# ABSTRACTS
# SIA ANNUAL CONFERENCE,
# Savannah GA, June 3-5, 1999

## SIA Home: http://www.sia-web.org or http://www.siahq.org

Session I: 8:30 - 10:00

Panel 1. A: **HAER Recording of Southern Textile Mills**

**Chair: Dean Herrin, HAER"Engineering the New South: A HAER Case Study" -- Lisa Pfueller Davidson, HAER**

**During the 1890s the Southern textile industry expanded greatly as New South ideals of industrial development began to take the tangible form of new cotton mills and villages. Construction in the South provided new opportunities for many Southern and Northern engineers. Charles Praray, a mill engineer from Providence, Rhode Island utilized the building boom in the South to construct a number of mills using an unique patented mill construction system. Praray patented his system in 1899 while working for the Providence mill engineering firm of Charles Makepeace and Co. The "Praray Improved System of Construction" called for the support columns and outer walls to be built on two separate foundations, making the walls of the mill non-load bearing. The exterior walls were constructed in unusual triangular bays to allow more natural light into the mill.**

**My case study of Praray focuses on the five Southern mills built using his patented system, and particularly Dixie Mill in LaGrange, GA, which Praray advertised as hiving "cost less per spindle for building than any mill built in the South." Dixie Mill was included as part of Phase I of the Historic American Engineering Record's Southern Textile Industry Survey. Researching Dixie Mill led to the rediscovery of Praray's patented system, and the other mills built with this design. The other Praray system mills are in Douglasville, Georgia; Haw River, North Carolina; and Selma, Alabama. This case study illustrates both a type of innovative mill construction taking place in the South, and the possibilities for new regional and national perspectives on the Southern textile industry through HAER's work.**

**"19th Century Southern Cotton Mill Operations - An Illustrated Reconstruction of Historic Manufacturing Technology" -- Robert C. Stewart, Historical Technologies**

**The production of cotton textiles in the South lagged behind Samuel Slater's 1793 mill operation by twenty-four years. Southern textile manufacturing grew slowly compared to the Northern industry. The early Southern mill investors had trouble acquiring local capital; most of the regional money remained invested in land and agricultural development. In addition, Southern plantation owners strongly opposed industrial development. Some mills were built and placed in production during the antebellum period, but the Civil War devastated most of them. Significant production did not resume until after Reconstruction. Rapid growth and ultimate Southern dominance of cotton textile manufacturing occurred between 1890 and 1930.**

**Lower labor and energy costs gave Southern mills a 10 to 20\5 cost edge over Northern mills. The Northern mill owners allied with Southern entrepreneurs to take advantage of lower costs and accelerated the move to the South. Capital infusions allowed Southern mills to expand and install modern equipment during the early years of the 20th century.**

**This paper examines Southern cotton manufacturing in selected regions of Alabama and Georgia during this period of rapid growth. It focuses on the machinery and technology used by these mills.**

**By examining construction blueprints of several plants, Historic American Engineering Record researchers determined the specifications of installed equipment, machine capability, power transmission methods and the type of goods produced. Additional research located original machinery catalogs and turn-of-the-century technical manuals that helped in reconstructive delineation of mill operations.**

**"Southern Textile Mills and Mill Workers' Houses: HAER Drawing Processes" -- Richard K. Anderson, Jr., Cultural Resources Documentation Services**

**Textile mill workers' houses are a major social and architectural component of southern textile mill villages. Designed by apparently**

**anonymous persons, the vernacular nature of the housing merits documentation with measured drawings to capture architectural appearance, internal room organization, and various structural and decorative details. The Secretary of the Interior's Standards for Architectural and Engineering Documentation allow for several levels of documentary effort governed primarily by the significance of the resources, and to a lesser degree by budget and scheduling considerations. In the case of mill workers' houses in the Southern Textile Industry Survey, the documentation team decided that HAER Level II documentation was appropriate, given the number and vernacular nature of the buildings, the myriad modifications made to them individually over time, and the project budget and scope. The team selected eleven "typical" houses to document in LaGrange, Georgia, and in the cities of Valley and Huntsville, Alabama. One drawing sheet was allotted per house. Field work took an average of 6 hours per building, including hand-measurement and 35 mm field photography. A similar approach was applied to Dixie Cotton Mill in LaGrange, Georgia. HAER drawings were developed in CAD, using hand measurements, scanned maps and digitally rectified 35 mm field photographs. The field methods and CAD processes conserved time, effort and funds, while improving the traditional graphic and information qualities of HAER drawings. These drawings served as test applications of the new *HABS/HAER Guidelines for Recording Historic Sites and Structures Using Computed Aided Design*; they also attempted to address several data archiving issues which arise when using digital technologies for long-term documentation.**

## Panel I. B: Public Works and Public Utilities

**Chair: Frederic L. Quivik, consulting historian of technology"Tapping the Branch: The Palatka Water Works" -- Martin F. Dickenson, SouthArc, Inc.**
**In 1886, the Palatka Water Works Company began pumping water from White Water Branch in Palatka Heights, Florida. For the next 100 years this facility provided water to the Heights and the City of Palatka, weathering court cases, acquisition by the City, and numerous expansions and upgrades. Since 1986 the facility has been closed and deteriorating. The City is currently focusing on development of an ecotourism program and hopes to use the old Water Works facility as a centerpiece of that program.**

**Palatka is located on the St. Johns River in northeast Florida. Founded in the early 19th century, it has functioned as a major port for shipment of agricultural and timber products, a railhead, and the location of a number of timber mills. During the late 19th century it became a winter resort for northerners, as well as a citrus production area. In 1886, several enterprising businessmen who were interested in developing the independent community of Palatka Heights, which overlooked the City, decided to take advantage of a spring-fed creek issuing from a deep ravine in the Heights. They formed a company and erected a brick water works with steam-powered pumps. In 1922, Palatka Heights was incorporated into the City of Palatka and the City bought the water works.**

