2014

Electrical resistivity employed at the Livonia Mound site (16PC1), Pointe Coupee Parish, Louisiana

Jennifer Patricia Gardner
Louisiana State University and Agricultural and Mechanical College, jgardner36025@gmail.com

Recommended Citation
Gardner, Jennifer Patricia, "Electrical resistivity employed at the Livonia Mound site (16PC1), Pointe Coupee Parish, Louisiana" (2014). *LSU Master's Theses*. 1803.
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ELECTRICAL RESISTIVITY EMPLOYED AT THE LIVONIA MOUND SITE (16PC1), POINTE COUPEE PARISH, LOUISIANA

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Masters of Arts

in

The Department of Geography and Anthropology

by
Jennifer Patricia Gardner
B.A., Salisbury State University, 2000
B.A., Salisbury University, 2007
May 2014

ACKNOWLEDGEMENTS

The journey to pursue my graduate degree took me down several different pathways with the first taking me to Louisiana. In my wildest dreams I never imagined that following my passion would take me so far away from my home in Maryland. The credit for my success would not have come to fruition without the assistance of many individuals. First, I would like to thank the Town of Livonia, the Historical Society of Pointe Coupee Parish, and Brad Bergeron (adjacent property owner) for granting me permission to work at the Livonia Mound site. A special thanks to Mr. Tucker for obtaining the necessary permission to complete the field work. Mr. Tucker volunteered his time in the not so ideal weather conditions of December when the temperature dipped below freezing, and May when the temperature reached into the mid 90s.

To my committee, I want to express my heartfelt appreciation to Dr. Rebecca Saunders, Dr. Brooks Ellwood, and Dr. Rob Mann. Dr. Saunders, thank you for becoming my adviser. You stepped in when I thought my dreams of finishing were shattered. Without your continual support, guidance, and patienc throughout this journey, my dream of receiving my masters degree would not have come true. You pushed me to work hard (as you should have), past what I thought I was capable of doing. I am stronger now at the end of this journey, and I thank you!

Ms. Dana Sanders, you are the heart of the Department of Geography and Anthropology. I will always be thankful for all that you have done to assist me with finishing my degree. You make sure that all the graduate students make their deadlines. You were my mom away from home, always there to give me that hug or that push back into reality. I could not have reached the end of this chapter at LSU without you.

Thank you to my fabulous volunteers at Livonia Mound Site and at King George Island. Without assistance from Jessica Harrison, Julie Doucet, Harry Brignac, Jr., Kellye French, Jessica Bush, Christopher Triche, Cory Sills, David Richardson, Mark Robinson, and Colt

Buffington, I would be still be out in the field collecting data or lost in the middle of a cypress swamp.

To Dr. Amanda Evans, thank you for taking me under your wing by becoming my mentor and guiding me down the next path. Amanda exemplifies what it means to possess grace, strength, knowledge, and a commitment for excellence. Thank you for not only being such a fabulous mentor, but for becoming such a wonderful friend!

A tremendous amount of people contributed to the completion of my thesis, out of the academic, setting through friendship, support, and understanding my need to sacrifice my time with them to achieve my dreams and goals. Thank you for welcoming me back with open arms! I am truly fortunate to have such wonderful friends in Maryland, Pennsylvania, and Louisiana.

To my loving parents, words will never do justice for all the unconditional love and support you continually show me, even when my dream took me 1,700 miles away from home. Because of your love and encouragement for me, I am the person I am today and able to accomplish my dreams. I am the luckiest girl in the world because I have you as my parents. To my brother, Kenny Gardner, thank you for endless support and patience with me. I am the luckiest sister to have you there to continually encourage me to succeed. Tiffany Markuski, thank you for helping me bring back the non-thesis Jenny (I haven’t seen her in a long time). To Alexis Norris, I look forward to becoming Aunt Jenny. Remember, you are a smart young lady and able to accomplish anything you want with hard work and passion.

Thank you to the Ballard Family (Nolen, Johnelle, and Bruce) for becoming my Louisiana family as your first “foreign exchange student.” Louisiana is a world different than the one I grew up in Maryland. When I missed my family, you welcomed me as your own. Your love and support over these past four years has been critical to my success.

Kathy Raab, thank you for taking your time to help with editing my thesis. I appreciate all of your assistance and confidence that my writing will improve. You are an amazing aunt and you are always doing for others. I do not know how I will ever be able to repay you for your help. Betty Gray you have taught me that strength comes when you think you have nothing left to give, and crying is not showing weakness, rather a release from being strong for too long. Jake Aiello, you are my living legend, a special thanks for showing me strength, determination, and courage comes with a smile and laughter. You continually show me that to succeed in life you need to be willing to face your fears head on. To the Gray and Gardner clans, I appreciate all of your love and support through the years. I look forward to spending more time together, especially now that my Masters degree is not consuming all of my spare time. I am the luckiest girl to have such a wonderfully close family.

Dana Raab, you helped me realize that some of the greatest writers have to work at their craft; it is not something that comes naturally. It comes through hard work and learning to love the written word as a new way of expressing myself. My writing still needs lot of work, but thank you for igniting this desire.

Thank you Neal Johnson and Robert Honeycut for reminding me that stepping out of my box is what brought me to Louisiana in the first place. Thank you to Jermaine Miles (because he always likes to go first), Jamie Tindle, Dustin Miller, Linda Dickerson, Lauren Modenbach, Ryan Glick, Mary Beth Groze, Hale Gonzales, Gene, Pam Knighton, Jenny, Blane, Steve Delk, Josh Dixon, Kristen Baker, Allen, Andrew, and Beau for your friendship and strength comments which have helped me to continue to live by the golden rules.

I dedicate my thesis to the late Michael Thomas Gray (my cousin) and to the late Florence Lee Gardner (my grandmother). Michael showed me life is to be lived on your own terms, and it is not that you got to the finish line, but how you got there that determines your character. To Florence Gardner, in loving memory, thank you for encouraging me to pass through doors that women before me have not. You taught me to be an independent, strong woman and to be proud of it! I thank you! I will always miss you both and I am a better person because of having you both in my life.

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ABSTRACT

Electrical resistivity was used at the Livonia Mound site (16PC1) to identify construction breaks, possible human burials, and other cultural activity below the surface. Resistivity transects traveled across the mound and the level surface directly south of the mound; this latter section was called Area A. Four transects stretched across the north, south, west, and east slopes of the mound; as a result, four vertical profiles were created from the apparent resistivity (ρ_a) values. The standard deviation of each transect was computed using the ρ_a values from the four pseudo-sections to establish the base-line for analysis. ρ_a values for Area A were figured separately because of the differences in temperature at the times the surveys were taken which impact the moisture within the soil.

Four areas of high ρ_a were identified; these anomalies could represent human burials or other cultural activity beneath the surface. Area A and the west transect produced anomalies hinting at cultural activity below the surface, although no definitive evidence of human burials was found. The vertical profiles from the east and west transect show evidence that the top 3.0 m were deposited in a single construction episode. High ρ_a anomalies in the north and south transects distort the profiles; thus there was no conclusive evidence to support or refute a single-phase construction episode for the top 3.0 m of the remaining mound.

CHAPTER 1
INTRODUCTION

The Livonia Mound site (16PC1) is a Coles Creek mound complex located within the city limits of the town of Livonia (Figure 1-1), in southeast Louisiana. Previous historical accounts of the site mention three possible mounds; however, only Mound A remains at the site (Jones and Shuman 1987; Mann 2002, 2004, & 2007). The three-mound complex is positioned along the eastern bank of Bayou Grosse Tete on top of a natural levee and to the left of a little street called Bayou Road. The most intact mound is also visible from the main highway, Mississippi River Trail, which runs through the town of Livonia. Historically, the water level in Bayou Grosse Tete was higher before the Morganza Floodway altered the watershed (Jones and Shuman 1987).

Figure 1-1. Google Aerial of Livonia Mound Site (16PC1) in Pointe Coupee Parish

My thesis research at the Livonia Mound site involves using apparent resistivity (ρ_a) to credibly identify construction phases within the first three meters of the Mound A's subsurface.

The remote sensing is an extension of the work done by Dr. Brooks Ellwood's Geoarchaeological class on the LSU Campus Mounds in the fall of 2007. Ellwood's class employed ρ_a, ground penetrating radar, cesium vapor magnetometer, and magnetic susceptibility studies to explore internal stratigraphy of the mounds. I chose the ρ_a method to run survey lines at different electrode spacing (e.g. 0.5 m, 0.75 m, 1.0 m etc) over the earthen structure at Livonia Mound site. In this thesis, I report my findings using ρ_a methods. Electrical Resistivity, a quick and non-destructive geophysical method, identifies non-conformities below the earth's surface (Clark 1990; Ellwood 2009). Non-conformities are the result of disturbances that produced either higher or lower ρ_a values from the immediate background (Clark 1990; Ellwood 2009). An additional survey grid, Area A, was established directly south of the mound. The lines ran parallel from east to west with the electrode spacing at 0.5 m.

In Chapter 2, I provide an overview of the cultures of the Baytown and the Coles Creek periods (Roe 2007; Saunders, R. 2007). Chapter 3 highlighted the previous research at the Livonia Mound site. I discuss the ρ_a method and how it was administered at the site in Chapter 4. In Chapter 5, the ρ_a results are presented and the work is compared with previous research completed at the Livonia Mound site and the LSU Campus Mound Site (16EBR6). In the final chapter, I summarize the research findings and make recommendations for further research at the Livonia Mound Site.

CHAPTER 2
CULTURAL OVERVIEW

Louisiana has over 700 Indian mounds according to the records at the Division of Archaeology (Milner 2004; Saunders, R. 2007; Gibson 2000); the bulk of these were built during the Baytown and Coles Creek periods (Neuman 1984). The Baytown (A.D. 400 - 700) and Coles Creek (A.D. 700 - 1000) periods can be distinguished on the basis of material culture. However, there is a substantial amount of continuity between the two, with Coles Creek mound sites often built on Baytown foundations (Anderson 2004; Gibson 2000; Homburg 1991; McIntire 1958; Milner 2004; Roe 2010; Roe and Schilling 2010; Saunders, R. 2007). The subsistence practices, settlement patterns, social organization, and mortuary treatment from the Baytown and Coles Creek periods will be discussed below, sources include: Anderson 2004; Gibson 1994, 2000, 2006; Homburg 1991; Jeter et al. 1989; Lee 2010; Neuman 1988; McIntire 1958; Milner 2004; Roe 2010; Roe and Schilling 2010; Saunders, R. 2007; Smith et al. 1983.

Baytown Period (A.D. 500-750)

The Baytown Period represents the progression in social development between the Marksville and Coles Creek periods. Within this period, two cultures are described, Baytown and Troyville. The Troyville culture occupied the southern portion of the Lower Mississippi River Valley (LMRV), where the Livonia Mounds are located. The northern culture, Baytown, will not be discussed here.

Population grew during Troyville; as a result, sites associated with the Troyville culture stretched from the Louisiana Gulf Coast shoreline to the southern border of Arkansas (Jeter et al. 1989; Lee 2010). At one point Troyville culture was referred by Williams (Quoted in Lee 2010:136; Williams 1963:297) as a “good gray culture,” but now it is regarded as the catalyst for the development of the later Mississippian chiefdoms observed by early explorers (Lee 2010).

Subsistence

In southern Louisiana, the fishing, hunting, and gathering subsistence practices established during the Archaic period remained relatively intact until the introduction of agriculture around A.D. 1200 (Carr and Stewart 2004; Ford and Willey 1941; Gibson 1994, 2004; Jeter et al. 1989; Neuman 1984; Milner 2004; Rees 2010; Saunders, 2004, 2010; Smith et al. 1983). Fish and shellfish provided most of the protein; white-tailed deer were also exploited, along with other medium and smaller mammals. Persimmons, grapes, sunflower seeds, and nuts (e.g., pecans, acorns) also continued to be staples in the subsistence system (Jeter et al. 1989; Lee 2010). The Baytown period saw the introduction of new hunting devices, the bow and arrow, which revolutionized deer hunting (Jeter et al. 1989; Neuman 1984; Lee 2010).

Settlement Pattern

Very few Troyville villages have been identified, so little can be said of a settlement pattern (Lee 2010). However, it is believed that most of the Troyville population lived in small dispersed hamlets tied to regional ceremonial centers. Surrounding villages joined together to celebrate festivities for common civic ceremonies and feasts at the mound sites.

With some major exceptions, like the Troyville site itself, Troyville mounds are generally low, flat-topped or domed mounds. The lack of post molds on the surface suggests that the mounds did not support structures (Jeter et al. 1989; Lee 2010). The elevated flat-topped mounds either served as stages for the public to view the aforementioned rituals (Knight 2001) or as residences for the elite (Roe and Schilling 2010:158).

Social Organization

According to Lee (2010:137) "Baytown societies are thought to correspond with a tribal or local level of sociopolitical organization. Leadership positions were achieved by individuals rather than ascribed or inherited, and power was only temporarily vested in these individuals."

Influences from the Hopewell area declined in the Troyville period. Instead, Troyville people increased interaction with other cultures along the northern Gulf coast as far east as the Florida panhandle. The relationship can be seen in pottery surface decoration. The same complex motifs can be found on pottery from Louisiana and Florida (Jeter et al. 1989; Lee 2010).

Mortuary Treatment

Mortuary practices are highly variable; human remains are found as primary and secondary burials and as cremations; primary burials may be extended or flexed. The general lack of grave-goods associated with individuals suggests that an egalitarian social structure prevailed until the end of the Baytown period in south Louisiana (Lee 2010). Burial-goods in direct association with the burials were discovered at the Old Creek Site (16LA102) and Gold Mine site (16RI13) (Jeter et al. 1989). However, at the Gold Mine site, the items were simply pebbles or other mundane objects. The discovery of 26 ceramics vessels and 41 burials located in an ossuary or a small mound at the Old Creek site (16LA102) and yielded a new view into the mortuary practices of the Troyville people (Jeter et al. 1989). Especially with the discovery of a distinctive deep bowl, that Jeter et al. (1989:152) described as having "Churupa Punctuated decoration encircling the rim and a Mulberry Creek Cord Marked body." This bowl was found among other Baytown plain ceramic vessels or other variant types of Troyville ceramics found in direct association with burials (Lee 2010). This discovery diverges from the overall known mortuary practices, which suggest no class or status differentiation (Jeter et al. 1989; Lee 2010; Neuman 1984; Saunders, 2007). Dog burials are found with human remains at the Greenhouse and the Gold Mine sites in Troyville contexts, suggest that such burials were a common practice during that time period (Jeter et al. 1989; Lee 2010; Neuman 1984).

The discovery of eight bathtub-shaped pits at the Greenhouse site, some of which were in close proximity to the mounds, is consistent with finds at other Troyville sites and hints at a potential relationship between feasting and mortuary practices (Lee 2010). Ford (1951:104) noted that Fowke considered these "barbeque pits." The depth (thickness) of the ash at the base of the pits demonstrates their repeated use and suggests that feasting was held as an integral part of ceremonial activity associated with the mortuary treatment of ancestors (Jeter et al. 1989; Lee 2010; Knight 1989).

Coles Creek Period

The transition from the Baytown to the Coles Creek is apparent in the changes in settlement patterns, subsistence strategies, ceramic technology, and mortuary practices (Roe 2010; Roe and Schilling 2010; Stephonaitis 1986). New styles of ceramics (e.g., Pontchartrain Check Stamped) and new projectile points, clearly used as arrowheads instead of darts (e.g., Collins, Bayougoula), appear (Brown 1984; Jeter et al. 1989; Keller et al. 1983).

Subsistence

Although the addition of bow and arrow technology, introduced during the Baytown period may have increased hunting success (Lee 2010), the diet of inland residents living away from mound sites consisted of mainly fish and turtles, whereas the diet of residents living at coastal sites emphasized estuarine fishes and shellfish (Brown 1980; Roe and Schilling 2010). Wild plants, especially plants with starchy seeds, such as maygrass and knotweed, remained the primary plant foods (Listi 2007; Roe and Schilling 2010). However, for the first time in Louisiana prehistory, there is evidence that high-status folks at mound sites had nicer cuts of deer meat, which were consumed in greater quantities on top of the mounds than at non-mound sites (Milner 2004; Roe 2010; Roe and Schilling 2010; Steponaitis 1986;). Maize became a minor component late in the Coles Creek Period (Fritz and Kidder 1993; Jeter et al. 1989; Listi 2011; Milner 2004; Roe 2010; Roe and Schilling 2010; Saunders 2007; Shelley 1977; Steponaitis

1986). It is likely that maize was initially used as a status or ritual item because early agriculture was "an environmental [and health] catastrophe," according to Larsen (2006).

Settlement Pattern

Ford and Willey (1941:344) said, "The most marked features of this new complex [Coles Creek] was the construction of rectangular flat-topped mounds about a court and plaza." Coles Creek mounds were built on top of natural levees of relic distributary systems, and in western coastal Louisiana, along the chenier plain (remnant beach ridges) (Jeter et al. 1989; Roe and Schilling 2010). Many Coles Creek mound centers began during the Baytown period; Coles Creek peoples subsequently expanded on these bases. Saunders (2007) noted that mound centers "became more elaborate as sociopolitical roles developed, and political positions became inherited." This enlargement of the ceremonial centers resulted from the ability of the social leaders to motivate their people through religious beliefs or institutions (Roe and Schilling 2010).

Coles Creek sites in southern Louisiana typically contain three to four mounds around an open space, called a plaza. These mound centers contained both flat-topped and conical mounds (Roe and Schilling 2010). Plazas were said to be kept free of debris and were built by filling in the gulleys and leveling the rises to create a flat activity areas (Roe and Schilling 2010). The lack of cultural debris exemplifies the sacred nature of the mounds to the people (Roe and Schilling 2010; Saunders, R. 2007).

The earthen structures at the mound-and-plaza sites were typically no more than 6 m high, varying in shape and size, although there are notable exceptions (Roe and Schilling 2010). In northern Louisiana, for instance, some later Coles Creek mound sites rival Mississippian mound sites in size (Roe and Schilling 2010; Roe 2010). When comparing the size of mound centers, it is apparent that there was some competition between the residents (Roe and Schilling 2010). The construction of similar mound-and-plaza centers throughout the Coles Creek region indicates a common meaning and function, even though the centers were said to be autonomous (Roe and Schilling 2010).

Flat-topped mounds, usually the largest mounds at a site, were ideal for public rituals (feasting or mortuary). They allowed the audience, non-elites, to view from below (Saunders 2007). Evidence of wooden posts on the summits of some flat-topped mounds suggests people were living on top of the mounds (Roe and Schilling 2010); other flat-topped mounds probably supported temples or charnel houses. Still others have no evidence of structures at all (Roe and Schilling 2010), and their function remains unclear.

Villages (non-mound sites) were located at junctions of smaller distributaries and streams (Roe and Schilling 2010). While Keller et al. (1983) describe the Coles Creek people as living a more sedentary lifestyle than previous cultures, small camps or resource procurement camps were established between the non-mound sites and the mound centers (Roe and Schilling 2010; Jeter et al. 1989). By the end of the Coles Creek period, people were living in larger villages (Roe and Schilling 2010). These villages possibly supported the elites living at the restricted mound centers.

Social Organization

As the population grew and placed more demand on resources, it appears that the Coles Creek people moved away from the egalitarian social organization and into hierarchical polities (Roe and Schilling 2010). However, differences in faunal remains and artifact assemblages at mound and non-mound sites are subtle, and the lack of status or wealth reflected in grave goods, indicates a lower level of social stratification among the Coles Creek as compared with Mississippian sites (Roe and Schilling 2010:159).

Mortuary Treatment

Coles Creek burial treatment is quite variable. Many individuals do not appear to receive any special treatment, although the remains were not haphazardly buried (Roe 2010; Roe and Schilling 2010; Steponaitis 1986). Burials were often placed on the outer layers of fill or in a pit as secondary or primary burials. Grave goods were rarely seen in direct context with burials inside the mounds. Grave goods, when present, show no evidence of status differentiation in the grave preparation when compared to those without goods (Roe 2010; Roe and Schilling 2010; Steponaitis 1986). Remains within the burial mounds show two types of patterns: concentrated as bundles, or scattered (Jeter et al. 1989). Secondary burials have been interpreted as the result of emptying a charnel house (Roe and Schilling 2010).

Summary

The Baytown and Coles Creek periods were a time of evolution. Baytown period is more commonly referred to in Louisiana as the Troyville. Troyville was a time when the population begun to expand, the development of the bow and arrow, and the mounds were the foundation for Coles Creek and later mounds. The Coles Creek period saw the development of political leadership becoming inherited over ascribed, rectangular flat-topped mounds around a court-and-plaza, and maize made its introduction as a minor component in subsistence rituals.

CHAPTER 3
PREVIOUS INVESTIGATIONS

Kniffen and Beecher originally documented the Livonia Mound site (16PC1), in 1938, noting two, and possibly three, mounds (Jones and Shuman 1987:131). Subsequently, in the early 1950s, the grandmother of Patrick Betty (former property owner) bulldozed the second mound at the site. Patrick Betty was in attendance at the clearing and recalled two sets of two human burials unearthed on the south side of the mound. One set was located southwest, towards the river, and contained what he believed to be two Native Americans. The second pair of burials was positioned on the southeast side; Betty believed these to be historical burials because of the tattered remains of clothing (Personal Communication, Patrick Betty 2010).

Weinstein and Burden conducted a surface collection in 1975, where they recovered shell (presumably *Rangia cuneata)* and Bayou Cutler phase ceramics (Jones and Shuman 1987:131; Mann 2002:43). They also collected pottery from the Delta Natchezan Phase of the the Mississippi Period (Jones and Shuman 1987:131; Mann 2002:43).

Jones and Shuman (1987) were the first to map the mound; they said the location of the second mound was marked by a "very low rise and scatter of *Rangia cuneata* shells" (Jones and Shuman 1987:131). However, they found no evidence a third mound. Jones and Shuman (1987:132) recovered diagnostic aboriginal sherds recovered during a surface collection that demonstrated a Coles Creek occupation. They also indicated that the one standing conical mound was 9.4 m tall, with a basal diameter of 50.3 m (Jones and Shuman 1987:131; Mann 2004), and noted difficulty in mapping due to the overgrowth of grasses and briars on the mound. However, they were able to record the shallow depression located at the top of the mound resulting from the temporary burial of a woman who died during the 1927 flood. They did not mention what happened to the burial or when it was moved.

Mann's (2002) initial visit to the site was at the request of the Livonia town officials during their acquisition of the property. The town officials were taking precautions to protect and preserve the mound; as a result, they sought direction from Mann to assist with the preservation efforts (Mann 2002). A manicured lawn, with a few trees, has replaced the overgrown grasses and briars. Mann gathered a small surface collection of unidentifiable plain sherds eroding out of a looter's pit (Mann 2002:44). Later, with help from State Archaeologist Chip McGimsey, Mann (2004) completed the first topographic map of the Livonia Mound site to include all three mounds (Figure 3-1). They also extracted three soil cores.

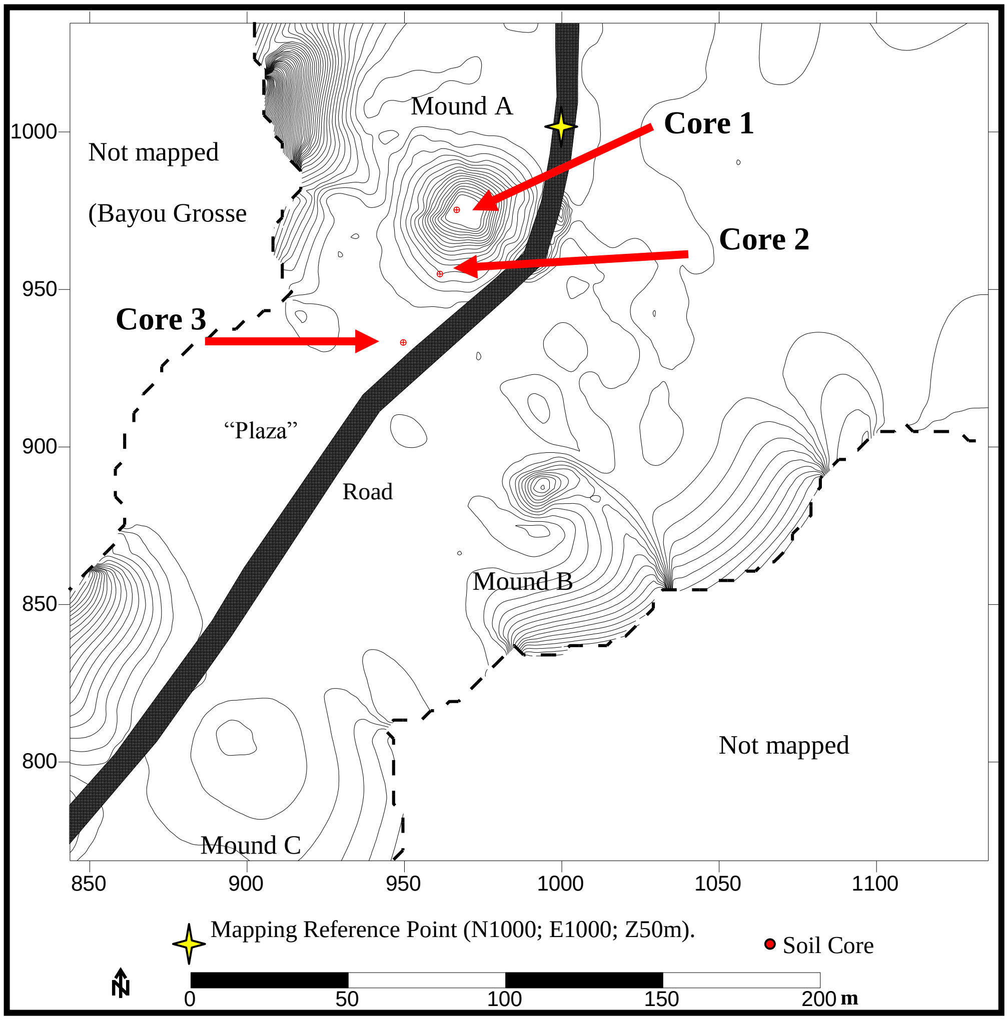

Figure 3-1. Topographic map of Livonia Mound site (16PC1) showing soil core locations (Mann 2004). Used by permission of author.

The topographic map clearly illustrates all three mounds and the extraction points of the cores. The three soil cores (two from the remaining mound and one from the "plaza" showed no definitive proof of a construction sequence (Table 3-1) (Mann 2004). Core 1 was removed from the summit of Mound A (Figure 3-1), measured 9.6 m long, with evidence for basketloading appears at 60 cm below the surface; the soil is mixed with both A and B horizon soils (Mann 2004). In the same moundfill horizon at 90 to 368 cm below the surface, a ceramic sherd was found at 292 cm below the surface and approximately 20 cm is missing from the soil core between 368-387 cmbs (Mann 2004). Between 520-525 cmbs, a possible surface is described as consisting of "deformed laminated wash faces." This is contained among the moundfill horizon, between 368 and 600 cm depth in the core (Mann 2004). This suggests a possible construction phase at this level; the thin soil lense does provide any adequate evidence indicating that Mound A may have been built in different construction sequences (Mann 2004:18). Cores 2 and 3 do not yield at this level, the same soil deposit. Between 600.0 and 835.0 cm below the surface in Core 1, individual basketloading becomes more difficult to distinguish as in above horizons. Also, the horizon below the presumed base of the mound is not the same soil as the soil described in Cores 2 and 3. The C horizon is described both Cores 2 and 3, but is not seen in Core 1 (Mann 2004). Mann and McGimsey added Baytown Plain, Pontchartrain Checked Stamped, and Plaquemine Brushed to the collection of ceramics recovered at the site (Mann 2004:19).

