North Carolina Department of Cultural Resources

State Historic Preservation Office

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

January 20, 2006

MEMORANDUM

TO: Greg Thorpe, Ph.D., Director
Project Development and Environmental Analysis Branch
NCDOT Division of Highways

FROM: Peter Sandbeck RSE for PBS

SUBJECT: National Register of Historic Places Evaluation of the Piedmont Tin Mine, Improvements to NC 150, From US 312 at Lincolnton to US 321 Bypass, R-0617C, Lincoln County, ER 04- 3160

Thank you for your letter of November 21, 2005, transmitting the above survey report by Marvin A. Brown of URS Corporation – North Carolina.

The following property is determined not eligible for listing in the National Register of Historic Places:

Piedmont Tin Mine, east of US 321 between Tin Lane and Tin Mine Road, Lincolnton vicinity, Lincoln County, is not eligible for the National Register because it no longer retains sufficient integrity to support any significance under National Register Criteria. Only a few physical traces of the once extensive operation survive.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

cc: Mary Pope Furr
Marvin A. Brown, URS Corporation

bc: Southern/McBride
County

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-4763/733-8653
RESTORATION	515 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6547/715-4801
SURVEY & PLANNING	515 N. Blount Street, Raleigh, NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6545/715-4801

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

November 21, 2005

Ref # 04-3160
Sandbeck
12/13/05

Mr. Peter Sandbeck
Deputy State Historic Preservation Officer
North Carolina Department of Cultural Resources
4617 Mail Service Center
Raleigh, North Carolina 27699-4617

Dear Mr. Sandbeck:

RE: Improvements to NC 150 from US 321 at Lincolnton to US 321 Bypass, Lincoln County, North Carolina, State Project No. 8.1830402, Federal Aid No. STP-150(3), WBS No. 34250.1.1

The North Carolina Department of Transportation (NCDOT) is conducting planning studies for the above-referenced project. Please find attached two copies of the Historic Architectural Resources Survey Report, which meets the guidelines for survey procedures for NCDOT and the National Park Service.

In 1991, Hall and Baker Archaeological Consultants completed an archaeological investigation of the project area for NCDOT. This report noted the presence of a mining operation with in the project area, yet did not evaluate the site for National Register eligibility. Marvin Brown and Dan Cassedy of URS Corporation undertook the National Register evaluation of the mining site, identified as the Piedmont Tin Mine, and prepared this report. The report concludes that the Piedmont Tin Mine is Not Eligible for the National Register of Historic Places.

Please review the survey report and provide us with your comments. If you have any questions concerning the accompanying information, please contact me at (919) 715-1516.

Sincerely yours,

Jennifer Cathey

Jennifer Cathey
Historic Architecture Group
Office of Human Environment

Attachment: survey report

Cc (w/ attachment): Mike Penney, Project Development, NCDOT/PDEA
John F. Sullivan, III, Division Administrator, FHWA

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
OFFICE OF HUMAN ENVIRONMENT
1583 MAIL SERVICE CENTER
RALEIGH NC 27699-1583

TELEPHONE: 919-715-1500
FAX: 919-715-1522

WEBSITE: WWW.NCDOT.ORG

LOCATION:
PARKER LINCOLN BUILDING
2728 CAPITAL BOULEVARD, SUITE 168
RALEIGH, NC 27604

NATIONAL REGISTER OF HISTORIC PLACES EVALUATION OF THE PIEDMONT TIN MINE

IMPROVEMENTS TO NC 150 FROM US 321 AT LINCOLNTON TO US 321 BYPASS LINCOLN COUNTY, NORTH CAROLINA

TIP No. R-0617C
P.O. No. 6300008161
Line No. 70
WBS No. 34250.1.1
Contract No. 700003401

Prepared For:

Office of Human Environment
Project Development and Environmental Analysis Branch
North Carolina Department of Transportation
and
Federal Highway Administration

Prepared By:
URS Corporation – North Carolina
1600 Perimeter Park Drive
Morrisville, NC 27560

Marvin A. Brown
Daniel F. Cassedy
Principal Investigators

November 2005

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November 2005

Marvin A. Brown 11-14-05

Marvin A. Brown, Principal Investigator **Date**
URS Corporation-North Carolina

Mary Pope Furr, Supervisor **Date**
Historic Architectural Resources Section
North Carolina Department of Transportation

MANAGEMENT SUMMARY

The following National Register of Historic Places evaluation was conducted by URS Corporation–North Carolina (URS) in support of improvements to NC 150 from US 321 in Lincolnton to US 321 Bypass, Lincoln County, North Carolina (TIP No. R-0617C). The scope of work for this report—which was limited to evaluating whether an early tin mining operation was eligible for National Register listing—was devised after consultation with Ms. Mary Pope Furr of the Office of Human Environment, Project Development and Environmental Analysis Branch of the North Carolina Department of Transportation (NCDOT). The fieldwork and research were conducted, and the report was prepared by, URS Senior Architectural Historian Marvin A. Brown and URS Senior Archaeologist Daniel F. Cassedy, Ph.D.

As a result of its investigations, URS recommends that the former Piedmont Tin Mine is not eligible for listing in the National Register. Only a few physical traces of the once extensive mining operation survive and the resource is therefore not believed to retain sufficient integrity to support any significance under the National Register Criteria.

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I. PROJECT DESCRIPTION AND METHODOLOGY

The following National Register of Historic Places evaluation was conducted by URS Corporation–North Carolina (URS) in support of improvements to NC 150 from US 321 in Lincolnton to US 321 Bypass, Lincoln County, North Carolina (TIP No. R-0617C) (Figure 1). The scope of work for this report—which was limited to evaluating whether an early tin mining operation was eligible for National Register listing—was devised after consultation with Ms. Mary Pope Furr of the Office of Human Environment, Project Development and Environmental Analysis Branch of the North Carolina Department of Transportation (NCDOT). The fieldwork and research were conducted, and the report was prepared, by URS Senior Architectural Historian Marvin A. Brown and URS Senior Archaeologist Daniel F. Cassedy, Ph.D.

In 1991 Hall & Baker Archaeological Consultants completed an archaeological investigation of the NC 150 project corridor from Cherryville in Gaston County to Lincolnton in Lincoln County (TIP R-0617). The area considered in the current report for TIP R-0617C was included within this larger study area encompassed in the earlier report (Baker 1991). That report noted the presence of a mining operation within the current project area, as well as the presence of non-diagnostic prehistoric artifacts. It concluded that the integrity of any potential prehistoric sites had been destroyed by the mining operation and later activities on the land. It therefore recommended that there were no National Register-eligible archaeological sites within what is now the current project area. The Hall & Baker report did not, however, address whether the mining operation was itself eligible for National Register listing as a historic or archaeological site. The current report, at the request of NCDOT, addresses the integrity, significance, and National Register eligibility of the mining operation as a mining operation.

A cultural resources survey within the Area of Potential Effects or APE associated with the proposed bypass was necessary for compliance with the basic requirements of: Section 106 of the National Historic Preservation Act of 1966, as amended; the Department of Transportation Act of 1966, as amended; the Department of Transportation regulations and procedures (23 CFR 771 and Technical Advisory T 6640.8A); the Advisory Council on Historic Preservation regulations on the "Protection of Historic Properties" (36 CFR 800); and NCDOT's "Historic Architectural Resources, Survey Procedures and Report Guidelines." In order to meet the requirements of these laws and regulations, the work plan for the survey included the following items: (1) the development of a context for mining-related resources in Lincoln County; (2) a field survey of the tin mine and its associated artifacts that was *not* to include any archaeological shovel testing or excavation; (3) research at various local and statewide repositories; and (4) the preparation of a draft and final intensive-level report.

The APE—the area or areas within which an undertaking may cause changes in the character or use of historic properties—was defined as the footprint of the project area. It is delineated in this report on project plan sheets (Figures 2 and 3) and a portion of the East Lincolnton USGS topographical quadrangle map (Figure 4).

URS conducted fieldwork during the weeks of August 22 and September 12, 2005. Mr. Brown conducted local research at the Lincoln County Courthouse and Lincoln County Public Library in Lincolnton. He conducted further research in Chapel Hill at the University of North Carolina's Wilson Library and in Raleigh at the North Carolina State Archives and Library, the office of the

North Carolina Geological Survey, the Hill Library at North Carolina State University , and the North Carolina Museum of Natural Sciences.

As a result of its field investigations within the APE and its research, URS recommends that the mining operation—denoted as the Piedmont Tin Mine—is not eligible for listing in the National Register. Only a few physical traces of the once extensive operation survive and the resource is therefore not believed to retain sufficient integrity to support any significance under the National Register Criteria.

