SWCA
ENVIRONMENTAL CONSULTANTS

AN INTENSIVE ARCHAEOLOGICAL SURVEY OF THE PROPOSED NGL FRACTIONATION PLANT AND ASSOCIATED FACILITIES, JEFFERSON COUNTY, TEXAS

Prepared for

DCP Midstream, LP

Prepared by

Todd L. Butler, Kristen Jeremiah, Allison King, Anna Mod, and Grace Cynkar

SWCA Cultural Resources Report No. 2012-497

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FINAL DRAFT

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ABSTRACT

On behalf of DCP Midstream, LP (DCP), SWCA Environmental Consultants (SWCA) conducted an intensive archaeological survey for the proposed Natural Gas Liquids (NGL) Fractionation Plant and Associated Facilities (hereafter referred to as the project area). Approximately 535 acres of land were purchased for the proposed project, of which only 70 acres are anticipated to be disturbed during the construction of a proposed fractionation plant. Linear facilities will encompass 4.0 miles extending outside the existing property boundary. In all, SWCA investigated or assessed a total of 386.5 acres of land (defined as the area of potential effect or APE) comprised of 339 acres of fractionation plant locations; 46 acres of linear survey (3.8 miles within a 100-foot-wide corridor); and assessed the archaeological potential of approximately 1.5 acres (900 feet within a 75-foot-wide corridor) of a proposed wastewater discharge pipeline. DCP plans to construct a fractionation plant and associated linear facilities for the transportation of natural gas liquids, and has filed an application for a Greenhouse Gas (GHG) permit with the U.S. Environmental Protection Agency (USEPA). As such, investigations were conducted in accordance with the National Historic Preservation Act (NHPA), in addition to regulatory obligations associated with the acquisition of a United States Army Corps of Engineers (USACE) permit (33 CFR Part 325, Appendix C [Processing Department of Army Permits: Procedures for the Protection of Historic Properties; Final Rule 1990; with current Interim Guidance Document dated April 25, 2005]).

A background literature review revealed that the eastern-most 0.92-miles of the project area are within the boundary of the Lucas Gusher, Spindletop Oil Field National Register of Historic Places listing (Spindletop NRHP). Spindletop is also a National Historic Landmark (NHL). Ten archeological sites associated with Spindletop are within a one-mile buffer of the project area, and two sites, 41JF90 and 41JF84, are within the proposed survey corridor. SWCA understands that with the recent work of James Karbula (2010:79) in coordination with the Texas Historical Commission (THC), the THC has determined that Site 41JF90 is now subsumed as being part of the overall Spindletop archaeological site 41JF84 along with Sites 41JF85 through 89 and 91. In addition, James Karbula (2012) has recently completed the reporting of further testing and mitigation efforts at Site 41JF84. The results of which were not published prior to completion of this report.

After a review of the project area soils, geology, and known sites within the vicinity, a team of SWCA archaeologists conducted an intensive archaeological survey of the proposed fractionation plant and associated facilities. No artifacts were identified outside of the Spindletop NRHP boundary. Current investigations of the project corridor within the Spindletop NRHP boundary located a low density surface scatter of early twentieth century cultural materials extending east from West Port Arthur Road to the west side of an existing pond located west of Highland Avenue that are all associated with Site 41JF84. The remaining portions of the project corridor east and south of Highland Drive were highly disturbed by modern industrial facilities and modern buried pipelines. SWCA located no intact features within the current project corridor within the Spindletop NRHP boundary. Initial archival information indicated that as early as 1938, two anomalies (possible features/structures) are depicted within the current project corridor. One anomaly corresponds to the previous site boundary for 41JF90, while the other anomaly is located approximately 60 to 80 meters northeast of Site 41JF90. Later aerial

photographs suggest that these features/structures had been razed by 1953. Additional historical maps indicated that the project corridor followed established roads from 1901 to 1953, or have been subsequently developed by modern facilities (Appendix A, C, and D).

Based on the results of the survey, it is SWCA's opinion that the portion of 41JF84 identified within the proposed project corridor possesses little research value. SWCA conducted additional archival research in order to determine to what extent if any the proposed undertaking would impact the Lucas Gusher, Spindletop Oilfield NRHP area. An SWCA historian visited the Tyrell Historical Library in Beaumont Texas, the Woodson Research Center associated with Fondren Library at Rice University, and utilized a number of secondary sources to construct a more detailed context of the Spindletop oilfield.

The Spindletop Oilfield was listed in the NRHP in 1966 as a Site under Criterion A as an Event with significance in the areas of Industry and Science. In 1979 the NRHP listing was listed as a National Historic Landmark (NHL) due to its national significance. There are no remaining buildings, objects, or structures associated with Spindletop within the area of potential effect. As the pipeline will be buried within the NRHP boundary SWCA anticipates no visual effect to any extant significant resources located outside the project corridor. Likewise, SWCA recommends that none of the findings within the area of potential effect are NRHP eligible under Criteria B, C, and D. As such SWCA recommends that the proposed undertaking will have NO ADVERSE EFFECT on the NRHP-listed Lucas Gusher, Spindletop Oilfield.

With regard to potential visual effects, the proposed plant is located approximately 2.3 miles from the Spindletop NRHP boundary. Although no formal viewshed analysis was conducted as part of this work, SWCA anticipates that the proposed undertaking will result in no adverse visual effect to this NRHP and NHL property. In a meeting held on December 12, 2012, staff from the Architecture Division of the Texas Historical Commission indicated agreement with this assessment.

On February 19, 2013, SWCA, on behalf of DCP Midstream, LP, submitted the draft report to the THC with our findings (Appendix E). The draft report had already been submitted to the USEPA for review via DCP Midstream, LP. On March 20, 2013, SWCA received a letter from Mr. William Martin of the THC agreeing with SWCA's our assumptions for the overall project (Appendix E).

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MANAGEMENT SUMMARY

PROJECT TITLE: Phase I Archaeological Survey of the Proposed NGL Fractionation Plant and Associated Facilities, Jefferson County, Texas

SWCA PROJECT NUMBER: 24292.

PROJECT DESCRIPTION: SWCA Environmental Consultants (SWCA) performed a Phase I archaeological survey for a proposed fractionation plant and associated linear facilities, in Jefferson County, Texas. The project consists of linear and aerial segments located in Beaumont and Port Arthur, Texas.

LOCATION: The project area is located in the northeastern portion of Jefferson County, 3.2 miles south of the intersection of Interstate 10 and Highway 96, and 5 miles south of the city of Beaumont, Texas. The project area is depicted on the Beaumont East and Port Acres, Texas 7.5-minute USGS topographic quadrangles.

NUMBER OF ACRES SURVEYED: 386.5 acres total; 46 acres of linear survey (3.8 miles in a 100-foot-wide corridor), 339 acres of proposed fractionation plant locations, and assessed the archaeological potential of approximately 1.5 acres of a proposed wastewater discharge pipeline.

PRINCIPAL INVESTIGATOR: Todd L. Butler.

REPORT PREPARED BY: Todd L. Butler, Kristen Jeremiah, Allison King, Anna Mod and Grace Cynkar.

DATES OF WORK: October 24, November 6-7, November 13, and December 5-6, 2012.

PURPOSE OF WORK: DCP Midstream, LP has filed for a Greenhouse Gas (GHG) Permit with the U.S. Environmental Protection Agency (USEPA). As such, investigations were conducted in accordance with the NHPA, in addition to regulatory obligations associated with the acquisition of a USACE permit (33 CFR Part 325, Appendix C [Processing Department of Army Permits: Procedures for the Protection of Historic Properties; Final Rule 1990; with current Interim Guidance Document dated April 25, 2005]).

NUMBER OF SITES: No new archaeological sites were identified during the recent effort.

CURATION: SWCA conducted a non-collection survey. Artifacts were located and their type analyzed in the field, but were not collected.

COMMENTS: Based on the results of the survey, it is SWCA's preliminary opinion that the portion of 41JF84 identified within the area of potential effect (APE) possesses little research value. SWCA conducted archival research in order to determine to what extent, if any, the proposed undertaking would impact the NRHP-listed Lucas Gusher, Spindletop Oilfield. Based upon the archeological findings and the property's significance, SWCA recommends that the proposed undertaking will have NO ADVERSE EFFECT on the NRHP-listed Lucas Gusher, Spindletop Oilfield.

INTRODUCTION

On behalf of DCP Midstream, LP (DCP), SWCA Environmental Consultants (SWCA) conducted an intensive archaeological survey for a proposed fractionation plant and associated linear facilities in Port Arthur and Beaumont, Jefferson County, Texas. DCP has filed for a Greenhouse Gas (GHG) Permit with the U.S. Environmental Protection Agency (USEPA). As such, investigations were conducted in accordance with the NHPA, in addition to regulatory obligations associated with the acquisition of a USACE permit (33 CFR Part 325, Appendix C [Processing Department of Army Permits: Procedures for the Protection of Historic Properties; Final Rule 1990; with current Interim Guidance Document dated April 25, 2005]).

Based on a review of the project area soils, geology, and known sites within the vicinity, a team of SWCA archaeologists conducted an intensive archaeological survey of the proposed fractionation plant and associated facilities. The potential impact to historic archaeological resources associated with the National Register of Historic Places (NRHP)- and National Historic Landmark (NHL)listed (NRHP) Lucas Gusher, Spindletop Oil Field (Spindletop), resulted in an archaeological investigation of the entire area of potential effect (APE) . All investigations were in accordance with the standards and guidelines of the National Historic Preservation Act (NHPA) and the Texas Historical Commission's (THC) survey standards.

Todd L. Butler served as Principal Investigator for the survey (Appendix F). The field investigations were conducted over several mobilizations. The first mobilization took place on October 24, 2012 and was conducted by Meredith Moreno, Justin Preston, and Jay Zoch. On November 6-7, and again on November 13, 2012, field investigations were conducted by Kristen Jeremiah, Larkin Kennedy, Jay Zoch, and Galen Randall. A third series of investigations on December 5-6, 2012 was conducted by Allison King, Larkin Kennedy, and Galen Randall. The report was prepared by Todd Butler, Kristen Jeremiah, Allison King, Anna Mod and Grace Cynkar.

PROJECT AREA DESCRIPTION

The project area is located in northeastern Jefferson County, within the cities of Port Arthur and Beaumont, Texas. Approximately 535 acres of land were purchased for the proposed project, of which only 70 acres are anticipated to be disturbed during the construction of a proposed fractionation plant. Investigations were concentrated on those areas within the property boundary where disturbance from the construction of pipeline and facilities is anticipated (Appendix A). Linear facilities will include 3.8 miles of pipeline extending from the proposed plant site to an existing facility and 900 feet of a proposed wastewater discharge pipeline. In all, the APE is defined as encompassing approximately 386.5 acres of land comprised of 339 acres of fractionation plant locations; 46 acres of linear survey (3.8 miles within a 100-foot-wide corridor); and approximately 1.5 acres (900 feet within a 75-foot-wide corridor) of a proposed wastewater discharge pipeline (Figure 1).

The proposed fractionation plant is located approximately 0.7 miles west of the intersection of Hillebrandt Road and Sunshine Road. The associated linear segments of the proposed facilities are bounded to the northeast by Highland Avenue and to the northwest by the DCP West Beaumont Plant. The project area is

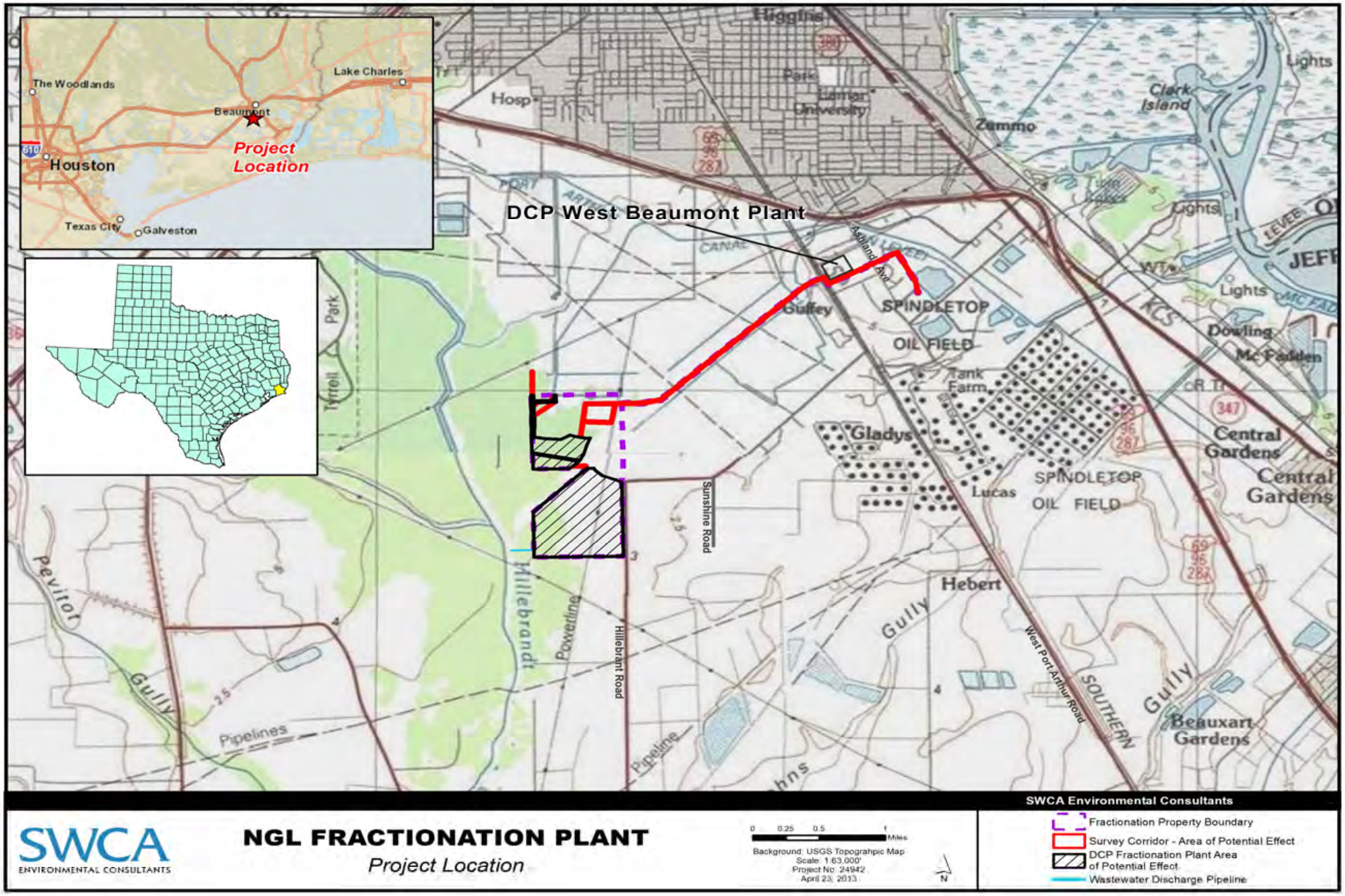

Figure 1. Project Location Map.

depicted on the USGS Beaumont East and Port Acres 7.5-minute topographic quadrangles (Figure 1).

ENVIRONMENTAL SETTING

The project area is located in southeast Texas within the Northern Humid Gulf Coastal Prairies. The Northern Humid Gulf Coastal Prairies are relatively flat, with 0-2 percent slopes. Soils are typically poorly drained, due to low relief and clay subsoils (Griffith et al. 2007).

The eastern most portion of the project area is approximately 2.5 miles west of the Neches River and three drainages of the Port Arthur Canal intersect the western and eastern portions of the project area.

Historically, vegetation was typically comprised of tall grasslands with oaks, little bluestem (*Schizachyrium scoparium*), yellow indiangrass (*Sorghastrum nutans*), brownseed paspalum (*Paspalum plicatulum*), gulf muhly M*muhlenbergia capillaries*) and switchgrass (*Panicum virgatum*) (Griffith et al. 2007). Presently, the majority of the coastal prairies have been converted to cropland, rangeland, pasture, or urban and industrial land uses (Griffith et al. 2007).

SWCA biologists identified seven general vegetation communities within the project area: estuarine emergent wetland, palustrine emergent wetland, palustrine scrub-shrub wetland, palustrine forested wetland, herbaceous upland, scrub-shrub upland, and forested upland (Hartnett et al. 2010).

Frequently occurring emergent species include smooth cordgrass (*Spartina alterniflora*), salt meadow cordgrass (*Spartina patens*), gulf cordgrass (*Spartina spartinae*), salt grass (*Distichlis spicata*), key grass (*Monanthochloe littoralis*), saltwort (*Batis maritima*), and black needle-rush (*Juncus roemerianus*). Shrubs present in sparse densities may include marsh elder (*Iva frutescens*) and less frequently, black mangrove (*Avicennia germinans*).

The most common wetland community within the project area, the palustrine emergent wetland community includes species such as green flatsedge (*Cyperus virens*), horned beaksedge (*Rhynchospora corniculata*), anglestem beaksedge (*Rhynchospora caduca*), common rush (*Juncus effusus*), mountain spikerush (*Eleocharis montana*), Virginia buttonweed (*Diodia virginiana*), and Vaseygrass (*Paspalum urvillei*). Shrubs present in sparse densities may include eastern baccharis (*Baccharis halimifolia*) and Chinese tallow (*Sapium sebiferum*).

