

US EPA ARCHIVE DOCUMENT

**Cultural Resource Review of the PDH Project
Ascend Performance Materials
Chocolate Bayou Plant**

**C3 Petrochemicals LLC
PDH Project Brazoria County, Texas**

Prepared for:



Prepared by:



TRC Environmental Corporation

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Acronyms

AOF	Active Operational Facility
APE	Area of Potential Effect
Ascend	Ascend Performance Materials Texas, Inc.
Atlas	Texas Archeological Sites Atlas
BA	Biological Assessment
CAA	Clean Air Act
C3 Petrochemicals	C3 Petrochemicals, LLC
FM	Farm to Market Road
GHG	Greenhouse Gas
LRRT	Outer Coastal Plain Land Resource Region
NRCS	Natural Resource Conservation Service
PDH	Propane dehydrogenation
PM	Particulate Matter
PSA	Pressure Swing Adsorption
PSD	Prevention of Significant Deterioration
SIL	Significant Impact Level
THC	Texas Historical Commission
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

Section 1

Introduction

Pursuant to the federal Clean Air Act (CAA), C3 Petrochemicals, LLC is seeking a permit under the United States Environmental Protection Agency's (USEPA) Greenhouse Gas (GHG) Prevention of Significant Deterioration (PSD) Program to authorize construction of a Propane Dehydrogenation manufacturing (PDH) unit at the existing Chocolate Bayou chemical manufacturing complex in Brazoria County, Texas, Figure 1 (Appendix B).

The purpose of this archeological resource report is to determine whether any known cultural resources are likely to be impacted by the United States Environmental Protection Agency's (USEPA) issuance of the federal Green House Gas (GHG) permit. This research examined direct impacts from the PDH unit within the existing Chocolate Bayou chemical manufacturing complex and possible indirect impacts within 1 mile around the Active Operation Facility (AOF). The area of potential effect (APE) and Ascend Facility property line is illustrated in Figure 2 (Appendix B).

1.1 Defining the Area of Potential Effect

C3 Petrochemicals, LLC is proposing to add a propane dehydrogenation (PDH) unit at the existing Chocolate Bayou facility. The new unit will be constructed within the already developed portion of the AOF (Figure 2). The footprint of this unit will encompass a 300 feet by 750 feet area. This footprint is no longer in a natural state having been previously disturbed by previous construction activities (Figure 2). This footprint is the specific area of potential effect (APE) that is the area where construction or earth disturbing activities will occur and thus the possibility for direct impact to cultural resources is very low. The Texas Historical Commission (THC) considers sites like this to be previously disturbed and does not require shovel testing. This archeological resource report evaluates the likelihood of adverse effects to cultural resources resulting within that footprint from USEPA's issuance of the federal GHG permit. The cultural resource site file search takes into consideration a 1.6 km (one mile) radius around the property boundary (Figure 4). This search area is larger than the APE radius and was done to be conservative for the file search. After the drafting of this report an additional APE (laydown area) was analyzed and the results are discussed in the report found in Appendix D of this report. The APE was expanded again to include linear features (pipelines and power line) under separate cover.

Air emissions modeling demonstrates that all concentrations of air pollutants, with the exception of PM_{2.5} are below the USEPA SILs at the Ascend Facility property line. The SIL is the concentration of a pollutant, below which USEPA has determined the impact to be de minimis

or insignificant. The SIL for PM_{2.5} was modeled to be a 479 meter radius around the centroid of construction. Accordingly, this report evaluates the likelihood of adverse effects cultural resources resulting from USEPA's issuance of the federal GHG permit within a 479 meter radius from the centroid of construction. Detailed information regarding air pollutants are found in the Biological Assessment (BA) under separate cover.

For the purpose of this report and the associated addendums (laydown area and linear features) the APE investigated for each portion of the Project will be:

- **C3 Facility:** 5.1 acres (300'x750') of direct construction related impact. A one-mile radius (2010 acres) around the C3 facility was searched for known cultural resources.
- **Laydown Area:** 7.3 acre (400'x800') area was investigated for cultural resources. This area was within the one-mile (2010 acres) search radius of the C3 facility.
- **Propane 1 Pipeline:** 873 acre (36 miles x 0.037 mile wide (200 feet)) area will be investigated. A one-mile radius search area was conducted around the proposed pipeline route was searched for known cultural resources.

1.2 Project Purpose and Location

C3 Petrochemicals is planning to build a new propane dehydrogenation manufacturing (PDH) unit for the manufacturing of propylene. The introduction provides detailed location information in reference to the closest populous area of Alvin, Texas. The PDH plant will be located within the United States Geological Survey (USGS) 7.5' Quadrangle Maps of Hoskins Mound and Mustang Bayou. The Centroid of Construction is at latitude of 29.257192 N and longitude of -95.215707 W. The proposed PDH unit is located approximately three miles north of the F.M. 2004 bridge that crosses Lost Bay upstream of Chocolate Bay and West Galveston Bay.

1.3 Construction Information

Construction of the proposed expansion, associated infrastructure, and auxiliary equipment will take place within the AOF in an area which was formerly the site of an Olefins Facility most recently owned and operated by Equistar Chemical Company (equipment dismantled to ground, foundations left in place). The construction area is approximately 300 feet by 750 feet on which the existing foundation will be demolished and new foundations will be constructed Figure 2 (Appendix B). The existing foundations will be demolished and the area backfilled with approved select material and graded to allow installation of new concrete mat and pier

foundations for the expansion. The proposed construction activities include the installation within the 300 foot by 750 foot construction area of approximately 150 reinforced concrete mat, pier, and spread footing foundations comprised of approximately 16,000 cubic yards of concrete. Additionally, an approximately 400 foot by 800 foot area outside of the construction area will be disturbed and used as a temporary equipment laydown and contractor parking facility. The laydown and parking area will require clearing a portion of the Ascend Facility property currently used for cattle grazing and historically used for agriculture. The temporary laydown and parking area will be grubbed to remove vegetation, back filled with stabilized select material, graded, and covered with gravel. The results of the archeological investigation on the laydown area can be seen in Appendix D.

Section 2

Background Information

2.1 History of the Chocolate Bayou Facility

The C3 Petrochemicals site will be leased from Ascend and most recently was occupied by Equistar Chemical Company. The real property was acquired by Ascend from Solutia Inc. in 2009. Solutia Inc. was an affiliate of Monsanto Chemicals Division created in 1997. Monsanto constructed the original chemical plant at the present location in the 1950's; additions to the manufacturing complex have been continuously erected and dismantled, as needed, since its inception.

2.2 Regional Environmental Background

The facility is located within the Texas Gulf Coastal Plain, which is situated within the Outer Coastal Plain Land Resource Region (LRRT). This area is composed of grasslands and riparian bayous with topography gently sloping to the coast. Historic elevations within the APE range from five to approximately 20 feet above sea level. Development has increased the elevation of portions of the APE to as much as 33 feet. The area within the APE was historically agricultural. Chocolate Bayou is outside the APE and to the west of the AOF. Presently the land use varies from areas of continued agricultural and grazing use, to residential and industrial use. The chemical complex comprising the AOF has been in operation for over 50 years.

The watershed of Brazoria County is composed of the Brazos River and the San Bernard River along with numerous smaller creeks and bayous, such as Chocolate Bayou, that either drain into the aforementioned rivers or go directly into coastal bays. Brazoria County encompasses a portion of West Galveston Bay and all of Christmas and Drum Bays. All of these are part of the larger Galveston Bay complex.

Brazoria County is located on the Upper Texas Coast. It is bounded to the north by Harris (County Seat Houston), Fort Bend (County Seat Richmond) and Wharton (County Seat Wharton) Counties. To the east and west the county is bounded by Galveston (County Seat Galveston) and Matagorda (County Seat Bay City) Counties, respectively. The southern boundary of the county is the Gulf of Mexico.