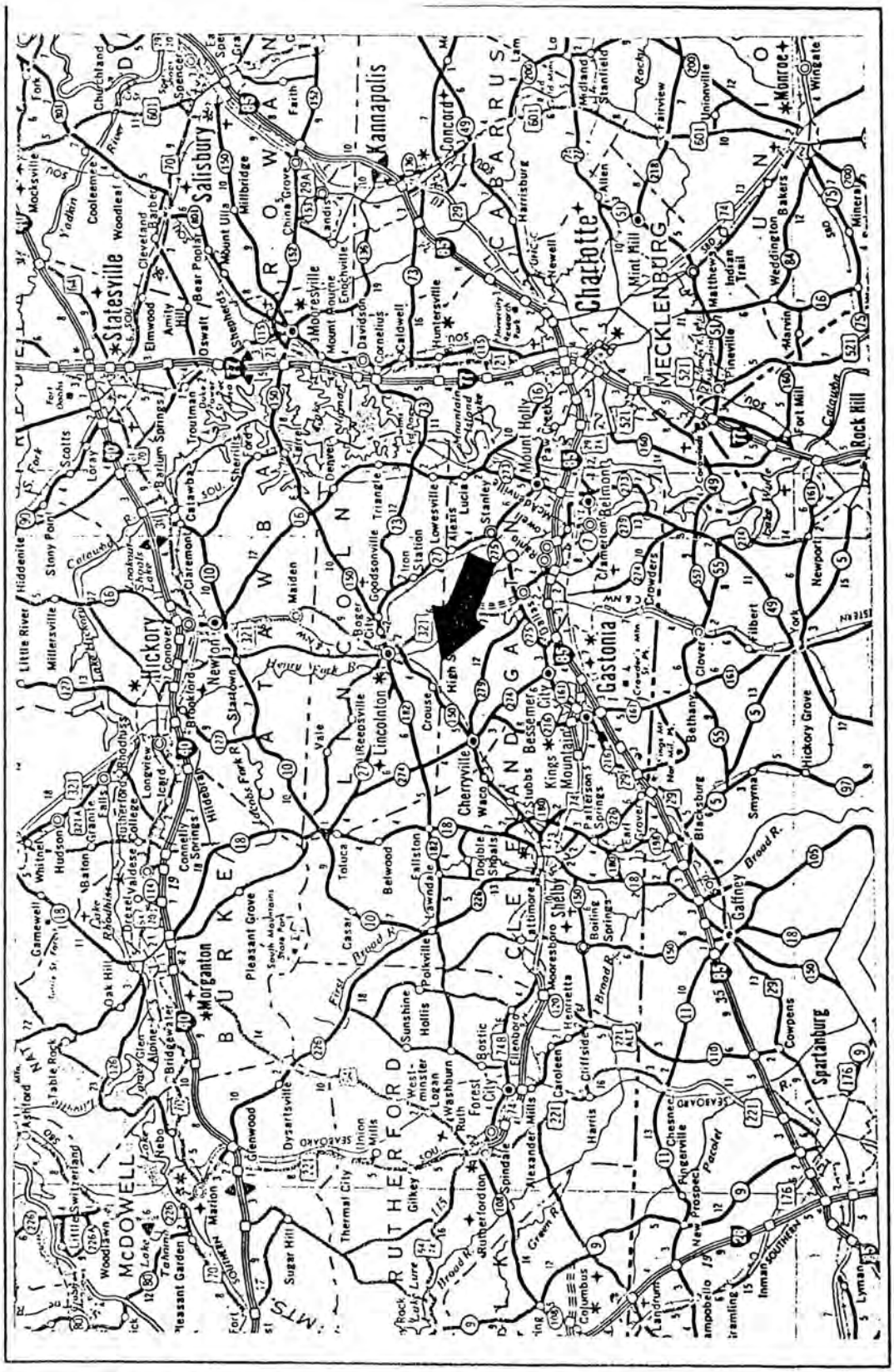

Figure 1: Project Locator Map (Source: Hall & Baker 1991)

REVISIONS

METRIC

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CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-0617C	9
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

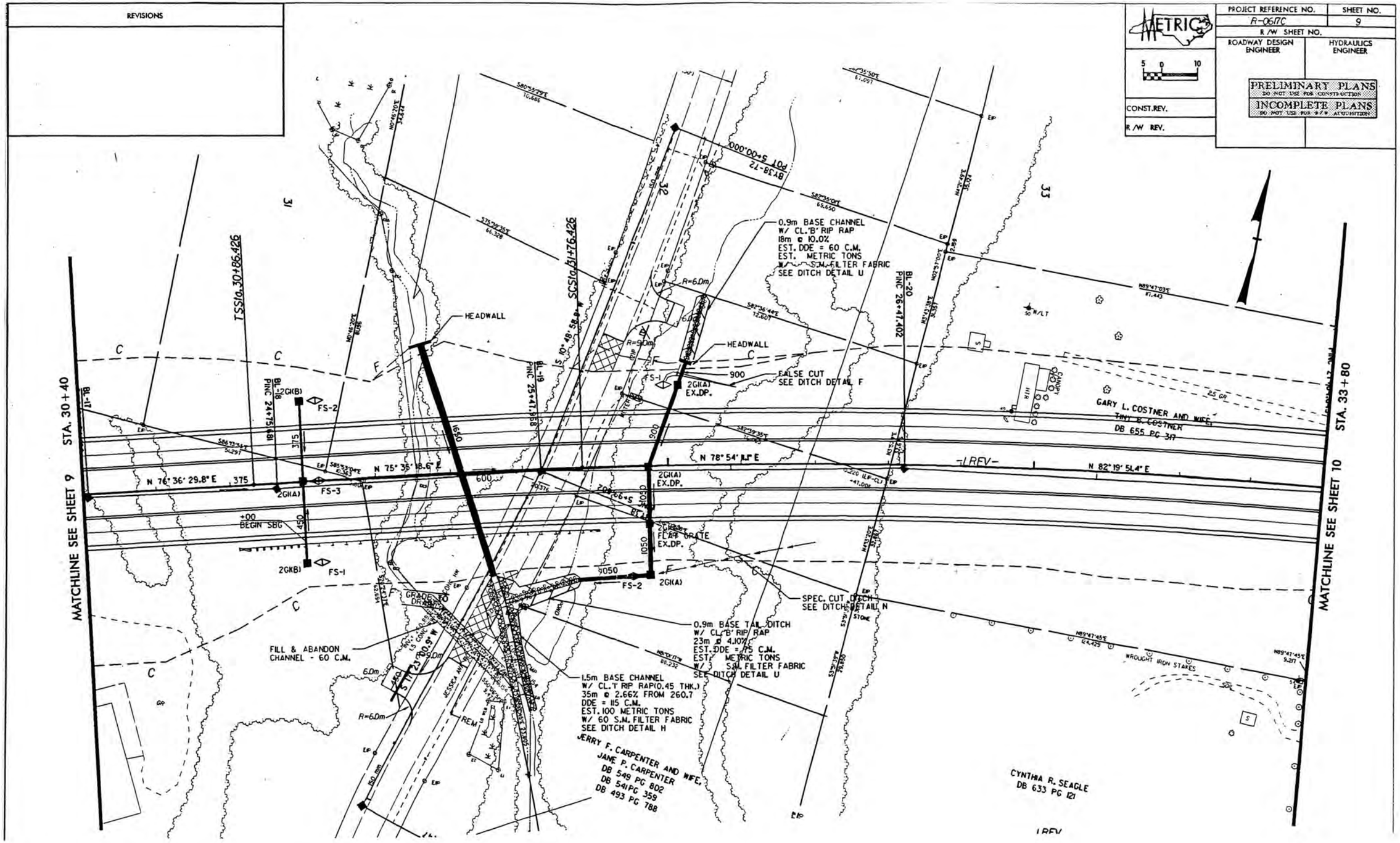

Figure 2: Eastern Portion of Project Corridor (Source: NCDOT, Preliminary Plan Sheet 8 for R-0617C)

Figure 3: Western Portion of Project Corridor (Source: NCDOT, Preliminary Plan Sheet 9 for R-0617C)

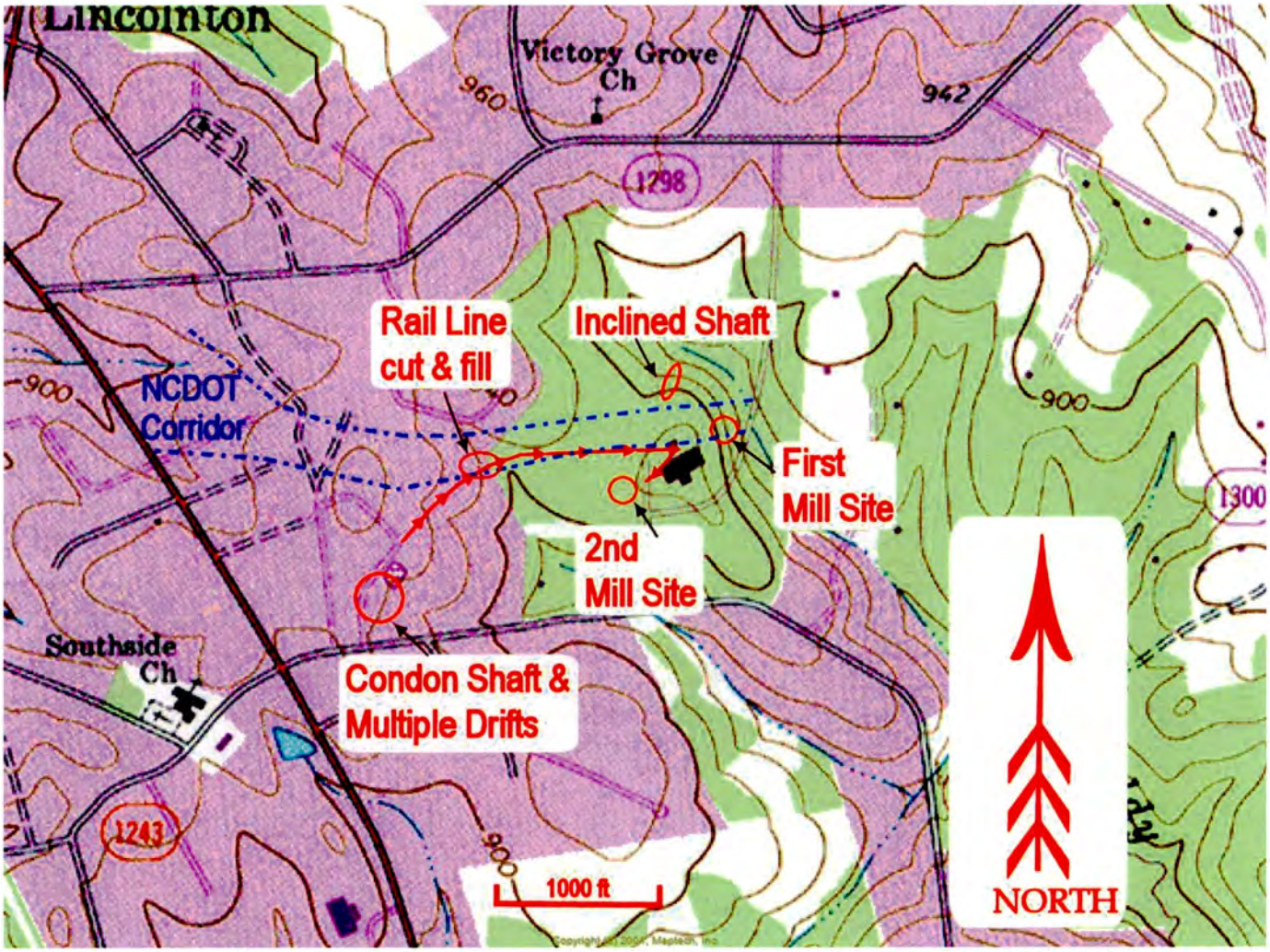

Figure 4: Project Corridor and Resource Locator Map (Source: USGS Lincolnton East Quadrangle Map)

II. PROPERTY INVENTORY AND EVALUATION

PIEDMONT TIN MINE

East of US 321 between Tin Lane and Tin Mine Road, Lincolnton vicinity, Lincoln County

History

Tin ore was discovered near Kings Mountain in Gaston County, North Carolina and Cherokee County, South Carolina, in 1883. Tin was briefly mined in the area at the Chestnut Hill works in 1892 and at the Ross Mine, near Gaffney in Cherokee County, off and on from 1903 through 1908. These activities spurred the North Carolina Geological Survey, in 1904, to produce the first account of the nascent tin industry in the Carolinas. It noted that "[w]hat may be called the Carolina tin belt" extended from Gaffney northeast, through the corner of Cleveland County and across sections of Gaston and Lincoln counties, to the edge of Lincolnton (Hyde and Sterrett 1904:10; Wright and Butler 1981:198; Lininger 1997). In a subsequent report on North Carolina's overall mining industry in the middle years of the 1910s, the North Carolina Geological and Economic Survey noted that the tin belt in the state extended from the southeastern part of Cleveland County to about four miles east of Lincolnton. Tin (Sn), commonly found in the mineral cassiterite (SnO_2 or tin dioxide), had been mined during the mid-1910s, according to the report, at the Jones, Foster, and Faires mines near Kings Mountain and at an unnamed mine or mines near Lincolnton (Pratt and Berry 1919:13).