Frequently observed shrub species within the palustrine scrub-shrub wetland community include eastern baccharis, southern waxmyrtle (*Myrica cerifera*), buttonbush (*Cephalanthus occidentalis*) and immature tree species such as black willow (*Salix nigra*), red maple (*Acer rubrum*), and Chinese tallow. Emergent species such as green flatsedge (*Cyperus virens*), spikerush (*Eleocharis* spp.), floating primrose-willow (*Ludwigia peploides*), and swamp smartweed (*Polygonum hydropiperoides*) are also present.

Tree species typically present within the palustrine forested wetland community may include red maple, sweetgum (*Liquidambar styraciflua*), Chinese tallow, willow oak (*Quercus phellos*), water oak (*Quercus nigra*) and black willow. Shrubs and emergent species may include eastern baccharis, buttonbush, southern waxmyrtle, common rush, Louisiana sedge (*Carex louisianica*), and Cherokee sedge (*Carex cherokeensis*).

Common species within the herbaceous upland community may include bahiagrass (*Paspalum notatum*), dallisgrass (*Paspalum dilatatum*), wooly croton (*Croton capitatus*) little bluestem (*Schizachyrium scoparium*), common carpetgrass (*Axonopus affinis*), bermudagrass (*Cynodon dactylon*), Vaseygrass, and smut grass (*Sporobolus indicus*). Sparsely occurring trees/shrubs may include eastern baccharis, Chinese tallow, yaupon (*Ilex vomitoria*), Macartney rose (*Rosa bracteata*), and southern waxmyrtle.

The scrub-shrub upland community includes species such as yaupon, Macartney rose, Chinese tallow, eastern baccharis, and southern waxmyrtle. Herbaceous species present typically include those associated with the herbaceous upland plant community.

The forested upland community is comprised of tree species including sweetgum, sugarberry, Chinese tallow, loblolly pine (*Pinus taeda*), water oak, and live oak (*Quercus virginiana*). Shrub species often observed may include yaupon, southern waxmyrtle, and eastern baccharis. Common herbaceous species may include slender woodoats (*Chasmanthium laxum*), Cherokee sedge, and basket grass (*Oplismenus hirtellus*) (Hartnett et al. 2010).

GEOLOGY

The geology of the project area is mapped as the Pleistocene-age Beaumont Formation. The Beaumont Formation consists of clay, silt, and sand with concretions of calcium carbonate, iron oxides and iron-manganese oxides. The surface is generally featureless with pimple mounds and river channels. Thickness is plus or minus 100 feet (Barnes 1982).

SOILS

According to the United States Department of Agriculture's Natural Resources Conservation Service (USDA 2012) for Harris County, 10 soils series are mapped within the project area. These soils are listed in Table 1.

Table 1. Soils of the proposed NGL fractionation plant and associated facilities.

Soil Series	Texture	Location	Description
League Clay, 0-1% slopes	Loam	Uplands	Very deep, somewhat poorly drained, very slowly permeable soils.
Beaumont clay, 0-1% slopes	Clay	Coastal prairies;	Very deep, poorly drained, very slowly permeable soils in clayey sediments of the Pleistocene Age.
Labelle-Levac complex, 0-1% slopes	Loamy clay	Uplands	Very deep, somewhat poorly drained, very slowly permeable soils. On nearly level uplands of Pleistocene age.
Labelle silt loam, 0-1% slopes	Silt loams	Uplands	Very deep, somewhat poorly drained, very slowly permeable soils. On nearly level uplands of Pleistocene age.
Lenton loam, ponded, 0-1% slopes	Loam	Coastal prairies	Very deep, poorly drained, slowly permeable soils formed in alluvial deposits
League-Urban land complex, 0-1% slopes	Clay	Coastal prairies	Very deep, somewhat poorly drained, very slowly permeable soils formed in sediments of Pleistocene age.
Anahuac very fine sandy loam, 0-2% slope	Loamy clay	Uplands	Very deep, moderately well drained, very slowly permeable soils formed on uplands of Pleistocene age.
Fausse clay, 0-1% slopes, frequently flooded	Clay	Alluvial plain	Very deep, very poorly drained, very slowly permeable soils that formed in clayey alluvium.
Estes clay, 0-1% slopes, frequently flooded	Clay	Coastal plain	Very deep, somewhat poorly drained soils formed in acid clayey and loamy alluvium in the Coastal Plains.
Oil wasteland	-	-	Barren lands

PREHISTORIC CULTURAL HISTORY

Several comprehensive reviews of the cultural history of Southeast Texas have been completed in the past two decades, beginning with Aten's (1983) study of the Upper Texas Coast. Story (1990) and Patterson (1995) both relied heavily on Aten's (1983) work but expanded and modified his cultural history to include more recent excavation and survey data. All three culture histories differ slightly from one another, particularly in terms of artifact date ranges. The following summary is based on the prehistoric cultural history proposed by Story (1990).

The prehistoric cultural history of southeast Texas has been divided into three general periods: Paleoindian, Archaic, and Ceramic. The Paleoindian period (12,000–7000 B.P.), called the "Early Cultures" by Story (1990:168), is most conspicuously identified by lanceolate projectile points with ground lateral and basal margins. Clovis, San Patrice, and Scottsbluff types are distributed throughout the East Texas part of the Gulf Coastal Plain, although Folsom and Dalton points tend to occur only in the northern and north-central areas. A general picture of these early peoples has been reconstructed from a relatively scant record. Their high-mobility lifestyle depended upon a diversity of food resources, including big game mammals. Population densities were low and social structure is hypothesized as relatively simple.

The Archaic period encompasses a wide span of time (7000–1900 B.P.) and cultures. Two basic characteristics, along with various adaptive changes, distinguish this from the earlier period. The "increased density of population and reduction in size of the area exploited" (Story 1990:213) are evidenced in the material record by a number of changes. Projectile point styles proliferated while displaying greater geographical and temporal specificity. Lithic technology became more expedient and liberal with raw material as locally available lithic resources were more commonly exploited. Specialization in cooking features and food processing implements suggest more intensive utilization of available plant resources. Shell exploitation along the coast became more prevalent as evidenced by ubiquitous shell midden sites. Archaeologically, the Archaic is much more visible, as these adaptations left a more voluminous and diverse legacy of sites and materials.

The Ceramic period, or "Late Cultures" as defined by Story (1990), for southeastern Texas began roughly 2,000 years ago. The earlier manifestations of this period have been otherwise named "Woodland," as tribute to certain similarities held with eastern cultures, or "Mossy Grove," Story's (1990:256) name for the local manifestation. A pervasive characteristic of these cultures is the ubiquity of plain sandy-paste ceramics. Kent and Gary points were common in the early stages of this period and were eventually displaced by arrow points such as Alba and Catahoula, perhaps as early as A.D. 500 to 600. Subsistence strategies depended on hunting and gathering, with little if any evidence of horticulture. Bison may have been exploited in the few centuries prior to European contact.

The first efforts at permanent European settlements in the area now known as Hardin County, part of the Atascosito District of Spanish and Mexican Texas, began with a colonization grant awarded to Empresario Lorenzo de Zavala in 1829 (Duncan 2006).

However, significant strides in attracting settlers to the area were not made until 1834 and 1835 when the Mexican Government issued more than 50 additional land grants (Duncan 2006). Early Hardin County settlements of Sour Lake and Saratoga were founded near mineral springs previously utilized by Native Americans for their medicinal properties. Realizing this potential, enterprising settlers were quick to capitalize on the healing properties of the springs. Spring water was bottled and sold and health resorts were operating in these settlements prior to the Civil War (Duncan 2006; Kleiner 2006).

Following the revolution of 1836 and steady population growth, Hardin County, named for the prominent Hardin family of Liberty, was established in 1858 by the state legislature (Duncan 2006). From the 1830s until the eve of the Civil War, a subsistence-based farming economy dominated. Slaves accounted for 14 percent of the county's 1,353 inhabitants in 1860; however, cotton was never a significant county export (Duncan 2006). Slaveholders and non-slaveholders held local offices, but the county favored secession (Duncan 2006).

After the Civil War, the subsistence economy remained a constant, though livestock began to grow in importance (Duncan 2006). The lumber industry in the county took off during this same time and provided the incentive to bring the Sabine and East Texas Railroad line into the county in 1881, and later the Gulf, Beaumont, and Kansas City line in 1894. After the establishment of the railroad, lumbering became the most lucrative of all Hardin County enterprises (Duncan 2006).

The twentieth century was dominated by oil production, first discovered near Saratoga in 1901; though, lumber remained an important fixture in the local economy (Duncan 2006). Oil production and lumber remain important parts of the local economy. The latter half of the twentieth century also saw a shift from subsistence-based agriculture to cash crops including soybeans, hay, and fruits (Duncan 2006).

HISTORIC CULTURE HISTORY

The Historic period (A.D. 1630 to present) in Texas roughly begins when Europeans first entered the region. From just after A.D. 1550 to the late 1600s, European journeys into the area were rare. Motivated primarily by European politics, the first Europeans into the project area were probably Spanish explorers and missionaries (Cecil and Greene 2004; Foster 1995). With the exception of these Spanish expeditions or entradas, Texas during the early Historic Period was claimed by Spain but basically remained without an established Spanish presence until around A.D. 1700 (Foster 1995; Taylor 1996). However the French and Spanish disputed ownership of the area of Jefferson County during the eighteen-century.

SPANISH COLONIAL/MEXICAN INDEPENDENCE PERIOD (1630–1830S)

The Spanish Colonial period (A.D. 1630–1821) may be characterized as the initial period of Aboriginal/European contact and European settlement in Texas. During this time Jefferson County was inhabited by several aboriginal groups including the Atakapas and Orcoquizas (Kleiner 2007). The first Spanish expedition into the area was the expedition of Álvar Núñez Cabeza de Vaca. Motivated more by a fear of French expansion than anything else, the Spanish explored and established missions in eastern and central Texas during the latter part of the seventeenth century (Foster 1995). These early overland Spanish entradas utilized established Indian trade routes, with the first being led by Governor Alonso de Léon (1689 and 1690) (Foster 1995). In 1756 the Spanish established San Agustín de Ahumada Presidio and Nuestra Señora de la Luz Mission near the mouth of the Trinity River. By 1803, when the United States acquired Louisiana, the area of Jefferson County was under Spanish control as a part of the Atascosito District. The area of the county was a path for slave smuggling between Louisiana, Point Bolivar, Jefferson County, and the Sabine River until the 1830s (Kleiner 2007).

The first settlement within the present county was established at Tevis Bluff in 1824 and became Beaumont. The area comprising present day Jefferson County was included in the Mexican Department of Nacogdoches as part of Liberty Municipality in Lorenzo de Zavala's empresario grant of 1831, which later became part of Jefferson Municipality (Kleiner 2007).

REPUBLIC OF TEXAS/PRE-CIVIL WAR (1836–1860)

During the Republic of Texas era, from 1836–1845, Jefferson County was formed and organized in 1837 as one of the original counties in the Republic of Texas (Kleiner 2007). By the 1840s, shingle manufacture and timber exports supplemented a domestic economy based on spinning, leather work, and soap and candle making. Also during the 1840s shipbuilding and the steam-driven industry developed. During the 1850s, the cotton industry grew in conjunction with the railroads. The Texas and New Orleans Railroad from Houston to Orange and the Eastern Texas Railroad from Sabine Pass to Beaumont were completed by 1861, but insufficient rail transportation and high freight rates limited antebellum growth (Kleiner 2007).

CIVIL WAR ERA (1860–1864)

Jefferson County residents voted 256 for and 15 against secession. During the Civil War, the county court voted to garrison a fort at Sabine Pass and Beaumont became a concentration point for Confederate troops. In 1862, Federal troops burned the cavalry barracks, railroad depot, sawmills, and shelled Sabine City. In 1863, the Confederates reoccupied Sabine Pass and the battle of Sabine Pass in September ended Federal efforts to penetrate the interior via the Sabine (Kleiner 2007).

THE POST–CIVIL WAR/RECONSTRUCTION PERIOD (1865–1880)

Following the Civil War, recovery from the war was slow. In 1867, Jefferson County exports of cotton, cattle, beef hides, lumber, cypress shingles, and lumber products including resin and turpentine, constituted only about one-fourth of their pre-war total. Significant agriculture did not develop again until after 1890. However, by 1876, the county was once again a lumber and shipping center, as loggers used the Neches and Sabine rivers to float logs to mills at Orange and Beaumont (Kleiner 2007).

LATE NINETEENTH/EARLY TWENTIETH CENTURY (1880–1940S)

After 1880, rail transportation increased significantly. The Texas and New Orleans (now the Southern Pacific Transportation Company), which abandoned the Orange County track in 1863 and line in 1867, rebuilt it in 1876. In 1881, this railroad was linked to the Louisiana and Western and through service to New Orleans. By 1881 service had also been reestablished by the East Texas Railway, which was renamed the Sabine and East Texas and later became part of the Texas and New Orleans (Kleiner 2007).

Between 1900 and 1910, the population grew from a major influx following the Spindletop oilfield opening in 1901 (discussed in detail below), and the growth in the decade came almost exclusively from the white population of Hardin, Tyler, Jasper, and Newton counties (Kleiner 2007). Spindletop transformed Beaumont into a major industrial center. Refineries were built in Port Arthur, Port Neches, and Beaumont.

During World War I, shipbuilding increased and the Magnolia Petroleum Company refinery on the Neches at Beaumont played an active role as a supplier for the war. During World War II, the Gulf refinery was the fourteenth largest refinery in the world (Kleiner 2007).

In the 1930s, despite the hardships many places experienced, Jefferson County was one among several Texas counties that continued to prosper. Jefferson County's economy up to modern times is focused around the shipping, lumber, and petroleum industry in addition to recreational activities.

SPINDLETOP OIL FIELD

The Lucas Gusher at Spindletop in Jefferson County, Texas was not the first such discovery in Texas or the U.S. In 1859, the first use of drilling technology had brought the Drake Well in Venango County, Pennsylvania into production and set off a flurry of new wells and refineries across the East Coast. In 1861, the first shipment of oil left the U.S. for Europe and opened the eyes of investors, entrepreneurs, and businessmen to the financial potential of the petroleum industry in the U.S. (Linsley, Reinstra, and Styles 1976). On June 9, 1894 the first producing well in Texas was discovered by the American Well and Prospecting Company near Corsicana, Navarro County, Texas (Smith n.d.). Although this discovery was an accident made as the company searched for a new water source, elsewhere in Texas people had already started actively searching for oil.

In Jefferson County, men and women had long noticed the abundance of discrete mounds rising a few feet above sea level and surrounded by mineral springs, escaping gases, oil seepages, and tar deposits. When the Spaniards and the French arrived, the Atakapas and Orcoquizas were already using the springs for their healing qualities. Some of the early settlers, arriving at the beginning of the 19th century, recognized potential economic value in these odd, natural resources and sought to acquire the land they were located on. One of the first of these visionaries was John Veatch who selected a land grant located southeast of the future Beaumont town site especially for the large mound with corresponding mineral springs, escaping gases, and tar deposits located on the property (Linsley, Reinstra, and Styles 1976).

TEVIS BLUFF AND THE JOHN VEATCH SURVEY

Following Mexico's independence from Spain in 1821, a wave of colonists swept into Texas spreading east and settling along the Gulf Coast (Linsley, Reinstra, and Styles 1976). Noah and Nancy Tevis were a part of this wave of 'Texians' and in 1824, they were the first to settle in the area that would become Jefferson County. Their settlement and the small community surrounding it came to be known as 'Tevis Bluff' or the 'Neches River Settlement.' In 1835, business partners Henry Millard, Joseph Pulsifer, and Thomas B. Huling purchased the Tevis' land and the nearby settlement of Santa Anna on which to plat their new town of Beaumont (Isaac n.d.). The Tevis' and other initial settlers to the area found numerous mineral springs, the majority of which surrounded small hills rising above the otherwise level topography (Linnsley, Reinstra, and Styles (1976).

John Allen Veatch, a colonist from Kentucky, was one of the first to see commercial potential in these resources. Veatch had come to Texas with his wife and two children in 1833. A man with a wide range of talents, Veatch was a physician, teacher, and surveyor professionally with interests in botany, mineralogy, and geology (Linsley, Reinstra, and Styles 1976). Upon his arrival in Texas, Veatch took a job as a surveyor for the Mexican Government in Nacogdoches under the local emprasario, Lorenzo de Zavala. In 1835, as a reward for his service, he received two land grants. The first grant Veatch chose was located southeast of Tevis Bluff and encompassed a large portion of the Spindletop mound, then called Big Hill or Sour Spring Mound by the local homesteaders. It is not known exactly what Veatch planned to do with the mineral springs, natural gases, oil seepages, or tar deposits on this land but from accounts of his conversations during the Mexican War, it is clear he chose this particular land because of the presence of these natural phenomena (Linsley, Reinstra, and Styles 1976).

