NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

511

NATIONAL REGISTER OF HISTORIC PLACES REGISTRATION FORM

1. Name of Property

historic name Canyon Creek Charcoal Kilns

other names/site number 24BE804

2. Location

street & number Approximately five miles northwest of Glendale on Forest Road #187 not for publication N/A

city or town Beaverhead-Deerlodge National Forest , Melrose vicinity X

state Montana code MT county Beaverhead code 001

zip code 59743

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this X nomination ___request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property X meets ___does not meet the National Register Criteria. I recommend that this property be considered significant ___nationally ___statewide X locally. (___See continuation sheet for additional comments.)

Signature of certifying official / Date 4/6/2005

Montana State Historic Preservation Office
State or Federal agency and bureau

In my opinion, the property ___meets ___does not meet the National Register criteria. (___See continuation sheet for additional comments.)

Signature of commenting or other official / Date 4/14/05

Deputy Federal Preservation Officer
State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:

	Signature of the Keeper	Date of Action
✓ entered in the National Register		6/2/05
___ see continuation sheet		
___ determined eligible for the National Register		
___ see continuation sheet		
___ determined not eligible for the National Register		
___ see continuation sheet		
___ removed from the National Register		
___see continuation sheet		
___ other (explain):		

5. Classification

Ownership of Property (Check as many boxes as apply)
___ private
___ public-local
___ public-State
_X_ public-Federal

Category of Property (Check only one box)
___ building(s)
_X_ district
___ site
___ structure
___ object

Number of Resources within Property

Contributing	Noncontributing	
0	0	buildings
16	0	sites
13	1	structures
0	1	objects
29	2	Total

Number of contributing resources previously listed in the National Register 0

Name of related multiple property listing N/A

6. Function or Use

Historic Functions
Cat: Industry/Processing/Extraction Sub: processing site
Domestic single dwelling

Current Functions
Cat: Vacant/Not in Use

7. Description

Architectural Classification
Other: Brick charcoal kilns
Other: Horizontal log cabin

Materials
foundation STONE
roof N/A
walls BRICK; WOOD/log; WOOD
other WOOD

Narrative Description (See continuation sheets.)
The Canyon Creek Charcoal Kilns are located on a south-facing slope above Canyon Creek, an easterly-flowing creek on the east side of the East Pioneer Mountains. Elevation ranges from 6500 feet at the kilns to 7400 feet at the top of the area near the loading platform. Vegetation in the area consists of Douglas-fir and Lodgepole pine in the overstory, and mixed grasses and sagebrush for the groundcover. Access to the site is possible from Interstate 15, taking the Melrose exit. From Melrose, Montana, drive ten miles west on Forest Road #187 to the ruined town of Glendale. At the junction with Forest Road #188, stay to the right on #187 and follow the road for another five miles to the kilns. The log chute location and loading platform are directly up the hill to the north of the kilns.

The Canyon Creek Charcoal Kilns district consists of the remains of twenty-three charcoal kilns, a wooden log chute, a wooden loading platform at the top of the chute, the remains of a horizontal log building, and an associated historic dump. The kilns were constructed in 1881, and were used continuously until the Glendale smelter was closed and dismantled in 1900.

The conical-shaped kilns are an impressive set of structures on the landscape of the Canyon Creek valley floor. They are in various stages of deterioration. Several have retained their full shape but have spalling brick, mortar loss, and vertical cracking. Others have collapsed from the top down leaving lower shells or partial walls on the landscape. However, the 23 kilns still give an impression of the whole site, no matter what stage of deterioration they are in.
(See continuation sheets.)

Description:
According to Adelaide Gelhaus, born in Glendale in the early 1900s, her uncle Don Streb built some of the kilns. He also had built many of the brick homes and the hotel in Melrose. She also believed that he built the Hecla Mercantile and Bank building (Gelhaus interview: 1991). The Gelhaus family (Adelaide's father) was involved in mining and freighting in Glendale in the late 1800s. Mary Fassler Hunt, granddaughter of John Streb, wrote that John Streb actually made bricks for the charcoal kilns and built some of the kilns in 1884-1885. Clay for the bricks came from the Glendale area (*The History of Beaverhead County, Vol. I*: 526).

Typically, a kiln has a twenty-two foot interior diameter, a twenty-four foot exterior diameter, and is twenty-two feet high on the interior. There is a slight taper of the walls inward from the ground to the eighteen-foot level, and then a rounded cap on the top. This is the perfect shape to hold the brick structure together and transfer the loads and stresses from the top dome to the base. The kilns sit on stone foundations (the depth is undetermined). The brickwork is a common bond, known as English Garden bond, with every seventh course headers tying the walls of each layer together. The lower third of the kiln has three layers of brick, with two layers on the upper two-thirds. Three vent rows circle the base of the kilns. Row one is at the base of the kiln, row two is eighteen inches up, and row three and thirty-seven inches from the base. Each ventilation row has twenty-six vents, for a total of seventy-eight vents per kiln.

There is an entrance opening on the lower level, and smaller vent opening on the upper part of the kiln. Each of the openings has a slightly pointed arch. Metal doors covered the openings during the firing of the kilns. There are air vents in the three lowest header courses on the lower level; the holes alternate half of the spacing distance of two feet, eight inches on each of the layers. Near the seven feet level on the wall there are wood blocks in the header course, spaced three feet, eight inches center to center. Evidence on the ground shows a wood ring was nailed to the blocks as a tension ring, however, because wood is not good under stress it would not hold much together. It could have been used during construction of the kilns, holding the lower walls in place while the upper part was being worked on. The ring was probably left on the structure after the shape was completed.