2.2.1 Land Use

Brazoria County was traditionally a rural agricultural county, with large portions of land being used for rice, cattle, and hay production. In recent years urban sprawl from the Houston metroplex has seen Brazoria County cities such as Pearland and Alvin grow significantly in size. Large areas of former agricultural lands have been developed for residential or commercial purposes. Brazoria County experienced a 29.53% increase in population between the 2000 and 2010 census counts and this is one of the fastest growing counties in the state (Texas State Historical Association, 2012).

The land proposed to be used for the Project is currently used for industrial purposes and has been for the past 50 years. The land surrounding the PDH unit is a mix of other industrial/chemical facilities, agriculture, open water, and coastal marsh. Peterson Landing is an unincorporated community situated across Chocolate Bayou, and west, of the Ascend Facility is outside the APE.

2.2.2 Climate

Brazoria County averages 57 inches of precipitation per year (USDA, 1981). This is composed almost exclusively of rain as snow fall is rare. Summers are long and hot with average highs being 91 degrees Fahrenheit (°F); however highs above 100°F are not uncommon. Winters are mild with an average high temperature of 43°F. Colder temperatures as low as 20°F or even in the teens do occur, however their duration is typically short. Southerly winds dominate with southeast being the predominate direction. North winds are almost exclusively correlated with frontal passage.

As of January, 2013, Brazoria County is under a D1- moderate drought (USDA, 2012). This is a substantial improvement over 2011 when the general area was under a D4-exceptional drought (the most severe level) (USDA, 2012). Texas has been in a drought five of the last seven years. Droughts coupled with salt water intrusion from the 2008 land fall of Hurricane Ike have severely damaged many coastal marshes and estuary ecosystems along the Upper Texas coast.

2.2.3 Topography

Topography in Brazoria County ranges from sea level on the coast to 146 feet above sea level at the Damon Mound in the west central part of the county. Historic elevations within the APE range from ten feet to approximately twenty feet above sea level. Development has increased the elevation of portions of the APE to as much as 33 feet. The APE has been altered due to past agricultural use, including rice cultivation, and the construction of the industrial facilities

including the Ascend Facility. The Federal Emergency Management Administration floodplain maps show that the entire facility is within the 100-year floodplain of Chocolate Bayou.

2.2.4 Geology

The existing Chocolate Bayou Plant lies on the Beaumont Formation along the Gulf of Mexico. The Beaumont Formation is broadly described as a barrier island and beach deposits. The surface is almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on a meander belt ridge, separated by areas of low, relatively smooth, featureless back swamp deposits without pimple mounds. The Beaumont Formation consists mostly of clayey sand and silt of moderate permeability and drainage, low to moderate compressibility and shrink swell potential, level relief with local mounds and ridges, and high shear strength. This includes mainly stream channel, point bar, natural levee, back swamp, and to a lesser extent, coastal marsh and mud flats deposits (Barnes 1982). Concretions of calcium carbonate, iron oxide, and iron manganese oxides are present in zones of weathering. The thickness of the Beaumont deposits is roughly 100 feet.

2.2.5 Soils

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), soils in the county are mostly alluvial loams and clays. They are highly productive. Approximately 70 percent of the county was considered prime farm land (Kleiner, 2012). There are 6 soil types mapped within the APE. These are represented in Table 1 (NRCS, 1981) and Figure 3 (Appendix B).

Table 1
Soils Found Within the APE

NRCS Map Unit Symbol	NRCS Map Unit Name	NRCS Map Unit Characteristics	USDA Classification				NRCS Hydric Soil
			Depth to Restrictive Feature	Drainage	Permeability	Landform	
13	Edna Fine Sandy Loam	0-1% slopes, not flooded	> 80 inches	Somewhat Poorly Drained	Moderate	Flats on Coastal Plains	Yes
15	Edna-Aris Complex	0-1% slopes, not flooded	> 80 inches	Somewhat Poorly Drained	Moderate	Flats on Coastal Plains	Yes

NRCS Map Unit Symbol	NRCS Map Unit Name	NRCS Map Unit Characteristics	USDA Classification				NRCS Hydric Soil
			Depth to Restrictive Feature	Drainage	Permeability	Landform	
21	Ijam Clay	0-1% slopes, rarely flooded	> 80 inches	Poorly Drained	Moderate	Flats on Coastal Plains / Lagoons	Yes
22	Ijam-Urban Land Complex	0-1% slopes, rarely flooded	> 80 inches	Poorly Drained	Moderate	Flats on Lagoons	Yes
24	Lake Charles Clay	0-1% slopes, not flooded	> 80 inches	Moderately Well Drained	Low	Flats on Coastal Plains	Yes
28	Leton-Aris Complex	0-1% slopes, occasionally flooded	> 80 inches	Poorly Drained	Moderate	Flats on Coastal Plains	Yes

2.2.6 Water Resources

The southern boundary of the county is the Gulf of Mexico. The Brazos River splits the county into east and west halves. The San Bernard River flows through the western part of the county. These two rivers make up the majority of the watershed in the county. Other minor drainages such as Halls Bayou, Oyster Bayou, Persimmon Bayou, Chocolate Bayou, and Jones Creek flow directly into the bay.

The Project is located within the existing developed portion of the Ascend property, which is situated on the left descending bank of Chocolate Bayou. Chocolate Bayou empties into Lost Bay, which empties into Chocolate Bay, and is part of the Galveston Bay system. The Brazos River is approximately 21 miles to the west of the Project. The San Bernard is even farther away at 30 miles west of the Project. In Brazoria County there are numerous stock tanks, irrigation canals, farm ponds, and emergent wetlands.

Section 3

Archeological Site File Search

An archeological site file search was performed by TRC archeologists on January 3, 2013, using the Texas Archeological Sites Atlas (Atlas) maintained by the THC. The file search found no cultural resources (archeological sites, cemeteries, historical landmarks, National Register of Historic Places, structures, historic districts) previously documented within the 2 kilometer search area.

A 2 kilometer radius from the APE was also assessed to determine the location of previous cultural resource projects and presence of previously documented cultural resources. Two archeological surveys have been performed within the search radius. In 1977, a cultural resources survey was done 0.44 miles west from the current facility; however, no additional information was available. About 0.51 mile north of the facility, another cultural resource survey was completed in 1978, and again no information is available for that survey.

The THC Atlas does show two prehistoric sites recorded in the 1970's within two kilometer radius of the proposed APE. Briefly, the sites include:

41BO41- A prehistoric shell midden lies 0.46 miles northwest with no recommendations or additional information presented at the time of recording.

41BO43- A prehistoric "very small" site in perfect condition at the time of identification was found 0.95 miles northwest from the C3 Petrochemicals location. Test pits yielded three "flint flakes" and one sherd. No additional information was available and no recommendations were presented at the time of filing.

A formal eligibility status of a cultural resource site is up to the determination of the Texas Historical Commission, however TRC recommends that these sites are not eligible for listing.

The atlas search found no documented National Register properties, cemeteries or historic landmarks documented within two kilometers of the APE.

In addition to the Atlas search, historic maps (Nationwide Environmental Title Research, LLC, 2009) including topographic maps from 1959 (<http://www.historicaerials.com/> accessed on January 3, 2013) depicting the APE were consulted to determine if historic structures or features were present. None were present within the APE on these historic maps.

3.1 Native American Tribes

Prior to European settlement, Brazoria County was inhabited by the Karankawa Indians (Carol A. Lipscomb, "KARANKAWA INDIANS," *Handbook of Texas Online* (<http://www.tshaonline.org/handbook/online/articles/bmk05>), accessed January 3, 2013; Published by the Texas State Historical Association). The Karankawa Indians inhabited a narrow strip of coastal Texas that extended from the southwest side of Galveston Bay south and west to Corpus Christi Bay and inland approximately 70 miles. Several accounts of the Karankawa Indians were recorded by Spanish and French explorers who visited this region. According to these accounts, the Karankawa Indians were a semi-nomadic people that lived in bands consisting of several family groups. Typically, these bands migrated seasonally between inland foraging grounds, which were inhabited during the warm season, and coastal encampments, which were utilized during the cool season. Encampments moved frequently to take advantage of food resources. The Karankawa Indians have been considered extinct since 1858. The C3 Petrochemicals facility is situated within the territory that the Karankawas were known to inhabit, however there is no evidence that Karankawas actually utilized the area of the Project. As this Native American tribe is considered to be extinct, consultation with this tribe is not possible nor warranted based on the location of the APE being inside an existing facility that has undergone previous land disturbance. There are no other known Native American tribes that inhabited the area.

