

**ENVIRONMENTAL INVESTIGATIONS
AT
THE PADUCAH GASEOUS DIFFUSION PLANT
AND SURROUNDING AREA
McCRACKEN COUNTY, KENTUCKY**

**VOLUME IV
CULTURAL RESOURCES INVESTIGATION**

**PART A
RESULTS OF FIELD INVESTIGATION**

Prepared by

**Department of the Army
Waterways Experiment Station, Corps of Engineers
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P.O. Box 1070
Nashville, TN 37202-1070**

Volume 4A of 5

**May 1994
Final Report**

Prepared for

**Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001**

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Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
acres	0.405	hectares
feet	0.3048	meters
inches	2.540	centimeters
miles	1.609347	kilometers
square feet	0.093	square meters

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Preface

This document provides results of one of four studies conducted to describe environmentally sensitive areas near the Paducah Gaseous Diffusion Plant properties at Paducah, Kentucky. This report presents the methods and results of the identification and evaluation of cultural resources on the Department of Energy and Tennessee Valley Authority reservations and selected areas not included as part of either reservation. The results of a pedestrian field survey are presented in Part A and the results of a statistical model of site occurrences in Part B.

This work was performed by the U.S. Army Engineer Waterways Experiment Station (WES). The report was prepared by Dr. Frederick L. Briuer of the Environmental Laboratory (EL). Dr. Kress was the WES project coordinator.

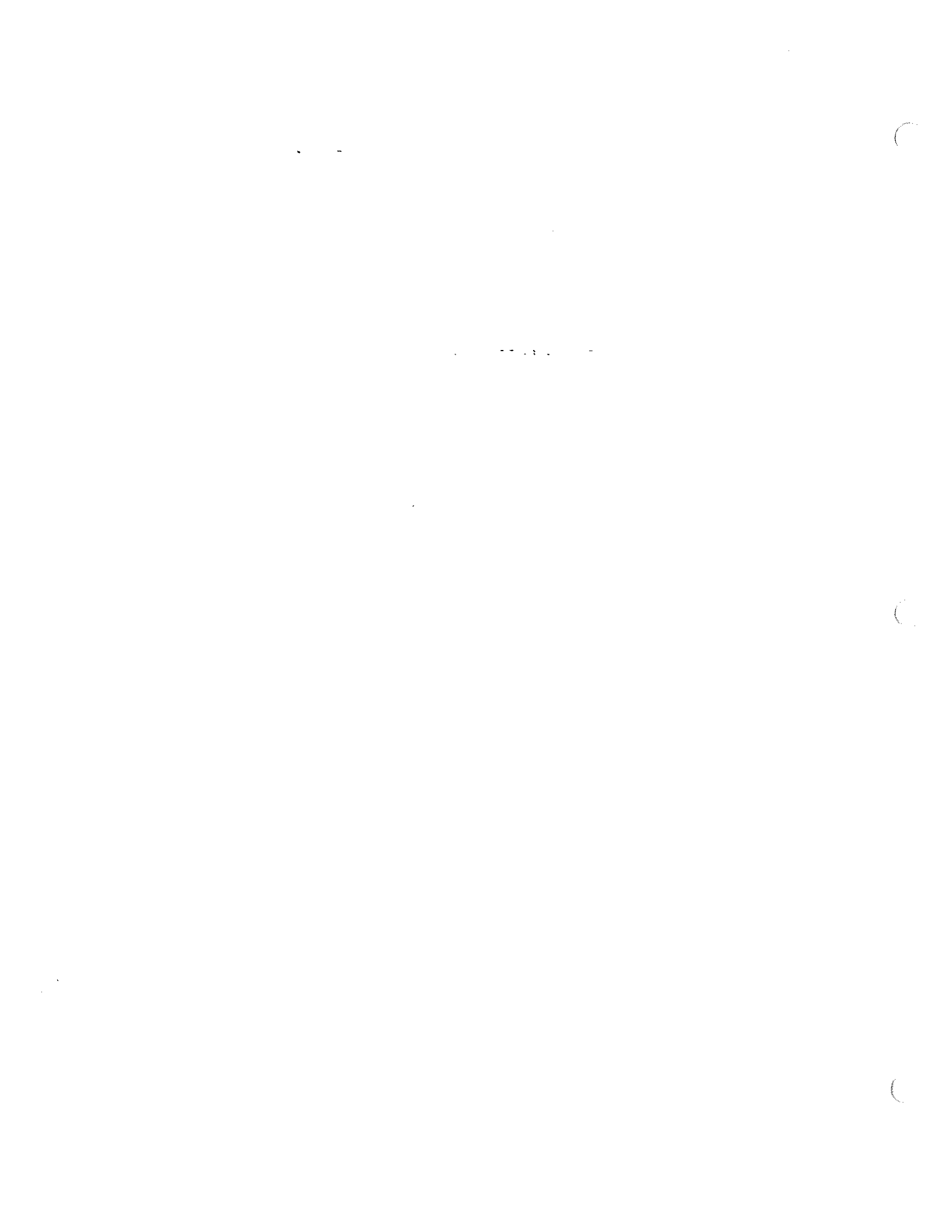
The work was conducted under the direct supervision of Mr. Roger Hamilton, Chief, Resource Analysis Branch. General supervision for the study was provided by Dr. Robert Engler, Chief, Natural Resources Division, EL, and Dr. John Harrison, Director, EL.