The Ross Mine in South Carolina produced in excess of 130 tons of tin concentrates—which were shipped to smelters in Cornwall, England, for processing—between 1903 and 1908. This tin was collected from placer deposits, through high-pressure hydraulic efforts, and from underground tunnels. Images of the Ross Mine's placer operation (Plate 1), miners (Plate 2) and headframe (Plate 3) may reflect the activity that took place almost contemporaneously a few miles south of Lincolnton (Lininger 1997).

The first identified record of mining activities in Lincoln County appears in local deeds from 1907. In multiple transactions in that year, the Piedmont Tin Mining Company of Georgia acquired mineral rights to 211 acres of land on and near the South Fork of the Catawba River (Lincoln County Deed Book 97/Pages 309, 310, 312, and 352 and Deed Book 109/Page 429). By 1915 these 211 acres and more than 255 additional acres were in the hands of Dr. William P. and Jeannie O.M. Cornell of Charleston, South Carolina, who transferred them to the United States Tin Mining Company (Lincoln County Deed Book 117/Page 394). The transfer was comprised of ten tracts, Tracts 1 and 2 of which had reportedly been acquired by Piedmont Tin in 1905.

The 1915 transaction indicates that Piedmont Tin had worked its holdings during the previous ten years. Tract 1 is described in the deed as "being the tract of land upon which are located the mills and stationary machinery of every character, late of the Piedmont Tin Mining Company, and as well upon which is located a large portion of its mining property which has been actually developed." The deed noted that hoisting and dumping machinery was located upon Tract 2 and that the tract was one of the "principal mining developments late of the Piedmont Tin Mining Company."

Plate 1: Placer mining and sluicing activities at the Ross Mine near Gaffney, c.1908 (Source: Lininger's "History of the Ross Mine," 1997)

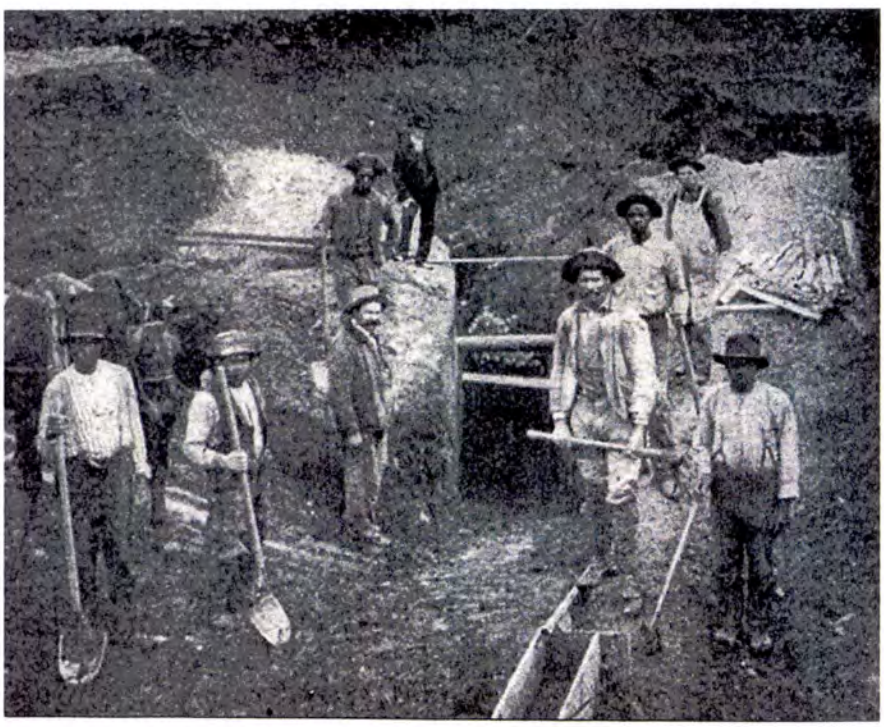

Plate 2: Miners at the entrance of the inclined shaft of the Ross Mine, c.1908 (Source: Lininger's "History of the Ross Mine," 1997)

Plate 3: Headframe of the Ross Mine near Gaffney, c.1908 (Source: Lininger's "History of the Ross Mine," 1997)

With Piedmont Tin, the other principal early player in tin mining in Lincoln County was Daniel Efird (D.E.) Rhyne. A Gaston County native and Lincoln County resident, Rhyne was one of the most prolific industrialists and entrepreneurs in turn-of-the-century North Carolina. In 1906 Thomas Edison visited with Rhyne and, independently, local amateur geologist Joseph Edgar Reinhardt. He questioned them about local sources of lithium, cobalt, and tin, likely in connection with his efforts to develop a stable filament for the light bulb (Lincoln County Historical Society 1997:188; Brown 1986:185, 208).

By 1912 Rhyne was involved in tin mining efforts in Lincoln County. In that year he conveyed a mineral interest in, rather than ownership of, a 58-1/2-acre parcel to Piedmont Tin. The deed noted that the land adjoined the property of, among others, the Piedmont Tin Mining Company. It also provided that if the company declared bankruptcy, the interest would revert to Rhyne (Lincoln County Deed Book 106/Page 456). This property was among the multiple tracts conveyed in 1915 to the United States Tin Mining Company. The precise connections between D.E. Rhyne, Piedmont Tin, and United States Tin are not clear, but they were so intimate that, before Rhyne's death in 1933, he appears to have acquired ownership of all of the mining rights of the two companies.

A typewritten biography of D.E. Rhyne (1852-1933) comments on his entrepreneurial interest in mining in North Carolina (Cauble 1974:66):

> The possibility of developing some of North Carolina's mineral resources always fascinated Mr. Rhyne, and over the years he owned a tin mine, a mica mine, and one or more gold mines. Although he invested rather large sums of money in these mining operations, none of them proved to be really profitable.

Rhyne's tin operations near Lincolnton were supposed to have been worth $325,000 at one time, but his estate, following his death in 1933, valued them at but $10,000 (Cauble 1974:67).

According to the report on the state's mid-teens' mining industry, in 1917 some tests were made on materials from the property of the United States Tin Company near Lincolnton, none of which were put on the market (Pratt and Berry 1919:85). United States Tin was therefore active, if not necessarily successful, in continuing Piedmont Tin's abortive efforts.

An account (Lincoln County Historical Society 1997:303-304) based upon the memories of longtime Lincoln County resident Calvin C. Mosteller is, with a page of notes on file at the Lincoln County Library (Mining File n.d.), a rare narrative of the early tin extraction industry in the county.[1] Although Mosteller candidly said of his account, "[t]his is recorded from memory, I make no claim to accuracy of dates," it is detailed and worthy of noting at some length:

> Shortly after [sic] World War I, a company, headed by D.E. Rhyne, owner of D.E. Rhyne Mills, was formed and mining operations started. There were two separate sites being worked at the same time. One between Southside and Long Shoals

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[1] In 1942 there were two small tin deposits adjacent to the Ka-Mi-Tin holdings identified by the names "Upper Mostellar cut" and "J. Mostellar." Lincoln County deeds also reference various Mosteller holdings in or adjacent to the tin fields. Mosteller's relationship to the person or persons who worked or attempted to work these holdings could not be determined (Kesler 1942:Table 18); Lincoln County Historical Association 1997:Mosteller family entries).

near the South Fork River; the other near what is now known as the Tin Mine Road.

The South Fork operation was a venture in hydraulic mining, which at that time was used extensively in the west.... This experiment evidently did not pay off for it was discontinued. The boilers and pumps were still in place in 1942, but were sold for scrap in the war effort.

The other site working at that time was near the present Tin Mine Road. This was a regular mining operation; a shaft dug straight down, drifts, or tunnels leading off to the side. This operation was under the supervision of an English Engineer from Cornwall, England, a Mr. Condon. This shaft was known as the Condon Shaft.

Enough ore was produced that a stamp mill was built, with a narrow gauge railroad to transport ore, from mine to mill. This track and the engine known as a "donkey" was also sold as scrap during World War II.

With underground water a big problem, low production and the depression coming on, after a few years the operation closed down.

Sometime in the early thirties, the property was bought by American Consolidated Tin Mine Corporation. A mining engineer, Ulysses S. James, was the head of this company.

...Around the mid-thirties, the property was bought by J.N. Brenizer, a mine operator from Montana. It was incorporated as KI-MI [sic] Tin Concentrating Co. with a Mr. Hipp as engineer.

Work was started on another shaft located nearby where the present Lincoln County Convenience Site is located. This shaft was sunk in 1935-36, and went down two hundred feet. Again underground water was the big problem. Again Kaolin, Tin, Gold, and Mica were found. Sometime around 1940 operations closed down, never to start again.