The mortar appears to be a mixture of clay, silts, and some sand aggregate. There is some cement on the outer surface of the lower level mortar. The high heat from the firing of the kilns has caused deterioration of the mortar from the inside burning out between layers of brick. These brick layers have eventually spalled off of the structure. Over the years much of the mortar has fallen out.

The brick has varying degrees of hardness. They also have many clay deposits in them that have absorbed water and spalled the brick faces. Brick dimensions vary from eight to nine inches long, three and a half to five inches wide, and two to two and a half inches high. The heat of the kilns has caused vertical cracking in the walls. The kilns on the west side of the property have cracks in the upper areas, whereas the kilns on the east side of the property have cracks extending from top to bottom.

The kilns still have evidence of the original whitewash on the exterior. All of the kilns' interiors are stained black with about a quarter-inch layer of creosote.

#1 Structure (contributing): Kiln – An expanded metal screen has been placed over the door, which opens to 196°. No wooden bands are present on this kiln. A cobble stone foundation supports the kiln on the downslope (south) side. Some mortar is evident between the brick and the rock. The lowest row of vents is blocked, but the second and third rows are open. The charging door, situated on the upper west wall, is expanding. Three feet up on the northwest side is a ten-inch by eighteen-inch hole.

#2 Structure (contributing): Kiln – The door opening faces 181°. An expanded metal screen was placed over the door opening in the 1990s. Vertical cracks are evident in the walls, and the outer layer of brick is coming off. Like Structure #1, a stone foundation supports the lower (south) elevation. Some of the original slip is evident on the northeast side. Some of the vents on the northeast and east sides are plugged. The charging door on the east side has expanded, creating an opening that has removed one-fifth of the dome.

#3 Structure (contributing): Kiln – The top of the dome down to the bottom of the charging door has caved in. The charging door faced west. An expanded metal screen placed over the door opening in the 1990s has been removed, and is leaning against the kiln. The door opening faces 82°. A stone foundation supports the kiln on the lower (south) elevation. The outer layer of bricks is spalling off for five courses below the band line. Twenty-three courses of brick are missing completely on the west side below the charging door.

#4 Structure (contributing): Kiln – Restoration work was completed on this kiln in the 1990s as part of the Passport in Time project. New wooden bands with square cut nails, a historically accurate metal door, and whitewash have been applied. The door has been removed. The door opening faces 113° and the charging door is on the west side. The foundation is on the south elevation.

#5 Structure (contributing): Kiln – The doorway, facing 259°, and the east-facing charging door have become enlarged from collapsed bricks. A stone foundation supports the lower (south) elevation. The opening above the doorway measures four feet wide and six feet high.

#6 Site (contributing): Kiln – This kiln has collapsed down to the triple wall. The north wall is intact for twenty-four courses above the triple wall. The door opening faces 269°, and the upper charging door faces east. Foundation stones are visible on the lower south and east sides.

#7 Structure (contributing): Kiln – The door opening faces 108°, and the charging door faces west. Foundation stones are evident on the lower (south) side. Twenty-six courses of bricks above the charging door are missing. The outer (third) layer of brick is missing on the east side of the kiln, and the top thirteen courses of the outer (third) layer are missing on the southeast side, just south of the door.

#8 Site (contributing): Kiln – The charging door is no longer evident, but it had been on the west side. The door opening, which faces 115°, is still evident. The top portion of the kiln to the bottom of the charging door has collapsed. The outer (third) layer of brick on the bottom of the kiln is missing on about two-thirds of the kiln. The lowest portion of remaining wall is on the northeast side, where the wall is down to the twenty-third course.

#9 Site (contributing): Kiln – The door opening faces 270°, and is still intact. The charging door would have been on the east side, but it is no longer evident. The foundation is on the south and southeast sides of the kiln, supporting the lower elevation. Twenty-six courses remain of the kiln, which comes to just above the door. The top half of the structure is gone. The vent holes are still plugged with brick and mortar.

#10 Site (contributing): Kiln – Seven-eighths of the structure is gone. The east wall is intact to the bottom of the charging door. The lower fifteen courses on the north (upslope) side are intact, and may be supported by the earth that has eroded up against the outside of the kiln. The door opening is no longer visible.

#11 Site (contributing): Kiln – The southeast corner of the kiln is gone clear to ground level. The rest of the kiln is intact up to 33 courses, with the northwest corner intact up to 36 courses. The charging door would have been on the west wall, but it the kiln has collapsed at that height. A small patch of modern white slip has been applied on the west wall. No door opening is evident; it may have been in the southeast corner that has collapsed.

#12 Structure (contributing): Kiln – This kiln is intact. Restoration work was completed on this kiln in the 1990s as part of the Passport in Time project. New wooden bands with square cut nails, a historically accurate metal door, and whitewash have been applied. A stone foundation supports the downslope (south) side. The door opening faces 139° and the charging door faces north.

#13 Structure (contributing): Kiln – This kiln is intact. Restoration work was completed in the 1990s as part of the Passport in Time project. New wooden bands with square cut nails and whitewash have been applied. An expanded metal screen cage has been placed inside for visitors to inspect the interior of a kiln and to see cordwood stacked five feet high, partially replicating how a kiln would have been fired. The door opening faces 211° and the charging door faces 107°. There does not appear to be a foundation under this kiln.