Despite whatever scheme he had in mind, Veatch did not remain in Texas or in possession of the land long enough to explore or exploit its natural resources. Following his service as a surgeon in the Mexican War, the prospect of gold in California lured him away from his wife and family, who he left behind in Beaumont. His wife eventually divorced him on the grounds of abandonment. Veatch never returned to Texas but continued his eclectic life in California discovering large deposits of borax and working as a curator of conchology, doctor, geologist, and professor (Wooster n.d.).

Upon his death in 1870, Veatch had no clear heirs for his land surrounding Spindletop having fathered children in Texas and California. This distance and confusion posed a large problem for the next group of men who recognized the potential in the Spindletop mound and sought to purchase the property several decades later.

EARLY ADVOCATES FOR OIL AT SPINDLETOP

The early settlers around Spindletop, including John Veatch, recognized the potential for the mineral springs, natural gases, and surface seepage but did not consider these occurrences as signs of a large oil deposit below the mound. It was not until the discovery of the Drake Well in 1859 in Pennsylvania that boring for oil was even considered possible; oil itself was not discovered in Texas until 1894.

Between its founding in 1835 and the late 1850s, Beaumont had become the county seat of Jefferson County and a center for cattle raisers and farmers. By the late 1800s its location on the Neches River and the advent of the railroads led the town to become an important lumber and rice-milling town. Although these businesses were prosperous, only a few recognized the potential for a greater source of income based once again on the strange mound southeast of Beaumont.

Patillo Higgins is commonly thought of as the hero of Spindletop for his outspoken and unshaken belief in the presence of oil beneath the mound. He was, however, not alone in his conviction. Several other men also suspected the presence of a substantial amount of oil at Spindletop and began to pursue it following the Civil War.

During the Civil War, soldiers of Spaight's Eleventh Battalion of the Confederate Army were stationed near the Spindletop mound. In 1862, the Confederate camp was used as a hospital during a yellow fever epidemic. The mineral springs surrounding the mound were used for their curative powers and those men who died were buried on top of the mound (Linsley, Reinstra, and Styles 1976). Captain George Washington O'Brien and A.B. Trowell were among the men stationed at Spindletop and both witnessed fellow soldiers lighting the gas escaping from the ground on fire for entertainment.

After returning to their law practices following the peace at Appomattox on April 9, 1865, Trowell wrote a letter to O'Brien concerning a scheme he had to make an easy fortune. Trowell believed there was a connection between the 'sour' or mineral springs, the random mounds dotting the landscape, and oil deposits. He had heard that James Ingalls, then owner of part of the original Veatch Survey, had mineral springs on his property near the Spindletop mound. Trowell urged O'Brien to buy the land with him at whatever price Ingalls asked. He was certain that no matter how much they paid, they were sure of a huge profit. For whatever reason, O'Brien did not purchase the land then but he remained determined to buy up the entire Veatch Survey in the near future (Linsley, Reinstra, and Styles 1976).

In 1866, another man interested in the possibility of finding oil near Beaumont arrived in Texas from Kentucky. In one of the first oil leases in Texas, Dr. Benjamin Taylor Kavanaugh obtained permission to drill on a portion of the Bullock Survey, located a mile east of Spindletop mound and owned by Matthew Cartwright (Sanders 1994). Although he did not succeed in finding a significant oil well, Kavanaugh did identify several veins of oil running near Spindletop. Most importantly, he met with O'Brien to discuss the likelihood of larger deposits under Spindletop strengthening the businessman's resolve to purchase the Veatch Survey (Linsley, Reinstra, and Styles 1976; Sanders 1994).

O'Brien set about untangling the legal mess of identifying which of the Veatch heirs truly owned the survey on Spindletop. Those members of the Veatch family remaining in Beaumont actually hired O'Brien and his son-in-law, Alfred Scott John, to sort through the legal issues surrounding the property and in 1888 they paid the two lawyers with 350 acres of the Veatch Survey (Sanders 1994).

While O'Brien sought means to profit directly from the oil he was sure lay under Spindletop, Patillo Higgins envisioned using the oil to create an industrial city with glass and brick factories, railroads, and a full residential district. He planned to use the oil in the production of other goods rather than focus on it as the final product. Of all of the men who sought oil beneath Spindletop, Higgins was by far the most outspoken and at times combative about his beliefs.

THE GLADYS CITY OIL, GAS AND MANUFACTURING COMPANY

A Sunday school teacher with little formal education and a strong interest in business, Patillo Higgins first thought to open a brick factory and in 1886 he established the Higgins Manufacturing Company. As part of his initial research, Higgins traveled to Indiana, Ohio, Pennsylvania, and New York where he toured brick factories to learn about the production process. While visiting these factories, he became intrigued with the use of oil and gas as an even-burning fuel and began to investigate the petroleum industry. Higgins spoke with geologists and performed his own research, reading academic journals and papers on the identification of oil deposits. He came to believe that the mineral springs, escaping gases, and other phenomena surrounding the salt dome at Spindletop were signs of oil beneath the hill (Figure 2).

Although many geologists disagreed with his conclusions, Higgins returned to Beaumont convinced of the presence of oil beneath Spindletop and pitched a new vision to anyone who would listen. He dreamt of constructing a thriving, efficient, industrial city that would transport goods by rail and by sea. Located adjacent to the salt dome, the city would have residential areas with all the amenities as well as glass and brick factories fueled directly by oil and gas wells (Sanders 1994).

Higgins finally found a partner in George W. Carroll, a prominent Beaumont lumber and rice businessmen and member of Higgins' First Baptist Church (Linsley and Rienstra n.d.). Together the two men purchased most of the remaining Veatch Survey, totaling 1077 acres. Higgins and Carroll then approached O'Brien and his daughter Emma John, Alfred Scott John's widow, about selling their holdings in the survey. O'Brien and his daughter refused to sell but instead agreed to form the Gladys City Oil, Gas and Manufacturing Company. Named after Gladys Bingham, a girl in Higgins' Sunday school class, the company brought together O'Brien's vision of producing oil and gas for profit and Higgins' dream of an efficient industrial city (Sanders 1994).

The company received its official charter in 1892 and the founding four agreed to sign their property on the Veatch Survey over to the company in exchange for shares. J. F. Lanier and Gladys Bingham also received several shares at this time, making the total number of shares 540 at the time of incorporation. Although O'Brien was the majority shareholder with 202 shares, Carroll served as the first president of the board (George Washington O'Brien Papers; Linsley and Rienstra n.d.). Higgins was appointed treasurer and also served as draftsman, designing a letterhead for the company that showed a picture of Gladys Bingham and the industrial city he envisioned. This same image was incorporated into the masthead of the town plat (Figure 2). He also worked with a surveyor to plat the actual Gladys City. The company used the money from the sale and lease of these lots to fund their first drilling attempt.

On February 17, 1893 M.B. Looney of Dallas led the first drilling attempt for the Gladys City Company with Walter B. Sharp serving as the lead driller. The drill reached a depth of 418 feet before it hit quicksand and could go no further. No oil was found. In 1895, the Savage Brothers, a West Virginia prospecting team, leased land on the Gladys City property but also failed to find oil (Sanders 1994).

Although the exact reason is unknown, by August 1895 Higgins had transferred the majority of his shares to J. F. Lanier and left the Gladys City Company (George Washington O'Brien Papers).

Without Higgins, the Gladys City Company continued to make ends meet through the lease and sale of its land. In 1896, the Texas Oil and Mineral Company signed a lease and began drilling with Walter A. Savage as manager. As with the first two wells this attempt failed to produce oil.

Meanwhile, on his own, Higgins purchased a tract of land adjacent to the Gladys City Company's holdings. He then placed an advertisement in newspapers on the east coast describing the promise of the salt dome at Spindletop offering leases on his own property (Sanders 1994).

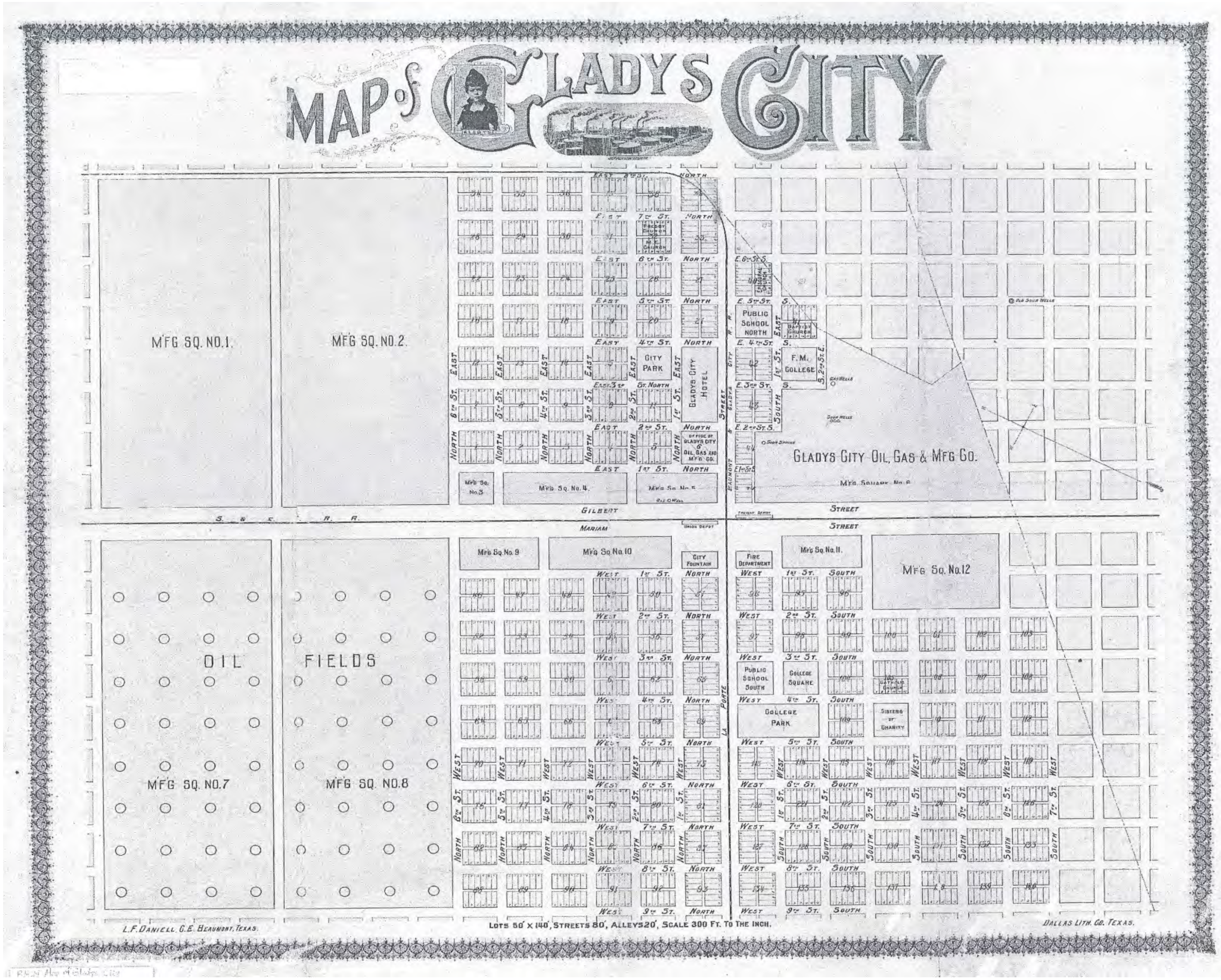

Figure 2. Plat Map of Gladys City, late 1890s.

An Austrian expatriate and petroleum engineer, Captain Anthony Francis Lucas answered the ad and journeyed to Beaumont. On June 20, 1899 Lucas signed a lease with the Gladys City Company for $33,150 and an agreement with Higgins for a one-tenth interest in the venture (Sanders 1994).

THE LUCAS GUSHER AND THE FIRST SPINDLETOP BOOM

In 1899 Lucas made his first drilling attempt attaining a depth of 575 feet before his funds ran out. In search of financial backers, Lucas approached the Pittsburgh-based team of James Guffey and John Galey. The two men had been involved with a small oil production venture in Corsicana, Texas four years earlier. Unfortunately, Galey and Guffey were also short on funds so they brought in Andrew Mellon of Pittsburg, Pennsylvania as an investor. Lucas returned to Texas to negotiate new leases on behalf of the partnership and without Higgins. On September 18, 1900 Lucas signed a lease with the Gladys City Company with Galey and Guffey leasing an adjoining tract on the McFaddin Wiess and Kyle Tract.

A little over a month later on October 27, 1900, the team started drilling their first well with Curt Hamill of the Hamill Brothers as chief driller. After facing difficulties with quicksand and other obstacles that had hindered previous teams, Hamill brought in a new, heavier rotary type bit (Wooster and Sanders n.d.). On January 10, 1901 at a depth of about 1,160 feet in depth mud began bubbling out before 6 tons of drilling pipe was shot from the hole. After a few minutes of quiet, mud, then gas, and finally oil came spurting out and rose to 100 feet in the air (Figure 3). It took the Hamills nine days to cap the geyser and by then a lake of oil six inches deep surrounded the derrick and word had spread of the discovery (Sanders 1994; Wooster and Sanders n.d.)

A gusher of this magnitude had never been seen before and people recognized the opportunity almost instantaneously. The vast amounts of oil obtained from the gusher resulted in the liquid fuel age. The increased petroleum supply was used to fuel steamships, locomotives, automotives, and factories. New techniques were sought for oil refinement, production and transportation.

Figure 3. Lucas Gusher, 1901.

Charles Ingalls owned land next to gusher and had been trying to sell it for three years at $400. When he brought news to Beaumont of Lucas' discovery, he complained that his farm was being flooded by oil. Two businessmen overheard him and immediately offered him $4,000 for it. The men then began the Lone Star and Crescent Oil Company and started drilling (Sanders 1994). Thousands flocked to Beaumont to lease land and begin drilling. By April 1901, six other gushers had come in including one found by Higgins' fledgling oil company (Gilbert Papers; Sanders 1994).

Gladys City became an instant boom town and in May 1901, the Gladys City Company paid its stockholders their first dividends (Sanders 1994). The oil produced in one day at Spindletop exceeded the international and remaining national production combined. By the summer of 1901, 214 derricks were erected and the population of Beaumont, tripled in size, growing from 10,000 to 30,000. By 1902, 132 different oil companies were listed as having producing plants on the Spindletop mound at a rate of 17 million barrels a year. Gladys City itself was mostly occupied by boarding houses, hotels, residences, grocery stores, and churches to support the throng of workers descending on Beaumont and Spindletop. There were no major brick or glass factories as Higgins had envisioned; however, there were some examples of light industry in the town including: the Southern Pacific Railroad Station, tank farms, pumping stations, iron and steel companies, tank producing companies, air plants, and blacksmith shops (Sanders 1994).

As the number of wells and derricks increased, so did the risk of fires. By 1902, 26 derricks and pumping stations were lost in the first blaze at Spindletop that continued for 12 days. At the cessation of the fire, regulations were mandated.

In 1908, Spindletop was in decline, and less than 5,000 barrels were produced. By 1924, the oilfield was deserted with few derelict houses and stores to represent the oil boom of 1901 that at one time had over 500 derricks (Figure 2).

THE SECOND OIL BOOM

Oil companies and petroleum engineers had concluded that Spindletop had been exhausted as a source of oil and gas; however, one man, Marrs McLean believed that oil was still present at the edges of the salt dome. In 1921 he obtained leases from the Gladys City Company and the McFaddin Wiess and Kyle interest. He drilled three wells to a depth of 5,400 feet before his money ran out and he was forced to find a partner. His neighbor, Frank Yount, owned an oil company that specialized in deep drilling and had producing wells in Sour Lake. On November 13, 1925 the Yount-Lee Oil Company brought in their first successful well, producing an estimated 5,000 barrels a day (Sanders 1994).

Once again, people flocked to Beaumont and Gladys City was booming again. Production on the oilfield rose from 412,000 barrels a year in 1915 to over 15 million in 1926 (Figure 4 and 5). In the first four months of 1927 alone, oil companies at the Spindletop oilfield produced over 8 million barrels (Sanders 1994). As with the earlier boom at Spindletop, the wells quickly dried up and Gladys City became a ghost town.

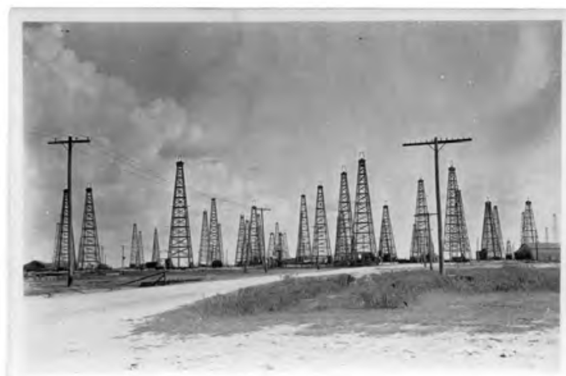

Figure 4. Overview Photograph of Spindletop in 1925. .

Figure 5. Aerial view of Spindletop in 1938.

Later Production at Spindletop

In 1936, the Texas Gulf Sulphur Company signed a lease with the Gladys City Company. The company did not begin production until 1952 when, using the Frasch Process, they were able to make nearly 2,000,000 tons of sulphur from the Spindletop salt dome (Sanders 1994).