A second account of the mine appeared in the Bicentennial Edition of the *Lincoln Times News* in September 1976. The source of its information was the wife of Ted Wolff, a South African who came to Lincolnton at an unidentified date to supervise the mine. It comments upon the unusual nature of the mine early in its history under Piedmont Tin's tenure: "When the tin mine was flourishing in 1909 it was an attraction for tourists from Charlestron [sic], S.C., who came to Lincolnton i[n] a special train on July 25, 1910 to make an inspection of the plant. The train carried a standard sleeper, a day coach, and a baggage car."

In 1932 the American Consolidated Tin Mines Corporation, which had corporate offices in New York City, announced their acquisition of the mining operation located near Tin Mine Road and their plans for it. The mine had been established, according to them, by John H. Furman, who had experience in the geology of tin deposits in Cornwall, as well as Australia and Africa. Furman's initial development work "had consisted of the sinking of 4 shallow shafts on vein outcrops and about 3,000 feet of drifting which disclosed five tin bearing veins." Furman and his associates estimated they could produce, yearly, 1,500 tons of one to two percent ore valued at nearly two million dollars (Spotswood 1932).

The American Consolidated operation was a successor to that of D.E. Rhyne and the Piedmont Tin and United Tin companies of the preceding two decades. In 1932 Rhyne transferred 26 tracts of land and mineral rights to American Consolidated for $250,000—which was never paid—and stock in the company (Lincoln County Deed Book 166/Page 683). The tracts, located in Lincolnton Township, contained about 600 acres.

American Consolidated's plans were grandiose, in light of the year, 1932 near the onset of the Great Depression, and the limited production of tin in the region in the previous 40 years. W.O. Heffernan, the company's president, put a cheerful gloss on the operation in his comments to potential investors (Spotswood 1932):

> To date it is estimated that over $1,000,000 has been spent in the development and equipment of the properties, which includes 15 shafts, several miles of underground workings, steam shovel pit, hydraulic pit and other open cuts, which have put in sight ore that in the judgment of mining experts would justify the construction of a mill of 1,000 tons daily capacity, in addition to deposits which can be handled by hydraulicking. Equipment includes hoisting plant, pilot mill, pumps, hydraulic pipe line, rail tramway, dinkey engine and cars, and various mine buildings.
>
> The American Consolidated Tin Mines Corporation's present plans provide for the erection of a 500-ton mill, to which other units can be added as desired. Properties will be equipped to recover kaolin and mica by-products, which will substantially increase the Corporation's operating income.

He stated that the company was capitalized for $3,000,000, with no bonds or other funded debt.

Due to the partly promotional nature of Heffernan's account, it is not clear what actually existed at the site in 1932 and what he hoped would exist there. Alexander Spotswood, American Consolidated's mining engineer, provided a somewhat more measured description of the current and projected conditions of the mine in the same publication:

> The properties controlled by the American Consolidated Tin Mines Corporation are located one and a half miles from Lincolnton...and consist of an irregular shaped tract of land about two and a half miles long and half a mile wide, containing approximately 600 acres so as to include five known tin bearing dikes, which are well defined.
>
> The southern end of the tract terminates with an abrupt descent to the Carolina and North Western R.R. and the Little Catawba River, thus affording one of many excellent sites for a large mill and exceptional transportation facilities. Another railroad, the Seaboard Air Line, runs within a short distance of the northern boundary. The property is crossed by a concrete highway (No. 16). The power line of the Southern Power Company, carrying 44,000 volts, also crosses the property, thus providing excellent power facilities.

He described the shafts and depicted them and other workings, buildings, and accessories in a detailed blueprint of the operation (Figure 5). He also included a narrative description of the existing surface equipment:

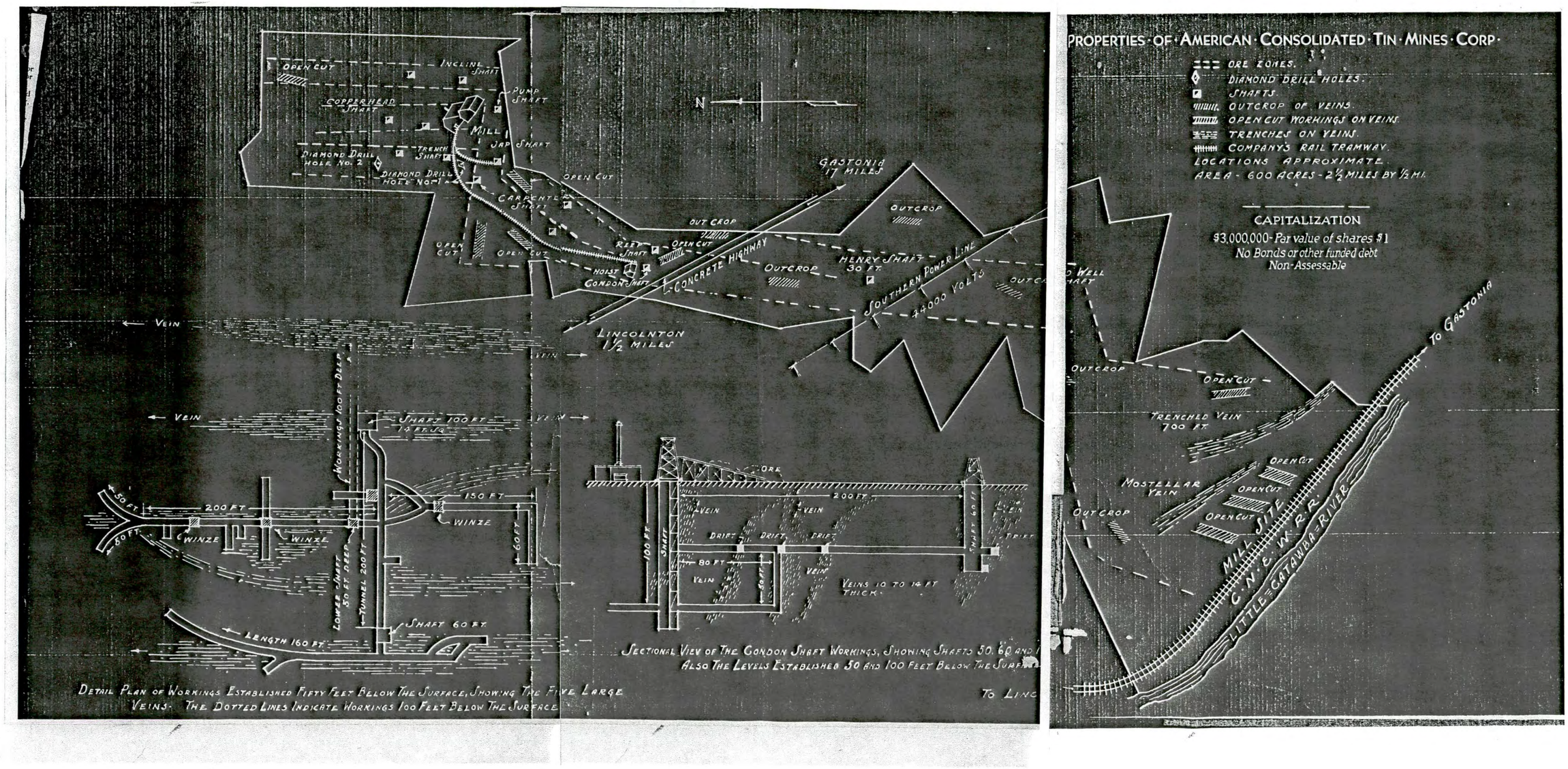

Figure 5: Blueprint of American Consolidated Tin Mines holdings south of Lincolnton, c.1932 (Source: Spotswood and Corporate Report, 1932)

> At the Condon shaft a 60 H.P. boiler is used to operate the hoist and also the Deane sinking pump. This pump has a capacity of 150 gallons per minute and at present it is pumping approximately 100 gallons per minute. The Condon shaft is 3000 feet distant from our mill. The mill is essentially a pilot or testing plant, having a capacity of approximately 25 tons per 24 hours. The mill is equipped with a log washer, trommell, rolls, Blake crusher and four Wilfley tables. The railroad track has been relaid from the mill to the Condon shaft. Rolling stock consists of a Dinkey steam locomotive and ore cars, all in good condition.

From the description of the operation and equipment by Mosteller, Heffernan, and Spotswood, it is possible to get an idea of what the Lincolnton mining operation looked like. According to the 1911 *Encyclopedia Britannica*, valuable minerals sought by miners—in this instance, tin—were released from surrounding waste rock by either crushing or disintegration. The equipment used for the Lincolnton ore indicates that the operation utilized a crushing process. The encyclopedia states that crushing was generally done in three stages, moving from coarse to medium to fine (LoveToKnow 2004). According to the 1941 revision of the standard *Mining Engineer's Handbook* (Peele and Church 1941:28-02), size reduction could take place in as few as two steps.

In all likelihood the coarse raw material from the Lincolnton mines was carried to the mill by the Dinkey steam-locomotive-drawn cars. It would first have gone to the trommels and the log washer. Trommels were cylindrical revolving screens or sieves used to clean, classify, and separate materials. Rotated by a machine, they could be operated either wet or dry (Pearson and McGowan 2000). They came in a variety of sizes and were often portable, so they could be moved from one deposit to another (The Miner's Light n.d.; LoveToKnow 2004). The log washer was likely comprised of a gently sloping trough containing rotating paddles attached to a number of shafts. (The machine's shafts were originally of log, hence its name.) The paddles and water would wash clay, sand, and other materials from the feedstock (AggRegain n.d.). The cleaned, but still coarse, material would then be loaded into the Blake crusher or rock breaker, which broke it into smaller pieces (Western Scale Models n.d.; LoveToKnow 2004). The Blake likely consisted of "a fixed and a reciprocating [iron] jaw set on an angle so as to progressively reduce the rock to a smaller size" (Pearson and McGowan 2000). The Blake was the best known type of jaw crushing equipment during the period (Peele and Church 1941:28-02).

After initial processing, the rock, still relatively coarse, would be further reduced in size by intermediate crushers. At the Lincolnton operation, the intermediate crushers were rolls (according to Spotswood), a stamp mill (according to Mosteller), or perhaps a combination of the two. The rolls mentioned by Spotswood likely consisted of pairs of revolving rollers, placed close together, through which the rock was fed. Rolls could be of the rigid type, with the bearings tightly fixed on the frame, or the spring type (Peele and Church 1941:28-10; LoveToKnow 2004). The stamp mill would have held stamps or stampers, which likely consisted of an iron rod, fitted with an iron or steel stamper, raised by a shaft and cam. The stamp and shoe would fall onto stamper dies held in an oblong box, thereby crushing the ore (Pearson and McGowan 2000).) There were two types of stamps—steam and gravity. By 1941 steam stamps were in use only in the Lake Superior copper plants and gravity stamps were approaching obsolescence. The latter were in use only in mills where they were already in place and discarding them would be uneconomical (Peele and Roberts:28-02, 13), apropos of the Lincolnton operation.