#14 Site (contributing): Kiln – The top portion of this kiln has collapsed down to the triple wall (twenty six courses) on the northeast and southwest sides. The west wall retains twenty-six more courses and the east wall has eighteen more courses. The charging door placement is not evident. The door opening faces 97°. Some of the vents are still blocked. A stone foundation supports the west and south elevations.

#15 Structure (contributing): Kiln – While this kiln is largely intact, the upper vent opening is enlarging from collapsed bricks and the kiln is developing a two-foot wide by four-foot high hole in the northwest wall. Vertical cracks are visible on all walls of the kiln. The outer layer of brick is failing on the north wall, and black creosote has come through the cracks as evidence of early failure in this kiln. The door opening faces 165° and the metal door is not attached. The charging door faces 120°. A stone foundation supports the southwest corner of the kiln.

#16 Structure (contributing): Kiln – A stone foundation supports the south wall of the kiln. The door opening faces 161° and is starting to expand. Six courses of the outer brick above the door are missing. The top of the kiln to the bottom of the charging door has collapsed. The west wall has collapsed down to the triple wall, leaving thirty-five courses.

#17 Structure (contributing): Kiln – This kiln is largely intact, though vertical cracks are forming. A stone foundation supports the south and southwest sides. The door opening faces 157° and has a wooden sill log. A crack is forming above the door. The upper charging door faces 321° and has had one course of bricks at its base fail. A vertical crack on the northeast side has expanded into a three-foot wide by six-foot high hole.

#18 Site (contributing): Kiln – Three-fourths of the kiln is gone. The tope part of the kiln to the bottom of the charging door has collapsed. The north-northwest wall is completely missing. No evidence remains of the charging door. The door opening faces 98°. Another hole has formed on the south wall from the ground up six feet.

#19 Site (contributing): Kiln – Three-fourths of the kiln is gone. A stone foundation supports the south side of the kiln. The door faces 281°, and the charging door faces 117°. The bottom course of bricks framing the upper door is all that remains of it. The wall below the charging door is intact (fifty-three courses). Seventeen courses remain on the west side, thirty-nine courses on the south side, and twenty-nine courses on the north side.

#20 Site (contributing): Kiln – The top portion of the kiln has collapsed. The door opening faces 113°, but the upper portion of the door has collapsed and is open. The charging door opening is no longer evident. Thirty courses of brick remain on the east, north, and south walls, with forty-four courses remaining on the southwest wall. Vent holes are still plugged. A stone foundation supports the southeast and south walls.

#21 Site (contributing): Kiln – Three-fourths of the kiln is gone. No evidence remains of the placement of the door or upper charging door. The northeast wall is completely gone. The southeast wall is intact for fifteen courses, and the south and west walls each have thirty-one courses intact.

#22 Site (contributing): Kiln – The top half of the kiln has collapsed. The door opening faces 289°. Only two courses remain above the door. The west and east walls retain thirty-five courses, forty-five courses remain on the northwest and north sides, and twenty-four courses remain on the southeast side.

#23 Site (contributing): Kiln – The top half of the kiln has collapsed. The door opening faces 115°, and no evidence remains of the upper charging door. The kiln has collapsed to the triple wall, leaving thirty courses intact.

#24 Structure (contributing): Road segment – This two-track spur road provided access to the kilns from the main road and divides the kilns into east and west clusters. The road is not used and has not been maintained or improved. It has evidence of cut and fill construction and its bare-ground tracks are overgrown with vegetation.

#25 Structure (contributing): Loading Platform – This structure extends twenty-three feet out from the slope of the ridge. It is thirty-one feet wide, with a small triangular "wing" on the west side measuring nine feet at the base and twelve feet at the hypotenuse. The foundation posts are nine-inch diameter, stringers are eight-inch diameter, and the decking is five-inch to seven-inch wide unmilled lumber. The crib portion of the platform has V-notching, nails are round wire, and half-inch diameter steel rods attach the decking to the stringers. Species of wood used in the construction is Lodgepole pine.

#26 Site (contributing): Log Chute – The log chute is no longer recognizable as an intact structure on the landscape, but the location is known from the few remnants of wood and stone left on site. The extremely steep pitch of the chute suggests that the logs were first cut to cordwood length (four feet) before being loaded on the chute and sent down to a staging area below. The mountain slope where the chute was located is 38 degrees. Stone piles (foundations for the log chute) begin about mid-slope. They vary in size from three to four feet in diameter. All have deteriorated to some degree, so judging their original height is difficult. From mid-slope to the platform there are fourteen stone piles, spaced approximately twenty feet apart. It is approximately sixty feet from the last stone pile to the platform. Below mid-slope the chute foundation may have been cribbed log structures of varying height. Some pieces of long lumber (likely remnants of chute decking) are visible along the line of the chute.

The remains of the chute disappear approximately one hundred meters from the kilns. All remnants may have been destroyed by more recent impacts. It is likely that the chute did not run all the way to the kilns. Large areas would have been needed to stack the cordwood for burning. It is likely that the large, relatively flat area north of the kilns was used to store cordwood prior to burning. That may account for the lack of features or artifacts in this area.