**The water works was expanded several times in its 100-year history, continuing to be the primary water source for the growing city. Finally, in 1986 it was closed as the City converted to reliance on deep well fields for water. However, the original brick pump house and reservoirs remain, as well as later additions and pumping systems. This paper will discuss the history of the water works and trace these changes over the 100-year period of its operation. It will also look at how the plant functioned in its final form.**

**"A Survivor of the Potomac: the Saga of the Potomac Power Plant at Harpers Ferry, WV" -- Christopher Marston, HAER**
**The Potomac Power Plant at Harpers Ferry NHP stands today as a survivor of nearly 200 years of history along the Potomac River. The existing condition of the structure provides not only a time capsule look at a 1930s hydroelectric plant, but also contains relics from generations of industrial use and structural recycling.**

**Beginning with the construction of the U. S. Armory and power canal in 1809, seven stone flumes were built to take advantage of a 25 foot draft. The armory first built a tilt hammer shop on the site in 1834, replacing it with a rolling mill in 1853. Following the Civil War, Thomas Savery constructed a pulp mill over the flumes in 1888, using recycled brick from armory rubble. Although pulp making proved unprofitable, Savery experimented with hydroelectric generation by installing secondary dynamos. Following a fire in 1925, two hydroelectric turbines and generators were installed. This power station generated electricity until the 1970s,. when it was closed by Potomac Edison. The park acquired the property in 1994,. albeit with**

**the condition that the Smith Morgan turbine be sold. allowing this loss,. the building was threatened once again by flood in 1996,. an event that led to HAER documentation.**

**This paper will illustrate the structural evolution,. industrial processes and mysteries enveloped in the Potomac Power Plant, a survivor of a tumultuous past, which is now undergoing preservation as a symbol of Harpers Ferry's industrial heritage.**

**"More Light for the Street: The Promotion of Public Electric Lighting in Twentieth-Century Trade Literature in Eastern Canada" -- Louise Trottier, National Museum of Science and Technology, Ottawa, Canada**

**The public electric lighting system was established progressively in most Canadian cities from the 1880s owing to a set of factors including,. first of all,. the consumers' dissatisfaction and the difficulties experimented with gas lighting. Canada was also quite accessible to the penetration of American inventions and technologies, and could offer an interesting market for entrepreneurs - such as Charles Brush, Thomas Edison, Elihu Thompson and Edwin James Houston - for the diffusion of their products.**

**Taking examples from the trade literature circulating in Eastern Canada since the 1890s, our presentation wishes to provide, in a first part, an analysis of the promotion of public electric lighting devices. This will give us the possibility to define the field of study and the areas of use, the technologies and trends involved in the manufacturing of the luminaire, the impact on industrial and urban development, and on social activities.**

**How did cities - like Montreal and Toronto - respond to the advertising of public electric lighting and adopt a model featuring their own personal expression? How did the publicity foster the relation between the public utility companies and the manufacturers when shaping a production and distribution system of street lighting? These are the questions we want to explore, in a second part, with examples, when possible, to IA projects in the field.**

**Our conclusion will consider the limits of the references provided by the trade literature, and suggest "illuminating" topics to be investigated with the contribution of IA and material culture**

**methodology.**

**Panel I. C: Archaeology of Shipping and Sea-Trade**

**Chair: John D. Light**

**"Sixteenth-Century Inland Cargo Vessel Remains in the Archaeological Record" -- Janalyn Gober, Texas A & M University and Grant L. Day, Cultural Resource Analysts, Inc.**
**This paper will discuss the excavation and preliminary analysis of a 16th century inland cargo ship (L89) excavated from the former Zuiderzee of the Netherlands. Inland cargo ships such as L89 played an integral role in the development of the Early Modern Dutch economy by supplying cities with fuel and building materials from outlying areas of the country. This vessel type was built and used between 1400 and 1600; after 1600 this vessel type is not seen in the archaeological record nor are references made to it in historical sources. The vessel's design, construction, and function is compared with three contemporary vessels of similar class (LZ1, M40, K73/74). Through comparison, it is apparent that these four vessels should be placed into a new category of vessel type descendant from the cog tradition.**

**"The Emanuel Point Ship: An Example of 16th-Century Iberian Shipbuilding Industry" -- Della Scott, Florida Bureau of Archaeological Research**
**In 1992, the remains of a Spanish galleon from the Age of Colonization was discovered in the dark waters of Pensacola Bay, Florida. Lodged in the sandbar upon which it had stranded, the ship represents the only known legacy of the ill-fated 1559 colonization attempt by Tristan de Luna. Struck by a hurricane shortly after arrival at the Bay of Ochuse, his fleet of 11 ships was decimated and most were sunk with an appalling loss of supplies and equipment that spelled disaster for the 1,500 people of the colony.**

**While the loss of the large galleon meant tragedy for Luna's settlers, it created a time capsule of 16th-century life for archaeologists who discovered the ship over 400 years later. Items needed by the colonists for survival and protection, as well as for shipboard**

**subsistence, were represented in the archaeological record. Additionally, the ship itself provided clues to the Spanish shipbuilding industry in the age of discovery, exploration, and colonization.**

**This paper will describe the Emanuel Point Ship from an industrial perspective, including shipbuilding techniques, armament and ammunition, and artifacts for subsistence. As one of only a handful of 16th-century ships investigated in the New World, the Emanuel Point Ship represents an extraordinary opportunity to better understand the vessels that carried Europeans into the Americas.**