The ore was further concentrated at the Wilfley tables. Invented in the mid-nineteenth century, the Wilfley table generally "had a slightly sloping table top, linoleum coated, with timber riffles of gradually reducing size attached to its length. The table was shaken and water and crushed ore poured down it, the fractions of the mixture being sorted by weight as they traveled across the table" (Pearson and McGowan 2000).[2] The mineral ore from the Wilfley tables was likely then loaded back onto the narrow-gauge steam train and carried to one of the nearby rail lines for transshipment. The gangue—the material of no value that dropped down beneath the table (Nelson 1965:514)—was likely disposed of on site.

As indicated by the American Consolidated blueprint rendering of the mine activities and the accounts of Heffernan and Spotswood, the mill or mills occupied but a small part of the operation. Heffernan referred to shafts, underground workings, a steam shovel pit, a hydraulic pit, and open cuts, in addition to a hoisting plant, pilot mill, pumps, hydraulic pipe line, rail tramway, and various mine buildings. Spotswood also described some of the physical plant and the locations of the shafts. The drawing depicts how widespread the mining activities were. It also mentions and locates particular mechanical features of the operation, including the tramway tracks; a mill with a pair of adjoining or side-by-side structures; and, at the Condon shaft, a building with a tall smokestack that likely powered a hoist, as well as two headframes straddling a pair of shafts.

The property also included a "mine bungalow" according to Mrs. Ted Wolff (Anonymous 1976). The bungalow was occupied at various times by mine employees. These included foreman Tom Reep, his wife, and seven children; supervisor Crouse Baxter and his family; and perhaps the Wolffs and their son.[3]

There are two known photographs of the Lincolnton operation. A c.1931 image in *The State* (Plate 4), accompanying a general article about tin mining in Lincoln County, depicts a headframe at the operation, along with Alexander Spotswood and an unidentified employee (Claytor 1931:20). An undated image, which accompanies the account of Mrs. Wolff (Plate 5), depicts a rectangular gable-end building sided with vertical boards or sheet metal. Extending from one of its long elevations is a trestle supporting a conveyor belt. A shed roofed structure with a steeply pitched roof extends from the other long elevation. Two smokestacks rise in the distance. An aerial photograph from 1938 appears to depict some of these operations, particularly just northwest of the intersection of US 321 (then the Gastonia Highway) and Tin Mine Road (Plate 6). (This area was leveled in the 1970s or 1980s and brick ranchhouses were built upon it.)

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[2] Nothing is known of the work force at the Lincolnton operation, although the small output suggests a limited number of workers. The standard *Mining Engineers' Handbook* (Peele and Church 1941:28-18) described the typical laborers at Wilfley and other stationery and moving-surface sorting tables: "Labor for sorting is generally unfit for heavier work: boys, girls, women, or old or crippled men. Boys and girls are the quicker and, if properly supervised, do best work." The miners—as opposed to millworkers, supervisors, and owners—at the Ross Mine, as depicted above, appeared to have been able-bodied African-Americans.

[3] Mrs. Wolff illustrated the dangers of mining not only for miners, but their families: "Connie [Baxter]'s brother, Howard, found some dynamite caps. He was under the bungalow porch cleaning out the powder with a hairpin, his sister said, when the cap exploded in his hands blowing off a thumb and a middle finger end...."

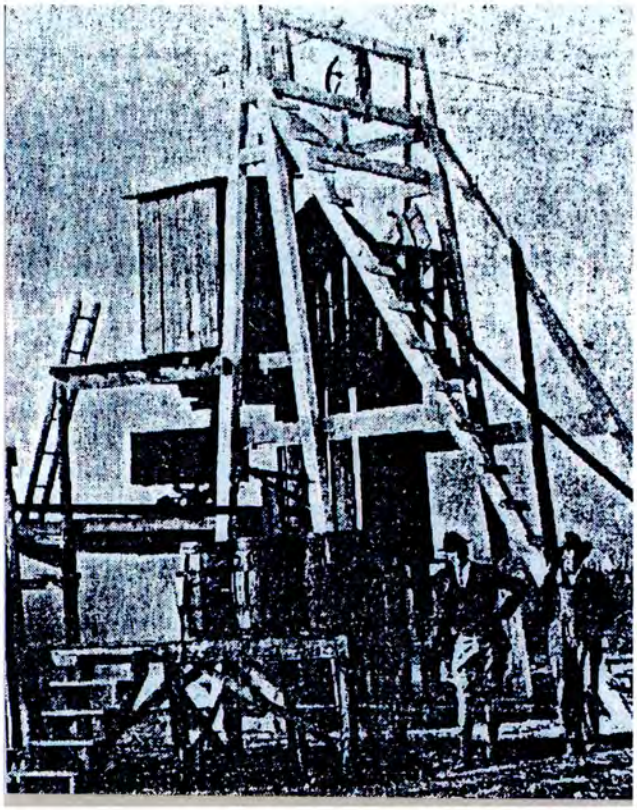

Plate 4: Headframe at Lincolnton mine, c.1931 (Source: Claytor 1931)

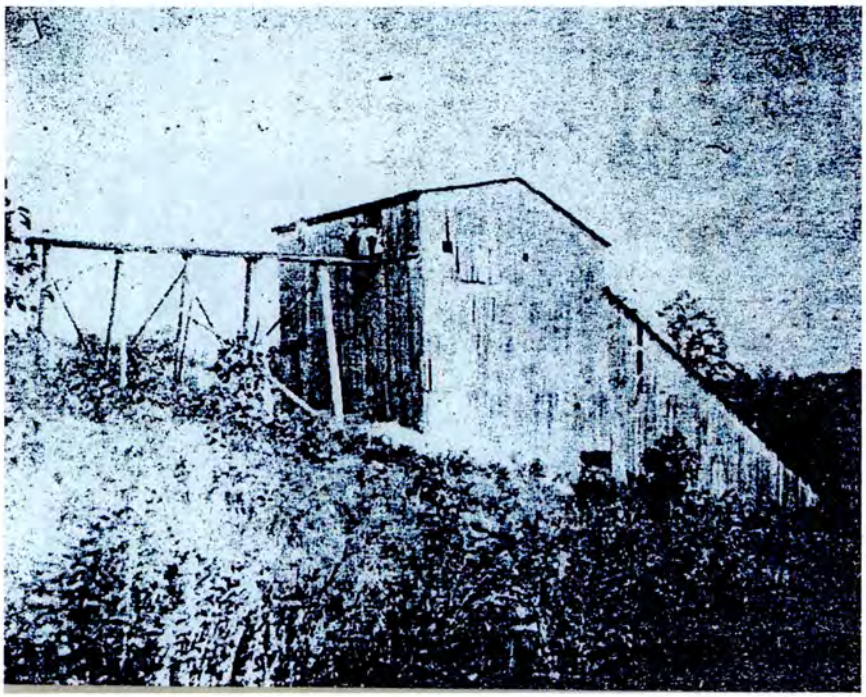

Plate 5: Hoisting plant or mill at Lincolnton mine, no date (Source: Anonymous 1976)

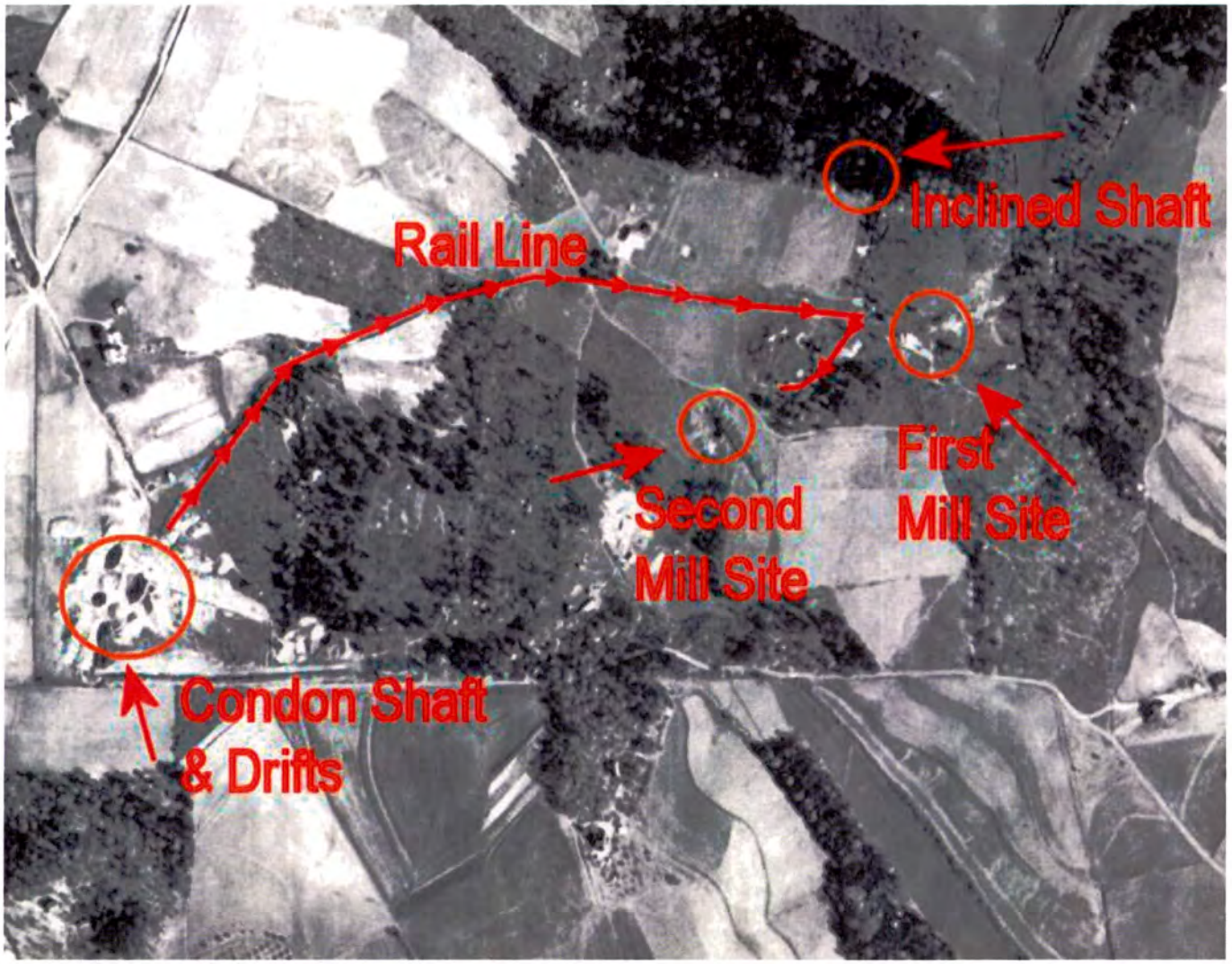

Plate 6: Aerial view of Lincoln County southeast of Lincolnton, 1938 (Source: State Archives of North Carolina)

A photograph of a perhaps similar operation pictures a tin mine and mill near Kings Mountain in North Carolina about 1907 (Plate 7). It depicts tracks and a railcar; a principal shed-roofed building, likely the mill or hoisting plant, with a tall stack and shed-roofed additions; and, leading to the mill, a trestle supporting a conveyor belt, a water tank, and what might be a headframe. An additional building is vaguely visible in the distance.[4] (The three images of the Ross Mine operation complete the known photographic record of the tin mines of the Carolinas.)