3.2 Brazoria County Historical Museum

Jamie Murray, Collections Manager for the Brazoria County Historical Museum, was contacted to identify known cultural or historical resources within the local area. In a telephone conversation, she was aware of no significant resources in the vicinity of the C3 Petrochemicals facility. She contacted Sandra Pollan, Chair of the Brazoria County Historical Commission. On January 2, 2013, Ms. Pollan replied via e-mail (Pollan, 2011) that she knew of no significant cultural or historical resources in the vicinity of the proposed project.

Mr. Neil McLain, a volunteer at the Brazoria County Historical Museum, also replied that to the best of his knowledge, there are no known significant cultural resources in the vicinity of the plant.

Copies of a telephone communication record with Ms. Murray and the e-mail communications from Ms. Pollan and Mr. McLain are included in Appendix E.

Section 4 Conclusion

The geoarcheological potential for this area, which reflects archeological sites with a high degree of preservation and integrity, is minimal for prehistoric sites located in the Beaumont Formation. A Texas Department of Transportation model concerning prehistoric sites, referred to as the Houston-PALM, rates this area as low potential for intact prehistoric sites (Abbott 2001).

The lack of buildings depicted on the 1966 topographic map indicates no building(s) of historical significance are present in the 0.5 mile viewshed of the C3 Petrochemicals Chocolate Bayou facility. The fact that the proposed new PDH unit will be constructed within the boundaries of an existing facility, and on a foot print that has existing development indicates that there is no potential for intact archeological deposits in this AOF and therefore no effect to intact cultural resource sites. Thus, no field surveys (i.e., with shovel testing and/or mechanical trenching) are recommended for the proposed PDH plant area. Therefore, no further cultural resource investigation or mitigation is warranted. Shovel testing was conducted on the laydown area. The results of those findings are reported under separate cover that can be found in Appendix D.

The two cultural resource sites outside the APE, 0.46 and 0.95 miles away, will not be adversely affected by the proposed new PDH. Therefore, their eligibility status is not important to the new PDH. A formal eligibility status of a cultural resource site is up to the determination of the Texas Historical Commission.

No impacts to cultural resources (archeological sites, cemeteries, historical landmarks, National Register of Historic Places, structures, historic districts) will occur from this Project.

Section 5 List of Preparers

- J. Michael Quigg, M.A.

Section 6 References

Abbott, James T. 2001. Houston Area Geoarcheology: A Framework for Archeological Investigation, and Cultural Resource Management in the Houston Highway District. Texas Department of Transportation, Environmental Affairs Division, Archeological Studies Program, Report 27, Austin.

Diana J. Kleiner. 2012. Brazoria County, Handbook to Texas Online. Found on January 3, 2013. <http://www.tshaonline.org/handbook/online/articles/hcb12>

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Pollan, S. Personal Communication via email on October 2, 2011.

Texas State Historical Association. 2012. Texas Almanac. Found on March 23, 2012. <http://www.texasalmanac.com/topics/government/brazoria-county>

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USDA-NRCS. 1981. Soil Survey of Brazoria County Texas.

Appendix A

Resume of Author

J. Michael Quigg, M.A.

EDUCATION

M.A. Archaeology, The University of Calgary: 1973.

B.A. Anthropology, University of Northern Colorado, 1971.

PROFESSIONAL REGISTRATION AND CERTIFICATIONS

- Permitted to perform cultural resource investigations by the Bureau of Land Management (BLM) in Texas, Oklahoma, Wyoming, Montana, and New Mexico.
- Member of Council of Texas Archeologists (CTA).
- Texas Department of Transportation pre-certification (No. 4265) for service 2.10.1, 2.11.1, 2.8.1 (archeological survey, historical and archival research, and mitigation).

EMPLOYMENT HISTORY

Cultural Resource Project Manager/Principal Investigator, TRC Environmental Corporation, 1990 to present,

Staff Archaeologist, Texas Archaeological Research Laboratory, Austin, 1989-1990.

Senior Staff Archaeologist, Co-Principal Investigator, Prewitt and Associates, Inc., Austin, 1987-1989.

Staff Archaeologist, U.S. Forest Service, Clearwater National Forest, Idaho, 1987

Supervisory Archaeologist, Co-Principal Investigator, Historical Research Associates, Missoula, Montana, 1985-1986.

Vice-President, Secretary, Project Manager/Senior Archaeologist, Ethos Consultants, Ltd., Medicine Hat, Alberta, 1980-1985.

Plains/Prairie Archaeologist, Archaeological Survey of Alberta, Alberta, 1975-1980.

Seasonal Instructor and Private Consultant, Alberta, 1974-1975.

Curator of Osteology Collection and Manager, University of Calgary, Alberta, 1973-1974.

Contractor, Project Director, National Museum of Canada, Alberta, 1972, 1973.

Field Director, World Heritage Site, Head-Smashed-In Buffalo Jump, Alberta, 1971.

Field Director, Waterton National Park Archaeological Project, Alberta, 1971.

Teaching Assistant, University of Calgary Field School, Indian Springs, 1970.

Crew Chief, Waterton National Park Archaeological Project, Alberta, 1970.

EXPERIENCE

Mr. Quigg has 36 years of archeological experience involved in all aspects of cultural resource management (CRM) including private consulting, managing a cultural resource firm, directing CRM program, and government regulation. Mr. Quigg has managed and conducted over 60 individual cultural resource projects for Government agencies, oil and gas firms, mining, highways, transmission lines, water pipelines, and reservoir construction projects in Alberta, Montana, Colorado, Texas, and New Mexico. As a project manager he completely understands the nature of the complex cultural resource, problem areas, and works directly with clients to meet their specific project needs in obtaining governmental approval to proceed. He understands research issues and provides management plans to gather necessary data, structures data analyses, and writes reports to explain and interpret the resource, to obtain necessary regulatory approval of the documentation in timely and cost efficient manner. He provides direction and innovative ideas to mitigate and manage cultural resources to the clients benefit while meeting government regulations.



Cultural resource investigation are carried out under a variety of Federal and state laws, regulations, and guidelines, such as the National Historic preservation Act (NHPA), the National Environmental Policy Act (NEPA), Native American Graves Protection and Repatriation Act (NAGPRA), Native American Free Exercise of Religion Act (NAFERA), Traditional Cultural Properties (TCP), Army Regulation 200-4 Cultural Resource Management, Army Regulation 420-40 Historic Preservation, Department of Defense Protection of Archeological Resources (32 CFR 229),. Mr. Quigg has worked directly with these legal requirements and Native Americans on particular sensitive projects. He has routinely completed archeological projects ranging from small surveys to large multidisciplinary field investigations, including development of management plans, popular brochures, and consultation.