The purpose of the WES environmental investigations was to support PGDP's National Environmental Policy Act (NEPA) compliance program. These investigations provide current information about environmentally sensitive areas on the PGDP reservation and support the development of environmental impact statements planned for the PGDP site. These investigations also support current DOE regulations (10 CFR 1022) which implement Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands), and support DOE to comply with the National Historic Preservation Act and the Endangered Species Act of 1973.

The results of the environmental investigation are presented in five volumes as follows:

- Volume I: Executive Summary
- Volume II: Wetlands Investigation
- Volume III: Threatened and Endangered Species Investigation
- Volume IV: Cultural Resources Investigation
- Volume V: Floodplain Investigation

Director of WES during the preparation of this document was
Dr. Robert W. Whalin. Commander was COL Bruce K. Howard.



1 Introduction

This report presents the results of a cultural resources survey of 669 hectares (1,653 acres) at the Department of Energy's Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky (Figure 1). In addition, archival research was conducted to assess the possible significance of potential historic sites identified during survey. The Nashville District Corps of Engineers (ORN) provided technical assistance for this project to the Department of Energy (DOE) under Interagency Agreement No. DE-AI05-92OR22026. This work was completed by the Cultural Resources Division of Geo-Marine, Inc., of Plano, Texas under Delivery Order No. 3 of Contract #DACW-39-92D-0008. Fieldwork for this project was carried out from April 2, 1993 to April 15, 1993 and from May 24, 1993 to June 4, 1993.

The cultural resources survey conducted at the Paducah Gaseous Diffusion Plant (PGDP) is one phase of a larger project designed to identify and document environmentally sensitive resources at the facility. Specific tasks include the identification and documentation of cultural resources as well as wetland, floodplain, and threatened and endangered species investigations.

The cultural resources investigation portion of this project is being undertaken to fulfill the legal requirements set forth in the National Historic Preservation Act of 1966, as amended (PL96-515), the Archaeological and Historical Preservation Act of 1974 (PL93-291), the Archaeological Resources Protection Act of 1979 (PL96-95), the National Environmental Policy Act of 1969 (PL90-190), and Executive Order 11593, "Protection and Enhancement of the Cultural Environment."

Personnel from Geo-Marine, Inc., conducted the field investigations at the PGDP facility under the direction of the Principal Investigator, Duane E. Peter. Gathel Mark Weston acted as Field Supervisor. Forty-one sample survey units totaling 669 hectares (1,653 acres) were selected for survey. The Field Supervisor and crew expended a total of 560 hours conducting systematic survey and selective shovel testing. As a result of this survey, seven prehistoric and four historic sites were recorded. Twelve additional nonsite localities were recorded but not assigned state site numbers. With one exception, all sites exhibit some degree of disturbance, ranging from light to heavy.