**"Salt Production in the Turks and Caicos Islands and the Development of Protective Tariffs in the United States" -- Carol D. Litchfield, George Mason University**
**Historically salt has been a preferred object for governmental revenue generation, and the US has been no different. Salt importation into North America was encouraged by the British, but with the successful conclusion of the Revolutionary War there was a desire to encourage home industries. Thus the debates began on tariffs on imported salt. The first excuse was to pay for the war, then the westward expansion, then the War of 1812 and so on. Arguments against salt tariffs were the fact that it would hurt the fishing industry (one of the biggest exports), hurt the shipping industry, impact the meat and tanning industries, and hurt the average consumer. Generally during the nineteenth century, imported salt amounted to between 10 and 50% of the salt consumed in tanning, chemical industry, and food preservation. The nearest source of imported salt has been the Turks and Caicos Islands in the Caribbean. Salt raking on a commercial scale first began on Grand Turk Island in 1678 and continued until the 1960's. The United States was the primary consumer of this salt - often importing 90% of the salt produced. Turks salt was typically shipped north the major east coast ports and had an average tariff of 6 cents per bushel or $1.68 per ton. Details of the methods of salt production and the effects of the various tariffs will be described.**

## Panel I. D: Annual SIA Bridge Symposium I

**Chair: Eric Delony, HAER"Welcome & "State of the Bridge" Remarks" -- Eric Delony,**

**HAER"Relocation of the Cape Hatteras Lighthouse" -- David C. Fischetti, DCF Engineering, Inc.**
**As the North Carolina barrier islands of the Outer Banks roll over themselves in tank-tread fashion, nature maintains this dynamic equilibrium of beach and ocean through unceasing trade-offs of material, energy, topography, and the rising sea level. For 120 years the Cape Hatteras Lighthouse has warned mariners of this treacherous coastline. In 1980 the National Academy of Sciences reported that relocation was the best way to preserve the lighthouse. In June 1989, the National Park Service concurred.**

**The project called for the relocation of the complete light station (lighthouse, two keeper's quarters, oilhouse) to an area 2900 feet southwest from its present site, an alternative which would preserve the lighthouse for an estimated 200 years. The successful design/building team proposed a system for moving the 4800 ton lighthouse consisting of cross steel and main steel resting on hydraulic jacks and industrial rollers. A heavy steel mat on a prepared sub-grade was constructed to the new site. Hydraulic push jacks provided the force needed for movement.**

**The relatively simple and modern structure of the Cape Hatteras Lighthouse, documented by the original 1869 drawings, and its ideal location contributed to the feasibility of relocation. The 208 foot tall lighthouse is a brick masonry cylinder enclosed by a truncated cone with inner and outer walls. Despite its weight, it was more feasible to move the lighthouse in one piece rather than several. The lighthouse's inherent stability against overturning, critical to its successful relocation, is excellent because its center of gravity is only fifty-six feet above its base. The very dense sands underlying the lighthouse provided support, making the stability of the lighthouse on its trip a question of simple static.**

**"Discovering Zonas King" -- Alan King Sloan, AICP**
**Zonas King founded the King Iron Bridge Company in Cleveland, Ohio in 1858 and embarked on a business venture that produced over 5,000 bridges in the next 50 years. these bridges were an important contribution to the system of highways and railroads making possible the nation's economic growth and expansion and is his principal legacy. But another legacy of less cosmic importance, except to me, is that I am his great-great grandson. Belatedly I have**

**tried to find out what I could about this ancestor whose story was never well documented by his earlier descendants. It is a story of a man of imagination and ambition finding ways to operate effectively in the dynamic environment of the late 19th century.**

**The story starts in 1818 with the birth of Zonas in a tiny Vermont farming community and continues through the first forty years of his life during which time he was successively a farmer, house builder, clothing merchant, farm machinery salesman, and finally an inventor and bridge builder. He was also a family man and pillar of his church. While not among those seeing the building of iron bridge as a way to fame and fortune, he had the foresight to create three important pillars of his business operations; first, a well-designed and marketable product, second, a nationwide network of salesmen able to find the clients, and third, a way of delivering his product quickly and efficiently throughout the land. All this in the days before the telephone, fax machines, and air travel.**

**Zonas also desired to have his family profit from his business success. While other bridge builders were merging to form larger companies to deal with competition. Zonas was making sure his sons were able to control the enterprise. His strategy was to form a pooling arrangements with other bridge companies to control prices and markets. This eventually led to prosecution under antitrust laws and a gradual loss of energy and interest on the part of his sons to continue the business.**

**What is left from this effort are a few King bridges, some big, some small, and some thankfully preserved as part of our national heritage.**

**"Saving Historic Roads" -- Dan Marriott, Rural Heritage Program, National Trust for Historic Preservation**
**The appreciation and preservation of historic bridges has gained significant momentum in recent years. Whether graceful arching forms or solid utilitarian structures, the preservation community, general public, and even departments of transportation no clearly recognize these structures as resources worthy of special attention and care. It is at the end of the bridge, however, where the second part of any bridge story begins---the historic road.**

**Historic roads share the rich engineering, technological, and historic**

**past of bridges. Unlike bridges, an often dramatic and very definable resource, historic roads cover greater distances, can be more nebulous in form and integrity, and, by virtue of being "land-based" subject to more frequent and expeditious alterations over the years. Nonetheless, a growing movement recognizing these historic resources, from post roads to parkways, is looking at tools for identification, management, and preservation.**

**This presentation will address the research conducted by the National Trust for Historic Preservation regarding historic roads. Recognizing that safety and historic preservation are not mutually**