#27 Site (contributing): Horizontal log cabin– Located sixty-three feet east of the loading platform, the collapsed remains this log cabin are set on a small flat spot cut out of the slope. The Lodgepole pine logs averaged eight inches in diameter, were unpeeled, hewed flat on the interior, had axe-cut, V-shaped saddle notches, and had both sawn and axe-cut ends. Round wire and square cut nails were used, quarter-pole chinking was placed on the interior walls, with no apparent daubing. No foundation is evident. The roof had a ridgepole and one purlin per side. The cabin may have housed men who cut logs into cordwood and loaded it into the chute, *or* it may have housed the chute tender who greased and maintained the chute. The exact function of this log dwelling is unknown.

#28 Site (contributing): Dump – Located just below the cabin to the south, this trash dump indicates a long-term habitation based on its size. Items identified in the dump include green, amethyst, and brown glass; a shoe sole; sheet tin; iron hoops and strap iron; hole-in-top cans of various shapes and sizes, including cans for cooking oil, baking powder, and meat; tobacco tins; and a watch fob. For the size of the dump, very little glass is present.

#29 Site (contributing): Cull Pile – Located at the base of the log chute, the cull pile contains the remnants of cord wood that splintered or shattered at the base of the chute.

#30 Structure (noncontributing): Wooden fence – The Forest Service constructed a jack-leg fence around the kilns in the 1980s to keep livestock away from the kilns. It surrounds the twenty-three kilns, but not the other features associated with the site. The north portion of the fence burned in a small wildfire in 2004, but it was reconstructed.

#31 Object (noncontributing): Interpretive sign – The Forest Service placed a wooden interpretive sign in front of the kilns in the 1990s. Two, four-inch square posts support the sign.

Integrity Statement: The kilns sat abandoned until the 1990s, when the Forest Service initiated restoration and stabilization work that was conducted as a Passport in Time project from 1994 through 1997. Some of the kilns have collapsed and have received no preservation work. The area around the kilns has been cleared of vegetation, specifically sagebrush, small pine and fir trees, and weeds growing in and adjacent to the kilns. Four kilns have been stabilized, and three of the kilns have been restored: masonry joints were hand raked where necessary; missing bricks were replaced with bricks scattered around the site; walls were repointed, one-by-four inch pine bands were secured with square nails; and plaster whitewash, replicating what was originally used, was reapplied to the exterior. The slip used to whitewash the kilns was replicated by a master mason to match with the original material. Mortar used in the repair work received laboratory analysis to match with the original mortar. Charging doors and the lower doors were replaced on the three kilns: replicas were based on a door found at the Hecla Consolidated Mining Company's Trapper Creek kilns. As part of the PIT project an interpretive sign was placed in front of the kilns, replacing an inaccurate sign that dated to 1961.

The essential physical features in the district are the charcoal kilns. The fact that the platform and log ruins are still present, and that the route of the chute has been identified, strengthen the ability of the site to convey the significance of the Canyon Creek Charcoal Kilns. Modifications to the area include road improvements that widened and graveled the Forest Service system road, construction of a wooden jackleg fence, and the placement of an interpretive sign. None of these developments intrudes upon the historic setting or feeling of the site in a manner that would distract visitors from identifying with the historic nature of the site. The Canyon Creek Charcoal Kilns Historic District retains all seven aspects of integrity.

8. Statement of Significance

Applicable National Register Criteria

- _X_ A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ____ B Property is associated with the lives of persons significant in our past.
- _X_ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ____ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations

- ____ A owned by a religious institution or used for religious purposes.
- ____ B removed from its original location.
- ____ C a birthplace or a grave.
- ____ D a cemetery.
- ____ E a reconstructed building, object, or structure.
- _X_ F a commemorative property.
- ____ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance

Engineering
Industry
Social History

Period of Significance 1881-1900

Significant Dates N/A

Significant Person N/A

Cultural Affiliation N/A

Architect/Builder McLain, G. M. (designer)
Streb, John (builder)

Narrative Statement of Significance

The Canyon Creek Charcoal Kilns are associated with the Hecla Consolidated Mining Company's silver and lead smelting operations at Glendale, Montana, and illustrate the broad patterns of the mining frontier at the end of the nineteenth century. The kilns exemplify charcoal production facilities used throughout the United States in the latter half of the nineteenth century, and are examples of architectural engineering that supported frontier industrial processes. Therefore, the Canyon Creek Charcoal Kilns are significant under Criteria A and C.

Historic Context

Large-scale placer mining began in Montana with the discovery of free gold in the gravels of Grasshopper Creek during the summer of 1862. Bannack, the first territorial capital, grew up at the diggings virtually overnight. By the summer of 1863 Bannack was already being eclipsed by discoveries of rich deposits of placer gold in Alder Gulch some fifty-five miles east. There, Virginia City, Montana's second territorial capital, grew to be the most important of several mining camps in the gulch. Working from Bannack and Virginia City, prospectors spread throughout the surrounding mountains to locate other strikes. The era of placer mining in southwestern Montana lasted at a much-reduced level for many years, but by the late 1860s and early 1870s the best placer deposits were largely depleted and emphasis shifted to lode mining. Trapper Creek and the adjacent Canyon Creek were prospected in the early 1870s.

(See continuation sheets)

9. Major Bibliographical References

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS)
__ preliminary determination of individual listing (36 CFR 67) has been requested.
__ previously listed in the National Register
__ previously determined eligible by the National Register
__ designated a National Historic Landmark
__ recorded by Historic American Buildings Survey # _____
__ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data
___ State Historic Preservation Office
___ Other State agency
_X_ Federal agency
___ Local government
___ University
___ Other
Name of repository: _Beaverhead-Deerlodge National Forest Supervisor's Office, Dillon, MT_____

10. Geographical Data

Acreage of Property _19.2 acres

UTM References (All points are Zone 12, NAD 27)

	Zone	Easting	Northing		Zone	Easting	Northing
A	12	354394	5060632	B	12	354527	5060640
C	12	354574	5059970	D	12	354398	5059941

Verbal Boundary Description (See continuation sheet.)