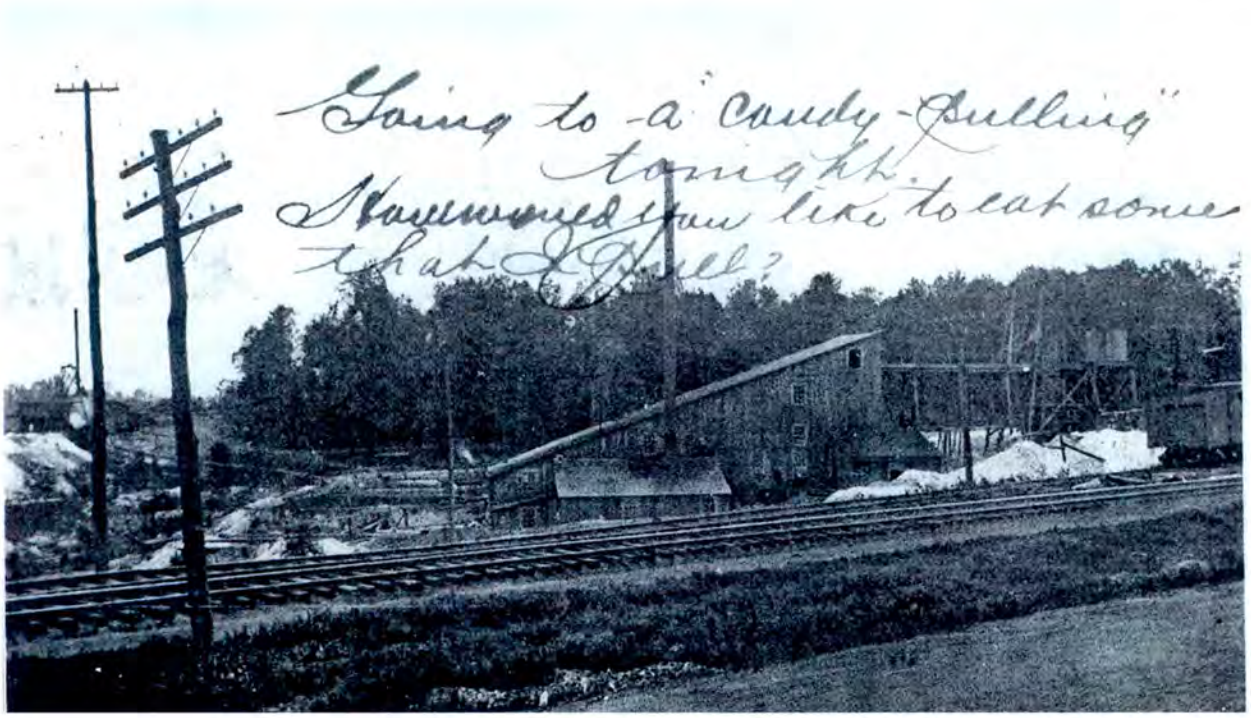

Plate 7: Kings Mountain, North Carolina, tin mine operation, c.1907 (Source: State Archives of North Carolina)

Activity at the Lincolnton mine was apparently extremely limited through the middle 1930s, for in 1936 American Consolidated announced with some fanfare—the story ran in the Raleigh press, not just in Lincolnton—a rich strike of tin ore reportedly assayed at two to fifteen percent (*Lincoln Times*, September 17, 1936; *Lincoln County News*, September 17, 1936). The announcement "came as a climax to some six years of development work on the properties, during which many thousands of tons of material have been removed and thousands of feet of drifting and crosscutting done." According to Louis H. Hipp, the superintendent in charge of operation, "[f]urther development work is being rushed with a view to getting enough ore above ground to insure a supply for a projected mill on the location…." He noted that the mine, though known for many years, had "never been worked on a commercial basis" and averred that once

[4] The image of the Kings Mountain operation was printed on a postcard. The script across the front of the card reads: "Going to a 'candy pulling' tonight. How would you like to eat some that I pull?" The connection between the grit of the mine and romance of the advance is obscure.

the new strike was tapped, the property would be "the only commercial tin producer of any importance in the United States" (*[Raleigh] News and Observer*, September 17, 1936).

The American Consolidated operation was run by the Ka-Mi-Tin Mine Concentrating Corporation, which may have been a subsidiary of the company[5]. A 1936 deed between the D.E. Rhyne Estate and American Consolidated (Lincoln County Deed Book 191/Page 10) included, along with leasing and financial terms, a history of the ownership of the mining property. It noted that in 1935 American Consolidated leased its Lincoln County property to Ka-Mi-Tin. These tracts, according to the deed, were formerly owned by D.E. Rhyne and known as the "Old Piedmont Tin Mines property" and later as the "Carolina Tin Mines." In other words, the bulk or all of the Lincolnton tin mining operations—D.E. Rhyne, Piedmont Tin, Carolina Tin, United States Tin, American Consolidated, Ka-Mi-Tin—were nearly identical enterprises.

In spite of the new discovery, the operation failed yet again to pan out, even in the face of growing demand and market disruptions brought on by World War II. A report on the mining industry in North Carolina between 1929 and 1936 noted the presence of tin deposits near Gaffney, Kings Mountain, and on the Rhyne estate, but did not identify any appreciable production (Bryson 1937:43). The national Minerals Yearbook for the year 1939 noted that "tin ranks high among our deficient strategic metals because of the essential usefulness of the metal industrially, the lack of domestic deposits, and our almost total dependence on supplies from relatively few overseas sources, the most important of which is southeastern Asia." In spite of the need, "[o]nly 34 long tons of tin were produced in 1939, a decline of 64 percent from 1938. Alaska again supplied virtually all the output" (Pehrson and Umhau 1940:677, 682). By 1940 production had increased by 29 percent, to "only" 44 tons, with Alaska again supplying "virtually all the output" (Pehrson and Umhau 1941:673).

Interest remained high in Lincoln County and Carolina tin in the early 1940s, although the outlook for success remained equally grim. In 1940 T.G. Murdock, the North Carolina Assistant State Geologist, responded to an inquiry about the state's tin resources (Murdock 1942).[6] In 1942, in answer to another inquiry (Haney 1942), he wrote:

> The Ka-Mi-Tin Concentrating Corporation, of which Mr. J.N. Brenizer of Lincolnton is Manager, was doing some work at the old Rhyne property, and the Atlas Collapsible Tube Company [of] Chicago was doing some prospecting work at the Faires property near Kings Mountain. . . . [H]owever, as you will note from the press release, the entire situation is not very promising (Murdock 1942).

The press release, put out by the North Carolina Department of Conservation and Development, announced that, "[w]ith the demand for tin and nickel increasing daily as result of their importance in the manufacture of airplanes, guns and other material need," the state geologist was embarking upon a new investigation of the state's tin reserves. Somberly and realistically, the release noted that the deposits in the North Carolina tin belt had been worked intermittently since the 1880s, "but without much success." It continued: "Reports have been current for some weeks that an effort will be made to reopen the tin mine near Lincolnton owned by the Ka-Mi-Tin Concentrating Corporation, which now owns the old mine and deposits, but the Division of

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[5] "Ka-Mi-Tin" was in all likelihood an acronym for the minerals kaolin, mica, and tin.

[6] The original letter is lost and only the second page of the response survives.

Minerals Resources has no definite information concerning this deposit...." Therefore, in spite of the tremendous demand for tin, by 1942 American Consolidated has ceased operations outside of Lincolnton and its successor or separate arm, Ka-Mi-Tin Concentrating, had had little or no success with the mine either.

Even though labeled "preliminary," the promised study of the tin belt of the Carolinas was printed and released by the US Geological Survey in 1942 as part of its national Strategic Metals Investigations report (Kesler 1942). (The onset of war certainly prompted its quick production.) In its abstract, it located and identified the tin resources of the region: "Cassiterite and spodumene, of possible economic importance, occur in a belt, 24.5 miles and 1.8 miles in maximum width, extending southwestward from Lincolnton to Grover, N.C....There are at least 91 such deposits of potential tin ore in North Carolina, and 1 near Gaffney in South Carolina." Yet again, though, the assessment of the commercial viability of mining the tin was gloomy: "Because of their small size, low grade, and scattered distribution, the deposits are not being mined at present, and it seems unlikely that any now exposed could be mined profitably unless the price of tin became extremely high" (Kesler 1942:245). The report estimated that more than four decades of tin production in the belt, much of which was too minimal to register in mineral yearbooks, had perhaps netted but 300 tons. It included a detailed, oversized map that located the various tin deposits within the tin belt in North and South Carolina (Figure 6). It also included a plan of the workings of the Ka-Mi-Tin Concentrating Company (Figure 7). This plan identified numerous drifts (horizontal underground passages that generally follow a vein); seven shafts and one named pit; two mill sites; an earthen dam; a curving network of narrow unpaved roads; a narrow-gauge railroad grade with tracks removed; and the footprints of two small buildings within the workings and of a few nearby dwellings. (The dwelling adjacent to the "Bungalow Shaft" may have been Mrs. Wolff's mining bungalow.)