Table 3-1. Livonia Mounds Core 1 Description (From Mann 2004: Table 2, P. 18)

Debth (cmbs)	Horizon	Description
0-10	A1	10YR5/2 silt loam-strong fine to very fine subangular blocky structure and slighly hard to hard dry consistence.
10-20	A2	10YR5/3 silt loam-strong fine to very fine subangular blocky structure and slightly hard to hard dry consistence.
20-35	A/B	10YR5/3-5/4 silt loam-strong very fine subangular blocky structure
35-60	Bw	10YR6/3 silt loam-strong fine to medium subangular blocky structure, few distinct silt coats on ped bases.
60-90	Moundfill	Silt to silt loam-mixed basketloaded episodes of A and B horizon, very homogenous-influenced by overlying B horizon processes.
90-368	Moundfill	Silts to silt loam-composed primarily of A horizon basketloaded sediments, many including midden (with bone, charcoal, and ceramic.) Missing ca. 20 cm.
368-600	Moundfill	Silts and very fine sands-very homogenous, little evidence of basketloading, which is most evident between 490-510 cm with basketloads of A horizon with some midden (charcoal and burned soil). 510-525 cm basketloads with deformed laminated wash faces, some of which are horizontal, possible surface.
600-835	Moundfill	Silt loams and clay loams (with some lenses of alluvial clay) - very heterogeneous unit, as you move lower in this unit sediment block become smaller and basketloads become difficult to discern, perhaps due to the nature of the parent material. Presumed base of mound.
835-960	Moundfill	2.5Y5/2-4/1 fine sandy loam to clayey silt loam - unit appears more homogenous than moundfill above, individual soil blocks are smaller and do not have distinct outlines. Iron staining is distinct to prominent and few to common in abundance along pores and ped faces. Very few charcoal and burnt bone flecks. Strong very fine to fine subangular blocky structure. In this zone we continue to see soil mottling similar to obvious moundfill that does not appear to be present at a similar depth in Core 3, off the mound core. The coupled with the presence of cultural inclusions (e.g., burnt bone at 886 cm) suggests this is still moundfill, if so base of mound may be sitting in a cup-shaped basin. Unable to core any deeper.

Core 2 was extracted from the southern toe of Mound A (Figure 3-1) and measured 3.6 m long (Table 3-2). Like Core 1, Core 2 shows clear evidence of moundfill from 45.0 to 263.0 cm below to surface (Mann 2004). The core reaches the base of the mound between 260 and 263 cm below the surface. The A horizon in Core 2 is equivalent to the A1 Horizon in Core 1, but double the thickness. From 45.0 to 120.0 cm below the surface, basketloaded moundfill is the most prominent feature in the core (Mann 2004). Below 120.0 cmbs, the evidence for the individual basketloads becomes less prominent, with fewer specks of charcoal and burnt bone (Mann 2004). At 263.0 cm below the surface, the soil transitions into a C horizon, and is described as very fine sand to very fine sandy loam (Mann 2004). This change in soil texture and C horizon are present in Core 3 (Mann 2004).

Table 3-2. Livonia Mounds Core 2 Description (From Mann 2004: Table 2, P. 18)

Debth (cmbs)	**Horizon**	**Description**
0-20	A	10YR5/2 silt loam - strong fine to very fine subangular blocky structure and slightly hard to hard dry consistence.
20-45	Bw	10YR6/3 silt loam - strong fine to medium subangular blocky structure, few distinct silt coats on ped bases.
45-120	Moundfill	10YR7/2 to 10YR5/1 sandy loam to silt loam - basketloaded moundfill, but not the A horizon basketloads typical of Core 1. Looks much like basal unit of Core 3, the natural levee deposits.
120-200	Moundfill	10YR5/3 to 10YR4/2 silt loam - fairly homogenous moundfill. Individual basketloads are not visible and very few charcoal and burnt bone flecks are visible.
200-263	Moundfill	10YR5/1-5/2 - homogenous very fine loam to silt loam, with very few charcoal flecks. This unit is distinguished primarily by the presence of numerous horizontal 10YR7/3 very fine sand wash lenses, these occur primarily in bands between 200 - 210 cm, 222 - 227 cm, 237 - 254 cm, and 260 - 263 cm is the supposed base of Mound A.
263-300	C	Natural levee-grading upward from the homogenous very fine sand into a very fine sandy loam into a silt loam, moderate to strong subangular blocky structure and firm, moist consistence. Some iron staining among pores and ped faces.

Core 3 was extracted from south of Mound A (Figure 3-1) in the “plaza,” and is 2.4 m in length, having the same A horizon (Table 3-3) seen in Core 1 and Core 2 (Mann 2004). At 160 to 240 cm below the surface, Mann (2004) documents three individual flood deposits that are each 15 to 30 cm thick. Core 3 shows no evidence of basketloading below the surface.

Table 3-3. Livonia Mounds Core 3 Description (From Mann 2004: Table 2, P. 18)

Debth (cmbs)	**Horizon**	**Description**
0-15	A	10YR5/2 silt-strong very fine to fine subangular blocky structure, slightly hard to dry consistence.
15-25	A/B	10YR3/1 silt loam with common medium 10YR4/3 mottles-strong very fine to fine subangular blocky structure, slightly hard dry consistence.
25-50	Bw	10YR4/3 silt loam-strong fine subangular blocky structure, very few iron stains on pore faces.
50-160	C	Natural levee-bottom of unit homogenous fine sand grading upward to very fine sand at ca. 130 cm and into a very fine sandy loam by 115 cm. By 80 cm grades into a silt loam. From 120-150 cm sediment is characterized by moderate to strong subangular blocky structure, with firm moist consistence, few distinct iron stains among pores and on ped faces. 120-160 cm has enough silt to have a strong fine subangular blocky structure and a friable moist consistence.
160-240	C	Natural levee-series of at least 3 flood deposits each characterized by a very fine sandy loam overlain by clay lense, individual flood deposits are 15-30 cm thick.

In 2006, Mann monitored the property directly south of the Mound A (Figure 3-1), during brush clearing, and recovered either an Alba or Scallorn arrow point. This point was the first projectile point to be discovered at the site (Mann 2007:44), and supports a Late Coles Creek/Mississippi period occupation for the Livonia Mound site (Mann 2007:44). In summarizing the previous works at the site, Mann (2002, 2004, & 2007) recommended shovel testing and limited excavations be undertaken at the site.

CHAPTER 4
METHODS

Ellwood's Geoarchaeology class in February 2008 studied the Louisiana State University (LSU) Campus mounds (16EBR6) by employing four geophysical methods: magnetic susceptibility (MS), electrical resistivity (ER), ground penetrating radar (GPR), and cesium vapor magnetic gradiometer. For my thesis research, I chose electrical resistivity for the remote sensing technique at the Livonia Mound site (16PC1). Electrical resistivity, known as apparent resistivity (ρ_a), is a non-destructive, sensitive, quick, easy and inexpensive method capable of producing profiles that establish a sites' layout and boundaries, allowing telltale patterns to emerge (Clark 1990; Ellwood 2009; Ellwood and Harrold 1993; Matney and Donkin 2006; Samouëlian et al. 2005; Williams 1984). ρ_a remotely pinpoints water-filled cavities, water tables, and burials, present without disturbing the soil's function or structure (Clark 1990; Ellwood and Harrold 1993; Samouëlian et al. 2005). Diagrams produced, known as pseudosections, allow the researcher to identify features (e.g. burials) located in the subsurface (Atkinson 1963; Darwin et al. 1990; Ellwood and Harrold 1993).

Because ρ_a is quick and non-destructive, it is an attractive method for archeological research (Britt et al. 2002; Clark 1990; Ellwood 2009; Hargrave et al. 2007; Matney and Donkin 2006; Weymouth 1986). ρ_a produces effective results by measuring the bulk electrical properties of soils below the surface (Ellwood 2009). During reconnaissance surveys, ρ_a is capable of identifying historic or prehistoric archaeological sites, e.g., foundations, trash middens, sub-sided mounds, filled ditches, etc. (Aitken 1961; Atkinson 1952; Clark 1990; Ellwood 2009; Hertz and Garrison 1993; Matney and Donkin 2006; Samouëlian et al. 2005; Weymouth 1986; Williams 1984). ρ_a surveys do not possess the ability to self-filter; as a result, background noise (e.g. rebar) directly impacts the potential targets (Ellwood 2009; Britt et al.

2002; Clark 1990; Samouëlian et al. 2005). In addition when the probe separation is too wide, ρ_a surveys do not always detect very small or low-contrast targets (Britt et al. 2002).

To properly identify anomalies as cultural as opposed to natural signals, one must understand those landscape features that produce different ρ_a patterns (Britt et al. 2002; Ellwood 2009). Low ρ_a values have a direct correlation to cultural disturbances (Clark 1990; Ellwood 2009; Ellwood and Harrold 1993), but low values can also result from natural factors. Understanding how natural factors, such as trees and moisture content, impact not only the surface, but the subsurface, is also instrumental in effectively analyzing data (Clark 1990; Ellwood 2009; Ellwood and Harrold 1993).

Different electrode arrays are used to collect ρ_a data (e.g. double dipole, twin electrode, square array, etc.) (Clark 1990). The Wenner Array, the most common method used, was chosen for this field research because of its compatibility with the Williams Instrument used during the surveys. The popularity of the Wenner Array comes from its consistent and reproducible results with the lowest margin of error (Samouëlian et al. 2005, Ellwood 2009; Ellwood and Harrold 1993). The Williams Instrument has a rotary switch, allowing the four electrodes to be equally spaced electrodes to be easily reconfigured by moving only one electrode at a time (leap frog) to take readings at each point along the survey (Clark 1990; Ellwood 2009; Ellwood and Harrold 1993; Samouëlian et al. 2005; Weymouth 1986; Williams 1984). This method has the greatest possibility of detecting horizontal structures (Samouëlian et al. 2005).

The Williams Resistivity Meter was used to collect the ρ_a measurements in the field. The instrument generates a 145 Hz current into the ground by way of four electrodes; the two outside electrodes allows current to flow into the ground and the inner two electrodes measure the potential difference (voltage) developed in the subsurface using the Wenner configuration, the four electrodes are equally spaced e.g., 0.5 m, 0.75 m (Ellwood and Harrold 1993).

Instead of running only one survey line over the mound at 1.0, 2.0 and 3.0 m spacings, as had been done at the LSU Mounds, I ran four transect lines, one each across the north, east, west, and south slopes of the Livonia Mound. The use of multiple spacings created vertical profiles (pseudosections) that were examined for lithological variations beneath the surface, which could indicate construction stages, human burials or other cultural activity, and/or erosion.

Factors Controlling ρ_a

Undisturbed soils tend to produce a homogenous ρ_a pattern (Clark 1990). Disturbances, or anomalies, have the potential to be positive or negative (to increase or decrease resistivity) when their values are compared to the background; positive anomalies produce higher values than the background and negative anomalies have lower values (Ellwood and Harrold 1993).

Temperature, moisture content, organisms, relief (slope), parent material, and time play into the ability to measure the current flow through soils and rocks. Outside factors, such as power lines, may also interfere or exaggerate results (Britt et al. 2002; Ellwood 2009; Ellwood and Harrold 1993; Samouëlian et al. 2005). Knowledge of the external factors allows proper identification of targets or anomalies below the surface (Samouëlian et al. 2005). General knowledge of the area’s temperature and weather patterns remains vital to understanding their impact on ρ_a readings (Samouëlian et al. 2005).

In the Northern Hemisphere, November through February are correlated with the greatest (largest) ρ_a values, while June and July have the lowest (Samouëlian et al. 2005). Cold temperatures tend to increase the resistance measurements, while the opposite holds true when temperatures rise (Samouëlian et al. 2005). Large amounts or lack of rainfall can interfere with the electrodes ability to connect with the soil or create water tables that mask features (Clark

1990; Samouëlian et al. 2005). To avoid any possible misinterpretation during data acquisition, it is fundamental to recognize any variation in temperature or amount of rainfall, especially when collecting data on different days, months, or years (Samouëlian et al. 2005). Without notations, researchers generally assume the data were collected under similar stable conditions (Bottraud et al. 1984b in Samouëlian et al. 2005).

Subsurface water retention is directly related to the parent material (e.g., stone, clay, gravel or sand) (Clark 1990; Ellwood and Harrold 1993). For example, stone is more resistant to moisture; therefore, ρ_a measurements are higher with porous rock (100 to 10^5 Ωm) rather than non-porous rock (10^3 to 10^6 Ωm) (Clark 1990; Ellwood and Harrold 1993; Ellwood 2009). Soils mixed with clay absorb more water, thus producing measurements ranging from 5 to 150 Ωm; whereas soils with sand and gravel are highly resistive producing values that range from 50 to 10,000 Ωm (Clark 1990; Ellwood and Harrold 1993). Changes to the soil compaction, such as due to bioturbation, can create air gaps, ultimately affecting how the soil retains water (Clark 1990). High volumes of recent rainfall will hinder running survey lines (Britt et al. 2002). On the other hand, when the soil is dry, the poor contact with the soil and electrodes (Ellwood 2009; Britt et al. 2002). May hinder the electrodes ability to make contact with the soil and as a result, it can produce false positives (Hertz and Garrsion 1993).

The amount of moisture retained in the subsurface by the soils and rocks directly contributes to the ρ_a value measured in the field (Aiken 1961; Samouëlian et al 2005). Water retention increases the capability of the electrical conductivity and therefore decreases ρ_a values (Clark 1990; Samouëlian et al. 2005).

Because vegetation affects moisture, it must be taken into account. Large trees draw ground water, creating high ρ_a readings; moderate to low growth trees do not produce similar ρ_a readings (Ellwood and Harrold 1993). The trees protect the soil from the sun's leaching rays, and so help to retain moisture (Clark 1990; Ellwood 2009; Ellwood and Harrold 1993; Samouëlian et al 2005). Survey work done during in freezing weather avoids the difficulties in detecting features or anomalies that can be caused by high water table retention (Aiken 1961). According to Clark (1990), rainfall that contains dissolved carbon dioxide and carbonic acid from the atmosphere forms a conductivity electrolyte through reaction with the minerals in the soil. These minerals also contain weakly conductive organic acids, which can affect the resistance measured in the soil. Monitoring the precipitation over several months before starting survey work ensures that the fieldwork is conducted when there has not been an increase or decrease in precipitation (Clark 1990). Recent rainfall, even during a survey, does not always directly affect the ρ_a collected; however, heavy rainfall has the potential to create non-existent, anomalies near-surface anomalies (Clark 1990).

Creating Pseudosections

Pseudosections depict vertical contour profiles, illustrating the widespread horizons in the subsurface. Each ρ_a value directly correlates to the reading taken in the field (Clark 1990; Darwin et al. 1990; Ellwood 2008; Ellwood and Harrold 1993). These readings provide a continuous profile of electrical subsurface values, while simultaneously illustrating the homogenous soils horizontally or vertically (Clark 1990; Edward 1977 in Samouëlian et al. 2005; Ellwood 2009; Ellwood and Harrold 1993). Separate strata can be distinguished even though the results are not directly correlated to specific dates in time (Hertz and Garrison 1998).

In theory, the spacing between the electrodes is equivalent to the vertical depth of penetration into the subsurface (Clark 1990; Edwards in Samouëlian et al. 2005; Ellwood and Harrold 1993; Samouëlian et al. 2005; Williams 1984). Repeating the survey line at different electrode spacing may take longer; however, increasing the line spacing with each pass produces vertical pseudosection in the survey area (Aiken 1961; Hertz and Garrison 1993). With too large or small a separation, the feature could be missed or, as Aiken (1963) says, “the feature forms only a fraction of the volume” (Ellwood 2010).

ρ_a is calculated for each resistance reading measured in the field using the following formula:

$$\rho_a = 2\pi RD, \tag{1}$$

Where R is the resistance measured and D is the distance between electrodes (Ellwood 2009). The results are expressed in Ohm-meter (Ωm) (Aiken 1961; Darwin et al. 1990; Ellwood 1994, 2009; Ellwood and Harrold 1993; Samouëlian et al. 2005; Williams 1994). The focus should be on all the ρ_a readings in comparison to the surrounding area and whether the values conform or show abnormality, rather than on the individual readings (Aitken 1961; Ellwood 2009; Ellwood and Harrold 1993). ρ_a should not be interpreted as a timeline description of the subsurface, but rather thought of as deposits bounded together genetically (Ellwood and Harrold 1993; Hertz and Garrison 1998; Ellwood 2009; Samouëlian et al. 2005).

Fieldwork

Geophysical archaeological fieldwork was accomplished in three stages: surveying, data processing, and interpretation (Clark 1990). The actual interpretations of the results are discussed in Chapter 5. The surveying and data processing is the main focus here. The mound pseudosections were completed in December 2010, when temperatures were in the low to mid 30s. Because of the steep slope of the mound and the large depression at the summit, the transect lines were set on the mound slopes (Figure 4-1). Concrete debris covered the area west of the mound, a house with a storm drain pipe sat directly north, and a road lay directly to the east. This left only the section directly south of the Livonia Mound (called Area A) suitable for survey off the mound. The ρ_a work in Area A was done over ten consecutive days in May 2011, when the temperatures ranged from the mid 80s to mid 90s. No precipitation was recorded leading up to the fieldwork in May 2011.

Figure 4-1. Google Aerial View of Area A and Pseudosection Lines Drawn across the mound.

Data for the West Transect survey were taken at 0.5, 0.75, 1.0, 1.5 m intervals using the Williams Instrument. Because the resistance readings were higher in the field for the North, West, and South transects than the West Transect, I decided to incorporate additional electrode intervals at 2.0, 3.0, and 4.0 m to the North, West, and South Transects. The West Transect was begun at the southern end and terminated at 50.0 m, due to the metal drainage pipe at the northern end. The North Transect ran from west to east along the northern slope, measuring 46.0 m. The East Transect ran in the same fashion as the West Transect, measuring 44.5 m along the eastern slope of the mound. The South Transect ran in the same direction as the North Transect and measured 43.5 m along the south side of the mound. The survey of Area A represented a total of 29 lines running at 0.5 m electrode spacing, covering an area 7.0 m wide by 38.0 m long, 266.0 square meters.

CHAPTER 5
RESULTS

After all the data were collected, the ρ_a values were calculated, then the standard deviation was calculated for each individual transect and Area A using the equation below:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2} \qquad (2)$$

Where N is total number of in the data set, μ is the mean of all values, and x_i represents the individual x values. The base contour line for the each pseudosection is set at half of the standard deviation. After all the contour maps were completed, it became evident that comparing the results would be an issue. The results are presented below. However, difficulty arose when comparing the pseudosection data to Area A. The Transect data were collected in December 2010, when the temperatures hovered in the low 30s. Area A was collected in May 2011, when the temperature reached well into the 90s. The ρ_a values collected in Area A are much smaller than the South Transect, which only was 2.0 m north. The disparity in temperatures leaching the moisture from the soil appears to have impacted the ability to compare Area A results with the psuedosections.

The ρ_a values were downloaded into the Surfer 6.0 program to create the contour maps. Atkinson (1963) recommends the minimum contour line spacing to be drawn at half of the standard deviation. Each data set produced a different standard deviation and this information was used to interpret the site's boundary, anomalies, and/or features. Setting the minimum contour line at half the standard deviation as Atkinson (1963) recommends, ended up masking the features below the surface (discussed below). Instead of, setting the contour line at the standard deviation simplified the pseudosections allowing for identification of anomalies. Each of the pseudosections is discussed individually; in addition, the Area A ρa survey results are presented.

West Transect

A total of 241 readings were recorded along the West Transect, at 0.5, 0.75, 1.0, and 1.5 m spacings (refer to Appendix A for the values). The average ρa for this transect was 13.7 Ωm. The highest ρa value was at 31.3 Ωm, while the lowest value was 0.1 Ωm. The contour line for the pseudosection was plotted at 2.4 Ωm (half of the standard deviation of 4.8 Ωm). The pseudosection does not appear to be homogenous below the surface (see Figure 5-1); especially considering that the West Transect travels over a subtle and smooth slope. Even with the irregularities below the surface, one negative (W-5) and six positive anomalies have been identified as points of interest. The values on and off the mound are too low to suggest a perched water table is below the surface.

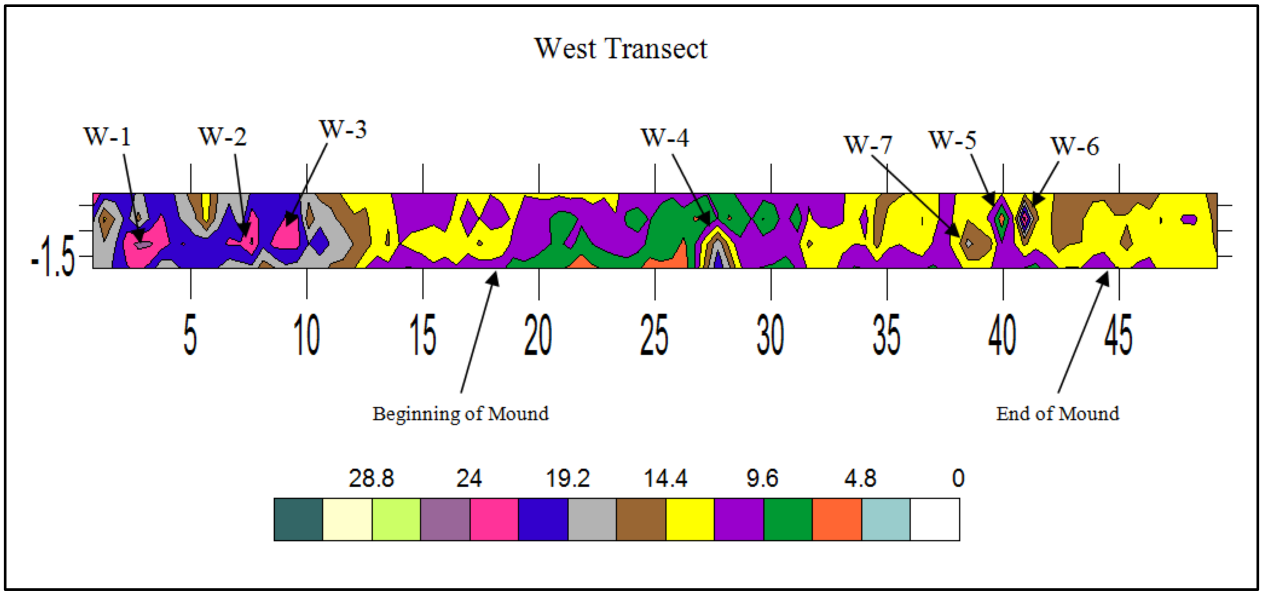

Figure 5-1. West Transect Pseudosection running from the south to the north (see Figure 4-1 for location).

South of the mound (the mound begins at 19.9 m), anomalies W-1, W-2, and W-3 were defined (Figure 5-1). Values for these anomalies ranged from 26.4 and 28.8 Ωm, which is slightly elevated from the immediate background (19.2 to 21.6 Ωm). The shape and size of W-1 may be a little distorted due to its location at the beginning of the line. Anomaly W-1 is located at 3.0 m, 0.75 m below the surface, and is 1.0 m in depth by 1.5 m in width. The next two anomalies, W-2 and W-3, are close in proximity and may be one anomaly. W-2 appears at 8.0 m, stretching 1.0 m in depth by 0.5 m in width, with ρ_a values reaching between 24.0 and 26.4 Ωm. W-3, which is just 1.0 m north of W-2, is similar in shape, has the same point of origin as W-2 and has the same ρ_a. The anomaly is 1.5 m long by 0.75 m wide.

The next anomaly, W-4, is within the mound. It begins at 27.0 m, one meter below the surface, and extends to the base of the pseudosection. It is 1.0 m in length by 1.5 m in width. The values for this anomaly range between 26.4 to 28.8 Ωm. The last group of anomalies (W-5, W-6, and W-7) occurred toward the north end of the line. W-5 is the only negative anomaly along the west transect; it emerges at 38.0 m, 1.0 m below the surface. The ρ_a values decrease for W-5 to between 4.8 to 7.2 Ωm, while the background ranges between 12 to 14.4 Ωm. The contour map creates a diamond silhouette for W-5 that measures 0.5 m in length by 0.5 m in width. Anomaly W-6 sits three meters away at the same distance below the surface as W-5. W-6 values max out at 26.4 Ωm, more than double ρ_a values of W-5. W-6 anomaly has the same outline as W-5 although a little larger, with measurements of 0.75 m long by 0.75 m wide. W-7 appears at 38.0 m, one meter below the surface, with the ρ_a values ranging from 16.8 to 19.2 Ωm; it is just slightly higher than the background (12.9 to 14.4 Ω), and barely registers on the contour map.

Changing the contour line from half of the standard deviation, 2.4 Ωm, to the standard deviation, 4.8 Ωm, results in the identification of more anomalies below the surface. Figure 5-2 illustrates a more homogenous ρ_a composition, where the majority of the geoelectric composition on the mound falling between 0.0 and 9.6 Ωm. Four anomalies (W-2, W-3, W-5, and W-7) from Figure 5-1 all but disappear when the contour line is increased to 4.8 Ωm. The details in Figure 5-1, present before the change in contour lines seen in Figure 5-2, have reduced. W-1 appears even smaller in size and the anomaly is distorted due to its location at the beginning of the line. The anomaly is at 3.0 m and 1.5 m below the surface; it measures 1.0 m long by 0.25 m wide. Anomalies W-4 and W-6 shape and size did not changed from a lot from Figure 5-1.