Boundary Justification (See continuation sheet.)

11. Form Prepared By

name/title__Zane L. Fulbright/South Zone Archeologist_

organization_Beaverhead-Deerlodge National Forest__ date__March 10, 2005__

street & number__420 Barrett Street___ telephone_(406) 683-3900_

city or town_Dillon_ state_MT_ zip code _59725_

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps
A USGS map (7.5 or 15 minute series) indicating the property's location.
A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs
Representative **black and white photographs** of the property.

Property Owner

(Complete this item at the request of the SHPO or FPO.)
name _Beaverhead-Deerlodge National Forest_____

street & number_420 Barrett Street_____ telephone_(406) 683-3900____

city or town__Dillon_____ state_MT__ zip code _59725____

William Spurr and James A. Bryant located a promising silver lode in Trapper Creek in 1872, calling their claim the Forest Queen. Neither worked the claim, and the following year it was reopened for relocation. The following year, while out searching for lost horses on Trapper Mountain, Bryant's partner P.J. Grotevant kicked a rock that contained almost pure silver. They staked a new claim before returning to Bannack to record their find.

This find spurred dozens of men to stake claims in Trapper Creek; among them was Noah Armstrong. Armstrong located the Cleve, Avon, Alta, and Atlantis lodes, which quickly became the leading producers of the Bryant (later the Hecla) Mining District. Armstrong soon bought other properties until he owned the bulk of the mines in Trapper Creek. One of his acquisitions was the Cleopatra, which together with the Atlantis became the two most profitable mines in the district.

Trapper City sprang up first in 1873, followed by Glendale, centered around Armstrong's smelter ten miles farther downstream. Until Armstrong completed the smelter, he and the other mine owners shipped ten tons of high-grade silver ore to Swansea, Wales, via Corrine, Utah, for refining that first year. Trapper City died with the closure of the Trapper Mine, forcing the inhabitants to move to more active areas. Lion City developed at the foot of Lion Mountain, and the last Trapper City inhabitant relocated to this new settlement in 1878.

Armstrong's original smelter burned down in 1879 at a reported loss of $100,000. Construction of a new smelter began immediately. The Glendale smelter was processing ore from the Lion Mountain mines, as well as from the mines in the adjoining districts of Highland and Vipond. By 1880 ore from the mines was smelting at $1000 per ton. Base bullion was being shipped by wagon and train from Glendale to Omaha, Nebraska, where it averaged $100,000 in value over a period of several months in 1880. Despite its apparent vigor, Armstrong's company was $77,785 in debt as of January 1881. Armstrong sold his interests in the Hecla Consolidated Mining Company to E.C. Atkins of Indianapolis, who owned the Atkins Saw Works. Atkins employed Henry Knippenberg as manager of the saw works. Knippenberg accepted the position of general manager of Hecla Consolidated, arriving in Glendale with his family in April 1881.

Knippenberg set about an immediate reorganization of Hecla's operations. That Knippenberg was an able manager, and his reorganization successful, is seen from the company's balance sheet. By December 1881 Knippenberg had erased the debt owed by Armstrong and showed a year-end profit of $237,730. In 1883, Knippenberg corresponded with A. J. Crook of Challis, Idaho, referring to a letter from a Mr. Nash regarding the charcoal kilns. While the contents of Mr. Nash's letter are uncertain, the letter did inspire Knippenberg to mail the drawings and written specifications for the kilns that he had expected to construct the previous year. The need to construct the kilns was intensified since Knippenberg had four old kilns that had been in use for six years "just taken down" since they "never were good kilns" (Knippenberg to Crook, June 9, 1883).

The mid-1880s saw Glendale's smelter and community growing. Two crushers and a large roaster supported the smelters three fifty-ton blast furnaces. The arrival of the Utah and Northern Railroad assured the growth and production of the District. The tracks reached Melrose in the spring of 1881, and were completed to Butte in December of the same year. The Hecla District was now linked to Butte on the north and Salt Lake City on the south – two major centers of east-west transcontinental rail traffic.

In 1889, Henry Knippenberg was elected to represent Beaverhead County in Montana's Constitutional Convention; seventy-five men from around the Territory were elected to the Convention. The territory became the forty-first state on November 9, 1889. Six years later Knippenberg was elected to represent Beaverhead County at Montana's Fourth Legislative Session. He also served as County Commissioner, filling in as a result of the death of the previous commissioner. In 1896 he was appointed one of three McKinley electors, and fought for the gold standard even though the Hecla Company was a major silver producer (*The History of Beaverhead County, Vol. I:* 332).

In 1892 Glendale appeared on a map of Montana's leading towns. The future of Glendale appeared strengthened by the passage of the Sherman Silver Purchase Act of 1890. The act required the United States government to purchase twice as much silver as it had previously, and added the amount of silver money in circulation. However, the act threatened to undermine the nation's gold reserve. President Grover Cleveland, convinced that the act helped precipitate the Panic of 1893, called Congress into special session, which in 1893 repealed the Sherman Silver Purchase Act.