TRC Environmental Corp. - 1990 to present

Principal/Co-Principal Investigator and project manager for the; BLM data recovery at Landis Property in Potter County in 2008; data recovery at Long View site in Roberts County for TxDOT in 2006; TxDOT 2007 data recovery at Gages Creek in Young County, BLM remedial testing in 2007 at four sites in West Amarillo Creek in Potter County, TxDOT 2006 data recovery project in Austin at 41TV2161; 2006 site assessments at Gages Creek in Young County; the 2005 assessment of 41RB112 in Roberts County; 1999-2000 Otero Mesa data recovery for Fort Bliss; the 1990 and 1996 Palo Duro Reservoir data recovery project (Sanders Site); Sulphur Springs Draw and Red Lake Reservoir survey and assessment projects; Mitchell Reservoir data recovery, Leon River Medicine Wheel ethnographic and archeological investigations; TxDOT data recovery at the Lino site (41WB437) in 1998, the 2000-2001 TxDOT data recovery at the Boiler site (41WB557); the 2002-2003 TxDOT Varga site (41ED28) mitigation; and data recovery at 41ZP364; and the Rush Site data recovery programs. He served as Project manager for large area survey of Area F at Jewett Mine, reservoir surveys, many small linear surveys, and principal author for the reporting of the early Archaic site excavations (41TG307 & 309) on the Concho River. Duties included the development and implementation of research designs, development of cost proposals, managing project budgets, hiring and directing field crews and on site investigations, analyses of faunal remains from 41HF128, 41TG346, and Palo Duro and Stacy Reservoir sites, ceramic and lithic data sets, integrating and interacting with sub-consultants on their technical assistance to various programs, report writing and compilation of all aspects of programs, and overall project management from beginning to end including client liaison, accounting oversight, curation of documents and artifacts.

Implemented interdisciplinary data analyses by technical experts including: geomorphology, stable carbon and nitrogen isotope analyses of bison bones, burned rocks, and ceramic sherds, macrobotanical analyses, phytolith studies, radiocarbon dating of burned rocks and ceramic sherds, lipid residue analyses on burned rocks and ceramic sherds, demagnetization analysis of burned rocks, diatom analysis, use wear studies on stone tools, *Rabdotus* shell A/I ratios and dating to assess site and feature context issues.

Archeological Data Recovery Projects

Mr. Quigg has managed and directed numerous data recovery/mitigation projects stemming from the Section 106 of the NHPA, Section 404 of the Clean Water Act, and Section 110 and the Antiquity Code of Texas (ACT). Mitigation projects have included a variety of site types such as



stone circles, deep stratified campsites, single component camps, bison kills and processing centers, burned rock middens, and small burned rock features. Examples of major data recovery project are as follows:

- **Data Recovery at Three Prehistoric Sites at the Landis Property, Texas Panhandle, 2007 - 2010, for the Bureau of Land Management.** Mr. Quigg served as Project Manager, Principal Investigator, Field Director for this intensive (451 m²) testing, excavation, analysis and reporting. The three open sites were of different ages, with different stratigraphy, and provided diverse cultural assemblages for hunter-gatherers. Multiple outreach programs were conducted on-site for local individuals and groups as well as development of the Texas Beyond History webpage for the site. The technical report was two volumes (ca. 1200 pages) that integrated interdisciplinary approaches that included 16 technical analyses. Mr. Quigg is an author or co-author on 3 peer-reviewed journal articles that have been published from the data gathered from the project.
- **Data Recovery at 41YN452 in 2007 for Texas Department of Transportation, in North Central Texas.** Mr. Quigg served as Principle Investigator, Project Manager, and part time Field Director, on this 50.3-m³-multiple block excavation in 60 to 110 cm deep deposits that targeted a Late Archaic component in the right-of-way of FM 3109 for TxDOT. A two volume technical report (740 pages) integrated multiple technical analyses that provided great insight to human behaviors.
- **Data Recovery at 41RB112, 2006, for Texas Department of Transportation, Texas Panhandle.** Mr. Quigg served as Principle Investigator, Project Manager, and part time Field Director, on this 103-m³-multiple block excavation of .50+ cm deep deposit with two well-defined Plains Village period components (with pithouses) in the right-of-way of SH 70 for TxDOT. He directed this multidisciplinary data analyses and reporting phase. A two volume technical report (1200 pages) has been submitted to TxDOT.
- **Data Recovery at 41TV2161, 2006, for Texas Department of Transportation, Central Texas.** Mr. Quigg served as Principle Investigator, Project Manager, and part time Field Director, on this 40-m³-block excavation of 2.0+ m deep cultural deposits in the right-of-way of SH 130 for TxDOT. The project is on going with data analysis and reporting to continue.
- **Data Recovery at the Varga Site (41ED28), 2002-2003, for Texas Department of Transportation, Southwest Texas.** Mr. Quigg served as Principle Investigator, Project Manager, and report author on this 104-m³-block excavation of a 1.2 m deep four-component campsite in the right-of-way development. He oversaw a field crew of nine archeologists in the hand-excavations of two major blocks, and directed this multidisciplinary data analyses and reporting phase. He managed the contract and budget, and coordinated with the client and other technical scientists. Included the text development for an outreach exhibit for Texas Beyond History web page, and brochure on site investigations.
- **Data Recovery at the Boiler Site (41WB557), 2000, for Texas Department of Transportation, South Texas.** Mr. Quigg served as Principle Investigator, Project



Manager, Field Director, and primary report author on this 142-m³-block excavation of 1.5 m deep cultural deposits in the right-of-way for the planned Texas Department of Transportation improvement. He directed a field crew of 12 archeologists in the hand-excavations of two major blocks, directed the multidisciplinary data analyses, wrote a 550 page technical report, managed the contract and budget, and coordinated with the client.

- **Data Recovery at 41ZP364, 2000, for the Bureau of Land Management and International Boundary and Water Commission in South Texas.** Mr. Quigg served as the Principal Investigator, Project Manager, and Field Director on this geoarcheological and archaeological investigation. The investigations included 21 backhoe trenches that guided the hand excavations of 48 m² and two small block areas of 20 and 16 m². He directed the subsequent laboratory work, analysis, and wrote most of the 350 page technical report that included multidisciplinary investigations.
- **Prehistoric Site Testing and Data Recovery in the New Target Complex, Otero Mesa, in West Texas 1999, for U.S. Army, Fort Bliss.** Mr. Quigg served as Principle Investigator and primary author for the testing of four sites potentially eligible for the NRHP and the data recovery for seven sites to mitigate the direct impact the proposed U.S. Air Force development as required under Section 106. This project included detailed excavation and field-documentation on some 63 burned rock features, coupled with an interdisciplinary laboratory approach that brought new insights to the understanding of small burned rock features. He was the primary author for the 650 page technical report for the Directorate of Environment, Conservation Division at Fort Bliss, Texas.
- **Data Recovery at the Lino Site (41WB437): A Stratified Late Archaic Campsite in South Texas, 1998, for Texas Department of Transportation.** Mr. Quigg served as the Project Manager, Field Director, and primary author on this 235-m² mitigation required under Section 106. He directed the laboratory processing, supervised the data analysis, facilitated the interdisciplinary technical analyses, wrote most of the 450 page technical report, directed the report production, managed and controlled the project budget, and coordinated with regulators and the client.
- **Data Recovery at the Sanders Site (41HF128): A Single Event Late Archaic Camp/Bison Processing Site, Palo Duro River Authority, 1997, Northwest Texas.** Mr. Quigg served as the Project Manager and Field Director of the 115-m² data recovery program under Section 404 of the Clean Water Act and NEPA. He coordinated all laboratory analyses and interacted with professional from multiple disciplines to support the cultural interpretations. Mr. Quigg also conducted the detailed analyses of the faunal and tool analyses. He wrote the 220 page technical report incorporating all recovered data and addressed six major research issues.
- **Data Recovery at the Rush Site, Colorado River Municipal Water District, 1993, Western Texas.** Mr. Quigg was the Project Manager and Field Director for the emergency mitigation of 45 m² necessary to comply with Section 404 of the Clear Waters Act for the client. He coordinated with the client, managed the budget, and conducted the stone tool,

faunal and ceramic analyses, and interacted with numerous specialists to facilitate the integration of a multidisciplinary approach to the analysis and interpretations. He wrote the majority of the 200 page technical report and completed the project on time and in budget.