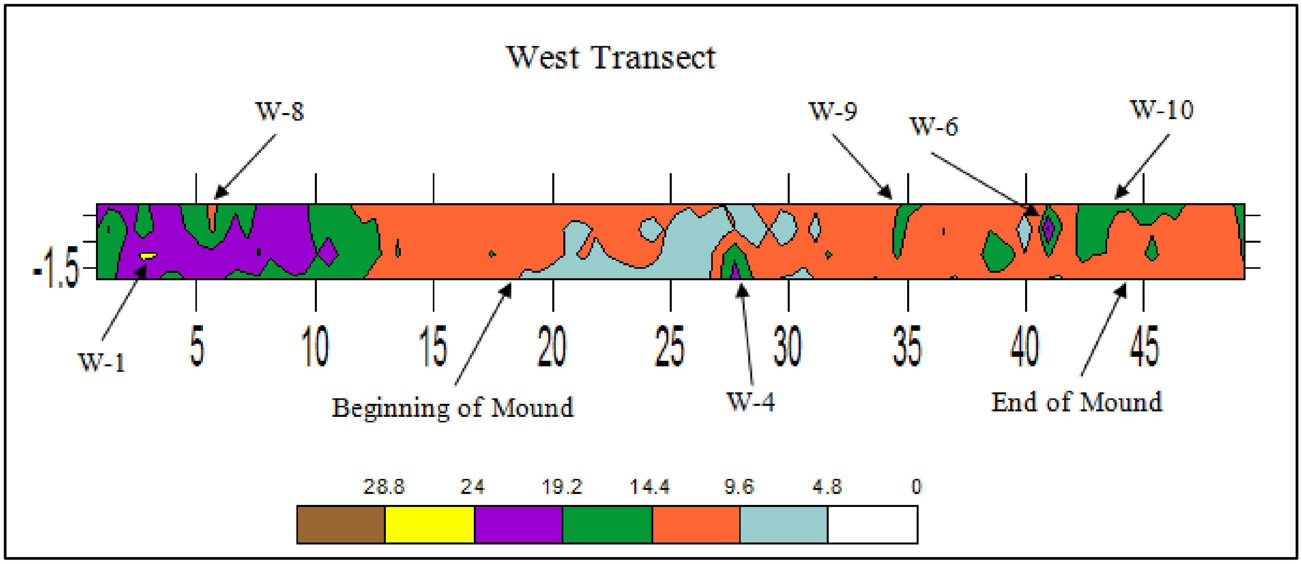

Figure 5-2. The West Transect pseudosection with the contour line set at 4.8 Ωm

Three new anomalies (W-8, W-9, and W-10) appear on the surface, with the new contour lines. Anomaly W-8 appears at 6.0 m, with ρ_a values ranging from 9.6 and 14.4 Ωm, dipping 1.0 m below the surface. Both W-9 and W-10 anomalies have ρ_a values ranging 14.4 and 19.2 Ωm, stretching to over 1.0 m below the surface. W-9 is a narrow anomaly; where W-10 is 5.0 m long. These three new surface anomalies suggest to activity after the mound was built. The ρ_a values for the anomalies along the West Transect do not indicate to a perched water table or any possible burials below the surface. They do, however, imply potential cultural or biological activity just below the surface. The first 10.0 m do overlap Area A (Figure 4-1), which is defined by Mann 2004 as part of the "plaza."

North Transect

A total of 256 readings were recorded along the North Transect, at 0.5, 0.75, 1.0, and 1.5 m, with two additional readings at 2.0 and 3.0 m spacings (Figure 5-3). The North Transect crosses the northern slope of the mound, with the readings procured from west to east. The average ρ_a value equals 30.9 Ωm, which is twice as much as the west transect. The highest (97.0 Ωm) and lowest (8.3 Ωm) ρ_a values are also higher than the west transect. The highest ρ_a value of 97 Ωm is found at 23.5 m along the transect and at 1.0 m below the surface; however, the reading gets absorbed into the background and no anomalies appear at this location on the pseudosection. The contour line for the north pseudosection is set at half the standard deviation, 6.4 Ωm. The background ρ_a values off the mound range from 19.2 to 25.6 Ωm.

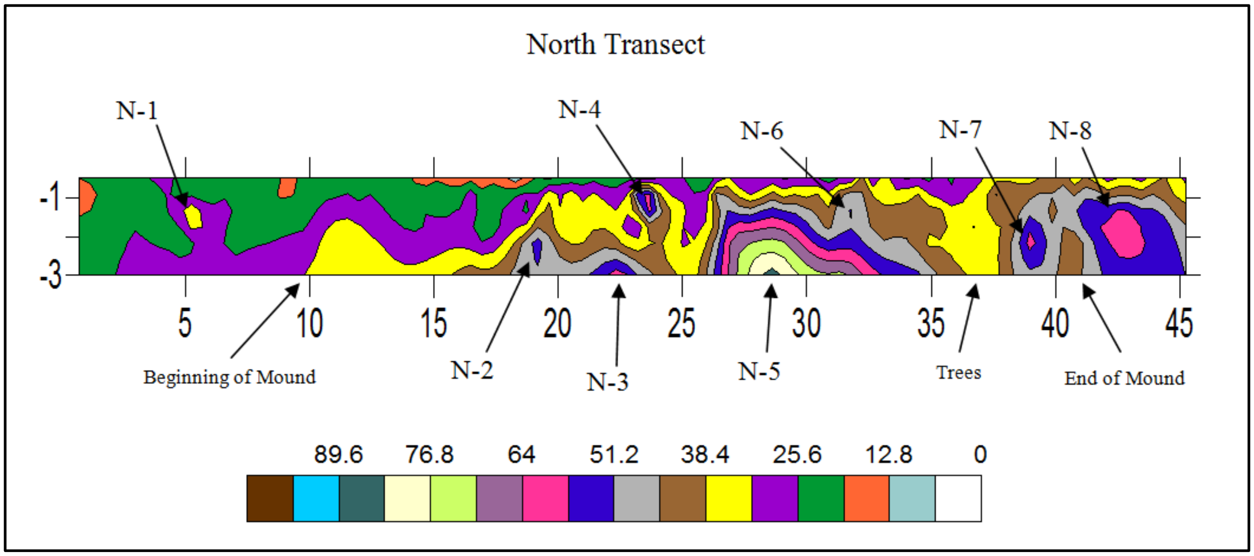

Figure 5-3. Electrical Resistivity Pseudosection North Transect (see Figure 4-1 for location)

The electrical values appear to be more homogenous on the western side of the mound, however, there is a greater level of ρ_a detail as the transect crosses over the mound. The soil ρ_a patterns show a general progression increasing ρ_a values with depth. On the mound, the ρ_a values steadily increase as electrode spacing gets wider, thus penetrating deeper below the surface. Even with the high amount of activity below the surface, nine anomalies appear in the pseudosection and are discussed below.

Because of the two trees located between 35 and 40 m, the steep slope, and the animal burrows present at the base of the mound the apparent resistivity values are distorted towards the end of the transect. Anomaly N-1 appears west of the mound, at 5.0 m, 1.0 m below the surface. N-1 is 1.0 m in length by 0.5 m in width, with the values peaking between 32.0 and 38.3 Ωm. N-2, emerges at 18.0 m, 2.0 m below the surface; it is shaped like a tear drop (0.75 m in length by 0.5 m in width). The values of the anomaly peak between 51.2 to 57.6 Ωm. Anomalies N-3, N-4, and N-5 demonstrate the greatest variation from the background resistivity, which has values ranging between 25.6 and 44.8 Ωm. N-3, at 23.0 m, is located at the bottom of the pseudosection, and the size is probably exaggerated due to its location. The values for N-3 range between 57.6 and 64 Ωm, and it measures 2.0 m long by 0.5 m wide. N-4, at 23.5 m, is another strong positive anomaly, with ρ_a values peaking between 57.5 to 64.0 Ωm. Anomaly N-5 produces the highest ρ_a values, from 83.2 to 89.6 Ωm and is interpreted to have great potential for cultural activity (e.g., possible human burial) in the outer fill of the mound. N-5 starts at 26.0 m, and continues to 35.0 m (9.0 m in length by 2.5 m in width) and 0.5 m below the surface. Anomaly N-6 materializes at 32.0 m mark, 1.25 m below the surface, and is possibly a part of N-5. It is very small, barely registering on the contour map. ρ_a drops from 51.2 to 57.6 Ωm.

The last two anomalies, N-7 and N-8, are found where the transect travels down the slope of the mound towards the road. Two trees are present at 35 m, at the crest of the mound before the slope drops off. The high ρ_a values for N-7 and N-8 are the direct result of the soil around the tree roots absorbing the moisture. Anomaly N-7, at 38.0 m, is 2.0 m below the surface and shaped like a diamond 0.5 m long by 0.25 wide, with values between 57.6 and 64.0 Ωm. N-8 is five meters away at 43.0 m, with the same values as N-7; however, this feature is much larger, 2.0 to 3.0 m long by 1.5 m wide. The anomaly appears at 1.25 m below the surface, and bottoms out at 2.5 m below the surface.

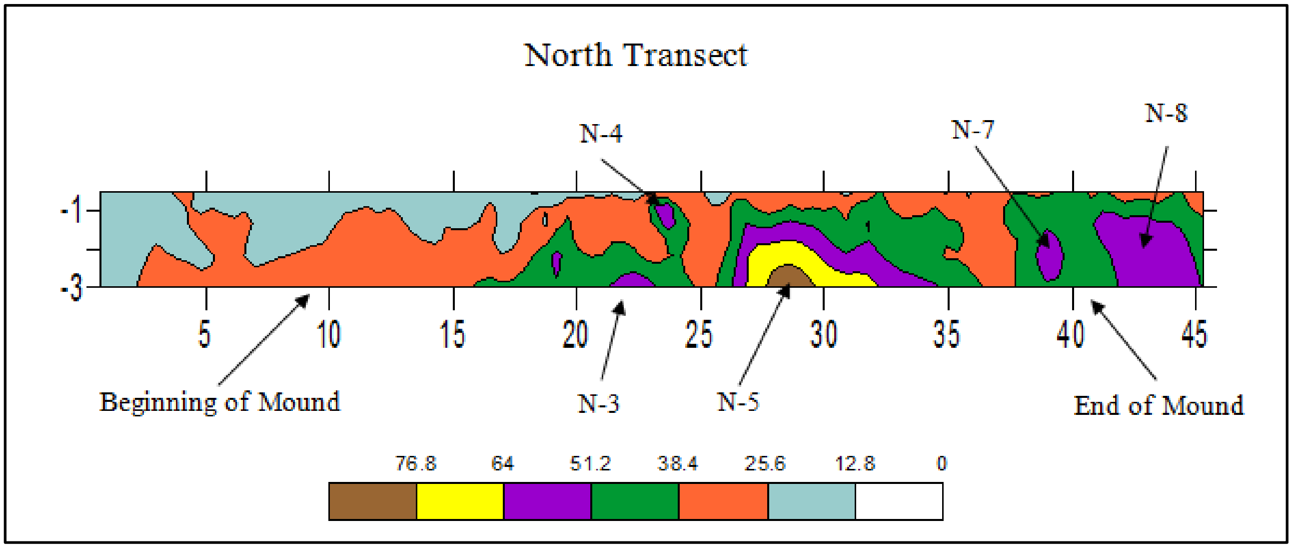

Figure 5-4. The North Transect pseudosection with the contour line set at 12.8 Ωm

The contour line for the North Transect changes from 6.4 to 12.8 Ωm (see Figure 5-4); this grouping reinforces five anomalies from Figure 5-3. N-3 at 23.0 m, appears at 1.5 m below the surface; it is 1.0 m in length by 0.5 m width, with values peaking between 51.2 and 64.0 Ωm. Anomaly N-4 is 1.0 m away from N-3, at one meter below the surface. It has the same values but is larger, stretching to 1.0 m in length by 0.5 m in width.

N-5 starts at 26.0 m and stretches to 35.0 m at the base of the pseudosection, with the ρ_a values reaching 76.8 and 88.6 Ωm. The anomaly is 10.0 m long and 2.0 m wide, and it begins just below the surface. N-7 and N-8 appear larger in the Figure 5-4, with N-7 measuring 1.0 m long by 2.0 m wide and N-8 recorded at 4 m long by 2.0 m wide. Both anomalies' ρ_a values range from 55.0 to 66.0 Ωm.

All of the anomalies along the North Transect are of interest. The ρ_a values below the surface are not as homogenous as in the West Transect, which is apparent when comparing the lines side by side. The temperature during data acquisition was in the low 30s, eliminating water as a factor interfering with the analysis or the results. N-5's size and high ρa values suggest human burial(s) or cultural activity beneath the surface. The other anomalies may be the direct result of cultural activity during the mound construction, or to erosion, which is obvious along the slope. The elevated levels, from 40.0 to 45.0 m, are likely the direct result of the steep slope and erosion present before the mound was cut off by the road.

East Transect

The East Transect runs parallel to the West Transect (see Figure 4-1), and cuts across the east side of the mound from the south to the north (Figure 5-3). A total of 242 readings were recorded, with the same electrode spacings as the North Transect. The average ρa reading is 17.6 Ωm, the highest is 80.7 Ωm, and the lowest is 0.1 Ωm. The contour line is drawn at a half standard deviation, 5.15 Ωm. The ρa values for the East Transect are on the lower side, with values barely reaching 15.3 Ωm. As with the West Transect, the beginning of the East Transect is within Area A. Within the mound, there are four anomalies. There are relatively high values south of the mound, but these are not labeled as anomalies because they begin at the surface. The elevated apparent resistivity values are likely due to bioturbation or modern activity at the surface.

Anomaly E-1 at 15.0 m is 1.5 m below the surface; it has values between 30.6 to 35.7 Ωm. This is a significantly higher than the background values recorded south of the mound, which were between 0.1 and 20.4 Ωm. E-1 has an oval shape that is 1.5 m long and 2.0 m wide. E-2 may be important, with ρa values from 66.3 to 71.4 Ωm. This anomaly starts at 20.0 m, 2.0 m below the surface, with background values hovering between 25.2 and 30.6 Ωm. E-2 is 6.0 m in length by 1.0 m in width; this size and peak may indicate cultural activity. E-3 is at 25.0 m and 1.0 m below the surface; the values are only slightly elevated from the background (25.5 to 30.6 Ωm), and the anomaly measures 0.5 m in diameter. E-4 at 35.0 m, 2.0 m below the surface, does not appear to be of interest. This anomaly's values range between 15.3 to 20.4 Ωm, with a background of 10.2 to 15.3 Ωm, and is 0.5 m long by 1.0 m wide. E-4 is noteworthy because the values around the anomaly are fairly homogenous, and these values stand out when compared to the background.

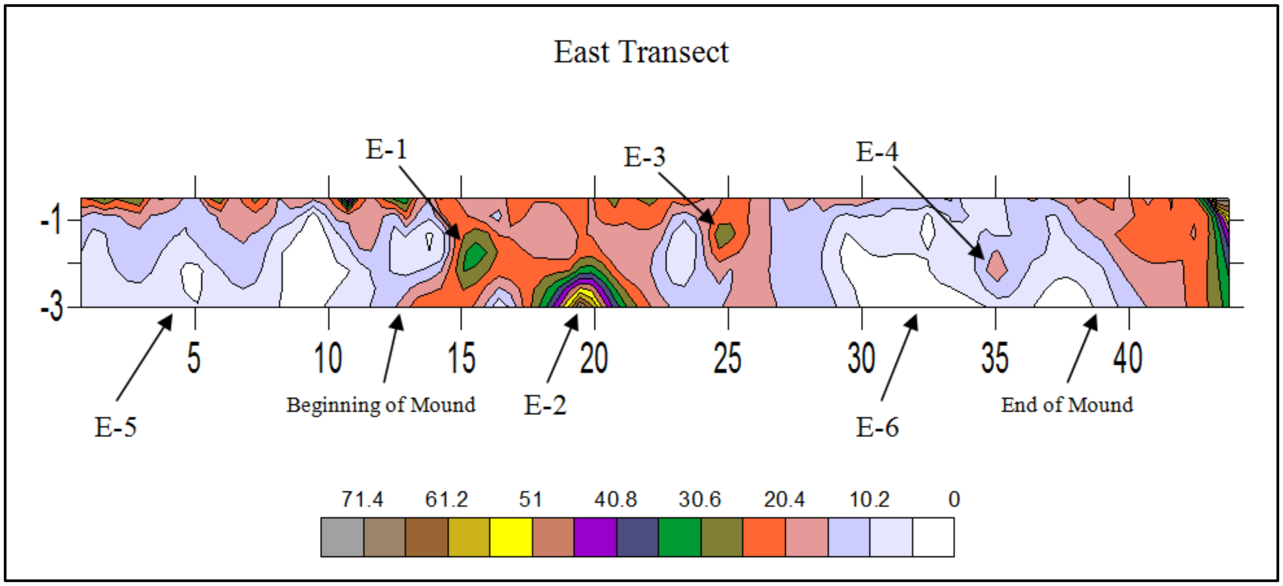

Figure 5-5. Electrical Resistivity Pseudosection East Transect (see Figure 4-1 for location)

Anomaly E-1 at 15.0 m is 1.5 m below the surface; it has values between 30.6 to 35.7 Ωm. This is a significantly higher than the background values recorded south of the mound, which were between 0.1 and 20.4 Ωm. E-1 has an oval shape that is 1.5 m long and 2.0 m wide. E-2 may be important, with ρ_a values from 66.3 to 71.4 Ωm. This anomaly starts at 20.0 m, 2.0 m below the surface, with background values hovering between 25.2 and 30.6 Ωm. E-2 is 6.0 m in length by 1.0 m in width; this size and peak may indicate cultural activity. E-3 is at 25.0 m and 1.0 m below the surface; the values are only slightly elevated from the background (25.5 to 30.6 Ωm), and the anomaly measures 0.5 m in diameter. E-4 at 35.0 m, 2.0 m below the surface, does not appear to be of interest. This anomaly's values range between 15.3 to 20.4 Ωm, with a background of 10.2 to 15.3 Ωm, and is 0.5 m long by 1.0 m wide. E-4 is noteworthy because the

values around the anomaly are fairly homogenous, and these values stand out when compared to the background.

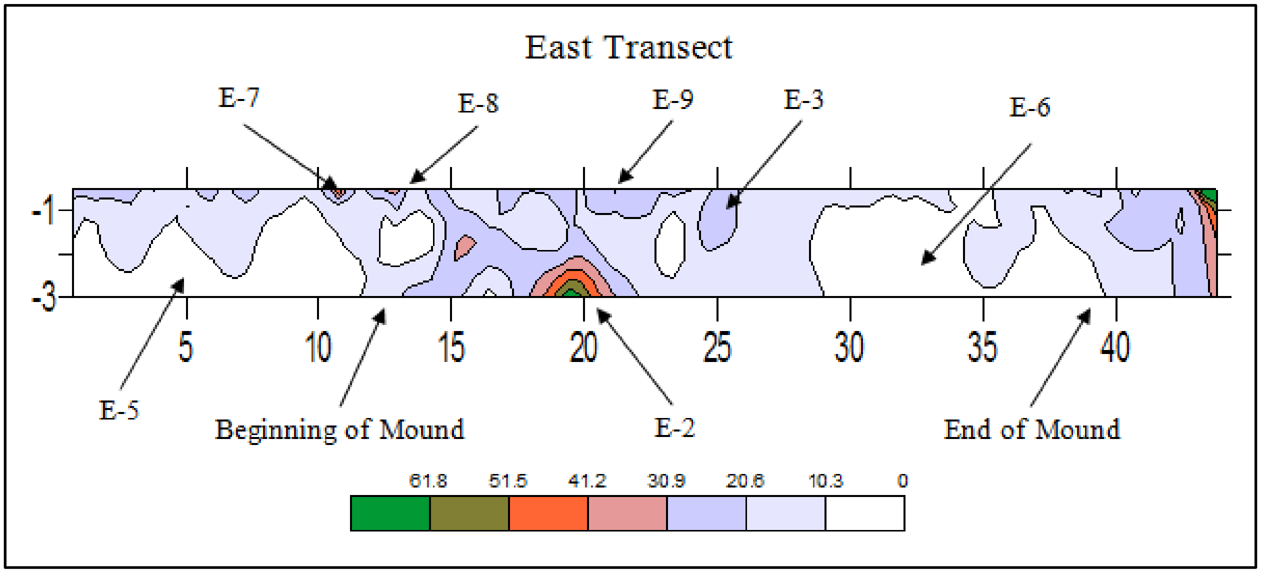

Figure 5-6. The East Transect pseudosection with the contour line set at 10.3 Ωm

The shift in the contour line from 5.15 to 10.3 Ωm in the East Transect (Figure 5-8) highlights significant differences in the geoelectric pseudosection, with only two anomalies (E-2 and E-3) remaining from Figure 5-5. Five new anomalies surface with the increase in the contour line setting. The size of E-2 was reduced to 6.0 m long by 1.0 m wide, starting 2.0 m below the surface. The details become more defined, with the values peaking between 61.8 to 72.1 Ωm. E-7, E-8, and E-9 are new anomalies that appear on the surface of the pseudosection. E-9 runs almost 4.0. m in length, dipping 1.0 m below the surface, and ρ_a values range from 20.6 to 30.9 Ωm. E-7 and E-8 are 1.5 m in length, with values peaking between 30.9 and 41.2 Ωm. These three anomalies, with the addition of E-3, suggest to activity occurring after the mound was in the present location. The activity at the surface likely was the result from animals or removing the shrubbery in efforts to clean off the debris. Anomalies E-5 and E-6 are located at the beginning and the end of the mound with ρ_a values for both anomalies ranging from 0.0 to 10.3 Ωm. These low values are also where the transect lines stretch across the steep slope of the mound; this pattern is the result of the water draining off the mound producing low ρ_a values. The high ρ_a values at the north end of the pseudosection are likely due to the concrete caveats retaining the moisture as the result of modern disturbances.

The ρ_a values below the surface are homogenous. Evaluation of the East Transect suggests the mound was of a single phase of construction through the first three meters. The ρ_a values demonstrate little to no change on or off the mound. E-2 apparent resistivity values hint towards another potential human burial. The anomaly is not nearly as large or with the same high apparent resistivity values as N-5, but a similar pattern of increasing ρ_a values at the base of the pseudo-section occurs within E-2.

South Transect

The south transect runs parallel to the north transect, cutting across the southern slope of the mound (see Figure 4-1 for location); a total of 240 ρ_a readings were recorded (Figure 5-4). The highest ρ_a value is 307.9 Ωm, the lowest is 20.1 Ωm, and the average reading is 51.0 Ωm. These ρ_a values are considerably higher for this line than the three previous pseudosections discussed. Readings were taken from the west to the east, with the same electrode spacing as seen in North and East Transects. The steep slope of the mound made taking the readings along this side of the mound extremely difficult. ρ_a values off the mound are consistent for the first 10.0 m on the mound (Figure 5-4). The values on the mound, almost half way across the mound, significantly increase. Five anomalies are of potential interest, with one negative anomaly that is discussed below.

Surface anomaly S-1 at the 16.0 m mark, has ρ_a values reaching 85.8 to 100.1 Ωm; S-1 measures 1.5 m long by 1.0 m wide. These are unusually high surface values, which may be the direct result of bioturbation. Large ρ_a values are observed at 27.0 m, just one meter below the surface, with values between 185.0 and 200.2 Ωm; S-2 is 2.0 m in length by 1.0 m in width. The background values range from 42.9 to 85.8 Ωm, which is high given the ρa values previously noted in the discussion of the other pseudosections. Anomaly S-3 produces relatively large ρa values ranging from 128.7 to 143.0 Ωm. S-3 is at 28.0 m, starting 1.0 m below the surface; it is only 0.5 m around and is less than 2.0 m away from S-2. S-3 and S-2 may be part of the same anomaly that stretches 5.0 m long by 3.0 m wide; the only way to confirm this is through excavation or coring.

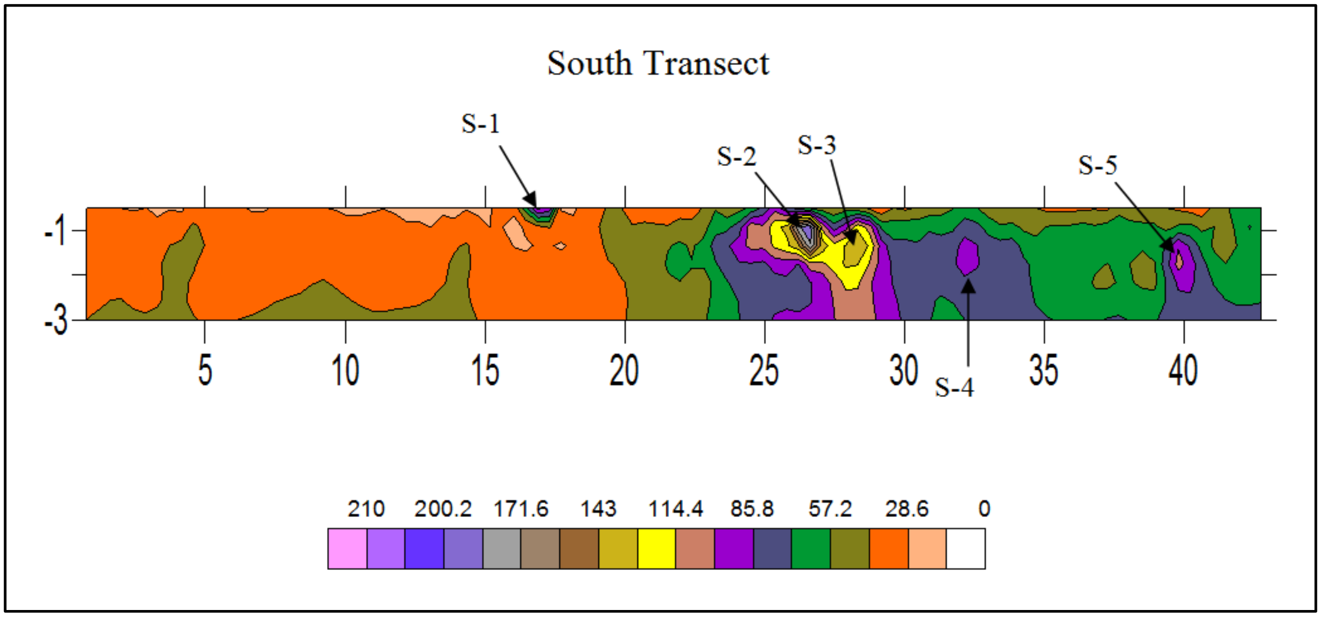

Figure 5-7. Electrical Resistivity Pseudosection South Transect (see Figure 4-1 for location)

S-4 appears just before 33.0 m, 1.0 m below the surface, with ρa values between 85.8 to 100.1 Ωm. The anomaly is in the shape of an oval that is 1.0 m long by 0.5 m wide. The values suggest that the S-4 anomaly may be the result of cultural activity. Negative anomaly, S-5, at 40.0 m, 1.5 m below the surface, has ρa values drop to 14.3 to 28.6 Ωm. This is a dramatic shift from other anomalies seen along this line. S-5 is no more than 0.5 m wide by 0.5 m long, with the ρa drastically decreased from the background values of 42.9 to 85.8 Ωm.