The particular appearance of the mine workings is not described in any of the accounts of the operation. The two illustrations, by Spotswood in 1932 and Kesler ten years later, indicate the workings consisted of shafts, drifts, open cuts, and pits, with winzes—small, vertical or inclined, downward-excavated openings (Nelson 1965:517)—extended from some of the drifts. The workings went as far as 100 to 200 feet into the ground. The equipment utilized in the workings is also not described, although Spotswood refers to the use of a 60-horsepower boiler at the Condon shaft to operate a hoist and a Deane sinking pump. A sinking pump is a long narrow pump designed to keep a shaft dry during sinking (downward excavating) operations (Nelson 1965:414).[7]

[7] An illustration of a "vertical pump for use in sinking a shaft" is included in the 1954 first English edition of volume two of *Introduction to Mining*, which additionally includes images of a jaw crusher, a gravity stamp mill, crushing tools, and a shaking table (Stočes 1954:353-358), as well as numerous illustrations of underground workings. Whether the Lincolnton equipment looked like any of this equipment could not be determined, as it no longer remains in place.

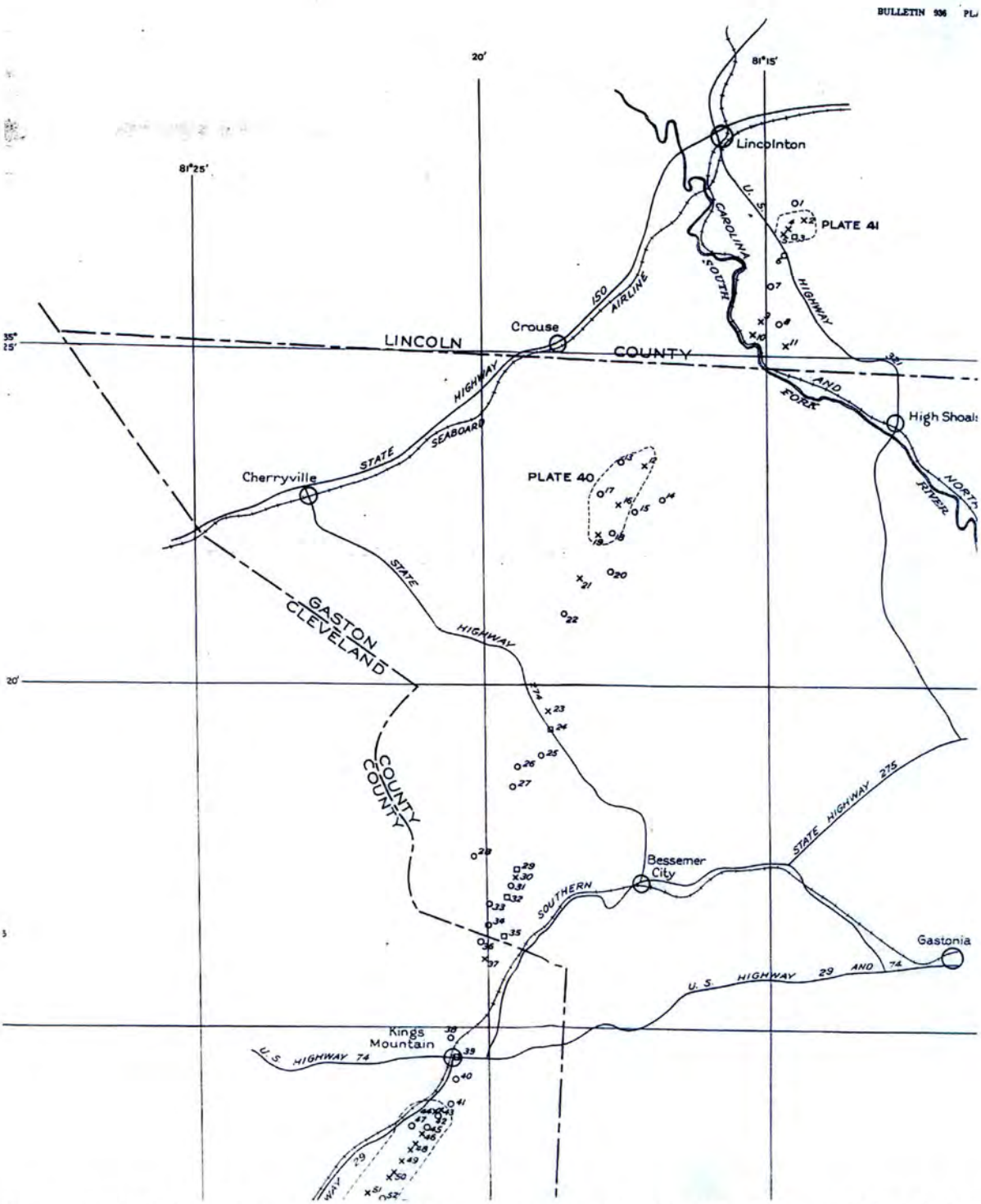
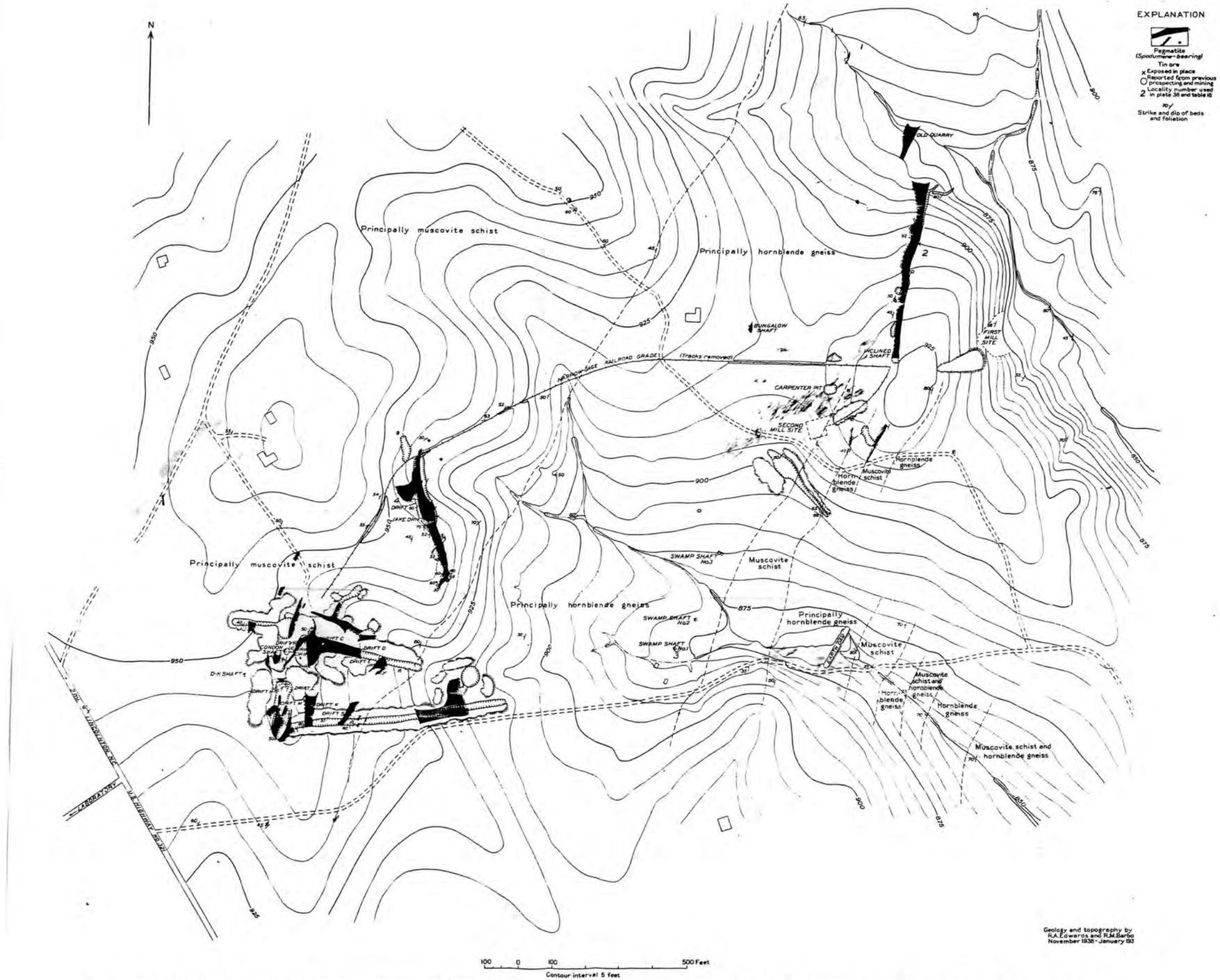


Figure 6: Portion of map depicting tin resources in the Carolina Belt, c.1942; Ka-Mi-Tin operation marked with reference to Plate 41 at upper right (Source: Kesler 1942)



PLAN OF WORKINGS AND PEGMATITE BODIES EXPOSED ON PROPERTY OF THE KA-MI-TIN CONCENTRATING CO., 2 MILES SOUTHEAST OF LINCOLNTON, NORTH CAROLINA

Figure 7: Plate 41 of strategic metals investigation report depicting Ka-Mi-Tin mining operation (Source: Kesler 1942)

Although Mosteller, as noted in his account of tin mining in the Lincoln County, claimed that the company closed its operations "sometime around 1940," it may have produced some tin in the early 1940s. A 1942 article in the Raleigh *News and Observer* (June 14, 1942) exclaimed: "[T]he company has been reorganized and the mining site reopened. A portentous program of developing the area is scheduled by the new company. It has approximately 100 tons of raw ore on a loading platform ready for shipment." An account of North Carolina's late 1930s and early 1940s mining industry noted that Ka-Mi-Tin "prospected during 1941 and 1942, by power shovel work in the Jake open cut and by underground work at the Condon shaft" (Murdock c1947:17). It suggested, however, that the fate of Ka-Mi-Tin was similar to the 1941 operations of the Atlas Collapsible Tube Company of Chicago near the town of Kings Mountain, which had found low-grade ore and accordingly abandoned its operations before reaching a production stage. The account of North Carolina's mineral industry in the late 1940s and early 1950s was crystal clear, if contradictory, on the lack of production at the Lincolnton mine in the early forties. Although Ka-Mi-Tin had explored several pegmatite bodies for tin in 1941 and 1942, the account reported that, "no tin was produced" (Broadhurst 1955:25). Without a doubt, tin mining of any notable productivity had ceased at the Lincolnton operations by the end of 1942.