- **Data Recovery and Geomorphologic Investigations, Palo Duro Reservoir, Palo Duro River Authority, 1991, Northwestern Texas.** Mr. Quigg directed and field supervised the data recovery from two prehistoric campsites, a rock shelter, and a historic dugout during a three-month span with three separate crews that involved 20 personnel. He was responsible for client and government resource manager communications during the field and subsequent data analysis. He directed data analysis, conducted the faunal, ceramic, and stone tool analyses, coordinated with six technical subconsultants, integrated data sets, and wrote most of the 600 page technical report.
- **Mitigation Excavation at Two Prehistoric Sites, Texas Department of Transportation, 1990, Central Texas.** Mr. Quigg served as the Field Supervisor at Barton (41HY202) and Mustang Branch Sites (41HY209) under a Section 106 investigation clearing the right-of-way for new construction. He directly supervised 20 archeologists for six months in the excavation of two stratified camps, a lithic workshop, and a burned rock midden. The intensive excavations encompassed 330 m² and involved a vast array of cultural materials. He oversaw and guided the faunal analysis.
- **Mitigation of Large Multicomponent Tipi Ring Site (24TT83) and Buried Campsite (24CA194), U.S. Department of Energy, Western Area Power Administration, 1986, North-central Montana.** Mr. Quigg served as co-Principal Investigator and Field Director for the intense data recovery program along a transmission corridor. He directed an archeological crew of 12 people over a two-month period that involved 380-m² of excavation. Subsequently he coordinated the technical analyses, analyzed the lithic debitage, burned rocks, stone tools, faunal remains, and ceramic materials from the various components, and wrote the final comprehensive technical report.
- **Crown Site (FhNa-86) Mitigation, Ethos Consultants Ltd., 1984, Saskatchewan Research Council, Central Saskatchewan.** Mr. Quigg was the Field Director for this Middle Archaic to Late Prehistoric stratified site with nine separate components in three cultural units. He directly supervised the analyses of the various data sets including the stone and bone tool assemblages, the lithic debitage, and ceramic analyses, and wrote the technical report that was submitted to the client.
- **Lloyd Site (FhNa-35) Mitigation, Ethos Consultants Ltd., 1982, Saskatchewan Research Council, Central Saskatchewan.** Mr. Quigg was the Field Director for this site excavation of a Late Prehistoric, single component, buried campsite. He directed the laboratory processing of various data sets that included 18,000 artifacts and conducted the faunal identification, supervised the stone tool analysis, and the lithic identification, and wrote the technical report for the client.

- **Mitigation of EcPp-24 and EfPg-5, Ethos Consultants Ltd. 1982, Southwestern Alberta.** Mr. Quigg served as Principal Investigator, Project Manager, and Field Supervisor for these two buried campsites in planned highway construction zones. He oversaw the laboratory processing, coordinated and communicated with the client, conducted the lithic and stone tool analysis and authored the final technical report.
- **Mitigation of Ross Glen Stone Circle Site, Ethos Consultants Ltd., 1981, Southeastern Alberta.** Mr. Quigg was the Principal Investigator, Project Manager, and Field Director of a large scale, 508 m², and hand-excavation of a stone circle site. He directed the laboratory processing and stone tool and lithic debitage analysis, burned rock and feature analysis, and wrote the 200-page technical report with conclusions, interpretations, and management recommendations.
- **Highway Salvage in the Crowsnest Pass, Lifeways of Canada Ltd., 1975, Southwestern Alberta.** Mr. Quigg served as Field Director for this multiple site data recovery program along the planned expansion of highways in Crowsnest Pass. He directed a crew of 10 archaeologists, conducted the stone tool and lithic debitage analysis, completed the feature descriptions, and was primary author in the final technical report.

Archeological Site Assessment Projects

Mr. Quigg has managed and conducted numerous site testing and evaluation projects in Texas, Alberta, and Montana. These projects ranged from evaluating single surface sites, deeply buried campsites, bison kill sites, burned rock middens, medicine wheels, stone cairns, to multiple component buried campsites. Information recovered was analyzed, interpreted, and used in the development of site-specific and project related recommendations and determination of sites eligibility for inclusion to the National Register of Historic Places under the Section 106. This included the development of data recovery plans, project specific budgets, hiring staff, and scheduling. A sample of projects Mr. Quigg has managed is listed below.

- **West Amarillo Creek Remedial Testing at 41PT185, 41PT186, and 41PT245 for the BLM in Northwestern Texas in 2007.** As Project Manager and Principal Investigator Mr. Quigg directed the basin wide geomorphic investigations (48 trenches), followed by the hand excavation of 48.0 m³ at selected locations at these prehistoric sites. A status report, draft and final interim reports were authored by Mr. Quigg with subsequent analysis and reporting.
- **Gages Creek Eligibility Assessment of 41YN450 and 41YN452, Texas Department of Transportation, 2006, North-central Texas.** As Project Manager and Principle Investigator Mr. Quigg directed the National Register field assessment of these two prehistoric sites buried in the TxDOT right-of-way in Young County. Field assessment included hand excavations (6.5 m³) and mechanical trenching (n=7) in terrace deposits that documented buried cultural remains. He directed the preliminary data analysis and coauthored the interim report submitted to TxDOT. Site results and recommendations

were presented to the client and government review agencies, who concurred with the recommendations.

- **Survey and Eligibility Assessment of Two Prehistoric Sites at Boot Ranch, 2005, Central Texas.** Mr. Quigg served as Principle Investigator and project manager. He oversaw the survey of 377 ac including 67 shovel tests, documentation of nine sites, the assessment of two sites including 15 units, 53 m in eight trenches, mapping of sites, and profiling. He coauthored the report that presented the data findings, recommendations. The report and recommendations were accepted by the Army Corps of Engineers.
- **Eligibility Assessment of 41RB112, Texas Department of Transportation, 2005, Texas Panhandle.** Mr. Quigg served as Principle Investigator and field director. He directed a 10 person crew in the hand excavations and profiling of this two part site. He authored the interim report that presented the data findings, recommendations, and a data recovery plan that included research questions and field approach to follow. The report and recommendations were accepted by the Texas Historical Commission.
- **Eligibility Assessment of 41BL278, Texas Department of Transportation, 2004, Central Texas.** Mr. Quigg served as Principle Investigator, project manager, and field director. He directed the hand-excavations on 10 units (4.1-m³), backhoe trenching, site mapping, exposure profiling, and oversaw the geoarcheological investigations. He coauthored the interim report that presented the data findings, recommendations. The report and recommendations were accepted by the Texas Historical Commission.
- **Eligibility Assessment of 41MS69, Texas Department of Transportation, 2004, Central Texas.** Mr. Quigg served as Principle Investigator, project manager, and field director. He directed the hand-excavations (8.9-m³), site mapping, and exposure profiling. He coauthored the interim report that presented the data findings, recommendations. The report and recommendations were accepted by the Texas Historical Commission.
- **Eligibility Assessment of Three Prehistoric Sites along FM 580W Over Lynch Creek, Texas Department of Transportation, 2004, Central Texas.** Mr. Quigg served as Principle Investigator and field director. He directed the hand-excavations of 21 units (17.4-m³), trenching of deposits (n=5), mapping of sites, profiling, and oversaw the geoarcheological assessment. He coauthored the interim report that presented the data findings, recommendations, and a data recovery plan that included research questions and field approach to follow. The report and recommendations were accepted by the Texas Historical Commission.
- **Eligibility Assessment of 41EP4439, Texas Department of Transportation, 2002, West Texas.** Mr. Quigg served as Principle Investigator and oversaw the project that included 20 backhoe trenches, 20 manual units, and geoarcheological investigations. The final report that presented the data findings, recommendations. The report and recommendations were accepted by the Texas Historical Commission.