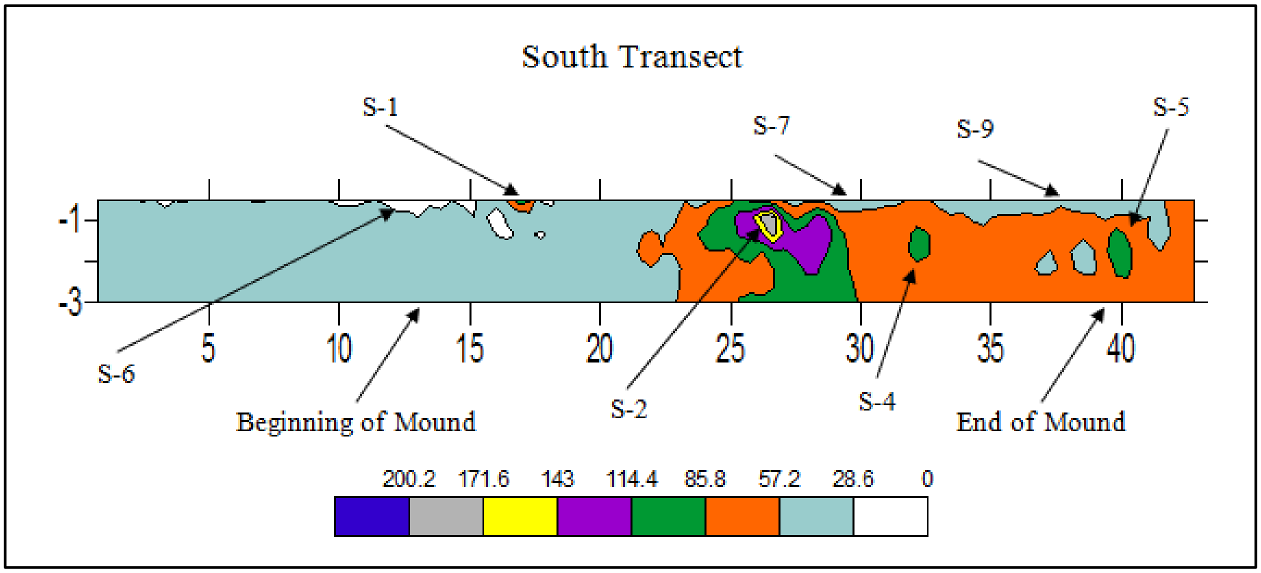

Figure 5-8. Electrical Resistivity Pseudosection South Transect with contour at 28.6 Ωm

Changing the contour lines from 14.3 to 28.6 Ωm played a major effect for the South Transect (Figure 5-9) than it did for the previously discussed transects. The contour lines greatly decreased almost any activity before the mound and placing more of an emphasis on S-2 anomaly. The South Transect retained four anomalies (S-1, S-2, S-4, and S-5) and three new surface anomalies appear when the contour lines were increased. S-6, appears at 10.0 m, is 5.0 m long, and dips 1.0 m below the surface. The ρa values do not exceed 28.6 Ωm. S-7 and S-9 have ρa values ranging between 28.6 and 57.2 Ωm. S-7 starts at 28.0 m and measures 4.0 m long. S-9 may be connected to S-7, and measures 8.0 m long and dips almost 1.5 m below the surface. These three new anomalies suggest to activity on the surface after the mound was already constructed.

The apparent resistivity values along this transect illustrates the greatest variation below the surface. The contour lines off the mound appear to be homogenous; whereas the values are the complete opposite. The earthen mound could be the result of a single construction phase; however, the anomalies and the variation along this South Transect would not be able to support or rebut the statement. All of the anomalies' values show high probability of being possible human burials with values well over 88.0 Ωm, except for S-1 at the surface. S-1 is likely to be the result of erosion or bioturbation at the surface.

The ρ_a values for the pseudosections have considerably differences resulting than North Transect, with less activity and almost no variation below the surface. The first section of North Transect aligns with the end part of West Transect, possibly aligning W-6 and N-1 to be a part of the same anomaly. West Transect runs parallel to East Transect, south to north, with the apparent resistivity values for both off the mound ranging from 0.0 to 22.0 Ωm. However, the East Transect values off the mound are larger. The es may be the result of East Transect additional electrode spacings at 2.0 and 3.0 m. The greatest differential is discerned in E-2, which starts 2.0 m below the surface and goes further in depth than West Transect, 1.5 m below the surface. Beyond the extra electrode spacings there is little difference when comparing the apparent resistivity values. However, the ρ_a values for West Transect do not match up to South Transect, even after the values are grouped together. The values for West Transect do not exceed 33.0 Ωm, where South Transect 4 values go well beyond West Transect ρ_a even at the point where the two lines intersect (West Transect at 15.0 m with South Transect at 5.0 m).

Area A

Electrical resistivity surveys over Area A were performed in May, 2012, five months after the pseudosection fieldwork on the mound was completed. A total of 29 lines (Line 101 to 129, starting in the south) were spaced 0.5 m apart, with each line running parallel up the south slope of the mound. The electrodes were also spaced at 0.5 m; starting east, along the road, moving westward towards the river. The ρ_a values from this work are drastically lower than those for the pseudosection work; however, Area A does show great potential for cultural activity. A total of 2,146 readings, covered 532 square meters were taken. ρ_a values ranged from

67.5 Ωm to 0.3 Ωm (Figure 5-9). A trailer and electrical pole were a few meters away from Line 101 and possibly interfered with the first couple lines. The average ρ_a value is 3.7 Ωm, with 2.7 Ωm the half standard deviation. A total of 32 anomalies of interest were identified. The anomalies in Area A show a potential pattern for rows of sugarcane.

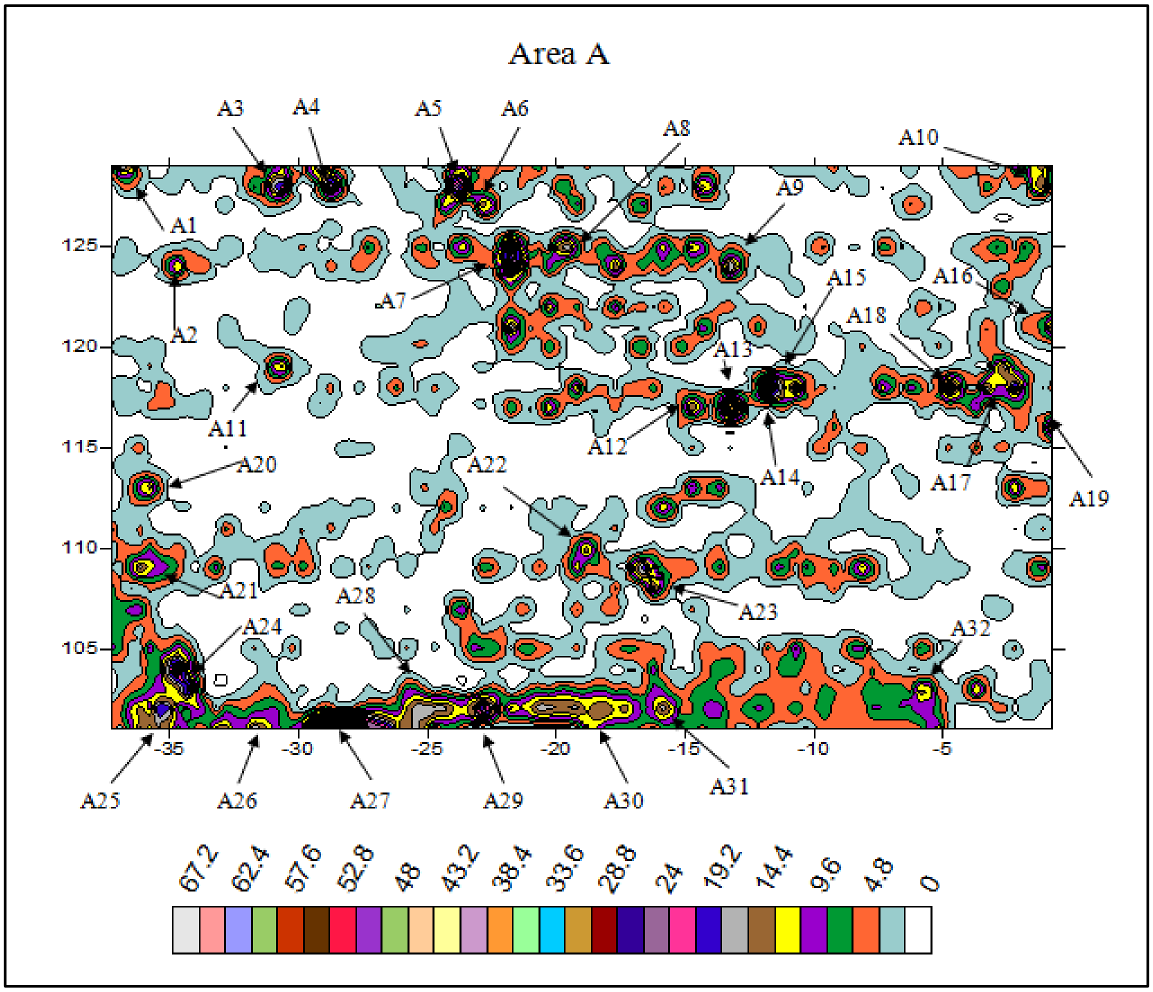

Figure 5-9. Electrical Resistivity Contour Map – Area A

The ρa values for anomalies and to set the contour line for Area A are on the lower range. To clear up the map for analysis, the contour line was changed from 2.4 Ωm to 4.8 Ωm and Lines 101 and 102 were removed. This change seen in Figure 5-10 changes the perspective of what ρa values are beneath the surface in the “plaza.” The activity level does not look as intense as

Figure 5-9 with its 32 anomalies. Figure 5-10 has twelve anomalies with ρa values between 14.4 and 28.8 Ωm. The sugarcane pattern is more prevalent when the contour line changed. The presence of sugar cane cropping may provide evidence for Coles Creek or Baytown function, it does suggest to the land’s function after the Coles Creek period.

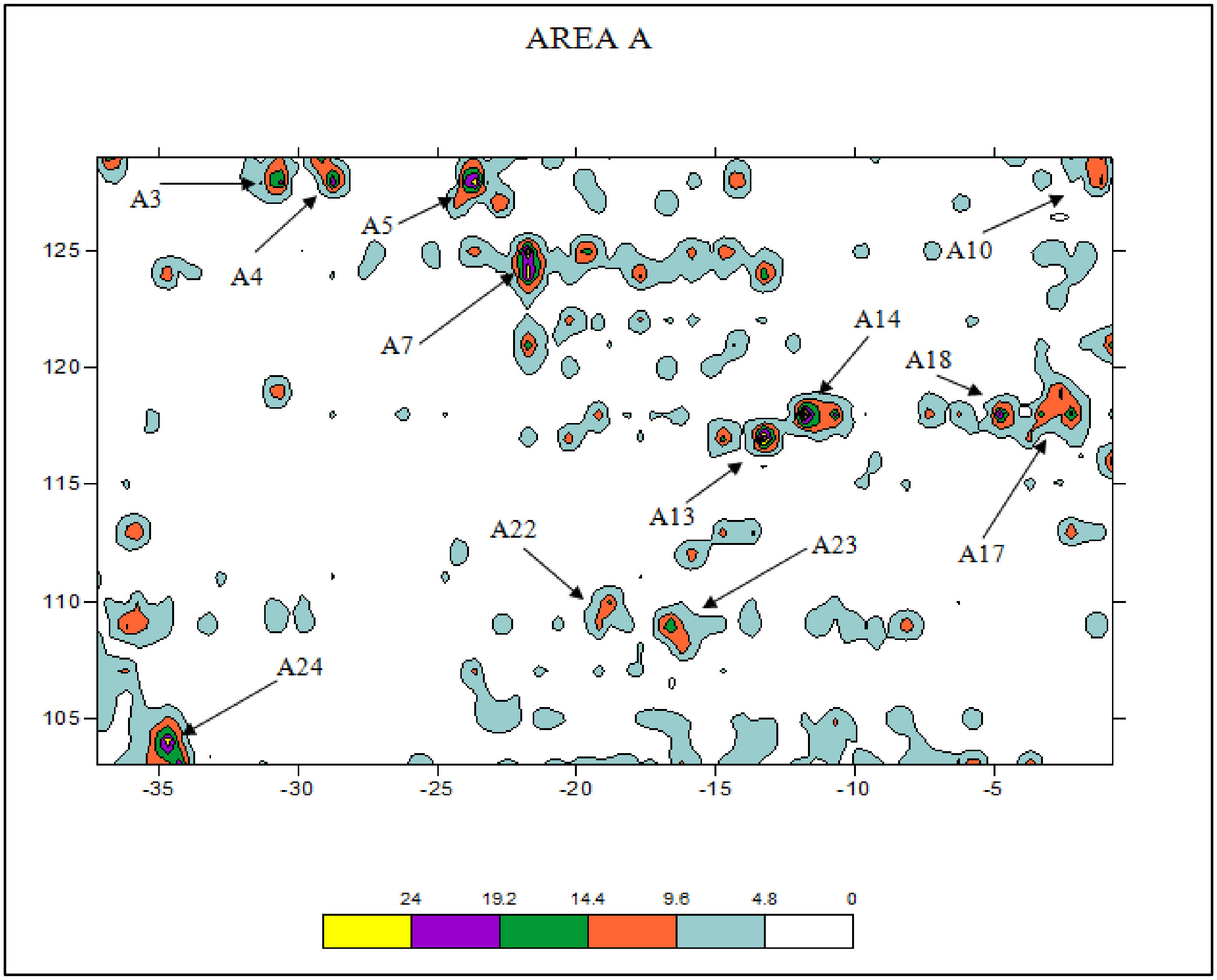

Figure 5-10. Area A Contour Map at 4.8 Ωm

CHAPTER 6
CONCLUSION AND RECOMMENDATIONS

Several thousand years divide the Archaic and Coles Creek mounds. However, mounds played a ceremonial function in both cultures. Large Coles Creek period conical mounds were also acknowledged as a place to bury their dead. The pseudosections do provide sufficient evidence that the Livonia Mound Site functioned for ceremonial purposes and possibly as a burial mound. Expanding Area A contour lines for from 2.4 to 4.8 Ωm, brought forth a ρa pattern suggest sugar cane was harvested directly south of the mound. Evidence of sugar cane harvesting does not give insight into function at the Livonia Mound Site during Coles Creek or Baytown periods. It does suggest to the sites use and function after the mound was built. Area A, the "plaza", also shows great potential for cultural activity directly to the south of the mound. Unfortunately, the remaining area of the "plaza" at the Livonia Mound Site has been heavily impacted by houses, with a road running directly through the center of the site. As a result, research is limited to the mound and the immediate area surrounding the mound.

The Livonia Mound Site demonstrates potential for cultural activity just below the surface in the mound and in the "plaza" directly south of the mound. After examining the pseudosections and Area A, a total of three to four possible groups of human burials within the first 3.0 m of the pseudosections are believed to be identified in the moundfill. The North (N-5), East (E-2), and South (S-2 & S-3) transects show high probability of being directly associated with human burials. The anomalies identified in the West Transect do not suggest any burials, but do suggest cultural activity at the point where Area A overlaps with the line. The apparent resistivity (ρ_a) values in Area A provide substantial evidence that people were living or participating in cultural activity directly off the mound, in the "plaza." This activity goes against Roe and Schilling (2010) assumption that plazas were said to be kept free of debris.

The West and East transects appear to have homogenous moundfill. The ρ_a values suggest that within the top 3.0 m of mound fill, and the top layer of the mound was built during a single construction phase. Conversely, the ρ_a values for any of the pseudo-sections do not mirror or match well at their points of intersections. However, when you compare the North and South transects with the East and West Transects, there is a completely different story. The large value of the anomalies in the North and South Transects raises more questions about what is going on below the surface or at the surface, and the cause for these differences in ρ_a values. One might question why the mound is slumping along the southern and western sides, while the northern and eastern sides of the mound see high levels of erosion.

The West and East Transects stretch into Area A and the South Transect runs parallel to Area A only a few meters away. However, the pseudosection ρ_a values in comparison Area A were nearly double. Thus, evaluating the results together as a whole becomes tricky. The dramatic shift between the Transects and Area A supports the theory of Samouëlian et al. (2005) that temperature (hot vs. cold) directly affects resistivity values.

In my opinion, the electrical resistivity survey work done at the Livonia Mound Site appears to be static. To fully understand the scope of the Livonia Mound site, this research needs to be expanded upon and duplicated with some alterations. Providing a comparison of the earlier results with current data would provide a more distinct insight into internal changes in the mound's composition.

Recommendations

Fortunately, the Livonia Mound Site (16PC1) is in no apparent danger as a result of the Town of Livonia assuming ownership. All the work described in this thesis will assist in the Town's aspiration to put the site on the National Register for Historical Places (NRHP). If the Town of Livonia plans on further investigating the mound, I highly recommend waiting to core or excavate into the sides of the mound. Ideally, this thesis research should be repeated and built upon.

The next investigation should include a magnetometer gradiometer survey, one of the methods used at the LSU Campus Mound Site (16EBR6). This method was highly successful at the LSU Mound site and will give additional insight into the results presented here. A set arbitrary pattern of repeating the electrical resistivity survey, I suggest every five years, with place a hold on digging or coring at the site. Changes from the first investigation should be compared with the second, five years later, then again at the ten year mark. Withdrawing a core could change or impact the possible results, so coring or opening test pits should wait.

Due to an error in judgment, I recommend that the next investigation add two additional electrode spacings at 2.0 and 3.0 m to the West Transect. It might be beneficial to do more if possible (e.g. 4.0 and 5.0 m spacings) for all transects. Adding these additional spacings would give a more solid comparable assessment where all pseudosections reach the same depth below the surface. Also, two additional survey lines on both sides of each transect should be in the next investigation. Repeating Area A at 0.5 m and adding 1.0 m spacings during the winter months will give results that will be comparable to the results of the pseudosections. The fieldwork should include four pseudo-sections in the “plaza” to possibly identify activity between or below the layers of flood deposit. Also, all the fieldwork should be gathered at the same time during the fall, winter, or spring months.

Soil development within the mounds evolved over thousands of years, and we are continuing to learn about these amazing earthen structures. Thus, repeating and adding the additional electrical resistivity survey lines would monitor the ongoing activity beneath the mound’s surface. The slopes of the Livonia Mound Site are gently eroding and/or slumping, with the trees possibly serving as a vehicle to maintain or erode the mound’s form and height.

Each mound is uniquely built with no two mounds comprised of the same composition. The LSU Campus Mounds site serves as a good example. As a result, long term study of the geological composition will provide more clues to the interior workings of these earthen mounds, shedding light on their previous function and the intent of the people who built them. This research is merely a starting point and needs to be continually built upon, because soil composition changes. Repeating the fieldwork will provide a model to potentially identify evidence of erosion, slumping, or sliding occurring at the Livonia Mound Site and other mound sites. The results presented here as a starting point to understand the composition of the mounds. They provide a base from which to monitor these modifications.

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APPENDIX A
RAW PSEUDOSECTIONS ELECTRICAL RESISTIVITY DATA

West Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
0.75	7.7	24.2
1.25	5.75	18.1
1.75	6.3	19.8
2.25	6.5	20.4
2.75	5.7	17.9
3.25	6.5	20.4
3.75	6.2	19.5
4.25	6.7	21.0
4.75	5.2	16.3
5.25	5.3	16.7
5.75	3.6	11.3
6.25	6.25	19.6
6.75	6.0	18.8
7.25	5.9	18.5
7.75	6.6	20.7
8.25	6.1	19.2
8.75	7.35	23.1
9.25	6.2	19.5
9.75	6.5	20.4
10.25	5.4	17.0
10.75	5.0	15.7
11.25	5.2	16.3
11.75	4.2	13.2
12.25	4.5	14.1
12.75	4.5	14.1
13.25	4.4	13.8
13.75	3.4	10.7
14.25	3.6	11.3
14.75	4.0	12.6
15.25	3.4	10.7
15.75	2.9	9.1
16.25	3.6	11.3
16.75	4.2	13.2
17.25	3.95	12.4

West Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
17.75	3.8	11.9
18.25	3.5	11.0
18.75	4.7	14.8
19.25	3.5	11.0
19.75	3.7	11.6
20.25	4.0	12.6
20.75	3.4	10.7
21.25	4	12.6
21.75	3.5	11.0
22.25	4.2	13.2
22.75	3.6	11.3
23.25	4	12.6
23.75	3.3	10.4
24.25	3.3	10.4
24.75	3.3	10.4
25.25	3.2	10.1
25.75	2.75	8.6
26.25	3.4	10.7
26.75	3.2	10.1
27.25	2.9	9.1
27.75	2.9	9.1
28.25	2.7	8.5
28.75	3.3	10.4
29.25	3.2	10.1
29.75	3.3	10.4
30.25	3.0	9.4
30.75	3.45	10.8
31.25	3.4	10.7
31.75	3.7	11.6
32.25	3.9	12.3
32.75	3.6	11.3
33.25	3.8	11.9
33.75	4.1	12.9
34.25	4.0	12.6

West Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
34.75	4.7	14.8
35.25	4.7	14.8
35.75	4.65	14.6
36.25	4.15	13.0
36.75	4.4	13.8
37.25	3.6	11.3
37.75	3.4	10.7
38.25	4.4	13.8
38.75	3.55	11.2
39.25	4.75	14.9
39.75	3.5	11.0
40.25	4.2	13.2
40.75	4.3	13.5
41.25	4.7	14.8
41.75	4.4	13.8
42.25	4.55	14.3
42.75	4.7	14.8
43.25	5.1	16.0
43.75	4.9	15.4
44.25	4.35	13.7
44.75	4.8	15.1
45.25	5.1	16.0
45.75	4.2	13.2
46.25	5.4	17.0
46.75	4.1	12.9
47.25	4.4	13.8
47.75	4.1	12.9
48.25	4.3	13.5
48.75	4.35	13.7
49.25	5.05	15.9

West Transect: 0.75 m		
Distance	Resistance	Apparent Resistivity
1.125	2.55	12.0
1.875	3.4	16.0
2.625	3.0	14.1
3.375	3.6	17.0
4.125	4.1	19.3
4.875	3.3	15.6
5.625	2.75	13.0
6.375	3.8	17.9
7.125	3.7	17.4
7.875	4.1	19.3
8.625	4.1	19.3
9.375	4.5	21.2
10.125	2.9	13.7
10.875	3.7	17.4
11.625	2.9	13.7
12.375	2.9	13.7
13.125	2.5	11.8
13.875	2.3	10.8
14.625	1.8	8.5
15.375	2.2	10.4
16.125	2.2	10.4
16.875	2.0	9.4
17.625	1.5	7.1
18.375	2.3	10.8
19.125	1.9	9.0
19.875	2.1	9.9
20.625	1.2	5.7
21.375	1.65	7.8
22.125	1.55	7.3
22.875	2.0	9.4
23.625	1.6	7.5
24.375	1.5	7.1
25.125	1.4	6.6
25.875	1.6	7.5
26.625	1.2	5.7
27.375	1.2	5.7
28.125	1.35	6.4

West Transect: 0.75 m		
Distance	Resistance	Apparent Resistivity
28.875	1.8	8.5
29.626	1.4	6.6
30.376	1.55	7.3
31.126	1.6	7.5
31.876	1.95	9.2
32.626	2.3	10.8
33.376	2.5	11.8
34.126	2.3	10.8
34.876	2.95	13.9
35.626	2.35	11.1
36.376	2.75	13.0
37.126	2.55	12.0
37.876	2.4	11.3
38.626	2.4	11.3
39.376	2.2	10.4
40.126	0.2	0.6
40.876	5.6	26.4
41.626	2.4	11.3
42.376	3.4	16.0
43.126	2.65	12.5
43.876	2.6	12.3
44.626	2.7	12.7
45.376	2.9	13.7
46.126	2.55	12.0
46.876	2.45	11.5
47.626	2.3	10.8
48.376	2.35	11.1

West Transect: 1.0 M		
Distance	Resistance	Apparent Resistivity
1.5	2.9	18.2
2.5	4.4	27.6
3.5	5.0	31.4
4.5	3.9	24.5
5.5	3.45	21.7
6.5	4.2	26.4
7.5	4.7	29.5
8.5	4.4	27.6
9.5	4.2	26.4
10.5	3.6	22.6
11.5	3.5	22.0
12.5	3.0	18.8
13.5	2.8	17.6
14.5	2.5	15.7
15.5	2.65	16.7
16.5	2.6	16.3
17.5	3.0	18.8
18.5	2.8	17.6
19.5	2.15	13.5
20.5	1.75	11.0
21.5	2.35	14.8
22.5	2.1	13.2
23.5	2.5	15.7
24.5	2.25	14.1
25.5	2.05	12.9
26.5	1.6	10.1
27.5	2.3	14.5
28.5	1.3	8.2
29.5	2.05	12.9
30.5	2.4	15.1
31.5	2.7	17.0
32.5	2.2	13.8
33.5	2.35	14.8
34.5	2.95	18.5
35.5	2.2	13.8
36.5	2.9	18.2

West Transect: 1.0 M		
Distance	Resistance	Apparent Resistivity
37.5	1.85	11.6
38.5	3.4	21.4
39.5	2.8	17.6
40.5	2.2	13.8
41.5	2.4	15.1
42.5	3.0	18.8
43.5	2.6	16.3
44.5	2.4	15.1
45.5	2.9	18.2
46.5	2.05	12.9
47.5	2.3	14.5
48.5	2.15	13.5

West Transect: 1.5 m		
Distance	Resistance	Apparent Resistivity
2.25	2.35	22.1
3.75	1.7	16.0
5.25	2.1	19.8
6.75	1.8	17.0
8.25	1.5	14.1
9.75	1.9	17.9
11.25	1.7	16.0
12.75	1.1	10.4
14.25	0.9	8.5
15.75	1.2	11.3
17.25	1.1	10.4
18.75	0.9	8.5
20.25	0.9	8.5
21.75	0.55	5.2
23.25	0.85	8.0
24.75	0.6	5.7
26.25	0.4	3.8
27.75	2.55	24.0
29.25	0.9	8.5
30.75	0.75	7.1
32.25	1.5	14.1
33.75	0.9	8.5
35.25	1.0	9.4
36.75	1.0	9.4
38.25	1.3	12.3
39.75	1.15	10.8
41.25	0.9	8.5
42.75	1.35	12.7
44.25	1.1	10.4
45.75	1.25	11.8
47.25	1.4	13.2

North Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
0.75	6.1	19.2
1.25	6.5	20.4
1.75	7.0	22.0
2.25	7.2	22.6
2.75	7.7	24.2
3.25	8.2	25.8
3.75	8.5	26.7
4.25	9.35	29.4
4.75	7.2	22.6
5.25	7.7	24.2
5.75	6.65	20.9
6.25	6.65	20.9
6.75	6.9	21.7
7.25	7.4	23.2
7.75	7.7	24.2
8.25	7.8	24.5
8.75	6.4	20.1
9.25	5.5	17.3
9.75	6.8	21.4
10.25	6.8	21.4
10.75	7.8	24.5
11.25	7.8	24.5
11.75	7.2	22.6
12.25	6.0	18.8
12.75	7.3	22.9
13.25	6.5	20.4
13.75	7.6	23.9
14.25	5.6	17.6
14.75	4.8	15.1
15.25	6.35	19.9
15.75	5.3	16.7
16.25	6.25	19.6
16.75	4.0	12.6
17.25	5.35	16.8
17.75	4.9	15.4
18.25	2.65	8.3
18.75	4.9	15.4

North Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
19.25	7.2	22.6
19.75	4.7	14.8
20.25	8.3	26.1
20.75	6.45	20.3
21.25	8.2	25.8
21.75	6.7	21.0
22.25	7.0	22.0
22.75	7.7	24.2
23.25	7.5	23.6
23.75	7.3	22.9
24.25	9.4	29.5
24.75	8.5	26.7
25.25	7.55	23.7
25.75	5.65	17.7
26.25	7.9	24.8
26.75	10.9	34.2
27.25	8.35	26.2
27.75	8.4	26.4
28.25	8.4	26.4
28.75	8.5	26.7
29.25	8.25	25.9
29.75	8.8	27.6
30.25	8.9	28.0
30.75	7.1	22.3
31.25	8.05	25.3
31.75	8.0	25.1
32.25	13.1	41.2
32.75	7.1	22.3
33.25	13.7	43.0
33.75	6.35	19.9
34.25	8.8	27.6
34.75	6.9	21.7
35.25	9.5	29.8
35.75	7.6	23.9
36.25	9.35	29.4
36.75	8.3	26.1
37.25	11.15	35.0

North Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
37.75	11.55	36.3
38.25	11.9	37.4
38.75	11.0	34.6
39.25	12.0	37.7
39.75	12.1	38.0
40.25	14.1	44.3
40.75	10.7	33.6
41.25	12.8	40.2
41.75	10.4	32.7
42.25	8.85	27.8
42.75	11.7	36.8
43.25	8.6	27.0
43.75	9.9	31.1
44.25	12.8	40.2
44.75	11.4	35.8
45.25	9.6	30.2

North Transect: 0.75 m		
Distance	Resistance	Apparent Resistivity
1.125	3.5	16.5
1.875	4.2	19.8
2.625	4.2	19.8
3.375	4.45	21.0
4.125	4.9	23.1
4.875	3.7	17.4
5.625	4.2	19.8
6.375	3.1	14.6
7.125	4.0	18.8
7.875	4.1	19.3
8.625	3.4	16.0
9.375	2.9	13.7
10.125	3.75	17.7
10.875	4.3	20.3
11.625	3.75	17.7
12.375	3.7	17.4
13.125	4.1	19.3
13.875	4.1	19.3
14.625	4.1	19.3
15.375	3.8	17.9
16.125	3.6	17.0
16.875	3.8	17.9
17.625	4.0	18.8
18.375	3.7	17.4
19.125	3.4	16.0
19.875	5.0	23.6
20.625	4.6	21.7
21.375	5.5	25.9
22.125	5.35	25.2
22.875	6.15	29.0
23.625	5.9	27.8
24.375	5.75	27.1
25.125	6.5	30.6
25.875	4.7	22.1
26.625	7.2	33.9
27.375	7.25	34.2
28.125	5.5	25.9

North Transect: 0.75 m		
Distance	Resistance	Apparent Resistivity
28.875	5.55	26.2
29.626	6.05	28.5
30.376	6.3	29.7
31.126	5.5	25.9
31.876	8.8	41.5
32.626	6.4	30.2
33.376	5.8	27.3
34.126	7.1	33.5
34.876	5.8	27.3
35.626	5.3	25.0
36.376	4.9	23.1
37.126	6.7	31.6
37.876	8.85	41.7
38.626	7.8	36.8
39.376	9.55	45.0
40.126	10	47.1
40.876	8.4	39.6
41.626	8.5	40.1
42.376	7.0	33.0
43.126	7.9	37.2
43.876	9.1	42.9
44.626	8.1	38.2

North Transect: 1.0 M		
Distance	Resistance	Apparent Resistivity
1.5	3.25	20.4
2.5	3.55	22.3
3.5	4.2	26.4
4.5	4.5	28.3
5.5	3.85	24.2
6.5	4.55	28.6
7.5	3.9	24.5
8.5	3.55	22.3
9.5	4.0	25.1
10.5	4.1	25.8
11.5	4.75	29.8
12.5	4.8	30.2
13.5	3.35	21.0
14.5	4.4	27.6
15.5	3.7	23.2
16.5	5.2	32.7
17.5	4.35	27.3
18.5	5.8	36.4
19.5	7.1	44.6
20.5	6.5	40.8
21.5	5.9	37.1
22.5	4.75	29.8
23.5	15.5	97.4
24.5	5.3	33.3
25.5	4.2	26.4
26.5	9.4	59.1
27.5	4.95	31.1
28.5	7.6	47.8
29.5	6.85	43.0
30.5	7.05	44.3
31.5	9.0	56.5
32.5	7.4	46.5
33.5	6.05	38.0
34.5	6.6	41.5
35.5	4.35	27.3
36.5	6.3	39.6
37.5	7.55	47.4

North Transect: 1.0 M		
Distance	Resistance	Apparent Resistivity
38.5	7.4	46.5
39.5	7.25	45.6
40.5	7.5	47.1
41.5	8.8	55.3
42.5	7.5	47.1
43.5	7.0	44.0
44.5	6.2	39.0

North Transect: 1.5 m		
Distance	Resistance	Apparent Resistivity
2.25	2.2	20.7
3.75	2.25	21.2
5.25	4.6	43.4
6.75	2.85	26.9
8.25	2.3	21.7
9.75	2.4	22.6
11.25	3.3	31.1
12.75	2.95	27.8
14.25	2.4	22.6
15.75	2.7	25.4
17.25	2.0	18.8
18.75	2.0	18.8
20.25	2.8	26.4
21.75	3.9	36.8
23.25	2.9	27.3
24.75	3.95	37.2
26.25	3.35	31.6
27.75	5.75	54.2
29.25	5.8	54.7
30.75	3.95	37.2
32.25	4.65	43.8
33.75	4.5	42.4
35.25	4.9	46.2
36.75	3.25	30.6
38.25	3.8	35.8
39.75	4.45	41.9
41.25	6.4	60.3
42.75	7.0	66.0
44.25	5.85	55.1

North Transect: 2.0 m		
Distance	Resistance	Apparent Resistivity
3	2.15	27.0
5	1.5	18.9
7	1.65	20.7
9	2.05	25.8
11	2.9	36.4
13	2.45	30.8
15	2.2	27.7
17	1.75	22.0
19	4.5	56.6
21	2.85	35.8
23	2.2	27.7
25	2.4	30.2
27	5.4	67.9
29	5.5	69.1
31	3.8	47.8
33	3.4	42.7
35	2.7	33.9
37	2.6	32.7
39	5.1	64.1
41	3.3	41.5
43	4.65	58.4

North Transect: 3.0 m		
Distance	Resistance	Apparent Resistivity
4.5	1.7	32.0
7.5	1.7	32.0
10.5	1.8	33.9
13.5	1.8	33.9
16.5	2.3	43.4
19.5	2.6	49.0
22.5	3.4	64.1
25.5	1.9	35.8
28.5	4.6	86.7
31.5	3.9	73.5
34.5	2.8	52.8
37.5	1.9	35.8
40.5	2.2	41.5

East Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
0.75	8.1	25.4
1.25	9.1	28.6
1.75	10.85	34.1
2.25	7.6	23.9
2.75	11.75	36.9
3.25	6.3	19.8
3.75	6.8	21.4
4.25	5.7	17.9
4.75	4.55	14.3
5.25	4.6	14.5
5.75	13.2	41.5
6.25	4.9	15.4
6.75	6.6	20.7
7.25	9.1	28.6
7.75	6.6	20.7
8.25	4.1	12.9
8.75	7.6	23.9
9.25	6.2	19.5
9.75	5.65	17.7
10.25	6.5	20.4
10.75	17.2	54.0
11.25	6.5	20.4
11.75	5.3	16.7
12.25	10.8	33.9
12.75	12.1	38.0
13.25	6.75	21.2
13.75	4.65	14.6
14.25	8.7	27.3
14.75	6.1	19.2
15.25	5.9	18.5
15.75	6.4	20.1
16.25	6.25	19.6
16.75	6.25	19.6
17.25	8.15	25.6
17.75	6.5	20.4
18.25	6.9	21.7
18.75	7.2	22.6

East Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
19.25	7.25	22.8
19.75	6.2	19.5
20.25	7.2	22.6
20.75	9.7	30.5
21.25	5.8	18.2
21.75	9.0	28.3
22.25	9.1	28.6
22.75	6.5	20.4
23.25	8.85	27.8
23.75	6.9	21.7
24.25	6.4	20.1
24.75	5.9	18.5
25.25	8.5	26.7
25.75	6.5	20.4
26.25	5.9	18.5
26.75	3.9	12.3
27.25	5.7	17.9
27.75	5.5	17.3
28.25	4.75	14.9
28.75	6.15	19.3
29.25	6.2	19.5
29.75	6.2	19.5
30.25	5.4	17.0
30.75	4.9	15.4
31.25	3.8	11.9
31.75	3.0	9.4
32.25	5.3	16.7
32.75	4.5	14.1
33.25	6.0	18.8
33.75	2.8	8.8
34.25	2.25	7.1
34.75	2.6	8.2
35.25	3.2	10.1
35.75	4.2	13.2
36.25	5.4	17.0
36.75	4.7	14.8
37.25	5.15	16.2

East Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
37.75	5.7	17.9
38.25	7.5	23.6
38.75	6.2	19.5
39.25	7.8	24.5
39.75	4.9	15.4
40.25	7.7	24.2
40.75	5.4	17.0
41.25	7.65	24.0
41.75	8.65	27.2
42.25	6.5	20.4
42.75	10.1	31.7
43.25	25.7	80.7
43.75	23.7	74.5

East Transect: 0.75 m		
Distance	Resistance	Apparent Resistivity
1.125	2.8	13.2
1.875	3.6	17.0
2.625	4.3	20.3
3.375	3.6	17.0
4.125	3.2	15.1
4.875	1.8	8.5
5.625	2.5	11.8
6.375	3.4	16.0
7.125	4.25	20.0
7.875	4.2	19.8
8.625	2.9	13.7
9.375	1.4	6.6
10.125	4.0	18.8
10.875	3.0	14.1
11.625	3.9	18.4
12.375	3.25	15.3
13.125	7.0	33.0
13.875	3.7	17.4
14.625	4.5	21.2
15.375	4.15	19.6
16.125	2.15	10.1
16.875	5.5	25.9
17.625	4.4	20.7
18.375	3.75	17.7
19.125	4.7	22.1
19.875	3.9	18.4
20.625	4.5	21.2
21.375	5.1	24.0
22.125	4.85	22.9
22.875	3.5	16.5
23.625	4.7	22.1
24.375	4.0	18.8
25.125	4.9	23.1
25.875	3.6	17.0
26.625	3.3	15.6
27.375	3.4	16.0
28.125	2.7	12.7

East Transect: 0.75 m		
Distance	Resistance	Apparent Resistivity
28.875	2.5	11.8
29.626	3.0	14.1
30.376	2.1	9.9
31.126	1.8	8.5
31.876	2.3	10.8
32.626	2.25	10.6
33.376	1.15	5.4
34.126	1.8	8.5
34.876	1.0	4.7
35.626	2.1	9.9
36.376	2.75	13.0
37.126	2.1	9.9
37.876	3.5	16.5
38.626	3.2	15.1
39.376	3.6	17.0
40.126	3.4	16.0
40.876	5.1	24.0
41.626	4.8	22.6
42.376	4.55	21.4
43.126	5.5	25.9

East Transect: 1.0 M		
Distance	Resistance	Apparent Resistivity
1.5	1.8	11.3
2.5	2.4	15.1
3.5	2.1	13.2
4.5	1.9	11.9
5.5	2.1	13.2
6.5	2.8	17.6
7.5	2.7	17.0
8.5	2.0	12.6
9.5	0.1	0.6
10.5	2.6	16.3
11.5	3.5	22.0
12.5	1.35	8.5
13.5	0.8	5.0
14.5	4.0	25.1
15.5	3.1	19.5
16.5	2.15	13.5
17.5	2.8	17.6
18.5	2.8	17.6
19.5	3.7	23.2
20.5	3.8	23.9
21.5	3.3	20.7
22.5	3.6	22.6
23.5	1.0	6.3
24.5	3.55	22.3
25.5	3.8	23.9
26.5	2.4	15.1
27.5	1.9	11.9
28.5	2.4	15.1
29.5	1.0	6.3
30.5	1.65	10.4
31.5	1.65	10.4
32.5	0.15	0.9
33.5	2.7	17.0
34.5	1.7	10.7
35.5	1.8	11.3
36.5	1.5	9.4
37.5	1.6	10.1
38.5	2.9	18.2
39.5	3.65	22.9
40.5	4.0	25.1
41.5	4.4	27.6
42.5	3.25	20.4

East Transect: 1.5 m		
Distance	Resistance	Apparent Resistivity
2.25	1.5	14.1
3.75	1.2	11.3
5.25	1.7	16.0
6.75	1.6	15.1
8.25	0.5	4.7
9.75	0.3	2.8
11.25	2.4	22.6
12.75	1.0	9.4
14.25	0.1	0.9
15.75	3.8	35.8
17.25	1.8	17.0
18.75	1.75	16.5
20.25	1.8	17.0
21.75	2.1	19.8
23.25	0.4	3.8
24.75	3.6	33.9
26.25	1.8	17.0
27.75	1.6	15.1
29.25	0.5	4.7
30.75	0.8	7.5
32.25	0.6	5.7
33.75	0.5	4.7
35.25	0.9	8.5
36.75	1.3	12.3
38.25	1.3	12.3
39.75	2.3	21.7
41.25	2.3	21.7

East Transect: 2.0 m		
Distance	Resistance	Apparent Resistivity
3	1.0	12.56
5	0.15	1.9
7	1.2	15.1
9	0.3	3.8
11	0.4	5.0
13	0.5	6.9
15	2.6	32.7
17	2.2	27.7
19	1.4	17.6
21	1.1	13.8
23	0.45	5.7
25	1.2	15.1
27	1.1	13.8
29	0.4	5.0
31	0.3	3.8
33	0.6	7.5
35	1.8	22.6
37	0.65	8.2
39	0.8	10.1
41	1.65	20.7

East Transect: 3.0 m		
Distance	Resistance	Apparent Resistivity
4.5	0.35	6.6
7.5	0.35	6.6
10.5	0.4	7.5
13.5	1.4	26.4
16.5	0.2	3.8
19.5	4.0	75.4
22.5	0.9	17.0
25.5	0.9	17.0
28.5	0.8	15.1
31.5	0.1	1.9
34.5	0.2	3.8
37.5	0.1	1.9

South Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
0.75	9.9	31.1
1.25	9.5	29.8
1.75	9.85	30.9
2.25	8.2	25.8
2.75	9.3	29.2
3.25	8.6	27.0
3.75	9.1	28.6
4.25	8.9	28.0
4.75	10.9	34.2
5.25	9.6	30.2
5.75	10.4	32.7
6.25	9.6	30.2
6.75	8.35	26.2
7.25	9.05	28.4
7.75	10.5	33.0
8.25	10.8	33.9
8.75	10.0	31.4
9.25	9.3	29.2
9.75	8.6	27.0
10.25	8.15	25.6
10.75	8.4	26.4
11.25	9.0	28.3
11.75	8.4	26.4
12.25	6.4	20.1
12.75	7.2	22.6
13.25	6.5	20.4
13.75	9.1	28.6
14.25	9.1	28.6
14.75	8.65	27.2
15.25	9.1	28.6
15.75	10.5	33.0
16.25	11.7	36.8
16.75	36.4	114.4
17.25	32.0	100.5
17.75	7.4	23.2
18.25	8.55	26.9
18.75	10.3	32.4

South Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
19.25	13.65	42.9
19.75	14.8	46.5
20.25	10.9	34.2
20.75	11.2	35.2
21.25	10.3	32.4
21.75	10.4	32.7
22.25	11.1	34.9
22.75	13.6	42.7
23.25	18.0	56.5
23.75	14.6	45.9
24.25	17.7	55.6
24.75	20.95	65.8
25.25	31.15	97.9
25.75	24.8	77.9
26.25	20.4	64.1
26.75	17.0	53.4
27.25	14.8	46.5
27.75	16.8	52.8
28.25	14.4	45.2
28.75	13.1	41.2
29.25	9.2	28.9
29.75	14.15	44.5
30.25	10.4	32.7
30.75	14.6	45.9
31.25	15.8	49.6
31.75	18.2	57.2
32.25	20.7	65.0
32.75	15.95	50.1
33.25	15.15	47.6
33.75	14.1	44.3
34.25	13.8	43.4
34.75	13.8	43.4
35.25	11.4	35.8
35.75	12.2	38.3
36.25	11.5	36.1
36.75	13.2	41.5
37.25	12.85	40.4

South Transect: 0.5 m		
Distance	Resistance	Apparent Resistivity
37.75	16.7	52.5
38.25	12.4	39.0
38.75	16.0	50.3
39.25	13.5	42.4
39.75	13.0	40.8
40.25	11.65	36.6
40.75	10.0	31.4
41.25	16.1	50.6
41.75	18.9	59.4
42.25	19.3	60.6
42.75	18.1	56.9

South Transect: 0.75 m		
Distance	Resistance	Apparent Resistivity
1.125	6.5	30.6
1.875	7.2	33.9
2.625	7.0	33.0
3.375	6.35	29.9
4.125	5.85	27.6
4.875	7.4	34.9
5.625	7.8	36.8
6.375	7.9	37.2
7.125	6.35	29.9
7.875	6.5	30.6
8.625	5.65	26.6
9.375	6.7	31.6
10.125	6.2	29.2
10.875	6.5	30.6
11.625	6.7	31.6
12.375	5.8	27.3
13.125	4.9	23.1
13.875	4.8	22.6
14.625	5.1	24.0
15.375	5.1	24.0
16.125	4.7	22.1
16.875	9.9	46.7
17.625	9.3	43.8
18.375	8.5	40.1
19.125	9.0	42.4
19.875	9.6	45.2
20.625	9.4	44.3
21.375	9.7	45.7
22.125	10.3	48.5
22.875	10.35	48.8
23.625	10.8	50.9
24.375	14.8	69.7
25.125	19.5	91.9
25.875	23.7	111.7
26.625	19.65	92.6
27.375	11.9	56.1
28.125	17.5	82.5
28.875	14.25	67.2
29.626	15.1	71.2
30.376	17.2	81.1
31.126	16.1	75.9
31.876	15.4	72.6
32.626	15.8	74.5
33.376	11.0	51.8
34.126	12.1	57.0
34.876	12.4	58.4
35.626	12.4	58.4
36.376	13.7	64.6
37.126	12.1	57.0
37.876	14.5	68.3
38.626	13.5	63.6
39.376	12.1	57.0
40.126	12.1	57.0
40.876	13.9	65.5
41.626	14.5	68.3
42.376	16.0	75.4

South Transect: 1.0 M		
Distance	Resistance	Apparent Resistivity
1.5	5.8	36.4
2.5	5.8	36.4
3.5	4.5	28.3
4.5	8.1	50.9
5.5	6.5	40.8
6.5	6.0	37.7
7.5	6.2	39.0
8.5	6.0	37.7
9.5	6.7	42.1
10.5	5.4	33.9
11.5	6.65	41.8
12.5	5.6	35.2
13.5	6.3	39.6
14.5	6.4	40.2
15.5	5.1	32.0
16.5	4.3	27.0
17.5	4.7	29.5
18.5	5.5	34.6
19.5	8.7	54.7
20.5	7.3	45.9
21.5	6.9	43.4
22.5	7.4	46.5
23.5	12.55	78.9
24.5	20.2	126.9
25.5	23.0	144.5
26.5	49.0	307.9
27.5	13.8	86.7
28.5	25.2	158.3
29.5	9.1	57.2
30.5	8.9	55.9
31.5	9.75	61.3
32.5	12.15	76.3
33.5	9.85	61.9
34.5	7.4	46.5
35.5	9.4	59.1
36.5	9.3	58.4
37.5	10.75	67.5

South Transect: 1.0 M		
Distance	Resistance	Apparent Resistivity
38.5	9.5	59.7
39.5	7.4	46.5
40.5	8.4	52.8
41.5	6.05	38.0

South Transect: 1.5 m		
Distance	Resistance	Apparent Resistivity
2.25	4.6	43.4
3.75	5.2	49.0
5.25	4.3	40.5
6.75	4.5	42.4
8.25	3.65	34.4
9.75	4.1	38.6
11.25	4.2	39.6
12.75	3.6	33.9
14.25	5.0	47.1
15.75	3.6	33.9
17.25	3.1	29.2
18.75	3.25	30.6
20.25	4.65	43.8
21.75	7.1	66.9
23.25	8.55	80.6
24.75	9.5	89.5
26.25	9.3	87.7
27.75	14.4	135.7
29.25	10.0	94.2
30.75	9.0	84.8
32.25	10.7	100.8
33.75	9.4	88.6
35.25	7.7	72.6
36.75	7.3	68.8
38.25	6.0	56.5
39.75	12.8	120.6
41.25	5.4	50.9

South Transect: 2.0 m		
Distance	Resistance	Apparent Resistivity
3	3.0	37.7
5	2.9	36.4
7	2.65	33.3
9	3.4	42.7
11	2.9	36.4
13	2.9	36.4
15	2.8	35.2
17	3.4	42.7
19	3.0	37.7
21	3.75	47.1
23	4.1	51.5
25	5.7	71.6
27	6.9	86.7
29	7.1	89.2
31	5.8	72.9
33	5.85	73.5
35	5.1	64.1
37	3.8	47.8
39	3.9	49.0

South Transect: 3.0 m		
Distance	Resistance	Apparent Resistivity
4.5	2.3	43.4
7.5	2.55	48.1
10.5	2.4	45.2
13.5	2.6	49.0
16.5	1.9	35.8
19.5	2.1	39.6
22.5	2.85	53.7
25.5	4.8	90.5
28.5	5.8	109.3
31.5	3.4	64.1
34.5	3.9	73.5
37.5	4.0	75.4

APPENDIX B
RAW AREA A ELECTRICAL RESISTIVITY DATA

Line 101		
Distance	Resistance	Apparent Resistivity
0.75	0.1	0.3
1.25	0.1	0.3
1.75	0.1	0.3
2.25	0.1	0.3
2.75	0.15	0.5
3.25	0.1	0.3
3.75	0.4	1.3
4.25	0.55	1.7
4.75	0.7	2.2
5.25	5.1	16.0
5.75	2.1	6.6
6.25	1.6	5.0
6.75	1.7	5.3
7.25	1.7	5.3
7.75	1.4	4.4
8.25	2.35	7.4
8.75	2.1	6.6
9.25	2.3	7.2
9.75	2.2	6.9
10.25	0.1	0.3
10.75	1.35	4.2
11.25	0.9	2.8
11.75	1.15	3.6
12.25	2.5	7.9
12.75	0.1	0.3
13.25	1.9	6.0
13.75	2.8	8.8
14.25	1.9	6.0
14.75	2.45	7.7
15.25	2.2	6.9
15.75	2.85	9.0
16.25	0.9	2.8
16.75	2.3	7.2
17.25	2.2	6.9

Line 101		
Distance	Resistance	Apparent Resistivity
17.75	2.2	6.9
18.25	2.4	7.5
18.75	5.55	17.4
19.25	0.1	0.3
19.75	0.1	0.3
20.25	0.1	0.3
20.75	0.1	0.3
21.25	0.1	0.3
21.75	0.1	0.3
22.25	0.1	0.3
22.75	0.1	0.3
23.25	0.1	0.3
23.75	1.5	4.7
24.25	2.75	8.6
24.75	0.1	0.3
25.25	6.4	20.1
25.75	5.05	15.9
26.25	4.25	13.4
26.75	10.4	32.7
27.25	6.2	19.5
27.75	21.5	67.5
28.25	14.1	44.3
28.75	14.3	44.9
29.25	17.3	54.3
29.75	4.1	12.9
30.25	3.4	10.7
30.75	2.9	9.1
31.25	4.8	15.1
31.75	6.7	21.0
32.25	1.65	5.2
32.75	5.6	17.6
33.25	5.0	15.7
33.75	0.3	0.9
34.25	4.05	12.7

Line 101		
Distance	Resistance	Apparent Resistivity
34.75	2.35	7.4
35.25	5.9	18.5
35.75	4.0	12.6
36.25	5.9	18.5
36.75	0.65	2.0
37.25	1.8	5.7

Line 102		
Distance	Resistance	Apparent Resistivity
0.75	0.1	0.3
1.25	0.9	2.8
1.75	2.0	6.3
2.25	0.1	0.3
2.75	2.8	8.8
3.25	0.7	2.2
3.75	0.1	0.3
4.25	0.1	0.3
4.75	1.0	3.1
5.25	2.9	9.1
5.75	3.7	11.6
6.25	2.85	9.0
6.75	3.1	9.7
7.25	2.9	9.1
7.75	3.35	10.5
8.25	1.0	3.1
8.75	2.45	7.7
9.25	1.8	5.7
9.75	3.1	9.7
10.25	1.4	4.4
10.75	3.5	11.0
11.25	1.45	4.6
11.75	2.9	9.1
12.25	3.4	10.7
12.75	2.55	8.0
13.25	1.5	4.7
13.75	4.1	12.9
14.25	3.2	10.1
14.75	2.2	6.9
15.25	1.7	5.3
15.75	6.9	21.7
16.25	3.7	11.6
16.75	2.3	7.2
17.25	5.7	17.9
17.75	4.0	12.6
18.25	6.2	19.5
18.75	3.9	12.3

Line 102		
Distance	Resistance	Apparent Resistivity
19.25	6.0	18.8
19.75	5.1	16.0
20.25	5.7	17.9
20.75	6.1	19.2
21.25	3.2	10.1
21.75	5.65	17.7
22.25	0.1	0.3
22.75	11.5	36.1
23.25	5.15	16.2
23.75	3.7	11.6
24.25	6.1	19.2
24.75	5.7	17.9
25.25	6.4	20.1
25.75	5.2	16.3
26.25	2.0	6.3
26.75	3.6	11.3
27.25	3.3	10.4
27.75	2.8	8.8
28.25	1.0	3.1
28.75	3.0	9.4
29.25	2.7	8.5
29.75	0.45	1.4
30.25	1.2	3.8
30.75	3.7	11.6
31.25	2.9	9.1
31.75	2.9	9.1
32.25	1.7	5.3
32.75	3.8	11.9
33.25	0.15	0.5
33.75	4.9	15.4
34.25	2.8	8.8
34.75	2.4	7.5
35.25	9.3	29.2
35.75	2.7	8.5
36.25	5.9	18.5
36.75	2.1	6.6
37.25	2.05	6.4

Line 103		
Distance	Resistance	Apparent Resistivity
0.75	1.4	4.4
1.25	0.9	2.8
1.75	0.6	1.9
2.25	0.2	0.6
2.75	0.1	0.3
3.25	1.2	3.8
3.75	6.2	19.5
4.25	0.3	0.9
4.75	1.5	4.7
5.25	1.3	4.1
5.75	6.9	21.7
6.25	1.1	3.5
6.75	3.5	11.0
7.25	2.0	6.3
7.75	3.15	9.9
8.25	2.1	6.6
8.75	1.4	4.4
9.25	2.4	7.5
9.75	2.9	9.1
10.25	0.7	2.2
10.75	2.1	6.6
11.25	1.1	3.5
11.75	2.0	6.3
12.25	2.1	6.6
12.75	0.9	2.8
13.25	1.25	3.9
13.75	2.3	7.2
14.25	2.8	8.8
14.75	2.3	7.2
15.25	1.1	3.5
15.75	2.5	7.9
16.25	4.1	12.9
16.75	0.5	1.6
17.25	2.8	8.8
17.75	1.7	5.3
18.25	3.3	10.4
18.75	2.3	7.2