Adding to the external stresses, production from the mines declined rapidly after 1893. The Cleopatra Mine played out in 1895. The Atlantis followed soon after, although it continued small-scale production until 1903. Even with ore reserves depleted and silver greatly devalued, the company managed to show a profit for stockholders, paying annual dividends of six percent between 1870 and 1900. In 1900 the Glendale

smelter closed and was dismantled. Low-grade ore and slag were shipped to Omaha for smelting; mining on a large scale was over by 1903.

In the history and development of lode mining in Montana, the Hecla District ranks as one of the most important and productive silver and lead districts in the state. Geach (1972) called the Hecla District the "treasure house of Beaverhead County, having produced ore valued at nearly $20,000,000." Commentators of the period pointed to the Hecla Mining District as equal in importance to any in Montana's famous "silver triangle:" Butte to Philipsburg to Helena.

The Use of Charcoal in Smelting

The ores smelted at Glendale were not refractory. They did require blast furnace treatment because ore with silica content greater than four percent needed a blast furnace. To "charge" a blast furnace a highly-controlled mixture of ore, flux, and a solid fuel were placed in the furnace. The most common smelter fuels were coke, charcoal, or a combination of the two. Prior to the arrival of the railroads, coke imported from the northeastern United States was too expensive for southwestern Montana smelters. With access to the eastern markets provided by the Utah and Northern Railroad, there was a change in reliance on charcoal as blast furnace fuel to a mixture of coke and charcoal (this shift in fuel preferences happened at numerous localities in the mining West). This shift occurred at Glendale after 1881. Coke was shipped to Melrose from Pennsylvania. In 1895, the Hecla Company imported 1000 tons of coke. This coke cost $16.65 per ton delivered at Melrose and an additional $2.35 per ton to haul the ten miles by wagon from Melrose to Glendale. The smelter consumed ten tons of coke per day, reducing the stockpiled 1000 tons of coke in about three months. This rate of consumption motivated the Hecla Company to absorb the additional expense of charcoal production as a portion of the blast furnace fuel.

The production of charcoal involves locating a source of cordwood, felling the trees, limbing, bucking into cordwood lengths (four feet), transporting the wood to the burning site, and burning – or "coaling" – the wood. Cordwood was reduced to carbon by being burned in brick kilns. Kiln production yielded forty-five to fifty bushels of charcoal per cord. In 1895 the Hecla Company produced charcoal in thirty-eight company-owned kilns (not all were in Canyon Creek) and also purchased pit-burned charcoal from independent burners.

Kiln Construction

Charcoal kilns came in several shapes and sizes. The form and construction depended upon the builder's preference, skills, and knowledge, as well as the dictates of the terrain. They could be rectangular, circular, or conical. Fuel quality did not differ from one to another. Round and rectangular kilns were declining in popularity by the mid-1850s due to their structural instability and their being prone to crack. Conical kilns have been recorded in the western United States (California, Nevada, Idaho) as well as along the East Coast (Vermont). All kilns expanded and contracted with the fluctuations in temperature. Metal or wire ropes were placed around them for support. The constant cracking and recracking introduced unwanted air into the kilns and made the burning process difficult to manage.

The twenty-three charcoal kilns on Canyon Creek represent the conical style that was most common in the charcoal industry after 1850. The Canyon Creek kilns are made of brick, are situated on stone foundations, and would hold between thirty-five and forty cords of wood. Based on kilns in Nevada of comparable size and material the cost to construct a kiln ranged between $500 and $1000 each (Ryan 1992).

Wood Fiber and Charcoal Production at Canyon Creek

The Hecla Mining District was favored with large stands of Lodgepole pine, some fir, and a few lesser species. Timber to feed the charcoal kilns was cut in Trapper Creek, Canyon Creek, and the large plateau north of Canyon Creek known as Vipond Park. Into the 1980s older people in Melrose remembered that all of the Trapper Creek area was denuded for fuel wood, charcoal, and mine timbers. Lodgepole in Canyon Creek produced about fourteen cords per acre. Determining the acres harvested for charcoal production has been determined from extrapolating from the Hecla Consolidated Mining Company's annual reports from its officers to their stockholders. The following table represents a minimum number of acres harvested to feed the charcoal kilns, located in Canyon Creek and Trapper Creek.

Year	Bushels	Cords	Acres Cut
1881	461,177	10,248	732
1882	685,323	15,229	1,088
1883	931,962	20,710	1,479
1884	827,894	18,398	1,314
1885	1,008,827	22,418	1,601
1886	1,035,164	23,004	1,643
1887	670,535	14,901	1,064
1888	477,788	10,618	758
1889	331,589	7,369	526
1890	222,857	4,952	354
1891	214,348	4,763	340
1892	198,714	4,416	315
1893	136,543	3,034	215
1894	?	?	?
1895	?	?	?
1896	?	?	?
1897	61,000	1,356	99
1898	66,328	1,474	105
1899	18,800	418	30
1900	Glendale smelter shut down and dismantled.		

Based on the rate of charcoal consumption in the company's reports, in sixteen years the company cut the equivalent of eighteen and two-tenths sections, or 11,665 acres of timber for charcoal alone.

Kiln Operation

Kiln operation can be divided into three parts: charging the kiln, burning the wood to charcoal, and discharging the kiln.