The success of the Texas Gulf Sulphur Company sparked a second era of production at the Spindletop mound. Although nowhere near as massive as the first two oil booms, the influx of business helped keep the Gladys City Company afloat. In March of 1957 the Texas Brine Corporation signed a lease with the company to begin brine production in 1959 (Sanders 1994).

Despite the new business, in 1955 the Gladys City Oil, Gas and Manufacturing Company abandoned its charter and the company ceased to exist. The owners however, remained partners using an agency arrangement to carry out company affairs such as leases.

In 1970, the owners of the former Gladys City Oil, Gas and Manufacturing Company reorganized under a new charter as the 'Gladys City Company.' The company is still in existence and based out of Amarillo, Texas as of November 2012.

On November 13, 1966, the Spindletop Oilfield was listed in the NRHP , under Criterion A as an Event with significance in the areas of Industry and Science "associated with events that have made a significant contribution to the broad patterns of our history", pursuant to 36 CFR part 63 (THC 2012). In 1979 the site was designated a National Historic Landmark with the additional Criterion D for archeology added.

Methods

Background Review and Initial Archival Research

SWCA performed a background review to determine if any portion of the project area had been previously surveyed for cultural resources or if any archaeological sites had been previously recorded within or near the survey corridor. To conduct this review, an SWCA archaeologist examined the maps for the proposed fractionation plant and associated facilities on THC's *Texas Archeological Sites Atlas* (an online database). This resource provides information on the nature and location of any previously conducted cultural resource investigations, previously recorded archaeological sites, NRHP properties, Recorded Texas Historic Landmarks (RTHLs), State Antiquities Landmarks (SALs), and Official Texas Historical Markers (OTHMs).

In addition, aerial photographs, historic maps including the Bureau of Economic Geology Maps, and the Natural Resources Conservation Service Web Soil Survey, were also examined for information pertinent to the project area.

Field Methods

The archaeological investigations for the proposed NGL fractionation plant and associated facilities were designed to be of sufficient intensity to determine the nature, extent, and if possible, significance of any cultural resources located within the project area.

An intensive pedestrian survey with systematic shovel testing was conducted in the APE. A team of archaeologists walked the proposed project area while inspecting the ground surface for artifacts and anomalies that may indicate subsurface cultural deposits.

Subsurface explorations consisted of shovel tests placed in the vicinity of any finds or suspect landforms, and at regular intervals throughout the survey corridor and proposed area of impact. Shovel tests were excavated with a standard round-headed or square shovel until sterile stratum or 100 centimeters below surface (cmbs) was reached. The excavated matrix was screened through ¼-inch mesh hardware cloth to retrieve any cultural materials that were present. The data from each shovel test was recorded on standardized shovel test forms and the location of the test was recorded using a handheld Global Positioning System (GPS) unit.

The survey was of sufficient intensity to determine the nature, extent, and significance of any cultural resources located within the proposed project area. The survey met all THC minimum archaeological survey standards.

RESULTS

BACKGROUND REVIEW AND INITIAL ARCHIVAL RESEARCH

The background literature review and initial archival research revealed that 0.92-miles of the eastern-most portion of the project area are within the NRHP- and NHL-listed Lucas Gusher, Spindletop Oil Field. Ten archeological sites associated with the Spindletop NRHP and NHL property are within a one-mile buffer of the APE, and two sites, 41JF90 and 41JF84, are within the APE (Table 2).

Numerous surveys have been conducted within NRHP- and NHL-listed Spindletop property, resulting in the identification of archaeological sites and loci, all related to the oil extraction at there and associated contemporary domestic occupations.

Site 41JF84 was identified during a 2007 survey by Panamerican Consultants, Inc. (Panamerican), while contracted by Ecology and Environment, Inc. Cultural materials related to Site 41JF84 suggest this site was both a domestic site and oil production locale from the twentieth century. The site was originally identified as having six separate loci consisting of brick features, buried storage tanks, standing wooden tanks, and artifact scatters (Karbula and Stinchcomb 2010).

Panamerican continued survey from March to May of the same year, identifying Sites 41JF85, 41JF86, 41JF87, 41JF88 and 41JF89. All five of these sites are comparable to Site 41JF84, with evidence of domestic occupation and the oil industry. The six sites identified by Panamerican during 2007 are all within close proximity to one another (0.1 to 0.25-mile radius), contemporaneous, and similarly defined. Because of this, all sites are now defined as being loci in one large site identified by trinomial 41JF84 and within the Spindletop salt dome, occupying the area bounded by Port Arthur Road, Spindletop Avenue, Highland Drive and Amico Road (James Karbula, Personal Communication 2012).

In August of 2007, Panamerican identified sites 41JF90 and 41JF91, located east and west of Spindletop Salt Dome, respectively. Both sites are defined as domestic residences dating from the early- to mid-twentieth century. These two sites were later determined to be a part of the overall site (41JF84) in coordination with the THC and James Karbula (Karbula 2010:79).

Additional linear and area surveys were conducted in 2008, 2009 and 2010 by

William Self Associates, Inc (WSA), to fulfill obligations with the Federal Energy Regulatory Commission (FERC). WSA examined the industrial and residential features contemporary to the two oil booms at Spindletop (1901 to 1908, and 1925 to 1936). Almost 1,800 historic artifacts related to residential occupancy and oil extraction were identified in the area that overlaps with the eastern portion of the current survey corridor. Among these artifacts, were bottle glass, ceramics, metal pipe fragments, nails, brick, mortar, rubber, ball bearings, and washers among others. The 90 acre parcel examined (Karbula 2010) identified as many as 11 zones of archaeological sensitivity (ASZs 1 to 11) with additional recommendations for further testing in specific areas. The current project area is not located in any of the 11 zones identified by Karbula 2010.

James Karbula has most recently prepared a report documenting further Phase II investigations within the 90-acre tract (Karbula 2012). The report was not available at the time of the preparation of this report, though we understand that the report has been recently reviewed by the THC. SWCA contacted James Karbula and discussed his work and he provided guidance on the methodology of his overall work at Spindletop (Karbula, personal communication 2012).

Moore Archaeological Consultants conducted surveys within the NRHP-listed Spindletop boundary in 2010. Sites 41JF93, 41JF94, 41JF95 and 41JF96 were identified during these surveys. These sites were all industrial and/or residential sites contemporaneous to the Spindletop oil booms.

Table 2: Cultural Resources within one mile of the Proposed NGL Fractionation Plant and Associated Facilities.

USGS Quadrangle	Site No.	Distance	Type	Time Period	Comments
Beaumont East	**41JF96**	[redacted]	Industrial & residential	Early to mid-20th century	Site has research value related to Spindletop
Beaumont East	**41JF95**	[redacted]	Residential	Early to mid-20th century	Dense domestic artifacts; site has research value related to the domestic side of Spindletop
Beaumont East	**41JF94**	[redacted]	Industrial	20th century	Remains of field structure; site has research value related to Spindletop
Beaumont East	**41JF93**	[redacted]	Industrial	20th century	Site consists of two wooden oil storage tanks and associated apparatus; additional testing recommended
Beaumont East	**41JF91** (now a component of 41JF84)	[redacted]	Residential	Early 20th century	No additional work necessary; site is disturbed with no intact deposits
Beaumont East	**41JF90** (now a component of 41JF84)	[redacted]	Residential	Early to mid-20th century	Surface scatter only; heavily disturbed with no intact deposits
Beaumont East	**41JF89** (now a component of 41JF84)	[redacted]	Residential	Early to mid-20th century	Heavily disturbed with no intact deposits
Beaumont East	**41JF88** (now a component of 41JF84)	[redacted]	Residential	Early to mid-20th century	No additional work necessary; site is disturbed with no intact deposits; surface scatter only
Beaumont East	**41JF87** (now a component of 41JF84)	[redacted]	Industrial & residential	Early to mid-20th century	Surface scatter only; heavily disturbed with no intact deposits
Beaumont East	**41JF86** (now a component of 41JF84)	[redacted]	Industrial & residential	Early to mid-20th century	Surface scatter only; heavily disturbed with no intact deposits
Beaumont East	**41JF85** (now a component of 41JF84)	[redacted]	Industrial & residential	Early to mid-20th century	Surface scatter only; heavily disturbed with no intact deposits
Beaumont East	**41JF84**	[redacted]	Industrial & residen[redacted]al	Early to mid-20th century	Now includes all features related to sites 41JF85-41JF91

FIELD SURVEY

Between October 24 and December 6, 2012, SWCA conducted an intensive archaeological survey for the proposed NGL fractionation plant and associated linear facilities. Investigations were concentrated in the 386.5-acre APE. Linear investigations were conducted within a 100-foot-wide survey corridor and generally consisted of an intensive pedestrian survey with shovel tests excavated at 100 m intervals, with any deviations discussed. The proposed fractionation plant locations were investigated with an intensive pedestrian survey with transect spaced at 30-meter intervals and shovel tests excavated along transects placed throughout the entire area in a 100-m grid pattern.

The majority of the project area has been disturbed by collocated pipelines, electric corridors, and industrial activities (Figures 6, 7, and 8). The majority of the southern and eastern linear survey corridors are currently utilized for agricultural purposes, specifically cow pastures and ranchlands (Figure 9). The eastern portion has also been heavily altered from years of past and present oil extraction. Soils in this portion of the project area are often truncated and typically prone to runoff. The project area located south of Hillebrandt Bayou and adjacent to Hillebrandt Road has been used for rice cultivation and is currently being utilized as pasture and ranchland (Figure 10).

Figure 6. Previous well pad disturbance at ST-25, view northeast.

Figure 7. Detail showing disturbance at previous well pad, plan view from ST-25.

Figure 8. Existing pipeline disturbance within the survey corridor, view east.

Figure 9. Current land use in southern portion of the project area, view northwest.

Figure 10. Overview of southern parcels located south of Hillebrandt Bayou, view north.

Investigation of the eastern-most 0.6-linear mile portion of the project area (totaling 7.3 acres of land) east of Highland Avenue consisted of a pedestrian survey only with no shovel testing due to heavy disturbances associated with current industrial use and related standing facilities (Figures 11, 12, 13 and 14). In these areas, soils were typically truncated and often overlain with fill. Standing water in these areas (including a nearby pond) is the result of subsidence after the extraction of oil (Figure 15).

A total of 223 shovel tests were excavated throughout the 385-acre project area, 27 of which were positive for twentieth century materials associated with previously identified sites 41JF84 and 41JF90 (discussed in detail below; Appendix A). Four shovel tests were attempted but not excavated because of modern industrial features and heavily disturbed areas (Figure 12).

A typical shovel test within the project area contained one to two strata in profile. When present, Stratum I typically extended from ground level to approximately 20 cmbs and contained a dark brown (10YR3/3) to brown (7.5YR4/3) clay or loamy clay. Stratum II extended from the base of Stratum I and was typically a very dark gray (10YR 3/1) or dark gray (10YR4/1) clay with iron-oxide mottles that appeared as strong brown (7.5YR 4/6) mottles.

Figure 11. ST-35B, not excavated, artificial berm in foreground.

Figure 12. Survey corridor west of Port Arthur Road, no shovel testing conducted.

Figure 13. Survey corridor west of Port Arthur Road, no shovel testing conducted.

Figure 14. Survey corridor east of Highland Avenue, no shovel testing conducted.

Figure 15. Survey corridor east of Highland Avenue, no shovel testing conducted. Pond created by the compression of sediments in background, view southeast.

SITES 41JF84 AND 41JF90

Sites 41JF84 and 41JF90 were relocated and examined during the current effort. During the investigations, a displaced sheet of refuse comprised of associated twentieth-century materials was observed throughout the majority of the survey corridor located east of West Port Arthur Road and the pond located west of Highland Avenue (Figure 1 and Appendix A). The material extends east, encompassing the previously recorded boundary for site 41JF90 and also crosses into site 41JF84 (Appendix A).

Archaeological investigation of this area consisted of a pedestrian surface survey and systematic subsurface testing with shovel tests excavated at 10-meter interval down the center of the project corridor.

The artifact assemblage encountered consists of domestic ceramics, glass, and metal fragments. Domestic ceramics include whiteware, porcelain, and stoneware. Brick fragments were also identified. The glass assemblage consists of aqua, cobalt, colorless, and amethyst glass shards. These cultural materials are contemporaneous with the 1925 to 1936 residential anomalies located in the northwestern portion of the triangular swath that is identified by the 41JF84 site boundary (Karbula and Stinchcomb 2010; Figures 16, 17, and 18).

Artifacts were typically observed on ground surface to 20 cmbs. Subsurface tests encountered a disturbed layer at the surface overlying a Bt horizon. Subsurface artifacts were of very low density, and soil profiles indicated disturbance resulting from industrial use and erosion. No intact cultural features were identified during the current effort.

Figure 16. Example of surface materials associated with site 41JF84.

Figure 17. Example of surface materials associated with site 41JF84.

Figure 18. Whiteware and glass associated with 41JF84 and recovered from ground surface to 20cmbs.

The continuity of similar cultural material between sites 41JF84 and 41JF90 concurs with the assessment of the THC and James Karbula that the deposits located at Site 41JF90 are part of the overall site deposits at Spindletop (i.e. Site 41JF84). However, for the purposes of this report SWCA has extended the boundary of Site 41JF84 that is on recorded at TARL, which includes deposits within 41JF90 (Appendix A).

Initial archival information indicates that as early as 1938, two anomalies (possible features/structures) are depicted within the current project corridor (Appendix A: 1938 Aerial Photo). One anomaly corresponds to the previous site boundary for 41JF90, while the other anomaly is located approximately 60 to 80 meters northeast of Site 41JF90. Later aerial photographs suggest that these structures had been razed by 1953. Additional historical maps indicated that the project corridor followed established roads from 1901 to 1953, or have been subsequently developed by modern facilities (Appendix A, C, and D). SWCA did not locate any intact features at these two anomaly locations. Based on the investigations conducted to date, the extension of 41JF84 consists of a surficial scatter of fragmentary domestic materials with little potential to contribute any research value to our understanding of activities at Spindletop.

NRHP SIGNIFICANCE REQUIREMENTS

In order for a property to be eligible for placement or consideration for listing on the National Register of Historic Places (NRHP) the following eligibility criteria must be met.

The eligibility criteria for listing in the NRHP includes sites, districts, buildings, structures, and objects that are at least 50 years old and conform to at least one of the following criteria (taken from 36 Code of Federal Regulation [CFR] Part 60):

(A) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(B) that are associated with the lives of persons significant in our past; or

(C) that embody distinctive characteristic of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(D) that have yielded, or may be likely to yield, information important in prehistory or history.

The eligibility criteria above also state that a property must be "significant" in order to be NRHP-eligible. In order to determine what "significant" means, the property's place in local, state, or national history must be understood through its historic context. It is not enough for a property to be interesting in and of itself, it must also be a representative of a broader pattern of history—whether it is an event or person that changes existing patterns of society, a style or form of technology that changes the way people saw and did things, or something that provides valuable information about our own history that would otherwise be lost. If the property can be linked with a historic context that describes an important aspect of history, whether it is the history of a local community or a sign of nationwide change, the property is considered significant, and may be eligible for listing in the NRHP.

If a property is more than 50 years old and is significant, the final aspect to be evaluated is integrity. The property must be able to convey its significance, i.e., to adequately represent in a physical way what makes the property special. When the significant aspect of the property is physical (such as an architectural form or technological innovation), the evaluation of the property is easier; it must retain those attributes that make it significant, such as design, materials, and workmanship. However, if the association with history is an idea, person, or event, the physical representation of significance is more abstract. The property must convey to those who see it the same environment (time and place) where the significant event happened or person lived/worked. Aspects of integrity such as location, setting, feeling, and association are very important to the significance of these types of properties in order to provide a sense of place and time. Properties that are eligible for the historic information they can provide, usually prehistoric archaeological sites or historic properties that have little or no documentary information, primarily require feature integrity (location, design, and materials) best capable of providing the desired information.

Above Ground Historic Resource Assessment

SWCA conducted additional background research to better understand the historic context of the development and history of the Spindletop Oil Field. This research included the review of the results of the archeological investigations including site photographs. As there are no remaining above ground buildings, structures or objects located within the APE, SWCA recommends that this area is NOT ELIGIBLE for listing on the NRHP under Criteria B or C. The current NRHP and NHL designations (Criteria A and D) will not be threatened or compromised by the proposed project activity.

Wastewater Discharge Pipeline Assessment of Archaeological Site Potential

SWCA was notified by DCP of a proposed wastewater discharge pipeline that will extend from the proposed fractionation plant to the Hillebrandt Bayou to the west (Figure 1). The proposed wastewater discharge pipeline will extend for 900 feet encompassing approximately 1.5 acres (within a 75-foot-wide project corridor) (Figures 1 and Appendix A). SWCA has examined the location for the proposed wastewater discharge pipeline and has assessed this area as having low buried archaeological site potential consisting of lowland soils (Beaumont clay and Fausse clay) that are very poorly drained that formed in clayey sediments. At the time of the original survey this area was entirely inundated with standing water and is typically flooded (Figure 19). No further archaeological investigations of the proposed location of the wastewater discharge pipeline are recommended as currently designed.