Archival research and informant interviews were conducted prior to the initiation of fieldwork. The results of these investigations were used to predict site locations and to relocate previously recorded sites. Of the two previously recorded prehistoric sites and three unregistered prehistoric sites reported within the 41 sample survey units, one of the previously recorded sites and one of the unregistered sites were located. In addition to the prehistoric sites, 17 potential historic sites were identified through archival sources. Four of these sites were located, recorded, and assigned state site numbers. Four sites were located but were classified as localities due to the limited amount of cultural material remaining at the locations. No evidence of the remaining nine potential historic sites was observed. All nine sites were located in areas that have been heavily disturbed by the construction of the PGDP facility or the Kentucky Ordnance Works, with little or no possibility of any contextual integrity remaining.

This report is presented in five chapters. Chapter 2 presents a summary of the project area, including a brief description of the regional geology and environment as well as a discussion of the previous archeological research and the cultural history that is relevant to the current project. Chapter 3 presents the field methodology, survey strategies, and research objectives that guided this project. Chapter 4 presents the results of this investigation, including both site descriptions as well as a discussion of the physical environment at the facility and its effect on archeological survey. A summary of site assessments and recommendations as well as a summary of recommended strategies for future survey efforts are presented in Chapter 5.

Five appendices are included following the body of the report. Appendix A provides a listing of all subsurface cultural materials that were documented from shovel tests as well as a listing of all collected materials from either surface or subsurface deposits that are to be curated. Appendix B presents maps of the survey units. Copies of the Transect Forms are found in Appendix B, Appendix C; is composed of copies of the Survey Unit Forms, and Appendix D provides copies of the Kentucky Archaeological Site Survey forms.

2 Project Area

The PGDP is located on the south bank of the Ohio River, approximately 16 km downstream from the city of Paducah, Kentucky, and 80 km upstream from the Mississippi River (Figure 2). The total study area is 4,746 hectares (11,719 acres). 22 archeological sites have been located and recorded by previous surveys covering approximately 300 hectares (740 acres).

The PGDP is located within the western part of Kentucky commonly referred to as the Jackson Purchase region or just the "Purchase." This name is derived from Andrew Jackson's negotiations with the Chickasaw Indians and the purchase of their lands north of Tennessee in 1818 (Gibson 1971:105). The name of this region also has been applied to the Jackson Purchase Management Area, one of seven management areas within Kentucky delimited for the purpose of managing prehistoric cultural resources. The Jackson Purchase Management Area covers 8,868 km² in 11 counties. The management area is bound by the lower Ohio River on the north, the state of Tennessee on the south, the Mississippi River on the west, and on the east by the Tennessee River and the eastern boundary of Livingston County. The management area is further divided into three sections: the Mississippi Section, the Ohio River I Section, and the Lower Tennessee/Cumberland Section. The PGDP is located entirely within the Ohio River I Section.

The name "Jackson Purchase" also has been applied to a second set of regional divisions related to cultural resources. The Jackson Purchase Cultural Landscape is one of five subdivisions used in Kentucky for the organization and analysis of historic sites. The Jackson Purchase Cultural Landscape encompasses the eight western counties of the Jackson Purchase Management Area.

Geology and Geography

The eight western counties of the Jackson Purchase Management Area, which include all of the Ohio River I Section and all of the Jackson Purchase Cultural Landscape, are within the Mississippi Embayment Region of the Coastal Plain Physiographic Province (Carter et al. 1990:9). Geologically, this is the youngest region in Kentucky (Humphrey 1976:1), with unconsolidated

Pleistocene sediments overlying unconsolidated and semi-consolidated Tertiary and Cretaceous strata (Pryor and Ross 1962:28). This area is generally level to gently rolling, with wide alluvial valleys and gentle slopes. The area in which the PGDP is situated is an excellent example of this topography. The central portion of the PGDP is level to nearly level and the Ohio River floodplain here is moderately wide, ranging between 1.6 km and 2 km (1 to 1.25 mi). The relief between the uplands and the floodplain is only 6 to 9 m (20 ft to 30 ft) with none of the bluffs or cliffs common in the middle Ohio River Valley.