Line 103		
Distance	Resistance	Apparent Resistivity
19.25	2.2	6.9
19.75	3.35	10.5
20.25	1.7	5.3
20.75	2.6	8.2
21.25	1.7	5.3
21.75	0.1	0.3
22.25	2.5	7.9
22.75	2.2	6.9
23.25	0.5	1.6
23.75	0.1	0.3
24.25	1.8	5.7
24.75	0.3	0.9
25.25	2.4	7.5
25.75	4.0	12.6
26.25	0.65	2.0
26.75	0.1	0.3
27.25	1.5	4.7
27.75	0.15	0.5
28.25	0.7	2.2
28.75	1.2	3.8
29.25	0.1	0.3
29.75	1.3	4.1
30.25	0.45	1.4
30.75	1.4	4.4
31.25	2.1	6.6
31.75	1.2	3.8
32.25	0.95	3.0
32.75	0.1	0.3
33.25	0.15	0.5
33.75	0.1	0.3
34.25	9.2	28.9
34.75	3.4	10.7
35.25	3.6	11.3
35.75	3.1	9.7
36.25	1.9	6.0
36.75	1.9	6.0
37.25	0.1	0.3

Line 104		
Distance	Resistance	Apparent Resistivity
0.75	0.1	0.3
1.25	2.0	6.3
1.75	0.1	0.3
2.25	0.2	0.6
2.75	0.5	1.6
3.25	1.0	3.1
3.75	0.4	1.3
4.25	0.2	0.6
4.75	0.1	0.3
5.25	1.0	3.1
5.75	0.5	1.6
6.25	0.6	1.9
6.75	1.25	3.9
7.25	1.1	3.5
7.75	2.65	8.3
8.25	0.8	2.5
8.75	0.8	2.5
9.25	0.4	1.3
9.75	2.1	6.6
10.25	1.2	3.8
10.75	3.2	10.1
11.25	2.9	9.1
11.75	1.3	4.1
12.25	0.4	1.3
12.75	1.7	5.3
13.25	2.8	8.8
13.75	2.7	8.5
14.25	2.0	6.3
14.75	0.2	0.6
15.25	1.1	3.5
15.75	0.3	0.9
16.25	4.1	12.9
16.75	0.5	1.6
17.25	0.9	2.8
17.75	0.1	0.3
18.25	1.5	4.7
18.75	0.1	0.3

Line 104		
Distance	Resistance	Apparent Resistivity
19.25	0.1	0.3
19.75	0.1	0.3
20.25	0.1	0.3
20.75	0.9	2.8
21.25	0.5	1.6
21.75	0.3	0.9
22.25	0.9	2.8
22.75	0.8	2.5
23.25	0.65	2.0
23.75	0.1	0.3
24.25	0.1	0.3
24.75	0.1	0.3
25.25	0.2	0.6
25.75	0.6	1.9
26.25	0.4	1.3
26.75	0.2	0.6
27.25	0.3	0.9
27.75	0.1	0.3
28.25	0.35	1.1
28.75	0.3	0.9
29.25	0.1	0.3
29.75	0.1	0.3
30.25	0.2	0.6
30.75	0.35	1.1
31.25	1.8	5.7
31.75	0.25	0.8
32.25	0.35	1.1
32.75	0.1	0.3
33.25	0.1	0.3
33.75	0.4	1.3
34.25	3.3	10.4
34.75	12.2	38.3
35.25	2.1	6.6
35.75	3.2	10.1
36.25	0.6	1.9
36.75	1.7	5.3
37.25	0.5	1.6

Line 105		
Distance	Resistance	Apparent Resistivity
0.75	0.1	0.3
1.25	0.3	0.9
1.75	0.1	0.3
2.25	2.0	6.3
2.75	0.4	1.3
3.25	0.3	0.9
3.75	0.25	0.8
4.25	0.2	0.6
4.75	1.7	5.3
5.25	0.1	0.3
5.75	4.5	14.1
6.25	0.8	2.5
6.75	0.2	0.6
7.25	1.0	3.1
7.75	0.1	0.3
8.25	4.75	14.9
8.75	2.1	6.6
9.25	0.9	2.8
9.75	1.8	5.7
10.25	1.4	4.4
10.75	4.7	14.8
11.25	0.1	0.3
11.75	3.0	9.4
12.25	0.2	0.6
12.75	1.8	5.7
13.25	1.9	6.0
13.75	1.3	4.1
14.25	2.6	8.2
14.75	0.4	1.3
15.25	0.1	0.3
15.75	1.65	5.2
16.25	1.85	5.8
16.75	2.35	7.4
17.25	2.8	8.8
17.75	2.1	6.6
18.25	1.4	4.4
18.75	0.1	0.3

Line 105		
Distance	Resistance	Apparent Resistivity
19.25	2.3	7.2
19.75	0.55	1.7
20.25	1.9	6.0
20.75	2.0	6.3
21.25	3.9	12.3
21.75	0.3	0.9
22.25	2.9	9.1
22.75	3.0	9.4
23.25	3.65	11.5
23.75	1.0	3.1
24.25	0.3	0.9
24.75	1.1	3.5
25.25	0.1	0.3
25.75	2.0	6.3
26.25	0.2	0.6
26.75	2.1	6.6
27.25	0.2	0.6
27.75	0.1	0.3
28.25	0.1	0.3
28.75	0.2	0.6
29.25	0.9	2.8
29.75	0.1	0.3
30.25	2.3	7.2
30.75	0.2	0.6
31.25	0.7	2.2
31.75	1.8	5.7
32.25	0.65	2.0
32.75	0.1	0.3
33.25	0.1	0.3
33.75	0.1	0.3
34.25	2.4	7.5
34.75	4.45	14.0
35.25	0.8	2.5
35.75	4.4	13.8
36.25	0.1	0.3
36.75	2.2	6.9
37.25	3.4	10.7

Line 106		
Distance	Resistance	Apparent Resistivity
0.75	0.1	0.3
1.25	0.1	0.3
1.75	0.1	0.3
2.25	0.15	0.5
2.75	0.4	1.3
3.25	0.1	0.3
3.75	0.1	0.3
4.25	0.1	0.3
4.75	0.1	0.3
5.25	0.1	0.3
5.75	0.2	0.6
6.25	0.1	0.3
6.75	1.0	3.1
7.25	0.1	0.3
7.75	0.1	0.3
8.25	0.1	0.3
8.75	0.9	2.8
9.25	0.1	0.3
9.75	0.55	1.7
10.25	0.1	0.3
10.75	0.1	0.3
11.25	0.6	1.9
11.75	0.1	0.3
12.25	0.4	1.3
12.75	0.1	0.3
13.25	0.1	0.3
13.75	0.4	1.3
14.25	1.1	3.5
14.75	0.15	0.5
15.25	0.1	0.3
15.75	1.2	3.8
16.25	0.2	0.6
16.75	0.1	0.3
17.25	0.5	1.6
17.75	0.1	0.3
18.25	0.7	2.2
18.75	0.3	0.9

Line 106		
Distance	Resistance	Apparent Resistivity
19.25	1.1	3.5
19.75	0.2	0.6
20.25	0.2	0.6
20.75	0.25	0.8
21.25	0.1	0.3
21.75	0.4	1.3
22.25	2.3	7.2
22.75	0.2	0.6
23.25	2.5	7.9
23.75	1.2	3.8
24.25	0.8	2.5
24.75	0.4	1.3
25.25	0.65	2.0
25.75	0.3	0.9
26.25	0.1	0.3
26.75	0.1	0.3
27.25	1.8	5.7
27.75	0.4	1.3
28.25	1.1	3.5
28.75	0.7	2.2
29.25	0.4	1.3
29.75	0.1	0.3
30.25	0.6	1.9
30.75	0.1	0.3
31.25	0.3	0.9
31.75	0.2	0.6
32.25	0.2	0.6
32.75	0.4	1.3
33.25	0.3	0.9
33.75	0.35	1.1
34.25	0.1	0.3
34.75	1.4	4.4
35.25	0.1	0.3
35.75	2.7	8.5
36.25	0.5	1.6
36.75	2.8	8.8
37.25	2.6	8.2

Line 107		
Distance	Resistance	Apparent Resistivity
0.75	0.1	0.3
1.25	0.5	1.6
1.75	0.5	1.6
2.25	0.6	1.9
2.75	1.6	5.0
3.25	1.4	4.4
3.75	0.1	0.3
4.25	0.5	1.6
4.75	0.3	0.9
5.25	0.4	1.3
5.75	0.3	0.9
6.25	0.4	1.3
6.75	0.4	1.3
7.25	0.5	1.6
7.75	0.8	2.5
8.25	0.1	0.3
8.75	0.5	1.6
9.25	0.5	1.6
9.75	0.4	1.3
10.25	0.5	1.6
10.75	0.3	0.9
11.25	0.1	0.3
11.75	0.1	0.3
12.25	0.6	1.9
12.75	0.7	2.2
13.25	0.2	0.6
13.75	0.5	1.6
14.25	0.8	2.5
14.75	2.1	6.6
15.25	0.4	1.3
15.75	0.2	0.6
16.25	0.2	0.6
16.75	0.1	0.3
17.25	0.4	1.3
17.75	2.5	7.9
18.25	1.8	5.7
18.75	0.4	1.3

Line 107		
Distance	Resistance	Apparent Resistivity
19.25	2.9	9.1
19.75	0.3	0.9
20.25	0.5	1.6
20.75	0.1	0.3
21.25	3.1	9.7
21.75	0.8	2.5
22.25	0.4	1.3
22.75	0.1	0.3
23.25	0.3	0.9
23.75	5.4	17.0
24.25	0.3	0.9
24.75	0.2	0.6
25.25	0.15	0.5
25.75	1.1	3.5
26.25	0.3	0.9
26.75	0.5	1.6
27.25	0.15	0.5
27.75	0.5	1.6
28.25	0.1	0.3
28.75	0.4	1.3
29.25	0.55	1.7
29.75	1.0	3.1
30.25	1.0	3.1
30.75	0.1	0.3
31.25	0.4	1.3
31.75	0.1	0.3
32.25	0.1	0.3
32.75	0.15	0.5
33.25	0.5	1.6
33.75	0.5	1.6
34.25	0.1	0.3
34.75	0.3	0.9
35.25	0.2	0.6
35.75	1.35	4.2
36.25	4.5	14.1
36.75	2.6	8.2
37.25	2.7	8.5

Line 108		
Distance	Resistance	Apparent Resistivity
0.75	0.6	1.9
1.25	0.4	1.3
1.75	0.6	1.9
2.25	0.1	0.3
2.75	0.4	1.3
3.25	0.5	1.6
3.75	0.7	2.2
4.25	0.3	0.9
4.75	0.8	2.5
5.25	0.3	0.9
5.75	1.2	3.8
6.25	1.1	3.5
6.75	1.1	3.5
7.25	0.5	1.6
7.75	0.9	2.8
8.25	0.1	0.3
8.75	0.5	1.6
9.25	2.4	7.5
9.75	0.55	1.7
10.25	1.9	6.0
10.75	0.15	0.5
11.25	0.3	0.9
11.75	0.7	2.2
12.25	0.3	0.9
12.75	0.4	1.3
13.25	0.85	2.7
13.75	0.8	2.5
14.25	0.35	1.1
14.75	0.5	1.6
15.25	0.2	0.6
15.75	2.0	6.3
16.25	5.9	18.5
16.75	0.1	0.3
17.25	0.1	0.3
17.75	2.7	8.5
18.25	0.1	0.3
18.75	0.1	0.3

Line 108		
Distance	Resistance	Apparent Resistivity
19.25	1.35	4.2
19.75	0.1	0.3
20.25	0.1	0.3
20.75	0.1	0.3
21.25	0.1	0.3
21.75	0.1	0.3
22.25	0.1	0.3
22.75	0.1	0.3
23.25	0.5	1.6
23.75	0.5	1.6
24.25	0.4	1.3
24.75	0.6	1.9
25.25	0.2	0.6
25.75	0.2	0.6
26.25	0.5	1.6
26.75	0.2	0.6
27.25	0.3	0.9
27.75	0.1	0.3
28.25	0.1	0.3
28.75	0.4	1.3
29.25	0.5	1.6
29.75	0.15	0.5
30.25	0.2	0.6
30.75	0.1	0.3
31.25	1.1	3.5
31.75	0.4	1.3
32.25	0.15	0.5
32.75	0.35	1.1
33.25	0.1	0.3
33.75	1.0	3.1
34.25	1.3	4.1
34.75	0.7	2.2
35.25	1.3	4.1
35.75	1.7	5.3
36.25	0.4	1.3
36.75	0.8	2.5
37.25	2.8	8.8

Line 109		
Distance	Resistance	Apparent Resistivity
0.75	0.1	0.3
1.25	5.15	16.2
1.75	0.8	2.5
2.25	1.5	4.7
2.75	0.7	2.2
3.25	0.1	0.3
3.75	0.35	1.1
4.25	1.2	3.8
4.75	0.75	2.4
5.25	1.35	4.2
5.75	0.9	2.8
6.25	0.8	2.5
6.75	0.3	0.9
7.25	0.6	1.9
7.75	2.6	8.2
8.25	6.0	18.8
8.75	0.35	1.1
9.25	3.5	11.0
9.75	0.7	2.2
10.25	4.4	13.8
10.75	0.1	0.3
11.25	4.65	14.6
11.75	1.8	5.7
12.25	0.5	1.6
12.75	1.65	5.2
13.25	0.6	1.9
13.75	4.3	13.5
14.25	0.3	0.9
14.75	2.6	8.2
15.25	2.2	6.9
15.75	2.1	6.6
16.25	3.2	10.1
16.75	8.7	27.3
17.25	0.2	0.6
17.75	0.8	2.5
18.25	3.2	10.1
18.75	0.5	1.6

Line 109		
Distance	Resistance	Apparent Resistivity
19.25	5.5	17.3
19.75	0.2	0.6
20.25	1.1	3.5
20.75	2.95	9.3
21.25	0.2	0.6
21.75	1.1	3.5
22.25	1.3	4.1
22.75	3.9	12.3
23.25	0.1	0.3
23.75	0.5	1.6
24.25	0.5	1.6
24.75	0.4	1.3
25.25	0.2	0.6
25.75	1.7	5.3
26.25	0.5	1.6
26.75	0.1	0.3
27.25	2.1	6.6
27.75	0.1	0.3
28.25	1.9	6.0
28.75	0.65	2.0
29.25	0.4	1.3
29.75	3.7	11.6
30.25	0.4	1.3
30.75	3.3	10.4
31.25	1.4	4.4
31.75	0.2	0.6
32.25	0.3	0.9
32.75	0.4	1.3
33.25	4.4	13.8
33.75	0.5	1.6
34.25	0.5	1.6
34.75	2.7	8.5
35.25	3.4	10.7
35.75	4.0	12.6
36.25	6.5	20.4
36.75	0.7	2.2
37.25	1.7	5.3

Line 110		
Distance	Resistance	Apparent Resistivity
0.75	0.7	2.2
1.25	0.2	0.6
1.75	0.5	1.6
2.25	0.8	2.5
2.75	0.2	0.6
3.25	0.1	0.3
3.75	0.5	1.6
4.25	0.1	0.3
4.75	0.7	2.2
5.25	1.0	3.1
5.75	0.2	0.6
6.25	2.0	6.3
6.75	0.5	1.6
7.25	0.5	1.6
7.75	0.55	1.7
8.25	0.2	0.6
8.75	0.5	1.6
9.25	0.1	0.3
9.75	1.65	5.2
10.25	0.2	0.6
10.75	3.2	10.1
11.25	0.7	2.2
11.75	1.0	3.1
12.25	1.1	3.5
12.75	0.2	0.6
13.25	0.1	0.3
13.75	2.5	7.9
14.25	0.6	1.9
14.75	0.4	1.3
15.25	1.0	3.1
15.75	0.1	0.3
16.25	1.8	5.7
16.75	0.3	0.9
17.25	0.6	1.9
17.75	0.8	2.5
18.25	0.1	0.3
18.75	6.2	19.5

Line 110		
Distance	Resistance	Apparent Resistivity
19.25	2.6	8.2
19.75	0.4	1.3
20.25	1.5	4.7
20.75	0.2	0.6
21.25	0.4	1.3
21.75	0.65	2.0
22.25	0.4	1.3
22.75	0.8	2.5
23.25	0.1	0.3
23.75	0.4	1.3
24.25	0.5	1.6
24.75	1	3.1
25.25	0.7	2.2
25.75	0.7	2.2
26.25	0.45	1.4
26.75	1.8	5.7
27.25	0.2	0.6
27.75	0.2	0.6
28.25	0.6	1.9
28.75	0.3	0.9
29.25	0.1	0.3
29.75	2.7	8.5
30.25	0.55	1.7
30.75	2.2	6.9
31.25	1.7	5.3
31.75	0.5	1.6
32.25	2	6.3
32.75	0.6	1.9
33.25	1	3.1
33.75	0.2	0.6
34.25	0.9	2.8
34.75	2.7	8.5
35.25	0.4	1.3
35.75	3.7	11.6
36.25	0.7	2.2
36.75	2.4	7.5
37.25	0.8	2.5

Line 111		
Distance	Resistance	Apparent Resistivity
0.75	0.8	2.5
1.25	2.0	6.3
1.75	0.7	2.2
2.25	0.8	2.5
2.75	0.4	1.3
3.25	0.2	0.6
3.75	0.6	1.9
4.25	0.8	2.5
4.75	0.7	2.2
5.25	0.8	2.5
5.75	0.5	1.6
6.25	0.7	2.2
6.75	1.1	3.5
7.25	0.85	2.7
7.75	1.4	4.4
8.25	0.6	1.9
8.75	1.15	3.6
9.25	1.1	3.5
9.75	1.55	4.9
10.25	0.4	1.3
10.75	0.1	0.3
11.25	0.2	0.6
11.75	0.9	2.8
12.25	0.9	2.8
12.75	1.0	3.1
13.25	0.9	2.8
13.75	0.4	1.3
14.25	0.8	2.5
14.75	0.2	0.6
15.25	0.3	0.9
15.75	0.5	1.6
16.25	0.5	1.6
16.75	0.1	0.3
17.25	0.15	0.5
17.75	2.0	6.3
18.25	1.0	3.1
18.75	0.8	2.5

Line 111		
Distance	Resistance	Apparent Resistivity
19.25	0.3	0.9
19.75	1.5	4.7
20.25	0.8	2.5
20.75	0.9	2.8
21.25	0.7	2.2
21.75	0.1	0.3
22.25	0.5	1.6
22.75	0.8	2.5
23.25	0.3	0.9
23.75	0.5	1.6
24.25	0.1	0.3
24.75	2.6	8.2
25.25	0.2	0.6
25.75	0.4	1.3
26.25	0.8	2.5
26.75	0.5	1.6
27.25	0.3	0.9
27.75	0.35	1.1
28.25	0.7	2.2
28.75	2.1	6.6
29.25	0.4	1.3
29.75	1.7	5.3
30.25	1.2	3.8
30.75	0.3	0.9
31.25	0.1	0.3
31.75	0.5	1.6
32.25	0.2	0.6
32.75	3.1	9.7
33.25	0.2	0.6
33.75	0.5	1.6
34.25	0.2	0.6
34.75	0.5	1.6
35.25	0.4	1.3
35.75	0.8	2.5
36.25	2.0	6.3
36.75	0.2	0.6
37.25	2.8	8.8

Line 112		
Distance	Resistance	Apparent Resistivity
0.75	0.15	0.5
1.25	0.8	2.5
1.75	0.1	0.3
2.25	0.4	1.3
2.75	0.65	2.0
3.25	0.1	0.3
3.75	0.3	0.9
4.25	0.3	0.9
4.75	0.5	1.6
5.25	0.3	0.9
5.75	0.7	2.2
6.25	0.3	0.9
6.75	0.3	0.9
7.25	0.3	0.9
7.75	0.6	1.9
8.25	1.1	3.5
8.75	1.4	4.4
9.25	0.1	0.3
9.75	0.2	0.6
10.25	0.7	2.2
10.75	0.55	1.7
11.25	0.4	1.3
11.75	0.1	0.3
12.25	0.8	2.5
12.75	0.9	2.8
13.25	0.1	0.3
13.75	0.7	2.2
14.25	0.5	1.6
14.75	0.1	0.3
15.25	0.8	2.5
15.75	5.4	17.0
16.25	2.6	8.2
16.75	0.7	2.2
17.25	0.6	1.9
17.75	1.5	4.7
18.25	0.4	1.3
18.75	0.8	2.5

Line 112		
Distance	Resistance	Apparent Resistivity
19.25	0.8	2.5
19.75	1.35	4.2
20.25	0.55	1.7
20.75	1.4	4.4
21.25	0.2	0.6
21.75	0.9	2.8
22.25	0.1	0.3
22.75	1	3.1
23.25	0.5	1.6
23.75	0.5	1.6
24.25	3.9	12.3
24.75	0.3	0.9
25.25	0.85	2.7
25.75	0.2	0.6
26.25	1.1	3.5
26.75	0.3	0.9
27.25	1.1	3.5
27.75	1.1	3.5
28.25	0.55	1.7
28.75	1.35	4.2
29.25	0.7	2.2
29.75	0.9	2.8
30.25	0.35	1.1
30.75	0.2	0.6
31.25	1.3	4.1
31.75	0.3	0.9
32.25	0.25	0.8
32.75	0.3	0.9
33.25	0.2	0.6
33.75	0.3	0.9
34.25	0.9	2.8
34.75	0.9	2.8
35.25	0.2	0.6
35.75	0.8	2.5
36.25	1.4	4.4
36.75	1.2	3.8
37.25	0.2	0.6

Line 113		
Distance	Resistance	Apparent Resistivity
0.75	0.4	1.3
1.25	3.5	11.0
1.75	0.9	2.8
2.25	6.2	19.5
2.75	0.55	1.7
3.25	0.3	0.9
3.75	0.4	1.3
4.25	0.65	2.0
4.75	0.55	1.7
5.25	0.1	0.3
5.75	0.1	0.3
6.25	1.9	6.0
6.75	0.4	1.3
7.25	0.5	1.6
7.75	0.1	0.3
8.25	2.1	6.6
8.75	0.3	0.9
9.25	0.5	1.6
9.75	0.3	0.9
10.25	1.3	4.1
10.75	0.1	0.3
11.25	0.5	1.6
11.75	0.2	0.6
12.25	0.5	1.6
12.75	2.1	6.6
13.25	0.25	0.8
13.75	5.1	16.0
14.25	0.6	1.9
14.75	5.5	17.3
15.25	0.2	0.6
15.75	0.8	2.5
16.25	0.1	0.3
16.75	0.3	0.9
17.25	0.5	1.6
17.75	0.4	1.3
18.25	0.9	2.8
18.75	0.4	1.3

Line 113		
Distance	Resistance	Apparent Resistivity
19.25	0.25	0.8
19.75	0.6	1.9
20.25	0.4	1.3
20.75	0.6	1.9
21.25	0.25	0.8
21.75	0.5	1.6
22.25	0.3	0.9
22.75	0.1	0.3
23.25	0.3	0.9
23.75	1.1	3.5
24.25	1.7	5.3
24.75	0.6	1.9
25.25	2.4	7.5
25.75	0.2	0.6
26.25	0.15	0.5
26.75	0.5	1.6
27.25	0.35	1.1
27.75	0.4	1.3
28.25	0.65	2.0
28.75	0.4	1.3
29.25	0.3	0.9
29.75	0.4	1.3
30.25	0.25	0.8
30.75	0.3	0.9
31.25	0.3	0.9
31.75	0.1	0.3
32.25	0.1	0.3
32.75	0.15	0.5
33.25	0.1	0.3
33.75	0.1	0.3
34.25	0.8	2.5
34.75	0.3	0.9
35.25	0.6	1.9
35.75	6.0	18.8
36.25	3.5	11.0
36.75	0.35	1.1
37.25	0.3	0.9

Line 114		
Distance	Resistance	Apparent Resistivity
0.75	0.2	0.6
1.25	0.1	0.3
1.75	0.1	0.3
2.25	0.2	0.6
2.75	0.9	2.8
3.25	0.1	0.3
3.75	0.6	1.9
4.25	0.65	2.0
4.75	0.5	1.6
5.25	0.7	2.2
5.75	0.7	2.2
6.25	0.35	1.1
6.75	1.1	3.5
7.25	0.5	1.6
7.75	1.25	3.9
8.25	0.4	1.3
8.75	0.1	0.3
9.25	0.2	0.6
9.75	0.2	0.6
10.25	0.5	1.6
10.75	0.5	1.6
11.25	0.5	1.6
11.75	0.6	1.9
12.25	0.2	0.6
12.75	0.4	1.3
13.25	0.1	0.3
13.75	0.4	1.3
14.25	0.3	0.9
14.75	0.2	0.6
15.25	0.1	0.3
15.75	0.6	1.9
16.25	0.1	0.3
16.75	0.7	2.2
17.25	0.4	1.3
17.75	0.5	1.6
18.25	0.2	0.6
18.75	0.5	1.6

Line 114		
Distance	Resistance	Apparent Resistivity
19.25	0.3	0.9
19.75	0.65	2.0
20.25	0.2	0.6
20.75	0.3	0.9
21.25	0.1	0.3
21.75	0.3	0.9
22.25	0.2	0.6
22.75	0.3	0.9
23.25	0.7	2.2
23.75	0.1	0.3
24.25	1.3	4.1
24.75	0.4	1.3
25.25	0.7	2.2
25.75	0.8	2.5
26.25	0.2	0.6
26.75	0.65	2.0
27.25	0.1	0.3
27.75	0.5	1.6
28.25	0.1	0.3
28.75	0.8	2.5
29.25	0.1	0.3
29.75	1.0	3.1
30.25	0.2	0.6
30.75	0.5	1.6
31.25	0.1	0.3
31.75	0.4	1.3
32.25	0.2	0.6
32.75	0.1	0.3
33.25	0.4	1.3
33.75	0.2	0.6
34.25	0.4	1.3
34.75	0.8	2.5
35.25	0.5	1.6
35.75	0.8	2.5
36.25	0.7	2.2
36.75	1.1	3.5
37.25	0.7	2.2

Line 115		
Distance	Resistance	Apparent Resistivity
0.75	0.5	1.6
1.25	0.8	2.5
1.75	0.4	1.3
2.25	0.5	1.6
2.75	2.7	8.5
3.25	0.4	1.3
3.75	2.9	9.1
4.25	0.4	1.3
4.75	2.0	6.3
5.25	0.6	1.9
5.75	0.1	0.3
6.25	0.1	0.3
6.75	0.1	0.3
7.25	0.9	2.8
7.75	0.8	2.5
8.25	2.8	8.8
8.75	0.3	0.9
9.25	0.55	1.7
9.75	3.1	9.7
10.25	0.4	1.3
10.75	0.1	0.3
11.25	0.5	1.6
11.75	0.45	1.4
12.25	0.4	1.3
12.75	0.45	1.4
13.25	0.9	2.8
13.75	0.3	0.9
14.25	0.7	2.2
14.75	1.8	5.7
15.25	0.4	1.3
15.75	0.5	1.6
16.25	0.4	1.3
16.75	0.4	1.3
17.25	0.3	0.9
17.75	0.1	0.3
18.25	0.65	2.0
18.75	0.5	1.6