**exclusive, the Trust has embarked on a campaign to educate preservationists and engineers alike of the many alternative design and safety solutions responsive to historic roads.**

**Many roads in the United States have been not only recognized for their historic qualities, but also are the subject of innovative state and federal programs to address their preservation. The Historic Columbia River Highway in Oregon, the Merritt Parkway in Connecticut, the Motor Roads of Acadia National Park in Maine, and the Lincoln Highway in Nebraska are but a few of the many historic roads embarking in strategies of preservation, community awareness, and favorable state policies.**

**Historic bridges can serve as an important catalyst for the preservation of historic bridges. The research, documentation and action they have inspired can be applied to their road counterparts. For historic bridges, an historic context looking beyond the edge of the bridge brings into view a larger historic picture and clearly links the historic bridge with the communities it was created to serve.**

**Session II: 10:30-12:00**

**Panel II. A: Technology of Southern Plantations**

**Chair: Susan Appel**

**"Ginning Bolls and Pressing Bales: A Century of Cotton Production at Magnolia Plantation" -- Richard O'Connor, HAER**
**Defunct Industrial sites present unique challenges in the**

**documentation of their construction, organization and operation. Buildings are expanded and modified for different processes and products, and technologies are routinely retired, replace, or adapted, with the pace of technological change often varying widely within and between sites. Since records are rarely maintained on outdated equipment and structures, the artifacts themselves become important sources of information. But they can present hazy and even contradictory evidence of the ways active industrial sites functioned, as the recent documentation of the gin house and equipment at Magnolia Plantation near Natchitoches, Louisiana by the Historic American Engineering Record (HAER) demonstrates. One of many structures on the site, the gin house contains cotton processing equipment that cleaned the lint of seed and trash in preparation for baling and shipping. Technological remains span the nineteenth century and include a wood screw press, and steam-powered ginning and pressing equipment.**

**A compendium of once state-of-the-art cotton processing technologies representing vastly different eras of Southern history, the Magnolia plantation's juxtaposition of equipment (some still in its original placement but some randomly strewn about) inhibits a quick reading of its operation and seemingly defies confident explanation. But the need to study and evaluate this equipment, the search for new sources to explain its nuances and contradictions, and the compelling desire to locate it in its many historical contexts, suggest that the richness of the resource lies precisely in the challenges it presents.**

**"Burning Bricks: A South Carolina Plantation Industry" -- Lucy B. Wayne, SouthArc, Inc.**
**The Wando River Basin in Berkeley and Charleston Counties, South Carolina is located northeast of the City of Charleston. Unlike much of the Lowcountry, this river basin could not readily support large-scale production of plantation cash crops such as indigo, rice and cotton. The soils are poorly drained and frequently wet, and the river itself is too saline to support rice cultivation, except at its extreme upper reaches.**

**The river basin did have assets, however. The first was proximity to the City of Charleston, one of the few larger southern cities during the antebellum period. The second was water transportation via the**

**tidal rivers. This led to the development of the Wando basin and the Wando Neck between the river and the Atlantic Ocean as a production center for the urban market. Agricultural production focused on produce and livestock, with supplementary income from firewood, timber, naval stores and bricks.**

**Brickmaking has four basic requirements: suitable clay, sand to temper the clay, fuel to fire the kilns and labor. The Wando River basin had an abundance of all of these resources, with labor provided by enslaved African-Americans. The navigable tidal river flowing into Charleston harbor provided market**

**access, which turned brickmaking into a thriving industry in this region. This was an industry which would permanently alter the landscape of the plantation while enriching their owners.**

**Using the framework of landscape archaeology, this paper will examine brickmaking in terms of: (1) the planters' perception of the environment, (2) how the environment influenced adaptation within the plantation system, (3) how these adaptations in turn affected the environment, (4) the technologies and processes employed in plantation brickmaking, (5) the role of the marketplace and proximity to that market, (6) historic events which influenced development of the industry, and (7) the nature and interrelationships between the identified brickmaking sites.**

**"Tabby: A Historical Perspective on an Antebellum Building Material in Tidewater Georgia" -- Buddy Sullivan**
**This paper focuses particularly on the remains of south Georgia sugar mills, c. 1820.**

**Panel II: B: Aeronautical Archaeology**

**Chair: Squire Brown**

**"The Historic American Engineering Record (HAER) Documentation of the Looking Glass Aircraft (No. 62 852) at Offut Air Force Base, Nebraska" -- Donald M. Durst and Stanley J. Popovich, Hardlines: Design & Delineation**
**In January 1999, Offut Air Force Base (OAFB) completed a Historic American Engineering Record (HAER) project, to document the EC-**

**135 aircraft that served as a 24-hour, airborne command post during the Cold War. The EC-135 aircrafts, known as "Looking glass" because they mirrored the functions of the underground Strategic Air Command (SAC) center, provided the means to guarantee a nuclear retaliation in event of war with the Soviet Union.**

**In 1960, SAC started Project Looking Glass. By 1961, Looking Glass aircraft began round the clock operation. SAC maintained a 24-hour operation until 1990. The EC-135 aircraft is a modified Boeing KC-135 tanker with four engines. For the Looking glass mission, the KC-135 was customized to hold a variety of command and communication equipment that enable the personnel on board the aircraft to wage World War III from the air.**

**This presentation will discuss the history and significance of the aircraft and its mission I will discuss the challenges in field measuring and documenting an aircraft versus a standing structure. The presentation will be illustrated with slides of field work, sketches produced in the field, and the final ink-on-mylar drawings.**