In the 1950s mining of tin in North Carolina was limited to secondary and coincident activities in Gaston rather then Lincoln County. The mineral spodumene ($LiAlSi_2O_6$), with which Carolina tin is associated, contains lithium (Li). In the early 1950s, the Foote Mineral Company of Kings Mountain began to recover very small amounts of tin along with its hauls of spodumene and lithium. In 1951 the tin amounted to a single short ton. The following year it rose to but four tons (Vallely and Stuckey 1955:679). Although lithium continued to be an important mineral product in the Kings Mountain area throughout the last half of the twentieth century, the production of tin either ceased or was dropped from the tables due to its miniscule value by the close of the 1950s.

Interest in tin mining in the tin belt and western North Carolina fitfully reawakened in the latter half of the century. Between 1951 and 1956, Ka-Mi-Tin entered into mineral leases, agreements, or contracts with four different mining entities: Commercialores, Inc (Lincoln County Deed Book 271/Page 349 (1951), Lincoln Mining Corporation (Lincoln County Deed Book 286/Page 430 (1953) and Deed Book 301/Page 456 (1956); Activated Resources, Inc. (Lincoln County Deed Book 301/Page 453 (1956); and Basic Atomics, Inc. (Lincoln County Deed Book 320/Page 167 (1956). In 1957 the Lincoln County Industry Commission passed on a request to the state's Mineral Resources Division, from a private firm, for information on the profitability of the county's tin resources (Allison 1957). The state geologist (Stuckey 1957) responded, yet again, that "I regret to inform you that the outlook for tin ore in North Carolina is not at all promising....Small amounts of tin ore are found in the district, but the deposits are small and, as a result, mining has never been carried out successfully there." In 1959, in spite of the state geologist's pessimistic assessment, M.A. Spangler, Jr. of Shelby leased the mineral rights to 570 acres of land in nearby Lincolnton Township from the Ka-Mi-Tin Concentrating Corporation (Lincoln County Deed Book 340/Page 588). This property was referenced as the same that D.E. Rhyne had sold to American Consolidated Tin Mines Corporation in 1932, although the listed acreages of the two do not quite match. There is no evidence that Spangler succeeded in his undertaking.

In 1966 Margaret N. Brenizer, whose husband was J.N. Brenizer—a mine operator with an interest in Ka-Mi-Tin—acquired the complete interests of Ka-Mi-Tin for $17,000 (Lincoln County Deed Book442/Page 183). The deed included all of the many tracts that D.E. Rhyne had leased to American Consolidated back in 1932. In the following years, the dream of mining tin in Lincoln County finally faded, as the property was broken into smaller tracts and sold off. In areas that once held evidence of the mining activities, lands were leveled off and filled in and new housing developments were raised (Hoyle 2005).

The lore of tin in North Carolina did not immediately end with the closing of the Lincolnton mines. In 1982, according to the *Asheville Citizen* (July 9, 1982), two companies announced plans to seek the mineral in western North Carolina. The state geologist, commenting on the potential exploration and perhaps reflecting on the repeated earlier failures in the Carolina tin belt, stated that if the mineral was found it "would be the first major tin ore deposit on record in the state." If the companies did indeed proceed with their search for tin, they followed their predecessors—Daniel E. Rhyne, United States Tin, Piedmont Tin, Carolina Tin, American Consolidated, Ka-Mi-Tin, Atlas Collapsible Tube, etc.—in dropping money down a bottomless and unforgiving pit.

Description

Little evidence of mining activity survives in and around the project's APE. It is limited to three components: the site of the first tin mill; the opening of a single shaft; and the alignment of a narrow-gauge rail line (Figure 4, above). These were identified during fieldwork with the assistance of map overlays and GPS points.

The c.1942 plan of the workings of the Ka-Mi-Tin Concentrating Co. depicts at its upper right a bowl carved into steeply falling terrain labeled the "First Mill Site" (Figure 7, above). This site is located just east and downhill of a large, metal-walled, textile machine shop, which was constructed in the late 1980s. The most notable feature of the site is the gouge in the hill that was created for it. Beyond that alteration of the terrain, little remains of the first mill site other than a few broken concrete and concrete-and-brick footings and pieces of foundation (Plates 8 and 9). West of the modern building, in an area of second-growth pine and shade trees, one shaft survives. It is the former Incline Shaft, also depicted at the upper right of Figure 7. As its names indicates, the shaft is dug on a gentle incline, at least where visible, into the earth. Whether through natural or manmade causes, it appears to be almost filled just inside its arched opening (Plates 10 and 11). The shaft is located just north of the APE. The alignment of the narrow-gauge rail line—only a small portion of which is located within the APE—is visible running to the west of the mill site and shaft (Plates 12 and 13). Its apparent path was confirmed by GPS measurement. No machinery or other evidence of mining was found at any of these sites or elsewhere on the site of the former mining operation, much of which is now occupied by houses. Some dark gray stones, identified as horneblende gneiss, are found in a few locations. For examples of cassiterite bearing pegmatite (i.e. tin) on the site, one must visit the collection of the North Carolina Museum of Natural Sciences in Raleigh (Plate 14).

Plate 8: Concrete footing or foundation at first mill site

Plate 9: Concrete and brick foundation at first mill site

Plate 10: Incline Shaft

Plate 11: Incline Shaft

Plate 12: Former alignment of narrow-gauge rail line

Plate 13: Former alignment of narrow-gauge rail line

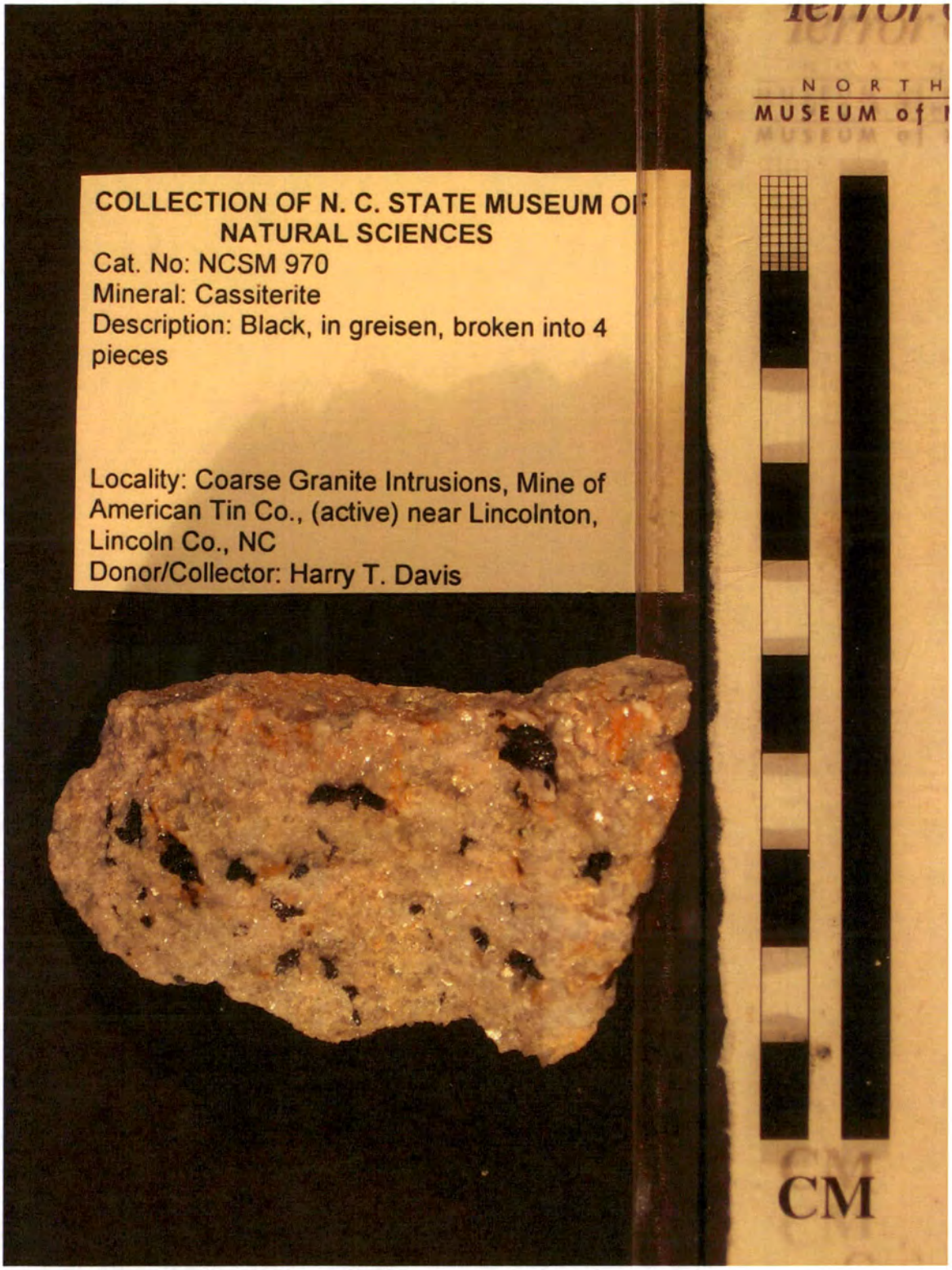


Plate 14: Cassiterite—black, tin-bearing crystals—in greisen from Piedmont Tin Mine

National Register Evaluation

Virtually all of the elements that comprised the Piedmont Tin Mine operation—headframes, hoisting plant, mills, hydraulic pumps, mill equipment (trommel, stamper, log washer, rollers, Blake crusher, Wilfley tables), dinkey engine and rail line, even multiple shafts and piles of tailings—have been removed. Further, much of its former landscape has been leveled and planted with modern houses and other buildings. It therefore retains none of the seven attributes of National Register integrity necessary to support significance (Noble and Spude 1997) and is not recommended as eligible for National Register listing.

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