Charging the Kiln: The act of charging a kiln referred to filling it with cordwood. The wood was stacked precisely to allow complete, even burning. Cordwood was four feet long, and of various diameters, although uniform diameter was helpful for even burning. Large and small diameter pieces were stacked together, with the larger being split to stack better. The kiln was filled from the main charging door on the front of the structure until it was no longer possible to reach the top of the stack. The upper portion of the stack was laid in from the smaller charging door at the upper rear of the kiln. A conical kiln thirty feet in diameter (larger than the Canyon Creek kilns) required the labor of four men and two horses for one twelve-hour day. This size kiln could hold thirty-five cords of wood and would produce 1750 bushels of charcoal, or fifty bushels to the cord. Egleston (1880) described the usual method for charging a conical kiln. Skids two inches in diameter were laid about three feet apart around the radii of the kiln floor to begin charging. These skids acted to allow smoke and gas to escape to the vents. If confined within the kiln this volatile material would eventually explode. A chimney about four feet square was made in the center of the kiln. A tunnel or air channel ran from the chimney to the door. This air channel was filled with shavings and light wood. When the kiln was ready for firing the upper door was closed and sealed with mortar. In some cases the upper charging door was left open during the firing process to allow for the escape of smoke and gases. The kiln was ignited through the lower door by firing the air channel. When the wood was well ignited, four vents on either side of the door were closed with bricks and mortared tight. Other vents around the bottom of the kiln then loosely closed to allow air inside to aid combustion. The main door was closed and sealed with mortar. A final comment mentions that firing was always done at night, without any explanation why.

Burning the wood to charcoal: The process of burning the wood to charcoal consisted of partially burning the wood in an oxygen-poor environment. The amount of air admitted to the kiln regulated the temperature. Open flame, which would consume the wood, was not desirable. Just enough oxygen was introduced to create a low burn of sufficient temperature to drive the moisture and combustible gases from the wood. The end result was an almost pure carbon residue.

The entire art and science of producing a good grade of charcoal centered on the manipulation of the kiln vents, and the ability of the burners to understand conditions inside the kiln from external signs. Once the kilns were fired, the charcoal burners never left the site until the burning was completed. They watched the smoke coming from the three rows of vent holes around the bottom of the kiln. Thick white smoke came from the topmost row of vents, usually for three or four days. His signaled water being driven out of the wood as steam. In one to four days, depending upon the size of the kiln and the weather, a yellowish smoke began to appear. Blue smoke followed next. When it began pouring out of the top vents it was allowed to burn for twelve hours. Blue smoke indicated the kiln was very hot and the firing process almost complete. After the first twelve hours the top vents were closed. In another twelve hours the second row of vents smoked blue; they were then closed also. The bottom row of vents was opened and the fire was drawn down to the very bottom of the kiln. When the burners judged the bottom of the kiln to have been thoroughly burned, the bottom row of vents was closed and sealed.

The burning time for a thirty-five-cord kiln was between six and eight days. When the kiln was completely fired all vents were closed by inserting a brick into each vent hole, and mortared tight. The kilns were allowed to stand two and a half to three days. Eight to ten barrels of water were then thrown into the kiln from the top charging door. The charcoal could usually be drawn the next day. The kiln cooling time was extended to five days if it was not watered. Burners determined that the kiln was cool enough to draw by feeling the sheet metal doors. When the doors were cool to the touch the kiln could be opened and drawn.

Discharging the kiln: Two men working a twelve-hour day could "draw," or discharge a conical kiln thirty feet in diameter and twenty feet high. (The Canyon Creek kilns average twenty-two feet in diameter and twenty-two feet high. Their capacity is approximately twenty-five to thrity-five cords.) It required one day to charge, thirteen days to burn, and one day to discharge a kiln of this size. Describing a charcoal works with thirteen kilns of this size, Egleston (1880) wrote that it was operated by eight men, and the kilns could be "turned" (charging through discharging) as many as twenty-two times per year.

Status and Role in Charcoal Production

There was a clear division of labor in the charcoal industry that separated the woodcutters from charcoal burners, and sometimes each of them from the teamsters who delivered the charcoal to the smelters.

In the early 1860s mining camps native-born "Americans" held most jobs. This was true of woodcutters as well. Over time the job of cutting fuel wood seemed to fall more and more to immigrants, while native people moved to other occupations. By the time Hecla Consolidated was buying fuel wood, the woodcutters were Canadian and French Canadian. That the Hecla Company employed its own woodcutters is certain. A news item in *The Atlantis* appeared on January 19, 1881, about the time Armstrong sold the company to Atkins Saw Works: "All the men employed as choppers in Canyon Creek, by the Hecla Co., were discharged last Thursday, causing a general surmise that the company had sold."

Charcoal burners were most often identified as Italians, and usually immigrants. Some of them had followed the trade in Italy. In the western mining districts charcoal burners apparently occupied the bottom of the economic and social ladder – not only because they were recent immigrants from Southern Europe, but specifically due to their trade.

In a letter to Knippenberg, George Conway, cashier for the company, identified Italian burners working at the charcoal kilns at Trapper Creek (George Conway to Henry Knippenberg, October 13, 1889). Sassman (1941) maintained that the Italian burners not only produced the fuel, but also delivered it to the smelter for eleven cents per bushel. *The Atlantis* confirmed that independent coal haulers were delivering charcoal, rather than company haulers (September 8, 1880). The editor did not specify whether the haulers were also the charcoal burners, or if they were teamsters buying directly from the burners. Local folklore at Melrose said that the Hecla Company imported many Italians directly from Italy to work in the mines. Some of them may have found their way into charcoal production. The story continued that after some time in this country the men grew homesick. In order to keep them in Montana Territory the Company sent to Italy for brides. A trainload of women arrived at Melrose, and the matchmaking took place on the platform.