**"The Historic Significance of the Development and Utilization of De-Mountable (DH-1) Hangers at Reese Air Force Base, Texas" -- Charissa Y. Wang and Roy A. Hampton, III, Hardlines: Design & Delineation**
**Reese Air Force Base (RAFB) served as an air training facility during World War II and was part of a military mobilization plan that came into effect after the fall of Poland in 1939. On June 26, 1941, Federal Government established the Air Corps Advanced Flying School at Lubbock, Texas.**

**However, unlike other bases being established in the heart of the country, the Air Corps emphasized the construction of temporary buildings and removable hangers instead of permanent structures. At RAFB, the Air Corps built 3 DH-1 Demountable Hanger Facilities. The use of DH-1 allowed the military to remove entire hangers and support facilities and reestablish operations at another location in event an invasion through the Caribbean or Central America.**

**DH-1 hangers utilized different construction techniques such as bolted connections instead of welded joints. Each Hangers were to be built in individual steel unit sections that allowed for easier**

**packaging, replacement, and reassembly.**

**The Air Corps became so enamored with portable hangers that several manufacturers established shops in the region to meet the growing demand. Nearly 30 demountable hanger buildings were built in the nation. At the time, the Air Corps believed DH-1 hangers would be cheaper and quicker to build than permanent facilities, however, this did not turn out to be accurate.**

**The presentation will discuss the architectural and engineer significance of these buildings and the impact on the regional industry. The presentation will be illustrated with slides of the hangers, construction drawings, and other related materials.**

**"Building 79D, Wright-Patterson Air Force Base" -- Roy A. Hampton, III, Hardlines: Design & Delineation**
**This presentation will focus on Building 79D, a jet engine testing facility documented in 1998 by Hardlines: Design & Delineation at Wright-Patterson Air Force Base (WPAFB) in Dayton, Ohio. The structure was an unusual test stand for highly classified experiments in jet technology.**

**During World War II, the Allies became aware of the need to develop a viable jet fighter aircraft as a countermeasure against German jet aircraft. In 1944, this situation led the U.S. Army Air Forces to build a new jet technology development and testing facility in a remote location at Wright Field, Dayton, Ohio. in 1998, Hardlines: Design & Delineation investigated the historical significance of WPAFB's Building 79D, built as part of this jet technology laboratory.**

**Original construction drawings showed that Building 79D was built as a simple concrete circle with a wooden canopy in the middle. In contrast, most World War II era jet engine test stands at Wright Field were fully enclosed rectangular concrete bunkers. Drawings and files at WPAFB gave few clues Building 79D's original function. A 1944 construction memo in the National Archives at College Park finally revealed that the building was originally constructed as a test facility for extremely hazardous experimental jet engines. In anticipation that a number of these engines would malfunction and self-destruct, Building 79D was built with a series of wooden parts that could be replaced after each explosion. The structure's unique design allowed**

**it to withstand violent explosions on a regular basis.**

**Building 79D was modified in the early 1950s, and served as a rocket engine test stand until all rocket testing activities at WPAFB were moved to Edwards AFB in the late 1950s. Our documentation of this structure has provided a vivid picture of the extreme dangers associated with experimental jet testing during World War II. It has also given a us a clearer view of how jet engine testing facilities were used at Wright Field in the late 1940s.**

**Panel II. C: Students respond to "Whither Industrial Archaeology"**

**Chair: Fredric L. Quivik, consulting historian of technology**

**Joe Deaton, Michigan Technological University**

**Tim Tumberg, University of Arizona**

**Greg Galer, MIT**

**Panel II. D: Annual SIA Bridge Symposium II**

**Chair: Eric Delony, HAER**

**"Alabama's Historic Bridge Inventory" -- Jim Richardson, University of Alabama at Tuscaloosa; Mike Davis, Lane Bishop York Delahay, Inc.; Mary Lou Crenshaw, Alabama Dept. of Transportation**
**The University of Alabama, under contract with the Alabama Department of Transportation, recently surveyed Alabama's bridges and selected approximately 200 as either eligible or possibly eligible for the National Register of Historic Places (NRHP). The authors discuss the process of surveying, selecting and documenting Alabama's historic bridges to produce a historic bridge inventory, and the lessons learned.**

**Selecting a bridge for NRHP eligibility was rarely a cut-and-dried decision. Nevertheless, after visiting potentially-historic bridges in every county in the state, patterns began to emerge. The state-wide survey provided the perspective to select bridges that were unique or were good examples of a particular bridge type. Engineering**

**judgement was also brought to bear in the decision by considering the structural condition of a bridge and the feasibility of leaving a bridge in place and rerouting the highway.**

**The state-wide survey did not provide adequate historical information for the bridge inventory. Mail-out surveys to county engineers and local historic societies were largely unproductive. Retrieving historic information (by visiting county court houses and local libraries) for the 450 bridges visited in the state-wide survey was not feasible. As a result, most of the bridges were selected for NHRP eligibility based on Criteria C ("Bridges that embody distinctive characteristics of a type,..."). A lesser number (42 of the 200) were selected based on Criteria A ("Bridges that are associated with events...").**

**The final product, Alabama's Historic Bridge Inventory, has proven to be a useful tool for the Alabama DOT. The inventory is documented in a large report containing photographs and maps to 372 bridges and a history of transportation in Alabama. A computer program was also produced for searching and updating the bridge database.**

**"Save Our Bridge: How Citizens of a Small Town in Texas Are Working to Save a Steel Truss Bridge" -- Robert A. Gammage, Attorney at Law**
**Told by their area's state highway engineer that he didn't care if the "little old ladies" of Llano, Texas chained themselves to their town's historic Roy B. Inks Bridge because it was "gone," a small group of citizens found themselves confronting the political might and resources of their community's largest employer and taxpayer, their own municipal government, their state legislators and lieutenant governor, and the Texas Department of Transportation. The fight goes on, but so far the Llano Citizens Preservation Coalition has effectively fought back with its own physical and financial resources, engineers, legal research, and networking on a national scale.**

