the pipeline (API Research Study #040, July 1987).

The 2500-ft zone defines the area in which receptors such as population density and environmentally sensitive locations are characterized.

6.3.6 Comment

Commentors expressed concern about possibilities for potential impacts to schools from an explosion resulting from a worst-case leak or spill from the pipeline.

Response

As discussed in the Responsiveness Summary (RS) Section 6.3.1, the risk of explosion from a gasoline pipeline is remote. Threats of greatest concern are the damages from a flash fire and/or a pool fire following a spill and ignition.

The EA includes modeling of several fire impacts due to catastrophic events in populated areas. Pool fire modeling of impacts near four sites (mostly schools) in the Austin area was conducted (draft EA Table 6-18 shows results for these sites, including two schools). These sites were not within the zone of impact at the 4 kilowatts per square meter heat flux level. This conclusion is based on a modeled catastrophic event with a radiant heat flux of 4 kilowatts per square meter—a person's discomfort level, but not hazardous for short durations—at approximately 750 ft. The impacts assessment (Chapter 7 of the draft EA) addressed the hazards and the special sensitivity of populated areas and areas near schools.

6.3.7 Comment

A commentor noted an increase in hazards associated with pressurized refined products due to the atomizing effect of a sudden rupture.

Response

If a leak occurs on a pressurized liquid pipeline, the leaked liquid would initially vaporize or spray as droplets into the air. This would occur whether the liquid was crude oil or a refined product, although many components of crude oil would not vaporize under ambient conditions. The extent to which the liquid would spray depends on the pressure at the point of release, the size of the hole, and the temperature and viscosity of the liquid. A higher internal pressure would indeed transfer more energy to a release, causing a more intense spraying of droplets (atomization) and rapid vaporization. These effects could cause an increase in the local dispersion area and therefore an increase in ignition potential. This assumes that a larger vapor cloud would have a greater flammability zone, and hence, more probability of encountering an ignition source.

This effect was considered in the risk assessment because conservative modeling assumptions were used. Ignition potentials, fire scenarios, and dispersion estimates were discussed in Chapter 6 of the draft EA.

6.3.8 Comment

Commentors stated that the assumption that only 50 percent of the spills would reach the surface, used in the fire and explosion probability calculations, was too low.

Response

Based on new data and calculations (see previous responses), there is no longer a need to make this assumption. The final EA reflects this change.

6.3.9 Comment

A commentor questioned the risks associated with transporting “highly explosive elements” and the reliability of cathodic protection and “other sacrificial measures.”

Response

The National Fire Protection Association (NFPA) classifies gasoline as a flammable liquid, not a “highly explosive” substance. Only under special conditions of confined vapors is there an explosion hazard from gasoline. These conditions are unlikely to occur from a pipeline leak or spill.

The Longhorn pipeline is proposed to transport a flammable liquid. The resulting risks, including possible consequences from this, were outlined in several sections within the draft EA (Chapters 6 and 7).

Application of cathodic protection currents (small electrical charges) to the pipe wall is one part of a two-part defense system against external corrosion. It utilizes sacrificial anodes and rectifiers to produce the currents. “Sacrificial” refers to the fact that anode material is consumed (very slowly) in order to provide the protective currents. This industry-standard system is proven effective in halting or minimizing corrosion. Surveys and inspections designed to confirm the effectiveness of the corrosion prevention systems were described in Chapter 5 of the draft EA.

6.4 ESTIMATES OF SPILL PROBABILITIES

6.4.1 Comment

Several commentors challenged the way that historical leak data were used to estimate future leak probabilities. Commentors expressed specific concerns regarding what subsets of data were most appropriate and offered alternate approaches.

Response

An approach to probabilistic risk assessment was shown in the draft EA Chapter 5. Since data were limited, many judgments were required in determining the appropriateness of certain subsets of data used to predict the leak rate from future operations. Alternative approaches are also possible and could be equally valid. Some additional calculations have been performed in response to commentors’ suggestions and concerns.

Regardless of the specific assumptions and methodology employed in analyzing historical leak rates, results of such analyses cannot be correctly used in isolation. They can easily over- or understate the actual probability of future failures, due to the small amount of available data and the constantly changing environment. The draft EA relied more on an assessment of risk factors to determine risks. This assessment is linked to estimates of future leak rates as is shown in the final EA, Appendix 9B. As with other estimates, this approach has considerable uncertainty but is the most realistic appraisal of post-mitigation leak rates.

6.4.2 Comment

Commentors questioned the validity of equations for estimating spill probabilities.

Response

There are several acceptable approaches to estimating failure probabilities using historical leak data. The draft EA used an average spill frequency for the whole line, applied an exponential probability distribution function to calculate an overall probability for the whole line, and then estimated a segment POF by dividing by the number of segments in the line. The better method, in this case, is to use the Poisson distribution equation to calculate the probability of "one or more" leaks in a segment. The EA has been accordingly revised to use this equation to calculate leak probabilities. This has been done for one-mile and 1,250-ft segments of the line. Results are presented in the final EA.

6.4.3 Comment

Commentors challenged methods used for estimating the probability of accidents in general and for specific segments of the pipeline.

Response

The probability analyses in the draft EA focused on estimating the threat to specific locations along the pipeline in the event of a spill, fire, or explosion. This provided a quantitative measure of the risk, as measured by probability, for these three types of events. Different size spills were used to provide a broader spectrum of potential effects.

In response to comments on the approach, the estimates were re-examined for the final EA and the approach changed to:

- Estimate spill probability in total, without attempting to differentiate by size;

- Use new analysis results regarding the likely impacts of mitigation measures on spill frequency and hence, probability;
- Estimate frequencies and probabilities of specific impacts such as fatality, injury, drinking water contamination, etc.

The draft EA estimates focused on the probability of at least one spill in each of several size ranges, but did not account for the possibility that over a span as long as 50 years, more than one spill might occur at the same location. To do this, the Poisson equation relating spill probability and frequency is used to better estimate the probabilities.

This equation is:

$$P(X)SPILL = [(f * t)^{X} / X!] * \exp(- f * t)$$

where: P(X)SPILL = probability of exactly X spills

f = the average spill frequency for a segment of interest, spills /year

t = the time period for which the probability is sought, years

X = the number of spills for which the probability is sought, in the pipeline segment of interest.

The probability for one or more spills is evaluated as follows:

P(probability of one or more)SPILL = 1 - P(X)SPILL; where X = 0.

6.4.4 Comment

One commentor stated that the proper estimates of future spills would lead to the conclusion that there would be one spill every year.

Response

This statement is true only if one assumes the leak frequency for the new Longhorn operation would be the same as for the former EPC operation. More reasonable assumptions are based on a detailed risk assessment; the requirements that future operation be conducted under the proposed Longhorn Mitigation Plan (LMP); and other changes in the system and its operations should significantly reduce the overall leak probability compared to previous operations. The spill probabilities for mitigated operation are discussed elsewhere in this RS.

6.4.5 Comment

Commentors stated that the draft EA failed to consider increased leak frequency in urban areas.

Response

A frequency-of-leak comparison between urban and rural areas has been calculated for the EPC line as is shown in Appendix E of this RS. These calculations suggest that there is a difference, at least statistically, between expected leak rates in urban and rural areas. Urban area leak rates were statistically higher for this line while it was under EPC operational control. This had already been predicted in general, on the basis of probable increased third-party activity levels and certain corrosion control complications found in urban settings.

Urban areas might therefore experience increased failure rates. This is considered in the relative risk assessment (for example, population density as an indicator of increased third-party activity and the presence of other buried utilities as potential interferences with corrosion control). Therefore, urban area "penalties" assigned in the risk model must be overcome in the achievement of tier point levels. Urban areas also present the potential for increased impacts. As such, the urban areas are required to have a higher level of mitigation than rural areas (unless the rural area has some additional impact consideration such as ground water sensitivity). Use of different leak rate estimates for urban and rural areas is not thought to materially affect the EA.

6.4.6 Comment

Commentor stated that higher flow rates will unavoidably lead to an increase in spill frequency and that minimizing surge pressure spikes will not change this.

Response

There are no known mechanisms whereby higher flow rates would increase spill frequencies unless the associated flow velocities were somehow eroding the pipe wall. This is not the case for the flow conditions and materials of the subject pipeline. If the higher flow rates required higher pressures with commensurate increased stress levels in the pipe wall, then spill frequencies might be logically expected to increase. For this pipeline, flow rate increases would not increase pressure levels all along the pipeline. Some segments would even experience reduced pressures. The location and design of pump stations and the resulting hydraulic profile (including elevation effects) determines pressure at any point along the line.

Restricting the maximum surge pressures as specified in the LMP is a significant measure to ensure that high stress levels in the pipe wall are avoided. Such high stress levels when coincident with a pipe wall flaw could otherwise increase the chances of pipe failure.

6.4.7 Comment

A commentor questioned statements regarding adjustment factors in leak frequency calculations and questioned why historical frequencies were lowered by an adjustment factor.

Response

Page 6-41 and Table 6-6 (page 6-64) of the draft EA discussed the use of an adjustment factor. The adjustment factor is the ratio of the 10-year leak rate to the 29-year leak rate and is equal to 0.9. This means that in the most recent 10-year operating history, the leak rate is about 10 percent less than in the entire 29-year operating history. In Table 6-6, this factor was multiplied by the historical data for the full 29-year average of leak or spill rate, the result of which was then used to calculate probabilities. This value was initially used to estimate a leak rate for the future operation of the subject system.

For the final EA, it was felt that adjusting the 29-year leak rate to account for the apparently smaller leak rate of the most recent 10 years was not justified because of the small amount of leak data available. The unadjusted leak rate for the 29-year period was used in estimating future leak rates along the pipeline.

6.4.8 Comment

Several commentors expressed concern that probabilities of failure estimates are too low.

Response

Probabilities of failure were estimated under several different sets of assumptions, usually based on historical leak frequencies. In one case, the absolute probability estimates are derived from historical failure rate data for the former Exxon Pipeline Company (EPC) portions of the Longhorn Pipeline System. The failure frequency data included both DOT-OPS reportable accidents as well as non-reportable leaks and spills obtained from EPC's own records. In other cases, failure rates from comparable companies are used (see Appendix D); and in Chapter 9, estimates for the mitigated system are described. Possible sources of error for estimates are discussed. The conversion of failure frequency data to probability data is discussed in the EA, Chapter 6. Data for both the pipe and pump station parts of the system were developed separately.

As is further discussed in RS Section 6.11, historical pipeline leak data provide a limited view of failure potential. They can easily under or overestimate future leak potential since conditions are not always comparable. Therefore, leak history is not used in isolation for judgements of POE.

6.4.9 Comment

One commentor asked for comparable safety information for pipelines that are similar to the proposed project (i.e., crude-to-gasoline service with older pipe).

Response

Such data are not currently available. Most investigators cite difficulties in obtaining failure data for specific types of pipeline. For example, separating pipelines of specific diameters, age, type of product, etc. from overall incident statistics is problematic. This is due to incomplete database information. It would be especially difficult to find accurate failure rate information for other pipelines substantially similar to this one, including the change-in-product aspect.

6.5 CONFIDENCE LIMITS ON STATISTICAL DATA

6.5.1 Comment

Some commentors challenged the use of the absolute probability calculations on the grounds that no confidence limits were provided. A commentor calculated an upper bound of 95 percent confidence limit on the former EPC pipeline mean spill rate data for estimating the rate for the future Longhorn Pipeline System.

Response

Confidence limits are statistically calculated bounds, within which values would appear with a certain probability. When the number of data points available is small, the confidence limits are wide, indicating that there is not enough information available to be confident that all future data would be close to the small data set already obtained. Data on pipeline failure rates are limited. Hence, the use of statistical confidence intervals, especially at a high, 95 percent confidence level, would not present meaningful representations of true failure potential. It would present unrealistically large predictions, strictly as a result of the small number of data points available.

The commentor's failure estimates based on confidence limit calculations would theoretically apply equally to all other pipelines similar to this pipeline. Therefore, if these estimates were meaningful predictors of failure rates, many more pipeline failures would be experienced nationwide than are actually observed. It may be theoretically correct to say, for example, that "one can be 95 percent confident that there is no more than a one in ten chance of a spill in this area" as a result of a statistical confidence calculation on limited spill data. However, the best estimate of spill probability might be only one chance in a thousand. EA calculations are based on the "best estimates" rather than upper confidence limits. This is consistent with failure analysis work in general.

As is further discussed in RS Section 6.11, historical leaks of the EPC pipeline provide a limited view of failure potential. They can easily under- or overestimate future leak potential since conditions have changed and would change from the previous operations. Therefore, leak history is not used in isolation for judgements of POF. It is used as evidence of certain conditions that might exist, and this evidence, along with all other information that can be obtained, is used in a relative risk assessment to present a more realistic view of the risk.

6.5.2 Comment

Commentors noted that uncertainty should be considered in developing probability estimates. In particular, the commentors stated that the uncertainty in the mean rate of spills should be included in estimating probabilities of spills.

Response

In the EA, the mean spill frequency, f, expressed as leaks/year/mile, was calculated as:

$$f = \frac{N}{t\,L},$$

where:

N = Number of documented leaks of all sizes
t = time period over which the leaks were recorded, years
L = Length of pipeline from which leaks were recorded, miles

The confidence intervals or bounds about the mean leak frequency can be calculated using methods proposed in Hahn and Meeker[1] and assuming a Poisson distribution of the leak frequency data. The calculation of these confidence intervals for the EPC pipeline over the past 29 years and over the most recent 10 years of operation are summarized in Table RS 6-1.

In the EA, the future leak probabilities are estimated using the mean historical leak frequencies. In most engineering calculations, the mean values of those factors that have been derived from historical data are most often chosen as being the most likely to be predictive of future performance.

6.6 ANALYSIS OF DRAIN-DOWN VOLUMES AND WORST CASE SCENARIOS

6.6.1 Comment

A commentor stated that the EA made no attempt to calculate or predict actual spill quantities that could potentially be released in the event of an accident. The commentor stated that this calculation is essential to understanding the range of toxin doses that humans may be exposed to in the event of an accident.

Response

Spill quantities were estimated for several sensitive locations along the pipeline. In evaluating the pipeline risks, the emphasis was placed on assessing potential damage to the environment and on estimating the probabilities of imminent injury or death to persons in the vicinity of the pipeline. Since a Superfund-type human health risk assessment was not within the scope of the EA nor considered appropriate in this application, chronic health effects from a pipeline spill, including receptor pathways, population classifications, and dose-response predictions, were not specifically estimated. In the scenarios considered in the draft EA, fire and/or explosion presented a more direct threat to the areas in the immediate vicinity of the pipeline.

The estimated release volumes shown in draft EA Table 6-15 and Table 6-16 consist of (a) the volume released during the time it takes to shut down the pipeline, plus (b) the maximum volume that can drain from the pipeline segments upstream and downstream of the leak site. During the five-minute shutdown time, the leak rate was assumed to be equal to the pumping rate through the pipeline. The pipeline segments subject to draining are bounded by the upstream and downstream valves nearest to the spill location, provided these valves were either automatic, remote control, or check valves. If they were manually operated, it was assumed that they could be closed within two hours of the leak determination. During these two hours, liquids were assumed to be moving through the manually operated valve(s). Using common fluid flow

Table RS 6-1

Confidence Intervals about the Leak Frequency, f

Case A: Last 10 years of Operation
Pipeline Length = 459 miles
Number of Leaks = 8

n = pipeline mile-year combinations
= 4590

for 8 occurrences, values of G from Table A.25 in Hahn & Meeker are:

G for 95% lower confidence bound = 3.454
G for 95% upper confidence bound = 15.76

Upper confidence bound = G (upper) / n
Lower confidence bound = G (lower) / n

Applying this method to Case A gives

Leak frequency	=	0.00174 leaks/mile/year
Lower 95% confidence limit	=	0.000744 leaks/mile/year
Upper 95% confidence limit	=	0.00343 leaks/mile/year

Case B: Last 29 years of Operation
Pipeline Length = 459 miles
Number of Leaks = 26

n = pipeline mile-year combinations
= 13311

for 26 occurrences, values of G from Table A.25 in Hahn & Meeker are:

G for 95% lower confidence bound = 16.98
G for 95% upper confidence bound = 38.10

Upper confidence bound = G (upper) / n
Lower confidence bound = G (lower) / n

Applying this method to Case B gives

Leak frequency	=	0.00195 leaks/mile/year
Lower 95% confidence limit	=	0.00128 leaks/mile/year
Upper 95% confidence limit	=	0.00286 leaks/mile/year

References

1. Hahn, G.J., and W.O. Meeker. Statistical Intervals, A Guide for Practitioners, John Wiley & Sons, Inc., New York, 1992.

equations, these volumes were estimated by calculating the velocity of the draining liquid in the respective line segments. These volumes were assumed to have been released in a very short time, thus providing a worst case scenario for evaluating potential acute impacts. The estimates of maximum drain volumes were made using an algorithm described in Appendix 5F of the draft EA.

6.6.2 Comment

A commentor stated that the spill volume would depend upon spill rate and operator reaction time and that the history of operator inability to respond in a timely fashion does not appear to be factored into the EA Risk Model.

Response

With the existing Supervisory Control and Data Acquisition (SCADA) systems, Longhorn can identify large leaks and shut down the pipeline within five minutes. The state-of-the-art transient flow model system to be installed prior to startup would be capable of detecting leaks in the range of 100 to 130 barrels per hour (bph) within one minute. The pumps would stop automatically or can be shut down from the control center when a leak is identified, and remote-controlled valves along the pipeline can be closed within 1 to 3 minutes. Leak detection capabilities are discussed in more detail in Appendix 5A of the draft EA. Since the previous owner/operator, EPC, would not operate the pipeline, the response history for this pipeline is not a direct consideration in the EA risk assessment. The historical performance of the future operator, WES, with regards to reaction times has not been evaluated. Such an evaluation would be problematic given the wide variety of pipeline systems monitored, the limited number of events on record, and the constantly changing conditions pertinent to such an evaluation. The future operator has been evaluated in terms of having systems in place that support the stated response-time capabilities. A certain amount of “reaction inefficiencies” is also embedded in the five-minute estimate since full line ruptures should be detected and responded to in less than one minute.

6.6.3 Comment

A commentor stated that “the method of how spill volumes were calculated from previous spills are not reported and are very suspect.” The commentor said that the reported spill volumes from any of the past reported spills should not be considered accurate or relied upon until supporting calculations are brought forth.

Response

The methods of estimating past leak volumes and amounts recovered were not described in the draft EA. This information was not available in the data and documents supplied by EPC, Longhorn, and government sources examined. The amounts of crude oil that were reported as recovered were not directly used in any of the leak probability calculations. The distribution of past leak rates among five volume categories ranging from < 50 bbls to > 5,000 bbls has been used to estimate the probability of leaks in these volume ranges occurring in the future. The average leak frequency used in estimating the probability of a leak occurring at any point on the Longhorn pipeline is dependent only on the frequency of leak occurrence and not on the volume of that leak.

The estimated spill volumes shown in the draft EA Table 6-15 and Table 6-16 are for selected sites along the Longhorn pipeline and represent the maximum amounts that might be lost at these locations. The maximum losses were estimated by assuming that the hole causing the leak was equivalent to a complete severing of the pipe and that all liquid that could drain would drain from the pipeline. In actuality, volumes potentially spilled are thought to be significantly less than the estimated maximum. For example, full line ruptures are rare and the pump immediately downstream of the leak should be left running for a period of time after the leak has been detected and located, drawing liquid away from the leak site. Additionally, a response crew might arrive in time to stop or reduce some drainage from the pipeline.

6.6.4 Comment

A commentor expressed concern that spill size categories used in the draft EA understate the potential spill sizes from the pipeline.

Response

The use of a maximum spill size category of >5,000 bbl included the possibility of all spills of larger volume. Rather than understating the spill potentials, this tended to overstate the probability of large spills since the largest sizes were assigned the same probability as those closer to 5,000 bbl, even though they were much rarer. The draft EA showed relationships between spill sizes and leak rates in Chapter 5.

6.6.5 Comment

A commentor stated that the draft EA should have included elevation profiles along the pipeline to show valve locations and pressure testing records.

Response

The new hydrostatic testing records from recent (1999-2000) tests are available. In graphic form, the records show elevations and test pressures as well as a new elevation profile. See Appendix 6C of the final EA. Previously, tabulated elevation values were used for the draft EA.

6.6.6 Comment

The commentor objected to the statement on page 6-28 of the EA. In discussing the spill volume estimates and their application in the risk model, it is implied that the spill volume calculations only show which sections of pipe have more consequence potential.

Response

Spill volumes were estimated for several areas of particular interest along the pipeline. These areas were considered to be more consequential spill locations and therefore required greater scrutiny. Draft EA page 6-28 referred to a calculation that was a part of the Leak Impact Factor (LIF) score which was later abandoned in favor of the tier designation system to represent consequences. Draft EA page 6-28 remained only as a reference for comparisons with previous risk assessments conducted by WES and EPC.

6.6.7 Comment

A commentor requested an explanation regarding the definition of worst case accident. The commentor made the assumption that calculations are based on volumes produced after block valves are closed.

Response

Leak scenarios incorporate volumes leaked before and after valve closures. The spill size estimates take into consideration the flow rate through the pipe, the time needed to detect and react to a large leak, and the maximum volume that could drain down at the leak site. The potential drain volume was calculated using an algorithm that incorporated the elevation profile of the pipeline. Potential drain volumes were estimated by analyzing the elevation profile at 100-ft intervals between the leak site and the upstream and downstream valves. These estimated maximum spill volumes are provided in Table 6-16 of the draft EA.

6.6.8 Comment

A commentor said that a discussion about the potential drainage from pipe is not included in Appendix 5F of the draft EA. A table of points and geographic information system (GIS) layer are mentioned but not included. A table and/or spatial representation of this information is needed.

Response

As explained in the draft EA, Section 6.5.5 and Volume 2, Appendix 5F, potential drain-down volume was estimated at intervals of 100 ft over the entire length of the pipeline. The resulting table is a spreadsheet containing 40,382 rows. Because of its very large size, printing would be impractical. Electronic versions of both the spreadsheet and GIS file are available.

6.6.9 Comment

A commentor questioned statements in the draft EA that imply that corrosion would not result in a large leak.

Response

A failure mechanism such as corrosion is characterized by a slow removal of metal and hence is generally prone to produce pin-hole type leaks rather than large openings. Outside forces, especially when cracking is precipitated, can cause much larger openings. The size of a leak is dependent upon the size of the opening, the product density, the pipeline pressure, and time. The size of the opening is a function of many factors including stress levels and material properties such as ductility. Since there are so many permutations of factors possible, leak sizes can be highly variable. However, the opening size is at least partly dependent upon the initiating failure mechanism. The EA does not attempt to make correlations between failure mechanisms and leak sizes. Conservative leak size assumptions, regardless of mechanism, are used.

6.6.10 Comment

Commentors questioned the estimates of spill volumes because it was assumed, in the draft EA, that check valves would function as designed in the event of a large leak. The commentors stated that it is more reasonable to assume that check valves would fail.

Response

As discussed in Appendix H of this RS, the reliability of check valves appears to be high, especially against a failure mode that would prevent the valve from at least partially restricting flow when needed. It is not reasonable to assume that check valves would not perform their intended function in the event of a simultaneous pipeline failure. Nonetheless, spill scenarios are generated in the EA without considering the benefits from the check valves.

6.6.11 Comment

Commentors requested more discussion on the expectation that mainline valves can limit spill volumes, and they asserted that the mainline valves should only be counted on to reduce spill flow rate if they work properly. Also, the commentors requested consideration of the need for additional valves in critical areas and/or if these valves should be operated remotely.

Response

The locations of most of the existing mainline valves along the Longhorn pipeline were selected with the objective of either protecting specific environmental areas (e.g., major streams, Edwards Aquifer) or isolating pump stations. They can also, depending on the location along the pipeline, provide some reduction in the maximum volume of product that can drain and be released from potential leak sites along the pipeline. The maximum drainage volume released at any location between two mainline valves on the pipeline was estimated using an algorithm described in Appendix 5F of the draft EA. In this algorithm, it is assumed that both of the two valves at either end of the pipeline segment under consideration are closed. Under this assumption, additional drainage from further upstream or downstream of the segment is prevented.

The above assumption is valid when the block valves are either check valves or are remotely operated and can be closed within 1 to 3 minutes (Appendix 5D of the draft EA). If one or both block valves are manually operated, it would take some time for a technician to reach the valve and close it. In estimating the release volumes at the specific locations listed in Table 6-16 of the draft EA, it was assumed that it took two hours from the time the leak started to the time that a manual valve was closed. Drainage from the pipeline upstream or downstream of any manual valve was assumed to continue for this two-hour period. The velocity of the product draining was estimated using common fluid flow equations. The maximum volume drained was calculated from the estimated velocity. The calculation methodology is included in Appendix 5C in the final EA.

The primary types of block valves in service on the Longhorn pipeline are swing-type check valves, remote controlled gate valves, and manually operated gate valves. Data from the literature indicate that the reliability of check valves and motor-operated gate valves is high (see Appendix F of this RS).

6.6.12 Comment

Commentors asserted that:

- It could take more than 2 hours to reach and close a manual valve on the pipeline;
- It would probably take more than 5 minutes to identify a leak and shut down the line; and
- Siphoning should have been considered in calculating spill volumes.

Response

Manual block valves are generally placed in areas that are reasonably accessible. Longhorn has committed to responding to any spill in Tier 2 areas within 2 hours and to a spill in Tier 3 areas within 1 to 2 hours. Scenarios can be envisioned where response time is more than 2 hours or much less than 2 hours. Given the commitments, it was determined that 2 hours was a reasonable time estimate for a technician to reach and close a manual block valve.

Longhorn has the capability via its current SCADA system to identify large leaks and stop pumps within 5 minutes. The new transient flow leak detection model that would be installed on the pipeline should also provide rapid identification of smaller leaks along the pipeline (Appendix 5C of the final EA discusses leak detection capabilities). Nevertheless, the shutdown time was more conservatively assumed to be 10 minutes in some of the latest spill scenarios.

Siphoning was not considered in the estimation of drain-down volumes. Given the many rises and falls in elevation along most segments of the pipeline, the probability of significant amounts of siphoning is low. Additionally, developing an estimate of the amount of siphoning that would occur is difficult, and the results of such an estimate would be of questionable accuracy. There is already some conservatism in the estimation of drain down volumes, since it is assumed that all liquid that could potentially drain would be released at the leak location.

6.6.13 Comment

Commentors wanted to know what an “instantaneous” leak was and how the drain-down volume was calculated.

Response

In providing estimates of leak volumes, it was assumed that all of the product released as a result of draining was released at one time, or instantaneously. This was done as a worst case condition and is conservative compared to a real-world scenario. In a few cases, a drainage rate was calculated to enable a release volume to be estimated as a function of elapsed time. Details of this calculation are provided in Appendix 6C of the final EA.

The algorithm used to calculate the drain-down volume is described in Appendix 6C of the draft EA. For any 100-ft increment along the entire pipeline, the algorithm returns the length of pipe that could potentially be drained to that point. The drain-down volume can then be calculated from the drain length.

6.7 APPROPRIATENESS OF PERFORMING A RELATIVE RISK ASSESSMENT IN ADDITION TO A PURELY STATISTICAL ANALYSIS

6.7.1 Comment

A commentor questioned a statement in the draft EA on page 9-38 where it was stated that "A mathematical model based on known causes of failure was developed."

Response

Characterizations of the draft EA relative risk model were intended to enable the reader to better understand the design and use of the model. The EA model does quantify relative risks through basic mathematical relationships. Underlying factors are also sometimes based on more sophisticated statistical analyses.

6.7.2 Comment

Commentors questioned the use of a "qualitative" approach rather than a "quantitative" approach to parts of the risk assessment.

Response

At this time, there are no complete pipeline risk models that are purely quantitative. The EA relative risk assessment can be described as a semi-quantitative model since both qualitative and quantitative methodologies are used. Appendix 9B in the final EA describes a linking between the EA assessment and pipeline failure rates, thereby showing a relationship to statistical data.

The terms “qualitative,” “quantitative,” and “semi-quantitative” are sometimes used in discussing approaches to risk assessment. The terms “subjective” and “objective” are similarly used. There is often an erroneous perception that a model that is labeled “quantitative” or “objective” has access to data that are not available to other modeling approaches. In reality, all approaches have access to the same databases and all must address concerns when data are insufficient to generate meaningful statistical input for a model. Including risk variables that have insufficient data requires an element of “qualitative” evaluation. The only alternative is to ignore the variable, resulting in a model which does not consider variables that intuitively must be important to the risk picture. Therefore, all models which attempt to represent the true risks must incorporate qualitative evaluations.

6.7.3 Comment

Commentors requested clarification of the purpose of the relative risk model and its role in the EA.

Response

For the purposes of this study, the relative risk assessment process measured the POF aspect of total risk. The assessment therefore considers the interaction of all critical variables in all failure modes, including any POF-reducing measures taken by the operator. This provided a screening tool to assess current POF and allow judgements of additional POF-reducing measures to be taken by the operator. The level of additional measures required was linked to the impact analyses portion of the study. Therefore, a higher potential impact necessitates more reductions in the POF. This led to the creation of target levels for the overall POF measurements. The probability of each specific failure mode (measured as part of the overall POF) was also considered in finalizing the required risk mitigation actions.

The underlying principle of the relative risk assessment is that conditions constantly change along the length of the pipeline. A mechanism is required to measure the changes and assess their impact on risk. In the absence of appropriate statistical data, this can be effectively done on a relative basis.

6.7.4 Comment

A commentor challenged the relative risk assessment model used in the draft EA, stating that “…few in industry have attempted to implement the model...”; a recent industry/government team failed to choose this model as a standard; and the methodology is “... not proven by time and experience...", and the commentor questioned why this model is being used. A commentor also asked about alternative models that could have been chosen.

Response

The EA risk assessment approach was chosen for it usefulness in the process and, contrary to the comment, appears to be the most widely adopted pipeline risk model currently available. It is well suited to the EA application in terms of comprehensiveness and its ability to indicate improvement opportunities (mitigations). This was considered in the choice to base aspects of the EA on this approach.

The model was customized specifically for this application by a team led by the original developer (Muhlbauer) and in a manner consistent with the supporting documentation. Customization was done in order to take advantage of electronic data that were not commonly available at the time the original reference was written.

The methodology is documented and recognized in industry from its appearance in textbooks, numerous articles in industry publications, and presentations at technical conferences since 1992. Software in support of the basic methodology has been developed in-house by many users, and a commercially available package has outsold all other competing software packages. At least four consulting engineering companies are providing software and/or services based on the methodology. The only software product to have sold almost as many copies is based on a similar technique and was heavily influenced by the Muhlbauer approach.

Users of this risk assessment technique include the largest pipeline operators in the country; many of whom have used the techniques for years. Articles from Amoco Pipeline Company appear as early as 1993. One of these (in 1995) quantifies reductions in leaks and attributes this to a risk management protocol based on this risk assessment methodology. Other major pipeline companies, as well as some foreign countries with government-owned pipeline systems use this technology.

Recent government/industry efforts related to pipeline risk management include a final report: "Risk Management within the Liquid Pipeline Industry," June 20, 1995. While this report intentionally refrained from endorsing any particular methodology, it did include an article reprint by Muhlbauer as a background document to describe one category of risk assessment approaches. These approaches are indeed recognized in the report and in subsequent efforts related to the DOT's "risk management demonstration project" currently underway.

An effort is underway in Canada to produce a more statistically driven pipeline risk model. This effort has been on-going for several years. Certain components of the model are now reportedly available (only to participating companies), but the entire risk model is not yet complete. This effort, along with all other risk measurement approaches, is also limited by data availability and would therefore contain some judgement-based aspects.

6.8 Source and Use of Data in Assessing Risks with the Relative Risk Model

6.8.1 Comment

Commentors questioned the extrapolation of leak rates from previous operations of the subject line to proposed operations, in light of changed flow direction, elevation profile, product transported, and age factors. The suggestion was made that risk assessments using leak rates under previous operations are not representative of future risks.

Response

Historical leaks of the pipeline provide a limited view of failure potential. They can easily under- or overestimate future leak potential since conditions have changed and would change from the previous operations. Therefore, leak history is not used in isolation for judgements of POF.

Data for the last ten years of EPC operation were examined for flow rates and pressures. The data revealed that average annual throughput rates declined from the beginning toward the end of that period, ranging from a high of around 180,000 barrels per year (bpy) to a low of about 50,000 bpy during the ten-year period. Exact pressure data for the EPC system for the full range of flow rates and, more particularly, at the times the leaks occurred during that period were not available. However, from available data and engineering estimates, pressure profiles for several crude oil flow rates were derived.

Total pressure at any point in the pipeline depends on flow rate, elevation, and relationship to the location of the pump stations. Pumping refined products does not result in a higher pressure than pumping crude oil at all locations. The changed hydraulic profile (due to changed product, pump station configurations, and direction of flow) expose some portions of the pipeline to more pressure and some to less pressure than in previous service.

One notable observation is that across the central Texas area, including parts of the Austin metropolitan area and Edwards Aquifer recharge zone, the proposed refined products pipeline appears to result in lower pressures at both the mid-range flow rate and high flow rate than the mid-range rate for the system previously in crude oil service.

The change in product transported raises issues related to internal corrosion potential in either the previous or proposed service. Damages from former service would be detected and addressed via the integrity-verification program while operations protocols (such as inhibitor injection) and periodic integrity re-verifications address potential future threats.

Of the system changes listed by the commentor, only age is a possible indicator and then only secondarily, of an increased POF. Age-related deterioration potential (see draft EA Sections 5.3.2, 5.3.3, and 5.8.7) is effectively mitigated through integrity verifications as described in the draft EA Section 5.3.3 and Chapter 9, the Longhorn System Integrity Plan (SIP) and Operational Reliability Assessment (ORA), as well as RS Section 9.20.

Given the possible contradictory indications of changing POF (in isolation, some indications suggest higher, some suggest lower), the relative risk model is used to capture and assess all pertinent information. This includes leak history and all changes in conditions and/or planned O&M that would impact future leak potential.

6.8.2 Comment

The commentor questioned why the Lead Agencies allowed mitigation credit to an old pipeline in order to qualify for Tier 3 areas that appear to be beyond the points allowed in Muhlbauer's *Pipeline Risk Management Manual*. The commentor also questioned differences between risk scores shown in the EA and ones that he calculated.

Response

The commentor provided a relatively detailed analysis of post-mitigation scores using the EA relative risk model, based on Muhlbauer's *Pipeline Risk Management Manual*. The commentor's assessment of points for various conditions and activities were close to those in the draft EA and in some cases even awarded more points (i.e., was less conservative) than did the draft EA. In general, the commentor's results differ from the draft EA's post-mitigation scores because the commentor considered only the 34 numbered mitigations and not the measures shown in the LMP SIP and ORA. See Appendix G of this RS.

6.8.3 Comment

A commentor said that the design index analysis does not consider the non-code branch connections in the pipeline and possible cast iron valves and pumps in the pipeline.

Response

No branch connections inconsistent with code recommendations were identified. Many connections, not falling under current design standards, were removed as part of the pipeline conversion. No cast iron or “semi-steel” components are known to be present.

6.8.4 Comment

A commentor noted that most of the CP data used in the corrosion assessment do not comply with National Association of Corrosion Engineers (NACE) RP 01-69, especially regarding potential drops other than those across the structure to electrolyte boundary.

Response

In the pre-mitigation assessment of the pipeline, “penalties” were assigned in the EA relative risk model when conformance to any industry standard was in question. This included the consideration of “other than structure to electrolyte” voltage drops that were recommended by NACE and that were not conclusively performed in previous EPC corrosion control efforts.

For the post-mitigation assessment, scores are based on practices defined in the LMP. As detailed in Section 3.5.1 of the LMP, all corrosion control practices are to be consistent with industry practices including NACE, American Society of mechanical Engineers (ASME), and American Petroleum Institute (API) recommended practices. Activities are to be conducted by NACE certified personnel. No inconsistencies with NACE or other industry standards have been identified.

6.8.5 Comment

A commentor requested an explanation as to why project flow rates were not used on page 5-27 of the draft EA in the discussion of operating flows.

Response

This page reflects a surge study performed in August 1999. This study has been updated since new valve installations have been completed. However, the flow rates that were studied did not change. The maximum flow rate that was considered was 5,000 bph (120,000 bpd). In the LMP, Longhorn has committed to performing a surge analysis whenever there is a change in flow rates, pressures, valve locations, etc. that could impact the surge pressure profile. The surge pressure analysis at the highest proposed flow rate of 225,000 bpd was not performed because (1) operation at this flow rate is not foreseen for several years and (2) the locations of several new pump stations, required for the higher flow rates, have not been specified closely enough to be used in a surge-pressure analysis.

6.8.6 Comment

A commentor said that the draft EA did not consistently cover how conditions were assessed and how missing data were accommodated in the EA Model Index Sum scoring.

Response

The draft EA described in general how conditions were assessed. These descriptions were supplemented by the details provided in the references. A complete electronic database of assessed conditions along the pipeline route can be found in the reading room.

6.8.7 Comment

A commentor expressed concern that the design index analysis does not specify how missing pipe data are evaluated or how seam design factors are determined for electric weld pipe of unknown manufacturing standards.

Response

All pipe specification information missing from the pre-mitigation assessment was later provided by Longhorn during the process of achieving tier scores. A risk “penalty” was assigned to pre-1970 electric resistance weld (ERW) pipe as was shown in draft EA page 6-20. This is not exactly the same as a derating factor as used in design calculations mentioned by the commentor but serves to show increased risks associated with such pipe.

6.8.8 Comment

A commentor challenged the EA relative risk points allocated to various depths of cover.

Response

The commentor's assertion that shallow cover can be more dangerous than exposed pipe is correct. Since it is very difficult to determine at what point cover begins to afford protection, the EA risk model does not make this distinction. It identifies "exposed" pipe and then "0-18" inches as the next category. Only 50 readings out of over 19,000 are <6 inches cover, but not exposed. Of these, most have approximately 5 inches of cover. It would be problematic to characterize risks in this range, and disregarding these instances is not thought to materially affect the assessment.

6.8.9 Comment

A commentor questioned why the surge potential analysis awarded index points for exceeding the surges allowed by regulations.

Response

The pre-mitigation surge scores reflected, on a relative basis, the exposure of the segment to over stressing and are independent of regulatory or industry-standard requirements. These scores were based on preliminary and unmitigated surge potential calculations. They have many conservative assumptions including no attenuation of pressure waves, regardless of distance. These scores have been upgraded in the post-mitigation analysis to reflect commitments to limit surge pressure.

6.8.10 Comment

A commentor noted that the index scores plotted on a single page were impossible to read and that specific scores for each sensitive area should be given.

Response

Volume 3 of the draft EA provided detailed, site-specific Index Sum scores to address this comment.

6.8.11 Comment

A commentor said the draft EA was inadequate because relative risk assessments were not performed on the existing pump stations.

Response

A relative risk assessment similar to one completed for the pipeline was not done for pump stations. Since pump station risk factors on this system are not as variable as conditions along the pipeline, mitigation measures for pump stations are less site-specific in nature. More general mitigations can be applied to all pump stations.

HAZOPS risk assessment reviews have been conducted by WES for stations to be operational at start-up. A review of these studies was done for the draft EA and can be found in Section 6.1.2 and Appendix 6A.

Pump stations have different risk considerations than the general pipeline right-of-way. The leak accident rate for crude oil pump stations on the EPC portion of the Longhorn pipeline does not reflect potential leak rates for the new pump stations on this pipeline since the new pump stations are designed and operated with significant differences from a typical crude oil operation. Additional risk variable differences include leak response issues: pump stations in general tend to have more direct observation (opportunity to detect and respond to abnormal conditions), and those stations that have tanks would have secondary containments around the tanks as per the LMP (see LMP 27).

6.8.12 Comment

A commentor asked why only two miles of the 250 miles of new 18-inch and 20-inch pipeline construction had pre-mitigation Index Sum scores of less than 240 points.

Response

It is assumed that the commentor is suggesting that the scores were higher than he would have expected. New pipe in a favorable environment would be expected to score higher points for several reasons: there would be few opportunities for pipe defect growth, integrity would have been recently verified, (ROW) would be clear, foreign crossings would have been addressed, and other such factors. The “new construction” aspect improves the risk picture as much or more than does the “new pipe” aspect.

6.8.13 Comment

The commentor expressed concern that the Lead Agencies have significantly increased Index Sum scores for the large majority of the pipeline since the presentation to certain interested parties (plaintiffs and Longhorn) in August 1999.

Response

As is described in Section 6.10 of this document, the relative risk assessment was a process producing new risk scores as new information was obtained. Data provided early in the process were preliminary and subject to updates. In the large majority of cases, the preliminary assessment penalized segments for lack of information, assuming "worst case" conditions. New data showing better conditions than the assumptions, resulted in improved scores.

6.8.14 Comment

A commentor wanted to know exactly how the pipeline was divided into sections for the relative risk assessment.

Response

Pipeline segments can be seen in the draft EA Volume 3. The relative risk assessment process gathered data on conditions and activities, termed risk variables, all along the pipeline length. The variables overlapped. Every time any variable changed, a new section was created. Each section, therefore, had a unique set of variables. Section length was entirely dependent on how often the variables changed. The smallest sections were only a few feet in length where one or more variables were changing rapidly; the longest sections were several hundred feet long where variables were fairly constant. This process resulted in the creation of approximately 6,300 sections. The final version of the EA Model is expected to contain fewer segments, due to a lower number of unknown variables being included, and the aggregation of certain short segments. The number of segments in the final EA Model is estimated to be about 6,100.

6.8.15 Comment

A commentor noted that the draft EA risk assessment did not consider the presence of approximately 5,000 pipe joints with one or more indications of metal loss or mechanical damage between Crane and Satsuma in estimating future mainline spill frequencies.

Response

As stated in Chapter 5 of this RS, the pipe joints where anomalies were found were either repaired or judged to contain only insignificant anomalies. Wherever a repair was made, the relative risk model shows a "penalty," reflecting the fact that conditions conducive to failure were present.

A Probability of Exceedance determination was performed on the 4,339 pipe joints shown in the 1995 ILI to have at least one anomaly. This is described in the ORA portion of the LMP. These joints would have their integrity re-verified through the LMP requirements, including pressure testing and additional ILI.