Line 115		
Distance	Resistance	Apparent Resistivity
19.25	0.6	1.9
19.75	0.2	0.6
20.25	0.7	2.2
20.75	0.3	0.9
21.25	0.7	2.2
21.75	0.5	1.6
22.25	0.1	0.3
22.75	0.6	1.9
23.25	0.8	2.5
23.75	1.2	3.8
24.25	0.7	2.2
24.75	0.4	1.3
25.25	0.9	2.8
25.75	0.15	0.5
26.25	0.5	1.6
26.75	0.5	1.6
27.25	1.0	3.1
27.75	0.85	2.7
28.25	1.3	4.1
28.75	0.5	1.6
29.25	0.1	0.3
29.75	0.1	0.3
30.25	0.3	0.9
30.75	0.1	0.3
31.25	0.8	2.5
31.75	0.1	0.3
32.25	0.3	0.9
32.75	0.9	2.8
33.25	0.3	0.9
33.75	0.6	1.9
34.25	0.2	0.6
34.75	0.4	1.3
35.25	0.8	2.5
35.75	0.3	0.9
36.25	2.8	8.8
36.75	0.3	0.9
37.25	0.7	2.2

Line 116		
Distance	Resistance	Apparent Resistivity
0.75	7.2	22.6
1.25	0.3	0.9
1.75	1.9	6.0
2.25	1.7	5.3
2.75	0.2	0.6
3.25	0.8	2.5
3.75	0.4	1.3
4.25	0.3	0.9
4.75	0.3	0.8
5.25	0.8	2.5
5.75	0.5	1.6
6.25	0.4	1.3
6.75	0.25	0.8
7.25	0.3	0.9
7.75	0.25	0.8
8.25	0.1	0.3
8.75	0.35	1.1
9.25	3.2	10.1
9.75	0.5	1.6
10.25	0.2	0.6
10.75	0.1	0.3
11.25	0.3	0.9
11.75	1.0	3.1
12.25	0.4	1.3
12.75	0.25	0.8
13.25	0.1	0.3
13.75	0.4	1.3
14.25	0.1	0.3
14.75	0.25	0.8
15.25	2.1	6.6
15.75	0.3	0.9
16.25	0.1	0.3
16.75	0.2	0.6
17.25	0.3	0.9
17.75	0.1	0.3
18.25	1.7	5.3
18.75	0.2	0.6

Line 116		
Distance	Resistance	Apparent Resistivity
19.25	0.1	0.3
19.75	0.2	0.6
20.25	0.1	0.3
20.75	0.7	2.2
21.25	0.4	1.3
21.75	0.25	0.8
22.25	0.1	0.3
22.75	0.1	0.3
23.25	0.4	1.3
23.75	0.7	2.2
24.25	0.7	2.2
24.75	0.6	1.9
25.25	0.2	0.6
25.75	0.4	1.3
26.25	0.2	0.6
26.75	0.1	0.3
27.25	0.2	0.6
27.75	0.2	0.6
28.25	0.2	0.6
28.75	0.1	0.3
29.25	0.35	1.1
29.75	0.1	0.3
30.25	0.4	1.3
30.75	0.4	1.3
31.25	0.4	1.3
31.75	0.2	0.6
32.25	0.1	0.3
32.75	0.2	0.6
33.25	0.7	2.2
33.75	0.5	1.6
34.25	0.3	0.9
34.75	0.1	0.3
35.25	0.35	1.1
35.75	0.1	0.3
36.25	0.2	0.6
36.75	0.1	0.3
37.25	0.3	0.9

Line 117		
Distance	Resistance	Apparent Resistivity
0.75	0.8	2.5
1.25	0.8	2.5
1.75	1.8	5.7
2.25	2.6	8.2
2.75	1.0	3.1
3.25	0.1	0.3
3.75	5.2	16.3
4.25	0.8	2.5
4.75	1.9	6.0
5.25	0.2	0.6
5.75	2.4	7.5
6.25	0.1	0.3
6.75	0.3	0.9
7.25	0.1	0.3
7.75	0.4	1.3
8.25	1.3	4.1
8.75	0.8	2.5
9.25	1.8	5.7
9.75	0.2	0.6
10.25	2.2	6.9
10.75	0.1	0.3
11.25	3.1	9.7
11.75	0.2	0.6
12.25	1.5	4.7
12.75	0.8	2.5
13.25	16.1	50.6
13.75	0.1	0.3
14.25	2.0	6.3
14.75	7.2	22.6
15.25	0.6	1.9
15.75	0.4	1.3
16.25	1.0	3.1
16.75	0.6	1.9
17.25	0.8	2.5
17.75	2.3	7.2
18.25	0.7	2.2
18.75	0.8	2.5

Line 117		
Distance	Resistance	Apparent Resistivity
19.25	1.5	4.7
19.75	0.6	1.9
20.25	5.8	18.2
20.75	0.8	2.5
21.25	0.6	1.9
21.75	4.1	12.9
22.25	0.3	0.9
22.75	0.9	2.8
23.25	0.8	2.5
23.75	0.6	1.9
24.25	0.1	0.3
24.75	1.4	4.4
25.25	0.6	1.9
25.75	0.5	1.6
26.25	0.5	1.6
26.75	0.6	1.9
27.25	0.4	1.3
27.75	0.6	1.9
28.25	0.1	0.3
28.75	1.0	3.1
29.25	1.9	6.0
29.75	0.2	0.6
30.25	0.5	1.6
30.75	0.5	1.6
31.25	0.4	1.3
31.75	0.4	1.3
32.25	0.2	0.6
32.75	0.3	0.9
33.25	0.3	0.9
33.75	1.7	5.3
34.25	0.7	2.2
34.75	1.8	5.7
35.25	1.5	4.7
35.75	2.0	6.3
36.25	0.4	1.3
36.75	2.0	6.3
37.25	0.3	0.9

Line 118		
Distance	Resistance	Apparent Resistivity
0.75	2.2	6.9
1.25	0.3	0.9
1.75	2.1	6.6
2.25	8.2	25.8
2.75	1.2	3.8
3.25	7.3	22.9
3.75	0.5	1.6
4.25	1.9	6.0
4.75	10.6	33.3
5.25	0.3	0.9
5.75	2.0	6.3
6.25	4.2	13.2
6.75	0.2	0.6
7.25	5.8	18.2
7.75	1.0	3.1
8.25	1.2	3.8
8.75	1.4	4.4
9.25	0.6	1.9
9.75	2.3	7.2
10.25	0.6	1.9
10.75	8.6	27.0
11.25	1.3	4.1
11.75	15.9	50.0
12.25	0.6	1.9
12.75	0.8	2.5
13.25	0.2	0.6
13.75	0.6	1.9
14.25	0.8	2.5
14.75	0.9	2.8
15.25	1.5	4.7
15.75	1.0	3.1
16.25	3.1	9.7
16.75	1.3	4.1
17.25	2.4	7.5
17.75	0.1	0.3
18.25	2.8	8.8
18.75	0.2	0.6

Line 118		
Distance	Resistance	Apparent Resistivity
19.25	5.7	17.9
19.75	0.2	0.6
20.25	0.6	1.9
20.75	0.6	1.9
21.25	0.4	1.3
21.75	0.5	1.6
22.25	0.3	0.9
22.75	0.9	2.8
23.25	0.3	0.9
23.75	0.9	2.8
24.25	0.8	2.5
24.75	2.0	6.3
25.25	0.7	2.2
25.75	0.7	2.2
26.25	3.0	9.4
26.75	0.8	2.5
27.25	0.5	1.6
27.75	1.2	3.8
28.25	0.1	0.3
28.75	2.2	6.9
29.25	0.5	1.6
29.75	0.45	1.4
30.25	0.5	1.6
30.75	0.6	1.9
31.25	1.4	4.4
31.75	0.1	0.3
32.25	0.5	1.6
32.75	0.9	2.8
33.25	0.6	1.9
33.75	0.8	2.5
34.25	0.3	0.9
34.75	0.2	0.6
35.25	3.0	9.4
35.75	0.2	0.6
36.25	0.8	2.5
36.75	1.4	4.4
37.25	0.8	2.5

Line 119		
Distance	Resistance	Apparent Resistivity
0.75	0.7	2.2
1.25	1.1	3.5
1.75	1.4	4.4
2.25	2.5	7.9
2.75	7.2	22.6
3.25	0.1	0.3
3.75	0.8	2.5
4.25	1.4	4.4
4.75	0.7	2.2
5.25	0.4	1.3
5.75	0.4	1.3
6.25	0.8	2.5
6.75	0.7	2.2
7.25	1.9	6.0
7.75	0.9	2.8
8.25	0.7	2.2
8.75	1.0	3.1
9.25	0.3	0.9
9.75	1.0	3.1
10.25	1.0	3.1
10.75	0.6	1.9
11.25	1.4	4.4
11.75	0.3	0.9
12.25	0.8	2.5
12.75	0.8	2.5
13.25	0.4	1.3
13.75	0.4	1.3
14.25	0.3	0.9
14.75	0.3	0.9
15.25	0.5	1.6
15.75	0.4	1.3
16.25	0.2	0.6
16.75	1.2	3.8
17.25	0.4	1.3
17.75	0.3	0.9
18.25	0.1	0.3
18.75	0.3	0.9

Line 119		
Distance	Resistance	Apparent Resistivity
19.25	0.5	1.6
19.75	0.6	1.9
20.25	0.9	2.8
20.75	0.6	1.9
21.25	0.6	1.9
21.75	0.1	0.3
22.25	0.7	2.2
22.75	0.9	2.8
23.25	0.8	2.5
23.75	0.2	0.6
24.25	0.8	2.5
24.75	0.4	1.3
25.25	0.1	0.3
25.75	1.0	3.1
26.25	0.6	1.9
26.75	0.7	2.2
27.25	0.5	1.6
27.75	0.6	1.9
28.25	0.4	1.3
28.75	0.3	0.9
29.25	0.8	2.5
29.75	0.8	2.5
30.25	1.0	3.1
30.75	6.6	20.7
31.25	0.9	2.8
31.75	0.6	1.9
32.25	0.4	1.3
32.75	0.7	2.2
33.25	0.3	0.9
33.75	0.5	1.6
34.25	0.4	1.3
34.75	0.2	0.6
35.25	0.5	1.6
35.75	1.8	5.7
36.25	0.5	1.6
36.75	0.4	1.3
37.25	0.7	2.2

Line 120		
Distance	Resistance	Apparent Resistivity
0.75	0.8	2.5
1.25	0.8	2.5
1.75	0.5	1.6
2.25	0.3	0.9
2.75	0.7	2.2
3.25	2.8	8.8
3.75	1.0	3.1
4.25	0.5	1.6
4.75	0.7	2.2
5.25	2.2	6.9
5.75	0.6	1.9
6.25	0.2	0.6
6.75	0.6	1.9
7.25	0.7	2.2
7.75	0.7	2.2
8.25	2.2	6.9
8.75	0.6	1.9
9.25	0.6	1.9
9.75	0.6	1.9
10.25	0.9	2.8
10.75	1.0	3.1
11.25	1.3	4.1
11.75	0.6	1.9
12.25	0.8	2.5
12.75	0.3	0.9
13.25	0.4	1.3
13.75	0.5	1.6
14.25	0.8	2.5
14.75	1.6	5.0
15.25	3.8	11.9
15.75	0.3	0.9
16.25	0.5	1.6
16.75	4.6	14.5
17.25	0.4	1.3
17.75	0.8	2.5
18.25	1.4	4.4
18.75	0.5	1.6

Line 120		
Distance	Resistance	Apparent Resistivity
19.25	0.7	2.2
19.75	0.6	1.9
20.25	4.0	12.6
20.75	0.4	1.3
21.25	1.3	4.1
21.75	3.1	9.7
22.25	0.6	1.9
22.75	0.4	1.3
23.25	0.8	2.5
23.75	0.7	2.2
24.25	0.5	1.6
24.75	1.4	4.4
25.25	1.7	5.3
25.75	1.5	4.7
26.25	1.5	4.7
26.75	0.8	2.5
27.25	1.7	5.3
27.75	0.3	0.9
28.25	0.3	0.9
28.75	0.8	2.5
29.25	0.8	2.5
29.75	0.3	0.9
30.25	0.4	1.3
30.75	0.4	1.3
31.25	0.7	2.2
31.75	1.2	3.8
32.25	0.7	2.2
32.75	0.8	2.5
33.25	0.6	1.9
33.75	0.5	1.6
34.25	0.8	2.5
34.75	0.4	1.3
35.25	0.9	2.8
35.75	1.4	4.4
36.25	0.6	1.9
36.75	1.2	3.8
37.25	0.7	2.2

Line 121		
Distance	Resistance	Apparent Resistivity
0.75	6.8	21.4
1.25	1.3	4.1
1.75	2.8	8.8
2.25	0.2	0.6
2.75	0.7	2.2
3.25	2.8	8.8
3.75	0.8	2.5
4.25	0.65	2.0
4.75	0.3	0.9
5.25	0.5	1.6
5.75	0.8	2.5
6.25	1.7	5.3
6.75	0.6	1.9
7.25	0.4	1.3
7.75	0.2	0.6
8.25	0.6	1.9
8.75	0.6	1.9
9.25	1.0	3.1
9.75	0.5	1.6
10.25	1.1	3.5
10.75	0.5	1.6
11.25	1.7	5.3
11.75	0.6	1.9
12.25	3.6	11.3
12.75	0.2	0.6
13.25	0.2	0.6
13.75	0.5	1.6
14.25	5.0	15.7
14.75	0.5	1.6
15.25	0.5	1.6
15.75	0.3	0.9
16.25	0.7	2.2
16.75	0.6	1.9
17.25	0.5	1.6
17.75	0.7	2.2
18.25	0.5	1.6
18.75	2.2	6.9

Line 121		
Distance	Resistance	Apparent Resistivity
19.25	0.65	2.0
19.75	0.4	1.3
20.25	1.0	3.1
20.75	1.9	6.0
21.25	1.1	3.5
21.75	7.6	23.9
22.25	0.4	1.3
22.75	0.8	2.5
23.25	0.7	2.2
23.75	0.8	2.5
24.25	1.0	3.1
24.75	1.1	3.5
25.25	1.3	4.1
25.75	0.7	2.2
26.25	0.3	0.9
26.75	0.3	0.9
27.25	0.35	1.1
27.75	0.5	1.6
28.25	0.5	1.6
28.75	0.4	1.3
29.25	0.5	1.6
29.75	0.4	1.3
30.25	1.6	5.0
30.75	0.3	0.9
31.25	0.2	0.6
31.75	0.3	0.9
32.25	0.4	1.3
32.75	1.9	6.0
33.25	0.35	1.1
33.75	0.4	1.3
34.25	0.7	2.2
34.75	0.4	1.3
35.25	0.4	1.3
35.75	0.2	0.6
36.25	0.5	1.6
36.75	0.5	1.6
37.25	0.5	1.6

Line 122		
Distance	Resistance	Apparent Resistivity
0.75	0.7	2.2
1.25	0.7	2.2
1.75	1.4	4.4
2.25	0.2	0.6
2.75	1.4	4.4
3.25	0.7	2.2
3.75	0.7	2.2
4.25	0.5	1.6
4.75	1.1	3.5
5.25	0.6	1.9
5.75	2.7	8.5
6.25	0.8	2.5
6.75	0.4	1.3
7.25	0.5	1.6
7.75	0.5	1.6
8.25	0.5	1.6
8.75	0.1	0.3
9.25	0.7	2.2
9.75	0.4	1.3
10.25	0.8	2.5
10.75	0.65	2.0
11.25	0.4	1.3
11.75	0.80	2.5
12.25	0.9	2.8
12.75	0.8	2.5
13.25	2.1	6.6
13.75	1.6	5.0
14.25	0.7	2.2
14.75	0.5	1.6
15.25	0.4	1.3
15.75	3.0	9.4
16.25	0.6	1.9
16.75	2.6	8.2
17.25	0.7	2.2
17.75	4.5	14.1
18.25	0.7	2.2
18.75	0.4	1.3

Line 122		
Distance	Resistance	Apparent Resistivity
19.25	3.2	10.1
19.75	0.7	2.2
20.25	5.3	16.7
20.75	0.7	2.2
21.25	1.0	3.1
21.75	2.3	7.2
22.25	1.0	3.1
22.75	0.7	2.2
23.25	1.0	3.1
23.75	1.4	4.4
24.25	0.8	2.5
24.75	0.3	0.9
25.25	0.6	1.9
25.75	0.3	0.9
26.25	0.4	1.3
26.75	0.9	2.8
27.25	0.7	2.2
27.75	0.4	1.3
28.25	0.8	2.5
28.75	0.4	1.3
29.25	0.6	1.9
29.75	0.9	2.8
30.25	1.0	3.1
30.75	0.5	1.6
31.25	0.3	0.9
31.75	0.7	2.2
32.25	0.1	0.3
32.75	0.6	1.9
33.25	0.6	1.9
33.75	0.2	0.6
34.25	0.3	0.9
34.75	0.4	1.3
35.25	0.2	0.6
35.75	0.4	1.3
36.25	0.2	0.6
36.75	0.2	0.6
37.25	0.4	1.3

Line 123		
Distance	Resistance	Apparent Resistivity
0.75	0.1	0.3
1.25	0.7	2.2
1.75	1.1	3.5
2.25	0.5	1.6
2.75	4.5	14.1
3.25	0.3	0.9
3.75	0.4	1.3
4.25	0.1	0.3
4.75	0.5	1.6
5.25	0.3	0.9
5.75	0.6	1.9
6.25	0.7	2.2
6.75	0.1	0.3
7.25	0.6	1.9
7.75	0.7	2.2
8.25	0.4	1.3
8.75	0.3	0.9
9.25	0.4	1.3
9.75	0.8	2.5
10.25	0.6	1.9
10.75	1.1	3.5
11.25	0.7	2.2
11.75	0.2	0.6
12.25	0.4	1.3
12.75	0.6	1.9
13.25	0.8	2.5
13.75	1.1	3.5
14.25	0.9	2.8
14.75	0.1	0.3
15.25	0.4	1.3
15.75	0.6	1.9
16.25	0.4	1.3
16.75	0.1	0.3
17.25	1.0	3.1
17.75	0.4	1.3
18.25	0.2	0.6
18.75	0.4	1.3

Line 123		
Distance	Resistance	Apparent Resistivity
19.25	0.5	1.6
19.75	0.8	2.5
20.25	0.9	2.8
20.75	0.6	1.9
21.25	0.2	0.6
21.75	3.5	11.0
22.25	0.4	1.3
22.75	0.3	0.9
23.25	0.7	2.2
23.75	1	3.1
24.25	0.7	2.2
24.75	0.4	1.3
25.25	0.4	1.3
25.75	0.2	0.6
26.25	0.7	2.2
26.75	0.7	2.2
27.25	0.4	1.3
27.75	0.5	1.6
28.25	0.3	0.9
28.75	0.4	1.3
29.25	0.5	1.6
29.75	0.7	2.2
30.25	0.6	1.9
30.75	0.3	0.9
31.25	0.1	0.3
31.75	0.7	2.2
32.25	0.2	0.6
32.75	0.8	2.5
33.25	0.4	1.3
33.75	0.2	0.6
34.25	0.6	1.9
34.75	0.4	1.3
35.25	0.2	0.6
35.75	0.5	1.6
36.25	0.2	0.6
36.75	0.8	2.5
37.25	0.5	1.6

Line 124		
Distance	Resistance	Apparent Resistivity
0.75	0.7	2.2
1.25	0.9	2.8
1.75	1.9	6.0
2.25	2.6	8.2
2.75	0.1	0.3
3.25	1.6	5.0
3.75	0.8	2.5
4.25	0.5	1.6
4.75	0.5	1.6
5.25	0.3	0.9
5.75	0.7	2.2
6.25	1.8	5.7
6.75	0.7	2.2
7.25	0.3	0.9
7.75	0.3	0.9
8.25	0.4	1.3
8.75	0.2	0.6
9.25	0.1	0.3
9.75	0.7	2.2
10.25	0.3	0.9
10.75	0.5	1.6
11.25	1.1	3.5
11.75	1.5	4.7
12.25	0.5	1.6
12.75	1.5	4.7
13.25	8.5	26.7
13.75	0.3	0.9
14.25	1.0	3.1
14.75	2.8	8.8
15.25	0.4	1.3
15.75	3.4	10.7
16.25	1.3	4.1
16.75	3.5	11.0
17.25	0.7	2.2
17.75	7.1	22.3
18.25	0.8	2.5
18.75	1.9	6.0

Line 124		
Distance	Resistance	Apparent Resistivity
19.25	0.4	1.3
19.75	1	3.1
20.25	4.5	14.1
20.75	0.6	1.9
21.25	2.3	7.2
21.75	12.4	39.0
22.25	0.7	2.2
22.75	2.3	7.2
23.25	0.5	1.6
23.75	1.0	3.1
24.25	1.1	3.5
24.75	1.8	5.7
25.25	1.5	4.7
25.75	0.8	2.5
26.25	0.2	0.6
26.75	0.6	1.9
27.25	1.5	4.7
27.75	2.3	7.2
28.25	0.8	2.5
28.75	2.3	7.2
29.25	0.8	2.5
29.75	0.4	1.3
30.25	1.6	5.0
30.75	0.6	1.9
31.25	1.1	3.5
31.75	0.8	2.5
32.25	0.2	0.6
32.75	0.9	2.8
33.25	0.4	1.3
33.75	3.2	10.1
34.25	0.3	0.9
34.75	6.6	20.7
35.25	0.7	2.2
35.75	0.7	2.2
36.25	0.8	2.5
36.75	0.9	2.8
37.25	0.8	2.5

Line 125		
Distance	Resistance	Apparent Resistivity
0.75	1.2	3.8
1.25	0.9	2.8
1.75	4.0	12.6
2.25	0.7	2.2
2.75	3.8	11.9
3.25	2.5	7.9
3.75	1.5	4.7
4.25	1.5	4.7
4.75	0.5	1.6
5.25	0.7	2.2
5.75	0.3	0.9
6.25	0.9	2.8
6.75	0.6	1.9
7.25	3.9	12.3
7.75	0.1	0.3
8.25	1.0	3.1
8.75	0.8	2.5
9.25	0.4	1.3
9.75	3.4	10.7
10.25	0.7	2.2
10.75	0.5	1.6
11.25	1.0	3.1
11.75	1.4	4.4
12.25	1.1	3.5
12.75	1.1	3.5
13.25	2.4	7.5
13.75	0.3	0.9
14.25	3.4	10.7
14.75	5.2	16.3
15.25	0.4	1.3
15.75	5.0	15.7
16.25	2.3	7.2
16.75	1.1	3.5
17.25	0.4	1.3
17.75	1.0	3.1
18.25	3.8	11.9
18.75	0.3	0.9

Line 125		
Distance	Resistance	Apparent Resistivity
19.25	3.5	11.0
19.75	7.8	24.5
20.25	0.1	0.3
20.75	2.9	9.1
21.25	0.5	1.6
21.75	12.7	39.9
22.25	0.6	1.9
22.75	1.7	5.3
23.25	2.1	6.6
23.75	5.8	18.2
24.25	0.7	2.2
24.75	0.3	0.9
25.25	3.8	11.9
25.75	0.5	1.6
26.25	0.6	1.9
26.75	0.9	2.8
27.25	3.7	11.6
27.75	0.6	1.9
28.25	0.5	1.6
28.75	0.8	2.5
29.25	0.4	1.3
29.75	2.0	6.3
30.25	1.0	3.1
30.75	0.8	2.5
31.25	1.7	5.3
31.75	0.6	1.9
32.25	0.7	2.2
32.75	1.8	5.7
33.25	0.4	1.3
33.75	0.8	2.5
34.25	1.4	4.4
34.75	0.8	2.5
35.25	0.7	2.2
35.75	0.7	2.2
36.25	0.5	1.6
36.75	1.6	5.0
37.25	0.3	0.9

Line 126		
Distance	Resistance	Apparent Resistivity
0.75	0.8	2.5
1.25	0.1	0.3
1.75	0.1	0.3
2.25	0.1	0.3
2.75	0.1	0.3
3.25	0.1	0.3
3.75	0.1	0.3
4.25	0.4	1.3
4.75	0.1	0.3
5.25	0.1	0.3
5.75	0.1	0.3
6.25	0.2	0.6
6.75	0.5	1.6
7.25	0.4	1.3
7.75	0.4	1.3
8.25	0.2	0.6
8.75	0.1	0.3
9.25	0.2	0.6
9.75	0.1	0.3
10.25	0.3	0.9
10.75	0.1	0.3
11.25	0.6	1.9
11.75	0.5	1.6
12.25	0.2	0.6
12.75	0.1	0.3
13.25	0.3	0.9
13.75	0.4	1.3
14.25	0.1	0.3
14.75	0.1	0.3
15.25	0.1	0.3
15.75	0.1	0.3
16.25	0.8	2.5
16.75	0.1	0.3
17.25	0.5	1.6
17.75	0.2	0.6
18.25	0.6	1.9
18.75	0.1	0.3

Line 126		
Distance	Resistance	Apparent Resistivity
19.25	0.4	1.3
19.75	0.4	1.3
20.25	0.3	0.9
20.75	0.1	0.3
21.25	0.4	1.3
21.75	0.1	0.3
22.25	0.5	1.6
22.75	0.1	0.3
23.25	0.4	1.3
23.75	0.4	1.3
24.25	0.8	2.5
24.75	1.8	5.7
25.25	0.3	0.9
25.75	0.6	1.9
26.25	0.4	1.3
26.75	0.6	1.9
27.25	0.6	1.9
27.75	0.5	1.6
28.25	0.6	1.9
28.75	1.4	4.4
29.25	0.6	1.9
29.75	0.4	1.3
30.25	0.4	1.3
30.75	0.1	0.3
31.25	0.8	2.5
31.75	0.5	1.6
32.25	0.5	1.6
32.75	0.2	0.6
33.25	0.5	1.6
33.75	0.6	1.9
34.25	0.1	0.3
34.75	0.1	0.3
35.25	0.7	2.2
35.75	0.3	0.9
36.25	0.3	0.9
36.75	0.2	0.6
37.25	0.5	1.6

Line 127		
Distance	Resistance	Apparent Resistivity
0.75	0.2	0.6
1.25	0.2	0.6
1.75	0.9	2.8
2.25	0.5	1.6
2.75	0.1	0.3
3.25	0.5	1.6
3.75	1.6	5.0
4.25	0.5	1.6
4.75	0.3	0.9
5.25	0.2	0.6
5.75	1.6	5.0
6.25	2.9	9.1
6.75	0.8	2.5
7.25	0.5	1.6
7.75	0.4	1.3
8.25	0.4	1.3
8.75	0.3	0.9
9.25	0.1	0.3
9.75	0.4	1.3
10.25	0.1	0.3
10.75	0.2	0.6
11.25	0.7	2.2
11.75	0.6	1.9
12.25	0.2	0.6
12.75	1.0	3.1
13.25	0.2	0.6
13.75	1.2	3.8
14.25	0.7	2.2
14.75	0.8	2.5
15.25	0.7	2.2
15.75	0.9	2.8
16.25	0.5	1.6
16.75	5.0	15.7
17.25	0.6	1.9
17.75	0.7	2.2
18.25	0.9	2.8
18.75	0.4	1.3