**When the 800-foot, 1936 four-span riveted Parker steel truss Inks Bridge, crossing the Llano River in the center of town, is threatened with removal or destruction, a handful of diverse citizens seek to preserve their community's historical integrity and quality of life by entering the bewildering maze of state and federal bureaucracy and regulations, only to find their efforts under assault by some of their own local and state elected officials. Convinced that knowledge is**

**power, they embark upon an intense program of self-education, and then, utilizing tested and proven techniques of grassroots political campaigning, proceed to inform and persuade their neighbors and those charged with the responsibility to monitor, enforce and implement federal funding and preservation laws. The bridge that was "gone" now appears to have a fighting chance for many more years of service as community historical icon and calming conduit for highway traffic in the center of this small Texas town.**

**"The Lower Bridge at English Center: An Innovative Method of Stiffening Suspension Bridges" -- Justin M. Spivey, HAER**
**Americans have been building metal suspension bridges since 1801, when James Finley used iron chains to span Jacob's Creek in Fayette County, Pennsylvania. Truss railings stiffened the flexible chains of Finley's bridge against moving loads and wind, answering a need recognized by designers and users of suspension structures throughout their history. In this slide presentation, I show that despite continued popularity of deck-stiffening trusses for suspension bridges, a large variety of alternate stiffening systems have spanned Pennsylvania's waterways.**

**I first introduce a typology of suspension bridge stiffening methods, illustrated with Pennsylvania examples including braced chains by Gustav Lindenthal, diagonal stays by John Roebling, and cable trusses on a footbridge built by Roebling's Sons Company. I then focus on a pair of bridges erected in 1891 by former Phoenix Bridge Company agents Dean and Westbrook in the logging and tanning borough of English Center. The pair, of which one survives, are rare examples of eye-bar suspension chains stiffened by diagonal crossing each panel between chain and deck. I explain how the extant bridge's unusual stiffening system occupies an important position in Pennsylvania's rich legacy of suspension bridges. Although the English Center bridge's appearance resembles a suspension structure, stout vertical elements (evidently designed for compression) indicate that its structural behavior might not. Using results from structural analysis and full-scale load testing, I show how the bridge carries loads primarily by truss action. By comparing Dean and Westbrook's creative solution to other stiffening systems, I demonstrate its relative efficiency for short spans.**

**Annual Business Meeting/Lunch: 12:15 - 2:15**

**Session III: 2:30 - 4:00**

**Panel III. A: The Archaeology of Involuntary Labor**

**Chair: Gray Fitzsimons**

**"A Old South Legacy Adapted to a New Industrial Landscape: Convict Labor in the Coal Mines of the Birmingham Industrial District" -- Jack R. Bergstresser, University of Alabama at Birmingham**
**The late 19th and early 20th-century coal mining landscape of the Birmingham Industrial District reveals a uniquely southern blend of manpower and machinery, a distinctive melding of coerced labor and technological innovation. Following the Civil War northern and southern entrepreneurs and investors joined forces to make the Birmingham District the industrial show piece of the New South. Ironically, while they freely drew upon the north's most modern mining technology and expertise, they chose to retain the traditional labor relations of the old south. Although slavery had been outlawed, state legislators and prominent coal mine operators who had employed slaves to mine coal for the Confederacy were able to revive the vestiges of the institution in the form of convict leasing. Paradoxically however, mine operators used the prison inmates in their most modern, mechanized operations while employing skilled, paid miners in their labor intensive hand mining operations. This arrangement made it possible for owners to avoid expensive shut downs of their capital intensive plants during strikes or periods of low demand for coal. At the same time they could easily shut down the low-overhead, hand mining operations as needs dictated. The bargaining position of free miners was seriously impaired while owners maintained a steady output of coal. Stark, mute symbols, the few remaining nearly all black convict miner's cemeteries place a unique southern stamp on the historical landscape of Alabama coal mining.**

**"Hard Toil: The Negro Slave in Antebellum Industry" -- David M. Brewer, Oneonta, AL**
**The economy of nineteenth century antebellum**

**Alabama depended primarily upon the exploitation of slave labor.**

**Despite principally answering the manpower demands of agriculture, this coercive system also provided Alabama's early-industrialists with an abundant labor supply. Many of these industrial entrepreneurs owned slaves, while many others hired slaves from local planters. Whether owned or hired, slaves performed virtually all of the unskilled tasks, as well a many of the skilled tasks, associated with manufacturing, mines, iron works, and railroad construction in antebellum Alabama.**

**Previous studies of slavery in Alabama have emphasized the agrarian nature of the state's antebellum economy, while de-emphasizing the development of industry. As a result, slavery in Alabama has been interpreted as primarily a plantation based-agricultural system. Despite the predominance of agriculture, industry played a crucial role in the economy of early and mid-nineteenth century Alabama in the production of much-needed manufactured goods. In turn, slave labor played an integral role in this industrial and manufacturing development.**

**This paper will explore the role of bondsmen in the growth of Alabama industry and will highlight the use of owned and hired slaves as industrial laborers, including an examination of specific industries and job tasks associated with each. It will also argue that industry and manufacturing within the plantation context provided impetus for the use of coerced labor in full-scale industrial plants removed from the plantation. Slides will be used to supplement the text and to highlight the hard toil faced by Alabama industrial slaves.**