Within the PGDP, the upper floodplain of the Ohio River is dominated by ridge and swale terrain, with elevations ranging between 97.5 and 100.5 m (320 to 330 ft) msl. This terrain was created as a result of meander scrolls formed by the lateral migration of the river across its floodplain (Sharitz and Mitsch 1993:317). The results are low, sandy ridges that remain dry for a majority of the year and sloughs that are seasonally or permanently flooded. Permanently flooded sloughs have resulted in Metropolis Lake, which is encircled by a moderate stand of bald cypress and a deep water tupelo swamp farther to the east.

A steep-sided ridge north of Bayou Creek is a former natural levee that has a maximum elevation of 100 m (328 ft) msl, approximately 3.5 m higher than the immediately surrounding floodplain. In the spring of 1993 this ridge was above water even when the Ohio River was approximately 10 m (30 ft) above its normal pool elevation. Between this former levee and the current levee is the lower floodplain of the Ohio River. The elevation of the lower floodplain ranges between 91.5 and 97.5 m (300 and 320 ft) msl. The part of the floodplain in the western section of the PGDP is actively aggrading, as demonstrated by the thick, newly deposited silt observed on the outer 50 to 70 m of the floodplain. While this area has many of the characteristics of the ridge and swale landforms observed on the upper floodplain, the lower floodplain is currently being modified by both natural and human agents. Ridges observed at the high water mark of the seasonal floods are believed to be the result of barge traffic on the river rather than natural processes. Barges on the river were observed to create a 60- to 100-cm wake, resulting in the beach ridges observed during survey.

Barge traffic is also believed to be partially responsible for extensive erosion of the river bank observed in the eastern part of the PGDP. The natural levee in this area was breached by the construction of a drainage channel and was probably further damaged during the construction of the high voltage transmission lines that cross the Ohio River at this location. Observing the exposed root systems of trees growing along the river bank suggests that as much as 1.5 m (5 feet) of sediments has recently been eroded from the river bank.

The lower floodplain contains recent (historic) sedimentary deposits of unknown depth, making it difficult to assess the potential for buried archeological deposits. It is possible that a considerable extent of the lower floodplain

may date only to the last 500 years. Geomorphological investigations are needed to clarify the processes involved in the formation of the floodplain.

The Metropolis Terrace divides the uplands from the floodplain. This high terrace is the result of a glacial lake that formed in the Ohio River valley during the Pleistocene (Butler et al. 1981:5). The terrace averages 108 m (355 ft) msl in elevation and slopes gently to an indistinct boundary with the floodplain. This boundary averages 100.5 m (330 ft) msl.

The upland sections of the PGDP range in elevation from 108 to 137 m (355 to 450 ft) msl. Maximum local relief is 18 m (60 ft) between the valley floor of Bayou Creek and the surrounding hilltops. Relatively broad considering the small size of the creek, Bayou Creek's alluvial valley has a level floor and gentle valley slopes. The upland areas are covered with thick deposits of loess, with deposits in McCracken and Ballard counties ranging from 3 to 10 m (10 to 32 feet) in depth (Humphrey 1976:70). Upland alluvial deposits are silt loams derived from upland loess deposits.

Due to the thick loess deposits, gentle slopes, and limited relief of the Jackson Purchase region, few if any rock outcrops exist in this area, offering little opportunity for exploitation of lithic resources. South of the Ohio River the nearest major outcrops of sedimentary rocks that have potential for chert deposits are in Lyon County, Kentucky, approximately 80 km east of the PGDP (Quarterman 1993:38). The important chert sources of Union County, Illinois, are located only 70 to 80 km north of the Ohio River. Other important chert sources are found upstream from the PGDP along both the Ohio and Tennessee Rivers. Within the PGDP itself, numerous gravel deposits containing Mounds Gravel chert are available in gravel bars along the Ohio River and in local terrace deposits (Butler et al. 1981:37). Although there are no primary sources of lithic raw materials in a majority of the Jackson Purchase area, both secondary deposits and rich lithic sources in surrounding regions could have provided ample raw materials to aboriginal populations.