6.8.16 Comment

A commentor noted that the Third-Party Index scoring did not consider the 600 indications of possible mechanical damage that have been detected by geometry inspection tools.

Response

The draft EA relative risk model considered possible pipe damages in the Design Index since they might have suggested weakened pipe. This was a data input from previous ILIs and included possible mechanical damage, corrosion, cracking, dents, and other detectable anomalies. The commentor might be referring to preliminary, ungraded ILI anomalies when stating "600 indications of possible mechanical damage." Many preliminary indications from ILI results are later judged to be insignificant or "false positives." After data evaluation and confirmation, approximately 150 indications, including corrosion anomalies, from the 1995 ILI were identified and input to the risk model.

All previous leaks and repairs were also input to the relative risk model. The "activity level" variable in the Third-Party Index could also be influenced by previous damage indications, but relevance to present day activity would need to be established. Instead, relative activity level was judged using other evidence as described in the draft EA.

6.8.17 Comment

A commentor questioned why the relative risk assessment did not use Vetco's reports and only used EPC's limited reporting of Vetco's ILI.

Response

The data in the Vetco reports were evaluated for the relative risk assessment. However, most of the anomalies detected during the Vetco ILI were either found to contain insignificant amounts of corrosion or were assumed to contain only insignificant amounts of corrosion after conducting correlation and initial verification excavations. The anomalies with significant corrosion were excavated and, if needed, repaired. The pre-mitigation risk assessment shows approximately 150 ILI anomalies where the grading and/or repairs are uncertain. These are conservatively assumed to be serious indications for risk assessment purposes.

In 1998, Kiefner & Associates reviewed the Vetco report and the Corrpro excavation results. Kiefner concurred with the results of the Vetco and Corrpro programs.

6.8.18 Comment

A commentor expressed concern that the relative risk assessment used little or none of the data provided by the plaintiff parties for the draft EA.

Response

Data provided by the plaintiff parties were reviewed for use in the EA, and relevant portions were incorporated into Chapters 5 and 6. Much of the information provided was especially useful in identifying integrity concerns and assessing past practices. This, in turn, was instrumental in assessing the current state of the pipeline, including the relative risk assessment.

6.8.19 Comment

A commentor requested clarification of table on page 6-10 of the draft EA; and asked for definitions of a “flaw” and a “localized initiator.”

Response

The draft EA page 6-10 described sources of conservatism in the relative risk model. When uncertainty was higher, the model showed higher risk. By this approach, not only were risks probably overstated, but there was also an incentive for the operator to resolve uncertainty and improve the modeled risk situation.

In the context of page 6-10 of the draft EA, a “flaw” referred to any and all evidence of a section of pipe that was weakened or had failed some time in the past. This could have been from corrosion, outside force damage, cracking, etc. It might have been evidenced by the ILI, previous leaks, or previous repairs. Experience shows that such flaws are usually very localized, effecting only a few feet of pipe. The phrase “localized initiator” means that whatever caused the flaw effected only this short section of pipe. Nonetheless, the risk model conservatively “penalizes” a long stretch of pipe, depending on the type of flaw, as if the cause was more widespread than is probably the case.

6.8.20 Comment

A commentor noted that data in Appendix 6D of the draft EA are incomplete.

Response

The commentor does not elaborate on this statement. This table is believed to be complete.

6.8.21 Comment

Commentor asks how EA risk model variable weights are associated with “actual risk” and requests explanation of how the data is used to weight categories (i.e., public education weighed almost as equally as depth of cover).

Response

This is fully described in the EA and associated references. In a relative way, conditions or activities that have a larger impact on the risk, either increasing it or decreasing it, have more numerical “weight” in the model. The weights are based on statistical data when available and on experience and engineering judgement when not available.

6.8.22 Comment

A commentor said that an unbiased public education score is needed since the published score seems to come from WES self-assessment.

Response

The draft EA assessment of public education was done independently of WES's assessment of public education. Draft EA page 6-14 stated that the Public Education score agreed with the WES self-assessment. Since both used the same risk model reference, it was not unexpected that the scores would be similar, if not the same.

6.8.23 Comment

A commentor questioned why depth of cover is not considered in the corrosion index score.

Response

Depth of cover is not a significant risk variable for corrosion. Soil corrosivity and soil movements that can potentially damage coating or pipe are considered in the risk model. Depth is not necessarily well-correlated with these and would not be a useful assessment variable. Depth is considered as a deterrent to third party damages and is, therefore, included in that part of the risk model.

6.8.24 Comment

Commentor asks how gasoline could be "benign" if corrosion is already present in the pipeline.

Response

This question is not clear, but corrosion potential of steel in contact with various products is well understood. All products to be shipped in the Longhorn pipeline are required to meet a minimum level of corrosion protection. Longhorn would also be injecting a corrosion inhibitor into the product stream and monitoring for possible corrosion.

Any evidence of previous internal corrosion would be from the pipeline's crude oil service history. Such indications are to be located and addressed as part of the LMP integrity verification program.

6.8.25 Comment

A commentor asserted that within the four failure indices, weights (or influences) were selected based upon perceived, or subjective, assessments rather than on more statistical analysis.

Response

In the absence of meaningful statistical data, modelers use techniques that rely more on expert judgement and engineering experience. This is a limitation to all risk assessment methodologies. Such judgements, when necessary, are made conservatively using engineering judgement and expert knowledge of pipeline failure mechanisms.

Whenever more data become available, such judgements are modified, if necessary. At present, meaningful statistical data to validate many of the model weightings are not known to exist anywhere. The rationale for judging one variable to be more influential (greater weighting) in the model is fully described in the draft EA references which detail the relative risk methodology (draft EA page 6-57).

6.8.26 Comment

Commentors questioned possible limitations in quality of data due to its original intended use being different from EA purposes or its extraction from other records.

Response

The relative risk model is designed to incorporate information normally gathered by the pipeline operator, even though that information was not necessarily collected for purposes of risk assessment. Therefore, the original intent of the data collection was known and the data were judged to be consistent with the purposes of risk assessment before they were used. The use of existing records makes efficient use of resources and allowed maximum benefit from previous data collection efforts without which progress could have been greatly hindered.

When data must be extracted manually from paper records and entered into electronic format, errors are possible. This was the case for several of the data sets used in the EA. Care was exercised to perform quality control in the process of data entry. A supplemental quality assurance check was done when the data and model were used to help achieve necessary mitigation levels. Longhorn, in their own independent review of the data, reported minor errors that both under- and over-estimated risk levels. As a final check, routines were used to correlate model output with original data. By this method, other minor inconsistencies were identified and corrected.

6.8.27 Comment

A commentor suggested that “lack of data” means that there is a potential for high or

Response

Uncertainty generally appears as increased risk in the model. However, a degree of reasonableness must be exercised. “Known” deficiencies are certainly more evidence of risk than are “possible” deficiencies. To accurately portray the risk, a continuum of uncertainty must be envisioned. For example, there are scenarios where a close interval survey must omit 50 ft of readings because of an asphalt road, and readings adjacent to the road are more than adequate. Such a situation should not drive the risk score to a point where an expensive investigation under the roadway is indicated over more productive expenditures. Alternatively, years of no integrity verification should reflect high risk since it is possible that a number of integrity-threatening mechanisms could have developed.

6.8.28 Comment

Commentors questioned the use or non-use of industry-wide pipeline failure statistics in the risk assessment.

Response

Some limited industry-wide pipeline failure rate information is available. Pipeline failure data more specific than reported in the EA are not currently available. Risk investigators cite difficulties in obtaining failure data for specific types of pipelines. For example, separating pipelines of specific diameters, age, type of product, etc., from overall incident statistics is problematic. This is due to incomplete database information. It would be especially difficult to find accurate failure rate information for other lines substantially similar to this one, including the change-in-product aspect. DOT has made changes in its reporting protocols and, consequently, better information should be available in the future.

The EA is not relying heavily on the historical failure rates as reported in these databases, since such reliance could easily over- or underestimate the risks significantly. Extrapolations from population-wide data, failure rate information from all pipelines, to a specific pipeline, as proposed by the commentor, are similarly problematic. Since any conclusions drawn from such data must be considered weak, their usefulness in decision-making is accordingly weak. Industry-wide failure experience is captured informally in the risk assessment since knowledge gained from such failures contribute to the experience and judgement of variables.

Alternatively, in evaluating POF, the EA analyses focus on specific factors that contribute to the failure likelihood. This includes a careful study of all documented incidents on this pipeline while under EPC’s ownership. The relative risk model penalizes pipeline segments with previous leaks or if they are near previous leaks. Therefore, previous incidents on this pipeline influence the risk assessment and play a role in subsequent decisions regarding mitigation.

6.8.29 Comment

A commentor suggested that accuracy is lost by using ranges instead of actual measurements, such as using categories for depth of cover or “feet of atmospheric corrosion” instead of actual measurements, and that risk points are sometimes “awarded,” rather than measured.

Response

The use of categories representing ranges of values is a modeling convenience that does not diminish the risk assessment. Capturing ranges of actual measurements into categories reduces the number of pipeline segments generated by the model since new segments are created only when the variable changes significantly, rather than at every minor change. Using actual measurements is an option, but in many cases this adds an additional level of complexity, implies a level of resolution that is not supported, and requires a vastly larger number of segments. Whenever extremes of data are pertinent to the risk assessment and categorization would reduce the information available, the actual data are preserved.

In one example cited, additional depth of cover, or other impediment to third-party damages is captured as a risk reducer. However, while a difference between 1 ft of cover and 3 ft of cover is considered to be significant, differences of a few inches realistically might not be. The pressure profile, representing stress levels in the pipe wall, is similarly categorized—differences of only a few pounds-per-square-inch are less significant.

In using categories instead of actual measurements, the lowest possible measurement appears in the lowest possible category and the lowest points are assigned. There would be a group of “near lowest” measurements that are also placed into this lowest category and get the same score. This conservatively ignores increasing near-lowest measurements until the next category threshold is reached. Similarly, the “best case” measurements have less impact on the result since they are grouped with lesser measurements, diluting their influence. For example, burial depths of 50 inches or 60 inches are treated the same as a burial depth of 37 inches, since everything > 36 inches is in the same category. This has the effect of underestimating the risk benefits of such measurements. This categorization therefore produces a bias towards over estimating risk, thus introducing another aspect of conservatism into the model.

Atmospheric corrosion is a complex phenomenon, but plays a relatively minor role in pipeline failure potential. This risk is measured more qualitatively by identifying atmospheric exposures, and by assessing the corrosivity of the atmosphere and the quality of the coating. EA authors did not recognize a measure of “feet of atmospheric corrosion” as cited by commentor.

6.8.30 Comment

Commentors questioned the assignment of risk scores to human error potential.

Response

Human error potential is assessed in the Incorrect Operations index of the relative risk model. It is also an underlying element for all other risk measures, since a human error can be a contributing factor in almost every failure. This is a component of risk that is difficult to measure because many complex behavioral and psychological factors are involved and because assessments have to be more judgement-based. The risk model examines peripheral aspects of human error that are widely believed to reduce the potential risk. These include training, use of procedures, communications protocols and systems, ease of overpressure, use of redundant safety systems, maintenance systems, etc. Assessments of these aspects are based on examinations of the intended operator's systems, including visits to the operations control center and various field locations; review of O&M manuals; and interviews with operating personnel. The operator's systems were found to generally meet or exceed the best practices of industry, warranting scores in the upper quartile of the point scales in many instances.

Since the human error aspect of risk is more judgement-based, it is more open to challenge. However, since most ingredients of this index are uniform across the entire system, the relative risk model is not making many risk distinctions from segment to segment using these scores. The aspects that are subject to change from segment to segment, such as stress level (part of the "ease of overpressure" variable), are based more on measurable data. Other aspects such as use of procedures, communications systems and protocols, and training are done at a company-wide level, resulting in few significant differences segment to segment.

6.8.31 Comment

A commentor questioned if independence among sections (would a failure in one segment affect the POF in another segment) of the pipeline is valid and if the relative risk scores really represent the "best available knowledge" about the pipeline.

Response

Since the pipeline is segmented specifically by changing risk conditions, the assumption of independence is valid. An exception might be where a failure in one part of the pipe precipitates a failure in an adjacent segment. That risk aspect is consistent all along the pipeline and therefore segment demarcations are not meaningful. Each segment has a set of risk conditions distinct from its neighbors and is therefore independent of the neighbor's failure probability.

The draft EA assertion that the best available data were embodied in the risk number was believed to be accurate. While qualifiers such as "best" made this a judgement, this particular judgement seemed to be shared by persons most knowledgeable about pipeline failure potential. The judgement was also supported by data, although the amount of data was not as great as is desired. The experts who study pipeline failures agreed on the factors that are important, and those were the factors measured in the EA relative risk model. The specifics of how to measure the factors may vary somewhat, however, depending upon the risk evaluator.

6.8.32 Comment

A commentor asked why risks of sabotage are excluded from the assessment.

Response

The likelihood of a pipeline system becoming a target of sabotage is a function of many variables, including the relationship of the pipeline owner with the community and with its own employees or former employees. Vulnerability to attack is another aspect. In general, this facility is not thought to be more vulnerable than other pipeline systems. Standard or above-average security measures are to be in place, including fences, locks, increased patrols, and surveillance cameras. The motivation behind a potential sabotage episode would, to a great extent, determine whether or not this line is targeted. Reaction to a specific threat would therefore be very situation-specific.

The risk of sabotage is difficult to fully assess since such risks are so situation-specific and subject to rapid change over time. The assessment would be subject to a great deal of uncertainty, and recommendations would be problematic. This type of assessment is not thought to add significant value to the EA.

6.8.33 Comment

A commentor stated concern with the draft EA statement that: *"For scoring purposes, it is assumed that all non-pipe components carry an ANSI 600 rating."* The commentor says that an assumed rating for all non-pipe components seems inappropriate and inadequate. The analysis needs to be based on actual specifications for non-pipe components.

Responses

The EA risk model considers the pressure ratings of non-pipe components such as flanges, valve bodies, etc. These ratings are compared to the pressure limitations of the pipe itself in order to determine the weakest part of the system. Based on site visits to the pump stations and other parts of the system, and based on documented equipment specifications, it was observed that all components are rated as American National Standards Institute (ANSI) 600. That specification was used as the basis of the initial risk assessment. In the final risk assessment, two instances of ANSI 400 components are noted. These are consistent with the pressure requirements (maximum operating pressure) in those locations. The risk assessment looks for component strengths that are inconsistent with design requirements, while adequacy of component ratings is verified through the design process and the integrity tests.

There were ANSI 400 components at some of the old Exxon pump stations. These pump stations are no longer in service, and it was always Longhorn's plan to avoid using any of these old components. At Satsuma Station, the P&ID indicates there exists a 20-inch 400# valve MOV-2, a 20-inch 400# valve MOV-4, and a 4-inch 600# valve on the incoming piping. These valves are incorporated in a piping system having a maximum allowable operating pressure (MAOP) of 650 psig. ANSI 400 valves are rated at 960 psig. Aside from these two valves, Longhorn believes that everything else on the Longhorn pipeline is rated ANSI 600#.

6.8.34 Comment

Commentors stated that the draft EA failed to consider the increased risks due to adjacent pipelines.

Response

The DOT database on reportable incidents was examined in an attempt to identify such chain-reaction events. None were found although a recent example of a propane line incident east of El Paso, Texas, that affected a nearby line, shows that such events are possible.

Calculations and analyses for such scenarios were not included in the draft EA since the low likelihood of such incidents relative to other possible failure modes was not thought to materially impact the risk levels. Some considerations were noted which would be included in such a risk assessment. In the vast majority of situations on the Longhorn pipeline, an adjacent line was buried some distance from the subject line. Several feet of earth provides an effective barrier to many overpressure and fire effects, thus limiting situations where effects could be transferred from one line to the next. There could be an increase in third-party activity from maintenance on the neighboring pipeline(s) but this would be tempered by the fact that pipeline-knowledgeable personnel would be performing the activity. There are also benefits to shared or adjacent ROW situations since sometimes patrol, corrosion control, and other activities are in effect duplicated—each pipeline potentially benefiting from its neighbor's activities.

The potential for cumulative impacts have been examined further. Information from Longhorn pipeline alignment sheets, valve exposure conditions (above grade or below grade), and Longhorn Depth-of-Cover study results were used to develop a profile of areas along the Longhorn pipeline where cumulative impacts could theoretically occur. This profile and other results of this examination are provided in Chapter 9 of the final EA.

6.9 USE OF RESULTS FROM RELATIVE RISK ASSESSMENT

6.9.1 Comment

A commentor stated that the comparative risk assessment should have been performed on new pipeline that complies with all regulations, industry standards, and sound engineering practices.

Response

Many assumptions regarding pipeline conditions must be made in order to complete a general comparative analysis. The high number of assumptions makes such comparisons of questionable value. A hypothetical pipeline, similar to the Longhorn pipeline, and in minimum compliance with DOT regulations, was assessed. This is described in the draft EA, Section 6.4.10. Performing additional general analyses with permutations for different conditions, such as “new pipe,” would require many permutations with many assumptions. This is not thought to add value to the analyses.

6.9.2 Comment

A commentor had a question regarding linkage of regulatory compliance with Index Sum scores on page 6-38 of the draft EA. The commentor said that the draft EA should have used “full compliance” for comparison.

Response

Draft EA pages 6-37 and 6-38 described an effort to evaluate the risk levels implied by “minimum regulatory compliance,” using 49 CFR Part 195. As described on these pages, this was not a precise evaluation because of the structure of the regulations and the many assumptions required. For these purposes, “minimum regulatory compliance” was “full compliance” since full compliance was achieved as soon as minimum levels were met. Therefore, the comparison can be correctly viewed as a “full compliance” evaluation.

6.9.3 Comment

Commentors asked about the process of using the EA risk assessment to determine post-mitigation risk levels; the participation of Longhorn in this process; and where pertinent information can be found.

Response

The entire Longhorn pipeline was divided into approximately 6,300 segments. An Index Sum was calculated for each segment while preserving the individual index values and all associated input information. This was the pre-mitigation POF score. Longhorn was given the opportunity to provide additional information that might impact the scores. For example, missing hydrostatic test records initially penalized certain portions of the pipeline. Records were submitted and scores adjusted accordingly.

The EA model equations and relationships were then used to identify deficiencies and determine how to eliminate these and achieve tier target levels. Longhorn's participation in this process was consistent with current regulatory protocols. Numerical scores that indicated how deficiencies were to be corrected were studied to ensure that certain sub-variable deficiencies did not exist. The Index Sums were summarized (Index Sum graphs for pre- and post-mitigation scores) in the draft EA Volume 3.

6.9.4 Comment

A commentor stated that comparing "adjusted" and "unadjusted" risk scores is comparing

Response

There was no comparison between "adjusted" and "unadjusted" relative risk scores. The commentor is apparently referring to draft EA page 6-32 where a table footnote stated that "adjustment to these numbers prior to final summation affects the calculated average." This alerted the reader that the sum of the index averages did not exactly equal the average Index Sum. This is only a mathematical consideration. It was due to a multiplier to the Index Sum (penalizing segments for previous leaks with unknown causes) which occurred after the individual indices had been totaled. All Index Sum calculations had the same multiplier.

6.9.5 Comment

A commentor asserted that the index scores are meaningful only in context with other scores but other scores are not provided. A related comment stated that scores below a 70 should be "failing," based on familiar grading scales.

Response

The Longhorn pipeline is divided into many segments, each of which has index scores. These segments are correctly and productively compared to each other for purposes of identifying relative "hot spots" of higher risks. If a number of scores from other pipelines is available, the comparisons can be more robust, perhaps providing more insight into absolute risk levels, but this does not diminish the usefulness of within-system comparisons. Determining areas of greater need within the Longhorn pipeline is the basis of proper resource allocation.

It is also important to note that although the risk model has index scales that end at 100 points, this is not comparable to a grading scale familiar to students. A score of 100 reflects a theoretical condition where all imaginable actions, regardless of reasonableness, have been taken to reduce risk and/or virtually no threats exist for that failure mode. In this way, the model allows for all possible actions and conditions to be scored. However, scores significantly lower than 100 are entirely appropriate and may reflect high levels of safety.

6.9.6 Comment

A commentor asked how the risk analysis recognizes increased risks with the passage of time if population growth and "pipeline decay" are not included.

Response

Contrary to the comment, population growth and possible pipeline deterioration are indeed included in the relative risk analysis. Population is considered to be a consequence variable and as such is included in the tier designation system. Population is also an indicator of increased third-party activity level and was used to help assess the probability of third-party damages (draft EA page 6-12).

Pipeline "decay" implies an inevitable, irreversible process of wear. This is not an appropriate characterization of pipeline failure mechanisms. Mechanisms that can threaten pipe integrity and may not be active at any point on the line. Integrity threats are understood and can normally be counteracted with a degree of confidence. Possible threats to pipe integrity are not necessarily strongly correlated with the passage of time, although the "area of opportunity" for something to go wrong does increase with more time. The relative risk model measures the counteracting activities. When integrity re-verifications are not done in a timely way, the model reports higher risks. When corrosive and/or fatigue-supporting environments exist, higher risks are again reported.

Model input does need to be refreshed and updated periodically in order to capture changing risk conditions over time.

6.9.7 Comment

Commentors suggested that all modeling errors tend towards underestimation of the higher risk portions of the pipeline. As examples of the assertion, the commentor cited population density, historical leaks, and the use of subjective assessments. The process and rationale for population density estimations are discussed in RS Section 4.2.

Response

The model generally defaults towards overestimating risks. As tabulated on page 6-10 of the draft EA, uncertainty caused the model to report higher risk levels. This is a conservative practice which tends to predict higher risks than are probably present. Purely statistically driven judgements can force a model to underestimate a risk because "it has never occurred." This limitation is avoided in the current model.

The commentor's challenge to the way in which historical leaks are used in the model appears to be related to the "root cause analysis" that can remove a previously assigned "penalty" for a leak. The rational for this process was carefully considered and was described in the draft EA page 6-10. A leak (or other detected flaw) was evidence that a certain integrity-threatening mechanism was present at one time. Even after a repair, the model conservatively assumes that the underlying failure mechanism still exists. However, if this underlying mechanism is identified and effectively mitigated, then the threat no longer exists. It would be imprudent to ignore the evidence that a historical leak provides or to assume that the underlying cause could never be removed. The model would normally overestimate the risk initially, suggesting that it is in the interest of the operator to fully investigate and effect permanent repairs. After the operator performs a formal, documented root cause analysis, then the model can incorporate the new information and cease the overestimation of risk. This does not cause an underestimation of risk.

The presence of a leak or other flaw "penalizes" several hundred feet of pipe in the model, depending on the type of leak or flaw. This is driven by the assumption that failure mechanisms can extend some distance from the actual event. However, since most flaws are very localized, this is another example of risk over-estimation in the model.

6.9.8 Comment

A commentor questioned the use of the Index Sum independently of an overall risk score or the LIF, to represent the POF. Similarly, the use of individual index scores versus the Index Sum was questioned.

Response

Separating the Index Sum as an indicator of POF is an entirely appropriate use of the model. Original documentation describing and supporting the relative risk methodology repeatedly emphasized the need to examine risk components separately as well as in aggregate. The methodology is specifically designed to retain the intermediate calculations such as Index Sum for the express purpose of using them as independent measures of specific risk aspects.

The Index Sum is an appropriate measure of POF since it captures the important factors related to all known pipeline failure modes (EA Chapter 6).

The Index Sum does have the potential to mask deficiencies in one index by excesses in another. This was considered and guarded against through specific mitigation measures, as stated in draft EA page 9-30. Additionally, in reviewing Longhorn's plan to mitigate to the specified Index Sum targets, correlations and filters were used to inspect the data to ensure that deficiencies were not present, and that appropriate "balances" were being achieved in individual index scores.

6.9.9 Comment

A commentor stated that use of LIF in conjunction with Index Sum in the risk analyses would have resulted in different conclusions. The assertion was made that mitigations designed to reduce POF (as represented by the Index Sum) would have little effect on the overall risk in some areas since the consequences (as represented by the LIF) are too great.

Response

Risk scores calculated using both Index Sum and LIF can be heavily influenced numerically by the LIF since the LIF is a divisor (or multiplier, depending on the chosen scale) in arriving at the risk score. However, it is not correct to assume that higher consequential events can never be mitigated by reducing the probability of the events. As the probability of an event approaches zero, so does the risk, regardless of the level of consequences.

Had the LIF been used in the final analyses, it would have been calibrated to the range of potential consequences. Although this approach was considered early in the EA process, preliminary thinking had already identified the need to capture consequence variables of the following:

- Product hazard characteristics such as flammability, toxicity, and environmental persistence;
- Spill size (including possible reductions due to leak detection capabilities);
- Spread or dispersion characteristics (both subsurface and overland); and
- Receptors such as population density, ground and surface water proximity, plant and animal life, and others.

It is difficult to speculate about the precise outcome of the risk assessment using properly constructed LIF values. However, since the variables are the same as those used in the EA impacts analyses and the knowledge about those variables would not change simply because a different technique was employed, it is reasonable to forecast very similar results to the Tier system.

6.9.10 Comment

A commentor attempted to reconstruct LIF scores from preliminary EA work and apply these to the Index Sums published in the EA, drawing conclusions from the results.

Response

This is not an appropriate effort since the LIF numbers extracted by the commentor were not only incomplete, but were only at the earliest stages of development. The EA model makes no use of these preliminary numbers other than to provide some background information to the reader.

The probability aspects of risk are quantified in the Index Sum value and were used in the draft EA. An example of quantifying the consequence (or “impact”) aspects of risk was described as the LIF (draft EA page 6-27). In its published form, the LIF would require some modification to properly include the broad spectrum of concerns such as endangered species and drinking water contamination. An alternative approach to the LIF is the “tier designation” methodology developed for the EA. After analyses of the alternate ways to capture impact information, a decision was made that the tier approach would best serve the objective of the EA. All aspects of the LIF are included in the EA risk assessment, although the actual LIF calculation (as described in the reference) was not used in the final assessment.

Before the final decision was made regarding how to best analyze potential impacts, some calculations of partial-LIF numbers were made. These include some calculations with partial receptor information and some with only the spread and spill size aspects. It cannot be overemphasized that these calculations were intermediate and were never intended to offer a complete picture of consequences. This was an effort conducted in parallel with other assessments of impacts to help determine the best methodology. The draft EA included a "for illustration only" figure that showed LIF numbers and also included a discussion of the LIF calculation methodology since the LIF was used in self-assessments by EPC and WES. These seem to be causing confusion to some readers, but both are prefaced by statements indicating that they are included for reference only.

6.10 RISK ASSESSMENT FOR ALTERNATIVE ROUTES

6.10.1 Comment

Commentors believed that the risk assessment for the alternative routes in the EA was inadequate or was missing entirely. Commentors asked why the EA risk model was not used to develop Index Sum scores (i.e., relative risk scores) for the various route alternatives considered in the draft EA.

Response

The alternative route analysis focused primarily on environmental and population characteristics of the alternatives and associated possible impacts. A POF assessment was not done. Such an assessment would be based on many assumptions since there is no pipeline along these routes (design data would have to be assumed) and since there is no route specific data upon which to make probability estimates.

While a new pipeline can be designed to have a low POF, the design basis for a hypothetical line along the new route is not known. If there is an assumption made that such a pipeline would be designed and built in accordance with current DOT minimum requirements and assuming no exceptional route conditions, it is reasonable to assume a failure frequency comparable to other new pipelines in similar environments.

Neither the terms of the Settlement Agreement nor National Environmental Policy Act (NEPA) require that the EA examine alternative routes in the same degree of detail as the proposed project. The assessment of alternative routes made use of broad-based information that was readily available. The relative risk assessment and modeling was conducted pursuant to requirements in the Settlement Agreement for a risk assessment of the Longhorn pipeline.

6.11 Miscellaneous

6.11.1 Comment

Commentors wanted to know what authority DOT had over construction and the location of the route.

Response

Certain general requirements for construction specifications are enumerated in CFR 49 Part 195, the regulatory requirements for hazardous liquid pipelines. DOT is prohibited from mandating pipeline routing. (See 49 U.S.C. Section 60104[e].)

6.11.2 Comment

A commentor stated that Table 6-1 of the draft EA indicated that Buescher State Park is crossed by 0.02 miles of the pipeline and that the distance is understated. The same commentor also stated that Pedernales State Park and McKinney Falls State Park are listed as "sensitive" in the text in Chapter 7 of the draft EA, but not included in the sensitive areas examined in Chapter 6. Finally, the commentor indicated that the rationale for limiting distances that are considered as sensitive should be more fully explained.

Response

Buescher State Park (or any other park) was not addressed in Table 6-1 of the draft EA. Parks and other sensitive receptors were addressed in Table 6-10. The linear distance across Buescher State Park was stated in Table 6-10 as 1.24 miles; the Colorado River (listed below Buescher State Park) was spanned by 0.02 miles. The identification of sensitive receptors included a variety of factors. Factors included in Chapter 6 refer to risk; whereas those in Chapter 7 related to potential impacts to sensitive resources. Data from both chapters were used to develop mitigation plans as stated in Chapter 9.

6.11.3 Comment

A commentor produced summary statements on pipeline failure rates, causes of failures, and weaknesses in pipeline databases; based upon these summary statements, the commentor questioned the predicted failure rates cited in the EA.

Response

Many of the statements made by the commentor cannot be verified or specifically addressed without supporting documentation. However, inadequacies in current pipeline failure databases exist and this is acknowledged in the EA. DOT has made changes in its reporting protocols; therefore, information drawn from these databases should improve.

The EA does not rely only on the historical failure rates as reported in these databases, since such reliance could over- or under-estimate the risks. Extrapolations from population-wide data (failure rate information from all pipelines) to apply to a specific pipeline, as proposed by the commentor, are also problematic.

Alternatively, in evaluating probability of failure, the EA analyses focused on specific factors that contribute to the failure likelihood. This includes a careful study of all documented accidents on this pipeline while under EPC's ownership. The results of this study are included in the risk assessment and in subsequent decisions regarding mitigations.

7.0 COMMENTS AND RESPONSES RELATED TO EA CHAPTER 7 "POTENTIAL IMPACTS ANALYSIS"

7.1 NEED FOR RISK ASSESSMENT TO INCLUDE "SUPERFUND-TYPE" TOXICOLOGICAL EVALUATION OF HUMAN AND ECOLOGICAL EXPOSURES AS PART OF THE IMPACTS ASSESSMENT

7.1.1 Comment

Several commentors contended that any assessment of human and environmental impacts within the EA should be bound to the Professional Risk Assessment Standards which are represented by three guidance documents: "Guidelines for Ecological Risk Assessment" (EPA/630/RF-95/002F, April 1998); "Risk Management Program Standard" (Office of Pipeline Safety – Draft September 24, 1996); and "Risk Assessment Guidance for Superfund" (EPA/540/1-89/002). Commentors said that the EA risk assessment does not meet the guidance included in each of these documents, and therefore does not meet the stipulations of the Settlement Agreement.

Response

The "Pipeline Integrity Analysis and Risk Assessment," as stipulated in the Settlement Agreement, refers specifically to a methodology common in the pipeline industry for assessment of the integrity of the pipeline and the potential for various accidents to occur. The three referenced documents are not appropriate.

The document "Risk Assessment Guidance for Superfund" is not suited for a pipeline risk assessment. Superfund risk assessments are performed on sites of known contamination, where data is gathered to delineate the level of contamination, the site specific pathways and receptors, and the expected levels of impacts on human health and the environment. The objective of this process is to gather information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site. A Superfund-type risk assessment aimed at supporting a plan of remedial action and prioritization is not warranted.

A second document, referenced by commentors as representing Professional Risk Assessment Standards, the "Guidelines for Ecological Risk Assessment," also supports this conclusion. In discussing the appropriate level of scope and complexity of a Risk Assessment, the document states "Risk managers and risk assessors ... must often be flexible in determining what level of effort is warranted for a risk assessment. The most detailed assessment process is neither applicable nor necessary in every instance. Screening assessments may be the appropriate level of effort."

With reference to the Office of Pipeline Safety's draft "Risk Management Program Standard," which states that consequence analysis should consider the amount of hazardous substance that could be released; physical pathways and dispersal mechanisms; the amount of substance that could reach employees, the public, or the environment; and the expected effect of the released substance. It continues, "Consequences of events can be estimated in either qualitative or quantitative terms, or both."

In light of the type of facility being assessed and the probabilities of any individual receptor being impacted during the operation of the pipeline, the methodology used is appropriate and consistent with EPA and DOT guidance, with Professional Standards, and with the terms of the Settlement Agreement.

7.1.2 Comment

A commentor suggested that impacts associated with the release of product from the pipeline should be described in addition to short-term and long-term impacts.

Response

Chapter 7 of the draft EA describes, by category, the potential impacts of various accident-related product releases from the pipeline. The final EA includes more detailed accident and consequence scenarios throughout Chapter 7.

7.2 NEED TO MAKE THE SENSITIVITY OF PIPELINE SEGMENTS TO BE CUMULATIVE ACROSS IMPACTS CATEGORIES, AS IS DONE IN THE HAZARD RANKING SCORING SYSTEM (HRS) FOR PLACING HAZARDOUS WASTE SITES ON THE NATIONAL PRIORITY LIST

7.2.1 Comment

Commentors suggested that the draft EA should have focused additional attention on those areas along the pipeline where multiple receptor-based sensitivities exist. In particular, the question was raised as to why the potential for impacts to more than one type of sensitive receptor did not result in rating an area as hypersensitive with a higher level of mitigation.

Response

A scoring methodology, which assigns higher impact factors to portions of the pipeline where an accident could impact multiple sensitive receptors, is one methodology for assessing potential impacts. This method was not chosen for a number of reasons.

First, any methodology that relies on combining impacts to multiple receptors into a single impact factor, as this comment would require, involves policy-based judgements as to the valuation of individual receptors. While any assessment methodology must to some extent incorporate such value judgements, creating a scoring system across categories would have by nature made it more difficult for the public to interpret the means whereby the Lead Agencies assigned sensitivity to various portions of the pipeline. Instead of being concerned with creating and applying relative impact ranking between receptor categories, and focusing attention on those areas having the highest cumulative scores, the Lead Agencies instead chose to designate as sensitive or hypersensitive any areas where at least one receptor category would more likely be subjected to major impacts. This is a more conservative approach to assessing possible human and environmental impacts in the context of a 723-mile linear facility where the level of public concerns over specific impacts varied greatly (usually due to local issues).

Second, the impacts of primary concern along the pipeline are potential impacts and not expected impacts. The potential impact to any individual receptor from a pipeline accident is very low. The impacts assessment went into great detail to evaluate the possible impacts, up to and including reasonable worst-case possible impacts that could result from these accidents. However, scoring these potential impacts across categories would imply that a highly precise quantitative level of impacts analysis had been completed for all portions of the pipeline. This was not done; rather, the impacts analysis focused on places where a higher potential for significant impacts in the case of a pipeline accident exists either due to environmental or human conditions. Areas that do not have a high potential for significant impacts even in the case of a worst-case accident did not receive additional analysis to quantify these relative minor impacts. It would have been inappropriate to apply the same resolution to impacts analysis in areas where only minor impacts might occur in light of the low probability of accidents at any point along the pipeline.

7.3 CLARIFY CRITERIA FOR DESIGNATION OF SENSITIVE AND HYPERSENSITIVE AREAS

7.3.1 Comment

Commentors argued that the designation of tier categories for impacts analysis does not represent a risk assessment, but rather a definition of "management categories" for mitigation measures.

Response

Chapter 7 of the draft EA assessed impacts that are expected to occur as a result of pipeline operation and potential impacts which could occur in the event of an accident. No significant impacts that were expected as a result of normal pipeline operation were identified. There were locations identified along the pipeline where, due to the risk of an accident and the possible impacts to human and environmental receptors through various accident scenarios, the potential for significant impacts existed. These locations were designated as sensitive areas.

Because any potential for significant impacts exists due to the risk of a pipeline accident, it follows that any determination of the significance of the impacts must reflect the risk as well as the magnitude. Areas were designated as "hypersensitive" for specific impacts type due either to a higher potential for significant impacts or a higher magnitude of impacts which could be expected to occur in the case of a pipeline accident. This aspect of the impacts assessment was, in that sense, mitigation-related; it was clear that these areas would require additional mitigation above that which was prescribed for the entire system and even greater than that prescribed for sensitive areas.

7.3.2 Comment

Several commentors were either confused by the rationale used to classify some of the stretches of pipeline as sensitive (Tier 2) or hypersensitive (Tier 3), or the commentors stated that the EA did not clearly specify the criteria used to assign areas along the pipeline as "sensitive" or

Response

The criteria for designating sensitive and hypersensitive areas were listed in the draft EA Appendix 9C. Based on comments, some changes in designation were made in the final EA as noted in specific responses. The criteria themselves were not changed.

7.3.3 Comment

A commentor contended that the draft EA only identified where significant impacts could occur due to a pipeline accident, and did not fully assess, qualitatively or quantitatively, the potential impacts.

Response

In justifying the designation of specific areas along the pipeline as sensitive for certain impacts, the draft EA qualitatively describes these impacts. These impacts include potential for rendering specified public water supply (PWS) wells non-potable, potential for contamination of the Highland Lakes to levels which could render the reservoir water non-potable, the potential for death and population damage from ignition of a refined product spill, the potential for damages to threatened and endangered species populations, potential damages to recreational uses of parks and surface water bodies, as well as numerous other impacts that were described but deemed not significant. Failure to portray the consequences of an accident in a different format does not invalidate the work or conclusions of the draft EA.

7.4 COMPARING IMPACTS OF GASOLINE WITH OTHER PIPELINE PRODUCTS

7.4.1 Comment

A commentor said that the draft EA considered only the impact of a gasoline spill and stated that it would result in greater consequences than a diesel spill, but the document provides no support for this statement. The commentor asserted that diesel would, in fact, be more damaging to the environment because it is harder to remove from soil or to flush from a karst formation.

Additional commentor concerns included the lack of consideration of toxicity of petroleum products although it is an essential part of the hazard of the product. The commentor requested answers for the following questions: Why were diesel and jet fuel not mentioned if they could also be transported in the pipeline? Why is gasoline with 4.9 percent (sic) methyl tertiary-butyl ether (MTBE) the most hazardous product considered? Why are benzene and MTBE singled out as the constituents of greatest concern from a toxicity point of view? Is gasoline the lightest and most flammable product that could be carried? The EPA Leaking Underground Fuel Tank (LUFT) 1988 reference for the model gasoline composition cannot be found.

Response

It is true that the discussion in Sections 6.2, 7.1.3.1, and 9.1.1.2.2 of the draft EA focus on the differences between gasoline and crude oil, and that neither diesel nor jet fuel are discussed in detail. Gasoline was chosen as the worst-case product to be transported in the pipeline for the following reasons:

- Gasoline grades may contain between 11 and 15 percent MTBE in order to satisfy reformulated gasoline requirements; MTBE is not added to other petroleum products; as discussed in Appendix 7B of the final EA, MTBE is a leading concern with regards to ground water contamination.
- Some gasoline grades transported in the Longhorn pipeline may contain up to 4.9 percent benzene according to Longhorn's product specifications; other products generally contain far less benzene (less than 0.1 percent in diesel, 0.02 percent in jet fuel, according to Heath et al., 1993).[1]
- Gasoline is the lightest, most mobile, and most flammable compound to be carried by the pipeline, and it contains the highest fraction of water-soluble compounds.
- Diesel and jet fuel hydrocarbons are heavier (higher molecular weight) hydrocarbons; most of which are almost insoluble in water, which minimizes the concentrations they could leach into the water.

Additionally, it is important to recognize that the pipeline would probably carry far more gasoline than any other product, based on projected market demand.

The toxicity and possible exposure routes for the different constituents of interest are discussed briefly in Appendix 7C of the final EA. The rationale for their prioritization is also discussed in this appendix as well as in Appendix 7B of the final EA.

Because of its lower mobility, volatility, and solubility, diesel or jet fuel would take longer to dilute and flush from the subsurface. This lengthens the time for natural attenuation of these products compared to gasoline. While they attenuate, they serve as a source of contaminants for a longer time than gasoline. However, these properties also make it more likely that an identified and accessible spill can be recovered. Diesel and jet fuel would release contaminants to ground water at a lower rate and lower concentration than gasoline. A diesel or jet fuel spill would tend to contaminate a smaller area than a gasoline spill of the same size. The soil contamination with free-phase product would be less extensive, as would the plume of

[1] [1] Heath, J.S., K. Koblis, and S.L. Sager. 1993 "Review of Chemical, Physical, and Toxicologic Properties of *Journal of Soil Contamination*, 2 (a).

dissolved organics, especially if one takes into account the dissolved MTBE plume potentially associated with gasoline.

The LUFT 1988 reference can be found in Volume 1 of the draft EA, Section 6.8, References, page 6-57.

7.4.2 Comment

A commentor questioned if the validity of the statement that "the potential impacts posed by transporting refined products and crude oil are similar in nature."

Response

Crude oil and refined petroleum products are quite similar chemically. They are both hydrocarbons and have many compounds in common. Physically, they have similar density, vapor pressure, and flammability. As a result, considering the wide range of crude oil compositions, crude oil and refined products may cause similar environmental impacts. Composition data are provided in the draft EA Volume 2, Appendix 6B. This does not imply that all impacts from crude oil or refined product would be identical.

7.4.3 Comment

A commentor stated that the EA should recognize that the lower solubility of crude oil would decrease, not increase its long-term impacts compared to gasoline. The commentor questioned the draft EA statement, "crude oil may have greater impacts to long-term land use

Response

Crude oil is generally more viscous, less volatile, and contains less water-soluble compounds than gasoline. As a result, a crude oil spill would be more durable than a gasoline spill simply because it attenuates more slowly. Since crude oil is more viscous, it would be less mobile, would spread less, would be less subject to water flushing, and would tend to remain concentrated. Being less volatile, crude oil would lose less mass through volatilization to the atmosphere than gasoline and since it has a smaller proportion of soluble compounds, crude oil would lose less mass through dilution. The commentor did not provide any data or sources to contradict the draft EA statement. Qualitative evaluations indicate that this conclusion is correct. This effect was evident in the Kimball County oil spill where a large amount of crude oil is still present within a foot of the surface 26 years later. (See draft EA Appendix 7C.) A gasoline spill may have major short-term impacts, but it would tend to naturally attenuate more rapidly than a crude oil spill.