**"Stepping to It: The Prisoner Treadmill at Old Charleston Jail" -- David Shayt, Smithsonian Institution**
**This paper reviews the construction and usage of the treadmill that operated at the Jail in Charleston, South Carolina from 1825 to the 1840s. This installation was one of four introduced to American prisons in the 1820s after its success in British penitentiaries. The ultimate failure of this human motive power technology in the United States is not supported by Charleston's twenty years of mill operations.**

**This paper uses original images of the Charleston mill, slides of models, and shots of the one surviving prison treadmill in Wales to describe how such mills operated and why they succeeded in some**

**settings and failed in others, largely due to cultural and socio-economic reason.**

**Panel III. B: The Landscape of Large-Scale Industrial Plants**

**Chair: Charles Hyde**

**"The Workers' Garden at the Central of Georgia Railroad Shops in Savannah" -- Katherine Clark, Savannah**
**The Central of Georgia Railway, established in 1833, has a rich history of worker-initiated gardening. These gardens were rather spontaneous. Unlike landscaping at many northern industrial complexes, most of the Central of Georgia gardens were designed not by owners or landscape architects but by employees who adopted unused space around offices, warehouses and passenger stations for cultivation. A variety of employees representing all levels of the railroad's hierarchy, both men and women, embellished their workday surroundings with flowers and vegetables. In contrast to professional designers they rarely used trees or shrubs.**

**Central of Georgia's Repair and Maintenance Shops in Savannah are some of the oldest and most complete antebellum railroad facilities in North America. As the first fully self-contained and integrated railroad shops complex it contained a circular roundhouse, machine shop, blacksmith shop, foundries, offices, and an ornate smokestack all connected by underground smoke tunnels. Five of its surviving structures were built before 1860. The balance of its buildings were constructed or amended in a second building phase in 1926.**

**Prior to the 1926 building phase, workers employed in the shops constructed a formal garden and goldfish pond within a large courtyard enclosed by the superintendent's office, the copper foundry, and the machine shop. This area was a source of pride for employees. They competed in growing vegetables and admired their work from benches within the garden where they took their lunch breaks. After the shops permanently closed in the late 1960's the remaining workers bulldozed the garden and back-filled the pond in order to minimize maintenance.**

**Twenty years later, the railroad shops reopened as a historic site. Despite an earlier, comprehensive archaeological survey of the**

**shops complex, no sign of the garden could be discovered. In 1993 the evidence relating to the garden was re-analyzed. Beginning with an important clue derived from oral history, other evidence, including aerial photographs of the area, insurance maps, analysis of surrounding architecture, and finally archaeological excavation, the outlines of the garden and remaining portions of the pond were discovered.**

**Today the garden has been restored and is being properly interpreted in the history of the railroad shops. Volunteers update and maintain the garden. It is again a source of pride and recreation to all who visit it.**

**"Physical Setting and the Shaping of Giant Smelters: A Comparison of the Great Falls and Anaconda Smelters" -- Fredric L. Quivik, Alameda CA**

**This paper will compare the technological developments at two Montana smelters to show how proximity to a large river helped shape the course of innovation. Most copper smelters built around the turn of the twentieth century were built near the mines that supplied them with ore. Copper smelters were usually located on streams of sufficient size to supply water necessary from treating ore. Twenty-six miles west of Butte, the Anaconda Reduction Works, although the largest non-ferrous metallurgical plant in the world of its time, was otherwise typical of copper smelters in the way it was built near a source of water adequate to the smelter's needs but not appreciably larger. The Great Falls smelter, on the other hand, was relatively unusual in that it was built along a major waterway, the Missouri River. The most obvious difference the Great Falls smelter's setting made was that the river provided unusual access to an inexpensive source of hydroelectricity. The setting along the Missouri River also helped shape the course of development for technologies at the Great Falls smelter for concentrating ores that was significantly different from the trajectory followed by the Anaconda smelter. This paper will compare the two smelters, showing how the Missouri River's ability to carry away tailings led metallurgists at Great Falls to follow a remarkably different strategy of innovation than did those at Anaconda.**

**"A New Direction for Industrial Archaeology: The Recording of Three Nuclear Facilities at Argonne National Laboratory" -- Daniel J. O'Rourke and Konnie L. Wescott, Environmental Assessment Division, Argonne National Lab**

**Energy technologies have been studied under Industrial Archaeology since the inception of the discipline. As Cold War era facilities are beginning to be dismantled across the country, a new avenue of research has opened up for Industrial Archaeology. Knowledge of the technologies associated with nuclear research and the Cold War is important for understanding the last 50 years of American and world history. Industrial archaeologists are uniquely qualified to address this topic given their focus on technology and process as well as a familiarity with large-scale operations.**

**During 1998, decontamination and decommissioning (D&D) activities at Argonne National Laboratory, a U.S. Department of Energy (DOE) facility, located in DuPage County, Illinois, initiated the Section 106 process under the National Historic Preservation Act. Through this process it was determined that three Cold War era properties involved in nuclear research (the Argonne Thermal Source Reactor, the Chicago Pile-5 Reactor, and the Physics and Metallurgy Hot Laboratory) met the criteria for eligibility for inclusion on the National Register of Historic Places. To mitigate the effects of D&D activities on these facilities, the DOE, the Illinois Historic Preservation Agency, and the Advisory Council on Historic Preservation signed Memorandums of Agreement stipulating that DOE document the historical context, technical and operational aspects, and architectural descriptions of each facility.**

**This paper will briefly describe Argonne National Laboratory, its history at it relates to these three Cold War era facilities, the facilities themselves, and the approach to document these resources from an industrial archaeology perspective.**

**Panel III. C: Archaeological Investigations of Mills**

**Chair: Richard O'Connor**

**"Unearthing Anthropology and Technology at Rural Industrial Sites: Excavations at Three Grist Mills in Georgia" -- Sarah E. Cowie, Southern Research - Historic Preservation Consultants, Inc.**