Flora and Fauna

During prehistoric times, the level uplands, gentle slopes, and broad valleys of western Kentucky were covered by dense stands of timber, ranging from the pine-, spruce-, and fir-dominated forests of the full glacial period (18,000 BP) to the mixed deciduous hardwoods that replaced these boreal coniferous forests after the retreat of the glaciers (Greller 1988:291). The modern woodlands of western Kentucky have been grouped with the western mesophytic forest association, a transitional region between the oak and hickory forests to the west and the mixed hardwoods of the mixed mesophytic forests to the east (Greller 1988:294-296). A second classification places the western mesophytic forests within the oak-hickory forest association (Bryant et al. 1993:143-144), while other classification systems group varying portions of the western mesophytic region with the oak-hickory forests. Regardless of the classification system that is used, from the Appalachians westward to the Ozarks the proportion of

oaks to other deciduous hardwoods increases, with oak species becoming dominant west of the Cumberland River (Bryant et al. 1993:167).

The classification of the western Kentucky forests into either oak-hickory or western mesophytic forest is complicated further by the floodplain forest communities of the Mississippi and Ohio River valleys. The lower Ohio River valley is at the northern extension of the Southern Floodplain Forest, in which oak, bald cypress, and water tupelo dominate the floodplains (Sharitz and Mitsch 1993:312). It has been observed that some floodplain species have extended onto the loess uplands of western Kentucky (Bryant et al. 1993:159) resulting in a forest environment of greater diversity. In addition to the influence of the floodplains on local vegetation, the forests of western Kentucky exhibit influences from the north, west, and southeast.

Faunal resources within the Jackson Purchase region are most abundant within the floodplains. Four ecological attributes contribute to the abundance and diversity of the floodplain environment: the predominance of woody plant communities, the presence of surface water and abundant soil moisture, the diversity and interspersed of habitat features, and the river, which acts as a corridor for dispersal and migration (Sharitz and Mitsch 1993:348-349). This diversity extends into the near upland areas providing a greater quantity of forage foods than the floodplains. With the development of cultivated domesticates during the Middle to Late Archaic periods, certain economically significant fauna such as white-tailed deer would have become more abundant as the available browse increased in active and abandoned aboriginal cultivated fields (Delcourt et al. 1993:71-72).

Besides the white-tailed deer, other economically significant faunal species that would have been available to prehistoric populations included bison and wapiti (both now extirpated); turkey and other resident and migratory avians, various small mammals such as eastern cottontail, beaver, and squirrel; and a wide variety of both vertebrate and invertebrate aquatic species.

The mixture of northern, southern, and eastern influences in the Purchase Area created a varied and rich environment. The floodplains of the area, with a mosaic of wetlands, swamp forest, small lakes, and oak/hickory forest, offered even greater variety. However, even in this rich environment there would have been limitations on prehistoric exploitation of the environment. The most significant limitation likely was the relatively limited amount of floodplain in this area compared with areas such as the American Bottoms near St. Louis and the Black Bottoms located on the Illinois side of the Ohio River. Prehistoric populations dependent on cultivation would not have been able to maintain population levels in this area as high as those in regions with greater floodplain acreage. A second limitation would have been the scarcity of local sources of lithic raw materials. However, this shortage could have been easily overcome by direct exploitation of or exchange for nonlocal cherts.

Previous Archeological Research

The earliest documentation of archeological sites within the Jackson Purchase was reported by Constantine Rafinesque as the result of his 1820 to 1824 archeological survey of Kentucky (Rafinesque 1824). Rafinesque reported on a number of sites in the valleys of the Ohio and Mississippi Rivers, with 35 monuments reported in McCracken County (now McCracken, Ballard, and Hickman Counties). Unfortunately, Rafinesque's methods were imprecise, resulting in the inability to relocate his reported sites.