Line 127		
Distance	Resistance	Apparent Resistivity
19.25	4.3	13.5
19.75	0.5	1.6
20.25	0.2	0.6
20.75	0.7	2.2
21.25	0.4	1.3
21.75	1.0	3.1
22.25	0.7	2.2
22.75	7.5	23.6
23.25	0.8	2.5
23.75	0.7	2.2
24.25	5.6	17.6
24.75	0.8	2.5
25.25	1.0	3.1
25.75	1.0	3.1
26.25	0.7	2.2
26.75	0.5	1.6
27.25	0.7	2.2
27.75	0.9	2.8
28.25	0.2	0.6
28.75	0.6	1.9
29.25	0.2	0.6
29.75	0.5	1.6
30.25	0.9	2.8
30.75	1.4	4.4
31.25	1.6	5.0
31.75	0.4	1.3
32.25	0.2	0.6
32.75	1.4	4.4
33.25	0.7	2.2
33.75	0.4	1.3
34.25	0.4	1.3
34.75	0.6	1.9
35.25	0.1	0.3
35.75	0.3	0.9
36.25	0.6	1.9
36.75	0.1	0.3
37.25	0.4	1.3

Line 128		
Distance	Resistance	Apparent Resistivity
0.75	0.5	1.6
1.25	8.0	25.1
1.75	0.2	0.6
2.25	2.2	6.9
2.75	0.5	1.6
3.25	3.8	11.9
3.75	0.5	1.6
4.25	1.6	5.0
4.75	0.7	2.2
5.25	0.3	0.9
5.75	0.6	1.9
6.25	0.8	2.5
6.75	0.4	1.3
7.25	1.0	3.1
7.75	0.3	0.9
8.25	1.8	5.7
8.75	0.4	1.3
9.25	1.1	3.5
9.75	0.6	1.9
10.25	0.1	0.3
10.75	0.1	0.3
11.25	0.8	2.5
11.75	0.6	1.9
12.25	0.6	1.9
12.75	0.8	2.5
13.25	0.6	1.9
13.75	0.8	2.5
14.25	7.2	22.6
14.75	0.5	1.6
15.25	0.4	1.3
15.75	3.3	10.4
16.25	0.4	1.3
16.75	0.6	1.9
17.25	1.1	3.5
17.75	0.9	2.8
18.25	0.2	0.6
18.75	0.7	2.2

Line 128		
Distance	Resistance	Apparent Resistivity
19.25	0.8	2.5
19.75	4.4	13.8
20.25	0.5	1.6
20.75	0.2	0.6
21.25	2.2	6.9
21.75	0.8	2.5
22.25	0.3	0.9
22.75	2.3	7.2
23.25	0.4	1.3
23.75	14.5	45.6
24.25	0.5	1.6
24.75	0.2	0.6
25.25	1.0	3.1
25.75	0.7	2.2
26.25	0.9	2.8
26.75	0.6	1.9
27.25	0.7	2.2
27.75	0.3	0.9
28.25	0.9	2.8
28.75	10.9	34.2
29.25	0.8	2.5
29.75	0.3	0.9
30.25	0.55	1.7
30.75	10.8	33.9
31.25	0.7	2.2
31.75	4.0	12.6
32.25	0.5	1.6
32.75	0.5	1.6
33.25	0.5	1.6
33.75	1.2	3.8
34.25	0.4	1.3
34.75	1.1	3.5
35.25	1.1	3.5
35.75	0.5	1.6
36.25	1.3	4.1
36.75	2.4	7.5
37.25	0.2	0.6

Line 129		
Distance	Resistance	Apparent Resistivity
0.75	0.5	1.6
1.25	7.1	22.3
1.75	1.3	4.1
2.25	4.1	12.9
2.75	0.3	0.9
3.25	0.6	1.9
3.75	1.6	5.0
4.25	2.3	7.2
4.75	1.8	5.7
5.25	0.5	1.6
5.75	0.4	1.3
6.25	1.5	4.7
6.75	0.6	1.9
7.25	0.5	1.6
7.75	0.4	1.3
8.25	0.3	0.9
8.75	0.4	1.3
9.25	2.5	7.9
9.75	0.8	2.5
10.25	1.5	4.7
10.75	1.4	4.4
11.25	0.8	2.5
11.75	0.8	2.5
12.25	0.5	1.6
12.75	0.5	1.6
13.25	0.9	2.8
13.75	0.8	2.5
14.25	1.8	5.7
14.75	0.5	1.6
15.25	0.8	2.5
15.75	0.6	1.9
16.25	1.2	3.8
16.75	0.5	1.6
17.25	0.55	1.7
17.75	1.4	4.4
18.25	0.7	2.2
18.75	2	6.3

Line 129		
Distance	Resistance	Apparent Resistivity
19.25	0.9	2.8
19.75	0.6	1.9
20.25	0.7	2.2
20.75	3.5	11.0
21.25	1.2	3.8
21.75	1.8	5.7
22.25	1.8	5.7
22.75	2.9	9.1
23.25	0.5	1.6
23.75	4.3	13.5
24.25	0.6	1.9
24.75	0.9	2.8
25.25	0.8	2.5
25.75	0.7	2.2
26.25	0.9	2.8
26.75	1	3.1
27.25	0.3	0.9
27.75	0.3	0.9
28.25	1	3.1
28.75	1.2	3.8
29.25	7.8	24.5
29.75	1	3.1
30.25	1.5	4.7
30.75	4.5	14.1
31.25	0.3	0.9
31.75	2.2	6.9
32.25	0.9	2.8
32.75	1.3	4.1
33.25	1.1	3.5
33.75	0.8	2.5
34.25	1.1	3.5
34.75	0.8	2.5
35.25	0.7	2.2
35.75	0.4	1.3
36.25	1.5	4.7
36.75	8.3	26.1
37.25	0.9	2.8

APPENDIX C
RAW MAGNETIC SUSCEPTIBILITY DATA

Core 1			
Depth (m)	Sample #	Mass (g)	Magnetic Susceptibility (m3/kg)
0.0	1-1	7.346	3.86E-07
0.05	1-2	8.967	4.13E-07
0.10	1-3	5.7	4.57E-07
0.15	1-4	5.419	4.66E-07
0.20	1-5	7.801	3.76E-07
0.25	1-6	3.675	3.55E-07
0.30	1-7	10.37	2.99E-07
0.35	1-8	11.078	3.40E-07
0.40	1-9	11.705	2.99E-07
0.45	1-10	10.409	2.55E-07
0.50	1-11	12.78	2.31E-07
0.55	1-12	13.104	2.66E-07
0.60	1-13	9.927	2.43E-07
0.65	1-14	4.702	3.35E-07
0.70	1-15	10.344	2.82E-07
0.75	1-16	2.842	3.35E-07
0.80	1-17	10.723	2.13E-07
0.85	1-18	4.411	2.29E-07
0.90	1-19	7.243	3.44E-07
0.95	1-20	5.32	3.56E-07
1.00	1-21	8.181	3.28E-07
1.05	1-22	8.344	2.78E-07
1.10	1-23	3.996	3.61E-07
1.15	1-24	8.103	3.01E-07
1.20	1-25	9.016	2.86E-07
1.25	2-1	4.595	3.14E-07
1.30	2-2	9.46	2.70E-07
1.35	2-3	9.221	2.74E-07
1.40	2-4	7.899	3.05E-07
1.45	2-5	6.053	3.16E-07
1.50	2-6	12.469	2.29E-07
1.55	2-7	7.137	2.80E-07
1.60	2-8	13.544	2.77E-07
1.65	2-9	6.98	9.44E-07
1.70	2-10	13.768	2.35E-07

Core 1 continued			
Depth (m)	Sample #	Mass (g)	Magnetic Susceptibility (m3/kg)
1.75	2-11	7.585	3.35E-07
1.80	2-12	5.382	2.17E-07
1.85	2-13	7.812	2.55E-07
1.90	2-14	6.159	3.05E-07
1.95	2-15	6.862	1.84E-07
2.00	2-16	5.955	2.29E-07
2.05	2-17	8.812	4.05E-07
2.10	2-18	9.637	2.08E-07
2.15	2-19	10.141	2.07E-07
2.20	2-20	11.885	1.90E-07
2.25	2-21	11.412	1.76E-07
2.30	2-22	13.247	1.99E-07
2.35	2-23	7.614	2.58E-07
2.40	3-1	9.059	2.29E-07
2.45	3-2	9.073	2.67E-07
2.50	3-3	6.631	2.77E-07
2.55	3-4	8.016	2.75E-07
2.60	3-5	4.071	2.96E-07
2.65	3-6	11.007	1.93E-07
2.70	3-7	3.993	2.72E-07
2.75	3-8	3.343	3.20E-07
2.80	3-9	12.535	3.03E-07
2.85	3-10	8.4	4.57E-07
2.90	3-11	4.7	2.52E-07
2.95	3-12	4.923	2.63E-07
3.00	3-13	5.445	2.91E-07
3.05	3-14	8.325	2.14E-07
3.10	3-15	7.276	3.07E-07
3.15	3-16	6.1	2.33E-07
3.20	3-17	8.01	2.73E-07
3.25	3-18	7.618	2.34E-07
3.30	3-19	11.238	2.45E-07
3.35	3-20	10.505	2.36E-07
3.40	3-21	7.911	2.60E-07
3.45	3-22	4.573	2.96E-07
3.50	3-23	5.74	2.57E-07
3.55	4-1	9.119	2.23E-07
3.60	4-2	6.893	2.66E-07

Core 1 continued			
Depth (m)	Sample #	Mass (g)	Magnetic Susceptibility (m3/kg)
3.65	4-3	8.839	2.30E-07
3.70	4-4	5.508	2.72E-07
3.75	4-5	8.743	2.49E-07
3.80	4-6	6.567	3.11E-07
3.85	4-7	14.1	2.38E-07
3.90	4-8	11.252	2.39E-07
3.95	4-9	9.793	2.02E-07
4.00	4-10	8.218	1.96E-07
4.05	4-11	5.883	4.22E-07
4.10	4-12	10.931	2.78E-07
4.15	4-13	13.25	2.72E-07
4.20	4-14	4.641	2.47E-07
4.25	4-15	9.112	2.59E-07
4.30	4-16	6.76	2.73E-07
4.35	4-17	11.32	2.62E-07
4.40	4-18	6.249	3.01E-07
4.45	4-19	8.193	3.74E-07
4.50	4-20	6.141	3.37E-07
4.55	4-21	5.599	2.98E-07
4.60	4-22	7.363	2.90E-07
4.65	4-23	9.522	1.89E-07
4.70	4-24	4.427	3.17E-07
4.75	4-25	12.749	2.33E-07
4.80	5-1	6.033	2.86E-07
4.85	5-2	9.637	2.23E-07
4.90	5-3	9.991	2.61E-07
4.95	5-4	8.818	2.46E-07
5.00	5-5	8.05	2.21E-07
5.05	5-6	13.044	2.38E-07
5.10	5-7	6.513	2.15E-07
5.15	5-8	11.867	2.50E-07
5.20	5-9	9.648	2.05E-07
5.25	5-10	5.347	1.84E-07
5.30	5-11	5.8	2.12E-07
5.35	5-12	6.09	2.34E-07
5.40	5-13	5.141	2.42E-07
5.45	5-14	9.556	2.32E-07
5.50	5-15	12.004	2.14E-07

Core 1 continued			
Depth (m)	Sample #	Mass (g)	Magnetic Susceptibility (m3/kg)
5.55	5-16	5.406	2.64E-07
5.60	5-17	8.479	2.55E-07
5.65	5-18	8.956	2.41E-07
5.70	5-19	7.031	2.61E-07
5.75	5-20	9.537	2.84E-07
5.80	5-21	7.188	2.91E-07
5.85	5-22	8.934	2.64E-07
5.90	5-23	8.848	1.96E-07
5.95	5-24	5.658	2.29E-07
6.00	6-1	4.739	2.88E-07
6.05	6-2	3.071	2.70E-07
6.10	6-3	9.808	2.11E-07
6.15	6-4	3.643	2.93E-07
6.20	6-5	2.771	3.31E-07
6.25	6-6	4.936	2.19E-07
6.30	6-7	9.2	2.82E-07
6.35	6-8	9.119	2.73E-07
6.40	6-9	4.805	1.88E-07
6.45	6-10	7.31	2.57E-07
6.50	6-11	6.844	2.21E-07
6.55	6-12	4.957	2.33E-07
6.60	6-13	6.42	2.73E-07
6.65	6-14	9.049	2.20E-07
6.70	6-15	11.37	1.31E-07
6.75	6-16	4.309	2.73E-07
6.80	6-17	10.119	2.05E-07
6.85	6-18	5.621	2.67E-07
6.90	6-19	8.291	2.26E-07
6.95	6-20	9.515	1.95E-07
7.00	7-1	3.952	2.66E-07
7.05	7-2	3.769	2.31E-07
7.10	7-3	8.927	1.30E-07
7.15	7-4	3.45	2.30E-07
7.20	7-5	8.563	3.49E-07
7.25	7-6	6.08	2.79E-07
7.30	7-7	3.342	3.20E-07
7.35	7-8	6.726	2.29E-07
7.40	7-9	14.234	1.48E-07

Core 1 continued			
Depth (m)	Sample #	Mass (g)	Magnetic Susceptibility (m3/kg)
7.45	7-10	11.46	1.94E-07
7.50	7-11	11.73	2.98E-07
7.55	7-12	6.376	2.78E-07
7.60	7-13	4.254	2.74E-07
7.65	7-14	3.925	3.01E-07
7.70	7-15	5.332	2.23E-07
7.75	7-16	9.918	2.05E-07
7.80	7-17	5.876	2.34E-07
7.85	7-18	4.229	2.92E-07
7.90	7-19	3.827	2.65E-07
7.95	7-20	12.29	2.43E-07
8.00	7-21	4.794	3.03E-07
8.05	7-22	7.249	3.07E-07
8.10	7-23	7.964	3.36E-07
8.15	7-24	5.799	2.32E-07
8.20	8-1	6.749	2.25E-07
8.25	8-2	5	2.54E-07
8.30	8-3	7.547	2.77E-07
8.35	8-4	6.459	2.39E-07
8.40	8-5	8.676	2.33E-07
8.45	8-6	9.667	2.52E-07
8.50	8-7	8.961	2.28E-07
8.55	8-8	4.633	2.83E-07
8.60	8-9	7.488	2.83E-07
8.65	8-10	5.731	2.99E-07
8.70	8-11	4.251	3.45E-07
8.75	8-12	11.116	2.72E-07
8.80	8-13	3.671	3.93E-07
8.85	8-14	3.591	3.15E-07
8.90	8-15	3.945	3.24E-07
8.95	8-16	4.935	2.98E-07
9.00	8-17	3.709	3.49E-07
9.05	8-18	2.741	3.10E-07
9.10	8-19	8.557	2.67E-07
9.15	8-20	4.376	2.66E-07
9.20	8-21	6.908	2.29E-07

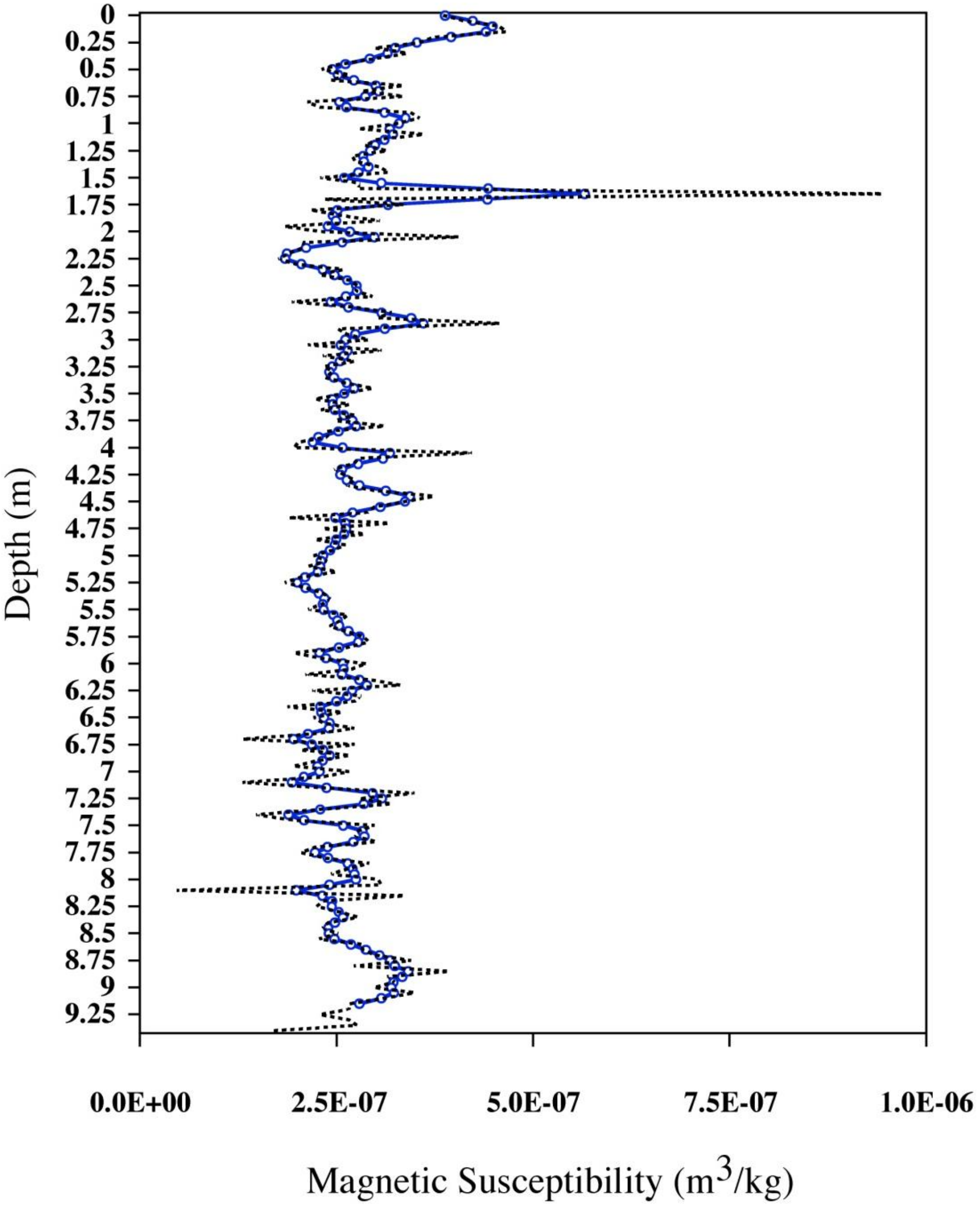
Core 1 continued			
Depth (m)	Sample #	Mass (g)	Magnetic Susceptibility (m3/kg)
9.25	8-22	5.185	2.66E-07
9.30	8-23	4.723	2.76E-07
9.35	8-24	5.721	1.70E-07

Core 2			
Depth (m)	Sample #	Mass (g)	Magnetic Susceptibility (m3/kg)
0.0	1-1	5.457	1.97E-07
0.05	1-2	5.565	2.27E-07
0.1	1-3	7.483	2.06E-07
0.15	1-4	6.852	1.84E-07
0.2	1-5	7.755	1.67E-07
0.25	1-6	7.108	1.55E-07
0.3	1-7	9.539	1.83E-07
0.35	1-8	6.951	1.75E-07
0.4	1-9	7.457	2.43E-07
0.45	1-10	7.479	2.65E-07
0.5	1-11	6.645	2.71E-07
0.55	1-12	7.833	2.22E-07
0.6	1-13	5.582	3.15E-07
0.65	1-14	4.548	2.82E-07
0.7	1-15	10.647	1.50E-07
0.75	1-16	4.276	2.56E-07
0.8	1-17	5.75	2.89E-07
0.85	1-18	3.981	2.43E-07
0.9	1-19	7.213	2.51E-07
0.95	1-20	9.676	2.14E-07
1.0	1-21	7.131	4.34E-07
1.05	1-22	11.398	3.26E-07
1.1	1-23	7.719	2.96E-07
1.15	1-24	9.233	2.65E-07
1.2	1-25	6.46	2.43E-07
1.25	2-1	6.479	2.87E-07
1.3	2-2	9.507	2.73E-07
1.35	2-3	3.743	2.87E-07
1.4	2-4	7.909	2.66E-07
1.45	2-5	6.377	2.32E-07
1.5	2-6	4.749	2.89E-07
1.55	2-7	4.275	3.04E-07
1.6	2-8	6.968	2.69E-07
1.65	2-9	4.076	2.86E-07
1.7	2-10	4.876	2.72E-07
1.75	2-11	3.33	3.03E-07

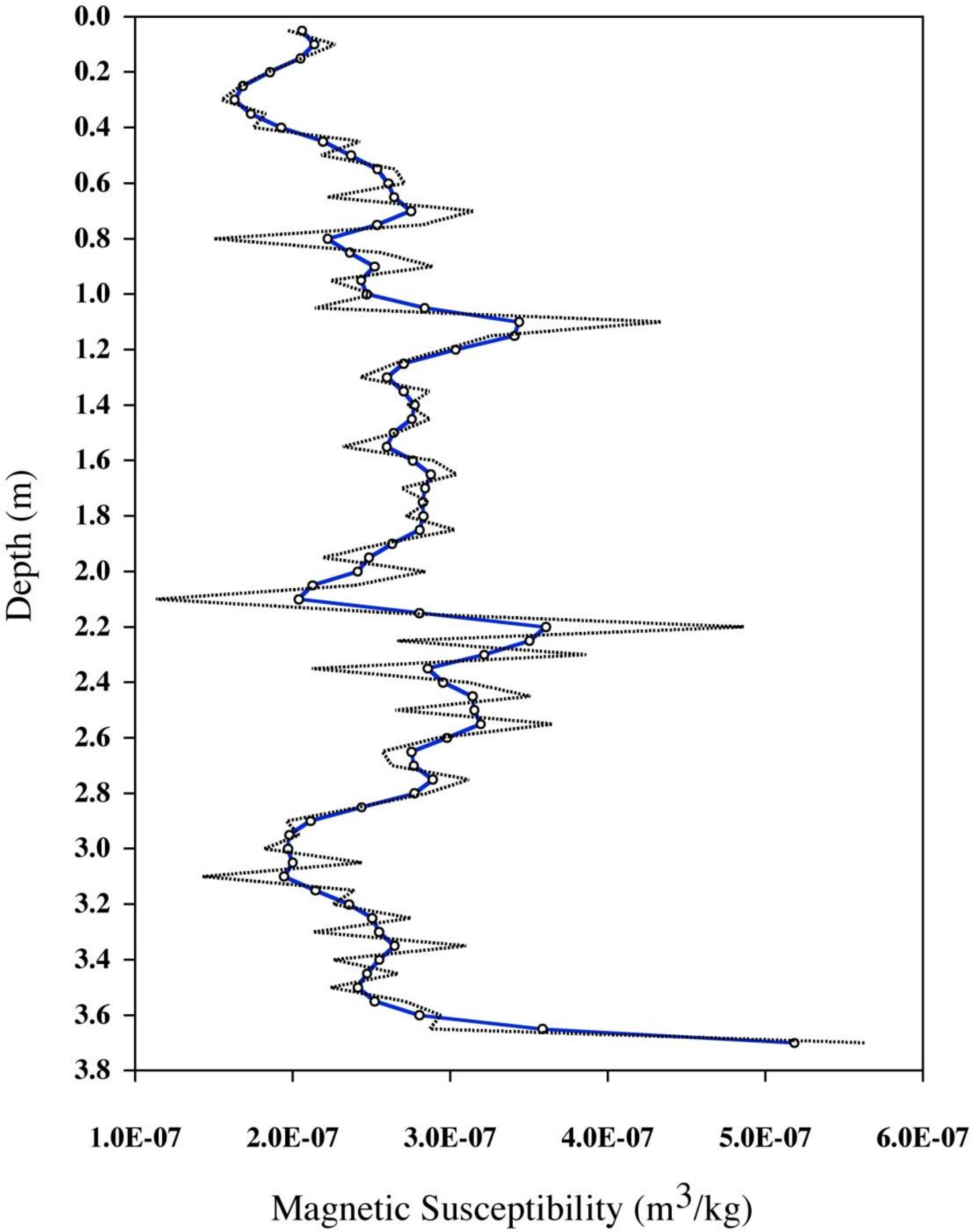
Core 2 continued			
Depth (m)	Sample #	Mass (g)	Magnetic Susceptibility (m3/kg)
1.8	2-12	8.092	2.57E-07
1.85	2-13	15.245	2.84E-07
1.9	2-14	3.907	2.84E-07
1.95	2-15	6.086	2.39E-07
2.0	2-16	17.953	1.13E-07
2.05	2-17	6.805	2.64E-07
2.1	2-18	4.404	4.86E-07
2.15	2-19	5.112	2.66E-07
2.2	2-20	2.758	3.86E-07
2.25	2-21	6.22	2.12E-07
2.3	2-22	5.602	3.11E-07
2.35	2-23	9.21	3.51E-07
2.4	2-24	6.983	2.65E-07
2.45	3-1	3.329	3.65E-07
2.5	3-2	6.978	2.92E-07
2.55	3-3	10.385	2.57E-07
2.6	3-4	12.516	2.63E-07
2.65	3-5	6.39	3.12E-07
2.7	3-6	3.489	2.85E-07
2.75	3-7	2.979	2.42E-07
2.8	3-8	5.579	1.96E-07
2.85	3-9	7.743	2.04E-07
2.9	3-10	5.734	1.82E-07
2.95	3-11	2.157	2.44E-07
3.0	3-12	5.74	1.43E-07
3.05	3-13	3.88	2.39E-07
3.1	3-14	3.868	2.26E-07
3.15	3-15	4.032	2.75E-07
3.2	3-16	4.859	2.13E-07
3.25	3-17	6.679	3.10E-07
3.3	3-18	3.217	2.26E-07
3.35	3-19	3.818	2.67E-07
3.4	3-20	4.022	2.24E-07
3.45	3-21	4.646	2.71E-07
3.5	3-22	3.619	2.94E-07
3.55	3-23	2.483	2.87E-07
3.6	3-24	3.612	5.63E-07

APPENDIX D
MAGNETIC SUSCEPTIBILITY ILLUSTRATIONS

CORE 1



CORE 2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0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
Depth (m)
1.0E-07
2.0E-07
3.0E-07
4.0E-07
5.0E-07
6.0E-07
Magnetic Susceptibility (m3/kg)

VITA

Jennifer Patricia Gardner was born in Baltimore, Maryland, in 1978. Ms. Gardner spent majority of her childhood in the outskirts of Baltimore City. Her family relocated to Hagerstown, Maryland, where she attended St. Maria Goretti High School. Jennifer graduated from Salisbury State University in 2000 with a Bachelor's degree in Communication Arts with a minor in Business Administration. Upon graduating, Jennifer began working in the mortgage industry before returning to Salisbury University for a second Bachelor's degree in Interdisciplinary Studies concentrating in her studies in Archaeology, History, and Geography. In the summer of 2006, Jennifer attended Pennsylvania State University's field school under the direction of Dr. Claire McHale Milner and Dr. Heath Anderson.

While pursuing a graduate degree at Louisiana State University in the Department of Geography and Anthropology, Jennifer worked as a graduate research assistant to Dr. Patrick Hesp on the Offshore Buried Archaeological Site Project funded by the Bureau of Ocean Energy Management (formerly Minerals Management System). For a short period of time Ms. Gardner worked for Natural Resource Professionals as Cultural Resource Specialist focusing in Section 106 compliance and regulation. Jennifer is currently working for R.C. Goodwin and Associates as a field archaeologist out of the Frederick, Maryland, office.