Figure 19. Overview of Lowland Landform in the Vicinity of the Proposed Wastewater Discharge Pipeline

Summary and Recommendations

On behalf of DCP Midstream LP, SWCA conducted an intensive archaeological survey for the proposed fractionation plant and associated facilities, in Jefferson County, Texas. DCP has filed for a GHG Permit with the USEPA. As such, investigations were conducted in accordance with the NHPA, in addition to regulatory obligations associated with the acquisition of a USACE permit (33 CFR Part 325, Appendix C [Processing Department of Army Permits: Procedures for the Protection of Historic Properties; Final Rule 1990; with current Interim Guidance Document dated April 25, 2005]).

A background literature review revealed that the eastern-most 0.92-miles of the project area are within the NRHP- and NHL-listed Lucas Gusher, Spindletop Oil Field area (Spindletop NRHP and NHL). Ten archaeological sites associated with Spindletop are within a one-mile buffer of the project area, and two sites, 41JF90 and 41JF84, are within the area of potential effect (APE). SWCA understands that with the recent work of James Karbula (2010:79) in coordination with the THC, the THC has determined that Site 41JF90 is now subsumed as being part of the overall Spindletop archaeological site 41JF84 along with Sites 41JF85 through 89 and 91. In addition, James Karbula (2012) has recently completed the reporting of further testing and mitigation efforts at Site 41JF84. The results of which were not published prior to completion of this report.

After a review of the project area soils, geology, and known sites within the vicinity, a team of SWCA archaeologists conducted an intensive archaeological survey of the proposed fractionation plant and associated facilities. In accordance with THC standards, 223 shovel tests were systematically excavated throughout the proposed 386.5-acre project APE. No new archaeological resources were identified during the investigations. No artifacts were identified outside of the NRHP- and NHL-listed Spindletop area.

Current investigations of the APE within the Spindletop NRHP and NHL area located a low density surface scatter of early twentieth century cultural materials extending east from West Port Arthur Road to the west side of an existing pond located west of Highland Avenue that are all associated with Site 41JF84. The remaining portions of the project corridor east and south of Highland Drive were highly disturbed by modern facilities and modern buried pipelines. SWCA located no intact features within the current project corridor within the Spindletop NRHP / NHLboundary. Initial archival information indicates that as early as 1938, two anomalies (possible features/structures) are depicted within the current project corridor. One anomaly corresponds to the previous site boundary for 41JF90, while the other anomaly is located approximately 60 to 80 meters northeast of Site 41JF90. Later aerial photographs suggest that these features structures had been razed by 1953. Additional historic maps indicated that the project corridor followed established roads from 1901 to 1953, or have been subsequently developed by modern facilities (Appendix A, C, and D).

Based on the results of the survey, it is SWCA's preliminary opinion that the portion of 41JF84 identified within the proposed project corridor possesses little research value. SWCA conducted additional archival research in order to determine to what extent if any the proposed undertaking would impact the NRHP- and NHL-listed Lucas Gusher, Spindletop Oilfield. An SWCA historian visited the Tyrell Historical Library in Beaumont, Texas, the Woodson Research Center associated with Fondren Library at Rice University, and utilized a number of secondary sources to construct a more detailed context of the Spindletop oilfield.

The Spindletop Oilfield was listed in the NRHP in 1966 as a Site under Criterion A as an Event with significance in the areas of Industry and Science (NRHP number 66000818). In 1979, the Lucas Gusher and the Spindletop Oil Field, comprising industrial and residential structural and archeological remains dating to the Oil Boom periods of 1901-1908 and 1925-1936, were listed as a National Historic Landmark (NHL). There are no remaining buildings, objects, or structures associated with the Event within the proposed APE. As the pipeline will be buried within the NRHP boundary, SWCA anticipates no visual effect to any extant significant resources located outside the project corridor. Likewise, SWCA recommends that none of the findings within the APE are eligible under Criteria B, C, and D. As such SWCA recommends that the proposed undertaking will have no adverse effect on the integrity of the NRHP-listed Lucas Gusher, Spindletop Oilfield.

With regard to potential visual effects, the proposed plant is located approximately 2.3 miles from the NRHP-listed Lucas Gusher, Spindletop Oilfield. Although no formal viewshed analysis was conducted as part of this work, SWCA anticipates that the proposed undertaking will result in no adverse visual effect to the Spindletop Oilfield NRHP and NHL property. In a meeting held on December 12, 2012, staff from the Architecture Division of the Texas Historical Commission indicated agreement with this assessment.

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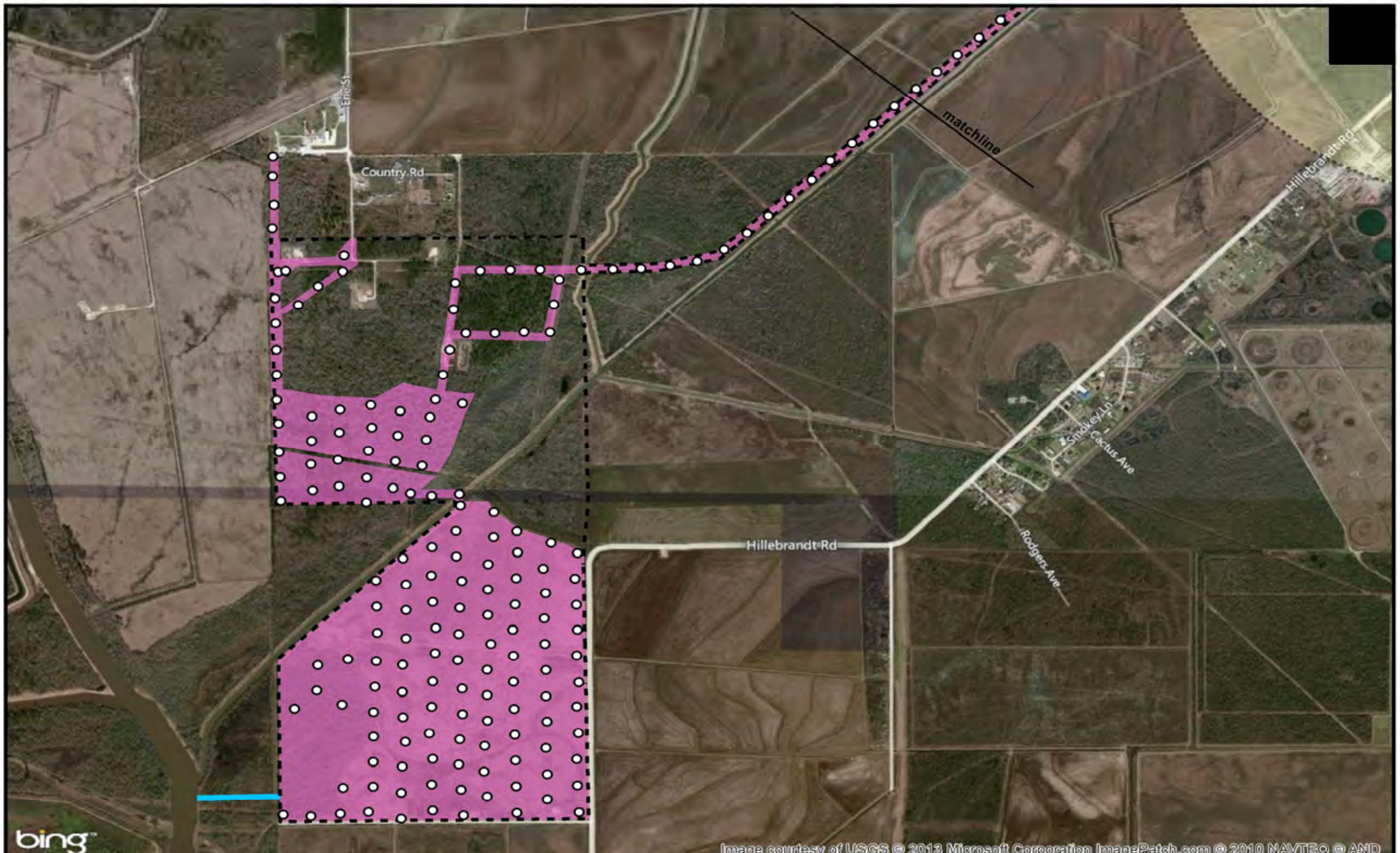
APPENDIX A
PROJECT ALIGNMENT SHEETS



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Sheet 1 of 2

NGL FRACTIONATION PLANT

Project Area

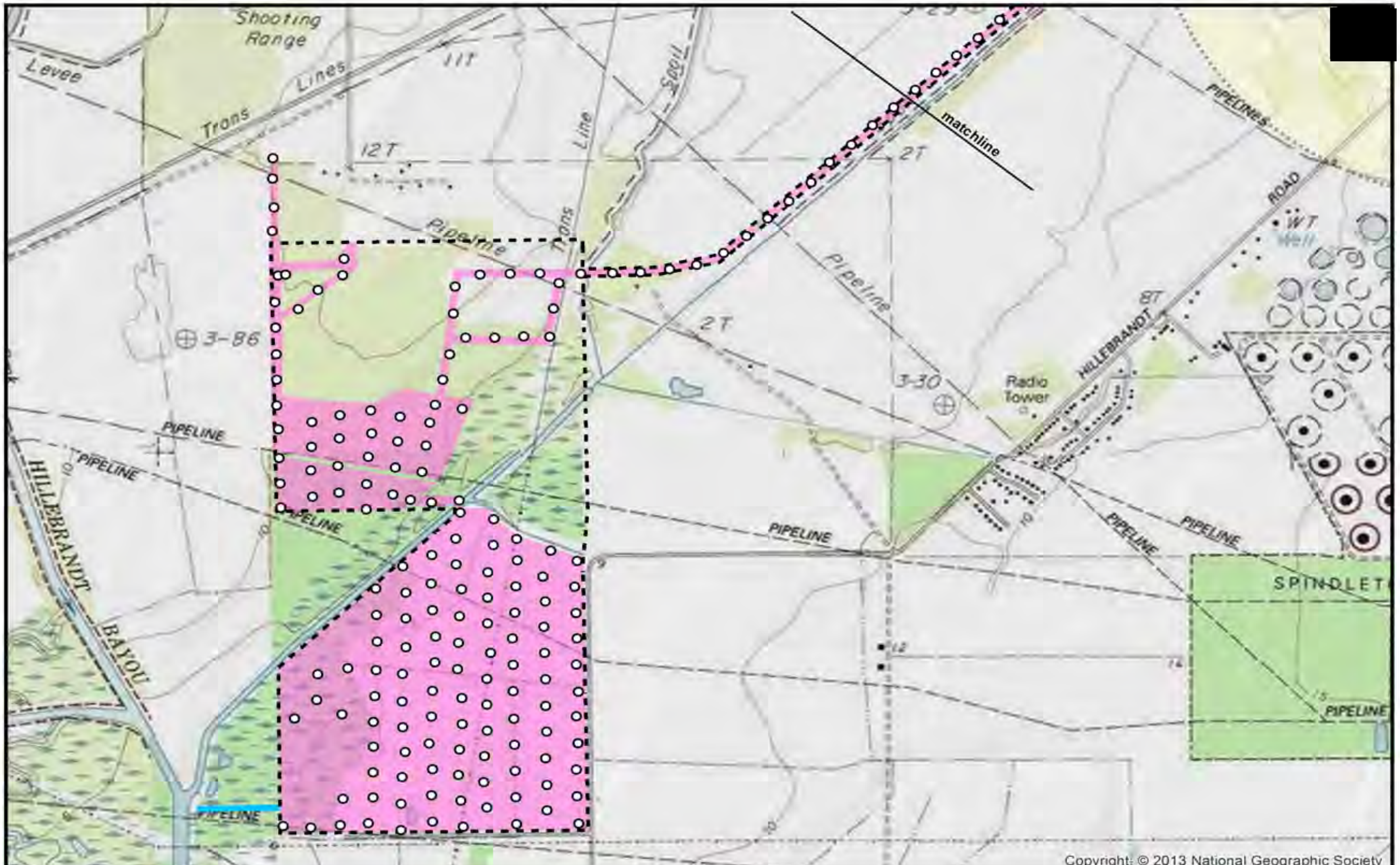
0 0.125 0.25 0.5 Miles

Background: BING Aerial Imagery
Scale: 1:19,000'
Project No. 24942
April 23, 2013

N

Positive Shovel Test
Negative Shovel Test
Not Excavated
Lucas Gusher, Spindletop Oil Field National Register District
Previous Site
Survey Area
Property Boundary
Wastewater Discharge Pipeline

This map has been redacted.



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SWCA
ENVIRONMENTAL CONSULTANTS
Sheet 1 of 2

NGL FRACTIONATION PLANT

Project Area

0 0.125 0.25 0.5 Miles

Background: USGS Topographic Map
Scale: 1:19,000
Project No: 24942
April 23, 2013

N

- Positive Shovel Test
- Negative Shovel Test
- Not Excavated
- Lucas Gusher, Spindletop Oil Field National Register District
- Previous Site
- Survey Area
- Property Boundary
- Wastewater Discharge Pipeline

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This map has been redacted.

APPENDIX B
AERIAL PHOTOGRAPH

This map has been redacted.

APPENDIX C
SHOVEL TEST DATA

Appendix C: Shovel Test Data

Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
10/24/12	A1	0-45	N	10YR5/2	Clay Loam	Mottled 10YR 4/6	Compact soil and roots	Mixed woods highly disturbed
	A2	0-40	N	10YR5/2	Clay Loam	Mottled 10YR 4/6	Compact soil	Mixed woods highly disturbed
	A3	0-25	N	10YR5/2	Clay Loam	Mottled 10YR 4/6	Compact soil	Mixed woods highly disturbed
	A4	0-10	N	10YR5/2	Clay Loam	Mottled 10YR 4/6		Mixed woods regrowth
		10-25	N	10YR5/1	Clay Loam	Mottled 10YR 4/6	Basal clay	
	A5	0-20	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods highly disturbed
	A6	0-25	N	10YR5/1	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods disturbed
	A7	0-30	N	10YR5/2	Clay	Mottled 10YR 4/6	Compact soil	regrowth mixed woods disturbed
	A8	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods
	A9	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Regrowth mixed woods disturbed
	A10	0-20	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods
	B1	0-15	N	10YR5/2	Clay	Mottled 10YR 4/6		
		15-20	N	10YR4/6	Clay	Mottled 10YR 5/7	Basal clay	Mixed woods
	B2	0-20	N	10YR5/1	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods
	B3	0-30	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Sec growth
	B4	0-20	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Sec growth
	C1	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Sec growth highly disturbed
	C2	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Sec growth highly disturbed
	C3	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Sec growth highly disturbed
	C4	0-20	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	D1	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods
	D2	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging

Appendix C: Shovel Test Data

Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	D3	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	D4	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	D5	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	E1	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	E2	0-25	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	E3	0-10	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	E4	0-30	N	10YR5/2	Clay		Basal clay	Mixed woods regrowth disturbed from logging
	F1	0-15	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	F2	0-35	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	F3	0-35	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	F4	0-35	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
	G1	0-30	N	10YR5/2	Clay	Mottled 10YR 4/6	Basal clay	Mixed woods regrowth disturbed from logging
11/6/12	ST-1	0-20	N	10YR3/3	clay			by a creek
		20-26	N	10YR5/4	clay			

Appendix C: Shovel Test Data

Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
		26-36	N	10YR2/1	clay		compact soil	
	ST-2	0-45	N	10YR4/1	clay	7.5YR4/6 mottles	compact soil	field
	ST-3	0-40	N	7.5YR4/4	clay	mottled with 40% ferrous inclusions, 10YR6/8 clay	compact soil	pasture
	ST-4	0-31	N	10YR3/1	clay	7.5YR4/6 mottles	compact soil	in grassy cow pasture; clay is extremely sticky at base
	ST-5	0-40	N	10YR4/1	clay	7.5YR4/6 & 10YR4/3 mottles	compact soil	
	ST-6	0-26	N	10YR3/3	clay			
		26-45	N	10YR5/4	clay		compact soil	
	ST-7	0-35	N	7.5YR4/4	clay	mottled with 60% ferrous inclusions, 10YR6/8 clay		pasture
		35-40	N	7.5YR6/8	basal clay		basal clay	
	ST-8	0-34	N	10YR3/1	clay	7.5YR4/6 mottles	compact soil	in grassy cow pasture; clay is extremely sticky at base
	ST-9	0-26	N	10YR3/3	clay			
		26-40	N	10YR2/1	clay		compact soil	
	ST-10	0-40	N	10YR4/1	clay	7.5YR4/6 mottles	compact soil	
	ST-11	0-30	N	10YR3/1	clay	7.5YR4/6 mottles	compact soil	~30 m west of transmission line; soils are extremely compact and sticky at base
	ST-12	0-40	N	7.5YR4/4	clay	mottled with 50% ferrous inclusions, 10YR6/8 clay	compact soil	