**Traditionally, industrial archaeology has studied the material manifestations of historic technology and economics. More recent excavations in the neighborhoods of industrial towns have commented on the industry's interaction with culture. However, excavations at more technologically-oriented sites (*e.g.* dams, raceways, mill buildings) usually focus unwaveringly on unearthing the technology at those sites. As a result, it often seems too difficult to find elements of cultural behavior within the various configurations of industrial earthworks, timbers, leather belts, and machine cut nails. Are we not looking hard enough at this information, or do certain sites simply obscure it? At the recent "Whither Industrial Archaeology" conference, it became apparent that if IA is going to be an accepted and respected discipline outside of our own circles, we must make our work useful to other disciplines such as anthropology and social history. In addition to answering questions pertaining to the history of technology, industrial archaeologists can examine issues of human behavior, perceptions, beliefs, and value systems expressed at industrial sites. This paper primarily examines the ongoing investigations of three technologically informative grist mill excavations, and then addresses the prospects of including an anthropological perspective in the analysis of such sites.**

**"An Archaeological View of a Southeastern Kentucky Sawmill" -- Grant L. Day and Jonathan P. Kerr, Cultural Resource Analysts, Inc.**
**The excavation of the Crawford-Nurre sawmill site (15WH165) in southeastern Kentucky uncovered the footprints of an 1880s steam-powered sawmill including engine pad and boiler foundation. According to archival records, in 1882, two Ohio businessmen, George S. Crawford and A. Joseph Nurre, built this sawmill to provide materials for their lumber yard and wood picture frame and molding company in Cincinnati, Ohio. This small sawmill and others like it blazed the trail for large-scale logging operations and coal mining in the region. The history of this sawmill is compared to others in the area to provide a clearer picture of eastern Kentucky's lumber industry during the late 19$^{th}$ century.**

**"Power and Production at The Daniel Pratt Gin Company" -- LeeAnn Bishop Lands, Georgia Tech University**
**During the summer of 1997, the Historic American Engineering**

**Record (HAER) conducted a three-month study of the Continental Eagle Corporation in Prattville, Alabama. Founded in 1833 by Daniel Pratt, long regarded as Alabama's premier antebellum industrialist, the Daniel Pratt Gin Company (predecessor of Continental Eagle Corporation) became the mainstay of Pratt's industrial village (Prattville) in 1838 when he relocated it from McNeill's Mill to its current location. The Prattville team studied and delineated the earliest five buildings still in existence, dating from c. 1848, c. 1852, 1854, 1898, and 1912. This manuscript examines the relationship between motive power, production methods, and factory design at the Daniel Pratt Gin Company from 1848 to 1950. During this period, the factory moved from water, to steam, to electric power. Significantly, this factory's transition demonstrates a pervasive yet inderstudied phenomenon - the used of multiple power supplies through much of the factory's life. After running on a mix of water and steam for forty years, the plant continued on water, steam, and electricity for about 15 years. Water power use ceased around 1945, and the plant continued using steam and electricity until the company began large-scale restructuring of the facility in the late 1950s. Choice to remain on water-powered, then steam-powered, and finally electricity-driven belt drives helped maintain a cumbersome manufacturing process and mitigated against a more rational processing of materials until the 1940s.**

**Panel III. D: Annual SIA Bridge Symposium III**

**Chair: Eric Delony**

**"Against All Odds: Georgia State Highway Department's Rise to National Prominence in Bridge Design" -- Mary E. McCahon and James Patrick Harshbarger, A.G. Lichtenstein & Associates, Inc.**
**against the backdrop of poverty, political interference, and regional differences, dedicated and dynamic engineers moved Georgia in less than 20 years from a state that substituted convict labor for a road and bridge program to a national leader in bridge design. From 1920 until the late 1930s Georgia's State Highway Department successfully established and developed a first-rate highway system where none had existed before by using economy as its guiding principle. By focusing on economy in order to maximize the benefit of every precious dollar spent, the department became a leader in low-cost, efficient bridges, especially continuous and continuous cantilever**

**design beam bridges.**

**This paper will develop the contextual background for the Department's need to emphasize economy in bridge design and how that philosophy resulted in the early application of the principles of continuity to steel beam bridges. Georgia was in the forefront of what after World War II would become commonly accepted technologies.**

**"Rehabilitating Georgia's Covered Bridges" - Gail A. D'Avino, Georgia Department of Transportation**
**When Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, the Georgia Department of Transportation recognized an opportunity to repair and stabilize the state's remaining covered bridges. We submitted an application seeking funding to rehabilitate these bridges under the Transportation Enhancement Activity program.**

**This presentation will discuss the Department's project to rehabilitate ten covered bridges in Georgia. These timber bridges have been vulnerable to neglect, fire and flood. Because of this vulnerability, wooden covered bridges are rapidly disappearing in Georgia.**

**The discussion will include the history of each bridge, a description of the bridges, and details of the work completed to rehabilitate these bridges.**

**"Reconstruction of the Talmadge Memorial Bridge in Savannah" -- Paul Liles, Georgia Department of Transportation**
**In the late 1980"s, the Georgia DOT undertook the reconstruction of the Talmadge Memorial Bridge in Savannah, Georgia. The new bridge consisted of a new 1100 ft main span cable stayed bridge over the Savannah River and would replace an existing truss bridge located just upstream. This world class bridge opened the port of Savannah to modern shipping traffic and has had a major impact on the commerce of the city. This paper details the construction methods used in building a cable-stayed bridge, discusses the advantages of this type of structure and covers the project from the beginning of construction, through the removal of the old bridge.**