7.4.4 Comment

A commentor disputed a statement in the draft EA (Section 7.1) that crude oil spills would have greater impacts to land use because of lower volatility and slower movement rates versus refined product.

Response

As noted in Section 7.1.3.1 of the draft EA, there is no single answer to this issue. Because of its lower mobility, volatility, and solubility, crude oil would take longer to dilute and flush from the subsurface. This lengthens the time for natural attenuation of these products compared to gasoline. While crude oil attenuates, it serves as a source of contamination for a longer time than gasoline. Crude oil would release contaminants to ground water at a lower rate than gasoline, and at a lower concentration. A crude oil spill also tends to contaminate a smaller area than an equivalent gasoline spill, both in terms of soil contamination with free-phase product, and in terms of the plume of dissolved organics.

7.4.5 Comment

A commentor questioned the draft EA's statement that gasoline has a higher benzene content than crude oil.

Response

Data indicate that gasoline has a higher benzene content. The American Petroleum Institute (API) (1993) lists benzene concentrations ranging from 0.04 to 0.4 percent in crude oil, while LUFT (1988) lists 0.12 to 3.5 percent benzene in gasoline.

7.4.6 Comment

A commentor said that qualitative statements in the draft EA, specifically on page 7-5, were completely subjective, and that additional detail needs to be provided before the statements supported any decision-making.

Response

Discussion in the draft EA Section 7.1.3.1 provides an overview of the comparisons between risks posed by baseline operation of the pipeline, as represented by a crude oil release, and by the proposed project, as represented by a release of gasoline. It is not meant to be quantitative or conclusive, but rather to support analyses of impacts in specific categories which are presented later in Chapter 7. In this case, specific events relate to releases of either gasoline or crude oil to ground water and surface water and with or without ignition of product.

7.4.7 Comment

A commentor stated that the draft EA discussion on the relative transport properties of gasoline, MTBE, and crude oil should be substantiated.

Response

Information on the transport properties of gasoline, MTBE, and crude oil are provided in the draft EA Volume 2, Appendix 6B.

7.4.8 Comment

A commentor said that Section 6.2 of the draft EA should have discussed lower viscosity of gasoline as hazard factor.

Response

Section 7.1.3.1 and Section 7.3.3.1 of the draft EA discuss the hazards of gasoline's lower viscosity.

7.4.9 Comment

A commentor stated that by excluding a discussion in the draft EA about the potential differences in damages associated with a crude oil release versus refined product, this represents a bias, because it is "plausible that gasoline would impact ground water supplies to a greater

Response

The commentor is correct in noting that the draft EA does state that "gasoline is considered to have higher impacts with respect to contamination of ground water resources compared to crude oil." This contradicts the basis for a claim of bias.

7.4.10 Comment

A commentor disputed the characterization of transport of crude oil versus gasoline, specifically objecting to the statements in the draft EA that "During a release, lateral transport of gasoline is more common than vertical transport (Davidson, 1998)," and "The large percentage of heavier weight organic constituents and the high viscosity of crude oil would limit its spreading (PBS&J, 1998)." The commentor argues that "vertical transport of gasoline components is very well documented and is the most likely fate during a release with a karst system," and "the high viscosity of crude oil does not prevent or limit its spreading laterally and

Response

As described in the EA, references indicate that hydrocarbons will predominantly flow downgradient with flows in the aquifer, with some diffusion transporting contaminants downward in the ground water.

7.4.11 Comment

A commentor contended that it is inappropriate to compare potential impacts of crude oil releases over the Edwards Aquifer with the potential impacts from a gasoline spill in the same area. The commentor said that a spill of between 350 and 1,600 barrels (bbl) of gasoline may be retained in the soil and therefore is amenable to remediation, while a spill of gasoline up to 57,400 bbl would not be retained in the soil. In addition, the commentor said that concentrations of benzene and other low-molecular weight hydrocarbon molecules in refined products would affect soil permeability. Benzene concentrations are much higher in refined products than in crude oil. Finally, the commentor stated there remains evidence of long-term hydrocarbon contamination in the Barton Springs Edwards Aquifer, possibly as a result of earlier spills.

Response

It is instructional to compare the impacts from historical crude oil releases with potential gasoline spills. Mitigation commitments would be in place to reduce the chances of third party pipeline damage (the cause of both previous spills in the Edwards Aquifer (BFZ) and to require new, higher grade pipe and higher sensitivity leak detection capability. These commitments would reduce the probability of a spill in this area as well as effectively reduce the potential volumes and consequences of a release. While it is true that constituents of gasoline can impact soil permeability, this is a long-term process. A more likely pathway for refined products to enter the Edwards Aquifer from a pipeline release is through a karst recharge feature. During installation of new pipe, karst features in the Kirschberg or Collapsed/Leach strata would be identified and sealed according to State of Texas and City of Austin guidelines. This would further reduce the potential for hydrocarbons to enter the aquifer. Data relating to long-term hydrocarbon contamination of the aquifer, primarily from previous spills, is partial evidence to support the contention that a leak of crude oil may have longer detrimental effects. Crude oil has slower degradation and transport rates and would adsorb to soils and aquifer formations more effectively than gasoline. These characteristics of crude oil slow the flushing of contaminants.

7.4.12 Comment

A commentor argued that it is possible and necessary to quantitatively differentiate between the potential impacts to the Barton Springs Salamander from hypothetical releases of gasoline or crude oil at worst-case locations in the Edwards Aquifer recharge zone or contributing zone.

Response

While it is technically possible to construct a mathematical model for these impacts, it is not possible to model these impacts to a level of precision that would change the conclusions of the draft EA. In the absence of specific modeling, the draft EA concluded that any major spill in the Edwards Aquifer (BFZ) could pose a risk to the Barton Springs Salamander population and designated the recharge zone as hypersensitive for potential impacts to the species. It is doubtful whether a model could be accurate enough to allow a downgrade of the area to sensitive. The commentor made the assumption that dye-tracing results in the Edwards Aquifer (BFZ) provides an adequate tool for assessing the difference in transport dynamics between refined product and crude oil. Dye-tracing studies of the Barton Creek watershed have not been completed, and modeling performed to date utilizes assumptions regarding recharge coefficients that are disputed by the Edwards Aquifer Conservation District.

7.5 CONCERNS REGARDING IMPACTS OF MTBE

7.5.1 Comment

A commentor inquired as to why MTBE was described in the draft EA as being relatively non-toxic.

Response

MTBE and benzene are the two gasoline components that are addressed by the draft EA. The statement was comparing MTBE relative to benzene. Benzene is toxic and is classified by EPA as a "known human carcinogen." Testing has shown little toxicity of MTBE at high doses, and it is classified as a "potential human carcinogen." According to the EPA publication, "Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Methyl tertiary-butyl ether (MTBE)" (December 1997), there is little likelihood that an MTBE concentration of 20 to 40 microgram per liter in drinking water would cause adverse effects in humans. The major concern with MTBE is its organoleptic (taste and odor) effects at very low concentrations (see Appendix 7B of the final EA).

7.5.2 Comment

Commentors stated that the EA did not adequately address potential threats from MTBE or benzene to current or future sources of drinking water.

Response

The status of MTBE and its impact on ground water are reviewed in Appendix 7B of the final EA. As discussed there, EPA has classified MTBE as a *potential* human carcinogen. The health hazard, water impact, and legal status of MTBE are further discussed in this appendix, which summarizes the regulatory status of and environmental consensus on MTBE, based on a survey of current literature and news articles. The LMP in the final EA (Appendix 9C) eliminates MTBE from the Longhorn pipeline.

7.5.3 Comment

A commentor asked what "other contaminants show similar trends" to MTBE at a fixed point downstream and why were these contaminants not discussed.

Response

Modeling was performed for benzene and MTBE as components of gasoline and crude oil. At a fixed point downstream of an instantaneous spill, the plume spreads out and disperses such that concentrations rise to a peak and then fall over a period of time. The shape of this "pollutograph" is primarily a function of the river hydraulics and geometry rather than the contaminant. This was demonstrated in the draft EA using MTBE.

7.6 CONCERNS REGARDING METHODOLOGY FOR ASSIGNING SENSITIVE AND HYPERSENSITIVE POPULATION VALUES

7.6.1 Comment

Commentors stated that the application of spatial analyses resulted in skewed and artificially low dwelling unit estimates along portions of the pipeline corridor; specifically, the application of one-tenth-mile segments failed to account for variances in housing densities which are often "lumpy." Commentors further indicate that "it is unclear as to why there is an attempt to establish segment densities in the first place."

Response

Although the use of one-tenth-mile segments can result in an artificially introduced reduction in housing density, the segment length (528 ft) was selected as a reasonable means to compile results of the housing density analysis. Those densities were then categorized as high, moderate, and low and used in the risk assessment. The relationship between housing densities and their applicability to the risk assessment is explained in Section 7.2 of the draft EA.

7.6.2 Comment

A commentor contended that the different bases for population between sensitive (20 residences per mile) and hypersensitive (100 residences per tenth of a mile) represents an attempt to mislead the reader. The commentor questioned how these classifications were determined.

Response

Different bases were utilized for hypersensitive area designation in order to identify small stretches of high-density population which may not have been as evident if a larger area was examined. For example, if a large multi-family complex containing 200 residences is near the pipeline, that portion of the pipeline would be identified as hypersensitive for population impacts. However, if as the commentor requested, the classification was set at 1,000 residences per mile, in the interests of making the comparison more "transparent," the mile stretch including the multi-family complex might not achieve the hypersensitive designation.

The designations of 20 residences per mile and 100 residences per tenth of a mile were developed as methods for identifying areas that reflect communities as well as areas that include large multi-family dwellings, which could suffer greater impacts from an accident because of the difficulty of evacuating larger numbers of people. Comparing the sensitive and hypersensitive designations along the pipeline with a non-quantitative observation of the characteristics of the communities surrounding the pipeline, it is evident that the screening tool served this purpose.

7.6.3 Comment

Commentors expressed confusion regarding the identification of 1.2 miles of housing density that fit the hypersensitive criteria along the pipeline versus the identification of an additional 3.2 miles of the pipeline as population hypersensitive.

Response

The identification of 1.2 miles of the pipeline as “hypersensitive” represented 17.9 percent of the dwelling units along the pipeline; the identification of an additional 3.2 miles as “hypersensitive” was carried out to minimize effects associated with artificially introduced spatial differences that are associated with the use of one-tenth-mile segments that could introduce somewhat lower housing densities. The reason for the spatial differences are associated with variances in housing densities which are often “lumpy.”

7.7 QUESTIONS REGARDING SPILL PROBABILITIES AND SIZES

7.7.1 Comment

A commentor wanted to know how it is possible to assess the risk from pipeline spills without predicting actual quantities resulting from accidents.

Response

Based on Chapter 6 of the draft EA about spill sizes and probabilities, the impacts evaluated in Chapter 7 were representative of the maximum spill size and the impacts on various receptors.

7.7.2 Comment

The commentor said that the draft EA should have provided data and examples to support the conclusion that large instantaneous leaks would result in greater impacts than small persistent/undetected leaks.

Response

The draft EA evaluated which case—a large leak or a small, undetected leak releasing the same volume—would be worst case with respect to environmental impacts analysis. Data for spill sizes along the pipeline, and therefore probabilities for specific spill sizes, do not differentiate between duration of release for a given amount of product loss. Chapter 7 explains why rapid product loss from the pipeline, rather than slow, long-term product loss, was modeled and evaluated for impacts categories.

7.7.3 Comment

Commentors stated that the comparison in the draft EA of “voluntary” risks such as automobile accidents, with those resulting from pipeline spills to nearby inhabitants, which would represent “involuntary risks,” was inappropriate.

Response

The purpose of the comparison was to provide readers with a probability that they were familiar with in order to illustrate the probabilities of pipeline failure that had been calculated in the draft EA.

7.7.4 Comment

A commentor requested clarification on how different design life expectancies for different parts of the pipeline affect the impacts assessment.

Response

The probabilities in the impacts assessment use methods developed in Chapter 6 of the draft EA. However, impacts analyses use subjective judgments of the predicted impacts of a major accidental release at any point along the pipeline. The life expectancy does not affect the magnitude of a major release.

7.7.5 Comment

A commentor questioned if scouring, spans, or exposed pipe were provided higher classifications in impact analysis.

Response

The factors discussed relate to the probability of a major release occurring at a river or stream crossing and not to the impacts that would occur if a complete line rupture were to occur.

7.8 CONCERNS THAT ZONE OF IMPACT SHOULD BE LOCATION-SPECIFIC THROUGHOUT THE IMPACTS ANALYSIS

7.8.1 Comment

Commentors stated that the zone of impact should vary in a way that characterizes the entire population, which may be impacted by a pipeline accident. This includes site specific pathways such as in-stream and overland gasoline flow, and ground water conduits.

Response

The zone of impact that the commentor refers to specifically is the 1,250-ft distance to each side of the pipeline where population density was evaluated (2,500-ft corridor). This corridor was used as an analytical tool for evaluating the likelihood of impacts to human health that might occur as a result of a pipeline accident, and not as an absolute distance within which people would be impacted by an accident.

In fact, under the great majority of possible accident scenarios, potential human health impacts are likely to occur only in a narrower band. However, in order to simplify the analyses, a corridor was selected that was representative of a reasonable approximation of a heat-effected zone from a pool fire (see Section 6.3 of the draft EA). This does not mean that the analysis did not consider the potential for other impacts that the commentors are concerned about, including the possibility of a channelized flow transporting contaminants and even burning gasoline to points farther than 1,250 ft from the pipeline. The Lead Agencies were aware that such impacts were possible, and held potential significance.

Chapter 6 of the draft EA addresses the methodology used by the contractor to determine the potential spread of a spill.

7.8.2 Comment

Several commentors questioned the acceptability of the draft EA's 1,250-ft radius of adverse impact in light of the Bellingham, Washington explosion. They wanted to know the difference in using this relative zone for the majority of the potential spills and leaks versus the worst case accident that affects a much larger area.

Response

The 1,250-ft radius of adverse impact, defined by the 2,500-ft corridor along the pipeline for counting population density and sensitive receptors, such as schools, hospitals, and hotels, is an appropriate measure of the normal spread expected from a pipeline release in the urban areas of Austin and Houston. In the case of the Bellingham, Washington accident, the gasoline fire actually proceeded up to 1.5 miles from the point where gasoline spilled from the pipeline. The cause of the gasoline spread, and thus the fire, was confined to a relatively narrow canyon containing Whatcom Creek. This channelized the gasoline, simultaneously extending the distance the fire extended from the pipeline, but limiting the spread of the fire away from the creek.

There are locations along the Longhorn pipeline where gasoline could be channelized, in which case flow may carry gasoline, and therefore fire, to locations more distant from the pipeline than 1,250 ft. This would do three things – it would cause impacts to points further away from the line than 1,250 ft, it would narrow the overall spread of the gasoline flow and reduce the impacts within the areas originally characterized by removing gasoline from pooling around the pipeline, and it would remove the risk from some residences currently counted in the 2,500 ft corridor. Therefore, while the impact would be felt at a distance farther than 1,250 ft from the pipeline, for classification purposes, it is not believed that this would change tier designations based on population density.

7.9 NEED FOR QUANTIFICATION OF CONSEQUENCES OF A FIRE WITHIN DENSELY POPULATED AREAS

7.9.1 Comment

The commentor stated that the consequences of a fire within densely populated portions of the pipeline were not properly quantified; numbers should have been provided for deaths, injuries, and houses that could be destroyed from various accident scenarios; without quantification, risk information cannot be analyzed.

Response

The response to this comment parallels the response in Section 7.1 of this RS. The draft EA includes a semi-qualitative determination of the possible impacts from a major release accompanied by a fire along the pipeline. Places along the pipeline where a fire would be expected to pose a higher potential for serious impacts to human health and property were rated using a quantitative process of estimating population within a specific distance along the pipeline. See Section 6.6 of the RS for a discussion of the rationale for choice of distance analysis.

The commentor is incorrect in concluding that estimated counts of deaths or injuries or quantification of property damages are necessary for completion of the EA. The magnitude of consequences that could result from a large volume release and ignition event in densely populated areas is reflected in a review of other event histories and in the calculations in Chapter 6 of the draft EA, which described the amount of area that could be exposed to high temperatures and heat radiation. Therefore, the risk of and potential for impacts in population sensitive and hypersensitive areas were considered in the final determination. The designation of sensitive and hypersensitive areas by population count was used to assess how large a portion of the existing pipeline contributes to these risks to populated areas.

7.9.2 Comment

A commentor expressed concern about potential impacts to schools from an explosion resulting from a worst-case leak or spill from the pipeline.

Response

The EA included modeling of several fire-related impacts in populated areas, which may include schools and other sensitive areas. All possible scenarios at every location were not modeled or evaluated individually. Since the probability of a worst-case accident at any specific sensitive location is low, the mitigation measures were designed to be protective of all sensitive areas by further reducing these probabilities and impacts. Chapter 7 of the draft EA assesses the hazard of fire from releases and the special sensitivity of populated areas and areas near schools. This assessment resulted in the Tier system explained in Chapter 9 of the draft EA.

7.9.3 Comment

A commentor requested the basis for draft EA statements that ignition and explosion of gasoline spills are improbable events, even when a spill occurs.

Response

The basis for these statements is discussed at length in Chapter 6 of the draft EA.

7.9.4 Comment

A commentor inquired about the potential for subsurface ignition of a leak and associated impacts and about possible accumulation of toxic byproducts.

Response

Ignition of a hydrocarbon leak requires two factors:

- An amount of hydrocarbon and air in which the concentration of hydrocarbon is within the explosive limits for the hydrocarbons in question, and
- An ignition source, such as an open flame, running engine, electric power equipment, metal impacts from steel cleats, etc.

In order to ignite, a gaseous mixture of fuel and air needs to be within well-defined concentration limits, referred to as the flammable range. If there is too little fuel in the air, the mixture cannot ignite, but that is equally true if there is too much fuel. A substantial leak into a cave could conceivably create a hydrocarbon cloud within the explosive range. In fact, all other factors remaining equal, this may happen more easily in a poorly ventilated cave than above the ground, where air movements could rapidly dissipate a hydrocarbon cloud. However, ignition sources are rarely found below ground. As a result, the likelihood of an ignition in a cave is probably much lower than aboveground.

Should a subsurface ignition of hydrocarbon vapors occur in a cave, it is likely to extinguish itself rapidly as oxygen is exhausted. This would temporarily result in an asphyxiating atmosphere in the affected cave. Carbon monoxide may also form as the fire smothers itself. Both gases would be displaced by air and diffuse eventually; they would only be harmful to individuals in the cave at that time. Depending on the thickness of overburden and the degree of venting, any blast effects (very rare) are likely to diffuse into the karst system of connected cavities, but some physical damage such as a cave-in is conceivable.

7.10 NEED TO ASSESS TOXICOLOGICAL IMPACTS TO HUMANS

7.10.1 Comment

Commentor questioned why only potential human environmental exposures to a gasoline spill from drinking water contamination were evaluated.

Response

In compiling the draft EA, risks from other pathways were considered but were not judged to be significant. This is because of the limited time frame during which exposures would take place following a spill, particularly since response would be proportional to the surrounding population density. The results of this analysis are included in Appendix 7C to the final EA.

7.10.2 Comment

A commentor stated that the draft EA needs to discuss the relative hazard of different hydrocarbon constituents and explain why MTBE and benzene are the primary concerns.

Response

MTBE and benzene are primary concerns because of the relatively high concentrations of these compounds that may be present in gasoline to be transported (4.9 percent benzene, 11-15 percent MTBE) and because of their very low concentrations of concern (15-20 parts per billion [ppb] for MTBE, 5 ppb for benzene).

7.10.3 Comment

A commentor wanted substantiation of the draft EA's assertion that gasoline aromatic hydrocarbons are more toxic.

Response

Appendix 7C of the final EA addresses this issue.

7.10.4 Comment

A commentor wanted to know if the toxicity of the poly-alphaolefin flow agent was included in risk modeling and what are the risks associated with this compound?

Response

The commentor is referring to flow-enhancing agents planned for the last phase of the Longhorn pipeline implementation. Polyalphaolefins (PAOs) are polymers of alpha-olefins such as 1-octene. They are used as lubricants in a wide range of flow enhancing applications, including engine lubrication (they are the major component of synthetic oils), cosmetics, and personal care products. They are more biodegradable than mineral oils. Particular formulations are used as pipeline drag reducing agent (DRAs). In that function they serve to reduce turbulence inside a pipe, allowing more product to flow at the same pressure. DRAs are also used to enhance the water flow rate in fire hoses. Note that these compounds do not reduce viscosity, and that they have no effect outside a pipe or pressure hose. The toxicity of PAOs are:

- Chemically identical products are used as personal care and cosmetics products, including lipstick, illustrating PAO's extremely low inherent toxicity.

- Flow enhancement is achieved a 5 to 25 parts per million (ppm) PAO in the pipeline; gasoline toxics like benzene, toluene, ethylbenzene, and xylene (BTEX) are present at levels of single percents to over ten percent (10,000s to over 100,000 ppm). So, PAOs, which are inherently far less toxic than many gasoline constituents, would be present at concentrations several orders of magnitude lower than these gasoline constituents. As a result, the contribution of PAOs to total hazard is negligible.
- The addition of DRAs is only planned for the last phase of the Longhorn pipeline implementation, i.e., to increase the flow rate from 200,000 to 225,000 bpd.

7.10.5 Comment

A commentor wanted to know the chemical used in the corrosion inhibitor that will be injected and its toxicological implications.

Response

Corrosion inhibitors would be injected into the pipeline to meet Longhorn's specification that the product meet a minimum corrosion rating of B+ as determined by NACE Standard TM0172-86, Test Method – Antirust Properties of Petroleum Pipeline Cargoes. This is done to protect the pipeline against corrosion. There are several types of corrosion inhibitors. Polar compounds wet metal surfaces preferentially, protecting them with a film of oil. Other products emulsify water, so that only oil touches the metal surface. Still others combine chemically with the metal to present a non-reactive surface.

Corrosion inhibitors and other additives are used in all hydrocarbon pipelines and are normal constituents of lubricants and fuels, including all grades of gasoline. In its product specifications, Longhorn lists 31 allowable corrosion inhibitors, 16 gum inhibitors and metal deactivators, and three other additives. These products are proprietary formulations, added in small amounts (ppms to tens of ppms). They are not particularly toxic compared to other constituents of petroleum products. Their toxicity is overshadowed by that of main components of petroleum products like benzene, which are present at levels of thousands to tens of thousands of ppm.

7.11 CONCERNS REGARDING HIGH RISK TO DRINKING WATER SUPPLIES

7.11.1 Comment

A commentor stated that the draft EA should have considered population served by PWS, and not just the location of PWS, in assessing impacts.

Response

The relative size of the population associated with each potentially affected water source (and the importance of that source as a sole source) was considered in the relative comparisons of environmental sensitivity between pipeline reaches. These data, however, were not included in the draft EA. Updated tables in the final EA would provide current population estimates for cities with ground water-based PWS systems. Two of these tables are revisions of tables that appeared in the draft EA; these would also be in the final EA. The population estimates are derived from, in order of preference: the recently published year 2000 population estimates developed as part of the Regional Water Planning Group process under Senate Bill 1; the year 1999 population estimates published in 1999 by the Texas State Data Center; and the 1996 population estimates published in the Texas Almanac. In general, however, designation of segments of the pipeline as sensitive or hypersensitive was based more on the vulnerability of PWSs to ground water contamination and not on the number of potentially affected users for a PWS.

7.11.2 Comment

A commentor asked if the introduction of carcinogens to a PWS as a result of accidental release from the pipeline is prohibited by the Clean Water Act.

Response

The objective of the Clean Water Act (CWA) of 1972 is to eliminate the discharge of pollutants into the nation's waters through a comprehensive framework of standards, technical tools, and financial incentives to local governments. The EPA does not issue permits under the auspices of the CWA for accidental spills into a PWS such as might occur from the Longhorn pipeline. Should such a spill occur and contaminate surface waters, it would constitute a violation of the CWA, although spill clean up would be regulated under the Oil Pollution Prevention Act.

7.11.3 Comment

A commentor said it was inappropriate to conclude that a short-duration impact to a surface water body would not be a major one without evaluating the storage capacities for downstream water users and methods for alerting these users.

Response

As stated in Chapter 7 of the draft EA, because of volatility rates and stream flows, impacts to the surface water quality of rivers or streams would be limited to a period of 10 to 20 hours. Standard water system design and engineering principles dictate that communities should have storage capacity in excess of this. The Brazos River Authority and the LCRA each maintain substantial communications networks for alerting communities and water users about these hazards. Longer-term impacts are predicted for reservoirs that may be impacted.

7.12 CONCERNS REGARDING EA ASSESSMENT OF IMPACTS TO PRIVATE WELL OWNERS

7.12.1 Comment

Commentor asserted that a major omission in the EA was the failure to consider the presence of private drinking water wells proximal to the pipeline as criteria for determination of pipeline sensitivity.

Response

The risks to private well owners were considered. The mitigation measures included in the EA would substantially reduce the probability of private well contamination from a pipeline accident and would reduce the impacts to private well owners if this occurs.

The pipeline crosses at least 12 aquifer formations between Houston and El Paso, representing a distance of about 540 miles of pipeline. At least eight of those aquifer formations have at least moderately high hydrogeologic sensitivity (representing a distance of about 365 miles of pipeline).

Numerous domestic and stock wells are adjacent to the pipeline throughout the length of the line, only a fraction for which information is available through Texas Natural Resource Information System (TNRIS) databases.

While the potential exists for contamination of at least one private well along a large portion of the pipeline, such an impact is viewed as mitigatable. This mitigation took two forms.

First, mitigation measures were designed to ensure that the overall performance of the pipeline from Houston to El Paso far exceeds previous standards. The mitigation plan, which was developed for the whole line was aimed at reducing the risk of private drinking water wells being contaminated due to release of product from the pipeline.

Second, as a recognition of the concerns voiced by commentors, a plan was developed to respond to concerns by private well owners regarding the potential for contamination. This plan included testing of the well, testing of the pipeline, and as necessary, providing alternative water supplies should the well water be contaminated. Additional detail on this mitigation measure is provided in Appendix 9C of the final EA.

It is not necessary to catalogue and specifically protect private drinking water wells by providing Tier 2 or Tier 3 levels of mitigation. In areas not designated as "sensitive" or "hypersensitive" for population, there still exists the potential for an individual to be harmed in a pipeline accident. Similarly, in many areas not designated as "sensitive" or "hypersensitive" for ground water resources there exists a potential for one or more private wells to be contaminated from the releases due to an accident. In both cases, this possibility of impacts was recognized during the EA process, and discussed in the draft EA.

However, designation of "sensitive" and "hypersensitive," and the corresponding requirements for Tier 2 and Tier 3 levels of mitigation, were reserved for places along the pipeline where the probability of pipeline failure and the possibility of impacts – either to human health and safety, or to public drinking water supplies – combined to present higher levels of concern. It was necessary to evaluate these areas in a different context from portions of the pipeline having lower population density and/or potential impacts only to private wells. This evaluation led to the stipulation of higher levels of mitigation for areas where public drinking water supplies could be, or were very likely to be impacted if a major release occurred in a specific area along the line.

The mitigation plan provides an adequate measure of safety for private well owners in light of the low probability of a pipeline spill impacting any individual well.

7.13 CONCERN OVER IMPACTS TO EDWARDS AQUIFER (BFZ)

7.13.1 Comment

A commentor asked how a Finding of No Significant Impact is acceptable when the risk of a major spill over the Edwards Aquifer (BFZ) is 1 in 210 over the 50-year life of the project. The commentor also asked if there are mitigation measures to reduce the failure rate.

Response

Mitigation measures are expected to reduce this failure rate through the replacement of pipe over the Barton Springs recharge zone and contributing zone with new, thicker-walled pipe and enhanced leak detection, which would reduce or eliminate the potential for a slow rate leak releasing a large amount of product to the aquifer over a long duration. In addition, the LMP specifies that new pipe would be placed in a trench which has been grouted to seal off recharge features. The trench would also be backfilled with porous median and covered with a concrete cap, in order to reduce the chance of spilled gasoline escaping to the aquifer from the trench or from flowing overland to an adjacent recharge feature. A new probability, based on these preventative measures is included in Appendix 9A of the final EA.

7.13.2 Comment

A commentor stated that actual conditions affecting water quality along the pipeline should be addressed, specifically, the transmissivity of the soils in the Austin area.

Response

Movement of ground water in Austin received more detailed attention in the draft EA than any other portion of the pipeline, primarily because of the availability of dye test studies and analyses provided by the plaintiffs. In general, across the pipeline, screening techniques were used to identify places along the pipeline where higher impacts could result from a pipeline accident. Additional analyses were brought to bear on these locations.

7.13.3 Comment

A commentor requested clarification on the status of the City of Austin's ground water flow tracer study in the Barton Springs/Edwards Aquifer. The commentor also requested validation of the position that mitigation planning is not possible within a karst aquifer environment without ground water flow tracing data. The commentor stated that the EA should evaluate preliminary results from this study or the environmental review should be delayed to include final results from the tracing studies, scheduled for completion in August 2000.

Additional data on Edwards Aquifer flowpaths in the Barton Springs watershed as determined by tracer studies were supplied by the Barton Springs Edwards Aquifer Conservation District (BS/EACD). A letter accompanied these data from the commentor. The commentor's written position is that mitigation planning in a karst environment is not possible without tracer studies to map ground water flowpaths.

Response

In a karst environment, flowpaths may be identified on a regional scale as in any aquifer utilizing potentiometric surface mapping. On smaller scales, the task of determining flowpaths becomes increasingly difficult. Tracer flowpath studies are the best tool for identifying specific ground water flowpaths in a karst aquifer. The data supplied by BS/EACD developed a generalized picture of what flowpaths are present in the Barton Springs segment of the Edwards Aquifer. These studies attest to the extreme sensitivity of that ground water system to contamination.

The most recent results of the test may be summarized as follows:

1. Recent Studies

Dye testing has been performed at locations along Bear and Little Bear creeks in the westernmost portions of the recharge zone. Testing was performed more recently, when semi-drought conditions prevailed. As would be expected under these conditions, lower conductivities were measured. Dyes at some locations proceeded to Barton Springs in time frames of 7-21 days, while other locations were found where, under semi-drought conditions, no discharges to springs were noted within a three-month time period. Attempts have been made to add water at specific locations to enhance flushing of the dye. Dye has been detected in some water wells as a result of this testing.

2. September 28, 1999 Press Release Data

This report included data from tracing at two locations in the Slaughter Creek watershed. Both of these sites are relatively close to the current Longhorn pipeline, as opposed to previous studies which took place further north in the Williamson and Barton Creek watersheds. Tracer poured into Whirlpool Cave in the Slaughter Creek Metro Park on the western side of the recharge zone required 7-8 days to arrive at the springs over eight miles away on Barton Creek, while tracer injected into the Brodie Sink, a sinkhole near Slaughter and Brodie lanes required 1-2 days to flow 7.4 miles to the springs.

Data from these studies demonstrated not only the travel time, but also helped to establish the distribution of flow from these recharge features to the different springs in Barton Creek. Preliminary results indicate that Upper Barton Springs and Barton Springs are not impacted by dye traces injected into the Brodie Sink, while Eliza Springs and Old Mill Springs, which are downstream of the dam at Barton Springs Pool, are impacted. Tracer from Whirlpool Cave appeared to impact each of the springs.

3. Oak Hill Water Supply Wells

No tracer was detected in Oak Hill drinking water wells as a result of either Slaughter Creek Watershed injection point over a three-month period. This contrasts with the results of past dye tracer studies further north in the BFZ, suggesting that ground water from the area near the pipeline moves in different pathways than ground water that recharges farther to the south.

For the purposes of this EA, the portions of the Longhorn pipeline that cross the Barton Springs segment of the Edwards Aquifer Recharge Zone have been designated as hypersensitive. Since this portion of the pipeline has already been assigned the highest sensitivity rating, the additional tracer data scheduled for August, 2000 would not change this rating. Tracer data reviewed to date support this conclusion.

7.13.4 Comment

A commentor requested that applicability of dye-tracing studies be addressed in the EA and added to impact analysis, if warranted.

Response

Dye-tracing studies were an important part of assessing the potential for impacts to Barton Springs and to the Colorado River-Town Lake as a result of a major leak over the Edwards Aquifer (BFZ). As stated in Chapter 7, Section 7.3.2.3 of the draft EA, "In the karstic Edwards Aquifer (BFZ), transmissivity rates of up to four miles per day have been documented based on dye tests (Hauwert et al., 1998)." Because of these rapid travel times, the entire three-mile stretch of the Longhorn pipeline crossing the Edwards Aquifer (BFZ) were classified as hypersensitive for potential impacts to recreation (Barton Springs), threatened and endangered species (Barton Springs Salamander), and drinking water (City of Austin Long Water Treatment Plant on Town Lake).

7.13.5 Comment

Commentors, in reading the draft EA, concluded that the assessment did not consider the potential impacts to drinking water wells clustered in the Sunset Valley area of Travis County.

Response

Table 4-14 of the draft EA presents the sensitivity of hydrogeologic units based on the hydrogeologic sensitivity of specific aquifers as well as the proximity of drinking water supplies that could be impacted by a spill along the pipeline. The stretch of the pipeline that could impact the Sunset Valley wells and other wells in the Edwards Aquifer (BFZ) was given the highest consideration with respect to those drinking water supplies.

This level of attention is continued in the impacts assessment in Chapter 7 of the draft EA. In Section 7.3.2.3, it is stated that "through the Edwards Aquifer (BFZ) any wells between the pipeline and Barton Springs or Cold Springs are considered to be in the zone of impact." This designation includes the Sunset Valley drinking water wells. Section 7.3.3.1 echoes this, and states "The entire Edwards Aquifer (BFZ) through south Austin is an area subject to special consideration for potential impacts to ground water as a drinking water resource resulting from a release. Any release along this stretch of pipeline could result in potential contamination of drinking water wells between the pipeline and Town Lake."

This level of concern carried through to the designation of sensitive and hypersensitive areas in Tables 7-1 and 7-2 of the draft EA, where the three miles of pipeline crossing the Edwards Aquifer (BFZ) are rated hypersensitive for "Edwards Aquifer (BFZ) – Sensitive and Hypersensitive Karst Areas." In addition, risk factors were identified for the stretch of pipeline crossing the Edwards Aquifer (BFZ) in Section 7.3.2.1. The potential for contamination of drinking water wells clustered through the Edwards Aquifer (BFZ) has required the highest amount of mitigation efforts to be directed at the pipeline in the area that could impact these wells.

7.13.6 Comment

A commentor questioned the following statement from the draft EA: "Despite the two major releases of crude oil that have occurred over the Edwards Aquifer (BFZ) in the past ten years (one from the EPC line), no long-term damage of the Edwards Aquifer (BFZ), or major impacts to drinking water wells, or to Barton Springs, have been documented." The commentor said that the statement was not entirely true or, in some cases, was true only because the impacts of previous spills were not fully investigated.

Response

The commentor is correct that all the impacts of previous spills have not been fully investigated, and because of this, the draft EA conservatively concluded, "Any release along this stretch of pipeline could result in potential contamination of drinking water wells between the pipeline and Town Lake." Because the contaminants in gasoline are lighter than crude oil contaminants and because of the strong ground water gradients in the Edwards Aquifer (BFZ), it is likely that most constituents from refined products would be rapidly flushed from the formation in the days to weeks following the release, with additional flushing occurring after major rainfall events. Nonetheless, some unquantifiable potential exists for hazardous constituents in the refined product to remain in the aquifer for longer periods of time.

7.13.7 Comment

Several commentors expressed concern about the potential impacts to ground water in the Edwards Aquifer (BFZ) from a spill affecting Williamson Creek or Boggy Creek.

Response

The pipeline crosses Boggy Creek downstream of the Edwards Aquifer Recharge Zone. Therefore, there would be no impacts to the ground water from a release into this creek. The Longhorn pipeline does not cross Williamson Creek or any of its tributaries. Analyses do show some overland flow traces that could potentially impact Williamson Creek in the vicinity of the recharge zone. However, the locations along the pipeline where this could take place are within the band designated as hypersensitive for potential impacts to Edwards Aquifer ground water. Recharge features within Williamson Creek represent one of many pathways by which a pipeline products release could take to impact aquifer water quality, as identified in the draft EA.

7.13.8 Comment

A commentor suggested that the draft EA should have rated Bear Creek and Little Bear Creek crossings along the Austin Re-route Alternative as highly sensitive because of the potential impact to Edwards Aquifer recharge

Response

The commentor is correct. The Austin Re-route has an even higher environmental sensitivity than previously assessed. This is adjusted in the final EA.

7.14 COMMENTS REGARDING IMPACTS TO SPECIFIC GROUND WATER RESOURCES

7.14.1 Comment

A commentor noted that there is insufficient information within the draft EA to support the sensitivity scoring. The commentor outlines the specific problems as follows:

- Identification of Gulf Coast Aquifer as non-sensitive;
- Low to moderate sensitivity of Carrizo-Wilcox Aquifer;
- Subdivision of Edwards Aquifer (BFZ) into areas of hypersensitive and sensitive reaches, and failure to score all karst areas as 1 for hydrogeological sensitivity;
- Low vulnerability score for Ellenburger-San Saba Aquifer;
- Low vulnerability score for Edwards-Trinity Aquifer; and
- Low sensitivity score for Hueco Bolson Aquifer without estimation of vadose zone contaminant times.

Response

In regards to the sensitivity of the Gulf Coast Aquifer, deep soil formations do not prevent ground water contamination, but they do limit it and make spills at potential sites capable of remediation.

Carrizo-Wilcox sensitivities have been modified in certain intervals, especially in the Bastrop County area.

The subdivision of sensitivities within the Edwards Aquifer (BFZ) is intended to provide information as to the sensitivity of aquifer units relative to each other. The entire aquifer system is considered to be the most sensitive and has been assigned the highest potential impacts classification.

Karst areas in the Ellenburger-San Saba Aquifer are evaluated according to hydrogeologic sensitivity and proximity to public water supplies. While hydrogeologic sensitivity was determined as being high, in most intervals, public water supplies were sufficiently distant to rate a low proximal sensitivity.

The evaluation of karst areas such as the Edwards Aquifer (BFZ) should take into account that the south Austin, Texas area has been intensely studied by multiple authors. The presence of nearby known karst features did generate a hydrogeologic sensitivity of 1. However, also based upon the relative aquifer unit characteristics as previously referenced, not all units (i.e., those not near known karst features) could be classified with a hydrogeological sensitivity of 1.

Using the methods of the draft EA, the Edwards-Trinity Aquifer was evaluated appropriately consistent with the previously described methods.

Hydrogeologic sensitivity of the Hueco Bolson Aquifer has been described as minimal because of the many confining units (playa deposits) that are between the surface and the usable ground water in the vicinity of the Longhorn Pipeline System.

7.14.2 Comment

A commentor asserted that the methodology for scoring aquifer sensitivities and proximity to drinking water supply represents a flawed decision-making process, providing inaccurate relative rankings because individual at-risk wells and water supplies were not identified. Specifically, the number of water wells proximal to pipeline across Hueco Bolson Aquifer should make it more sensitive than Cenezoic Pecos Alluvial Aquifer.

Response

The evaluation methods looked at individual PWS wells and springs as being potentially at risk from the Longhorn pipeline. In the example provided by the commentor regarding the Hueco Bolson Aquifer, the hydrogeology does not favor the rapid movement of contaminants into this ground water resource near the Longhorn Pipeline System. In regards to the Cenozoic Pecos Alluvium Aquifer, there are few public water supplies that would be affected in the event of a release. These have been accounted for in the draft EA.

7.14.3 Comment

A commentor said that the EA must list and assess all potential impacts to karst resources, recognizing that it is impossible to track and remediate hydrocarbon contamination in karst aquifers; the EA must provide a basis of mitigation to protect all known karst features.

Response

The EA fully recognizes the possibility for substantial and long-term contamination of karst aquifers, noting that "contamination is likely to remain in the aquifer for a considerable amount of time and to be resistant to treatment or removal by mechanical means." Chapter 4 of the draft EA shows a detailed cataloguing of the karst aquifers crossed by the Longhorn pipeline route. The potential for contamination of these resources by a major pipeline rupture is acknowledged, and a large portion of the pipeline crossing the Edwards Aquifer formations is assigned relative ranking scores of between 1 (the highest) and 3 on a scale of 5.

However, in the impacts assessment in Chapter 7 of the draft EA, the designation of portions of the pipeline as sensitive or hypersensitive, and therefore, the determination of where additional mitigation measures were necessary, was based on the current uses of the ground water in the aquifer. While Tier 1 mitigation measures are designed to protect ground water resources throughout the length of the pipeline, the criteria for the most sensitive and hypersensitive designations was the proximity to public drinking water supplies that could be impacted by an accidental release. Potential ground water impacts to threatened and endangered species were also a criteria, whereby some portions of the pipeline were classified as sensitive.

The choice of mitigation measures for the pipeline as a whole is seen as appropriate for protection of karst resources. See also Section 4.8 of the RS.

7.14.4 Comment

A commentor concluded that the draft EA Section 4.2.1.1.3 does not address karst hydrogeology in sufficient detail. The commentor stated that estimates of product travel times, distribution of travel times through vadose karst, and complete cataloguing of all currently known and unknown karst features along the pipeline are necessary to assess potential impacts.

Response

Section 4.2.1.1.3 of the draft EA is not intended to serve as a hydrogeologic modeling analysis of the Edwards Aquifer (BFZ) and other karstic formations. That discussion is reserved for Appendix 7A containing the R.J. Brandes Company technical memorandum reviewing ground water modeling.

The draft EA statement that an area where surface expressions of karst features are known to occur, it is likely that an order of magnitude increase of unknown subsurface features exists, is based upon a verbal communication with Dr. George Veni, who provided information for consideration in this draft EA. It is beyond the scope of this draft EA to conduct a statistical treatment of the probability of occurrence of unknown karst features.