Appendix C: Shovel Test Data

Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	ST-13	0-6	N	10YR5/1	clay	gravel (~ 10 mm in diameter)		
		6-30	N	10YR3/3	clay			
		30-40	N	10YR2/1	clay		compact soil	
	ST-14	0-30	N	7.5YR6/3	clay	heavily mottled with hydric, basal and other clay		by canal bank; probably disturbed from corral and two-track
		30-50	N	7.5YR6/3	clay	hydric clay (10YR7/8) mottles	basal clay	hydric clays (10YR8/1) at base
	ST-15	0-20	N	10YR2/2	loam clay			dense vegetation including palmetto, deciduous and tall weeds
		20-33	N	10YR3/1	clay	7.5YR4/6 mottles	compact soil	
	ST-16	0-16	N	10YR3/2	clay			
		16-28	N	10YR2/1	clay			
		28-38	N	2.5Y4/2	clay		compact soil	
	ST-17	0-35	N	7.5YR6/3	clay	10% ferrous mottling	compact soil	along existing power line corridor
	ST-18	0-50	N	10YR4/1	clay	7.5YR4/6 & 10YR5/6 mottles	compact soil	
	ST-19	0-28	N	2.5Y4/2	clay			
		28-38	N	2.5YR5/3	clay	10YR6/4 mottles	compact soil	
	ST-20	0-27	N	10YR2/2	clay	organics		dense new-growth
		27-37	N	10YR3/1	clay	7.5YR4/6 mottles	compact soil	
	ST-21	0-28	N	10YR5/2	clay			
		28-38	N	10YR5/1	clay	50% 10YR5/4 mottles	compact soil	

Appendix C: Shovel Test Data

Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	ST-22	0-50	N	10YR6/1	clay	10YR8/1 mottles	compact soil	
	ST-23	0-20	N	7.5YR6/3	clay	60-70% hydric clay mottles and ferrous inclusions		along existing corridor and heavily rutted two-track
		20-40	N	7.5YR6/3	clay	40% hydric ferrous clay mottles	compact soil	
	ST-24	0-20	N	10YR6/2	clay			near dirt road
		20-37	N	10YR5/2	clay	2% 10YR5/4 mottles	compact soil	
	ST-25	0-50	N	10YR3/1	clay	10YR2/2 & 7.5YR4/3 mottles	compact soil	in old well pad; area is very disturbed; soils smell (faintly) of oil/gas; decaying wood throughout
	ST-26	0-30	N	10YR4/1	clay	10YR4/3 streaks	compact soil	
	ST-27	0-35	N	7.5YR6/3	clay	heavily mottled with hydric and basal	basal clay	along existing corridor and heavily rutted two-track; basal clay mottles increase with depth
	ST-28	0-20	N	7.5YR6/3	clay	heavily mottled with hydric and basal		along existing corridor and heavily rutted two-track
		20-40	N	7.5YR6/3	clay		compact soil	
	ST-29	0-45	N	10YR4/1	clay	10YR4/3 streaks	compact soil	
	ST-30	0-20	N	10YR2/2	clay			
		20-40	N	10YR8/1	clay	10YR5/6 mottles	compact soil	
	ST-31	0-26	N	10YR5/2	clay			
		26-36	N	10YR5/1	clay		compact soil	
	ST-32	0-35	N	7.5YR6/3	clay	20% yellow mottles	compact soil	thick brush along an existing pipeline

Appendix C: Shovel Test Data

Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	ST-33	0-20	N	10YR6/1	silt clay			mixed woods
		20-50	N	10YR4/1	clay	7.5YR4/6 mottles	compact soil	
	ST-34	0-27	N	2.5Y4/2	clay	10YR6/1, 10YR6/6, 10YR4/3 2.5YR4/6 & 7.5YR5/6 mottles		heavily disturbed; on edge of well-pad; gravel on surface
		27-38	N	10YR3/1	clay	7.5YR4/6 mottles	compact soil	compact throughout
	ST-35	0-36	N	10YR5/2	clay			
		36-50	N	10YR3/1	clay		compact soil	
11/7/12	ST-35B	NE	NE	NE	NE	NE	not excavated	on bermed area, south of creek
	ST-36	0-20	N	7.5YR6/4	silt			pasture; collocated with existing lines; near canal; compact throughout
		20-40	N	10YR8/2	silt	mottled with 30% ferrous inclusions	compact soil	
	ST-37	0-30	N	10YR5/2	clay			open field, grasses
		30-40	N	10YR5/1	clay		compact soil	
	ST-38	0-35	N	10YR4/1	clay	5% gravel & 7.5YR4/6 mottles	compact soil	
	ST-39	0-20	N	10YR3/1	clay	7.5YR4/6 mottles	compact soil	extremely compact; 10 m west of pipeline; off two-track
	ST-40	0-30	N	7.5YR6/3	silt clay	40% red & yellow clay mottles	compact soil	pasture; collocated and along canal
	ST-41	0-35	N	10YR3/1	clay	7.5YR4/6 mottles; 0-10 cmbs: few limestone gravels	compact soil	gravels are likely from road, 15 m south of STP
	ST-42	0-30	N	10YR5/2	clay			open field

Appendix C: Shovel Test Data

Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
		30-40	N	10YR5/1	clay		compact soil	
	ST-43	0-30	N	10YR4/1	clay		compact soil	very disturbed
	ST-44	0-35	N	7.5YR6/3	clay	20% red clay mottles	compact soil	pasture; collocated and along canal
	ST-45	0-40	N	7.5YR4/3	clay	20% red clay mottles	compact soil	pasture; collocated and along canal
	ST-46	0-31	N	10YR3/1	clay	very few 7.5YR4/6 mottles	compact soil	10 m west of a linear berm; sticky and pliable clays
	ST-47	30-40	N	10YR5/1	clay	2% 10YR5/6 mottles at base	compact soil	
	ST-48	0-40	N	10YR4/1	clay	few 7.5YR4/6 mottles	compact soil	disturbed
	ST-49	0-15	N	7.5YR4/3	clay			pasture; collocated and along canal
		15-40	N	10YR6/4	clay		compact soil	
	ST-50	0-30	N	10YR3/1	clay	very few 7.5YR4/6 mottles	compact soil	area looks very disturbed, with berms and ruts; collocated with pipeline
	ST-51	0-26	N	10YR5/2	clay			start of forested area
		26-36	N	10YR5/1	clay		compact soil	
	ST-52	0-40	N	10YR4/1	clay	10YR5/6 inclusions	compact soil	
	ST-53	0-15	N	10YR6/4	clay			young-growth pasture; possible marsh? Collocated
		15-35	N	heavily mottled	hydric clay		compact soil	hydric, basal and 10YR6/4 clay mixed equally
	ST-54	0-31	N	10YR3/1	clay		compact soil	~10 m northwest of north-south oriented pipeline; remains collocated with east-west pipeline

Appendix C: Shovel Test Data

Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	ST-55	0-30	N	10YR2/2	clay			
		30-40	N	10YR3/1	clay		compact soil	
	ST-56	0-10	N	7.5YR6/2	clay			young-growth pasture; possible marsh? Collocated
		10-35	N	7.5YR6/2	hydric clay & clay		compact soil	
	ST-57	0-40	N	10YR5/1	clay		compact soil	very dry
	ST-58	0-30	N	10YR4/1	clay	few 10YR5/4 and 7.5YR4/6 mottles	compact soil	~5 m north of pipeline
	ST-59	0-40	N	7.5YR6/3	clay	50% red & yellow clay mottles	compact soil	young-growth pasture; collocated
	ST-60	0-30	N	10YR5/1	clay	10YR5/6 mottles		
		30-45	N	10YR4/1	clay	10YR5/6 mottles	compact soil	
	ST-61	0-35	N	7.5YR4/6	clay	60% red clay mottles		young-growth; immediately adjacent to active DCP worksite
		35-45	N	7.5YR5/3	hydric clay		basal clay	
	ST-62	0-40	N	10YR5/2	clay		compact soil	offset to test drainage
	ST-63	0-27	N	10YR5/2	clay			on edge of stream, in forested area
		27-37	N	10YR4/1	clay		compact soil	
	ST-64	0-20	N	10YR3/3	loam clay	10YR4/6 mottles		flood zone; probable alluvial deposit
		20-30	N	10YR3/1	clay		compact soil	~ 10 m west of creek
11/13/12	ST-1	0-20	N	7.5YR4/3	Loam			with organics the area is very disturbed 10 meters ssw of barbed wire
		20-50	N	10YR6/1	Sandy clay	Mg+Fe concretions few	compact soil	clay content increases with depth

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
						mottles 10YR5/4		
	ST-2	0-26	N	10YR4/3	silt loam			inside fence
		26-36	N	10YR3/3	clay		compact soil	
	ST-3	0-35	N	10YR5/3	silt loam clay		compact soil	mixed regrowth
	ST-4	0-28	P	10YR5/3	silt loam			4 pieces of glass 8 pieces of w.w.
		28-34	P	10YR5/1	clay			2 pieces of flat glass aquamarines 1 piece of clear flat glass
		34-45	N	10YR5/1	clay		compact soil	slightly more grey
	ST-5	0-15	P	10YR5/1	silt loam clay			1 piece of clear glass
		15-35	P	10YR4/1	clay	7.5YR4/6 mottles	compact soil	1 brick fragment
	ST-6	0-20	P	10YR3/3	loam			in wood line 5 meters south of barbed wire
		20-30	N	10YR3/2	Clay	Mottles 7.5YR4/6 + a few red mottles	compact soil	extremely compact,0-10cmbs gls,w.w.,stoneware,c.c,10-20cmbs glass,w.w
	ST-7	0-30	N	10YR5/1	silt loam clay		compact soil	mixed regrowth
	ST-8	0-25	N	10YR3/2	Clay	Mottles 7.5YR4/6 + a few red mottles		clay reamins compact comparable to rock density
		25-35	N	10YR3/2	Clay	Mottles 7.5YR4/6 + a few red mottles	compact soil	limestone gravel 0-10 cmbs
	ST-9	0-27	P	10YR4/3	silt loam			1 clear glass bottle fragment
		27-45	P	10YR5/2	clay			8 iron fragments on surface 1 clear glass bottle fragment 1 flat glass fragment
		45-70	N	10YR5/2	clay		compact soil	

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	ST-10	0-15	P	10YR5/1	silt loam clay			1 sherd of w.w.
		15-35	N	10YR5/3	silt loam clay	7.5YR4/6 mottles	compact soil	
	ST-11	0-52	P	10YR3/2	Clay loam	7.5YR4/6 mottles	compact soil	clay content increases with depth surface (1) glass,0-10 cmbs (1) w.w (1) shell10-20 cmbs (2) glass
	ST-12	0-30	P	10YR4/3	Fine sandy silt			0-10 (2) glass compact throught
		30-45	N	10YR3/2	Loam	mottles 7.5YR5/6	compact soil	
	ST-13	0-40	N	10YR5/3	silt loam clay		compact soil	mixed regrowth
	ST-14	0-24	P	10YR4/3	silt loam			1 clear bottle glass rounded fragment
		24-34	N	10YR4/3	clay		compact soil	shell and purple glass observed b y fence
	ST-15	0-12	P	10YR3/2	Loam	mottles 7.5YR5/6		0-10 cmbs glass (shattered most with shovel)
		12-25	N	10YR3/2	Loam	mottles 7.5YR5/6	compact soil	extreamly compact at base
	ST-16	0-23	P	10YR4/3	silt loam			1 aqua marine glass fragment, 1 iron fragment 3 shell fragments
		23-30	N	10YR4/3	silt clay		compact soil	possibly lighter
	ST-17	0-40	P	10YR5/3	silt loam clay		compact soil	1 frag of glass area is heavily disturbed
	ST-18	0-30	P	10YR4/3	silt clay			3 porcelin fragments, 33 clear flat glass fragments, 1 aqua marine flat glass fragments, 2 whiteware frags
		30-34	N	10YR5/2	clay		compact soil	5 more metal frags, 1 flat metal fragment

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	ST-19	0-10	P	10YR3/2	Loam	mottles 7.5YR5/6		0-10 cmbs : (2) glass10-20 : (1) w.w./surface glass+ceramic
		10-31	P	10YR3/2	Loam	mottles 7.5YR5/6	compact soil	in heavily disturbed area/historic site-see photos
	ST-20	0-30	P	10YR5/3	silt loam clay		compact soil	3 sherds of w.w.
	ST-21	0-40	P	7.5YR4/2	silt loam			0-10 cmbs: (2) glass (1 colbat 1 cl.) 0-20 cmbs: gravel
		40-60	N	7.5YR3/1	clay loam	mottles 2.5YR4/6	compact soil	clay content increased with depth
	ST-22	0-25	P	10YR6/2	silt loam			1 aquamarine cured bottle fragment
		25-32	N	10YR5/3	clay	mottles 10R4/3	compact soil	
	ST-23	0-40	P	10YR5/3	loam clay		compact soil	1 glass fragment
		40-50	P	10YR5/1	loam clay	mottles 10R4/3		1 railroad spikes 1 glass frag and 2 metal fragments
	ST-24	0-30	P	7.5YR3/1	clay loam	mottles 2.5YR4/6		0-10 cmbs: (1) glass 10-20 cmbs: (1) glass
		30-42	N	7.5YR3/1	clay loam	mottles 2.5YR4/6	compact soil	
	ST-25	0-10	P	10YR7/3	clay	5yr5/3 mottles		3 pieces white ware/ironstone and 1 piece of glass in top 15 cmbs
		10-35	N	10YR7/3	clay		compact soil	
	ST-26	0-35	N	10YR4/1	clay	mottles 10R4/3	compact soil	
	ST-27	0-24	P	10YR3/2	clay loam	~ 50% 2.5YR mottles		
		24-38	N	7.5YR3/1	loam clay	mottles 2.5YR4/6 yellow and St.BN inclusions	compact soil	heavily disturbed
	ST-29	0-35	P	10YR4/3	loam clay		compact soil	1 piece of glass fragment 1 sherd of w.w.

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	ST-30	0-34	N	7.5YR3/1	loam			clay content increased with depth
		34-48	N	7.5YR4/2	clay	mottles 2.5YR4/6	compact soil	
	ST-31	0-30	N	7.5YR4/2	clay	mottles 2.5YR4/6		
		30-40	N	7.5YR4/2	loam clay	mottles 2.5YR4/6	compact soil	clay content increases with depth
	ST-32	0-40	P	10YR6/1	loam clay		compact soil	1 sherd of w.w.
	ST-33	0-26	P	10YR5/3	sitly clay			1 porcelain canning jar fragment 1 stoneware interior slip 1 aquamarine bottle fragment
		26-45	N	10YR5/2	clay		compact soil	
	ST-34	0-45	P	7.5YR4/3	loam	mottles 7.5YR4/6	compact soil	clay content increases with depth 0-10 cmbs: (1) w.w (1) precelain
	ST-35	0-55	N	10YR5/3	loam clay		compact soil	lots of organic material
	ST-36	0-50	P	10YR3/2	loam	mottles 7.5YR4/6		10-20 metal frags and brick
		50-64	N	7.5YR3/1	loam clay	mottles 7.5YR4/6	compact soil	
	ST-37	0-+10	N	10YR5/2	silt loam			
		10-23	P	10YR5/2	silt clay		compact soil	1 fragment bottle glass
		23-35	N	10YR6/3	silt clay			
		35-45	N	10YR3/3	clay		compact soil	
	ST-38	0-50	N	10YR4/1	clay	mottles 7.5YR5/3 streaked 10YR7/8	compact soil	
	ST-39	0-25	N	7.5YR3/1	loam	mottles 7.5YR4/6		very old flagging tape at 0-10 cmbs
		25-38	N	7.5YR3/1	loam clay	mottles 7.5YR4/6	compact soil	
	ST-40	0-35	N	10YR5/2	silt loam			
		35-45	N	10YR6/2	clay		compact soil	

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	ST-29	0-16	P	10YR6/2	silt loam			1 pieces light purple table glass
		16-26	N	10YR3/3	silt clay			
		26-50	N	10YR7/3	silt clay			
		50+	N	10YR5/3	clay	5yr5/3 mottles	compact soil	unexcavated
12/05/12	1	0-8	N	7.5YR3/2	Clay loam			
		8-20	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	open pasture
	2	0-10	N	7.5YR6/1	Clay	Mottles		
		10-40	N	7.5YR6/1	Clay	Mottles		
		40-45	N	10YR7/8	Clay		Basal clay	
	3	0-20	N	10YR5/2	Silt clay			
		20-30	N	10YR5/1	Clay		Compact soil	
	4	0-15	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	
	5	0-30	N	7.5YR6/1	Clay	Mottles	Compact soil	
	6	0-3	N	7.5YR3/2	Loam			approx. 15m south of fenceline
		3-30	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	
	7	0-20	N	10YR6/1	Silt clay			
		20-30	N	5YR5/2	Clay		Compact soil	
	8	0-40	N	7.5YR6/1	Clay	Mottles	Compact soil	
	9	0-3	N	7.5YR3/2	Loam			
		3-20	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	
	10	0-35	N	7.5YR5/2	Clay	Mottles	Compact soil	
	11	0-25	N	10YR4/2	Clay	Mottles	Basal clay	approx. 5m south of low bermed drainage
	12	0-20	N	10YR6/1	Silt clay			
		20-30	N	5YR5/2	Clay		Compact soil	
	13	0-35	N	7.5YR5/2	Clay	Mottles	Compact soil	