- **Noodle Creek Eligibility Assessment, Texas Department of Transportation, 2002, North Texas.** Mr. Quigg was Project Manager and directed the National Register field assessment of site 41JS102 in the highway right-of-way next to the Noodle Creek Bridge crossing in Jones County. Field assessment included hand excavations and mechanical trenching in terrace deposits that documented buried cultural remains. Subsequently, he directed the data analysis and report writing. Site results and recommendations were presented to the client and government review agencies, who concurred with the recommendations.
- **USA #3 Assessment, TransTexas Oil And Gas Corp, 1997, South Texas.** Mr. Quigg was Project Manager and Field Director of the assessment of two prehistoric sites (41ZP39 and 41ZP176) in a well pad and pipeline ROW development zone at Falcon Reservoir. The site file search was followed by shovel testing and unit excavations that documented the buried nature of two sites. Site results and recommendations were presented to the client and government review agencies. The investigations resulted from the Archeological Resource Protection Act.
- **Pershing Field Assessment, Fort Sam Houston, 1997, Southern Texas.** Mr. Quigg served as Project Manager and Field Director of the archeological and geomorphologic assessment of 50 acres of undeveloped land on Fort Sam Houston. The natural terrace deposits were assessed through the excavation of 19 backhoe trenches to evaluate the potential for intact buried archeological remains. One prehistoric surface site was evaluated with shovel tests. The recovered data was assessed and recommendations were presented in a report coauthored by Mr. Quigg. The investigations were part of an Environmental Assessment document.
- **Assessment of Leon River Medicine Wheel, U.S. Army at Fort Hood, 1993-1994, Central Texas.** Mr. Quigg served as project manager and field director of seven archeologists in assessing the NRHP eligibility of this native religious site. He integrated geomorphology, geoarcheology, two geotechnical studies, and oral interviews of native religious leaders with hand excavation data and detailed feature recording techniques to thoroughly document the size, extent, age, and nature of the stone features and associated artifacts within shallow sediments. Mr. Quigg conducted a literature search into the history and background of northern plains medicine wheel investigations and ethno-history, performed specific data analyses, incorporated interdisciplinary technical analyses and results, and interpretations, and made recommendations for site protection and significance. He interacted with native religious leaders, archeologists, and government personnel in overall coordination of investigations and subsequent medicine wheel renewal ceremonies. Mr. Quigg also participated directly in the sacred reconstruction ceremonies and yearly renewals.
- **Burned Rock Mound Chronometric Assessment, U.S. Army, Fort Hood, 1993, Central Texas.** Mr. Quigg served as Field Director for the field evaluation of nine burned rock mounds (domed and annular middens) to assess their archeological potential and

establish an absolute chronometric framework for this site type. After reviewing some 100 prehistoric sites with burned rock features, Mr. Quigg selected nine promising sites and led the recovery of datable materials through backhoe trenching and limited hand excavations, which subsequently yielded 53 radiocarbon assays. This allowed for the creation of a chronological framework of burned rock mounds at Fort Hood and helped evaluate Fort Hood mound features with respect to their NRHP eligibility.

- **Mitchell Reservoir Testing, Colorado River Municipal Water District, 1992, Northern Texas.** Mr. Quigg served as Principal Investigator and directed the day-to-day operation of the 32-m² block excavations at 41MH49. He directed the laboratory operations and data analysis that included the integration of a number of technical analyses to support the interpretation. He wrote most of the final report and prepared the recommendations.
- **Site Assessment at ANR Pipeline Crossing of Palo Duro Creek, 1992, North Texas.** Mr. Quigg served as Project Manager and Field Director of an archeological and geomorphologic assessment of a river crossing in north Texas. Following a site file search, a foot traverse of the ROW was completed, and then six backhoe trenches were excavated and documented. The crossing was assessed, results evaluated, interpretations presented, and recommendations were made to the client.
- **Site Evaluation, U.S. Army, Fort Hood, 1991-1992, Central Texas.** Mr. Quigg served as Field Director and implemented the field evaluation program to assess individual prehistoric sites across the base. In conjunction with a project Geomorphologist, he evaluated over 500 prehistoric sites using numerous criteria, completed detailed evaluation forms, and made site specific recommendations.
- **Evaluation of Stone Circle Site EaPg-3, Archeological Survey of Alberta, 1984, Southern Alberta.** Mr. Quigg served as Principal Investigator and Field Supervisor of the site assessment through detailed documentation of eight stone circles. The investigations included feature mapping, the weighing and recording the depths of rocks, excavation of 81 augur tests and screened matrix, the hand excavation of 10 test pits. Data was subsequently analyzed and a comprehensive technical 35-page report was completed. Recommendations for future investigations were presented to the government.
- **Buried Prehistoric Campsite Evaluation, Alberta Transportation, 1981-1982, Alberta Foothills.** Mr. Quigg formulated field strategies and analysis goals to evaluate two buried prehistoric campsites through the excavation of 120 m². He integrated metric and descriptive analyses of over 1500 lithic artifacts, interpreted knapping technologies through refits studies, analyzed burned rocks, features, and conducted detailed faunal analysis, to place these events in time and space. He evaluated internal horizontal and vertical patterning to interpret human use of space, assess site integrity, and made recommendations for further work. He compiled and wrote the final 150 page technical report.

- **Excavation and Analysis Strategies to Evaluate Buried Prehistoric Sites, Alberta Transportation, 1980-1981, Southern Alberta.** Mr. Quigg devised excavation and analysis strategies to assess six shallowly buried prehistoric sites along multiple highway corridors. He served as Principal investigator and field director investigations that involved hand excavations by a six-person crew, managed the logistics and deployment of the crew, conducted data analysis, interpreted results, and reported the findings in a 200-page technical document. Mr. Quigg managed the overall project, and formulated the recommendations.
- **Archeological, Ethnographic, and Historical Literature Review of Site Specific Data, State Historical Society of North Dakota, 1983-984, Montana, North Dakota, and Wyoming, United States and Alberta and Saskatchewan, Canada.** Mr. Quigg served as Co-Principal Investigator and coordinator of a site-specific data review of stone circle site excavations from across the Northwestern Plains. This program included a review and synthesis of excavation methods, recording procedures, data analyses, data results, site and feature documentation strategies on stone circles and provided a detailed management plan and future direction concerning this specific site type.

Archeological Inventory/Survey Projects

Mr. Quigg has completed roughly 60 cultural resource inventories throughout the Plains states. These inventories ranged from small well pad and gravel pits to very large block areas of 6,000 acres to 100 mile long linear ROWs requiring multiple crews. Inventories were completed for government agencies, private industry, and individuals. Projects involved foot surveys of development areas, shovel testing, inventories of historic and prehistoric sites, completion of site forms, site and building sketch maps, analyzing cultural materials, writing reports, and making site and project eligibility recommendations and providing direction for future investigations. Listed below are a number of representative inventory projects.

- **Brushy Creek Reservoir Survey, City of Marlin, 2005, Texas.** Mr. Quigg served as Principal Investigator and director a crew of six in surveying 1140 ac with 523 shovel tests for the City of Marlins proposed reservoir. Fifteen new sites and He co-authored the technical report, managed the budget, and coordinated with the client.
- **Right-of-way Survey in four counties in central Texas, Texas Department of Transportation, 2006, North Central Texas.** Mr. Quigg served as field director on two of the surveys. He co-authored the technical report, managed the budget, and coordinated with the client.
- **Archeological Surveys in Central Texas, Texas Department of Transportation, 2006.** Mr. Quigg served as Principal Investigator and field director on two surveys. He conducted the foot traverses, shovel tests, and monitored the backhoe trenching, co-authored the technical report, managed the budget, and coordinated with the client.