The precise distance from the pipeline to known karst features could not be provided in the draft EA, due to a confidentiality agreement with the Texas Speleological Society, who provided the data. The protection of karst features is a high priority of the analysis in the draft EA. The draft EA assigned the highest ground water sensitivity to any reach of the pipeline that could spill onto a known karst feature and assigned the next highest sensitivity to any reach of pipeline within 2.5 miles of a known karst feature. The general locations of karst features near the pipeline can be deduced from the "Sensitivity and Justification" column in Table 4-14 of the draft EA.

Based upon area and regional studies from a significant number of published reports by the US Geological Survey (USGS), the Texas Water Development Board (TWDB), The University of Texas - Bureau of Economic Geology (BEG), the Texas Speleological Society, EPA, and BS/EACD, the sensitivity of the Edwards Aquifer (BFZ) has been assessed relatively as the most hydrogeologic sensitive interval along the Longhorn Pipeline System route. Additional modeling and/or site-specific surveys of potential ground water movement in the aquifer to assign a high degree of sensitivity to this aquifer are not needed.

7.14.5 Comment

A commentor requested an explanation on the dispersion of gasoline or other chemicals into a karst environment.

Response

The constituents in gasoline are relatively water soluble, and some, such as MTBE, are highly water soluble. Therefore, as described in the draft EA, they may disperse both horizontally and vertically in the ground water column. It is reasonable to expect that the gasoline constituents would behave in a manner similar to the soluble dyes used in dye testing, except that some volatilization of gasoline constituents would occur, particularly during the initial time period when an actual gasoline phase exists. Transport models were not used because of the unique nature of karst aquifers. Instead of using transport models, available dye test data were utilized. Conservative assumptions were made where such data did not exist.

7.14.6 Comment

A commentor said that the pipeline could endanger well fields in the Simsboro portion of the Carrizo-Wilcox Aquifer from which the City of San Antonio is under negotiation to utilize water.

Response

The commentor provides no evidence that wells on the tract in question, the City Public Service Board (CPS) properties in Bastrop and Lee counties, could be impacted. Studies prepared for the San Antonio Water System indicate that the Longhorn pipeline is hydrogeologically remote and substantially downgradient from the CPS properties, and therefore a major release on the pipeline could not impact these wells.[2]

7.14.7 Comment

A commentor stated that draft EA was inadequate regarding impacts to the Edwards-Trinity Aquifer and suggested that the final EA include potential impacts to the City of Eldorado's PWS well(s).

Response

The draft EA states that in most portions of the karstic Edwards and Edwards-Trinity aquifers there is not sufficient data available to guarantee that a major release of gasoline would not have large impacts to surrounding drinking water supplies. Because of the nature of ground water flow in karst, only dye tests (not modeling) can provide conclusive evidence that a particular well or set of wells could or could not be impacted from releases at any point along the line.

For that reason, wide bands of sensitivity for gasoline transport in karst were established. The draft EA considered PWS wells up to 25 miles away from the pipeline as having the potential for contamination from pipeline spills if karstic formations are present in the vicinity of the line. The draft EA relied on best available data, and where specific dye test data are available, such as in the Edwards Aquifer (BFZ), these data were further considered in the evaluation of potential well water contamination.

In the case of Eldorado, releases from the pipeline are unlikely to contaminate the Eldorado PWS wells because of the regional potentiometric contours and the location of the pipeline with respect to the wells. These factors suggest that in a macroscopic sense, ground water in the region flows away from Eldorado wells. However, there is still the potential for localized conduit flow or aboveground transport to recharge features that could impact the Eldorado wells. For this reason, and due to the evidence of localized karst formations and the proximity of the Eldorado wells to the pipeline, the pipeline near Eldorado was rated as hypersensitive for potential ground water contamination and, therefore, assigned the highest level of protection. This stretch is rated hypersensitive and designated for Tier 3 mitigation.

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[2] Assessment of Groundwater Availability on CPS Property in Bastrop and Lee Counties, Texas*;* Prepared for San Antonio Water System; HDR Engineering, Inc.; July 1999.

7.14.8 Comment

A commentor requested an evaluation on the potential impacts on Aqua Water Supply Corporation with respect to both proposed mitigation and recognized uncertainties.

Response

As stated in Appendix 7A of the draft EA, the Carrizo-Wilcox Aquifer including the Simsboro formation are less likely to be contaminated by a pipeline release than are the karstic Edwards and Edwards-Trinity aquifers to the west. First, approximately 30 ft of soil overlay the water table in this area, and this soil cover would retard the ability of a spill to reach the aquifers. Second, the Carrizo-Wilcox Aquifer is at or close to capacity the potential recharge is discharged to creeks, making it more likely that free-phase or dissolved phase contaminants would discharge to surface waters. Third, the artesian portion of the Carrizo-Wilcox Aquifer including the Simsboro formation is 300 to 1,100 ft below surface, while modeling of the Carrizo Aquifer estimated an average ground water velocity of 0.1 to 6 ft per day. Because of these factors, it is unlikely that under any conditions a spill would impact drinking water wells. However, if there were a major spill in this area, conventional remediation techniques would provide a margin of safety for the Aqua Water Supply wells in these aquifers.

In order to be consistent with the classification methodology throughout the draft EA impacts assessment, changes are being made to sensitivity ratings for ground water in Bastrop County. Portions of the Carrizo-Wilcox and Colorado Alluvial aquifers are being reclassified upwardly to sensitive. This band extends between MP 125.6 to MP 150.7, and from MP 157.4 to MP 157.7 (see Appendix C of this RS).

7.15 COMMENTS REGARDING SPECIFIC SURFACE WATER RESOURCES

7.15.1 Comment

The draft EA states that there is potential for significant contamination of Lake Travis. A commentor was concerned because their municipal water treatment system does not have the treatment processes to remove benzene and MTBE and states that upgrades to the system would cost $200 to $350 million. Also, the commentor expressed concern about the ability to replace the potable water supply.

Response

The impacts assessment of the draft EA focuses on identifying those portions of the pipeline where either normal operations or accidental releases could result in potentially significant impacts. This resulted, in general, of an overprojection of the amount of sensitive and hypersensitive areas along the pipeline that require mitigation.

Section 7.6.2.2 of the draft EA states that:

> "A release of 5,000 bbl of 15 percent MTBE product proceeding unimpeded to Lake LBJ could cause an immediate concentration of 700 ppb MTBE in Lake LBJ, or 83 ppb in Lake Travis, assuming instantaneous entry of all contaminant into the lake and complete mixing. If MTBE concentrations in the Highland Lakes reached these levels, it could take a considerable amount of time before the affected lake, and the water in the lakes and in the Colorado River downstream of the affected lake, reached an MTBE concentration less than the 20 ppb EPA advisory level."

This statement was made using greatly simplified assumptions in order to assist in designation of a zone that could be impacted by major releases from the pipeline in the absence of more specific modeling.

In response to comments, further modeling of the highly sensitive Pedernales River was performed in consultation with technical experts from the Lower Colorado River Authority (LCRA), was to better characterize the potential impacts to drinking water supplies dependent on Lake Travis, including the City of Austin. Two modeling exercises were performed.

A model of Lake Travis was set up using bathymetric, climactic, and flow data provided by the LCRA. The US Army Corps of Engineer's CE-QUAL-W2 two-dimensional water quality model was used to incorporate two-dimensional, longitudinal/vertical, hydrodynamic transport of benzene and MTBE through the lake. A target of 20 ppb MTBE and 5 ppb benzene were set for the penstocks of Mansfield Dam to ensure that water passing through to Lake Austin would not exceed drinking water standards and guidelines. Using these targets, iterations were performed to determine the maximum mass of MTBE and benzene that could pass from the Pedernales River to Lake Travis and not exceed those threshold concentrations. The Lake Travis model included the first 10 miles of the Pedernales River, where it widens and deepens as an arm of the lake.

The Pedernales River model followed the same methodology used for modeling the Colorado River and Onion Creek in the draft EA. The US Army Corps of Engineers Riverine Emergency Management Model (REMM) was used for incorporating Pedernales River specific factors, including flow data from the LCRA. Iterations were performed using the river model, including a determination of the amount of MTBE and benzene that would reach Lake Travis under varying flow conditions in the Pedernales River.

Based on these models, maximum release volumes at the Pedernales Crossing have been calculated which would not cause an exceedance of threshold concentrations at the Mansfield Dam penstocks as a function of flow rate in the Pedernales River. In addition, other places in the Pedernales River, Sandy Creek, and Llano River watersheds were studied with respect to basic characteristics, stream flow, distance to downstream reservoirs, and maximum release volumes which were calculated based on proposed maximum product throughput and current valve configurations.

It is important to note that the conclusions from these studies did not contradict any of the impact determinations made in the draft EA, but rather supported and refined them. These refinements are noted as follows:

1. The draft EA stated above that concentrations of up to 83 ppb MTBE could be present in Lake Travis if a 5,000-bbl release proceeded unencumbered to the reservoir. Modeling demonstrated that this conclusion was correct, and that under high flow conditions in the Pedernales River (5,000 cubic feet per second [cfs], as opposed to the average flow rate of 200 cfs) a release of approximately 6,500 bbl at the Pedernales crossing could result in 65,000 kg of MTBE and 670 kg of benzene entering the reservoir. With this mass of MTBE entering the reservoir, a peak concentration of about 80 ppb MTBE would be reached at the Mansfield Dam penstocks, approximately four months following the spill.

2. The draft EA noted that it was necessary for MTBE and benzene to proceed unimpeded to the Highland Lakes for a severe impact to drinking water quality to occur. Modeling bore this out – at normal flow stages in the Pedernales River (200 cfs), over 99.9 percent of the benzene and MTBE would be volatilized from the river prior to any contaminants reaching Lake Travis. In the absence of flood conditions, no major impacts are expected to any of the Highland Lakes as a result of any spill scenarios along the Longhorn pipeline. The flood stage modeled, 5,000 cfs, represents a flow level which may be expected to occur 0.4 percent of the time on an annual basis, or approximately twice per annum.

3. The draft EA designated 7.6 miles of pipeline in the Pedernales River watershed as sensitive, including 2.7 miles of hypersensitive watershed. In the Sandy Creek watershed, 1.86 miles of pipeline was designated sensitive and 0.79 miles were designated as hypersensitive. In the Llano watershed, 5.3 miles were sensitive and 1.88 miles were hypersensitive. Each of the areas judged in this follow-up study to pose serious impacts to Lake Travis or Lake LBJ water quality were already rated as sensitive or hypersensitive in the draft EA. Therefore, the original screening was successful at identifying places along the pipeline, that posed the greatest risk for significant impacts. Closer scrutiny suggests that the original designations were over-conservative, as it does not appear that any portions of the Llano watershed would be considered hypersensitive if specific modeling were done on the behavior of MTBE

and benzene in the river. Also, numerous crossings in the Sandy Creek and Pedernales watersheds which were originally scored as hypersensitive are not likely to pose a significant long-term threat to drinking water quality in the area.

4. The original purpose of the sensitive and hypersensitive area designations was to alert the Lead Agencies to places where significant impacts could occur from accident scenarios and the potential for these occurrences. This enabled the Lead Agencies to determine if mitigation measures were appropriate for the level of risk and potential impacts. Refinement of the model and watershed study have provided the Lead Agencies with additional data to specify appropriate and more protective mitigation measures, such as improving valve configurations and responding to flood conditions in the Highland Lakes watersheds through operator alerts and reduced maximum pipeline product capacity during flood stages in the rivers.

Documentation of the modeling background and methodology are provided in Appendix 7G of the final EA.

7.15.2 Comment

Commentor stated that a major uncontrolled release in the Barton Creek watershed or in the Barton Springs Recharge Zone could result in major impacts to the drinking water quality at the intakes of Austin's Green Water Treatment Plant on Town Lake.

Response

There are a number of factors to consider with respect to the potential impacts of gasoline contaminants on Town Lake. First, the Green Water Treatment Plant provides 11.3 percent of the City of Austin water supply on an annualized basis (1999 basis). Ulrich and Davis water treatment plants, which supply 88.7 percent of the water supply, are upstream on Lake Austin. Second, Town Lake is unlike the other Highland Lakes in that it has a much lower volume of water. This lower volume of water makes it easier to artificially reduce the concentration of MTBE and benzene in the lake by increasing withdrawals and inflows. Third, Town Lake is wider and shallower than Lake Travis and Lake Austin. MTBE and benzene volatilization would take place much more rapidly in the river.

Town Lake could be contaminated by one of two scenarios. First, a release in Barton Creek watersheds could flow downstream to the lake. Second, a release in the Barton or Slaughter creek watersheds could cause contamination of the Edwards Aquifer (BFZ) and result in discharge of pollutants from Barton Springs to the lake.

There are complicating factors in evaluating releases in the Barton Springs recharge zone and contributing zone. Much like the Pedernales River, Sandy Creek, and Llano watersheds, under normal flow conditions in the Barton Creek watershed, no major impacts to drinking water quality in Town Lake would be expected due to a release. Crossing of the creek and the Long Branch tributary occur 32.7 and 31.8 miles upstream of where Barton Creek enters Town Lake, and under normal flows, it is predicted that losses to volatilization would prevent any substantial amount of contaminants from reaching the lake.

However, recharge features in Barton Creek may allow a maximum recharge rate of 250 cfs to the Edwards Aquifer while Slaughter may allow up to 52 cfs.[3] The actual maximum recharge rate may be higher, according to the Edwards Aquifer Conservation District. In the case of a 5,000-bbl spill at a Slaughter or Barton Creek crossing, theoretically, if the spill is not adequately contained much of the spill could enter the aquifer and be transported to springs that feed Town Lake with little volatilization. This possibility is bounded by two constraints.

First, under low-flow conditions in Barton Creek, most of the spill constituents would either volatilize or absorb in soils before traveling the 23 to 24 miles from the Barton Creek or Long Branch crossings to the westernmost edge of the Barton Springs recharge zone. Spills in Slaughter Creek would reach the aquifer quicker with less volatilization.

At flood stage, the flow in Barton Creek may be approximately ten times higher than the maximum recharge rate for the Barton Creek section of the recharge zone as a whole. Therefore, while higher flows would transport more contaminants to the recharge zone, the recharge rate into the aquifer is still limiting. It is not possible to accurately characterize the amount of gasoline constituents that could enter the aquifer through these mechanisms without a more comprehensive model of Barton Creek, including historical flow data and projected recharge rates under various river conditions. While the Slaughter Creek watershed upstream of the pipeline is much smaller, with correspondingly lower flood flows, additional modeling would be necessary to specifically determine the volume of contaminants that could reach the Edwards recharge zone.

Under the high-flow scenario, the failure of contaminants to enter the aquifer does not necessarily provide protection to the Barton Springs Salamander which relies on aquifer water. If a maximum release from the pipeline rapidly surfaces and exits the pipeline trench, and no protective berms or other measures are in place to protect surface waters from contamination, gasoline contained in flood flows from Barton or Slaughter creek could also impact the Barton

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[3] Barrett, Michael E. and Charbeneau, Randall J., A Parimonious Model for Simulation of Flow and Transport in a Karst Aquifer, www.ce.utexas.edu.centers/crwr/reports/online.html.

Springs Pool and cause critical habitat contamination. Protective measures to be incorporated to protect Barton Springs are identified in the Phase II BA.

Under high flood flow conditions in Barton or Slaughter creeks, it may be possible that a high enough mass of benzene and/or MTBE could reach Town Lake to pose drinking water concerns. This is a conservative position, and more specific modeling would be required to verify this statement. The meteorological conditions necessary to produce this level of flooding would, however, probably also impact watersheds to the west and enable the LCRA to temporarily increase the flow rate through the watershed. Under any case, it should be possible to limit any large impacts to Town Lake water quality to a few days in duration.

Under any non-flood flow Barton or Slaughter creeks watershed scenario, it appears highly unlikely that any major impacts to Austin drinking water supplies would occur. This conclusion is based on extrapolation of information from previously derived models for the Pedernales River and Onion Creek, and a more definitive statement would require site-specific modeling.

As a pathway, a major pipeline rupture in the Edwards Aquifer Recharge Zone following a relatively direct pathway into a recharge feature may have higher impacts. This is because transport from the pipeline to the springs follows a much shorter pathway and because subsurface transport would virtually eliminate volatilization. Initially, a large discharge of benzene and MTBE from the springs would occur, followed by periodic flushing of higher levels in the aquifer following rain events, which would temporarily elevate the concentration of contaminants exiting the springs. Mitigation measures have been put in place to limit the potential for this occurrence, including installation of new pipe through the recharge zone, installation of more sensitive leak detection technology, a concrete cap to prevent third-party damages, secondary containment of gasoline within the pipeline trench, identification of karst recharge features in the proximity of the pipeline, and berms to direct flows from the recharge features so that the potential volumetric release and spread of a spill over the recharge zone may be further controlled.

7.15.3 Comment

A commentor stated that the LMP should include a measure that requires replacement of water supply for Austin.

Response

There is no technically feasible means for replacing Austin's water supply in a timely fashion. In the worst case flood/release volume scenario modeled, there would be about a four-month time period before the city drinking water supply would be impacted. This allows additional time for closing the Mansfield Dam penstocks so that water could be drawn from Lake Austin while alternatives were sought. During this time, volatilization would reduce the mass of MTBE and benzene in Lake Travis.

The modeling and additional mitigation measures described in the previous response would provide a margin of safety to ensure that the Highland Lake supply of water to the City of Austin would remain potable.

7.15.4 Comment

A commentor recently spent $65 million to purchase watershed protection lands with the specific purpose of protecting drinking water supply. The commentor wanted these areas to have additional protection.

Response

The data have been collected to identify these parcels with respect to the location of the pipeline. The crossings of these parcels has been upgraded to sensitive for ground water impacts because Slaughter Creek, and to a lesser extent Barton Creek, may carry water contaminants eastward into the Barton Springs recharge zone, where the contaminants could enter the Edwards Aquifer through instream recharge features.

Upon further review, it has been determined that it is appropriate to rate a larger stretch of pipeline, from MP 173.5 to MP 178.41, as sensitive for the potential for ground water impacts. Throughout this band, Slaughter Creek, which runs roughly parallel to the pipeline (and crosses the pipeline at MP 174.7, where it is rated as hypersensitive for potential impacts to Barton Springs), could conduct some fraction of a large spill eastward from the point of release from the pipeline to the Edwards recharge zone. This is analogous to the discussion of impacts from the Barton Creek watershed. Therefore, protection of this area for water quality purposes is appropriate, although impacts from most points along this stretch are not expected to pose the same risk to the Edwards as a spill in the aquifer recharge zone.

7.15.5 Comment

The pipeline crosses a draw close to where Bear Creek surfaces, and Bear Creek Drainage and West Bear Creek Drainage all flow into the Llano River; therefore, a commentor wanted this area to be considered hypersensitive.

Response

Sensitivity point values were assigned to each river and creek along the pipeline based on proximity to drinking water and recreational uses, on drinking water value, on volume of drainage upstream from the point where the river or creek crosses the pipeline (and thus, the potential for transport of a spill away from the pipeline), and on the difficulty to control a spill from the pipeline along the creek. Impacts to the Llano River from contamination to Bear Creek and West Bear Creek were both considered.

In addition, the impacts to waterways from drainages that are not listed surface water bodies were also considered. The Bear Creek and West Bear Creek watersheds were divided into 41 different pipeline segments, depending on slope, distance along drainage to surface water body, and soil cover. A number of these segments did possess characteristics that indicated spills would have a high probability of draining to Bear Creek and West Bear Creek.

However, although both Bear Creek and West Bear Creek are upstream from valuable drinking water resources, neither stream possesses hydrological characteristics that would enable a spill entering either creek to contaminate the resources. Modeling of other rivers indicated that it is highly unlikely that contaminants released into Bear Creek and West Bear Creek could adversely impact the use of drinking water in Lake LBJ, or for any significant period of time, the Llano River.

7.15.6 Comment

A commentor wanted an explanation regarding the Tier 1 designation for several streams in Fayette County, Bastrop County, Kimble County, Reagan County, Upton County, and Culberson County, given that many of the streams parallel the pipeline over considerable distances.

Response

Tier designations related to stream crossings are based on downstream sensitive receptors and other factors as defined in Chapter 9 of the final EA. All of the streams referred to in the commentor's letter except the Colorado River are ephemeral, and most are a considerable distance from major rivers. The Colorado River, which was referenced in the letter, is not within 1,250 ft of the pipeline corridor centerline except where the pipeline crosses the Colorado. Furthermore, as noted in the draft EA, tier designations and related mitigation plans that are discussed in Chapter 9 include numerous measures that are structured to protect the physical, human, and ecological environment.

7.15.7 Comment

A commentor noted that Table 4-17 in the draft EA shows that the Longhorn pipeline crosses 73 streams and watersheds; however, only 13 stream crossings will be monitored in LMC 29 in the draft EA. The commentor asked why the Pecos and Brazos rivers are excluded from the plan.

Response

The 73 streams included in Table 4-17 of the draft EA represent only a subset of the 266 stream and watershed crossings along the pipeline. These are the first- and second-order streams crossed by the pipeline. Not all streams crossed by the pipeline, including second order and higher streams, were deemed environmentally sensitive enough to warrant additional monitoring in the draft EA. LMC 29 has been revised in the final LMP. It now includes monitoring of the Pecos and Brazos rivers.

7.16 APPROPRIATENESS OF SURFACE WATER MODELING ASSUMPTIONS AND TECHNIQUES

7.16.1 Comment

A commentor questioned why the US Army Corps of Engineers (COE) REMM model was selected and whether it is appropriate for this application.

Response

The REMM model was developed by the COE to estimate the effects of petroleum hydrocarbon and chemical spills on river systems. Other public domain water quality models could have been adapted for this purpose, but REMM was specifically created to model the type of scenario under evaluation and it already contained the algorithms to compute losses from a floating-phase hydrocarbon spill.

7.16.2 Comment

Several commentors questioned the selection of certain input data for the model, including dispersion coefficients, percent of painted top-width, evaporative loss rates, and rating curves.

Response

Differences in velocity along a stream cross section were accounted for in the model by dispersion coefficients, which affects the extent of spreading of the plume as it moves downstream. Dispersion coefficients were estimated based on typical values provided in the REMM manual and other sources. Dye dispersion studies would need to be performed to obtain more precise values.

The percent of top-width "painted" by a spill affects the initial surface area of a spill. Since there is no way to predict this, a median value of 50 percent was selected.

Evaporative loss is calculated by the algorithms in the model code. The loss rates are based on the properties of the contaminants, which are documented in the draft EA. There are no decay coefficients or other input variables.

Stage-discharge-velocity relationships (rating curves) for Onion Creek were estimated based on HEC-2 model output obtained from the COE's work performed for the Travis County Flood Insurance Study. These results were the best data available and were not changed. For other streams, estimates were based on historical stream discharge measurements from USGS and LCRA, rating curves at the USGS gauges, and/or estimates based on normal flow calculations (Manning's equation).

7.16.3 Comment

A commentor recommended that a model sensitivity analysis be performed to determine the range of results obtained by varying input parameters.

Response

A formal error range or sensitivity analysis for every input parameter was not performed. Additional analyses would have to be performed to accomplish this. Spill volumes and flows are the most significant factors and they were varied over a large range.

7.16.4 Comment

Commentors asked why only the Colorado River, Onion Creek, and their associated reaches downstream of the pipeline crossing were selected for modeling. In addition, they felt these streams would not be representative of spills above the Highland Lakes.

Response

One large river and one smaller creek were initially selected for modeling to investigate the differences in potential impacts between streams of different sizes. While it is recognized that there are many factors that affect the impacts of a spill on a stream, those two were selected as representing a wide range of characteristics. Furthermore, those two streams had an ample amount of hydrologic and geometric data available that were required to perform the modeling. Following issuance of the draft EA, additional modeling was performed on the Pedernales River to investigate potential impacts on Lake Travis and City of Austin water supplies. These are presented in the final EA.

7.16.5 Comment

Several commentors requested clarification or a more detailed discussion of the assumptions used during the modeling of spills from the pipeline. Specifically, commentors requested information on the following topics:

- Consistency of modeled spill volumes;
- The selection of only two specific stream crossings for modeling; one of which is on the Austin Avoidance Alternative and not the main pipeline; and
- Selection of the US Army Corps of Engineers Riverine Emergency Management Model (REMM) as appropriate for this EA.

Response

As is described in Appendix 7D to the draft EA, various spill scenarios were modeled using the REMM to determine potential impacts to the Colorado River system from a variety of spill volumes. The original plan was to model small, medium, and large spills (50, 500, and 5000 bbl) at each crossing. However, the largest possible spill at the location of the Colorado River crossing was calculated to be 2,000 bbl, based on the maximum pipeline flow and assuming a complete rupture of the line and total product drain down between highpoints in the line. Therefore this volume was used as the maximum to be modeled for the Colorado River. At Onion Creek, because of the low flow rates in the creek, large volume spills were not modeled.

A large volume spill would dominate the flow in the creek, and thus be subject to non-modeled processes such as streambed interaction.

The choice of modeling the Onion Creek crossing on the Austin Avoidance Alternative route, rather than at the existing Longhorn crossing, was because the model would yield more data for assessing impacts due to the greater distance between the Austin Avoidance Alternative route crossing and the Colorado River, versus the existing crossing and the Colorado River (25.5 miles as opposed to 16.5 miles). Impacts to other streams were estimated based on a regression equation developed from the results of the Colorado River modeling.

In response to additional concerns regarding the integrity of the City of Austin water supply delivered from Lake Travis, additional modeling was performed on the Pedernales River at various flow scenarios. These flows were based on assumptions regarding check valve operation or failure, and additional modeling results are provided in Appendix 7G of the final EA.

The selection of the peer-reviewed REMM model over other types of surface water modeling programs was based on its availability, the fact that it already contains property and fate data for gasoline and crude oil, and that it is a widely used and accepted spill model.

7.16.6 Comment

Several commentors questioned the validity of applying the Colorado River model results to other streams. In addition, the use of a maximum spill volume of 2,000 bbls on the Colorado River limited maximum spill analyses on other streams to that value when they might actually have a larger worst possible spill.

Response

It was not possible to model every stream crossing with the time and resources available to conduct the EA. Consequently, an effort was made to provide something more than a qualitative analysis of spills on other streams. The regression equation developed from the Colorado River model was the best tool available to provide a semi-quantitative evaluation of various spills under various conditions on other streams. The draft EA states that there are limitations to this approach and that it is merely an estimation tool.

7.16.7 Comment

Several commentors questioned the use of a maximum spill volume of 2,000 bbls on the Colorado River as compared to 5,000 bbl at other locations.

Response

A maximum spill size at this location would be approximately 2,000 bbls. This estimate assumes a complete rupture at maximum throughput and takes into account valve closure time, draindown, and "siphoning effect."

The spill volume estimates were based on projected catastrophic conditions at the Colorado River crossing. This approach provides a better estimate than using historical averages for the entire line.

The commentor wants to add the equivalent of five minutes of flow (at 225,000 bpd) i.e., 34,000 gallons, to account for flow during the five-minute shutdown time. The spill volume of 2,000 bbl already includes this 34,000 gallons.

Longhorn has stated, on several occasions, that they can detect a large leak and shutdown the pipeline within five minutes. According to UTSI, the new leak detection system will be able to detect a leak equivalent to 88 bph within one minute of occurrence. In the event of a complete rupture, there would be immediate response. The remote-controlled valve immediately upstream of the Colorado crossing takes two minutes to close completely. Given these factors, a shutdown time of five minutes is achievable. Assuming a ten-minute shutdown time for the Colorado crossing, this would add 780 bbls to get a revised spill volume of 2,800 bbls.

7.16.8 Comment

Several commentors had concerns with the results of the Onion Creek model regarding the lack of documentation of actual instream concentrations, and also the low-flow limitations of this model.

Response

The standards evaluated in all modeled scenarios were the drinking water criteria of 5 ppb benzene and 20 ppb MTBE. The Onion Creek modeling showed that concentrations would not drop below the drinking water standards within the 26 miles that were modeled. Concentrations at each mile point are shown on the graphs in the draft EA Appendix 7D.

It was not reasonable to model a large spill in a small creek under low-flow conditions, where the spill would dominate the flow of the stream. The water would be saturated to the limit of solubility of the contaminants. An event such as this would be tantamount to an overland flow scenario rather than a river spill scenario, and the model used would be inappropriate.

7.16.9 Comment

A commentor asked why the Colorado River model would not run at the highest flow for the crude oil spill scenario and what additional work was done to investigate this.

Response

The crude oil spill scenarios were secondary in importance to the gasoline scenarios, since the pipeline is not proposed to carry crude oil. They were only included as a baseline for comparison to the gasoline spills. The two scenarios showed that the loss rate of crude oil and benzene would be much slower than for similar spills of gasoline. Several attempts were made to make the model run for the highest flow by adjusting input parameters, but these were unsuccessful. Subsequent efforts were focused on the primary objective of modeling impacts of the various gasoline spills.

7.16.10Comment

A commentor stated that the overland flow model relies on untested assumptions and that benchmarking from available spill data is warranted.

Response

The intent and utility of the overland flow model is to model the way that contours indicate product would flow downgradient from the pipeline. In addition, ranking of modeled flow traces was performed based on the common engineering principles that ground cover, slope, and distance of travel would all impact the transport characteristics of a liquid over soil. Benchmarking is not possible in the absence of data on surface water contamination resulting from the spills that have occurred along the pipeline in the past.

7.16.11Comment

A commentor stated that the draft EA is inconsistent in stating that "potential for a release causing impacts to surface water bodies may be greater, due to the potential for overland flows which can flow for more than 0.2 miles," and then defining a width of 0.4 miles as the area where a release would immediately impact the water body crossed.

Response

Distances based on site-specific analysis should be distinguished from those based on conservative assumptions. Overland flow analyses were performed along the pipeline to identify the most probable pathway for contaminants to travel from the spill site. The resolution for these analyses was determined by analyzing the flow pathway every 100 meters along the pipeline, or every 0.062 miles. These analyses were designed to determine where it was likely that an impact could occur to a stream that was not crossed by, or adjacent to the pipeline.

Two methods were used to define areas that could impact specific sensitive streams and rivers. First, the crossing itself, as well as two-tenths of a mile on either side is considered an area of concern. Second, any areas where flow trace analyses indicated that spilled product could reach a stream or river at a distance from the pipeline, were also considered to potentially impact the stream or river.

7.16.12 Comment

A commentor stated that drainage to storm sewers and streets from a pipeline leak should have been considered as a pathway to creeks in urban areas.

Response

The commentor is correct in that streets and storm sewers could provide an additional pathway for a product release from a pipeline to rapidly reach surface waters in urban areas. However, defining these areas as sensitive for surface water impacts would not change any area designations. This is because any areas and storm sewers are urbanized enough to classify as population sensitive. Thus, these areas are already subject to Tier 2 mitigation.

7.17 NEED TO ADDRESS FUTURE WATER SUPPLIES

7.17.1 Comment

Commentors stated that the draft EA considered impacts on current water supplies but did not address future water supplies. The commentors pointed out that there will be considerable growth along the Longhorn pipeline corridor in the future and that this growth will require development of future water supplies; therefore, the impact of the pipeline on these resources should be addressed.

Response

The Lead Agencies agree that over the projected 50-year lifetime of the Longhorn Pipeline System, it is highly likely that there would be growth in population and therefore growth in water needs and water supplies. The State of Texas has launched an effort to plan for future water demands through a comprehensive water planning process. Until this process is further along, it is difficult to accurately identify additional specific areas along the pipeline corridor that deserve higher sensitivity designations (e.g., elevated from a Tier 2 or sensitive area to a Tier 3 or hypersensitive area). This topic is further addressed in Appendix B to this document.

7.18 CONCERNS OVER BIOLOGICAL ASSESSMENT METHODOLOGY

7.18.1 Comment

Commentors expressed concern that information provided in the Biological Assessment (BA) was not considered in the draft EA impacts assessment.

Response

Impacts analyses presented in the draft EA were based on preliminary information provided in the BA and other sources. Subsequent to issuing the draft EA in October 1999, the BA was updated to provide a more comprehensive review of species that potentially could be affected by pipeline maintenance and minor construction activities. Based on the Phase I Biological Opinion (BO), there would be a net benefit to the species from Phase I mitigation measures.

The Phase II BA addresses potential impacts related to an accidental release of product. (See Appendix 4E of the final EA.)

Based on the conclusions of the Phase II BA and the FWS Concurrence Letter, O&M of the Longhorn pipeline would not jeopardize the continued existence of any federally listed species, including the Barton Springs Salamander; and is not likely to destroy or adversely modify the designated critical habitat of the Houston Toad.

7.18.2 Comment

A commentor questioned how a loss of up to 10 percent of a threatened or endangered species could be considered minor.

Response

The loss of up to 10 percent of any species would represent a "take" under the Endangered Species Act. In the context of defining sensitive areas along the pipeline, areas where at least 10 percent of the known population of a sensitive species could be impacted due to habitat destruction were considered sensitive.

7.18.3 Comment

A commentor questioned how cutoff of a potential 50 percent loss of threatened or endangered species for hypersensitive rating was considered for hypersensitive designation and how the percentages identified for each species were determined. In addition, the commentor wanted to know what types of impacts were predicted.

Response

The definition of hypersensitive areas for threatened and endangered species was used in the draft EA to help identify areas requiring mitigation. This was necessary to establish a benchmark for the EA process prior to the FWS developing the measures included in the BO. Experienced biologists examined the range and distribution of habitat available for species that could be impacted by pipeline operations or accidents. Considered were the relative amount and quality of habitat (as a percentage of total known habitat) that could be impacted through factors including fire, remediation activities, contamination, and anoxic conditions. Since the draft EA was released, further refinements to the BA were made for the Endangered Species Act Consultation process with FWS. See Appendix 4E in the final EA.

7.18.4 Comment

Commentors indicated that impacts to aquatic species should be addressed more fully and not be limited only to threatened or endangered species.

Response

Potential impacts to species that are not listed as either threatened or endangered are addressed in Section 7.4.2.1 of the draft EA. While extensive listings of species that can be affected could be generated, such an endeavor would result in inclusion of extraneous information that would not contribute to the overall objectives of the study.

7.19 NEED TO ASSESS POTENTIAL EFFECTS TO STREAM ECOLOGY AND AQUATOXICITY

7.19.1 Comment

Commentors indicated that the effects of a product release to surface waters should be addressed and aquatic toxicity should be assessed.

Response

The draft EA acknowledges that short-term morbidity of benthic and pelagic organisms would be likely to occur in certain water bodies in the event of an accident at specific locations along the pipeline. The extent of such impacts is likely to include acute toxicity of petroleum products that are characteristic of products that are being transported.

As a result of a spill at most points along the pipeline, no long-term chronic adverse impacts to stream ecology are expected. The products posing the greatest concern for aquatic environments, BTEX constituents and MTBE, are both volatile and therefore, would both move downstream in a plume, which decreases in concentration and mass of pollutants. The severity of impacts is expected to be minor, as the concentration of pollutant entering the stream would decrease rapidly over time. Upon entering the surface waters, volatilization processes are expected to reduce the concentration of contaminants to levels, which would not produce chronic effects on the downstream ecology. Following remediation of contaminated sediments, no long-term impacts to the stream ecology are anticipated.

Impacts to reservoirs could occur, if spill and rainfall conditions allow a large volume of contaminants to be transported into one of the Highland Lakes or into Town Lake in Austin.

There are potential major effects to the ecology of the springs themselves, although these effects would also decrease over time. This could include aquatic toxicity, persistent sheen, and sediment contamination. Because of this potential, springs that provide habitat for threatened and endangered or otherwise protected species were considered sensitive and locations along the pipeline where an accidental release of product could impact such springs were designated as hypersensitive.

Information pertaining to bioaccumulation has been compiled for several hydrocarbon components. Bioaccumulation of benzene is not expected. Based on its lipophilic properties, toluene has a moderate tendency to bioconcentrate in the fatty tissues of aquatic organisms. Xylenes bioaccumulate at modest rates; however, biomagnification in the food chain is not documented. Information about bioaccumulation of MTBE is not available; however, bioaccumulation is unlikely because of the high aqueous solubility of MTBE.

7.19.2 Comment

A commentor argued that discussion of in-stream ecological resources in Section 4.3 of the draft EA should discuss potential impacts to these resources.

Response

This discussion and evaluation is included in Chapter 7 of the draft EA. Chapter 4 of the draft EA is intended to describe the before-project baseline and to catalogue existing resources and not to assess potential future impacts.

7.19.3 Comment

A commentor questioned why potential impacts to stream ecology from a release at a water body crossing were not considered.

Response

These impacts were considered, and discussion is included in the impacts analysis, Chapter 7 of the draft EA.

7.19.4 Comment

A commentor stated that potential impacts to major rivers from a release of product are described in Section 7.4.2.1 of the draft EA, but that potential effects to aquatic life were not considered in the classification of pipeline segments. The commentor indicated that the classifications of pipeline segments were based on potential impacts to all aquatic organisms; however, they are only based on potential impacts to federally-listed threatened or endangered species.

Response

As noted by the commentor, the draft EA addresses potential impacts to all aquatic species that would result from a release of product to a waterway. The commentor also is correct that such impacts were not considered to be major factors used to rank the sensitivity of specific pipeline segments. In general, rivers and other major water sources were ranked as sensitive or hypersensitive due to potential impacts to other resources, such as downstream water uses.

7.19.5 Comment

A commentor requested clarification regarding assimilation of product from a small persistent leak and stated that exposures related to small leaks may be no more tolerable than those from large leaks.

Response

The toxicity of any compound is dependent upon the chemical's concentration, duration, and frequency of exposure. Concentrations for small leaks not in confined spaces would be considered as a low dose. Concentrations for large leaks would be considered a high dose. Duration of exposure by inhalation is defined as a continuous exposure for less than 24 hours (toxicology tests are usually for 4 hours). Exposures from small, lower concentration leaks would be of less toxicity than the same duration of exposure from a large, high concentration leak.

This same framework can be applied to frequency of exposure. The more frequent the exposure, the higher the dose to an exposed individual. If these frequent exposures are to a source of greater concentration, as in large leaks, it is reasonable that the dose and toxicity incurred would also be higher.

The concerns for small and large leaks are determined by the exposure and ultimate chemical dose. Chemicals in gasoline have specific toxicities related to dose. A low dose or exposure can result in effects on the central nervous system (dizziness, euphoria, headache, confusion, coma). Repeated doses, low or high, can cause the additional effects of depression, fatigue, tremor, or leukemia.

7.19.6 Comment

A commentor stated that the probability of spills at water crossings should be provided.

Response

The probability of a spill is addressed in Appendix 9B of the final EA. Methods that can be implemented to reduce the probability of a spill to waterways (and other sensitive resources) are addressed in Chapter 9 of the final EA.

7.19.7 Comment

Commentors were concerned about unique biological resources in Bastrop and Buescher State Parks and their dependence on ground water.

Response

Sensitivity ratings were incorporated by a variety of factors, including geological parameters such as recharge capabilities, ground water depth, and geomorphologic characteristics illustrated in Table 4-14 of the draft EA, analysis on potential impacts in Chapter 7, and drainage considerations stated in Appendix 7 of the draft EA.

As reported in the draft EA, Texas Parks and Wildlife Department (TPWD) records indicate 16 species of concern to be within Bastrop County. Although the following species may be present in Bastrop County, they are not listed on the TPWD Annotated County List of Rare Species: Pineywoods Dropseed; Hairyawn Muhly; Cliff Chirping Frog; Pileated Woodpecker; Pine Warbler; Kentucky Warbler; Hooded Warbler; Swainson’s Warbler; Southern Short-tailed Shrew; Elliot’s Short-tailed Shrew; and several Tiger Beetles.

7.20 IMPACTS TO SPECIFIC SENSITIVE SPECIES

7.20.1 Comment

Commentors stated that the draft EA did not sufficiently address potential impacts to the Houston Toad. Aqua Water Supply Corporation is currently expending significant funds to comply with the Endangered Species Act and to ensure the continued viability of the Houston Toad population. These efforts could be nullified if appropriate mitigation measures are not taken to eliminate the possibility of a product release. The mitigation level through Houston Toad critical habitat should be increased from Tier 1 to Tier 2.

Response

A more detailed BA has been prepared to address all potential impacts to federally listed, threatened, or endangered species. The FWS has issued the Phase I BO that addresses construction and maintenance activities in the pipeline ROW (see final EA, Appendix 4E), including a net benefit to listed species as a result of measures that would be implemented to enhance species populations. The Phase I BO and Phase II Concurrence Letter are located in Appendix 4E of the final EA.

7.20.2 Comment

A commentor expressed concern that the draft EA did not state that the Longhorn pipeline crosses a designated habitat for the Houston Toad.

Response

Potential impacts to the Houston Toad that could result from ROW maintenance and other routine activities are addressed in Phase I of the revised BA. Potential impacts associated with an accidental release of product from the pipeline are addressed in Phase II of the revised BA. Discussion regarding potential impacts to the species and mitigation measures is included in the Phase II BA and the FWS Concurrence Letter.

7.20.3 Comment

A commentor suggested that quantification be provided to support the statement in the draft EA that habitat for the Houston Toad is "marginal."

Response

As stated in Table 4-31, "Personal communications with Brent Leisure, Park Manager for Bastrop and Buescher State Parks ... confirmed that Houston Toad habitat within the portion of Buescher State Park that is crossed by the pipeline is marginal." Additional information regarding habitat suitability for the species was developed as part of the Phase I BA and is included in the final EA.

7.20.4 Comment

A commentor suggested that critical habitat for the Houston Toad should be designated as sensitive for impacts.

Response

Suitable habitat to support the species is only present at two locations, as defined in the revised Phase I and Phase II BA. Critical habitat, in and of itself, was not a sufficient reason to classify an area as sensitive. Additional protection of critical habitat is addressed in the Phase I and II BAs.

Sensitivity ratings were incorporated by a variety of factors, including geological parameters, such as recharge capabilities, ground water depth, and geomorphologic characteristics such as in the draft EA for hydrogeologic sensitivity in Table 4-14, analysis on potential impacts in Section 7.0, and drainage considerations stated in Appendix 7.

7.20.5 Comment

A commentor wanted an explanation of why potential impacts to the Devil's River Minnow were considered to be minor.

Response

As stated in the draft EA (Page 7-24), potential impacts to the Devil's River Minnow from a large release of product were considered to be minor, due to the great distance between the pipeline crossing and the species habitat. Furthermore, additional studies indicated that the possibility of impacts was remote and the species was not included in the BA. Therefore, references to the species in the draft EA have been eliminated.