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	14	0-3	N	7.5YR3/2	Loam			
		3-25	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	
	15	0-21	N	10YR6/1	Silt clay			
		21-40	N	5YR5/2	Clay		Compact soil	
	16	0-35	N	5YR4/3	Clay	Mottles	Compact soil	Very thick and compact
	17	0-25	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky
	18	0-20	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky
	19	0-20	N	10YR6/1	Silt clay			
		20-25	N	5YR5/2	Clay			
		25-32	N	5YR7/2	Clay		Compact soil	
	20	0-30	N	5YR4/3	Clay	Mottles	Compact soil	
	21	0-20	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky
	22	0-15	N	10YR6/1	Clay			
		15-40	N	7.5YR6/6	Clay	Mottles	Compact soil	
	23	0-30	N	7.5YR5/2	Sandy clay loam	Mottles	Compact soil	
	24	0-25	N	10YR4/2	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky
	25	0-15	N	7.5YR5/2	Clay loam	Mottles		
		15-35	N	7.5YR4/6	Clay	Mottles	Compact soil	
	26	0-15	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky
	27	0-25	N	10YR6/1	Clay		Compact soil	
	28	0-25	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky
	29	0-30	N	7.5YR5/2	Clay	Mottles	Compact soil	
	30	0-20	N	10YR6/1	Silt clay			
		20-25	N	5YR5/2	Clay		Compact soil	
	31	0-30	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	32	0-25	N	7.5YR6/2	Clay	Mottles		
		25-35	N	7.5YR6/8	Clay	Mottles	Basal clay	
	33	0-23	N	10YR6/1	Silt clay		Compact soil	
	34	0-30	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky. Immediately south of berm, under powelines
	35	0-20	N	10YR6/1	Silt clay			
		20-25	N	5YR5/2	Clay		Compact soil	
	36	0-10	N	7.5YR6/8	Clay	Mottles		
		10-30	N	7.5YR6/1	Clay	Small pockets of sand	Compact soil	
	37	0-25	N	7.5YR3/1	Clay	Rootlets, Mottles	Basal clay	Very compact, blocky
	38	0-18	N	10YR6/1	Clay		Compact soil	
	39	0-25	N	7.5YR5/2	Clay	Mottles		
		25-35	N	7.5YR6/1	Clay	Mottles	Compact soil	
	40	0-30	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	
	41	0-15	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	5m south of fence, 10m west of powerline
	42	0-20	N	7.5YR5/2	Clay	Mottles		
		20-35	N	7.5YR6/1	Clay	Mottles	Compact soil	
	43	0-20	N	10YR6/1	Clay			
		20-25	N	5YR5/2	Clay		Compact soil	
	44	0-30	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	
	45	0-30	N	7.5YR3/4	Clay	Mottles	Compact soil	
	46	0-20	N	10YR6/1	Clay		Compact soil	
	47	0-25	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	25m north of two-track, 30m east of stock tank

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
	48	0-30	N	7.5YR3/4	Clay	Mottles	Compact soil	
	49	0-20	N	10YR6/1	Clay		Compact soil	
	50	0-15	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	Very compact
	51	0-25	N	7.5YR5/4	Clay	Mottles		
		25-35	N	7.5YR3/4	Clay	Mottles	Compact soil	
	52	0-20	N	10YR6/1	Clay			
		20-25	N	5YR7/2	Clay		Compact soil	
	53	0-20	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	Between two fencelines
	54	0-30	N	7.5YR5/2	Clay	Mottles	Compact soil	
	55	0-20	N	10YR6/1	Clay	Mottles	Compact soil	
	56	0-10	N	7.5YR5/4	Clay	Mottles		
		10-35	N	7.5YR3/4	Clay	Mottles	Compact soil	
	57	0-15	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	approx. 30m south of bayou
12/06/12	58	0-30	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	Pasture approx. 10m north of two-track
	59	0-40	N	7.5YR5/1	Clay	Mottles	Compact soil	
	60	0-20	N	10YR6/1	Clay			
		20-25	N	5YR6/3	Clay		Compact soil	
	61	0-20	N	7.5YR4/4	Clay	Mottles		
		20-35	N	7.5YR5/1	Clay	Mottles	Compact soil	
	62	0-20	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	
	63	0-25	N	10YR6/1	Clay			
		25-30	N	5YR6/3	Clay		Compact soil	
	64	0-30	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	
	65	0-20	N	7.5YR5/1	Clay	Mottles		
		20-25	N	10YR7/4	Clay	Mottles		

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Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
		25-35	N	7.5YR5/1	Clay	Mottles	Compact soil	
	66	0-15	N	7.5YR3/1	Clay	Rootlets, Mottles	Basal clay	Platy and compact
	67	0-21	N	10YR6/1	Clay			
		21-25	N	5YR6/3	Clay		Compact soil	
	68	0-15	N	7.5YR3/1	Clay	Rootlets, Mottles	Basal clay	Platy and compact
	69	0-20	N	7.5YR5/1	Clay	Mottles	Basal clay	
	70	0-20	N	10YR6/1	Clay			
		20-25	N	5YR6/3	Clay		Compact soil	
	71	0-25	N	7.5YR5/1	Clay	Mottles		
		25-35	N	7.5YR5/1	Clay	Mottles	Compact soil	
	72	0-30	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	10m south of fence
	73	0-20	N	10YR6/1	Clay			
		20-23	N	5YR6/3	Clay		Compact soil	
	74	0-15	N	7.5YR4/4	Clay	Mottles		
		15-35	N	7.5YR5/1	Clay	Mottles	Compact soil	
	75	0-20	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	On edge of wetland north of two-track
	76	0-20	N	10YR6/1	Clay			
		20-23	N	5YR6/3	Clay		Compact soil	
	77	0-15	N	7.5YR4/4	Clay	Mottles		
		15-20	N	7.5YR5/1	Clay	Mottles		
		20-35	N	7.5YR6/1	Clay	Mottles	Compact soil	
	78	0-15	N	7.5YR3/1	Clay	Rootlets, Mottles	Basal clay	approx. 10m north of two-track
	79	0-20	N	10YR6/1	Clay			
		20-30	N	5YR6/3	Clay		Compact soil	
	80	0-20	N	7.5YR4/4	Clay loam			

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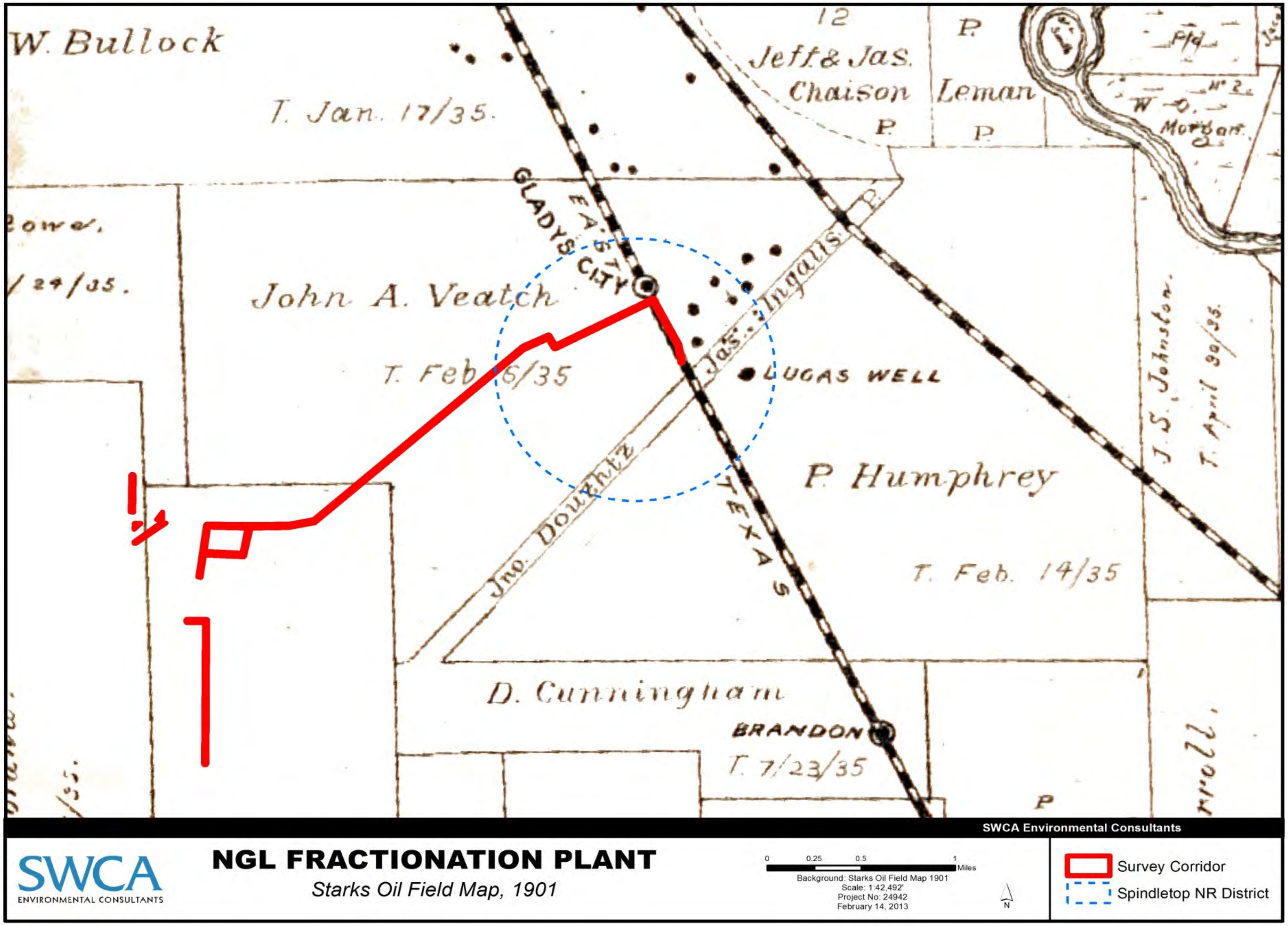
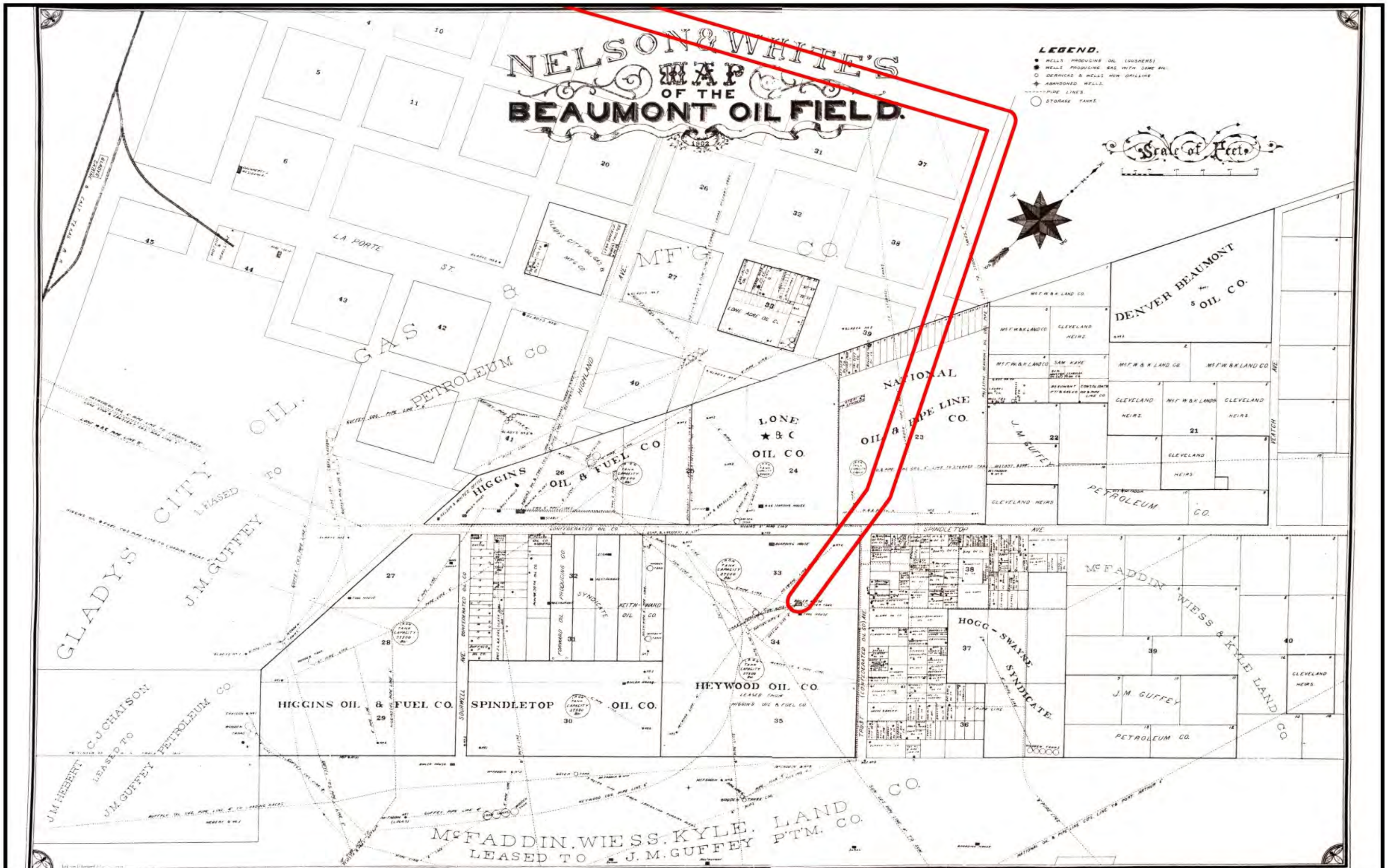
Date	Shovel Test	Depth (cmbs)	N or P	Munsell	Soil Texture Description	Inclusions	Reason for Termination	Comments
		20-25	N	7.5YR3/2	Clay loam			
		25-35	N	10YR5/6	Clay	Mottles	Basal clay	
	81	0-8	N	10YR4/2	Clay loam			SW corner of project area on edge of wetland, palmetto
		8-30	N	7.5YR4/1	Clay	Rootlets, Mottles	Basal clay	
	82	0-5	N	10YR6/1	Clay			
		5-20	N	5YR6/2	Clay			
		20-25	N	5YR6/1	Clay		Compact soil	
	83	0-35	N	7.5YR6/1	Clay	Mottles	Basal clay	
	84	0-20	N	10YR6/1	Clay			
		20-23	N	5YR6/1	Clay		Compact soil	
	85	0-20	N	10YR4/2	Clay	Mottles	Basal clay	North of wetland in area with heavy cattle trampling
	86	0-15	N	10YR4/2	Clay	Mottles	Basal clay	
	87	0-20	N	10YR4/2	Clay	Mottles	Basal clay	

APPENDIX D
HISTORIC MAPS


W. Bullock
T. Jan. 17/35.
Jeff & Jas. Chaison
Leman
W. O. Morgan
John A. Veatch
T. Feb. 6/35
GLADYS CITY
Jas. Ingalls
LUCAS WELL
J. S. Johnston
T. April 30/35
P. Humphrey
T. Feb. 14/35
Jno. Douthitz
D. Cunningham
BRANDON
T. 7/23/35
SWCA Environmental Consultants
SWCA ENVIRONMENTAL CONSULTANTS
NGL FRACTIONATION PLANT
Starks Oil Field Map, 1901
0 0.25 0.5 1 Miles
Background: Starks Oil Field Map 1901
Scale: 1:42,492'
Project No: 24942
February 14, 2013
N
Survey Corridor
Spindletop NR District