Geologic surveys and studies along with general regional and state histories were popular in the late nineteenth century, with several published for regions bordering the Ohio River. Two of these, a history of Kentucky (Collins 1874) and a geologic study (Loughbridge 1888), included discussions of archeological sites along the Mississippi River in western Kentucky. When professional archeological studies were initiated at the end of the nineteenth century, the focus on Mississippi valley sites continued (Thomas 1894).

The earliest professional archeological research in the vicinity of the PGDP was conducted in the 1930s by Funkhouser and Webb of the University of Kentucky. They recorded 11 sites in McCracken County, including sites 15McN1, 15McN6, and 15McN9. Site 15McN1, known at that time as "Cemetery Ridge," was reported as a stonebox grave cemetery with large numbers of artifacts (Funkhouser and Webb 1932:250-252). This cemetery reportedly was located at the base of Metropolis Terrace within 2 km of the PGDP. Although Autry (1979a:5) reported that this site had been totally destroyed, his plotting of the site was over 1.2 km east of the location recorded in the state of Kentucky's site files. Site 15McN6 was a large mound 4.8 km (3 miles) south of Paducah, while 15McN9 was reported by Funkhouser and Webb (1932:250-252) as an upland village site with abundant artifacts. This village site is located less than 2 km south of the PGDP.

Subsequent to the Funkhouser and Webb research in McCracken County and prior to initiation of project related surveys in the 1970s, a number of sites were recorded for McCracken County, including seven sites within the PGDP. Unfortunately, other than site locations and designations as prehistoric sites of indeterminate age, very little information regarding these sites is contained within the state site files. No state site forms are available and no reports discussing these sites were published. When attempts were made in 1979 to relocate two of these sites, only 15McN24 was found (Autry 1979a:7). A later survey tested site 15McN24 and successfully relocated and tested 15McN20 (Butler et al. 1981).

Archeological research along the Ohio River in the Jackson Purchase increased with the initiation of project specific cultural resource management projects during the 1970s. A majority of these projects were concentrated along the major river systems in the region. Major surveys included reconnaissance of the Lower Ohio Navigation area (Gray and Watson 1981), reconnaissance for the Great River Road Project (McGraw 1981), reconnaissance of

the Lower Cumberland River (O'Malley et al. 1983), and survey of the Olmstead Dam Abutment site (Hemberger 1988). One recent survey concentrated primarily on upland alluvial landforms in Ballard, Carlisle, McCracken, and Graves counties but failed to locate any upland sites (Oates 1992).

Surveys and testing related to two projects have been conducted within the PGDP. One project was in conjunction with the proposed 200 Megawatt Atmospheric Fluidbed Combustion Plant Project on TVA property west and south of the Shawnee Steam Plant (Autry 1979a, 1979b; Butler et al. 1981). Archeological surveys during this project relocated two prehistoric sites and recorded 15 new sites (eight prehistoric, seven historic). These survey efforts were concentrated on the Ohio River floodplain and the Metropolis Terrace, with all prehistoric sites located on the floodplain or at the terrace edge.

Surveys conducted for four proposed landfill sites have been the only intensive investigations conducted in the uplands of the PGDP. Sussenbach (1991) surveyed three proposed landfill sites totaling 22 hectares (55 acres) without locating any archeological sites. Two historic sites were recorded during survey of a fourth proposed landfill site (Evans 1993); site 15McN92 was recorded as a late nineteenth to early twentieth century residence, while site 15McN93 was reported as concrete debris from "a structure of some sort" associated with three recent artifacts (Evans 1993:23). Site 15McN92 appears on the 1932 La Center 15' USGS topographic map and is included in the PGDP, whereas site 15McN93 is not indicated on this map. Although no site map was provided for 15McN93 in the survey report, the description of this site indicates that it is likely one of the ubiquitous rubble piles common to the Paducah Gaseous Diffusion Plant. Evans also reported that the McCracken County Courthouse records for this area had been destroyed (1993:29), but our own research has found this to be in error.