7.20.6 Comment

A commentor stated that potential impacts to major rivers from a release of product are described in Section 7.4.2.1 of the draft EA, but that potential effects to aquatic life were not considered in the classification of pipeline segments. The commentor indicated that the classifications of pipeline segments should be based on potential impacts to all aquatic organisms; however, they are only based on potential impacts to federally-listed threatened or endangered species.

Response

As noted by the commentor, the draft EA addresses potential impacts to all aquatic species that would result from a release of product to a waterway. The commentor also is correct that such impacts were not considered to be major factors used to rank the sensitivity of specific pipeline segments.

7.20.7 Comment

A commentor would like an explanation concerning discrepancies that are present in the draft EA and the BA regarding the Black-capped Vireo and the Golden-cheeked Warbler.

Response

Information in the draft EA has been supplemented from revisions to the BA, the subsequent FWS BO, and included in the final EA.

7.20.8 Comment

A commentor wanted an explanation as to why "Only one major impact was identified for aquatic threatened and endangered species ..." in Section 7.4.5 of the draft EA.

Response

A release of product could cause contamination of Barton Springs Pool and could result in a major impact to the Barton Springs Salamander. However, due to the mitigation added to the LMP as a result of discussions between Longhorn and FWS, pipeline operation is not likely to adversely affect any threatened or endangered species or critical habitat (see Appendix 4E).

7.20.9 Comment

A commentor asked why a release of gasoline or crude oil to Barton Springs and resultant impacts to the Barton Springs Salamander cannot be quantitatively determined.

Response

Section 7.4.4 of the draft EA discusses factors associated with an introduction of crude oil and gasoline to Barton Springs; however, as stated in the text, there are comparative differences between the two substances. Those differences and numerous variables (e.g., spill volume and spill location) preclude the development of a quantitative comparison.

7.21 CONCERNS REGARDING AGRICULTURAL IMPACTS

7.21.1 Comment

The commentor requested clarification on how the agricultural uses, with specific reference to irrigation wells along the pipeline, were assessed for inclusion into the risk analysis.

Response

While the draft EA did not provide a detailed list of irrigation wells along the pipeline route, Section 7.3.3.3 of the draft EA addresses impacts to agricultural uses of ground water and discusses the impacts to irrigation wells along the pipeline. These were assessed for sensitivity to an impact using the same criteria as for drinking water wells. These criteria are further described in Section 4.2.1.2.2 of the draft EA on page 4-31, which lists the distance criteria for assessing the sensitivity of a ground water well.

7.21.2 Comment

A commentor raised questions regarding the impacts of MTBE and other constituents of gasoline to agricultural interests in the event of a spill that contaminated a well used for irrigation of crops or livestock watering.

Response

If irrigation wells become contaminated with gasoline as a result of a spill, MTBE and benzene, toluene, ethylbenzene, and xylene (BTEX) would be the most likely contaminants of concern.

If MTBE does not exceed 20 Fg/L, the water meets the EPA s drinking water advisory (20 to 40 Fg/L) concentration and therefore, would be appropriate for irrigation or stock watering. Appendix B of this RS discusses the characteristics and current information regarding MTBE in more detail. For benzene, the drinking water maximum contaminant level (MCL) is 5 micrograms per liter; benzene has the strictest MCL of all BTEX constituents. Water that has benzene concentrations below this level is appropriate for irrigation, provided no other MCL is reached.

If an affected well water exceeds these levels, it is unclear to what extent its use would be limited. BTEX constituents readily biodegrade in the surface soils and in the root zone of plants. BTEX can also be removed fairly easily by filtration through activated carbon or by air stripping. Some air stripping occurs during spray irrigation. As far as MTBE is concerned, we know that it is readily excreted in mammals (Appendix 7C of the final EA), so it should not bioaccumulate. These and other facts suggest that some use of water for irrigation and stock watering is possible when its contaminant content exceeds the MCL or drinking water advisories. However, the limits of this use need better definition.

7.21.3 Comment

One commentor cited a reference which states that MTBE is recognized as an animal carcinogen.[4]

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[4] Mehlman, 1995.

Response

While the carcinogenicity of MTBE to animals exposed to contaminated water is not addressed in the draft EA, it is acknowledged that this could be a concern for ranchers in the event of a spill. Additionally, crops used for human consumption contaminated by MTBE could be a concern. Further study on effects of MTBE on crops is warranted.

Depending on the local hydrogeological situation, pumping for irrigation or stock watering may have to be reduced or discontinued to prevent migration of the dissolved hydrocarbon plume or of the pure phase hydrocarbon source. A new LMC 37 sets out a $15 million liability insurance policy to provide compensation should these agricultural impacts occur.

7.21.4 Comment

A commentor questioned if the pipeline would adversely impact other aspects of ranching operations (such as soil compaction, soil erosion and/or loss of vegetation from routine maintenance of easement, inspections, construction, or use of heavy equipment).

Response

Section 5.10 of this document discusses operator rights within the ROW. These activities should not impact ranching, hunting leases, or other property uses.

7.21.5 Comment

Questions were raised regarding whether ranch owners would be able to safely continue their controlled burn practices over the pipeline, which is a large component of range management in central Texas.

Response

The use of controlled burning would not be affected by the presence of the Longhorn pipeline, unless the pipeline is exposed or if there is a leak. A controlled burn over an exposed portion of the pipeline could damage the coating, which in the future could lead to an increase in external corrosion. Controlled burns over buried pipeline should pose no problem, unless there is already a leak at the burn site.

7.22 NEED FOR MORE DISCUSSION OF LAND USE IMPACTS, INCLUDING DEVALUATION OF LAND

7.22.1 Comment

A commentor questioned why pipelines allowed to be situated next to homes, schools, and hospitals.

Response

In most cases, structures that abut or encroach upon the Longhorn pipeline ROW were built after the pipeline was put in service. It would be more correct to state that these structures were situated next to the pipeline rather than the other way around. Prescribing a minimum development setback to the pipeline is the responsibility of local government. However, along the Longhorn pipeline, there are no local regulations prescribing a minimum setback from a hazardous liquids pipeline. This was verified by telephone contacts with the Texas Railroad Commission, Harris County, City of Houston, City of Austin, El Paso County, and City of El Paso.

A spokesman for the Harris County Engineering Department said that at one time Harris County had a requirement that structures not be built within 50 ft of a pipeline but that this requirement was dropped several years ago.[5]

In 1988, the National Transportation Safety Board recommended setbacks from pipelines but could not agree on the distance. A panel of API experts has suggested 50 ft. Regardless, any such requirements would be implemented by local governments.[6]

7.22.2 Comment

Commentors requested additional analysis regarding potential impacts the pipeline would have on land use, including recreational activities, property values, land use regulations, and planning.

Response

Section 7.9 discusses impacts to land use and identifies only one situation in which recreational activities might be affected by the pipeline, which would be impacts in the event of a spill. These impacts could lead to the temporary closure of certain parks and natural areas

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[5] Telephone conversation (May 2000) with Reeves Gilmore, Engineering Department, Harris County.
[6] *Houston Chronicle*, February 28, 2000.

(Buescher, Pedernales Falls, Enchanted Rock) until the spill was cleaned up. Revegetation would be included in the cleanup and restoration plans for lands affected by spills. In addition, restoration of vegetation would be completed in the event that maintenance/construction activities disturbed vegetation alongside the ROW.

Longhorn has in place a new LMC that sets out a $15 million liability insurance policy to provide compensation should these impacts occur (see Appendix 9A of the final EA).

There is limited literature on the subject of pipeline easement effects on property values. An article written by independent appraiser Edmund D. Cook, regarding the effect of a High Pressure Gas Transmission Line on Real Estate Values in the New Jersey Metropolitan Area concluded that the pipeline easement had no detrimental effect on the sale price of dwellings subject to the gas pipeline easement, and found no difference in price between those dwellings adjacent to the easement and those several bocks away. Another article written regarding properties in Salt Lake City, Utah also examined residential lot sales with respect to their proximity to high-pressure natural gas lines and crude oil lines. This article found no significant difference in the sale value of lots that were crossed by the pipeline easements. In addition, it was noted that the easement and pipelines were in place long before the lots were developed, indicating that developers did not see any adverse marketing factors.

The former EPC pipeline (now part of the Longhorn Pipeline System) was also in place long before the adjacent subdivisions in Travis and Harris counties. The presence of the pipeline was not a deterrent to neither the land developers, the local governments that permitted the lots to be located next to the easements, nor the home buyers who should have been aware of the pipeline easement.

There are no federal regulations that limit the distance a new building can be placed to an existing pipeline. Some cities have regulations in place, such as Houston, which require a building to have a 15-ft setback of a building from a pipeline carrying flammable materials under pressure. Most cities rely on the easements that the pipeline company may have acquired to limit building next to the pipeline.

7.23 NEED TO ADDRESS THE POTENTIAL CUMULATIVE IMPACTS

7.23.1 Comment

Commentors stated that the draft EA should have addressed cumulative impacts by accumulating all of the resources that would be affected, including acres affected by pipeline spills and numbers of terrestrial and aquatic species lost.

Response

Under National Environmental Policy Act (NEPA) regulations (40 CFR §1508.8), cumulative impacts refer to impacts that occur from other past, present, or reasonably foreseeable actions in addition to those from the proposed action. This is different from the summation of numbers of individuals and species, acres, and people that would be affected by a proposed action. The draft EA presented quantities of certain types of sensitive receptors within 1,250 ft of the pipeline route in Chapter 4. The fact that sensitive receptors are in proximity to the pipeline route does not mean that they would be affected. As discussed in Chapter 6 of this Responsiveness Summary, it is more likely that any given receptor along the pipeline would not be affected by its operation. Had the proposed action of this EA been a new pipeline construction project, it would have been appropriate to quantify and sum up the natural resources that would have been affected by the proposed action. For example, new pipeline construction could result in the permanent removal of an easily quantifiable number of acres of woodlands, habitats, wetlands, etc. as a result of construction and maintenance of ROW. The Longhorn pipeline is already constructed with the exception of short stretches of desert land near El Paso and Odessa.

7.23.2 Comment

Several commentors stated that those living near the Longhorn pipeline face a cumulative impact risk from the Longhorn pipeline plus the other two pipelines that accompany the Longhorn pipeline along its route through central and west central Texas.

Response

It is true that the cumulative impact to the environment and to the public from all three pipelines is greater than the risk from the Longhorn pipeline by itself. If the Longhorn pipeline were to be abandoned in place, there would still be residual risk because of the presence of the other pipelines. The deletion of one line would reduce the probability of failure (POF) by approximately 1/3. The "residual" risk in this simple example would be about 67 percent of the initial risk. This does not take into account the effect of mitigation on the Longhorn pipeline.

There are some differences in the properties of the different substances transported in the different lines. Therefore, the risks to specific receptors would vary, specifically regarding issues of fire or explosion or environmental contamination. The lower flammability of crude oil makes it less of a fire threat than a gasoline pipeline; on the other hand, the natural gas liquids pipeline poses a higher threat of fire.

7.23.3 Comment

Several commentors asked for additional analysis of the possibility of a "chain reaction" accident whereby one pipeline fails and creates a larger accident because of the presence of other pipelines.

Response

Such accidents are rare. Only one documented accident has been reported to DOT and this occurred in west Texas during the time this EA was being prepared. Based on this comment, additional analysis has been performed and is addressed in Chapter 7 of the final EA.

Although rare, there are a few potential locations for such an occurrence on the Longhorn pipeline. These are pipeline segments where the Longhorn pipeline lies in close proximity to other pipelines and both are aboveground and exposed. These include, for example, spans across stream crossings, and other places where there are aboveground valves or pumps located near exposed infrastructure form another pipeline. As discussed in the final EA in Chapter 7, there are fewer than 20 such locations totaling less than one-quarter of a mile.

7.24 NEED FOR ADDITIONAL DISCUSSION CONCERNING AIR QUALITY IMPACT

7.24.1 Comment

A few commentors stated that the EA did not adequately cover air quality impacts in El Paso. They stated that the pipeline terminal with its tank farm and resulting truck traffic would add to air pollution.

Response

Air emissions from the proposed Longhorn pipeline El Paso Terminal and regulatory implications are covered in the draft EA, Section 7.7.2.1 Air Quality and in Appendix 7F. For the 72,000-bpd base case, the tank farm emissions would be below the threshold for new sources in the El Paso non-attainment area. For subsequent phases, the terminal would have to comply with Best Available Control Technology/Lowest Achievable Emissions Rate for ozone.

Truck traffic would be generated to deliver the Longhorn pipeline's products to the distribution points. This would result in air emissions, as discussed in Section 7.8 of the draft EA, Impacts to Transportation, where traffic emission estimates are provided. The numbers (160 trucks per day, rising to 248 over the next 20 years) suggest that the resulting emissions would be a minor addition to El Paso's traffic. The total gasoline truck transport in the El Paso area is independent of the existence of the pipeline or new terminal. With the pipeline in place, the tanker trucks filling up at the Longhorn Terminal would have replaced an equivalent amount of truck traffic that formerly supplied retail outlets from other terminals. Truck traffic volumes would remain the same; only the routes would change.

7.24.2 Comment

One commentor claimed that the proposed project would require trucking ethanol from the Gulf Coast to El Paso, which would further add to truck traffic and resulting air pollution and spill potential.

Response

With regard to truck transportation of ethanol from the Gulf Coast, this is an unsupported assumption. No transport of ethanol is implied by the proposed project. The delivery of gasoline additives for the creation of reformulated fuels is not the subject of the EA.

7.24.3 Comment

A commentor challenged the conclusion that if the Longhorn pipeline is not approved, refinery expansions in the target market areas (El Paso, Phoenix, Tucson, and Albuquerque) would be one alternative way to meet increasing demand and that this would increase air emissions in these locations. The commentor believes this statement is misleading because it ignores the increased air emissions resulting from additional refining capacity in Houston to support the pipeline.

Response

Increased demand for petroleum products in the El Paso Gateway Market area could be satisfied in theory by increasing local refining capacity. At present, such refinery capacity consists entirely of the 90,000 bpd Chevron refinery in El Paso (there are no oil refineries in Arizona or in Albuquerque). Ultimately, the Longhorn pipeline is projected to deliver 225,000 bpd of petroleum products. Assuming a gasoline yield of 60 percent (i.e., the gasoline production is equivalent to 60 percent of the processed crude volume), 225,000 gallons of product is equivalent to 375,000 bpd of crude processed. Considering the non-attainment status of El Paso, it is highly improbable that the local refining capacity can be quadrupled from 90,000 to 375,000 bpd to satisfy demand. A similar reasoning applies for the other target markets that are also non-attainment areas and have no refining capacity at present.

Greater Houston, on the other hand, has an existing cumulative refining capacity of 2,107,000 bpd.[7] To satisfy the Longhorn pipeline's maximum projected throughput would require at most an increase in the local refining capacity of 17.8 percent. This is a maximum estimate, because there is currently excess refinery capacity in Gulf Coast refineries outside of the immediate Houston area that could meet the demand. Before any new major sources of ozone precursors (NO_x and VOC) emissions can be constructed in Houston, the source owners/operators must demonstrate a net reduction in these emissions through emission offsets. Therefore, no increase in ozone precursors would occur in Houston as a result of the proposed project.

7.24.4 Comment

A commentor stated the new Longhorn Terminal would increase VOC and NO_x emissions relative to existing refineries in El Paso.

Response

A review of TNRCC's point source air emission inventory for sources exceeding one ton per year shows that major point sources were emitting 762 tons per year (tpy) of volatile organic compounds (VOCs) in El Paso County as of March 1999. The 90,000-bpd (crude) El Paso refinery and the Chevron South facility emitted a total of 380 tpy of VOCs. The Longhorn pipeline terminal is projected to produce 48 tpy of VOCs when delivering 72,000 bpd (product) and 66 tpy when delivering 225,000 bpd. The Longhorn pipeline would be delivering 225,000 bpd of gasoline to El Paso Gateway Markets (El Paso, Juarez, New Mexico, and Arizona) while emitting 66 tpy of NO_x (that would be offset to zero because of new source permitting requirements). By contrast, the El Paso refineries emit 1582 tpy of NO_x while delivering less than half the amount of gasoline.

[7] Worldwide Refining/Worldwide Production. *Oil & Gas Journal*, December 20, 1999.

7.24.5 Comment

Commentor stated that current air monitoring for six criteria pollutants (not mentioned in Section 4.2.4.2) is inadequate, and VOCs should be monitored on a 24-hour basis.

Response

Pipelines are minor sources of air emissions. Persistent air emissions may occur from tank farms at terminals. They may also occur from equipment at pumping stations. Air monitoring may be justified at those locations, provided there are nearby receptors. Air monitoring 24 hours per day along the entire pipeline is unjustified.

Major but short lived and exceptional emissions may occur in case of a spill. The health impact of these accident-related emissions is discussed in Appendix 7I of the final EA. The potential for accidental releases from the Longhorn pipeline causing impacts to the Austin Airshed with respect to criteria pollutant attainment status is not significantly different from the potential for accidental releases from numerous other sources, including gasoline tanker trucks, storage tanks, and the Koch pipeline which supplies the City of Austin marketplace with gasoline.

7.25 NEED TO DISCUSS IMPACTS TO RECREATIONAL AREAS

7.25.1 Comment

A commentor asked what the distance is from the pipeline that recreational ground water resources are considered.

Response

The distance that a recreational resource would be determined to be sensitive with respect to ground water contamination from the pipeline depends on the nature of the ground water movement in the area as well as any recreational surface water bodies that could be adversely impacted due to transport of contaminants in the ground water. It is a pathway-specific analysis, based on data available at the time of the draft EA. Thus, impacts may occur far downstream of a spill, depending on stream flows and spill size. This is included in the analysis of surface waters.

7.25.2 Comment

Commentors requested that the EA include Pedernales Falls State Park and Enchanted Rock State Park on the list of public parks that could potentially be impacted.

Response

In the impacts analysis, the potential effects on both Pedernales Falls State Park and Enchanted Rock State Natural Area are assessed. Table 7-1 (Chapter 7 of the draft EA) lists 3.36 miles of the pipeline as sensitive for potential impacts to Pedernales Falls State Park and 0.62 miles of the pipeline as sensitive for potential impacts to Enchanted Rock State Park. Table 7-2 lists 2.25 miles of the pipeline as hypersensitive for potential impacts to Pedernales Falls and 0.55 miles of the pipeline as hypersensitive for potential impacts to Enchanted Rock. Section 7.9.2 (Chapter 7 of the draft EA) discusses the evaluation of these impacts.

7.25.3 Comment

Commentors requested a review of the Performance Report titled, "Big Game Research and Surveys," published by TPWD. In addition, the commentors submitted a photograph of what they consider "destruction of former prime deer habitat [that resulted from a] crude oil spill near London, Texas, May 1979" as well as a photograph showing good rangeland.

Response

Key team members, who participated in the preparation of the EA, also participated in a field reconnaissance of the above referenced crude oil spill site and concur that a considerable amount of crude oil contamination remains downstream from the spill site. The extent of deer habitat lost as a result of the spill that occurred in 1979 does not now appear to be more than a few acres. Similarly, the provided photograph depicting good rangeland suggests benefits derived from good range management practices that are likely to include consideration of grazing pressures (intensity), the use of prescribed burning, and other management techniques.

Information provided in the Big Game Research Survey (Performance Report) from the TPWD, indicated that state-wide White-tailed Deer harvests from 1987 through 1995 have remained fairly constant (an average of 461,601 per year). State-wide recreation hunting during the period has steadily declined from 0.95 deer per hunter in 1988 to 0.76 deer per hunter in 1998. Analyses of harvest success on the Edwards Plateau have fluctuated from 1.25 deer per hunter in 1989 to 1.05 deer per hunter in 1998. A review of the data provided also indicated that hunter success on the Edwards Plateau is the highest of the 10 reporting regions within the state, and approximately 140 percent greater than the state-wide average. Approximately 7.7 deer were killed per 1,000 acres on the Edwards Plateau during the 1998 hunting season; the state-wide average was 4.7 deer kills per 1,000 acres.

Based on these data, the loss of deer habitat and related adverse impacts to hunting that could result from an accidental release of product would affect recreational hunting and revenues to local landowners that are typically derived through the sale of hunting leases. However, data indicate that actual losses from a state-wide perspective would represent a small portion of overall deer kills. Statistically, a spill resulting in the loss of 1,000 acres of deer habitat on the Edwards Plateau during the 1998 hunting season could result in 8 fewer deer kills from the season total of 183,984.

7.25.4 Comment

Commentors expressed concern that potential impacts associated with a fire within Bastrop State Park and/or Buescher State Park were not addressed.

Response

The Lost Pines subregion is ecologically unique and is important. A fire resulting from an accidental release of product from the Longhorn pipeline could result in detrimental impacts to either Bastrop or Buescher State Parks in the event that the pipeline leaks, the leaks ignite, and the fires spread rapidly through the pine forest as a recreation area. Where the pipeline passes through Buescher State Park, it is designated as sensitive.

7.25.5 Comment

A commentor said that any area along the pipeline where the potential for caves exists should be listed as sensitive for potential recreational impacts, not only areas where public or commercial caves are known to exist.

Response

A substantial portion of the land surrounding the Longhorn pipeline route represents privately held resources that have recreational value. It is acknowledged that a major accident along the pipeline could impact for a time the use of hunting leases, private in-stream pools, camp sites, private country clubs, and other recreational facilities not open to the general public. The current Tier 1 mitigation measures protect these privately held recreational resources.

7.25.6 Comment

A commentor stated that the list of aquifers containing caves that might be impacted by contamination in Section 7.3.3.4 of the draft EA excludes the Cap Mountain Limestone Aquifer.

Response

The Cap Mountain Limestone occurrences along the Longhorn pipeline route are documented in Table 4-14 of the draft EA and appropriately categorized for hydrogeologic and proximal sensitivity. The Cap Mountain is a potentially karsted hydrogeologic unit (although relatively unexplored). The unit has similar hydrogeologic sensitivity with other limestones in the region.

7.26 IMPACTS FROM FUTURE OPERATIONS AND MAINTENANCE ACTIVITIES

7.26.1 Comment

A commentor asserted that failure to include ground-disturbing activities associated with the installation of replacement pipe in routine maintenance and in conducting the three-mile pipe replacement over the Edwards Aquifer (BFZ), represents a bias in favor of the existing pipeline.

Response

Replacement or maintenance of pipeline sections within an existing pipeline ROW and an existing trench entails substantially fewer disturbances of natural resources than creating a new ROW with totally new excavation. It is not necessary to periodically remove pipeline sections for inspection in order to calibrate ILI results. Construction disturbances associated with on-going maintenance would be minor (see discussion in the Phase I BA and BO).

7.26.2 Comment

A commentor noted that the draft EA did not quantify decibel levels achieved by nitrogen purges at pump stations.

Response

Releases of nitrogen purges at pump stations would take, at low pressures, approximately 20 psi and would not generate significant noise. In addition, purges would only take place at line startup, and in the event, a portion of the line has to be isolated.

7.26.3 Comment

A commentor noted that impacts associated with the mitigation measures, specifically the lowering of new pipe across the Edwards Aquifer Recharge Zone in Austin to a greater depth of cover, were not addressed in the draft EA.

Response

Construction within the existing ROW may have impacts in four areas. First, there are potential biological impacts—these are covered in the Phase I BA and BO. Second, there are potential impacts to surface waters or ground water from uncontrolled runoff, which may occur during the construction process. Longhorn would practice storm water contamination prevention practices to prevent the runoff of sediment to surface streams or karst expressions during construction activities. Furthermore, the ROW would be revegetated following construction. Third, there is a potential impact to caves or other karst features from blasting, cutting, or drilling associated with installing the pipe at an increased depth of cover. These impacts would be minimized by Longhorn's use of ground penetrating radar studies of the pipeline, identification of surface expressions in the vicinity of the pipeline, and taking special precautions where karst features could be damaged. Finally, there may be some small short-term disruptions to local residents during the construction due to construction-related traffic and noise. None of the impacts noted are deemed significant.

7.26.4 Comment

A commentor asked how Longhorn could place new pipe across the Edwards Aquifer (BFZ) at a greater depth of cover without damaging cave formations.

Response

Longhorn has conducted a substantial amount of data gathering over the Edwards Aquifer (BFZ), including the use of ground penetrating radar, along both sides of the current pipeline for the entire length of the recharge zone. As noted in the draft EA, ground penetrating radar may not fully disclose the location of all small fissures that could provide a conduit for pipeline products to reach the Edwards Aquifer. However, a much larger formation, such as a cave, would be identified by the ground penetrating radar. One cave feature was found close to the pipeline, on the eastern section, south of Deer Lane. In order to maintain pipeline integrity, Longhorn would use special precautions when excavating and replacing pipe in this area.

7.27 CONCERNS REGARDING A BIAS IN CHARACTERIZING IMPACTS

7.27.1 Comment

Commentors claimed that bias towards Longhorn on the part of staff preparing the impacts assessment was evident. Two areas they cited were statements as to the improbability of major releases at points along the pipeline and consideration of some impacts in a non-negative light.

Response

EPA and DOT are responsible for the objectivity of the EA process, while recognizing that some of the language could be interpreted as favoring Longhorn, the analysis was done in an objective manner.

7.28 QUESTIONS ON SPECIFIC REFERENCES

7.28.1 Comment

A commentor noted that there is an inadequate citation for the USGS Water Resources Data Reports for 1998 and previous years.

Response

The USGS Water Resources Data Reports for Texas are published annually and contain all of the streamflow data recorded in the state for the year. Many years' reports were used in developing the flows for the surface-water modeling. They all contain the same type of data, and citation of the report for each year is unnecessary.

7.29 QUESTIONS ON DEFINITIONS AND TERMINOLOGY

7.29.1 Comment

A commentor requested a definition of an "instantaneous spill."

Response

The actual rate that refined product would escape from a large line rupture is a function of a number of things, including pumping rate at the time of the accident, depth of cover where rupture occurs, viscosity of the fluid, location of the rupture with respect to pipeline pressure gradients, localized topography, and location and function of check valves and control valves on the stretch of pipeline affected. In order to conservatively bind the magnitude of impacts, the assumption was made in the impacts assessments portion of the draft EA that the total volume of product would instantaneously escape the pipeline. This is impossible but is so conservative as to cover worst-case scenarios. This rate of release would have higher impacts on receptors as a more rapid release would overwhelm the ability of local soils to retard the release, for volatilization processes to remove much of the product, and for runoff or percolation to reduce surface volumes of the spill before a pool large enough to cause fire danger up to a radius of 1,250 ft occurred. Thus, "instantaneous spill" represents a working term for an impossible worst-case release rate for product.

7.30 MISCELLANEOUS

7.30.1 Comment

A commentor inquired about what effect, if any, a spill entering a lake would have on a hydroelectric generator.

Response

The chemicals in gasoline, particularly in the concentrations that could reach any hydroelectric dam, would not impact the generation of hydroelectric power. However, there could be a temporary disruption in the ability to generate hydroelectric power if water reaches the pinstocks at Mansfield Dam at a concentration that poses a risk to the drinking water supply for the City of Austin. In this case, the LCRA may choose to hold water at the dam while natural processes (volatilization, biodegradation, dilution) reduce the concentration of hazardous and nuisance constituents in the water to levels that do not exceed drinking water criteria and guidance. This impact is not considered significant with respect to power generation, although it is a serious water quality criteria concern.

7.30.2 Comment

A commentor noted that the mileage for Travis County does not agree between the draft EA and those on page 3B-4 of the draft EA (Volume 2).

Response

This is true; there is a small discrepancy. The correct mileage for the Travis County line is 223.5 on the east and 251.4 on the west.

8.0 COMMENTS AND RESPONSES RELATED TO EA CHAPTER 8 "ENVIRONMENTAL JUSTICE"

8.1 APPROPRIATENESS OF METHODS AND CONCLUSIONS OF THE EJ ANALYSIS

8.1.1 Comment

A commentor stated that relative risk scores are more appropriate than the Index Sum scores evaluated in Chapter 8 of the draft EA because Index Sum scores are not linearly related to pipeline failure probabilities.

Response

Index sum scores were used in the environmental justice (EJ) analysis in Chapter 8 of the draft EA instead of relative risk scores for evaluation of disproportionately high and adverse effects because they allowed the Lead Agencies to identify whether high and adverse effects, regardless of their degree of relative impact, would disproportionately affect minority or low-income populations. Although Index Sum scores are not linearly related to pipeline failure probabilities, they are inversely related—higher Index Sum scores indicate relatively lower pipeline failure probability (see Appendix 6E in the final EA). Chapter 8 of the draft EA does not imply a strictly linear relationship between Index Sum and pipeline failure probability, nor do the statistical techniques utilized require a linear relationship between these two variables.

The chi-square evaluation uses an Index Sum score value of less than 185 as a reasonable definition of areas with relatively high pipeline failure probability. Index sum scores greater than or equal to 185, therefore, indicate relatively lower pipeline failure probability. The evaluation does not discriminate between Index Sum scores from 184 and 147 (the lowest Index Sum score, or highest relative pipeline failure probability, recorded), since any score within that range was merely considered to be "relatively high" failure probability. The exact nature of the relationship between Index Sum scores and pipeline failure probabilities, linear or otherwise, was therefore of little consequence in the draft EA analysis.

However, since the cutoff value of 185 for "high failure probability" was determined, further analysis was performed to determine whether results were sensitive to changes in the cutoff score for high failure probability. Results were stable within a range of cutoff scores from 181 to 192. (See Section 8.3.4.5 and Table 8-1 of the draft EA.)

8.1.2 Comment

Commentors stated that the conclusions made in Chapter 8 are not meaningful because the Lead Agencies utilized an incorrect approach for selection of the risk assessment method, and the relative pipeline failure probability data used in the EJ evaluation are therefore inappropriate. One commentor further stated that the risk assessment method does not use actual data on normal pipeline operations to evaluate abnormal events (failures), and that pipeline failure data do exist that can be analyzed to more appropriately assess the risk of failure.

Response

Several commentors made similar statements regarding the risk assessment method described in Chapter 6, and a more detailed response to such comments is included in this Responsiveness Summary (RS).

The analysis to determine potential disproportionately adverse effects relies upon the results of EA Chapter 6, Overall Pipeline Risk Assessment and EA Chapter 7, Potential Impacts Analysis, in which the Lead Agencies concluded that routine operations of the proposed project would not cause significant adverse human or environmental impacts, but that adverse impacts may result from potential pipeline failure events. Taking this into account, a screening-level analysis was performed to determine if there is a likelihood for potential high and adverse effects to occur from abnormal events (i.e., failures). The potential socioeconomic impacts of routine operation are also addressed in Section 8.3.1.1 of the draft EA.

8.1.3 Comment

Commentors suggested that relevant information is missing from Section 8.3.4.1 and Section 8.3.4.5 of the draft EA, and one commentor provided the following statement:

The second bulleted item (in Section 8.3.4.1) points out "areas of EJ concern and relatively high pipeline failure probabilities represent less than one percent of the total pipeline." While this is a valid figure, it does not reflect the percent of such areas relative to the 147 populated one-mile segments of the pipeline, which is a more significant comparison. Thus, the EJ areas of concern with relatively high pipeline failure probabilities comprise 4.8 percent of the 147 populated segment, and 19.1 percent of areas with potential disproportionate impact based on county level analyses."

Response

It is valid to compare the areas of EJ concern in relation to both the total pipeline length and the 147 populated segments as described by the commentors. Analyses indicate that EJ areas of concern with relatively high pipeline failure probabilities comprise not 4.8 percent, but 15.6 percent of all populated segments (23 out of 147). In Harris County, 28.9 percent (in comparison to 19.1 percent as provided in the comment) of all populated pipeline segments were areas of EJ concern with relatively high pipeline failure probability.

These specific statistics are not included in Chapter 8 of the EA, but they provide the foundation for the conclusions made by the Lead Agencies regarding potential disproportionately high and adverse impacts. The fact that 15.6 percent of all populated segments are of EJ concern and have relatively high pipeline failure probabilities is the basis for the conclusions of the system-wide screening analysis. Although tabulated differently in Chapter 8, this finding is statistically significant (as defined in the draft EA Section 8.2.5, page 8-7) and indicates that disproportionately high and adverse effects may occur as the result of a pipeline failure event in these areas. This finding warranted further research, carried out in the county-level analyses to characterize the geographic location and degree of potential disproportionate impacts initially identified in the system-wide analysis (Section 8.3.4.2 of the draft EA).

The fact that 28.9 percent of all populated segments in Harris County are of EJ concern and have relatively high pipeline failure probabilities is the basis for the conclusions of the county-level analyses. As with the system-wide statistic provided in the comment, this value is not explicitly stated in the text, but the statistical significance tests indicated that disproportionately high and adverse effects may occur as the result of a pipeline failure event. Further statistical analysis lead to the conclusion that the pipeline segments from milepost (MP) 11 to MP 18 contribute to the system-wide and county-level potential disproportionately high and adverse impacts (draft EA Section 8.3.4.5). The statement that proposed mitigation measures must reduce the relative probability of pipeline failure to acceptable and proportionate levels in the area from MP 11 to MP 18 is supported by these findings (draft EA Section 8.3.6).

8.1.4 Comment

Commentors stated that the draft EA "mistakes people for pipe" and that the EJ discussion effectively trivializes a potential disproportionately high and adverse impact of the proposed project. As with the previous comment, this comment raises questions related to the conclusion regarding the area of potential disproportionately high and adverse impacts from MP 11 to MP 18. The text of the comment follows.

"It is true that the distance from MP 11 to 18 is seven miles, but the length is *irrelevant* to the issue of environmental justice. Environmental justice is sought for people, not pipe. Along those particular seven miles, according to the EA's own data, live 26 percent of the entire population in the pipeline's corridor (Volume Two, Table 8B-1, pp. 8B-1 to 8B-26). what's relevant. Along the 28-mile stretch from MP 7 to 35 live 67 percent of the population. (*Ibid.*) If these are areas of concern, then they remain an area of concern whatever the length of the corresponding pipeline."

Response

The Lead Agencies agree that the critical factor relevant to EJ is the people that are potentially impacted, especially those in minority or low-income social groups. The "pipe" is relevant, however, since the geographic location of the pipe in relation to current population patterns determines both the number and demographic characteristics of the potentially affected population.

The statistics provided in this comment are valid. The intent of the draft EA statement (Section 8.3.4.1, p. 8-12) in question is to provide geographic specificity in identifying the area of potential disproportionately high and adverse impacts identified in the county-level analysis for Harris County. It is true that the draft EA does not state that 26 percent of the entire pipeline corridor population lives between MP 7 and MP 11 or that 67 percent of the pipeline corridor population lives from MP 7 to MP 35. However, the draft EA does indicate (page 8-14) that "99 percent of the total potentially affected minority population and 98 percent of the total potentially affected low-income population is located in Harris County." The data supporting this statement as well as the estimate of the total potentially affected minority and low-income population are provided in the draft EA, Chapter 8, Table 8-1 and in Table RS 8-1.

The population that lives within 1,250 ft of each pipeline segment are accounted for in this analysis in two ways. The definition of sensitive and hypersensitive pipeline segments (Chapter 7) includes population as a factor, and the pipeline failure model (Chapter 6) incorporates population density as a factor for computing relative failure risk.

Since population density is included as a factor in the pipeline risk model, areas of potential EJ concern were defined based only on their minority and low-income population percentages. This was done to avoid double counting population density as a factor in the statistical analysis (draft EA page 8-5, table footnote). The only areas not originally evaluated for potential EJ concern were unpopulated pipeline segments.

Table RS 8-1

Minority and Low-Income Populations Potentially Affected by the Proposed Project

County	Mile Segments	Estimated Population (Total by County)[b]	
		Minority	Low Income
Harris	1.0 to 5.0 7.0 to 8.0 10.0 to 19.0 21.0 to 25.0	19,697	8,151
Waller	55.0 to 60.0	12	14
Austin	64.0 to 65.0 69.0 to 70.0 73.0 to 74.0	22	65
Fayette	104.0 to 105.0 106.0 to 109.0 112.0 to 113.0 114.0 to 115.0 116.0 to 117.0	8	25
Bastrop		134	162
Travis	153.0 to 155.0 156.0 to 161.0	3,093	983
Hays		13	19
Blanco	203.0 to 204.0 211.0 to 212.0	1	2
Gillespie		0	0
Mason		0	0
Kimble		0	0
Menard		0	0
Schleicher	333.0 to 335.0 339.0 to 340.0 342.0 to 343.0	8	12
Crockett		0	0
Reagan		0	0
Upton		0	0
Crane		0	0
Ward	522.0 to 524.0	4	2
Reeves	526.0 to 527.0	3	1
Culberson		0	0
Hudspeth		0	0
El Paso		0	0
Total	**49.0 Miles**	**22,995**	**9,236**

[a] Mile segments with EJ score (DVMAV*DVECO) of 3 or greater.
[b] Minority and low-income population estimates include all 147 populated one-mile pipeline segments.

8.1.5 Comment

Commentors indicated that the statement "more than 600 of the one-mile pipeline segments of the proposed project either have no residents or were judged as having low EJ concern" does not support the conclusion that the proposed project is not considered to result in disproportionately high or adverse impacts to minority and low-income populations. The commentor further stated that the draft EA fails to mention that the proposed project would transport large volumes of refined product through populated, urban neighborhoods.

Response

The statement is relevant because it shows that a majority of the pipeline does not contribute to potential EJ impacts, and is in keeping with the intent of the county-level analyses to provide specific information regarding the locations that may experience potential disproportionate impacts in Harris County.

The condition stipulated in Section 8.3.6 in the draft EA was developed by the Lead Agencies to protect minority and low-income populations from disproportionately high and adverse effects. This condition stipulates that "Proposed mitigation measures must reduce the relative probability of pipeline failure, in the area between MP 11.09 and MP 18.0, to *acceptable* and *proportionate* levels. Relative failure probabilities should be reduced to levels similar to areas of low EJ concern with comparable proximal conditions (MP 7 to MP 35), so that minority and low-income populations do not have a statistically greater potential of experiencing a future pipeline failure event." This condition adequately protects minority and low-income populations from experiencing any potential disproportionately high and adverse effects related to future pipeline failure events and note that this condition is made for a densely populated urban neighborhood.

The description of the volume of refined product to be transported by the proposed project is provided in Section 3.1.1 of the final EA.

8.1.6 Comment

Commentors stated the draft EA data show that 54 percent of the population living within 1,250 ft of the pipeline are minorities, compared to the statewide average of 39 percent.

Response

An error in the draft EA Table 8-1 indicates that the estimated potentially affected minority and low-income populations in Harris County are 32,953 and 19,697, respectively. The correct information for Harris County is shown in Table 8B-1of the final EA. The proper estimates for potentially affected minority and low-income populations in Harris County are 19,697 and 8,151, respectively. The correct total minority and low-income populations potentially affected by the proposed project are therefore 22,995 and 9,236, respectively. A correction to Table 8-1 is provided in Table RS 8-1. The commentors correctly adjusted for this error in computing the above statistics. The Lead Agencies agree that the statistics provided in the above comment are valid.

The purpose of Chapter 8 is to evaluate the disproportionality of potentially high and adverse effects of the proposed project. There are two basic approaches for conducting such an evaluation. The approaches differ in assumptions made regarding how effects are distributed among the population in the affected area.

The first approach, called a proximity-based analysis, assumes that effects are equally distributed within the affected area (i.e., the 1,250-foot pipeline buffer). Using this approach, a determination that high and adverse effects disproportionately impact EJ populations is made by comparing the demographic characteristics of the potentially affected population to the demographic characteristics of a suitable reference population, such as the population within a county or state. This is the approach taken by the commentors. The finding that the potentially affected population has a significantly higher minority percentage compared to the reference population is consistent with the finding in Section 8.3.4.2 of the draft EA and indicates there is potential for EJ populations to experience disproportionate impacts.

The second approach does not assume that effects are equally distributed within the affected area. Instead, geographic data describing the distribution of effects is combined with population and demographic data to determine if effects are unequally distributed among the potentially affected population. This approach analyzes disproportionality by comparing the potential effects on EJ populations in the affected area to potential effects on non-EJ populations in the affected area. This was the approach taken in Chapter 8, with relative pipeline failure probability scores as the effects. The finding, based on the system-wide analysis, was that areas of EJ concern experience a somewhat higher average relative failure probability than areas of low EJ concern. This finding is consistent with the implied conclusion of the statistic given in the comment.

Regardless of the approach taken, the finding that there is potential for disproportionate impacts to occur requires a more detailed analysis to characterize the geographic extent and degree of those impacts. Determining the geographic extent of potential disproportionate impacts is important because it allows development of specific, targeted mitigation measures. Determining the degree of potential disproportionate impacts is important because the statistical methods applied in Chapter 8 address the statistical significance of results, not whether those results are meaningful (or practically significant). In Chapter 8, the county-level analyses were performed to determine the geographic extent of potential disproportionate impacts (Section 8.3.4.4), and the Harris County Comparison Analysis was performed to characterize the degree, or amount, of potential disproportionate impact (Section 8.3.4.6).

As with the detailed analyses performed in Chapter 8, detailed research using the proximity-based approach would lead analysts to identify populated segments in Harris County as the section of the proposed project where disproportionately high and adverse impacts are most likely to occur. The approach used in Chapter 8 is preferred over the proximity-based approach; however, because it is based on both demographic patterns and impact distributions, thus allowing analysts to assess whether the degree of potential disproportionate impact is meaningful.

8.1.7 Comment

Commentors stated that Chapter 8 does not take into account work patterns and that poor and minority persons work near the pipeline.

Response

Although the US Census Bureau does provide data showing the location of workers, these data are based on a small sample and tabulated at a coarse geographic scale compared to the census data used in the EJ evaluation. These data do not, however, include the minority and low-income status of workers included in the sample and are therefore of minimal use in an EJ evaluation. Furthermore, use of residential data is a traditional method applied in EJ and other demographic-based analyses.

8.1.8 Comment

Commentors stated that NEPA EJ guidance considers a population to be of EJ concern if minority or low-income persons are present and that the EA incorrectly assumes both minority and low-income populations must be present before an area is considered to be of EJ concern.