- **Reconnaissance for FPL Energy's Horse Hollow Wind Power Project, 2006.** Mr. Quigg served as Principal Investigator and field director on this reconnaissance and chert sourcing project. He conducted the road and tower inspections, assessed impacts to area, collected natural chert samples for instrumental neutron activation analyses, authored the technical report, managed the budget, and coordinated with the client.
- **Backhoe trenching to discovery buried cultural resources along FM 2214 for Texas Department of Transportation, 2005, North Central Texas.** Mr. Quigg served as Principal Investigator and field director to investigate the alluvial deposits for cultural remains through 11 backhoe trenches (76 m) and profiling. He authored the technical report that included the findings and recommendations. He managed the budget, and coordinated with the client. The Texas Historical Commission and the Army Corps of Engineers accepted the report.
- **Sand Hill Energy Center, Travis County, Central Texas, 2002.** Mr. Quigg served as Principal Investigator and Field Director on two projects related to the expansion of facilities at the City of Austin power plant. He also co-authored the technical reports and managed the budget, and coordinated with the client.
- **Red Lake, Martin County, Southern Llano Estacado, 1993.** Mr. Quigg served as Principal Investigator and Field Director during the inventory and site assessment for proposed 47 ha. Reservoir for the Colorado River Municipal Water District. He also co-authored the technical report and managed the budget, and coordinated with the client.
- **Sulphur Springs Draw Reservoir: Geoarchaeological and Archaeological Investigations, Southern Llano Estacado, 1994.** Mr. Quigg served as Principal Investigator and Field Director during the inventory and site assessment for proposed 435 ha. Sulphur Draw Reservoir for the Colorado River Municipal Water District. He also co-authored the technical report and managed the budget, and coordinated with the client.
- **Texcor Property Assessment, Prewitt and Associates, Inc., 1988, West Texas.** Mr. Quigg served as Field Archeologist for the reconnaissance of a proposed hazard waste site in Kinney County. He authored a letter report (No. 356) with recommendations to the client.
- **Brooke Army Medical Center Assessment, Prewitt and Associates, Inc., 1988, South Texas.** Mr. Quigg served as the Field Archeologist for the reconnaissance of development impact along Salado Creek in Fort San Houston. He wrote the report with the recommendations to the client.
- **City of Robinson Water Plant, Prewitt and Associates, Inc., 1988, Central Texas.** Mr. Quigg served as the Archeologist for the reconnaissance of a 153 m long pipeline corridor and 7.4 acres parcel around the intake structure. He authored an appendix that included methods, results, and provided recommendations to the client.

- **Hidalgo County Drainage Ditch Realignments, Prewitt and Associates, Inc., 1988, South Texas.** Mr. Quigg served as the Field Archeologist for the reconnaissance of proposed development of water drainage ditches. He coauthored the final report.
- **Cultural Resource Inventory, Bureau of Indian Affairs, Northern Cheyenne Indian Reservation, 1986, Eastern Montana.** Mr. Quigg Field Directed the inventory of 6,300 non-continuous acres, 200 miles of road corridors, and 85 springs. He helped document 139 sites, created site typologies, analyzed site distribution by environmental attributes, projected settlement pattern distributions, and wrote the final report for the BIA.
- **Class II Cultural Resource Inventory, Bureau of Land Management, Milk River Region, 1985, Northern Montana.** Mr. Quigg field directed the inventory of 6,720 acres in the valley breaks of the Milk River Valley. He helped record over 200 sites encompassing 1,100 features including rock cairns, stone circles, lithic scatters, bison kills, and historic sites. He completed the data and site distribution analyses, coauthored the written documentation of the findings and interpretations for the BLM.
- **An Historical Impact Assessment, Deadfish Water Diversion, Ethos Consultants Ltd. 1984, Southern Alberta.** Mr. Quigg served as Project Manager and field director for the inventory and assessment of a 14.5 km ROW, documented in detail 12 prehistoric and one historic site through hand excavation of 102 m² individual features, site mapping, and recorded weight and depth of feature rocks. He also wrote and produced a 167 page technical report with site specific and general project recommendations to the government regulators.

Preparation of Cultural Resource Operational Management Plan and Management Plans

- **Palo Duro Reservoir, Operational Management Plan, Palo Duro River Authority, 1994, Hansford County, Texas.** Mr. Quigg helped develop the first OMP to be accepted for a reservoir in Texas. He was the primary author and compiled necessary data to write the contents of a plan that allows for the management of the cultural resources in the vicinity of the reservoir under the Texas Antiquities Code.
- **Archeological, Ethnographic, and Historical Literature Review of Site Specific Data, State Historical Society of North Dakota, 1983-984, Montana, North Dakota, and Wyoming, United States and Alberta and Saskatchewan, Canada.** Mr. Quigg served as Co-Principal Investigator and coordinator of a site-specific data review of stone circle site excavations from across the Northwestern Plains. This program included a review and synthesis of excavation methods, recording procedures, data analyses, data results, site and feature documentation strategies on stone circles and provided a detailed management plan and future direction concerning this specific site type.

Preparation of Testing, Data Recovery Plans, and Research Designs

- **Treatment Plan for Three Archeological Sites on the Landis Property near Amarillo, Texas.** Mr. Quigg developed an in-depth plan for the Bureau of Land Management. The plan presented a research design including research issues and questions, detailed field work plan for three sites, presented various technical analyses, and reporting to address six stated research issues. The client and regulators approved the plan.
- **Research Design for Sites 41WB556 and 41WB557, Texas Department of Transportation, 2000, South Texas.** Mr. Quigg developed and wrote a data recovery plan for two buried, prehistoric sites to be impacted by highway development. The plan covered the field investigations, data analysis, reporting to address six stated research issues. The client and regulators approved the plan.
- **Data Recovery Plan for 41ZP364, TransTexas Gas Corporation, 1997, South Texas.** Mr. Quigg developed the data recovery plan was used to guide the field and laboratory investigations. It was prepared to comply with the 1997 MOA for Well Pad #1 signed by the Council, BLM, SHPO, and the client. The client and regulators approved the plan.
- **Testing Plan for 41ZP39 and 41ZP176, TransTexas Gas Corporation, 1997, South Texas.** Mr. Quigg developed the testing plan used to assess these sites in the direct impact areas for inclusion into the NRHP. It was intended that the results was have a finding of no effect for the limited impacts by the pipeline route. The client and regulators approved the plan.
- **Testing of 41MT14 Sulphur Draw Reservoir, 1992, Colorado River Municipal Water District, Northwest Texas.** Mr. Quigg developed the testing plan for a buried campsite in the dam axis of the proposed reservoir. The regulators approved the plan.
- **Testing of 41MT21 Sulphur Draw Reservoir, 1992, Colorado River Municipal Water District, Northwest Texas.** Mr. Quigg developed the testing plan for a buried campsite in the dam axis of the proposed reservoir. The regulators approved the plan.

Historical Investigations

Mr. Quigg has managed, directed, and participated in historic site inventories, archival documentation, and record searches for various projects across the Plains, often as components of larger projects. These investigations have centered on documenting standing structures and mine sites. He has directed the hand excavation of a historic dugout and house foundation in Palo Duro Reservoir. He has documented various mining structures in the Clearwater National Forest in Idaho and at Rock Lake Marias Pass, Cabinet Mountain Wilderness, and Helmville East in Montana, and directed the records search for the Mitchell Reservoir Project and Area F at Jewett Mine.

- **Palo Duro Reservoir Historic Sites, Palo Duro River Authority, 1991, Northwestern Texas.** Mr. Quigg directed and field supervised the data recovery from a historic dugout (41HF113) and historic rock foundation (41HF8). He directed data analysis and communicated with historic archeologist for a chapter of the final report.
- **Zan's Cabin, U.S. Forest Service, 1987, Northern Idaho.** Mr. Quigg served as Archeologist and conducted the reconnaissance and documentation of the historic structure and pioneer mine prior to structure removal.
- **Footrot Cabin Assessment, U.S. Forest Service, 1987, Northern Idaho.** Mr. Quigg served as Archeologist and conducted the reconnaissance, documentation, and assessment of the historic structure.

Native American Consultation

Mr. Quigg has participated in a number of consultation processes with Native American groups in Texas and Canada. He has served as Project Archeologist and interacted with a number of Plains Tribes.

- **The Leon Medicine Wheel, U.S. Army Fort Hood, 1996, Fort Hood, Texas.** Mr. Quigg conducted interviews with the elders Mr. William Tallbull, Haman Wise, Floyd Youngman and Lee Lonebear of the Medicine Wheel Alliance, coordinated activities with the American Indian Resource, and Education Coalition of Texas, participated in spiritual cleansing ceremonies, was a participant in the actual reconstruction and rededication ceremony for the sacred wheel. Was Project Manager and primary author in the archeological and documentation of the medicine wheel and associated ceremonial events.
- **Northern Cheyenne Reservation, Bureau of Indian Affairs, 1986, Eastern Montana.** As Field Director of a large inventory across native lands and sites he interviewed a number of tribal members and leaders, in the location, markings, and dealings with sacred sites and how to protect these religious and sensitive sites. He was coauthor in the final report.