The remains of the Kentucky Ordnance Works (KOW) were excluded from the present survey sample. Given the availability of detailed site maps and architectural drawings that inventory, describe, and classify this industrial complex, no field recordation of the complex is planned at this time.

Cultural Setting

The prehistory and history of Kentucky has been divided into six general contexts or cultural periods (Table 1). The following section presents a brief discussion of the relevant cultural periods for the Ohio River I Section of the Jackson Purchase Management Area and for the Jackson Purchase Cultural Landscape. A more complete review of previous research, the cultural periods, and research objectives for the Commonwealth of Kentucky is presented in the State Historic Preservation Comprehensive Plan Report No. 1 (Pollack 1990).

Prehistoric

Paleo-Indian period

The evidence for Pleistocene human occupation of the lower Ohio River valley is sparse. The primary evidence consists of surface finds of fluted projectile points. Within the Ohio River I Section there are seven Paleo-Indian sites recorded. All seven are surface finds, and none have been thoroughly investigated. Additional sites are expected buried in the Ohio River floodplain and on elevated areas overlooking the floodplain (Tankersley 1990:100).

Early Paleo-Indian

The Clovis-like projectile points found in Kentucky are similar to the projectile points that have been recovered in the Great Plains and the Southwest. The association of these western points with Pleistocene megafauna has led to the assumption that eastern hunters were exploiting megafauna in a fashion similar to that postulated for western Paleo-Indian populations (Swartz 1973:9). However, since there is no direct evidence of the dietary regime of these earliest inhabitants (Muller 1986:52; Tankersley 1990:80), little can be said about the hunting methods and subsistence practices during this period. It is premature to imply that the presence of these early projectile points east of the Mississippi River indicates that specialized megafauna exploitation was an adaptation followed in the eastern forests (Driskell et al. 1979:19). However, the tool kit from the Paleo-Indian period east of the Great Plains does reflect activities involving hunting, butchering, hide processing, and bone or wood working, with little evidence of fishing or plant processing (Stoltman and Baerreis 1983:254), which may reflect an overall similarity in subsistence practices and a reliance on hunting megafauna. Most of the following discussion is based on the assumption that the hunting of large game, if not megafauna, was the dominant subsistence practice during the Paleo-Indian period.

Typical projectile points from the Early Paleo-Indian period in Kentucky are the Clovis point and the Folsom-like Cumberland point. The other components of the tool kit are unifacial tools made on prismatic blades, with a marked similarity in tool kit composition regardless of the environmental setting of the site (Tankersley 1990:79).

Late Paleo-Indian

The Late Paleo-Indian period is slightly better known than the earlier period. Initially, the Dalton complex may have adapted the subsistence practices developed for the exploitation of late Pleistocene megafauna to the exploitation of white-tailed deer residing in the expanding deciduous forests of this period (Stoltman and Baerreis 1983:255). By the end of the Paleo-Indian period the subsistence of the Dalton complex had shifted to a broader-based

economy with increasing exploitation of floral resources. Evidence from a number of Dalton complex sites located in northeastern Arkansas indicates that a wide variety of riverine and forest resources were being exploited with increasing efficiency during the later stages of this complex (Muller 1986:54). The final stages of the Dalton complex suggest a foraging subsistence adaptation had taken place, marking the transition to the Archaic Period. Typical projectile points dated to late Paleo-Indian include the Dalton point, as well as the Meserve, Plano, and other non-fluted or semi-fluted points. The Late Paleo-Indian tool kit is similar to the earlier period, with blades and unifacial tools still present (Tankersley 1990:79).

Archaic period

This period can be broken into three temporal sub-periods: the Early Archaic dating from 8000 to 6000 B.C., the Middle Archaic from 6000 to 3000 B.C., and the Late Archaic from 3000 to 1000 B.C. The transition from one sub-period to the next is often difficult to delineate and is based primarily on climatic changes.