Response

The Environmental Justice Index (EJI) used to determine the level of EJ concern does not require that one-mile pipeline segments include both minority and low-income populations. The EJI compares minority and low-income population percentages in one-mile pipeline segments to Texas average percentages. Segments were considered to be areas of EJ concern, rather than areas of low EJ concern, if either the minority or low-income population of the segment was greater than the Texas State average (EA pages 8-5, 8A-3).

Describing an area as having low environmental justice concern does not imply there is no EJ concern, just that the concern is lower relative to areas of EJ concern. The distinction was drawn for purposes of statistical evaluation, to determine if areas of relatively higher EJ concern experience relatively higher probabilities of pipeline failure, and is consistent with application of the EJI in other environmental assessments.

8.1.9 Comment

Commentors stated that Chapter 8 compares minority and low-income populations in the study area to either US or Texas statistics, whichever is in the interest of Longhorn and counter to the interest of environmental justice.

Response

EPA EJ guidance suggests comparison of minority and low-income characteristics of potentially affected populations to an appropriate reference population. Chapter 8 consistently applies appropriate reference populations, depending on the size of the area of potential effects.

EPA EJ guidance states an appropriate reference population is the population for a geographic area of resolution larger than the area of potential effects. Counties and states are often used as reference populations. In the case of the existing pipeline, the state of Texas provides an appropriate reference population since the pipeline transcends multiple counties. In Section 8.3.1.1, the area of potential effects for socioeconomic impacts includes large areas in the states of Texas, Arizona, and New Mexico and using the state of Texas as a reference population is therefore inappropriate.

8.1.10 Comment

Commentors state that discussion of the results of the chi-squared analysis in Chapter 8 is not adequate.

Response

Further discussion of the chi-square results is provided in Appendix 8A of the final EA.

8.1.11 Comment

Commentors stated that the pipeline encroaches on schools and playgrounds in minority and low-income areas of north and east Houston and that no such encroachments are found in higher income and non-minority areas.

Response

Evidence of such encroachments was documented in the pipeline's due diligence physical asset review video survey (draft EA page 8-16). The LMP in the final EA requires that all encroachments be removed.

8.1.12 Comment

Commentors stated that the EJI population density factor (POP) should have been included in the EJ analysis.

Response

The POP factor was not considered in the analysis because the pipeline risk model includes population density as a factor. Inclusion of the POP factor would have led to double-counting of the population.

8.1.13 Comment

Commentors stated that the estimated number of minority and low-income persons listed on page 8-13 is low because the EA utilized 1990 census data rather than current and projected population data.

Response

The estimated minority and low-income population within 1,250 feet of the pipeline is the projected current population. These estimates were developed by percent minority and low-income values from the 1990 census combined with current total population estimates reported in Chapter 5. The estimated current total population was projected using house counts from recent aerial photographs.

The table on page 8-13 only lists an estimate of minority and low-income individuals living in areas of highest relative failure probability. Estimates of the minority and low-income populations living within 1,250 feet of the pipeline are provided in Table 8-1.

8.2 APPROPRIATENESS OF METHODS AND CONCLUSIONS OF THE ANALYSIS OF ECONOMIC IMPACTS ON MINORITIES

8.2.1 Comment

A commentor challenged the approach, assumptions, and conclusions of the economic analyses conducted by Longhorn with respect to effects of the proposed project on racial minorities.

Response

The Settlement Agreement required that the EA evaluate the impacts of the proposed project on minority populations. A one-paragraph summary of an economic analysis of the proposed project on minorities is at the end of EA Chapter 8. This evaluation is based upon studies that had been done by an economic consultant to Longhorn (The Perryman Group, June 1998) and reviewed for accuracy and methodology by an economics subcontractor to Radian (Resource Economics, Inc., April 1999).

The full documentation containing methods, assumptions, calculations, and rationale for conclusions is contained in the public reading room, as is the independent review of these studies.

8.2.2 Comment

A commentor suggested that the draft EA should present tables with both the Perryman Group and Resource Economics, Inc. results. Negative impacts (shutdowns, layoffs) are mentioned in the text but not in the tables. The commentor said it was incorrect to assume that minorities will benefit in proportion to their share of the population, as assumed in the tables. The number of low-income people to gain jobs from the pipeline would be proportional to the number of low-income or unskilled positions made available.

Response

As explained in the text, economic effects are projected to result primarily from increased economic activity in the region. This is reflected in the tables. The possible layoffs or shutdowns of less efficient producers in the region may be part of that increased activity, the aggregate of which should yield increased employment. Consequently, it is also accurate to assume that benefits to minority or low-income populations would accrue in rough proportion to their share of the population. These tables do not reflect pipeline jobs; they reflect total employment and income effects from growth in the entire regional economy.

9.0 COMMENTS AND RESPONSES RELATED TO EA CHAPTER 9 "ALTERNATIVES AND MITIGATION"

9.1 APPROPRIATENESS OF THE EVALUATION OF THE NO-ACTION ALTERNATIVE

9.1.1 Comment

Although most commentors questioned the "definition" of the former No-Action Alternative (see Section 3.1 in this Responsiveness Summary [RS]), a few questioned the validity of the evaluation of the No-Action Alternative.

Response

As discussed in Chapter 3 of this RS, the No-Action Alternative has been changed to no operation of the pipeline. An evaluation of the former No-Action Alternative, the Resumption-of-Crude-Oil-Shipments by Longhorn from west to east, was presented in the draft EA in Volume 1, Chapter 9, to provide a basis of comparison. As noted in Section 9.1.1, the Lead Agencies considered all potential impacts of the proposed alternative, not just the incremental impacts between the former No-Action Alternative and the proposed alternative. Because the final EA still compares resumption of crude oil transport to other product alternatives, it is important to respond to the comments on the validity of the evaluation of the Resumption-of-Crude-Oil-Shipments Alternative. The categories of comparisons in draft EA Volume 1, Chapter 9, pages 9-3 through 9-8 are:

- Probabilities of spills;
- Consequences of spills;
- Quantities of liquids (i.e., crude oil or refined products) transported;
- Modes of gasoline transport (i.e., resumption of crude oil shipments would require other means of transporting refined products to the El Paso Gateway Markets); and
- Requirements for future pump stations.

In Section 9.1.1.2.6 of the draft EA, the environmental advantages and disadvantages of the Resumption-of-Crude-Oil-Shipment alternative were compared to the proposed project. In Section 9.3.5, the Lead Agencies concluded that the resumption of crude oil shipments "could result in less overall protection of the human and natural environment because DOT could not require implementation of the specified mitigation measures, which exceed the requirements of substantive law."

As an additional means of comparing alternatives and describing the potential impacts of the proposed alternative, a quantitative estimate of the reduction in the probability of pipeline failure between the operation of a mitigated pipeline and an unmitigated pipeline were developed. During the comment response period, the EA Contractor developed an estimate of the degree to which LMP reduces the probability of failure (POF) as a means of describing the risks associated with the proposed project, operating a mitigated pipeline. As shown in Appendix 9B of the final EA, it appears likely that there is at least a thirty-fold reduction in the POF between the unmitigated Longhorn pipeline and the mitigated pipeline. This underscores the importance of the LMP and reinforces the logic of the conclusions in the draft EA regarding the comparison between the No-Action Alternative, without the Longhorn Mitigation Commitments, and the proposed project with mitigation.

9.2 APPROPRIATENESS OF THE EVALUATION OF THE AQUIFER AVOIDANCE/MINIMIZATION ROUTE AND THE AUSTIN RE-ROUTE

9.2.1 Comment

Commentors objected to the evaluation of the alternative routes considered—both the level of detail of the analysis and the conclusions reached. In particular, commentors asked why the Aquifer Avoidance/Minimization (AA/M) Route Alternative was not selected as the environmentally preferred route since the US Bureau of Land Management (BLM) selected this route for a planned crude oil pipeline in 1987.

Response

The draft EA did not analyze the re-route alternatives in as much degree of detail as the route alternative proposed by Longhorn. The degree to which alternatives must be evaluated under the National Environmental Policy Act (NEPA) is determined by whether they are "reasonable," i.e., whether they are a feasible means of accomplishing fundamental project purposes. An EA or an environmental impact statement (EIS) must generally devote substantial treatment to reasonable alternatives and must briefly discuss the reasons other alternatives are eliminated from further study as unreasonable. See generally 40 CFR §152.14(b). Attachment B, Section C2 of the Settlement Agreement also reflects this doctrine, stating:

> "Lead Agencies, after consultation with other parties, shall consider a range of alternatives, including mitigation alternatives such as re-routing the pipeline…, explaining reasons why any that are selected or eliminated from detailed study. The Lead Agencies will evaluate in detail those alternatives that are determined to be reasonable."

Most commentors who sought additional analysis of alternatives focused on the 370-mile AA/M Route Alternative, claiming it should also have been the Lead Agencies' preferred alternative because it would avoid potential effects on the Edwards Aquifer. Although it would avoid those impacts, it is unlikely the AA/M Route Alternative would serve the proposed project's purpose, i.e., allowing Longhorn a means to transport refined petroleum products to the markets in which it hopes to compete. The additional costs of constructing 370 miles of new pipeline, estimated at $300 million, would eliminate Longhorn's potential ability to compete in those markets, which is currently served by its competitors transporting refined petroleum products for shorter distances via truck and, in the future, by shorter pipelines. As noted in Section 2.2.1 of the draft EA, the purchase and conversion of an existing operating pipeline covering the majority of the length of the system is critical to making it possible to compete in these markets and therefore be considered as a reasonable alternative.

The Lead Agencies have no quarrel with BLM's identification of the aquifer avoidance route as its preferred alternative for All American Pipeline. There, the project sponsor was proposing to construct an entirely new pipeline, not convert an existing pipeline to a different use. The cost difference among alternative project routes did not thus have such a significant effect on project feasibility. Moreover, the construction impacts associated with the AA/M Route Alternative were less significant than those of constructing a new pipeline along the proposed route. Potential construction impacts associated with Longhorn's proposed conversion of the existing pipeline are, of course, far lower than construction of a new pipeline along any route the Lead Agencies have considered in this matter.

If the Lead Agencies were now faced with the same proposal BLM faced in 1987, i.e., a proposal to construct an entirely new pipeline from Houston to El Paso, their preferred alternative might well be the AA/M Route Alternative. That does not, however, mean that either DOT or EPA could require Longhorn to construct its pipeline along that route. Neither agency possesses such authority.

9.2.2 Comment

A commentor stated that the draft EA implies that NEPA was the primary reason that alternative routes were considered, but that the Settlement Agreement also requires consideration of alternative routes. The commentor requested a clarification of the differences in between alternatives required by NEPA and those required by the Settlement Agreement.

Response

NEPA and the Settlement Agreement are not mutually exclusive. NEPA requires evaluation of alternatives and the Settlement Agreement specifies which ones should be evaluated.

9.2.3 Comment

Commentors stated that the Austin Re-route Alternative was designed to be infeasible and therefore easy to reject as a reasonable alternative. One commentor asked if Longhorn, rather than the EA Contractor, designed the route, and that, if so, this was not proper because "the Settlement Agreement requires that the EA develop the routes, not Longhorn."

Response

Early in the draft EA process, the EA Contractor recommended to the Lead Agencies that Longhorn, not the Contractor, develop route alternatives that avoid "populated areas in and around Austin." This became the Austin Re-route Alternative. The reasoning for this approach was as follows: Longhorn, through its operator, Williams Energy Systems (WES), has experienced pipeline route planners; and, if Longhorn were to lay the route, it could not later criticize the route alternative on the basis that it had no part in laying out the route. Longhorn was told that the purpose of the route was primarily to avoid populated areas but that route should otherwise be feasible from other perspectives such as feasibility of permitting and obtaining easements, environmental considerations, engineering feasibility, etc. Also, neither of the Lead Agencies has the authority to stipulate that a particular route be used.

A WES expert in pipeline route planning developed the Austin Re-route Alternative taking into account the factors he would normally use for feasibility, including inputs from environmental professionals and consultants. Next, the EA Contractor reviewed and commented on the draft route prepared by WES. Finally, Longhorn/WES made changes to the draft routing to address the EA Contractor's comments. This combination of Longhorn/EA Contractor development of the Austin Re-route Alternative resulted in a more feasible, rather than an infeasible, routing. The draft EA (page 3-13) acknowledges that Longhorn, not the Contractor, developed the Austin Re-route Alternative.

9.2.4 Comment

A commentor stated that 87 percent of the costs associated with the various route alternatives are materials and labor and that these costs would be needed to maintain the aging pipeline anyway.

Response

A new pipeline requires a major capital expenditure with land acquisition and construction occurring over a period of one to two years, followed by a lifetime of recurring maintenance expenditures. Maintenance costs are usually only a fraction of initial capital costs. The age of the pipeline is only a factor in maintenance costs when deterioration has been allowed to occur. Only in that event would extensive on-going maintenance be required, including potential pipe replacements. This could possibly drive costs to a level approaching new construction. Even then, the high cost of right-of-way (ROW) acquisition would be avoided, compared to an entirely new pipeline system.

9.2.5 Comment

A commentor said that the draft EA should have provided a cost estimate of the route alternatives independent of Longhorn's estimate.

Response

The construction cost information received from Longhorn was reviewed for reasonableness and found to be acceptable.

9.2.6 Comment

A commentor stated that human resources, ground water and surface water, ecological resources, and cultural resources information for the AA/M Route Alternative was not provided in Chapter 4 of the draft EA.

Response

Information about ground water, surface water, ecological resources, and cultural resources along the general alignment of the AA/M Route were summarized from the 1987 All-American Pipeline Supplemental Environmental Impact Statement and included in the draft EA as Appendix 9B. Detailed population and land use data were not included in Appendix 9B because they would require the identification of a specific alignment instead of a general routing.

9.2.7 Comment

A commentor asked why the EPA did not require Longhorn to move its pipeline away from highly populated areas because the company for whom he worked was required to locate its new offices 35 miles to the north of the company's preferred site in order to avoid Austin's growth corridor.

Response

The two situations are not comparable. The portion of the Longhorn pipeline that travels through south Austin is an existing pipeline that was built 50 years ago along a route that originally avoided populated areas. By contrast, the new facility that would house the commentor's employer was not yet constructed and had the option of selecting a variety of sites. Also, the siting of the new building was subject to local land use regulations that do not apply to pipelines. Finally, the objections to the new office complex was based, in part, upon the fact that it would generate large volumes of new road traffic and nearby residential and retail growth. This would not be the case for the Longhorn pipeline.

9.2.8 Comment

One commentor observed that the $147 million estimate by Longhorn to obtain easements and construct a new pipeline along the AA/M Route Alternative could easily be amortized with a one-cent per gallon increase in the price of gasoline.

Response

A one-cent per gallon increase in transport costs can be important where profit margins are often fractions of a cent per gallon. Moreover, as discussed in the Section 9.1.2.2.3 in the draft EA, the additional "lost opportunity" costs were estimated by Longhorn to be approximately $300 million because of the 18-to-24-month delays in obtaining and constructing.

9.2.9 Comment

An independent AA/M cost analysis is required, rather than relying on Longhorn's claims. Offsetting costs, such as not paying for substantial transaction costs related to use of the existing pipeline, higher maintenance and repair for the old pipeline, and the higher likelihood of spills and resulting cleanup costs along the old pipeline should be included.

Response

The construction cost information received from Longhorn was reviewed for reasonableness and found to be acceptable. It is not reasonable to assume that transaction costs would be lower for hundreds of miles of new pipeline in a new right-of-way, versus a thoroughly mitigated existing pipeline. The mitigation measures and operating procedures are intended to bring the Longhorn pipeline to a point where spill risk, and hence cleanup and restoration costs, would be comparable or better than those of any other pipeline or even a new one.

9.2.10 Comment

A commentor noted that in Section 9.1.2.2.1 of the draft EA, the risk of sinkhole collapse is discussed for the AA/M Route Alternative. The commentor asked why it was not mentioned for the proposed Longhorn route, despite the fact that it crosses more than twice as much karst terrain and that this karst is more developed, therefore more amenable to collapse.

Response

Sinkhole collapse is discussed in the context of activities related to construction of new pipeline alignment, including blasting to excavate trenches in hard limestone. This potential does exist for those small portions of the pipeline where the LMP requires new pipe to be installed at a greater depth of cover. However, this distance represents only a fraction of the amount of karst terrain which would require disturbance during the construction of a completely new pipeline alignment.

9.2.11 Comment

A commentor stated that Section 9.1.2.2.2 of the draft EA stated that the proposed route appears to have fewer surface water impacts than the AA/M Route. The draft EA indicated seven public water supplies that could be impacted by the AA/M Route. The Longhorn route (Section 4.2.2.1.4) listed 20 water supply entities downstream from the existing pipeline. Table 4-32 listed 10 stream crossings as most important to water supplies and listed 14 as highly important. The commentor asserts that the AA/M Route has fewer impacts to water supplies.

Response

As discussed in Section 9.1.2.2.2 of the draft EA, the potential impact on a water supply is determined by many factors other than the number of water crossings. The severity of the impact needs to be taken into account in addition to the number of water supplies impacted.

Based on these considerations, the AA/M Route appears to have more potential for surface water impacts (as measured by drinking water sensitivity).

9.2.12 Comment

A commentor noted that Section 9.1.2.3 of the draft EA mentioned spill risks to communities not now subject to those risks due to the AA/M Route, but it should also mention risks due to the existing route. The commentor said that the draft EA stated that the AA/M is not warranted due to the extensive mitigation required of the existing route.

Response

As the commentor requests, the avoidance of risks to surface water from the existing route would be added as an advantage to the AA/M in the final EA. Section 9.1.2.3 refers to discussion of mitigation in Section 9.2 of the draft EA.

9.2.13 Comment

A commentor stated that Longhorn significantly overstated their “lost opportunity cost”; at $299 million it equates to $13.5 cents per gallon. The commentor took the $299 million in reported lost opportunity costs and divided them by the product volume resulting from a flow rate of 72,000 barrels per day (bpd) for two years. This yields 13.5 cents per gallon, which the commentor then compared to the price difference between El Paso and the Gulf Coast to conclude that this cannot be lost profit. The commentor said the current pre-wholesale price difference between the Texas Gulf Coast and El Paso is 9 to 10 cents per gallon. The commentor asked what is meant by “lost opportunity costs.”

Response

The lost opportunity costs consist mainly of delayed profits and contract termination costs.

Profits from pipeline operations over the life of the pipeline would be delayed by the 18 to 24 months it would take to design, acquire, permit, construct, and test the new pipeline. The magnitude of the loss is a function of the discount rate chosen. At a typical industry discount rate of 10 percent, a two-year delay represents a 21 percent reduction of the present worth of those profits. Note that the entire stream of profits over the life of the pipeline must be included in the calculation of the lost opportunity cost.

The other element of lost opportunity cost is the collection of direct and indirect costs known as contract termination costs (costs of breaching, terminating, or renegotiating contracts to which Longhorn or its contractors are a party) or real losses requiring payouts from Longhorn and the long-term loss of business resulting from these changes such as the loss of goodwould or other tangible losses. The exact terms and conditions of existing and prospective contracts and related negotiations are confidential; however, these costs can extend far into the future and past the two years it would take to build a new pipeline.

9.3 QUESTIONS RAISED REGARDING MITIGATION REQUIRED STUDIES

9.3.1 Comment

Commentors questioned how decisions could be made when some studies have not yet been completed.

Response

Appendix 9E in the final EA briefly describes the scope of the studies, the revisions required by the reviewers, and where the studies' results are summarized in the final EA. In at least one case, the timing of the study has been moved up. Table RS 9-1 illustrates the current status of "study-type" mitigations.

Table RS 9-1

Requirement	Required by	Original Timing in draft EA	Status and Discussion in Final EA
Root cause analyses	LMC 19	Prior to startup	Appendix 9E
SCC (stress corrosion cracking) study	LMC 19	Prior to startup	Appendix 9E
Soil stresses	LMC 19	Prior to startup	Appendix 9E
Landslides	LMC 19	Prior to startup	Appendix 9E
Subsidence	LMC 19	Prior to startup	Appendix 9E
Scour	LMC 19	Prior to startup	Chapter 4 and Appendix 9E
Seismic	LMC 19	Prior to startup	Appendix 9E
Spans	LMC 15	Prior to startup	Appendix 9E
Valve study (for additional valves)	LMC 22	Within 3 months of startup	Appendix 9E
Revised surge analysis	LMC 9	Prior to startup	Appendix 9E
Facility Response Plan	EPA 90, DOT 194, and SPCC	Prior to startup	Appendix 9E and Appendix 5H

9.3.2 Comment

Commentors asked when remediation would be done if one of the mitigation-required studies indicates some deficiencies.

Response

Remediation or corrective work shall be completed prior to startup with DOT auditing such work.

9.3.3 Comment

Commentors pointed out that the Longhorn Mitigation Commitment (LMC) 19 states that the “Ground and Water Force Study” will be “conducted by a reputable third-party company with demonstrated engineering expertise.” The commentor stated that the study is primarily a hydrogeologic evaluation, so geologists and hydrogeologists should be contracted instead of engineers. Commentor also stated that the “Ground and Water Force Study” in LMC 19 should include studies of land subsidence in the Houston area and sinkhole collapse in karst and covered karst areas.

Response

The “Ground and Water Force Study” in the LMP has been divided into several individual studies. Each study covers an individual topic such as subsidence, seismic activity, stream scour, etc. These studies have been reviewed. The individual technical reviewer for each study has the technical experience, training, and background in the relevant areas to judge the quality and adequacy of the technical approach, content, and results. The credentials of the Longhorn study authors would be an important factor in evaluating the quality of the reports. A description and final evaluation of each Longhorn study, including those initially described as “Ground and Water Force Study,” is presented in Appendix 9E of the final EA. A separate subsidence study evaluates the potential for subsidence and the possible impacts on the pipeline along its entire length. See Appendix 9E in the final EA.

9.3.4 Comment

A commentor stated that Longhorn’s planned “Ground and Water Force Study” in LMC 19 and in the LMP does not address the fate and transport of spilled or leaked petrochemicals that may enter the ground water beneath the pipeline. The commentor said that such a study is warranted to determine the likely extent and impacts of a spill, and should contain a water-sampling plan to monitor the impacts on private and public water supplies.

Response

As noted above, Longhorn’s “Ground and Water Force Study” has been subdivided into several separate studies (soil stress, landslide, subsidence, scour, and seismic studies). The objectives of these studies are to define the potential effects of these several forces on the pipeline. Modeling was not conducted to estimate the fates of hydrocarbons spills that might reach the ground water because the large number of variables, and hence extremely speculative nature of such an exercise. Such a complex effort is not within the scope of the EA. The fate and transport of gasoline spills were, however, considered in the final EA where estimates of future spill probabilities and resulting drinking water contamination are presented. Finally, once a spill has occurred, ground water modeling is used to develop a water sampling plan for possible remediation.

9.4 NEED TO CONSIDER TRUCK AND RAIL ALTERNATIVES

9.4.1 Comment

Commentors stated that truck transport was uneconomical and therefore should not be considered. Other commentors stated that the EA should have addressed alternatives to pipeline transport of refined products, such as truck transport. A comment was received that the comparison of pipeline and truck safety in the draft EA was not specific to Texas or to refined products.

Response

With regard to comparative costs, in 1997 the average US oil pipeline operating revenue was 1.4 cents per inter-city ton-mile. The rail general freight operating revenue per ton-mile was 2.4 cents. The non-local trucking operating revenue per inter-city ton-mile was 9.9 cents (all current, i.e., 1997 cents).[8,9] These numbers confirm that truck or train product transport is not cost competitive with pipeline transportation.

With regard to comparative risks, tanker truck transportation is associated with a much higher accident risk in terms of immediate and severe harm to the public and a higher rate of air emissions, but possibly a lower risk of catastrophic soil and ground water contamination. Per billion ton-miles transported, refined petroleum product trucks have a fatal accident rate that is more than 7,000 times higher than that of refined product pipelines and have an accident rate that is approximately 360 times higher. Per billion ton-miles transported still, trucks spill up to 18 times more product, depending on what fraction of the tank is spilled in each accident; however, it can be argued that these spills are generally better contained than pipeline spills. Note that these statistics differ from Table 6G-2 of the draft EA. This is because the focus in this response is on refined petroleum products, not liquid hydrocarbons, in general, as in the draft EA.

The truck transportation alternative is briefly discussed in Section 6.6.1 of the draft EA and Table 6G-1 in Appendix 6G in the draft EA. Section 6.6.1 shows that relative risks and quantity of spills are much higher for truck and rail transport than for pipelines.

For truck transportation, the human health and safety risk affects the highway corridor used, while for pipelines it affects the pipeline ROW corridor. More people use and live along highway corridors than along pipeline ROWs; also, the truck transport spills occur where

[8] DOT. *National Transportation Statistics 1999 (NTS)*. At: http://www.bts.gov/ntda/nts/.
[9] Wilson, R. A. 1998. *Transportation in America – Statistical Analysis of Transportation in the United States, 16th Edition*. Eno Transportation Foundation.

motorists are driving resulting in even greater exposure. This explains why the human impact (injury or death) from an average truck accident is greater than the impact from an average pipeline accident.

To replace the 225,000 bpd from the Longhorn pipeline, more than 2,000 tanker trucks and more than 700 rail cars per day would be needed (assuming the trip could be made in one day and that the trucks would return empty). This would result in greater vehicle emissions, traffic congestion, accidents, and noise.

The environmental risks of truck transport would include the risk resulting from air emissions and spills. The air emissions from truck operation and multiple product transshipments are much higher than the air emissions resulting from an equivalent pipeline operation. Spills resulting from truck accidents rarely escape detection and thus, can be rapidly contained. Spills from pipelines, on the other hand, may release hydrocarbons directly into the subsurface and remain undetected for longer periods of time. In case of a catastrophic failure, pipelines can also release a far greater volume than a tanker truck. As mentioned in Sections 9.1.1.2.6 and 9.3.5 of the draft EA, a tanker truck spill is limited to the 8,500-gallon capacity of the tank, while a spill occurring as a result of a catastrophic event in sensitive and hypersensitive areas could exceed 200,000 gallons.

The relative risk of trucks and pipelines were compared by converting the available accident statistics to accident rates per ton-mile transported. Gasoline trucks transported 28.5 billion ton-miles in 1997; the total for refined petroleum products (including gasoline) was 29.5 billion. Refined petroleum product pipelines transported 280.9 billion ton-miles in 1996, the most recent number available; the average for 1990, 1994, 1995, and 1996 (the only years listed) was 266.0 billion. The resulting accident and impact rates are provided in the tables RS 9-2 and RS 9-3.

Table RS 9-2. Refined Petroleum Product Truck Transportation Accident Statistics

Trucks (1998)	Annual			Per Billion Ton-Miles		
	Low	High	Average	Low	High	Average
Fatal crashes						
Total	N/A	N/A	82	N/A	N/A	2.77
With cargo release	22	28	25	0.75	0.94	0.84
Non-fatal crashes						
Total	1,520	2,359	1,939	51.53	79.99	65.76
With cargo release	228	273	250	7.71	9.25	8.48
Total crashes						
Total	N/A	N/A	2,021	N/A	N/A	68.53
With cargo release	250	300	275	8.46	10.19	9.32

Table RS 9-3. Refined Petroleum Product Pipeline Transportation Accident Statistics

Pipelines (1989-99)	Decade Total	Annual Average	Per Billion Ton-Miles
Fatal accidents	1	0.1	0.0004
Fatalities	3	0.3	0.0011
Accidents with injuries	13	1.3	0.0049
Injuries	950	95	0.3571
Total accidents	507	52.6	0.1977

N/A = not available

Table RS 9-3 uses a 10-year average for the pipeline side of the comparison because some types of accidents (fatal ones, for example) are so rare that a one-year snapshot may not be representative. For trucks, accidents are sufficiently frequent that using one year's worth of data is acceptable. Note also that the years do not always match precisely in this comparison because we used the most recent years available. Because none of the statistics used change drastically from year to year, the conclusions remain valid.

The 1998 truck accident number estimates were obtained from the Federal Motor Carrier Safety Administration,[10] prorated by the refined hydrocarbon fraction of hazardous materials transported in the U.S.[11] (Note that petroleum gases/condensates were excluded, since these would not be carried by the Longhorn pipeline.) The uncertainty in the truck accident statistics (upper part of the table) is due to the fact that many hazardous material trucks do not display the

[10] Federal Motor Carrier Safety Administration. *Large Truck Crash Profile: the 1998 National Picture*. January 2000.
[11] U.S. Census Bureau. *Hazardous Materials- 1997 Economic Census - Transportation - 1997 Commodity Flow Survey*. December 1999.

required placard and that police at the site of the accident often do not fill in the relevant part of the accident report.

Next, we consulted the DOT pipeline database,[12] focusing on the decade from August 1989 to August 1999 (the most recent data available). This database includes accidents at pipeline-related tank farms and pumping stations. During the August 1989 to August 1999 decade, US refined petroleum product pipelines had one fatal accident, the Bellingham, WA, gasoline pipeline accident of June 1999, which killed three people and injured eight. In other words, without the Bellingham accident, there would have been no fatal accidents due to refined petroleum product pipelines over this decade. Averaged over the decade, a rate of fatal accidents of 0.1 per year and 0.3 fatalities per year results from this accident. Note also that 926 out of 950 pipeline-related injuries are associated with one incident, the San Jacinto River multiple pipeline rupture in Houston in the aftermath of Hurricane Rosa in 1994. The accident description states that no serious injury was incurred; anybody who checked into the hospital was listed as injured.

The total amount of pipeline gasoline spilled averaged 22,291 barrels per year (bpy), while refined petroleum products as a whole averaged 33,890 bpy. The spill size distribution suggests that the statistics are dominated by a few large spills. The largest single petroleum product spill in the 1989-1999 decade was a 30,000-bbl gasoline spill; the second largest was a 22,800 bbl diesel spill. Out of 339 gasoline spills, seven exceeded 5000 bbl; out of 526 refined petroleum product spills, ten exceeded 5000 bbl (210,000 gallons).

Comparable statistical data for railroad accidents were less available than for the trucking industry. Railroads annually move approximately 1.7 million carloads of hazardous materials and hazardous wastes. The railroad safety record in transporting hazardous materials compares to that of trucks. Preliminary 1998 data indicate there were a total of 1,038 releases involving hazardous materials (HAZMAT) on the rails, the vast majority of them minor spills or leaks, often occurring during loading or unloading.

Comparable data on refined product transportation accidents for Texas alone are not available.

[12] Office of Pipeline Safety (OPS) – DOT. *Hazardous liquid accident data, 1986-present*. FOIA On-Line Library; Distribution and Transmission Accident and Incident Data. Consulted in February 2000. At http://ops.dot.gov/IA98.htm.

9.5 NEED FOR FISCAL ASSURANCES FOR PIPELINE DAMAGES

9.5.1 Comment

Several commentors expressed concern about Longhorn's ability to pay for damages to water supplies (e.g., private wells) or other natural resources (e.g., agricultural soils) given that Longhorn is a limited liability corporation.

Response

Two mechanisms (outside of a lawsuit) assure compensation to property owners from spills. One of these is through provisions of the Natural Resource Damage Assessment (NRDA) process, and the other is through insurance provisions that Longhorn has obtained to cover such losses. These are briefly discussed below.

<u>NRDA process.</u> NRDA is the process by which resource management agencies (federal and state), such as the Texas Natural Resource Conservation Commission (TNRCC) determine injury and collect restoration funds when a hazardous materials spill or hazardous waste site harms natural resources. NRDA is authorized by the Superfund law (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]) and the Clean Water Act. The regulations, codified in 43 CFR Part 11, supplement those in the National Contingency Plan in 40 CFR Part 300, that provide for the identification, investigation, study, and response to a discharge of oil or release of a hazardous substance as defined in Section 101(14) of CERCLA.

The Natural Resource Trustees are made up of federal, state, and tribal officials and include the Department of the Interior (US Fish and Wildlife Service [FWS], National Park Service, BLM), National Oceanic and Atmospheric Administration, the US Department of Agriculture's Forest Service, and Indian Tribal Governments. State trustees are appointed by the Governor and, in Texas, include the TNRCC, Texas Parks and Wildlife Department (TPWD), and the Texas General Land Office.

The trustees, working on behalf of the public, may recover damages to fund restoration, rehabilitation, or acquisition of the equivalent of the injured resources. These actions are principally designed to restore injured resources to their baseline condition. They may also be used to compensate for the interim loss of services previously provided by the now injured resource. NRDA defines natural resources in 43 CFR §11.14 and, as such, the definition includes surface water, ground water, air, geologic, and biological resources. The TNRCC is the designated state trustee for surface water, sediments, ground water, and air resources. The authority of the trustees includes seeking compensation through the Attorney General for damages assessed, for cost of the assessment, and for restoration planning, and/or participating in negotiations to obtain assessments and/or restoration activities. The funding for these assessments and restoration is from the potentially responsible party. Longhorn would be the potentially responsible party in the event of a spill from its system. Under CERCLA §107(a), the responsible party is liable for all costs associated with the spill or discharge until the resource is restored to its baseline condition (the condition of the resource before the spill) and until interim lost services have been compensated, if appropriate.

Longhorn insurance. Longhorn is obtaining environmental liability insurance from AIG Environmental of Dallas, a division of the American International Companies, to cover damages from pipeline spills.

Details on the insurance policy are provided in Chapter 9 of the final EA.

9.6 OVERALL EFFECTIVENESS OF LONGHORN MITIGATION PLAN

9.6.1 Comment

A commentor requested that the material in the draft EA, Appendix 9C (the LMP) be clearly identified as a Longhorn product. The commentor requested that a title page including the date the document was prepared should also be provided.

Response

The LMP is a Longhorn product based on guidelines and performance measures developed by the Contractor and the Lead Agencies. Longhorn produced the document and added other measures and details regarding implementation. The final contents of the LMP are also the result of input from numerous technical experts outside of Longhorn and from various regulatory agencies. The LMP has been revised, and the revised version is included in Appendix 9C of the final EA. A title page, containing the preparation date, is included as part of the final document.

9.6.2 Comment

A commentor noted that although the draft EA stated that the mitigation measures go beyond compliance with industry and regulatory standards, the draft EA does not give any examples of these industry standards or regulations.

Response

Many provisions of the LMP represent actions not required under current regulations. Some are not addressed in industry standards nor are they in common practice among pipeline operators, as is confirmed by DOT personnel and industry consultants. In aggregate, the requirements of the LMP produce a set of actions that have no known precedent in the pipeline industry.

The draft EA does not list where current industry and regulatory standards are exceeded in the LMP. However, examples of LMP commitments that exceed both regulatory requirements and common industry practices include actions such as enhanced patrol frequency, surge pressure limitations, installation of leak detection cable, extra depth of cover with protective cap, and the performance of special studies that would result in additional safeguards.

9.6.3 Comment

A commentor expressed concern that the Lead Agencies were not requiring that the proposed project with mitigation measures comply with industry standards and sound engineering practices as required by the Settlement Agreement.

Response

No inconsistencies with industry practices or sound engineering practices have been identified. In many instances, the proposed project exceeds industry standards and sound engineering practices. See also a discussion of such practices in Section 5.1 and Section 5.2 of this RS.

9.6.4 Comment

A commentor was concerned that the draft EA only included mitigation measures from the Contractor, the Lead Agencies, and Longhorn, whereas page 3 of the Settlement Agreement requires that all appropriate and reasonable mitigation measures be included in the EA. A commentor expressed concern that numerous "appropriate and reasonable" mitigation measures suggested by the plaintiffs have not been incorporated in the EA.

Response

Alternative mitigation measures were received as comments to the draft EA. These have been carefully considered and in some cases, modifications have been made to the draft EA to incorporate the commentor's suggestions. For example, the addition of several check valves and other changes to operation, such as elimination of methyl tertiary-butyl ether (MTBE), resulted from extensive discussions between one of the plaintiffs, the Lower Colorado River Authority, Longhorn, the Lead Agencies, and the EA Contractor. Many appropriate and reasonable mitigation measure suggestions were added to the LMP following publication of the draft EA. Where the suggestion is not adopted, the RS gives the rationale for rejection. See Appendix F for discussions of several alternative mitigation plans received as comments.

9.6.5 Comment

A commentor, referring to mitigations stated that "...most of the proposals amount to no more than correction of past poor maintenance.…"

Response

Most of the mitigation measures in the LMP exceed DOT regulatory requirements and industry practice. Therefore, most actions would not be specifically mandated without the LMP and would not be seen as "normal industry practice."

However, since the DOT regulations are often performance-based, certain of the listed mitigations can be seen as prudent even without the mandates of the LMP. These include commitments to enhance cathodic protection in specific areas and further investigate and repair episodes of diminished cover and previous inspection anomalies.

9.6.6 Comment

A commentor stated that descriptions and discussions in the LMP were too vague to analyze scope and potential benefits of the individual mitigation measures. The commentor questioned how the draft EA could be issued with a tentative Findings of No Significant Impact (FNSI) before all mitigation details were developed.

Response

The commentor is referring specifically to a list of "process elements" on page 9-31 of the draft EA. These are a part of the LMP and, as stated on page 9-32 of the draft EA, are fully detailed elsewhere in the LMP. The LMP descriptions are thorough enough to enable informed comment on the measures.

9.6.7 Comment

A commentor noted that the Lead Agencies indicated that mitigation measures would reduce the probabilities of spills in sensitive and hypersensitive areas to lower levels than in non-sensitive areas, but the probabilistic risk analyses did not make distinctions regarding spill frequencies and probabilities between the new and the old pipeline, or the populated and unpopulated areas.

Response

The expected reduction in spill probability is the result of the mitigation measures that are more robust in the Tier 2 and Tier 3 areas. A probabilistic assessment of the post-mitigation leak rate is shown in Appendix 9B in the final EA. Spill frequency differences between urban and rural areas have been calculated and are shown in RS Appendix E. Distinctions between old and new pipe, or other pertinent risk factors using only historical leaks, imply a level of accuracy that is not warranted given the small data set (26 leaks of all sizes) of past leaks. Such distinctions are considered in the relative risk assessment and in the future leak rate estimates based on that assessment.

9.6.8 Comment

A commentor states that risk assessment and tiering for sensitivity are not related and that mitigation measures appear to have been prepared prior to risk assessment.

Response

Certain mitigation measures were developed in parallel with the risk assessment. This was possible because it was apparent even in early stages of the EA process that issues such as integrity verification and enhanced leak detection would be necessary to manage risks appropriately. Many other mitigation measures became apparent after the risk assessment identified specific concerns. Also, several mitigations were added as a result of public comments.

The tier designation system was developed in parallel with the EA risk model as a way to capture changing consequence potential along the pipeline. Tiers are related to risk assessment since probability-of-failure levels are tier sensitive, as described in the LMP.

9.6.9 Comment

A commentor asks why “threshold” values for scores for pipeline segments were not determined prior to scoring in the draft EA, Appendix 9C.

Response

Thresholds for tier categories were determined prior to the relative risk assessment results. The pre-mitigation assessment was still underway when preliminary thresholds were established. Draft EA Chapter 9 describes the rationale for setting the thresholds. These were later revised upward, requiring more mitigation, when a relative risk model discrepancy was detected. Mitigation measures to achieve these thresholds are also additive to mitigation measures which were determined early in the EA process and independently from the formal relative risk assessment.

9.6.10 Comment

A commentor asserted that the “conceptual linkage” between the two scales in Figure 9-3 of the draft EA is incorrect.

Response

The commentor's point that the conceptual linkage shown in Figure 9-3 of the draft EA is uncertain is not disputed. The intent of the figure is to show possible magnitudes of improvements to be gained from the LMP. The relationship between relative and absolute failure rates is further developed in Appendix 9B in the final EA. It still contains many uncertainties. The commentor raised concerns regarding specific aspects and offers opinions for possible changes. However, suggested changes are no more justified than the original assumptions and, in some cases, clearly less justified. Evidence and expert judgement indicates that leak reduction compared to historical experience or other companies' experience can be achieved through mitigation. Precise quantification of the reduction is infeasible due to the lack of pertinent data. See also Section 6.2 of this RS.

9.6.11 Comment

Several commentors stated that they could not determine the overall effectiveness of the LMP without knowing the POF before mitigation and after mitigation. Some of these commentors asked that the risk model results be expressed in POF values.

Response

A before- and after-mitigation estimate of POF was not attempted in the draft EA because of the many uncertainties in making such an estimate. Subsequent to the issuance of the draft EA, the limited statistical data has been combined with best professional judgement to calculate the before- and after-mitigation POFs. The approach, calculations, and discussion of uncertainties are presented in Appendix 9B of the final EA.

9.6.12 Comment

A commentor states that even with the LMP, the spill frequencies and probabilities in Travis and Harris counties are likely to remain significantly higher than the average for the mainline.

Response

The relative risk assessment identifies increased chances of third party damage in more populated areas and increased chances of corrosion interferences when more buried utilities are present. These result in Index Sum score "penalties" for pipe segments that are more susceptible to such threats. Susceptible pipe segments are more prevalent in the more urban counties such as Travis and Harris. In order to achieve target tier levels, these penalties must be overcome through more rigorous damage prevention actions such as increased patrol, public education, depth of cover, signage, corrosion-control, etc. These are designed to reduce the higher leak frequency that would otherwise be expected in such areas.

9.6.13 Comment

A commentor expressed concern that the technical feasibilities of specific mitigation measures, or groups of measures, were not provided in the draft EA as required in the NEPA guidelines.

Response

All mitigation measures required by the Lead Agencies are technically feasible. In most cases, they add to normal industry practices by increasing thoroughness and frequency but do not introduce new technical challenges. In a few cases, newer technologies are specified, but these also have been demonstrated to be technically feasible. Examples of the latter include direct burial leak detection cables and transverse wave in-line inspection (ILI) or "crack tool."

9.6.14 Comment

A commentor pointed out that there are eight Longhorn Mitigation Commitments that will not be implemented until a year after startup of the pipeline (LMCs 10, 11, 12, 13, 16, 21, 22, and 32). The commentor stated that this schedule is inadequate, because it makes the assumption that problems will not occur between startup and implementation of the mitigation commitments.

Response

LMC 22, requiring several studies of potential threats to the pipeline, has already been completed.