Technical Data Analyses

Mr. Quigg has personally conducted numerous site specific and in-depth analyses on various cultural materials and data sets including lithic debitage, ceramics, stone tools, bone tools, burned rocks, and faunal assemblages. He has developed expertise in these data sets and has formulated specific analysis to address specific research questions or issues relating to specific topics. The structured analyses have permitted concentration of often-limited resources on the most important data sets to address important questions.

- **Ceramic Analyses:** Mr. Quigg has performed metric and non-metric descriptions, analyzed data, and presented results in chapters of reports. He has formulated research designs and incorporated instrumental neutron activation, organic residue, stable carbon isotope, and petrographic analysis with the more descriptive analyses. Examples of ceramic analysis from excavated sites include the Long View (41RB112), Rush site (41TG346) in western Texas, the Manyfingers site (DhPj-31) in southern Alberta, the Cory Ranch site in (24TT83) in central Montana, and the Otero Mesa sites in Fort Bliss in southern New Mexico and western Texas. He has conducted chemical analyses such as stable carbon and nitrogen isotope and lipid residue analysis on sherds to explore for foods being cooked in vessels. He has used sherds to obtain direct radiocarbon AMS dates.
- **Faunal Analyses:** Mr. Quigg has conducted element and animal identifications, isolated animal ages through tooth eruption and fusion rates, identified sex based on bone metric data, and conducted in-depth butchering analyses on assemblages from bison kills, processing centers, and campsites sites and bison processing areas in western and northern Texas, and southern Alberta and central Saskatchewan. Examples of faunal analyses include Long View (41RB112), Rush site (41TG346) in western Texas, three sites (41RN169, 41CC131, 41CN95) in O.H. Ivie Reservoir in central Texas, Clear creek Golf Course 41CV413 in central Texas, the Sanders site (41HF128) and other Palo Duro Reservoir sites in northwestern Texas, the Lloyd site (FhNa-35) and Crown site (FhNA-86) in central Saskatchewan, the Manyfingers site in southern Alberta, and S.S. Burmis in southwestern Alberta. These assemblages included hundreds of elements and generally a variety of species. Other smaller assemblages have been analyzed and reported upon such as those from Justiceburg Reservoir. Mr. Quigg maintains his own faunal comparative collected. He has conducted chemical analysis on animal bones such as stable carbon and nitrogen isotope to investigate the types of foods specific animals were eating and what changes in the diet have occurred over time.
- **Lithic Analyses:** Mr. Quigg has conducted raw material identifications and metric and non-metric descriptive analyses on lithic artifacts and debitage. These and other analyses have been conducted on specific sites from across broad regions of hunter and gathers including the Schmidt Quarry (24BW559) and the Lost Terrace Site (24CH68) in Montana, lithic tool and debitage analysis of sites in the Palo Duro Reservoir and Fort Hood, the stone tool and debitage analyses for three sites near Falcon Reservoir in southern Texas and the Lloyd (FhNa-35) and Crown site (FhNA-86) in central Saskatchewan, the stone tool analysis from the Rush site (41TG346), the Sanders site stone tool assemblages

(41HF128) both in Texas, and many other lithic assemblages from across southern Alberta. Mr. Quigg maintains his own lithic reference collection from across two Canadian provinces, and four Plains states.

- **Burned Rock Analyses:** Mr. Quigg has been conducting burned rock analysis for many years at a variety of sites and has instigated a multiple disciplinary approach to help understand these poorly known waste products. He has employed the use of stable carbon and nitrogen isotope data, lipid residues, and starch grain analysis to help address the types of food resources that have been processed by the rocks. He has integrated rock size, weight data, and diatom data with specific context of features to address feature functions. He has also employed AMS radiocarbon dating of organic residues from burned rocks to determine the age of features. Examples of these analyses include the Varga (41ED28), Lino site (41WB437), the Boiler site (41WB557) and 41ZP364 in southern Texas, and the Otero Mesa burned rock features in Fort Bliss.

Collection Management

Mr. Quigg has managed, organized and sorted archeological collections, documents, and photographs from Baniff, Japer, and Waterton National Parks in Canada stored at the University of Calgary. He collected, processed and curated new faunal specimens for the osteological comparative laboratory at the Department of Archaeological, University of Calgary. Mr. Quigg also maintained, organized, and labeled a large collection of animal, fish, and bird skeletons for continuous use by staff and students and for instructional purposes. He performed osteological identifications for numerous individuals and groups while at the University of Calgary. Mr. maintains his own personal non-human osteological and lithic source comparative collections from the plains region.

SPECIALIZED TRAINING AND WORKSHOPS

- National Historic Preservation Act Section 106 Workshops
- Identification and Management of Traditional Cultural Places by T. F. King
- Managing Multiple Projects, Objectives, and Deadlines
- Time Management Training
- American Red Cross first aid and CPR Training
- U.S. Department of Labor and Mine Safety and Health Administration Training

Teaching History

- **Instructor, Continuing Education, University of Calgary, 1974, 1974-1975 Calgary, Alberta.** Mr. Quigg planned the curriculum and taught two night undergraduate courses in southern Alberta/Plains archaeology.
- **Instructor, Department of Archaeology, University of Calgary, 1974, Crowsnest Pass, Southwestern Alberta.** Mr. Quigg planned the curriculum, directed field and laboratory efforts, and taught three undergraduate archaeological field courses to 20 students.

- **Teaching Assistant/Field Director, Department of Archeological, University of Calgary, 1970, Waterton National Park, Southwestern Alberta.** Mr. Quigg directed 27 students in field excavation techniques and taught techniques and data recovery methods at a complex stratified campsite during a 6-week archaeological field school at Indian Springs under the direction of Dr. Leslie B. Davis.
- **Student Leader, Department of Anthropology, University of Northern Colorado, 1970, Sanora Mexico.** Mr. Quigg assisted eight students in a 2-week long archaeological reconnaissance and site documentation in northern Sanora under the direction of Dr. George Fay. He recorded open-air camps, shell middens, and rock art sites.

Organizations and Memberships

Council of Texas Archeologist
 Texas Archeological Society
 Plains Anthropological Society
 Travis County Archeological Society

Elected or Appointed Positions, and Honors

Received Aware for Excellence in Archaeology by the Texas Historical Commission, 2001.
 Chair, Governmental Affairs Committee, Council of Texas Archeologists, 1994-1995
 Member of the Board of Directors, Montana Archaeological Society, 1986
 Member of the Board of Directors of the Association of Consulting Archaeologists, Alberta, 1981, 1982, and 1985.
 Present, Association of Consulting Archaeologists, Alberta, 1983
 Member of the Board of Directors of Southeastern Alberta Archaeological Society, Alberta, 1981-1984
 Vice President/Secretary, Ethos Consultants Ltd. 1981-1985
 Board of Directors, Big Brothers, Medicine Hat, Alberta. 1981-1985
 Honorary Research Associate, Department of Archaeology, University of Calgary, Nov. 1973-Mar. 1975.

Professional Presentations

- 1971 Archaeological Research in Waterton Lakes National Park. Paper presented at 29th Annual Plains Conference, Winnipeg.
- 1974 Prehistoric Settlement Patterns in the Southwestern Alberta Foothills. Paper presented at the 17th Annual Meeting of the Montana Archaeological Society, Bozeman, Montana.
- 1977 Summary of Tipi Ring Excavations in Southern Alberta. Paper presented at the 32nd Annual Plains Conference.
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Appendix B

Figures

Appendix C

Photos

Appendix D

Cultural Resources Report for Laydown Area

US EPA ARCHIVE DOCUMENT



Appendix E

Reference Page