Early Archaic

The Dalton complex is often considered to be transitional between Late Paleo-Indian and Early Archaic based on the Archaic-like subsistence economy that was practiced by later Dalton complex populations. However, environmental rather than cultural change is the significant marker for the beginning of the Archaic period in this region (Stoltman and Baerreis 1983; Muller 1986:56). From 10,000 to 7000 B.C. the spruce-dominated boreal forest retreated north and was replaced first by pine and then deciduous forest. Faunal resources during the Paleo-Indian period were abundant, with big game such as caribou, musk-oxen, mastodons, and long-horned bison present, but edible vegetal resources in the coniferous forest were sparse (Stoltman and Baerreis 1983:253). The transition to deciduous forests was marked by a decrease in the availability of large game animals and an increase in floral resources. Due to this environmental change, by the beginning of the Early Archaic subsistence patterns had shifted to a dependence on deer, turkey, and squirrel with increasing exploitation of wild plant foods, especially nuts (Muller 1986:56-57). By 8000 B.C. environmental changes had a significant impact on the inhabitants of the Ohio River valley and on their subsistence economy, with this date used as the divide between Paleo-Indian and Archaic.

Cultural material from the Early Archaic generally is a minor component of archeological sites and is not usually associated with features, organic remains, or burials. Typical projectile points from the Early Archaic sites are large, flat, corner-notched points including Kirk, Thebes, and LaCroy points (Jefferies 1990:150; Muller 1986:56) with smaller, stemmed points with bifurcated bases becoming more common later in the period (Driskell et al. 1979:21). The general tool kit represents an expansion of subsistence activities, with fishing

gear as well as hunting and woodworking tools present (Bennett 1988:15; Stoltman and Baerreis 1983:255). Ground stone tools first appear during this period (Driskell et al. 1979:22).

The widespread distribution of similar projectile point styles having similar development sequences, the utilization of a wide variety of raw materials and the high percentage of nonlocal cherts, and the lack of evidence for long-term occupation of individual sites suggest that Early Archaic populations were exploiting relatively large territories (Jefferies 1990:150-151).

Middle Archaic

The beginning of the Middle Archaic period at 6000 B.C. corresponds with the beginning of the hypsithermal interval, a period of drier and possibly warmer weather. The Middle Archaic is a continuation and intensification of the changes started in the preceding period. The continued specialized exploitation of local resources, restriction of mobility, increasing sedentism, and increasing reliance on plant resources are indicated in the archeological record. The possibility of increasing populations likely played a role in changes in subsistence and settlement (Muller 1986:57-58). Although the adaptation of Middle Archaic populations in eastern and central Kentucky does not appear to have been drastically different from that of the Early Archaic, substantially larger sites have been recorded for this period (Jefferies 1990:152). These more substantial sites may have served as floodplain base camps from which a wide variety of both upland, floodplain, and aquatic resources could have been exploited.

Increasing regional variation in tool and point types occurs during the Middle Archaic with typical projectile points including Raddatz, Faulkner, Big Sandy II, Morrow Mountain, and other side-notched, stemmed, and corner-notched points (Jefferies 1990:151; Stafford et al. 1984:2-14). The tool kit now included an increasing array of ground stone tools, such as mortars, pestles, manos, metates, and nutting stones, indicating an increasing reliance on plant food processing. Ground stone axes, celts, pendants, and atlatl weights, along with bone tools such as fishhooks, pins, awls, and knapping tools supplemented the stone tool kit (Driskell et al. 1979:22). Exotic materials also begin to appear on sites dating from this period, with marine shell from the Gulf of Mexico and copper from Lake Superior indicating the initiation of inter-regional exchange (Muller 1986:66). Outside the Ohio River valley there are indications of the incipient domestication of plant resources during the Middle Archaic, but no evidence of domestication within the valley itself has been recovered (Muller 1986:61).

Late Archaic

There is little agreement as to the date dividing the Middle from the Late Archaic. The transition date in the eastern Ohio River valley has been placed