LMC 21 requires frequent inspection of pump stations continuously after startup. Frequent inspections of pump stations are not needed prior to startup because the equipment is not operating and product is not in the line. LMCs 10, 11, and 12, which deal with ILIs, are scheduled to be conducted after startup. It is safer and more accurate to perform these inspections when hydrocarbon liquid is driving the inspection tools (pigs) through the pipeline. The pipeline would operate at reduced pressure until the first of these inspections, performed with the transverse crack tool, is completed within three months of startup.

In LMC 13, Longhorn would install an enhanced transient flow leak detection system for the entire pipeline as well as a hydrocarbon-sensing cable over the Edwards Aquifer Recharge Zone portion of the pipeline. Both of these systems would be installed prior to startup. However, the transient flow model detection system is complex as well as sensitive. The system requires a substantial amount of "tuning" to fully achieve its leak detection capabilities. This tuning, which can take up to several months, can only be performed after the pipeline is operational.

LMC 16 is a commitment to remove those encroachments on the ROW that could hinder access to portions of the ROW. This would be done within a year of startup. The removal of some encroachments may require negotiations or legal proceedings that could be time-consuming. However, in LMC 17, the commitment is made to clear the ROW to excellent condition prior to startup and continuously thereafter. Encroachments (i.e., storage sheds, garages, etc.) that require time to remove affect only a small fraction of the ROW. Except for these areas of encroachment, the ROW should be cleared prior to startup, thereby enhancing third-party damage prevention and leak detection.

LMC 32 requires pipe-to-soil potential surveys to be conducted on a semi-annual basis, starting no more than six months after startup. A close interval survey (CIS) was conducted in 1998. In LMC 14, Longhorn would perform a CIS in hypersensitive areas and in areas not surveyed in the 1998 CIS. This latest CIS would be completed prior to startup.

9.6.15 Comment

A commentor questioned why Longhorn will receive mitigation credit for increasing the MOP and the maximum allowable surge pressure (MASP) in the pipeline. (The commentor’s letter actually said “AMOP” and “AMSP,” which is presumed to refer to MOP and MASP as used in the EA.)

Response

The maximum operating pressure (MOP) is determined per DOT regulations at 49 CFR §195.406, which uses design calculations and test pressures to establish a maximum pressure. No mitigation ”credit” is given or implied in setting this value. As stated in the LMP, the Longhorn pipeline is further pressure-limited in Tier 2 and Tier 3 areas since no surge events (MASP) are allowed to exceed the MOP, as would otherwise be acceptable under DOT §195.406. This is an important risk mitigation.

9.6.16 Comment

A commentor asked what the value of reducing surge pressure was in relation to LMC 31 and stated that "No system alterations to address pressure spikes can eliminate the failure frequency increase."

Response

The commentor's assertion that limiting surge pressures would not impact failure potential is unsupported and contrary to evidence and industry experience. A pressure surge is among the most serious pipeline events since it can rapidly bring the stress in the pipe wall to an abnormally high level. Surges are a known contributing factor in past pipe failures. The LMP would limit such surges as a risk reduction measure.

9.6.17 Comment

In referring to LMC 1, a commentor stated that replacement pipe specifications should be stated in terms of design factors rather than wall thickness.

Response

A design factor is calculated using the pipe wall thickness, material strength, diameter, and maximum pressure. Design factor and wall thickness are proportional when other variables are held constant. All pipe is required by regulations to have at least a 0.72 design factor.

9.6.18 Comment

Commentors questioned if Longhorn will repair all defects in a timely manner, as a follow-up to Longhorn's commitment to conduct frequent and regular inspections of the pipeline.

Response

The System Integrity Plan (SIP) and annual Operational Reliability Assessment (ORA) commit Longhorn to maintain the integrity of the pipeline. The SIP and ORA are described in detail in Section 3 of the LMP, which is included in the appendices to Chapter 9 of the draft and final EA. Twelve process elements are included in the SIP, and these are summarized in Section 3.4 of the LMP. Two process elements, the Corrosion Management Plan and the ILI and Rehabilitation Program, are probably most relevant to this comment.

The Corrosion Management Plan, described in Section 3.5.1 of the LMP, includes nine surveys, inspections, and mitigation activities. These are intended to identify deficiencies and are to be conducted at different intervals ranging from monthly to annually. Any deficiencies found during the survey would be resolved within one month to one year from the time of discovery, depending on the type of deficiency. Any deficiency presenting an immediate hazard to persons or property would be corrected immediately in accordance with the SIP and ORA.

9.6.19 Comment

A commentor noted that overpressure protection and control capability beyond 120,000 bpd was not discussed in the draft EA.

Response

Detailed design of the pipeline at a capacity of 225,000 bpd is not developed enough to conduct a meaningful surge analysis—a necessary step in designing overpressure protection. For example, the exact locations of the additional pump stations needed for the maximum capacity flow have not been defined. The LMP specifies a management of change (MOC) process that ensures proper consideration of all safety issues, including overpressure protection and control schemes, whenever any type of system change is contemplated. This program is designed to prevent unintended consequences from proposed changes. When flow rate increases are considered, the MOC requires an evaluation of all overpressure protection and control devices and processes to ensure adequacy under the new flow regime.

The LMP also specifies surge limits which apply to all flow conditions. Adherence to those limits would require new surge and overpressure equipment calculations whenever flow rates are to be changed.

9.6.20 Comment

Two commentors separately submitted 35 pages of complete alternative mitigation measure plans. Other commentors wanted to know how the LMP compared to the mitigation measures required for the Olympic Pipeline in the aftermath of the Bellingham accident.

Response

Appendix 9H of this RS provides responses for the various alternative plans and provides a comparison of the Bellingham mitigation measures and those in the LMP.

9.6.21 Comment

A commentor, referring to LMC 33, states that all threatened and endangered species are not considered in the draft EA. Conservation measures that are discussed in the LMP appendices address the Houston Toad, Navasota Ladies'-tresses, Prairie Dawn Flower, and Barton Springs Salamander. The commentor expressed concern that other threatened and endangered species that may be potentially impacted by the pipeline were not discussed.

Response

The FWS Phase I Biological Opinion and FWS Concurrence Letter on Phase II address all threatened and endangered species that could be impacted by the project. The BA and BO are contained in Appendix 4E of this EA.

9.7 NEED FOR MONITORING AND REPORTING ON IMPLEMENTATION OF LONGHORN MITIGATION PLAN

9.7.1 Comment

Several commentors questioned whether the mitigation commitments would be fully implemented. Some stated a desire for a mechanism to monitor the progress of the implementation of the mitigation commitments—especially for measures that would be conducted over the life of the pipeline. Most of these same commentors also expressed an interest in more information on enforcement of these measures.

Response

DOT has the responsibility of tracking the mitigation commitments and taking enforcement action against Longhorn. The mitigation monitoring and the enforcement issues are discussed separately below.

Mitigation Monitoring

A mitigation monitoring plan is often a part of NEPA documents. General NEPA implementing regulations in 40 CFR δ1505.3 require that a mitigation monitoring and enforcement program be adopted. Upon request, the results of such monitoring must be made available to the public.

Given that DOT is responsible for enforcing the mitigation measures, DOT would take the lead in monitoring mitigation progress. Longhorn would submit progress reports for DOT's review on a quarterly basis during the first two years of operation and annually thereafter (see LMC 38). These progress reports would be available to the public through Longhorn's web site. These reports would address the following:

- The status of each mitigation commitment with respect to completed tasks and details of what is planned for the next reporting period; and***
- Status of mitigation commitment implementation, any interim developments or complicating factors, and results of mitigation-related studies and analysis.

DOT would carefully review all progress reports submitted by Longhorn. Any inconsistencies or irregularities in operating and maintenance procedures would be noted and could prompt additional inspection of records or facilities. DOT's risk-based inspection cycle for complete reviews of pipeline integrity, including review of records and pipeline facilities, includes an inspection of each pipeline operator once every four years. Portions of the pipeline may be inspected more often, based on risk criteria which includes compliance and accident history.

It is anticipated that a complete records inspection, combined with some field inspection, would take two weeks to complete. Longhorn maintains records in New Mexico, Oklahoma, and

Texas. DOT would conduct field inspections to monitor significant activities such as hydrostatic testing, in-line inspections, installation of new pipe, lowering of pipe, and other construction-testing activities. In particular, inspectors focus on identifying and evaluating the following conditions: exposed pipe; pipe supports; cathodic protection; ROW clearances; pressure settings on relief devices; and any other relevant factors. Records of inspections are maintained at the Southwest Region office in Houston, Texas

During the 18-mile construction phase of the project in the contributing and recharge zones, DOT or its designee would observe as much of the construction activity as possible. DOT routinely observes the following construction-related activities: trenching, stringing of pipe, welding, installation of pipe, non-destructive testing, coating, and back filling operations. The inspection of Longhorn's construction activities would be performed by DOT or its designees, which may include use of a private contractor that DOT retains on occasion. Records of construction inspections are maintained at the Southwest Region office in Houston, Texas. It is difficult to predict how long the 18-mile pipe replacement would take; however, DOT estimates that this construction would take approximately three months to complete. Under this scenario, DOT would be present during all critical construction activities. Although it is not anticipated, DOT's attendance at these inspections could be altered based on budgetary or other resource constraints.

Mitigation Enforcement

DOT is responsible for regulating the design, construction, operation, and maintenance of hazardous liquid pipelines. This includes emergency response plans and procedures. DOT administers regulations to prevent spills and if a spill occurs, to lessen the adverse impact to the public and environment. DOT periodically evaluates the operating practices and the physical condition of the pipelines regulated. DOT also reviews and approves oil spill response plans required by the Oil Pollution Act (OPA) and required spill drills designed to test each operator's ability to respond to a large pipeline spill.

Enforcement of the LMP by DOT would ensure that mitigation measures and regular inspections are performed. This would be achieved through DOT's risk-based prioritization. It is DOT's policy to enforce each pipeline against minimum DOT regulations and the company's own operating procedures. In this case, the LMP would become enforceable under DOT's current enforcement process.

DOT would ensure that each mitigation measure included in the LMP would be implemented. Specifically, Longhorn is incorporating the LMP into its O&M manual, and would be required to follow the mitigation measures under its O&M manual. Under 49 CFR §195.401(a), no operator may operate or maintain its pipeline system at a level that is lower than that specified in its O&M manual. The LMP contains a provision specifying that no provision in the LMP would be changed without the prior consultation with DOT. Removal of the provision containing the commitment that the manual would not be changed could result in the automatic revocation of the Longhorn's FRP since this is the key provision, providing the assurance that the operation of the pipeline would not cause significant impacts.

Compliance with each mitigation measure would be enforced through the requirement to follow the O&M manual. Failure to follow individual mitigation measures could result in the imposition of the enforcement authority and sanctions set forth in 49 CFR Part 190.

9.8 LEGAL AUTHORITY FOR LEAD AGENCIES TO DETERMINE PIPELINE ROUTING

9.8.1 Comment

One commentor questioned a statement made at a public meeting regarding the lack of legal authority by EPA and DOT to require Longhorn to construct a pipeline along a different route.

Response

NEPA does not expand a federal agency's statutory authority; it instead requires that an agency consider environmental factors in exercising authority provided it by other statutes. In Section 1(e) of the Pipeline Safety Act, 49 U.S.C. 60104(e), Congress has specifically denied OPS authority "to prescribe the location or routing of a pipeline facility." Hence, OPS may not require that Longhorn reroute its pipeline.

EPA has statutory authority to respond to pipeline spills of oil or hazardous substances to the aquatic environment, but none to regulate routine pipeline operations. EPA is taking no regulatory action here in which it might consider the environmental factors addressed by the EA; it has participated in preparation of the EA solely to bring its expertise in environmental issues and NEPA review to the process.

9.9 INTERNATIONAL CROSS-BOUNDARY EFFECTS AND MITIGATION

9.9.1 Comment

Commentors raised the issue of transboundary effects from spills to the Pecos River or to watersheds that drain to the Rio Grande. The International Boundary and Water Commission

(IBWC) in El Paso requested “contact agency status” to facilitate reporting to the Mexican Section of the IBWC in the event of a product spill.

Response

The United States Section of the IBWC is a federal agency that has joint responsibility (with their Mexican counterparts) for management of the Rio Grande. The IBWC has determined that there would be no transboundary impacts provided that a monitoring alarm system were in place downstream of the pipeline crossing of the Pecos.

Any spill that would be even remotely capable of reaching the Rio Grande would be readily detected by Longhorn’s leak detection and Supervisory Control and Data Acquisition (SCADA) system. Therefore, the functional equivalent of a downstream alarm would be in place if the proposed project goes forward. The likelihood of any such spills even reaching the Rio Grande is very remote; the likelihood that such a spill would contain concentrations of benzene at levels that exceed guidelines and regulatory limits at the Rio Grande is virtually nil.

9.10 NEED TO REPLACE PIPE IN AREAS OF HIGH POPULATION

9.10.1 Comment

Several commentors questioned why the mitigation of “pipe replacement with new, heavier-walled pipe” was deemed appropriate to three miles of the pipeline over the Edwards Aquifer Recharge Zone but was not required for other (if not “all”) segments, especially through heavily populated areas.

Response

Thicker-walled pipe is defined, for these purposes, as pipe whose wall thickness exceeds that required to meet currently mandated design (or “safety”) factors. The design factors provide a margin of safety by requiring a thickness greater than the thickness necessary to withstand all anticipated internal pressures and external loads. Therefore, the mitigation measure of “thicker-walled pipe” provides an additional margin of safety against unanticipated forces as well as known failure modes. Longhorn would replace approximately 19 miles of pipe with heavy-wall pipe across the Edwards Aquifer recharge and contributing zones.

Along pipeline stretches specified, this measure is added to other mitigation measures to address simultaneous threats to sensitive receptors. This is an extraordinary measure that addresses an especially sensitive spill site. Pipe replacement is not specifically required by the

Lead Agencies, rather, Longhorn chooses to make this change to their system. Longhorn commits to limiting internal pressures to 50 percent of the strength of the new pipe (or less if restricted by hydrostatic testing). In other areas, several alternative mitigation measures combine to reduce risks to an acceptable level.

In other areas where pipe replacement is to occur, design factors equivalent or superior to current DOT regulations are to be used. Minimum design factor is 0.72, per DOT regulations. Replacement pipe specifications of 0.281-inch wall thickness with API 5LX65 grade pipe or 0.375-inch wall thickness with API5LX56 grade pipe or greater are specified in the LMP. Normal operating pressures must be kept below 72 percent of the strength of the replacement pipe (or even less, if restricted by hydrostatic test pressures).

9.11 NEED TO CONTROL ROW AND ASSIGN RESPONSIBILITY FOR ENCROACHMENTS

9.11.1 Comment

A commentor wanted to know if other government entities need to get involved to assist Longhorn in controlling right-of-ways (e.g., limited county land use controls around this and other pipelines) to reduce risks of third-party damage.

Response

Local land use controls could be very useful in requiring set backs for new development. However, the mitigation measures can only address what Longhorn can do to reduce third-party damage. Longhorn's pipeline operator, Williams Energy Services (WES) is active in developing practices to reduce third-party risk. WES has been working extensively for several years in a joint industry/agency workgroup, initiated by the US DOT's Office of Pipeline Safety (OPS), the Damage Prevention Quality Action Team (DAMQAT). Williams has over 20 individuals who sit on a variety of committees whose collective mission it is to provide recommendations to the OPS on the best utilization of available resources to educate the public on the prevention of damages to all underground and submerged facilities.

Various campaigns have been initiated by DAMQAT, including the Dig Safely Campaign, launched in June 1999, and the Common Ground Study of One-Call Systems and Damage Prevention Best Practices. These projects are targeted at professional excavators, underground facility owners/operators, public works/highway employees and other stakeholders, including the general public.

Key messages in the Dig Safely Campaign are:

1. Call before you dig;
2. Wait the required time; and
3. Respect the marks.

Over one-half of pipeline accidents are caused by third-party damage. The Dig Safely Campaign promotes the use of one-call systems and damage prevention measures beyond the one-call, and encourages all stakeholders to effectively communicate to ensure excavations can be conducted safely. It is the most effective way to reduce third-party damage to pipeline facilities.

The Common Ground Study of One-Call Systems and Damage Prevention Best Practices involved more than 160 volunteer industry experts, including several representatives from the Williams Pipe Line Company, who identified over 100 damage prevention best practices in a report presented to the Secretary of Transportation. This year-long effort reflects an ongoing collaboration among excavators, locators, design engineers, facility operators, and regulators to improve damage prevention practices. OPS inspectors work with pipeline operators and others to promote adoption of Common Ground practices. OPS and its state partners also work with pipeline operators to improve damage prevention practices, including use of Common Ground Best Practices. State pipeline safety programs work to educate operators about compliance, support new efforts in public education, and influence state laws.

Examples of the Damage Prevention Best Practices recommended by the agency/industry group include:

- Effective communication through the use of one-call systems, which are updated regularly as required;
- Enhanced mapping of facilities using a standard mapping coordinate system (GPS, Video Mapping/Imagery systems, Satellite and Digital Orthographic Imagery, Surface Survey Vehicles etc.);
- Locating and Marking Technologies (buried electronic marker systems, ground penetrating radar, acoustic-based locators etc.); and
- Excavation Technologies (directional drilling, use of test holes etc.).

The Common Ground Study of One-Call Systems and Damage Prevention Best Practices did not cover areas such as vandalism, acts of terrorism, acts of nature resulting in the movement of land or facilities or general facility maintenance and operation.

Another study in which WES's representatives are participating is the OPS initiative regarding Integrity Management.

The program considers the need for additional safety and environmental regulations for interstate and intrastate gas transmission and hazardous liquid pipelines in high-density population areas, areas unusually sensitive to environmental damage, and commercially navigable waterways. Topics under discussion include:

1. The extent to which operators now have integrity management programs;
2. How to promote the development and implementation of such programs; and
3. How OPS would confirm the existence and adequacy of such programs.

One of the critical ingredients in effective management of pipeline integrity is effective integration of the information from varied sources (e.g., operators, designers, testing and maintenance people, aerial surveillance sources, and data from pipeline walk-downs) to ensure that the best decisions are made to assuring integrity. The industry also has the obligation to help the public understand the often complex issues associated with pipeline safety and the OPS regulations.

The results of this initiative would be an integrity management rule-making proposal, which would identify the key elements required to effectively administer an integrity management program. The conceptual model proposed to date includes items on defining high consequence areas, inspection and testing requirements, and integration of data to establish criteria for evaluating and acting on the results of inspections and testing.

9.11.2 Comment

A commentor said that the draft EA should have noted that the approach to ROW management failed to mention that the pipeline operator bears the full responsibility for encroachments into the ROW (49 CFR §195.442[b]).

Response

The citation provided by the commentors 49 CFR §195.442 (a) through (d) deals with damage prevention and "one-call" systems for pipelines, and does not address the responsibility for encroachments into the ROW. The DOT pipeline regulations do not directly require a specific means of avoiding encroachments.

However, the LMC 16 described in Appendix 9D of the draft EA, addresses the clearing of encroachments into the ROW and references the Longhorn SIP, Section 3.5.5 which describes the procedures for addressing encroachments.

The SIP describes the following activities that are designed to address the removal of identified encroachments from the ROW:

- Prior to contacting the encroaching party the existing easement agreement would be reviewed to determine the specific easement rights on the subject property;
- Longhorn representatives would then contact the encroaching party to advise them of the details of what is allowed in the ROW, and would discuss with the party a proposal for resolution of the encroachment; and
- After the details have been settled, a written agreement would be entered into between Longhorn and the encroaching party.

9.12 NEED TO ADDRESS RELIEF VALVES IN LMP

9.12.1 Comment

Commentors suggested a review of all relief valves and their discharge points because they could be the source of major spills.

Response

Relief valves are located at pump stations and discharge to a sump and tank or are located at valve sites and designed to route surge pressures around a closed block valve. Under the proposed project as mitigated, all elements of the pipeline system would be inspected every two and one-half days in sensitive and hypersensitive areas, where remote camera surveillance would also be installed (LMC 21). This would protect against the possibility of an offsite spill resulting from a relief valve discharging improperly.

9.12.2 Comment

A commentor stated that the number and location of critical mainline valves to limit spill volumes needs to be carefully reviewed. The commentor is concerned about quickly reaching manual valves if they are in proximity to the leak, and suggests that additional remote-controlled valves are needed in critical areas.

Response

A review of valve needs in the vicinity of thirteen stream crossings of particular concern has been conducted by Longhorn in its Valve Study. (See Appendix 9E of the final EA.)

9.13 NEED FOR SECONDARY CONTAINMENT AT PUMP STATIONS

9.13.1 Comment

A commentor said that all pump stations should have secondary containment providing one ft of freeboard for a realistic worst case spill. In sensitive areas, the commentor believes, the secondary containment should also have an impermeable liner.

Response

The process configuration of the existing Cedar Valley pump station is typical of those that Longhorn plans to install along the pipeline. It has a remotely operated valve and continuous video surveillance on the upstream side, so the response time and spill volume are minimal on this side. On the downstream side, the station has a manually operated valve, resulting in a substantial response time. However, the response time is likely to be much shorter than the drainage time, which is typically many hours. Thus, most of the drainage volume would be contained on the downstream side. The worst case spill volume should be estimated based on these considerations.

Installing a berm around the pump station to contain this potential spill and allow one ft of freeboard is easy to implement, but it may not protect soil and ground water where highly permeable soils are found. A lined containment system is a more difficult proposition involving grading and leveling the area, installing a liner and properly connecting it to all existing structures, covering the liner with a protective layer, and finally, managing the resulting new drainage pattern. However, the Lead Agencies agree that this would be justified in sensitive areas where rapid percolation into the soil or rock is likely.

Thus, the LMP has been amended to include a requirement that the Cedar Valley Station has secondary containment. A lined containment system may also be required if rapid percolation of spilled liquid into the underlying soil or rock is likely.

9.14 ADEQUACY OF ACCIDENT RESPONSE CAPABILITIES IN REMOTE AREAS

9.14.1 Comment

Several commentors question the ability of Longhorn to respond to accidents in remote rural areas.

Response

Longhorn has a Facility Response Plan (FRP) and Williams has an Emergency Response Plan that meets the regulatory requirements for emergency planning and preparedness. Longhorn has put forth several mitigation items that should further enhance emergency response, including:

- LMC 23 Response center to facilitate 2-hour response to Tier 3 areas;
- LMC 24 Revise facility response plan for fire fighting outside metropolitan areas;
- LMC 26 Revise facility response plan for more planning for high population or sensitive areas; and
- LMC 28 Revise facility response plan for consistency with government plans.

Longhorn has developed a revised FRP. See Appendix 5H of the final EA for a discussion of these changes and to the FRP itself, available in public reading room at Contractor's office.

9.15 NEED TO CONSIDER ISSUES RELATED TO PIPE SPANS SUCH AS MARBLE CREEK CROSSING

9.15.1 Comment

Commentors question the safety of pipe on supports (aerial crossings) or other pipe spans. A commentor noted that the Rabbs Creek elevated crossing is proposed for replacement, yet the Marble Creek elevated crossing directly upstream from McKinney Falls State Park is also in poor condition.

Response

An aerial crossing does not necessarily present more risk than a buried crossing. There are advantages and disadvantages to either design. In the pipe-on-supports design, care must be taken that external loadings are considered, including impacts from flood-borne debris, unintended use, and vandalism of the structure.

The Longhorn pipeline currently crosses over Marble Creek and is supported on a series of rectangular supports that are imbedded in the bottom of the creek. From a visual inspection, the pipeline covering and coating appear, in spots, to have damage and/or wear. One of the supports leans slightly in the upstream direction.

According to the LMP the Marble Creek crossing is one of the locations at which, prior to startup, Longhorn would "lower, replace or recondition" the pipeline. In addition, at the Marble Creek crossing, Longhorn would perform the following activities:

- Re-coat the entire section to minimize potential atmospheric corrosion;
- Modify the pipe supports to provide additional lateral support; and
- Provide safety gates on either side of the crossing to deter access onto the pipe.

In LMC 15(a), Longhorn has provided engineering documentation to verify that all pipeline spans are adequately supported and protected from external loading. This documentation is provided as part of the final EA. The calculations and assumptions regarding the Marble Creek crossing design can be evaluated to ensure that the loading that could be experienced during a flood has been properly factored into the design.

9.16 MITIGATION OF RISK TO PRIVATE WATER WELL OWNERS

9.16.1 Comment

Commentors expressed concern that private wells were subject to excessive risk. They said that a need for a process to ensure that private well owners can have an uninterrupted potable water supply.

Response

The draft EA discussed the legal remedies available to private well owners in the case of a pipeline release that contaminated domestic or stock wells. The draft FNSI was predicated on the conclusion that well owners could receive restitution and/or alternate water supplies if private wells were shown to be impacted. However, it was pointed out by the commentor's that, in some cases, demonstrating cause can be a costly and time consuming process, potentially causing an unfair stress on the resources of a private well owner.

This plan was developed under guidelines laid out by the Lead Agencies and is in the LMP in Appendix 9C in the final EA. Included is a recognition that Longhorn is responsible for evaluating on a site-specific basis the potential spread, aboveground and sub-surface, of any large releases of product that occurs along the pipeline. Longhorn would take responsibility for monitoring any water wells in close proximity, for providing either treatment technologies for cleanup of water in the well or alternate water supply in a timely fashion, and for the costs of cleanup of spill contaminants. Since the potential also exists for wells to be contaminated by persistent small leaks, Longhorn is also committed to and would establish procedures for responding to calls from owners of any well owners within specified areas along the pipeline. This response would include evaluation of the complaint through sampling and hydrogeological investigation, and engineering testing of the adjacent pipeline. If it is determined that contamination is due to the Longhorn pipeline, in addition to repair and remediation, Longhorn would assume responsibility for restoration of water supply to the private well owners as described above.

Incorporation of this plan into the final LMP as well as Longhorn's posting of financial assurances to demonstrate that they can meet these provisions, mitigates potential impacts to private wells.

9.17 NEED FOR ADDITIONAL LONGHORN MITIGATION COMMITMENT ON SURFACE RESTORATION

9.17.1 Comment

Commentors discussed an original EPC easement agreement that stated that the pipeline operators would restore the surface, including grass for the property owner. Commentors noted that this has not occurred with EPC operators and asked that Longhorn commit to performing this service after clearing the right-of-way. They asked for a commitment that Longhorn reseed with native grass at appropriate times during the growing season.

Response

LMC 17, described in Appendix 9D of the draft EA, addresses the scope of work for ROW clearing activities. Longhorn has stated that it would maintain the ROW in excellent condition, which is considered to be a clear line-of-sight for aerial or ground patrols. Ground cover would be mowed so that all pipeline markers would be visible from the air or the ground. High canopy vegetation would be cleared or trimmed as necessary and all debris would be cleared from the ROW. All of these activities would be timed so as to cause the least disturbance possible to threatened and endangered species.

9.18 NEED TO ADDRESS POSSIBILITY OF DOUBLE-WALLED PIPE AS A MITIGATION MEASURE

9.18.1 Comment

Several commentors stated that the use of liners, double-walled pipes, and/or secondary containment systems around a pipeline should have been incorporated into the draft EA LMP or should have been explored in greater detail.

Response

Designs such as double-walled pipe are largely unproven and unprecedented for long distance pipelines. In theory, they could provide a margin of safety against external loadings and also provide for secondary containment in the event of carrier (interior) pipe failure. In practice, however, such designs have proven to be problematic and in some cases might even increase risks. These designs have been proposed and studied carefully for many years. Some applications have even been successfully installed, usually for short distances. As discussed briefly in Section 3.6.4 of the draft EA, the technological challenges seem to outweigh the benefits to be gained. Casing pipes, historically used as protection around pipelines under roadways, are rarely used today, because of the increased POF resulting from their use. Such systems may actually increase the probability of failure because it is more difficult if not impossible to:

- Apply cathodic protection currents (corrosion prevention) to the carrier pipe;
- Internally inspect the casing pipe;
- Avoid or minimize impact of contact between carrier and casing;
- Monitor the annular space; and
- Monitor the integrity of the outer containment.

9.18.2 Comment

Commentors requested comparisons in potential impacts from double-walled pipe versus new pipe.

Response

As noted in comment 9.18.2 above, double-walled pipe could provide a margin of safety against external loadings and also provide for secondary containment in the event of carrier (interior) pipe failure. In practice, however, such designs have proven to be problematic and in some cases might even increase risks.

Replacement of existing pipe with new pipe can provide risk benefits when the pipe being replaced is of questionable integrity and/or if the replacement pipe provides more resistance to failure modes.

In either case, risk reduction might be achieved through reduced POF. In the case of double-walled pipe, an additional benefit of secondary containment is possible. In theory, this additional benefit could eliminate impacts to the surroundings. As long as additional failure modes are not introduced by the use of an unproven, double-walled pipe design, it could provide the higher amount of risk reduction since it influences both the probability and consequences of failure.

9.19 LESSONS LEARNED FROM PREVIOUS INCIDENTS

9.19.1 Comment

Commentors noted that fire from a 277,000-gallon spill from the Olympic Pipe Line Company gasoline pipeline in September 1999 in Bellingham, Washington resulted in three fatalities and extensive environmental and property damage. Several commentors have drawn comparisons between the Longhorn pipeline and the Olympic pipeline given that both are comprised of several hundred miles of older pipe and the routes of both pipelines pass through sensitive environments and populated areas. Some commentors want assurance that Longhorn will be required to implement the same corrective actions or mitigation measures as Olympic Pipe Line Company before it is allowed to begin pumping gasoline.

Response

As a condition for granting Olympic Pipe Line Company the right to resume operations through portions of city-owned land where Olympic no longer had a valid easement, a team of Olympic representatives and city officials developed a set of special safety-related provisions under which Olympic can resume operations. A detailed comparison between the Bellingham agreement provisions and the LMP mitigation measures has been made. While the two situations are different and therefore not directly comparable in all regards, the LMP seems to offer more risk reduction through its inclusion of more potential failure modes. The Olympic agreement focuses on pre-start up activities while the Longhorn plan goes further to include on-going O&M activities. See Appendix H of this RS for a complete discussion of the comparison of mitigation measures required for Olympic Pipe Line Company and the Longhorn LMP.

9.20 NEED TO VERIFY AND PERIODICALLY RE-VERIFY PIPE INTEGRITY

9.20.1 Comment

A commentor indicated that LMC 2 of the LMP would not reduce the number of pre-1970 ERW failures in the old parts of the pipeline.

Response

The proof test for Tier 1 areas, coupled with the reduced operating pressure pending successful ILI, and the monitoring of pressure cycles provides assurance that the older portions of the pipeline have no injurious defects that could threaten pipeline integrity in the short term. This includes issues related to the low frequency ERW pipe. The ILIs to be conducted after start-up include a special “crack tool” and would further verify current integrity and also increase the safety margin by detecting defects that might, under certain conditions, become problematic in the future.

9.20.2 Comment

A commentor concluded that a test pressure ratio of at least 1.7 can reduce the number of pre-1970 ERW failures by 55 percent and is recommended as the minimum test pressure ratio for pre-1970 ERW pipe.

Response

While a higher test pressure can afford a greater margin of safety, the commentor’s analyses are flawed. The commentor is drawing conclusions that are inconsistent with the conclusions of the reports he cites as well as with more-complete studies of ERW failures and hydrotesting effectiveness. The reports cited by the commentor conclude that increased vigilance is advisable but that no special standards, including changes to test protocols, were warranted. No recommendations for higher test pressures are noted.

Higher test pressures relative to operating pressures could improve safety, because in order to achieve the higher tests, the pipe must have been designed for the higher pressures. Pipe cannot be successfully tested to pressure levels beyond that for which it is designed. The rationale for the commentor's use of a test-pressure-to-failure-pressure ratio for previous leaks to make the assertions is not explained by the commentor and seems to be without merit. Knowledge of the possible failure mechanisms discounts such a simplistic view, since corrosion, stress, and pre-existing defects are factors that determine pipe failure potential. Test pressure is not a causative factor in pipeline failures.

The hydrostatic test pressure ratio of 1.25, as specified in the LMP and in use by the pipeline industry for many years, has proven to be an effective integrity verification.

9.20.3 Comment

A commentor noted that the draft EA had few references and little backup data and information given to support the numerous claims on predicting and monitoring fatigue and corrosion. The commentor presents numerous equations and descriptions of fatigue and crack growth issues. The commentor said that crack growth predictions are based on laboratory conditions rather than on corrosive environments.

Response

Three technical references specific to crack growth and fatigue analyses are provided in the ORA in the LMP. The ORA was developed by a recognized authority in the field of pipeline failure analysis, Dr. J. F. Kiefner. The LMP requires the details of the ORA to be periodically reviewed and enhanced by the best knowledge and practices, as determined by literature reviews and/or independent expert critiques.

The approach used in analyzing fatigue-crack growth in the Longhorn pipeline is explained in the LMP. This method was described in a recent article.[13] The approach is based on linear-elastic fracture mechanics. Crack-growth-rate estimates used in these analyses are considered to be conservative. The crack-growth-rate constants for the current application were developed on the basis of three actual pipeline failures and therefore represent real-world conditions. These rate constants would be provided as part of the Longhorn ORA.

When citing alternative approaches, the commentor appears to be confusing fatigue-crack initiation (DNV rules) with fatigue-crack propagation. The DNV rules are based on stress range versus number of cycles to failure to initiate a crack where none exists initially. There is no demonstrated precedent for considering fatigue-crack initiation in an on-shore buried pipeline as the result of pressure-cycle-induced fatigue. All known cases of failure have arisen from the growth of already-existing defects. If crack initiation were a concern, the prior history of the pipeline would have to be reviewed. This is not necessary, however. The "clock" on fatigue-

[13] Kiefner, J. F., Maxey, W. A., "Periodic Hydrostatic Testing or In-Line Inspection to Prevent Failures from Pressure-Cycle-Induced Fatigue", presented at API's 51st Annual Pipeline Conference & Cybernetics Symposium, New Orleans, LA (April 2000).

crack growth is reset based on the maximum crack size established by either a hydrostatic test or an ILI.

Another issue is the factor of safety. Here again, the commentor may be confusing crack initiation and crack propagation. Crack initiation does require a large factor of safety on time to failure (a factor of 10 or 20) because of the large amount of uncertainty (scatter) in fatigue tests for crack initiation. In the approach used in the LMP, a conservative crack-growth rate validated by pipeline operating experience is used. This is a conservative assumption that the maximum defect sizes actually exist, and there is a worst-case operating-pressure spectrum. In addition, a safety factor of 2 is imposed on time-to-failure.

9.20.4 Comment

A commentor stated that the ORA proposed for the Longhorn pipeline might look good on paper, but questioned whether there is a successful track record on its use. The commentor stated that the chances of the ORA working as described are very low because this is not a new pipeline.

Response

The concept of an operational reliability assessment ORA for a pipeline began in 1986 in response to a pipeline accident in Mounds View, Minnesota. Since that time, operational reliability assessments have been performed in several instances to restore confidence in the serviceability of a pipeline after an accident. The list includes but is not limited to:

- William's #2 8-inch pipeline, Mounds View, Minnesota, 1986;
- Colonial's Line 4, Locust Grove, Virginia, 1990;
- Colonial's Line 3, Reston, Virginia, 1993;
- Texas Eastern's Line 20, Edison, New Jersey, 1994;
- Lakehead's Line 3, Grand Rapids, Minnesota, 1992; and
- Platte Pipeline Company's, Platte Pipeline, 1997.

In each of these cases, the pipeline operator was required by the DOT to prove by either hydrostatic testing or ILI and by making appropriate pipe replacements or repairs that the pipeline was fit for service. In some of these cases, (notably, Mounds View, Reston, and Edison) state and local agencies participated in the creation of these mitigation plans. These ORAs have been successful in several ways. Systematic problems such as ERW-seam defects, rail shipment fatigue cracks, and prior excavation damage have been identified. Additional injurious defects in these categories have been located and removed, thus preventing possible future accidents. Permanent programs have been established to review and reassess the serviceability of these pipelines on a periodic basis. To date, there have been no recurrences of incidents in these areas.

In the case of the Longhorn pipeline, the commitment to assess the pipeline reliability on a periodic basis is stated in the LMP. The Longhorn ORA would be carried out within the integrity management plan. The type and timing of the periodic reassessments would have to be established after more is known about the actual operational parameters.

9.20.5 Comment

A commentor stated that the fatigue-monitoring program is based on numerous unsubstantiated assumptions on crack detection by new ILI tools or pressure testing. The commentor stated that metal loss from non-corrosion mechanisms was not considered and that the remedial actions for fatigue monitoring are not explicitly stated in the draft EA.

Response

The ORA portion of the LMP includes consideration of ILI inaccuracies and previously detected anomalies in determining probability of remaining defects. This includes metal loss from non-corrosion mechanisms, such as mechanical damage. Such metal loss could be more dangerous than corrosion indications and is an important consideration in the ORA. These factors are used to determine re-inspection frequency.

Remedial actions are stated in the LMP. Where crack growth is calculated to be possible, integrity verification is to be re-done. Follow-up to such verification includes further inspection and repair if necessary, is also detailed in the LMP.

9.20.6 Comment

A commentor expressed concern about accelerated crack growth resulting from cathodic protection CP potentials more negative than 1.1 volts.

Response

Whether this phenomenon would or would not influence fatigue-crack growth in a given buried pipeline has not been proved. If fatigue-crack growth takes place under sound coating or in an area with low CP potentials, these CP potentials would not promote cracking. If fatigue-crack growth occurs at an area of disbonded or missing coating and if the CP potential is sufficiently negative, hydrogen evolution might be an issue in crack growth. The LMP requires situations to be investigated when CP potentials are found to exceed -1.2 volts relative to a copper-copper sulfate reference electrode.

As an additional assurance, the crack growth model used by Kiefner & Associates, Inc. in the LMP has a proven track record of success on real pipelines in typical buried-pipeline environments. Under such circumstances, it is reasonable to believe that the effects of hydrogen evolution, if any, are rolled into the overall driving factors for which the model has proven satisfactory.

9.20.7 Comment

A commentor stated that the corrosion anomaly analysis in the draft EA does not include the significant uncertainties in the ASME B31G and RSTRENG methods to predict the strength of corroded pipe.

Response

As detailed in LMP SIP, detected corrosion would be assessed and corrected in accordance with published standards and industry practices, including ASME B31G, RSTRENG, RSTRENG 0.85 Area Method, and LAPA. The LMP says that while one or more of industry accepted "remaining strength" calculation procedures may be used, ASME B31G would be used as a minimum to determine remaining strength. The commentor concurs that this is the more conservative of the possible approaches. Uncertainties exist in any methodology, and appropriate safety factors are used to account for these.

9.20.8 Comment

A commentor said that the draft EA states that defect detectability is 25 percent of wall, but Muhlbauer (EA reference page 6-57) states "...95 percent detection of all defects…is a reasonable expectation." The commentor asked that this discrepancy be explained (p. 5-43 of the draft EA and Muhlbauer, p. 107).

Response

The draft EA statement refers to an accuracy specification, and the Muhlbauer statement refers to reliability. There is no contradiction in the two statements.

The accuracy of an ILI tool is often expressed in terms of resolution—the smallest anomaly depth—stated as a percentage of wall thickness—that can be reliably detected. Accuracy has many other components including the ability to accurately characterize a wide variety of anomaly configurations—width, length, depth, and orientation. The reliability statement was presented in the context of an expectation that could govern the awarding of points in a relative risk model. The reference actually states, “When the evaluator is assured that the technique used provided meaningful results (95 percent detection of all defects that could have a short-term impact on line integrity, would be a reasonable expectation), points can be awarded based upon the timing of the pig run...” This refers to the ability of an ILI to locate, with a 95 percent confidence level, all defects of a configuration that might present a threat to short-term integrity. This was offered as an example expectation based on 1995 technical capabilities. Advances in ILI capabilities have occurred since then, so the expectation could realistically be moved upward, depending on the type of ILI tool and the characteristics of the run.

9.20.9 Comment

A commentor noted that there were erroneous statements made in the draft EA concerning the capability of ILI tools to measure corrosion rates in the Longhorn pipeline.

Response

ILI accuracies are normally provided by the supplier of the inspection services. Accuracies are based on calibrations and testing, sometimes performed by independent testers and sometimes by calibrating against intentional anomalies introduced at the beginning of an ILI run. ILI accuracy limitations increase uncertainty in estimating flaw growth and are considered in the ORA calculations.

9.20.10 Comment

A commentor asked why the probability of exceedance (POE) analysis includes only 393 of the 4,339 pipe joints between Kemper and Satsuma stations that contain at least one metal loss indication by Vetco.

Response

The 1995 inspection by Vetco reported the worst anomaly for each pipe joint. In the POE analysis, a POE was calculated for each pipe joint, not just for the 393 severe and moderate anomalies. The POE calculation is described in the ORA section of the LMP.

9.20.11 Comment

One commentor requested more details describing Longhorn's fatigue monitoring program.

Response

Details of this program were presented in Sections 3 and 4 of the draft EA LMP. It is also referred to as the ORA. The ORA describes calculations that would trigger either hydrostatic re-testing or ILI of the pipeline. These "integrity re-verifications" are to be done at intervals that would detect defects and flaws well before such flaws can grow to a size that threaten pipeline integrity. The technical considerations underlying such interval-calculations are sometimes complex, but the trigger points are generally to be based on:

- Estimates of possible defects which might be present, based on most recent test;
- Crack growth theory;
- Fatigue cycle measurements at pump stations (measuring pressure cycles);
- Corrosion growth rates based on internal inspections;
- Estimates of third-party damage potential;
- Safety margins; and
- Special circumstances (incidents, new technologies, industry advisories, etc.).

Pressure cycles are an important aspect of the fatigue-monitoring program. More frequent and higher magnitude cycles can lead to more crack growth. Therefore, a more frequent integrity-verification would be warranted when pressure cycles are significant. In the period since the most recent integrity verifications (hydrostatic testing and ILIs), few if any sources of fatigue were present. Since the pipeline was not in operation, pressure cycles did not occur; traffic loadings are thought to be adequately addressed by casing pipe and/or the pipe strength itself; and preliminary evidence shows no signs of fatigue-inducing ground movement. This is verified by LMC 19 that requires additional seismic studies.

A safety factor of 0.45 in the ORA is specified for crack-like defect. This means that re-inspection or testing is to occur at one-half of the calculated minimum time to failure for fatigue issues. For corrosion-type anomalies, a safety margin is to be determined based on internal inspection results, including verification excavations. Consideration of possible defects introduced by third-party activities would also be taken into account. Results from new integrity verifications would enter into calculations for subsequent verifications.