SWCA Environmental Consultants

SWCA ENVIRONMENTAL CONSULTANTS

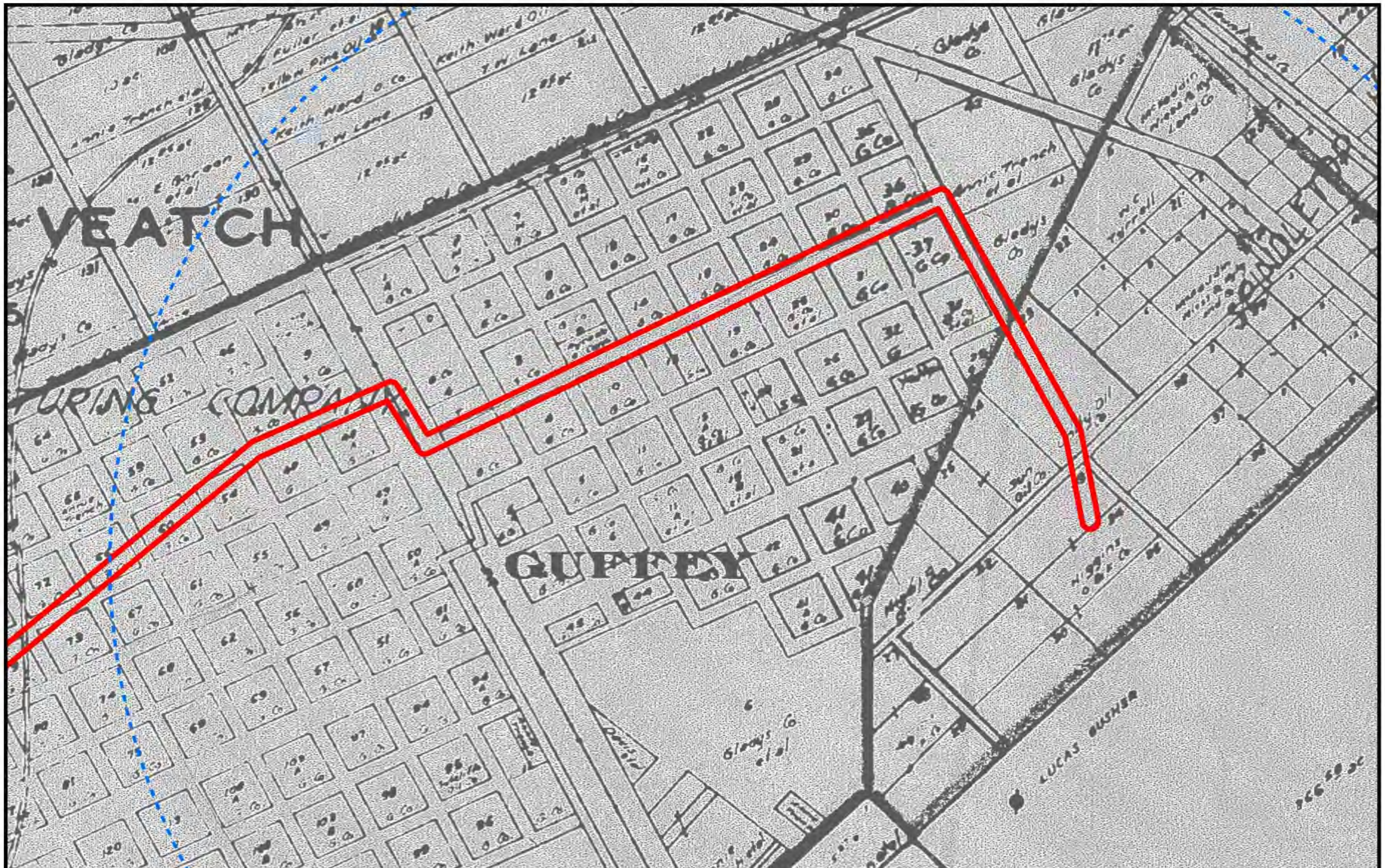
NGL FRACTIONATION PLANT

Spindletop (Beaumont) Oil Field, 1902

0 250 500 1,000 Feet

Background: Nelson & White Map of the Beaumont Oil Field
Scale: 1:5,942'
Project No: 24942
February 14, 2013

Survey Corridor



SWCA Environmental Consultants

SWCA
ENVIRONMENTAL CONSULTANTS

NGL FRACTIONATION PLANT

Gladys City Plat, Cancellation of Subdivision, 1953

0 250 500 1,000 Feet

Background: OTR 14377 Cancellation of Subdivision
Scale: 1:8,693'
Project No: 24942
February 14, 2013

N

Survey Corridor

Spindletop NR District

APPENDIX E
PROJECT CORRESPONDENCE

SWCA
ENVIRONMENTAL CONSULTANTS

February 19, 2013

Jeff Durst
Texas Historical Commission
1511 Colorado
Austin, Texas 78711

Re: Submittal of Draft Report- An Intensive Archaeological Survey of the Proposed NGL Fractionation Plant and Associated Facilities, Jefferson County, Texas.

Dear Mr. Durst,

SWCA Environmental Consultants (SWCA) respectfully submits the enclosed Draft Report for your review. On behalf of DCP Midstream, LP (DCP), SWCA has conducted an intensive archaeological survey for the proposed Natural Gas Liquids (NGL) fractionation plant and associated facilities, near Beaumont, Jefferson County, Texas. DCP has filed for an application for a Greenhouse Gas (GHG) permit with the U.S. Environmental Protection Agency (USEPA). As such, the investigations were conducted in accordance with the National Historic Preservation Act (NHPA), in addition to regulatory obligations associated with the acquisition of a United States Army Corps of Engineers (USACE) permit (33 CFR Part 325, Appendix C). This report has already been submitted to the USEPA for their review.

Approximately 535 acres of land were purchased for the proposed project, of which only 70 acres are anticipated to be disturbed during the construction of the proposed fractionation plant. Linear facilities will encompass approximately 3.8 miles extending outside the existing property boundary. In all SWCA investigated a total of 385 acres of land comprised of 339 acres of fractionation plant locations and 46 acres of linear survey (3.8 miles within a 100-foot-wide corridor).

A background literature review revealed that the eastern-most 0.92-miles of the project area are within the Lucas Gusher, Spindletop Oil Field National Register of Historic Places (NRHP) District (Spindletop NRHP). Spindletop is also a National Historic Landmark (NHL). Ten sites associated with Spindletop are within a one-mile buffer of the project area, and two sites, 41JF90 and 41JF84, are within the proposed survey corridor. SWCA understands that with the recent work of James Karbula (2010:79) in coordination with the THC, the THC has determined that Site 41JF90 is now subsumed as being part of the overall Spindletop archaeological site 41JF84 along with Sites 41JF85 through 89 and 91. In addition, James Karbula (2012) has recently completed the reporting of further testing and mitigation efforts at Site 41JF84. The results of which were not published prior to completion of this report.

After a review of the project area soils, geology, and known sites within the vicinity, a team of SWCA archaeologists conducted an intensive archaeological survey of the proposed fractionation plant and associated facilities. No artifacts were identified outside of the Spindletop NRHP boundary. Current investigations of the project corridor within the Spindletop NRHP District located a low density surface scatter of early twentieth century cultural materials extending east from West Port Arthur Road to the west side of an existing pond located west of Highland Avenue that are all associated with Site 41JF84. The remaining portions of the project corridor east and south of Highland Drive were highly disturbed by modern industrial facilities and modern buried pipelines. SWCA located no intact features within the current project corridor within the Spindletop NRHP boundary. Initial archival information indicated that as early as 1938, two anomalies (possible features/structures) are depicted within the current project corridor. One anomaly corresponds to the previous site boundary for 41JF90, while the other anomaly is located approximately 60 to 80 meters northeast of Site 41JF90. Later aerial photographs suggest that these structures had been razed by 1953. Additional historical maps indicated that the project corridor followed established roads from 1901 to 1953, or have been subsequently developed by modern facilities.

Based on the results of the survey, it is SWCA's opinion that the portion of 41JF84 identified within the proposed project corridor possesses little research value. SWCA conducted additional archival research in order to determine to what extent if any the proposed undertaking would impact the Lucas Gusher, Spindletop Oilfield NRHP area. An SWCA historian visited the

SWCA
ENVIRONMENTAL CONSULTANTS

Tyrell Historical Library in Beaumont Texas, the Woodson Research Center associated with Fondren Library at Rice University, and utilized a number of secondary sources to construct a more detailed context of the Spindletop oilfield.

The Spindletop Oilfield was listed on the NRHP in 1966 as a site under Criterion A as an event with significance in the areas of Industry and Science. There are no remaining buildings, objects, or structures associated with this significance within the proposed survey corridor. As the pipeline will be buried within the NRHP boundary SWCA anticipates no visual effect to any extant significant resources located outside the project corridor. Likewise, SWCA archeologists recommend that none of the findings within the project corridor are eligible under Criterion D. As such SWCA recommends that the proposed undertaking will have no effect on the integrity of the NRHP-listed Lucas Gusher, Spindletop Oilfield.

With regard to potential visual effects, the proposed plant is located approximately 2.3 miles from the Spindletop NRHP boundary. Although no formal viewshed analysis was conducted as part of this work, SWCA anticipates that the proposed undertaking will result in no adverse visual effect to this NRHP and NHL property. In a meeting held on December 12, 2012, staff from the Architecture Division of the Texas Historical Commission indicated agreement with this assessment.

If you have any questions or concerns, please do not hesitate to contact me at (713) 934-9900 or tbutler@swca.com.

Todd L. Butler

Todd L. Butler, MA, RPA
Archaeologist/Principal Investigator
SWCA Environmental Consultants
7255 Langtry, Suite 100
Houston, Texas 77040

Enclosures

cc: Rebecca Malloy (DCP)
A.C. Dumaual (USEPA)

TEXAS HISTORICAL COMMISSION
real places telling real stories

March 20, 2013

RECEIVED 3/25/2013

Todd Butler
Principal Investigator
SWCA Environmental Consultants
7255 Langtry, Suite 100
Houston, Texas 77040

Re: Project review under Section 106 of the National Historic Preservation Act of 1966
Draft Report: *An Intensive Archeological Survey of the Proposed NGL Fractionation Plant and Associated Facilities, Jefferson County, Texas.* (EPA)

Dear Mr. Butler:

Thank you for allowing us to review the survey report referenced above. This letter serves as comment on the undertaking from the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission.

After examining the documentation, we concur with your assessment that the artifacts that were found in the vicinity of site 41JF84 were in disturbed contexts and do not contribute to the National Register eligibility of 41JF84. We believe that there will be no effect on the Spindletop National Register District and that no historic properties will be affected by the construction of the NGL plant. The project may proceed without further consultation with this office.

Thank you for your cooperation in this federal review process, and for your efforts to preserve the irreplaceable heritage of Texas. **If we may be of further assistance, please call Bill Martin of our staff at 512/463-5867.**

Sincerely,

William A. Martin

for
Mark Wolfe, State Historic Preservation Officer

MW/wam

cc: A.C. Dumaual, EPA

APPENDIX F
CV/RESUME OF SECRETARY OF THE INTERIOR QUALIFIED PRINCIPAL INVESTIGATOR

SWCA
ENVIRONMENTAL CONSULTANTS

TODD L. BUTLER, M.A., RPA
Archaeologist/Principal Investigator

Education / Training

- M.A., Anthropology, University of Kansas, Lawrence, 1997
- B.A., Anthropology, University of Nebraska, Lincoln, 1991
- Trenching and Excavation, Kirkwood Community College; Cedar Rapids, Iowa, 2002
- ACHP New Section 106 Regulations, University of Nevada, Reno, 2000
- Section 106 in the New Regulatory Environment; Lynn Sebastian, Ph.D., SRI Foundation; Rio Rancho, New Mexico, 1999

Registration / Certification

- Registered Professional Archaeologist

Experience Summary

Mr. Butler has more than 20 years of experience in archaeology, with the last 14 years working as a principal investigator, currently working at SWCA's Houston, Texas office. He is responsible for directing all necessary archival and field research activities related to the identification and evaluation of prehistoric and historic cultural resources. This includes completing background research, designing and preparing proposals, conducting archaeological surveys and site excavations, analyzing prehistoric and historic artifacts, preparing technical reports, and project management.

Mr. Butler has successfully completed over 250 projects that have ranged from small power line locations, to extensive corridor surveys rich with archaeological sites, to multiple site testing projects, to both small and large-scale data recovery projects. These projects were completed in many different states, including Colorado, Iowa, Illinois, Kansas, Minnesota, Nebraska, North Carolina, North Dakota, South Carolina, Texas, Virginia, and West Virginia. Clients range from local, county, and state governments, to energy sector, to private sector, departments of transportation, and to federal agencies, including the National Park Service, Department of Agriculture, Department of Interior, and military installations. These projects show a wide variety of experience with many different types of clients with differing needs, but ultimately each project resulted in clearance from Federal Regulatory Agencies and/or State Historic Preservation Offices.

SWCA Project Experience

NGL Fractionation Plant - Cultural Resources; Jefferson County, Texas (2013): Prepared technical report in association with proposed pipeline and facilities development. *Role: Project Manager. Client: DCP Midstream, LP.*

Sand Hills Pipeline Phase II; Multiple Counties, Texas (2013): Prepared technical report in association with proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Spring Creek Greenway Phase III Hike & Bike Trail; Harris County, Texas (2013): Prepared technical report in association with proposed development. *Role: Archaeologist. Client: Confidential.*

Big Ethane System Feed Study; Westlake Parish, Louisiana (2012): Prepared background report on proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Cheyenne Lateral; La Salle County, Texas (2012): Prepared technical report for a proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Darrington Human Remains; Brazoria County, Texas (2012): Examined the location for a proposed development at the Darrington Facility. *Role: Archaeologist. Client: Texas Department of Criminal Justice.*

DeWitt/Karnes Gathering - Segment I; Dewitt County, Texas (2012): Prepared technical report in association with proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Gardendale to Three Rivers; Multiple Counties, Texas (2012): Prepared technical report in association with proposed pipeline. *Role: Archaeologist. Client: Plains All American Pipeline, LP.*

Hughes Underpass Historic Resources Survey; Houston, Harris County, Texas (2012): Conducted a background review of the proposed undertaking. *Role: Archaeologist. Client: HNTB Corporation.*

KDB Gas Gathering and Treatment Project; Dewitt County, Texas (2012): Prepared technical report in association with proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Lin Tract Verification; Harris County, Texas (2012): Prepared technical report in association with proposed development. *Role: Archaeologist. Client: Mason Westgreen, LP.*

Matador Pipeline Project; Lasalle County, Texas (2012): Prepared technical report in association with proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Pascagoula Pipeline; Jackson County, Mississippi (2012): Prepared technical report in association with proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Plains 300-mile McCamey to Gardendale Pipeline; Multiple Counties, Texas (2012): Prepared technical report in association with proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Seaway Pipeline (Loop) Segments 1-4; Harris County, Texas (2012): Prepared Scope of Work in association with proposed pipeline. *Role: Archaeologist. Client: Confidential.*

Texas Express Pipeline ; Mont Belvieu, Montgomery County, Texas (2012): Prepared technical reports in association with proposed pipeline . *Role: Archaeologist. Client: Texas Express Pipeline, LLC.*

Professional Experience

The Louis Berger Group, Inc.; Marion, Iowa (May 1997–March 2012): Responsible for directing all necessary archival and field research activities related to the identification and evaluation of prehistoric and historic cultural resources; Completed background research, designing and preparing proposals, conducting archaeological surveys and site excavations, analyzing prehistoric and historic artifacts, and preparing technical reports; Completed over 235 projects in Colorado, Iowa, Illinois, Kansas, Minnesota, Nebraska, North Carolina, North Dakota, South Carolina, Texas, Virginia, and West Virginia; Clients included energy sector, federal agencies (National Park Service, Department of Agriculture, Department of the Interior, military installations), departments of transportation, local, county, and state governments, and private sector clients. *Role: Principal Investigator.*

Kansas State Historical Society; Topeka, Kansas (May 1994–May 1997): Worked for the Kansas Highway Archeology Program; Monitored backhoe and belly-scraping equipment, flotation, and plane table and transit mapping; Analysis of artifacts recovered from numerous prehistoric and historic sites in Kansas;

Supervised laboratory personnel in the cleaning, sorting, labeling, cataloging, and organizing of materials recovered. *Role: Engineering Technician.*

University of Kansas; Lawrence, Kansas (January–March 1997; October 1995–March 1996): National Science Foundation grant to improve the curation of Middle Woodland collection; Identified, sorted, cataloged, and repackaged material from 23 sites; Responsible for sorting and identifying seeds and other botanical remains from flotation material collected at various Nebraska phase sites. *Role: Graduate Researcher.*

National Park Service - Midwest Archaeological Center; Lincoln, Nebraska (January 1992–August 1993; September 1991–January 1992): Surveyed and excavated various archaeological sites within National Parks and Monuments, including Agate Fossil Beds National Monument, Nebraska; Scottsbluff National Monument, Nebraska; Indiana Dunes National Lakeshore, Indiana; Ozark National Scenic Riverways, Missouri; Cuyahoga Valley National Recreation Area, Ohio; Apostle Islands National Lakeshore, Wisconsin; Lincoln Home National Historic Site, Illinois; and Ulysses S. Grant Home National Historic Site, Missouri; Cleaned, labeled, cataloged, and analyzed material recovered throughout the Midwest Region of the National Park Service; Data entry into the computerized Automated National Catalog System (ANCS) of material recovered throughout the Midwest Region of the National Park Service. *Role: Archaeological Technician/Aide.*

National Park Service - Western Archaeological & Conservation Center; Tucson, Arizona (June–August 1990): Survey on the Shivwits Plateau on the north rim of the Grand Canyon in the Lake Mead National Recreation Area. *Role: Archaeological Aide.*

University of Nebraska; Lincoln, Nebraska (1989): Supervised the analysis of Paleoindian artifacts recovered during the 1940s and 1950s from the Allen Site (25FT50) in southwestern Nebraska; Analysis involved the measurement of flake attributes from two different occupation zones and comparing them for reconstruction of the distribution of artifacts throughout the site. *Role: Student Supervisor.*

University of Nebraska Archaeological Field School; Lincoln, Nebraska (1988): Learned excavation and survey techniques at a Woodland seasonal occupation site (25GO2) located in southwestern Nebraska. *Role: Student.*

Papers / Presentations

Butler, T. 1996. *Raw Material Selection as seen from the Scott County Pueblo Site.* 54th Annual Plains Anthropological Conference, Iowa City, Iowa.

Butler, T. 1994. *Analysis of Non-Bison Remains at El Cuartelejo, Scott County, Kansas.* 16th Annual Flint Hills Archaeological Conference, Topeka, Kansas.

Professional Affiliations / Committees

- Society for American Archaeology (SAA)
- Association of Iowa Archaeologists (AIA), Membership Chair 1999–2005
- Council of Texas Archeologists (CTA)