All assumptions, safety margins, and calculations are subject to on-going review and approval by DOT, the LMP auditing agency.

9.20.12Comment

A commentor requested information regarding the hydrostatic testing that has been performed on the Longhorn pipeline as well as information about additional hydrostatic testing to be done prior to and after operation commences.

Response

The new and refurbished 20-inch diameter pipeline from the Galena Park Station to the Satsuma Station (distance of 34.1 miles) and the refurbished 18-inch diameter pipeline from the Satsuma Station to the Crane Station (distance of approximately 420 miles) were hydrostatically tested in 1995. The refurbished segment of the 20-inch pipeline from Valve J1 to the Satsuma Station was tested at pressures of 822 psi or more. The line from the Satsuma Station to Crane Station was divided into 17 sections for the hydrostatic testing. Test pressures ranged from 1,197 psi to 1,450 psi, depending on the elevation and pipe wall thickness.

As stated in 49 CFR §195.304, an initial hydrostatic test pressure must be equal to 125 percent of the MAOP. The 20-inch line from Galena Park Station to the Satsuma Station was qualified to operate at a MAOP of 650 psig. The refurbished 18-inch diameter pipeline from Satsuma Station to Crane Station was qualified to operate at an MAOP of 950 psig.

As stated in LMC 1, Longhorn would hydrostatically re-test the pipeline in the Tier 2 and Tier 3 segments as well as in the parts of the Tier 1 segments where surge pressures might exceed the MASP. All older portions of the line would be at least ‘proof tested’ (to a level of 110 percent MAOP). This testing would be done before startup of the pipeline. If any segments of the pipeline fail during the tests, the failed segments would be replaced with new pipe of equal or greater design. The segments containing replacement sections would be hydrostatically tested again until a successful test is achieved.

There is no fixed schedule for conducting additional hydrostatic tests after operation commences. Longhorn would periodically conduct an ORA. Based on the analysis of operational and testing results, the ORA would provide guidance on the need for additional testing and analyses. ILIs and/or hydrostatic re-testing would be scheduled to evaluate the possible effects of fatigue from operational pressure cycles, corrosion, and other threats to pipe integrity.

9.20.13 Comment

Commentors question the possibility of failures at pressures lower than the hydrostatic test pressure and the validity of the pressure test in general.

Response

Hydrostatic testing is a proven effective method of verifying pipe structural integrity. Benefits and drawbacks are discussed in the draft EA Section 5.3.3. The use of hydrostatic tests is assessed in the relative risk model as described in the draft EA Chapter 6.

The phenomenon described by the commentor is known as a "pressure reversal" and is a rare occurrence. While not completely understood, current thinking is that flaws are growing during the test, but do not reach a critical size that would propagate immediate failure. Post-test mechanisms which cause flaw growth (such as fatigue cycling) may bring the enlarged flaw to a size that can fail at a pressure lower than the test pressure. Hydrostatic tests are designed to minimize this potential by testing to relatively high stress levels, which makes the probability for a pressure reversal even smaller.

These issues are commonly recognized in industry. The LMP calls for an ORA that verifies and re-verifies pipe integrity, in light of crack growth theory and pressure reversal potential.

9.20.14 Comment

A commentor expressed concern about the final pipeline system configuration and its potential impacts. The commentor also wanted to know whether a surge analysis at the proposed maximum design rate had been performed, and if not, whether such an analysis would be done before capacity increases are approved. The commentor also requested that the results of hydrostatic tests at higher pressures, as noted on page 5-28 of the EA, should be further discussed.

Response

Surge analyses would be performed for each unique pipeline configuration to ensure accurate results. In LMC 31, Longhorn would perform a surge pressure analysis before capacity changes are made and/or before any other changes are made that could effect the surge pressure profile in the pipeline. The surge pressure analysis is to confirm that (1) the MOP would not be exceeded in the Tier 2 and Tier 3 segments, as stated in LMC 34, and (2) the MASP would not be exceeded in Tier 1 areas.

The pipeline configuration for the maximum flow rate would include nine pump stations in addition to those required for the 125,000-bpd case. Since the pipeline is not expected to operate at the maximum rate for several years, the exact location and configuration of these pump stations has not yet been defined. Until these positions and configurations are fixed, an accurate surge analysis at the maximum rate cannot be conducted.

A surge analysis was performed at flow rates of 3,000 to 5,000 barrels per hour. Using worst case flow assumptions, calculated surge pressures resulting from valve closures and pump shutdowns exceeded the MOP or MASP in several locations in the unmitigated cases (draft EA, page 5-28). All of the high surge pressures were due to modeled positive pressure waves propagating upstream of the point where flow was interrupted. None of the higher surge pressures resulted from negative pressure waves traveling downstream. Mitigation measures reduced the maximum surge pressure to levels below the MASP. However, Longhorn has committed to hydrostatic testing of approximately 85 miles of pipeline to higher pressures, thereby raising the MOP and MASP above the calculated surge pressures. This avoids having to apply potentially problematic methods to reduce the maximum surge pressures. Two sections of the pipeline would also be replaced with thicker-walled pipe to allow them to be qualified at higher MOP levels (LMC 34).

Longhorn’s valve study determined that additional mainline block valve offered no increased effectiveness in reducing the volume of potential releases at selected stream crossings and other locations. However, the valve study suggested that seven additional check valves, located at strategic points, might reduce the drainage in the event of leaks near these points. A surge analysis was performed with the seven check valves assumed to be in the proposed positions. The analysis indicated that the check valves reduced the surge pressures slightly. However, the surge pressures exceeded the new MOP levels at the river crossings. The new, higher MOPs are being verified by qualifying the pipeline, through hydrostatic testing, to operate at higher pressures.

The surge pressures at the river crossings were reduced to levels that are below the projected MOPs by installing bypass valves around the motor-operated mainline gate valves on the upstream side of four river crossings. These bypass valves are to be installed at the Brazos, Colorado, Pedernales, and Llano river crossings.

9.20.15 Comment

A commentor asked why the LMP only covers excavating and inspection of five "diameter reductions," when TDW and Enduro inline geometry inspection tools have identified about 600 areas of apparent diameter reductions that may be mechanical damage.

Response

"Diameter reductions" are typically caused by dents or pipe bending. Not all such anomalies are a threat to pipeline integrity (see discussion of dents in Chapter 5 of this RS). Many initial anomaly indications are eliminated from further investigation when subsequent data analyses characterize such indications as insignificant. The commentor might be referring to preliminary, unscreened indications.

In January 1995, Enduro Pipeline Services, Inc. conducted an ILI of the Kemper-to-Satsuma section of the pipeline. Two Enduro bend/geometry tools were used in the inspection. The primary purpose of this inspection was to identify any bends or bore restrictions that could cause problems for the Vetco corrosion tool. The Enduro inspection identified 20 anomalies, four of which measured greater than one inch total bore reduction. The Vetco ILI identified possible dents, of which five were selected for excavation because they appeared to be the most likely to contain corrosion or otherwise be of concern. Eighteen other dents would be excavated if any of the five dents initially selected are more serious than initially judged. Previous inspections are not being relied upon to demonstrate the current pipeline integrity. Current and future integrity verifications would be done as detailed in the LMP.

9.20.16 Comment

Commentors asked for explanations regarding pipe dents detected in earlier inspections, the repair protocol for these, and ramifications of dents not repaired.

Response

Dents characterized as "mild, smooth" do not necessarily reduce pipe integrity. They are a concern because they may indicate the possibility of other related defects such as coating damages, gouges, or scratches. These types of defects are of more concern than a "mild, smooth" dent. Severe dents or dents that weaken a longitudinal weld seam could, at some point, compromise the structural integrity and are a concern.

Without excavating the pipe, dents can be characterized by varying degrees, depending on the type of internal inspection device used. The most recent ILI was conducted in 1995. Vetco Pipeline Services was the tool vendor used for the inspection. The data resulting from the test were analyzed by Vetco and Corrpro Companies, Inc. Some dent indications were not excavated, presumably because they were not characterized as being severe enough, or containing any related damages that would warrant a repair. The Vetco report and data were analyzed in 1998 by Kiefner & Associates, Inc. (Kiefner). Kiefner, widely known for its expertise in pipeline metallurgy, examined the data for all dent areas to define their location on the pipe, to identify any additional information that could be obtained from the data, and to determine if any of the dent areas needed to be examined. Based on this review, 18 indications were identified as mild dents. Five dents were recommended for excavation and examination. These dents were selected for direct examination because they were either on the top of the pipe, on the side of the pipe, on the bottom with multifaceting, or on the bottom of the pipe and containing areas of possible corrosion. As such, these might not be mild, smooth dents but may rather be more problematic.

The LMC 8 would require Longhorn to inspect these five dents and to verify that they are minor and pose no threat to the pipe. If <u>any</u> of the inspected dents are indeed severe enough to warrant repair, then the previous characterizations of defects become more questionable and all 18 indications, no matter how mild, are to be excavated and investigated.

Current industry guidelines (ANSI/ASME) dictate conservative repair criteria as well as thresholds whereby repairs are warranted. These are based on pipe integrity research and years of actual application. According to the LMP, Longhorn would adhere to these guidelines.

9.21 NEED TO ADDRESS THE POTENTIAL BENEFITS OF ADDITIONAL VALVES

9.21.1 Comment

Commentors requested comparisons in potential impacts of spill control options such as additional valves, closer valve spacing, and the use of remote or automatic valve closure devices.

Response

The theoretical benefit of more valves and/or the means to operate them more rapidly, is the more effective and more rapid isolation of a leaking pipe segment. In practice, however, relatively few leak scenarios would have their spill volumes appreciably minimized by such additions.[14] The volume of product spilled is dependent upon the leak size, the time to stop pumps including leak detection time, and the drain volume which is topography dependent. Drain volume is the only component that is reasonably reduced by valve influences and then only if valve closure can happen rapidly.

Automated and remotely-operated valves are more prone to mis-operation than manual valves and may cause operational problems, which in turn might increase risk. These problems can be largely overcome through proper design and maintenance, but are nonetheless a consideration.

In aggregate, the possible risk-reductions of additional valves and valve-closure capabilities are recognized. Especially where low-lying, sensitive areas have potentially long drain volumes, additional line isolation capabilities might be warranted. However, benefits are not clear and an overall requirement for system modifications would be premature.

The Longhorn Valve Study, summarized in Appendix 9E of the final EA recommends that additional check valves be added to the pipeline. No changes were made prior to this study because indications are that, pending this more definitive analysis, resources can be more effectively applied in addressing other aspects of risk.

9.21.2 Comment

A commentor questioned the ability of the mainline valves to limit spill volumes. The commentor also wanted consideration of the need for additional valves in critical areas and whether these additional valves should be remotely operated.

Response

The locations for most of the existing mainline valves along the Longhorn pipeline were selected with the objective of either protecting specific environmental areas (major streams, Edwards Aquifer) or isolating pump stations. Depending on the location along the pipeline, they can also provide some reduction in the maximum volume of product that can drain and be released from potential leak sites along the pipeline. The maximum drainage volume released at any location between two mainline valves on the pipeline was estimated using an algorithm described in Appendix 5F of the draft EA. In this algorithm, it is assumed that both of the two valves at either end of the pipeline segment under consideration are closed. With both valves closed, additional drainage from further upstream or downstream of the segment is prevented.

[14] CA State Fire Marshall Report on Hazardous Liquid Pipeline Risk Assessment, 1993.

The above assumption is valid when the block valves are remotely operated and can be closed within 1- 3 minutes (Appendix 5D of the draft EA). If one or both valves are manually operated, it would take some time for a technician to reach the valve and close it. In estimating the release volumes at the specific locations listed in Table 6-16 of the draft EA, it was assumed that it takes two hours from the time the leak starts to the time that a manual valve is closed. Drainage from the pipeline upstream or downstream of any manual valve would continue during this two-hour period. The velocity of the product draining was calculated using common fluid flow equations. The maximum volume drained was calculated from the estimated velocity.

The primary types of block valves in service on the Longhorn pipeline are swing-type check valves, remote-controlled gate valves, and manually operated gate valves. The reliability of check valves and motor-operated gate valves is good. The Longhorn Valve Study is summarized in Appendix 9E of the final EA.

9.21.3 Comment

A commentor questioned the estimates of spill volumes because the draft EA assumed that check valves would work when needed.

Response

Data is limited, but suggest that check valves are highly reliable, especially against a failure mode that would prevent closure in an emergency. There are no known check valve failures in similar service. Available data are presented in Appendix F of this RS. In response to a request by the Lower Colorado River Authority regarding modeling of worst case spills to Lake Travis, a model run was made assuming that check valves did not work. See Appendix 7G of the final EA.

9.22 NEED TO ADDRESS LEAK DETECTION CAPABILITIES

9.22.1 Comment

Commentors raise several issues related to leak detection in general.

Response

Leak detection can reduce risk by allowing a more rapid response to a pipeline failure, thus reducing the impacts of the failure. The ability to detect a pipeline leak is primarily a function of the leak rate and the detection methodologies. Large instantaneous leaks are readily detected in a variety of ways. Very small leaks are only detectable with specialized equipment or after sufficient volumes have been released.

9.22.2 Comment

Commentors questioned the role of the SCADA system and raised issues regarding handling of alarms by control room personnel, and failure of primary systems during emergency.

Response

As more fully described in Appendix I of this RS, the remote monitoring and control made possible by the SCADA system and the control center normally provides a back up to on-site (located on the pipeline itself) protection systems. It can also play a primary role in leak detection. Longhorn relies on this system to alert control room personnel immediately to a wide variety of potentially threatening pipeline scenarios.

The SCADA system is considered to be a secondary system for purposes of pipeline integrity protection. The primary system is composed of on-site sensors and computers designed to prevent threats to pipeline integrity and also to halt flows (stop pumps and close valves) when abnormal conditions are detected. However, scenarios are possible where indications of abnormal conditions can be detected in the control center before on-site instruments can react. Human error in the control center in such scenarios may reduce response times to abnormal conditions, but primary systems (on-site) should also react.

A well-documented challenge in any remote monitoring situation is the trade-off between sensitivity and false alarms. In general, greater sensitivity causes a higher frequency of false alarms. Where too many false alarms occur, the human operator becomes insensitive to them as he tries to separate “signals” from “noise.” The ability to set temporary alarm bands around incoming data helps with this. However, improper interpretation of system conditions causes human error in assessing and reacting to an event. System design, human-machine interface features, operator training, and control center procedures should recognize and minimize this.

Leak detection capabilities are specified in the LMP. These capabilities are required under all flow conditions. As part of the final review and approval of the systems to be used, component failure rates, redundancies, and overall system “up time” must be considered in order to achieve the required capabilities. This necessitates a high degree of SCADA system availability when leak detection is dependent upon the SCADA data.

9.22.3 Comment

A commentor stated that enhanced leak detection was not explicitly detailed and was not fully evaluated. The commentor contends that described enhancements do not provide a method of accurately locating a spill along the pipeline.

Response

Issues related to the SCADA-based leak detection capabilities are found expanded in Appendices I of this RS. The LMP and this RS have been updated to show the enhanced leak detection system to be installed over the Edwards Aquifer Recharge Zone. Additional information regarding these systems, including certain vendor specifications and independent testing results, can be obtained from the Longhorn reading room.

9.22.4 Comment

Referring to LMC 13, a the commentor stated that the leak detection software "is touted for its ability to find small leaks and protect human health and the environment." The commentor requested that the name of the program, the version, and the vendor be provided so that it can be evaluated in the final EA.

Response

Longhorn was still evaluating potential leak detection software at the time the draft EA was being prepared. Longhorn selected a software package developed by LIC Energy, Inc. The name of the software package is PLDS and the version number is 2.8-02. This computational leak detection system is basically an enhanced volume balance model that is fully transient. This model monitors changes in the flow rate and compares measured flows with calculated rates. The model is quite sensitive, and can detect leak rates as low as 0.3-0.4 percent of flow within 90 minutes or less. The pipeline can be shut down within 5 minutes of a leak determination.

The SCADA system operated by Longhorn uses the OASyS (Open Architecture System) software, Version 5.2. The OASyS software is a product of Neles Automation. This software was commercialized in 1990, and has been installed at more than 500 systems. The software accommodates customer protocols for remote communication with Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs) of the types used by Longhorn.

The system has proven to be very reliable. In 1999, for example, the SCADA system had a reliability of 99.954 percent. The single downtime period was a 4-hour service outage.

Both the SCADA system and the computational leak detection model are described in this document and in the EA.

9.22.5 Comment

Commentors question aspects of proposed leak detection capabilities and refer to "fine tuning," leak detection done on the Yellowstone pipeline system and the use of technologies such as infrared.

Response

Since the LMP specifies leak detection capabilities, but not the specific techniques to achieve those capabilities, the selection of leak detection systems is done by the operator. This is a preferred method (and consistent with many regulatory approaches) since the operator is in the best position to retrofit its particular pipeline with the most effective leak detection system(s). As an outside review and approval of this selection, the operator must demonstrate, to the satisfaction of DOT, the auditing agency, that its installed system can meet the detection capabilities specified.

Issues regarding "fine tuning" of transient models and alternative leak detection approaches such as that used for the Yellowstone system or emerging technologies such as the use of infrared light, are aspects of the selection, design, and installation of the leak detection system. The details of these aspects are secondary to the achievement of specified leak detection capabilities. The ultimate system performance would have to be demonstrated, regardless of the techniques employed, and would be monitored by the auditing agency, DOT.

9.22.6 Comment

Commentors questioned how operators will address issues surrounding "slack line" conditions and non-steady state conditions.

Response

"Slack line" normally refers to a condition where a pipeline's internal pressure is lower than the product's vapor pressure. This condition does not present a threat to pipeline integrity, but does impact operational and monitoring capabilities. Leak detection systems dependent upon pressure readings could be compromised during slack line conditions. Longhorn's operations manual highlights the presence of back pressure control valves and control room procedures designed to prevent slack line conditions.

SCADA-based leak detection methods are most accurate under so-called "steady state" conditions. While normally not threatening pipeline integrity, non-steady state involves changing pressures, volumes, temperatures, product density, and temporary imbalances in mass entering and exiting the pipeline. These phenomena make leak detection more difficult, and hence, less accurate.

The LMP specifies very clearly the required leak detection capabilities. Considerations of temporary difficulties in meeting the requirements (including non-steady states, slack line, and system outages) must be factored in to the achievement of this mitigation. The review and approval of Longhorn's leak detection capabilities (an on-going audit procedure) should address this issue to ensure that slack line conditions are avoided and that full leak detection capabilities are always available.

9.22.7 Comment

Some commentors were concerned that reliance on dead vegetation for leak detection by aerial patrol was inadequate and question the timeliness of leak detection by aerial patrol. The comment was made that during the winter, patrol is ineffective, and that if the vegetation has already been killed it is too late to protect other resources.

Response

Pipeline patrols and the associated observations of unusual conditions are only one of many techniques used to monitor the pipeline. This is a proven method to detect nearby third-party activity (both in-progress and recently completed), certain earth movements, and small leaks that are not detected by other leak detection methods. In many cases, a minor spill of a lighter-than-water hydrocarbon such as gasoline would migrate to the surface and be detected as a sheen or, secondarily, through unusual dead vegetation. Industry experience has shown that effects on vegetation often occur with small leaks well before any substantial damage has occurred. Therefore, discovering such effects is, in fact, a valuable tool in preventing serious damage from a leak.

More frequent patrols would logically be expected to increase the effectiveness. The decision about frequency is based on regulatory requirements first and then professional judgement as to what extent the minimum requirements in the regulations might be profitably exceeded. Surveillance intervals are specified in the LMP as follows:

- Tier 2 and 3 areas: Every 2.5 days, not to exceed 72 hours;

- Tier 1 areas: Once a week, not to exceed 12 days; and
- Edwards Aquifer Recharge Zone: Daily.

These frequencies all exceed the 26 patrols per year required in current regulations and range from 365 patrols per year in the Edwards Aquifer Recharge Zone to over 140 patrols per year in Tiers 2 and 3 areas to 52 patrols per year in Tier 1 areas.

Although an important part of pipeline protection, it is important to note that patrols are not the primary means of leak detection.

9.22.8 Comment

A commentor expressed concern that a leak of less than 28,350 gallons per day, at the planned flow rate, will not be detected.

Response

Longhorn has committed to installing two leak detection systems along the pipeline. The most sensitive system consists of a hydrocarbon detection cable that would be placed beneath the 3-mile segment of new pipe to be installed over the Edwards Aquifer recharge zone. This system is capable of detecting leak rates as low as 1 gal/hr of gasoline within 15 minutes, or of No. 2 diesel within 2 hours.

A fluid transient simulation leak detection system would be installed to monitor the entire pipeline. With the proposed instrumentation installed and at a gasoline product rate of 72,000 bpd, this system is capable of detecting leak rates equivalent to 0.3-0.4 percent of flow within 90 minutes. Assuming that this rate is the lowest that can be detected, leak rates below approximately 9,000 – 12,000 gal/day would not be detected with this system.

The detection limits of this system depends on the characteristics of the product being transported and the flow rate through the pipeline. For example, at the proposed maximum flow rate of 225,000 bpd, the estimated leak detection level for gasoline (at 80°F) over the Cedar Valley – Crane pipeline segment is approximately 26.6 bph or 26,800 gal/day. The leak detection levels for other products and pipeline segments would vary slightly.

9.23 CAPTIVE BREEDING FOR BARTON SPRINGS SALAMANDER

9.23.1 Comment

A commentor stated that a release of product to Barton Springs could eliminate the Barton Springs Salamander population and, therefore, eliminate the possibility of establishing a captive breeding program. The same commentor also stated that the draft EA failed to determine whether a release to Barton Springs is likely or unlikely, but goes on to say that given a 99.84 percent probability of a spill larger than 1,000 barrels, such an event is "highly likely."

Response

The objectives of captive breeding programs are to provide an off-site viable population that would not be affected by a release of product. To be effective, the off-site population would be established prior to a release of toxic materials to the "wild" population(s). The commentor also mistakenly asserts that a 99.84 percent probability of a large spill over the life of the project would occur within the Barton Springs recharge zone. It should be noted that this was a pre-mitigation probability figure and did not represent the probability of a spill under the LMP. Although a spill is likely to occur at some point on the 723-mile system over a 50-year period, it is extremely unlikely to occur within the 7.4-mile segment that would affect Barton Springs.

9.24 PECOS RIVER ALARM SYSTEM

9.24.1 Comment

A commentor recommended the "installation of an additional monitoring alarm downstream of the Pecos River crossing."

Response

While it is unlikely that a release into the Pecos River would have any impacts on drinking water or irrigation uses of Rio Grande waters, any product release into the Pecos River of volume sufficient to cause impacts to Rio Grande water quality would be alarmed immediately through the existing leak detection system.

9.25 NEED FOR LEAD AGENCIES TO DESCRIBE HOW THEY DETERMINED "INSIGNIFICANCE" WITH RESPECT TO THE TENTATIVE FNSI FINDING IN THE EA AND THE NEED TO LINK RISK ASSESSMENT RESULTS TO THIS DECISION PROCESS

9.25.1 Comment

Commentors stated that the risk assessment results should be used to determine the significance of impacts. Specifically, one commentor asked the Lead Agencies to describe the process used to interpret the risk assessment results in the light of the tentative finding of no significant impacts (FNSI).

Response

For both the tentative and final FNSI determinations, the EA risk model was used as a tool to measure relative risk. In the final EA, absolute risk estimates were developed to supplement Lead Agency expert judgements that the proposed mitigation measures were adequate to assure safety and to avoid significant impacts.

10.0 MISCELLANEOUS

10.1 CONCERNS REGARDING HOW WELL THE EA CONFORMS TO THE SETTLEMENT AGREEMENT

10.1.1 Comment

Several commentors stated that the EA did not address all of the items required to be addressed in the Settlement Agreement.

Response

The March 1, 1999 Settlement Agreement is in Appendix 1A in the final EA. Attachment B (Sections II and III) to the Settlement Agreement provides the scope of work for the EA. The table below lists each portion of the scope of work in the Settlement Agreement, the requirements for the scope, and the portion of the draft EA where the topic is actually addressed. Note that the two last two columns do not contain every location where the topic is addressed.

Settlement Section	Requirement	Draft EA Section	Final EA Section
Section II - Affected Environment			
Section II A	Identify water resources and uses.		
II A(1)	Identify surface water resources and uses downstream of the pipeline.	4.2.2	4.2.2
II A(2)	Identify ground water resources and uses in proximity to the pipeline or otherwise hydrologically connected to water resources in proximity to pipeline.	4.2.1, App. 4D	4.2.1, App. 4D
II A(2) (a)	Identify significant aquifers in Barton Springs segment and any other affected segments of the Edwards Aquifer, Edwards-Trinity Plateau Aquifer, Colorado River Alluvium, Carrizo-Wilcox Aquifer, and Gulf Coast Aquifer.	4.2.1, App. 4D	4.2.1, App. 4D
II A(2)(b)	Identify depth to the aquifer from the surface, and porosity of aquifers.	4.2.1, App. 4D	4.2.1, App. 4D
II A(2)(c)	Identify karst features.	4.2.1, App. 4D	4.2.1, App. 4D
II A(2)(d)	Identify the permeability and other characteristics of soil types affecting transmission to ground water.	4.2.1, App. 4D	4.2.1, App. 4D
Section II B	Identify land resources and uses.	4.1.1.2	4.1.1.2

Settlement Section	Requirement	Draft EA Section	Final EA Section
II B(1)	Identify flood prone areas in proximity to pipeline.	4.2.2	4.2.2, App. 4G
II B(2)	Identify densely populated areas in proximity to pipeline and populated areas in City of Austin's jurisdiction, including neighborhood areas and schools in paragraph 4(c) of Settlement Stipulation.	4.1.1.3, App. 4A, 4C	4.1.1.3, App. 4A, 4C
II B(3)	Identify sensitive land uses (e.g., schools, hospitals, preserves) in proximity to pipeline, including proposed uses under permit, municipal authorization or approved bond on the date this stipulation is approved by court (3/1/99).	4.1.1 4.1.2	4.1.1, 4.1.2
II B(4)	Identify highly sensitive industrial facilities in proximity to pipeline (e.g., semiconductor industry).	4.1.2	4.1.2
II B(5)	Identify other significant land uses in proximity to pipeline (e.g., transportation or energy facilities) that could be affected by pipeline.	4.1.1, 4.1.2	4.1.1, 4.1.2
Section II C	Identify affected flora and fauna.	4.3	4.3
II C(1)	Identify threatened and endangered species that may be affected by pipeline operation.	4.3.3, App. 4E, 7B	4.3.3, App. 4E
II C(2)	Identify other species of concern in vicinity of pipeline that may reasonably be expected to be affected by pipeline operation.	4.3.1, 4.3.2, App. 4E, 7B	4.3.1, 4.3.2
Section II D	Identify recreational resources (including public parks, preserves, and natural resource laboratories) which may reasonably be expected to be affected by pipeline operation.	4.1.1.5	4.1.1.5, 4.1.2
Section II E	Identify cultural resources that may reasonably be expected to be affected by pipeline operation.	4.4	4.4
Section III - Environmental Consequences			
Section III A	Pipeline Integrity Analysis	Chapter 5	
III A(1)	Evaluate whether existing Longhorn pipeline, new facilities and testing of the pipeline have complied with government safety standards for operation of oil pipeline and are consistent with industry standards and sound engineering practice.	5.2.2, 5.2.3, 5.2.4, 5.5, 5.8.2, App. 5A, 5E	5.3.2, 5.3.3, 5.3.4, 5.5.1, 5.8.2, App. 5A, 5B, 5C
III A (1)(a)	Include consideration of inspection, test records, and test methods.	5.3.3, 5.8.3, App.5B, 5C 6.4.2 App 6C	5.2.3, 5.3.15, 5.8.3, App. 5B, 5C
III A (1)(b)	Include consideration of maintenance records.	5.3.6, 5.8.5, App. 6C	5.2.6

Settlement Section	Requirement	Draft EA Section	Final EA Section
III A (1)(c)	Include consideration of leak history including pin-hole leaks, line ruptures, and third-party accidents.	5.2.7, 5.7, 5.8.9, 6.4.3, App. 6C	5.3.7, 5.7, 5.8.7, 6.4.2
III A (1)(d)	Include consideration of aging effects on pipeline.	5.3.2, 5.8.7	5.2.2, 5.8.5
III A (1)(e)	Include consideration of pipeline repairs (e.g., clamps, replaced sections).	5.8.5, 6.4.3, App. 6C	5.2.6, 6.4.2
III A (1)(f)	Include consideration of section manufactured using low frequency electric resistance weld (ERW) process.	5.3.2, 5.3.3	5.2.2, 5.2.3
III A (1)(g)	Include consideration of block and check valve placement and spacing.	5.4.2	5.4.2
III A (1)(h)	Include consideration of stability of river and creek crossings, including weld integrity, pipeline strength, depth of cover, characteristics of cover material, potential for washout, erosion threats to aerial supports.	5.2.11, 5.3.5, 5.8.4, 5.8.6, 6.4.6	5.2.5, 5.3.12, 5.8.4, 5.2.9, 6.4.5
III A (1)(i)	Include consideration of the products to be carried	6.2	6.2
III A(2)	Evaluate whether Longhorn's proposed operational standards and procedures comply with government safety standards and are consistent with industry standards and sound engineering practice.	5.2, App. 5A, 5B, 5C	5.3, App. 5A, 5B, 5C
III A(3)	Evaluate Longhorn's spill/leak response plans and measures and determine whether such plans and measures comply with government safety standards and are consistent with industry standards and sound engineering practice.	5.4, 5.5, App. 5E, 5G	5.5, 5.4, App. 5D, 5E, 5F
III A(3)(a)	Include evaluation of proposed leak detection system and procedures for shutdown of pipeline sections considering resources at risk and reasonably available and proven technologies.	5.2.7, 6.5.5	5.2.7, 5.3.7, 6.5.4
III A(3)(b)	Include evaluation of shutdown decision process and timing.	5.4, 6.5.5	5.3.7, 6.2.2
III A(3)(c)	Include evaluation of level and type of pipeline surveillance for pipeline sections considering resources at risk.	6.4.4, 5.8.2,	5.2.3, 5.8.2, 6.4.3

Settlement Section	Requirement	Draft EA Section	Final EA Section
III A(3)(d)	Include evaluation of staffing and equipment for spill response plans considering resources at risk.	5.5 Chapter 5 Appendices	5.5, App. 5D, 5E
III A(3)(e)	Include evaluation of prevention and clean up standards and recovery plans considering resources at risk, including soil, surface water, ground water, known karst aquifers, threatened and endangered species.	5.5 Chapter 5 Appendices, Chapter 7, LMCs 28, 30, 33	5.5 Chapter 5 Appendices, Chapter 7
III A(3)(f)	Include evaluation of other components of OPA '90 Plan.	5.5 Chapter 5 Appendices	5.5 Chapter 5 Appendices
III A(3)(g)	Include evaluation of adequacy of plans to prevent and contain damage from fires and explosions in populated areas and local government input in such plans.	5.5, Chapter 5 Appendices	5.5 Chapter 5 Appendices
III A(4)	Identify and specify current government safety standards that are not being complied with and corrective/mitigation measures which need to be taken to achieve compliance, and specify benefit of each mitigation measure. Identify areas where standards for O&M are not consistent with industry standards and sound engineering practice.	5.5.1, Chapter 5 Appendices, 9.2	5.5.1, Chapter 5 Appendices
III A(5)	Evaluate whether Longhorn's and operator's computers affecting the pipeline are Y2K compliant.	5.6	5.6
Section III (B)	Environmental Effects and Risk Assessment	Chapters 6 & 7	Chapters 6 & 7
III (B)(1)	Perform analysis of safety and environmental consequences, including health effects, of potential leaks to resources identified as affected environments above.	Chapter 7, App. 6F	Chapter 7
III (B)(1)(a)	Identify characteristics of products to be transported, including chemical and physical properties and toxicity.	Chapter 6, Appendix 6B	6.2.1, App. 6A
III (B)(1)(b)	Identify potential hazards (e.g., fire, explosion, toxicity).	Chapter 6, Chapter 7, and Chapter 6 Appendices	6.2, Chapter 7, and Chapter 6 Appendices
III (B)(1)(c)	Identify most vulnerable points (e.g., stream crossings, pump stations, valves, construction areas).	Chapter 7	5.1, Chapter 7

Settlement Section	Requirement	Draft EA Section	Final EA Section
III (B)(1)(d)	Identify magnitude of hazards based on volume of product in uncontrolled pipeline segment, pressure in segment, time typically required to shut down pipeline and range of ambient temperatures.	5.7, 6.5, Chapter 7 Chapters 5 and 6 Appendices	5.8.7, Chapter 7, Chapters 5 & 6 Appendices
III (B)(1)(e)	Identify speed, extent, and effects of plume, also considering: (i) products being carried; (ii) spill to Colorado River and major tributaries at low, average, and flood flow conditions; (iii) spill onto ground with wet or dry antecedent soil conditions and high and low water table conditions; (iv) differing wind, temperature and other climactic variations.	Chapter 7, Water Modeling, App. 7A, 7D, 7E, 7F	7.1.4, App. 7F, 7G, 7H
III (B)(1)(f)	Identify emergency response plans and procedures, including notification procedures for releases, fires, explosions or other hazardous conditions and for deploying personnel and equipment.	5.5 App. 5G	5.5 App. 5G
III (B)(1)(g)	Identify availability and adequacy of qualified emergency preparedness agencies and services provided by Longhorn, including trained personnel, containment equipment, PPE, and communications capabilities.	5.5 App. 5G	5.5 App. 5G
III (B)(1)(h)	Identify safety and environmental consequences, including health consequences, of location of the pipeline in densely populated areas.	Chapter 7	Chapter 7
III (B)(1)(i)	Identify age and use of pipeline.	Chapters 6 & 7	5.2, Chapter 9
III (B)(1)(j)	Identify expected use of pipeline.	Chapters 7 & 9	Chapters 3, 7, 9
III (B)(1)(k)	Identify adequacy and risk of proposed safeguards to protect pipeline from damage from third-party construction.	6.4.4	6.4.3, 6.4.9.2
III (B)(2)	Identify overall risk assessment consistent with recognized professional risk assessment standards including discounting the magnitude of potential adverse consequences by probability of their occurrence and taking into account proposed or implemented mitigation measures.	Chapters 6 & 7, Appendix 6A	Chapters 6 & 7
III (B)(3)	Analyze, pursuant to EPA's NEPA policy, any environmental justice issues including issues raised by prices of fuels in El Paso and other markets in Texas and New Mexico and location of	Chapter 8, App. 8A, 8B	8.3, 8.5, App. 8A, 8B

Settlement Section	Requirement	Draft EA Section	Final EA Section
	pipeline in certain residential areas.		
Section III (C)	Identify and Analyze Alternatives.	Chapter 9	3.5, 3.6, Chapter 9
III (C)(1)(a)	Identify “no action” alternative.	9.1.1, App. 9A	3.8, 9.3.1
III (C)(1)(b)(i)	Identify “re-routing” alternatives - construction across Fort Bliss instead of along state highway ROW.	9.1.4, 3.5.3, App. 9B	3.5.3, 9.3.3.3
III (C)(1)(b)(ii)	Identify “re-routing” alternatives - construction around City of Austin, Edwards Aquifer, Edwards-Trinity Plateau Aquifer, Colorado River Alluvium, Carrizo-Wilcox Aquifer, and Gulf Coast Aquifer.	9.1.3, 3.5.2, App. 9B	3.5.1, 3.5.2, 9.3.3.1, 9.3.3.2
III (C)(1)(c)(i)	Identify pollution control alternatives - enhanced leak detection.	3.6.1, Chapter 9	3.6.1, Chapter 9
III (C)(1)(c)(ii)	Identify pollution control alternatives -enhanced ground surveillance.	3.6.2, Chapter 9	3.6.2, Chapter 9
III (C)(1)(c)(iii)	Identify pollution control alternatives - enhanced emergency response capability.	3.6.3, Chapter 9, LMCs 23, 24, 26, and 28	3.6.3, Chapter 9, LMC, 23, 24, 26, and 28
III (C)(1)(c)(iv)	Identify pollution control alternatives - replacement of pipe sections with new or double-walled pipe.	3.6.4, Chapter 9	3.6.4, Chapter 9, App. 9C
III (C)(1)(c)(v)	Identify pollution control alternatives - increased depth of buried sections.	3.6.5, Chapter 9	3.6.5, Chapter 9
III (C)(1)(c)(vi)	Identify pollution control alternatives - additional block and/or check valves and remote operation capability, berms or other containment for sections or facilities.	3.6.6, Chapter 9	3.6.6, Chapter 9
III (C)(1)(c)(vii)	Identify pollution control alternatives - any other mitigation measures identified in III (A)(4).	3.6.7, Chapter 9	3.6.7, Chapter 9
III (C)(2)	Analyze/consider alternative and mitigation measures to be in accordance with CEQ and NEPA regulations - explanations of why any alternatives/mitigation measures are selected or eliminated from detailed study.	9.2, 9.3	3.7, 9.2, 9.4

Settlement Section	Requirement	Draft EA Section	Final EA Section
III (D)	Analysis shall focus on entire pipeline, with particular focus on potential effects within Barton Springs segment and any other affected segments of the Edwards Aquifer, Edwards-Trinity Plateau Aquifer, Colorado River Alluvium, Carrizo-Wilcox Aquifer and Gulf Coast Aquifer, and at crossing of Colorado River and its twelve tributaries as designated by LCRA, and area within jurisdiction of City of Austin, which are in proximity to the pipeline or which may reasonably be expected to be affected by pipeline operation.	Chapters 7 & 9	Chapters 7 & 9

10.2 QUALIFICATIONS OF EA TEAM

10.2.1 Comment

Commentors stated that those responsible for preparing the risk assessment and the EA should be identified.

Response

The final EA would include a short appendix listing the names, roles, and brief credentials of those who prepared this EA including Lead Agencies and Contractor staff and subcontractors. (See Appendix 9G.)

10.3 QUESTIONS ON REFERENCES

10.3.1 Comment

A commentor noted that PBS&J, 1998 and EPA Drinking Water Advisory for MTBE were cited as information but not included in detailed list of references.

Response

The following citations would be added to the list of references in the final EA:

"Chemical and Physical Properties for Crude Oil, Gasoline, Diesel, and Jet Fuel; Prepared for Lower Colorado River Authority; Prepared by PBS&J; October 1998" (provided as

Appendix A to LCRA's Scoping Input to EPA for Preparation of the Environmental Assessment for the Proposed Longhorn Pipeline).

"EPA Fact Sheet; Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Methyl Tertiary-Butyl Ether (MTBE); EPA-822-F-97-009; US EPA Office of Water, December 1997."

10.3.2 Comment

A commentor argued that a reference does not match work included in his article referenced.

Response

The reference is not to the article he cites but to a personal communication. The commentor does not dispute information presented in the draft EA, nor does he provide additional data or information.

10.4 ERRORS OR IMPROVEMENTS NEEDED IN THE DRAFT EA

10.4.1 Comment

A commentor noted that paragraph two on page 7-23 of the draft EA contained a sentence fragment.

Response

Sentence incorrectly starts with "Although," and should start simply "The HCP was drafted to allow incidental takings of the species ..." This does not substantively change the meaning of the paragraph. This sentence has been corrected in the final EA.

10.4.2 Comment

The commentor requested that the EA include definitions specific to NEPA and other assessment terminology, in the "Definitions of Terms" section, with reference to Section 7.4.1 of the draft EA. In addition, commentors requested that definitions for the following terms be added also, "sensitive receptors," "minor impact," "major impact," "significant impact," "short-

Response

"Sensitive receptors" were defined in the draft EA under various categories, described in Chapter 4. For example, in addition to population density, the draft EA studied potential impacts to sensitive receptors such as schools, day care centers, parks and recreation facilities, overnight lodging facilities, health care facilities, urban residential subdivisions, and rural residential and agricultural/rangeland along or crossed by the pipeline (Section 4.1.2.1 and Section 4.1.2.2). For each of the various categories examined (human resources, physical resources, including ground water, surface water, geologic, climate and air quality, ecological resources, and cultural resources), the factors used in consideration of whether a resource should be designated as "sensitive" were described in Chapter 4 of the draft EA.

The topics considered in determining whether an impact would be classified as "minor" or "major" were outlined in Section 7.1.3 of the draft EA. Factors include the probability of an impact, the consequences of that impact, and what hazardous substance is being carried in the pipeline at the time of the occurrence (crude oil or gasoline).

A "significant impact" under NEPA requires a consideration of both context and intensity. Context considerations include the effects on society as a whole, the region, interests, and locality. Consideration of the specific setting of the proposed project would help determine the significance of any potential impacts. Intensity refers to the severity of the potential impact(s). Impacts of the proposed project can be both beneficial and adverse, and the following aspects must be taken into account during the evaluation process.

- Characteristics of the geographic location;
- The degree to which the proposed action affects public health or safety;
- The proposed actions' impacts on the quality of the human environment;
- Whether the action may establish a precedent for future actions;
- Whether the proposed action is related to other actions which may result in a cumulative impact;
- Potential impacts from the project related to the Endangered Species Act and the National Historic Preservation Act; and
- Whether the action would produce a violation of state, federal, or local laws regarding protection of the environment.

A "significant amount of time" of potential benzene exceedance in a drinking water supply represents a time longer than the time which communities rely on normally available storage capacity to service community needs.

“Short-term” and “long-term” impacts were defined in Section 7.1 of the draft EA. “Short-term impacts” are defined for the purposes of the EA as those that may cause adverse effects for a time period on the order of months. “Long-term impacts” resulting from a pipeline accident are those which could limit uses of a resource for five years or more.

“Limited” effects would be those that are restricted to a relatively small area of impact due to a minor release. “Extensive” effects would be those resulting from a large spill, which would cover a lengthy reach of river, for example, or a wide area of other habitat.

“Irretrievable impacts” as used in the draft EA could refer to, for example, a taking of an entire species as a result of a spill. The species of concern may suffer mortalities, which cannot be mitigated during a normal clean-up process. An “unavoidable impact” is an impact that cannot be totally mitigated. A spill of any size from some point on the pipeline over a 50-year period is assumed to be an unavoidable impact.