At least one non-Italian worked the charcoal kilns. According to Lucy (Else) Old, her father William J. Hopkins, an Englishman, immigrated to the United States in 1871, and arrived ay Vipond park near Canyon Creek in 1887. Soon after that they moved to Canyon Creek to operate the kilns. They left Canyon Creek in 1900 when they moved to the Big Hole Basin (Old to Sassman, October 26, 1992; *The History of Beaverhead County, Vol. I*: 285).

The Canyon Creek Charcoal Kilns, in operation from 1881 until 1900, exemplify the industrial development occurring with the mineral exploration and processing occurring in Montana as it developed from a territory to a resource-laden state. The kilns represent the industrial processing required to support mineral processing, and represent the cost-saving measures and adaptive use of the local resources utilized by Montana industrialist and politician Henry Knippenberg. Structurally, the kilns preserve nineteenth-century industrial brickwork. The site as a whole represents a processing yard: a loading platform and log building at the top of the slope, a chute and road segment transporting wood to the kilns, and the organized clusters of kilns to process the wood into charcoal. As a result, the Canyon Creek Charcoal Kilns Historic District meets National Register Criterion A for its part in the mining development of Montana in the late nineteenth century; and Criterion C as an example of industrial architecture, particularly conical brick charcoal kilns common in the charcoal industry after 1850.

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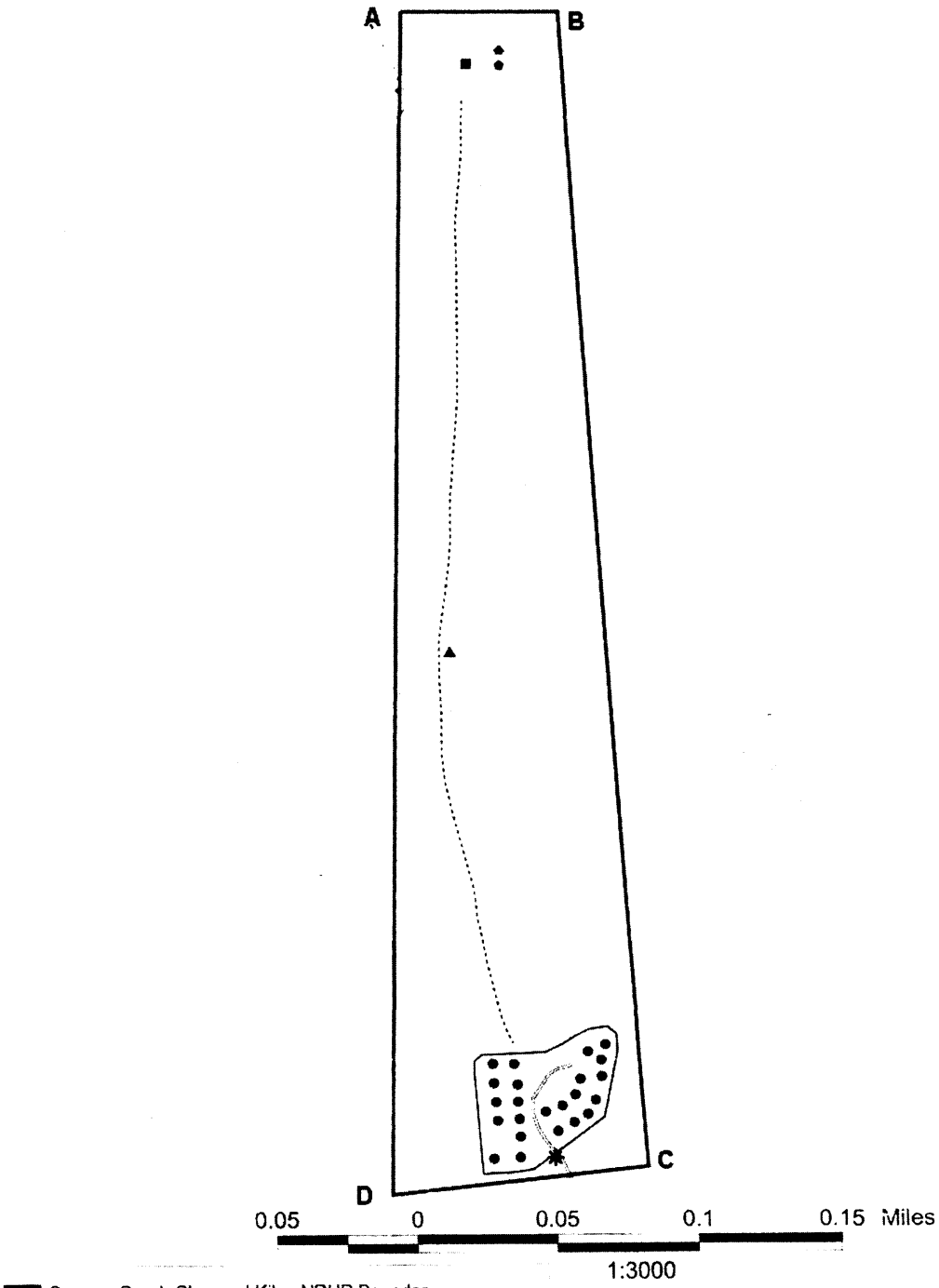
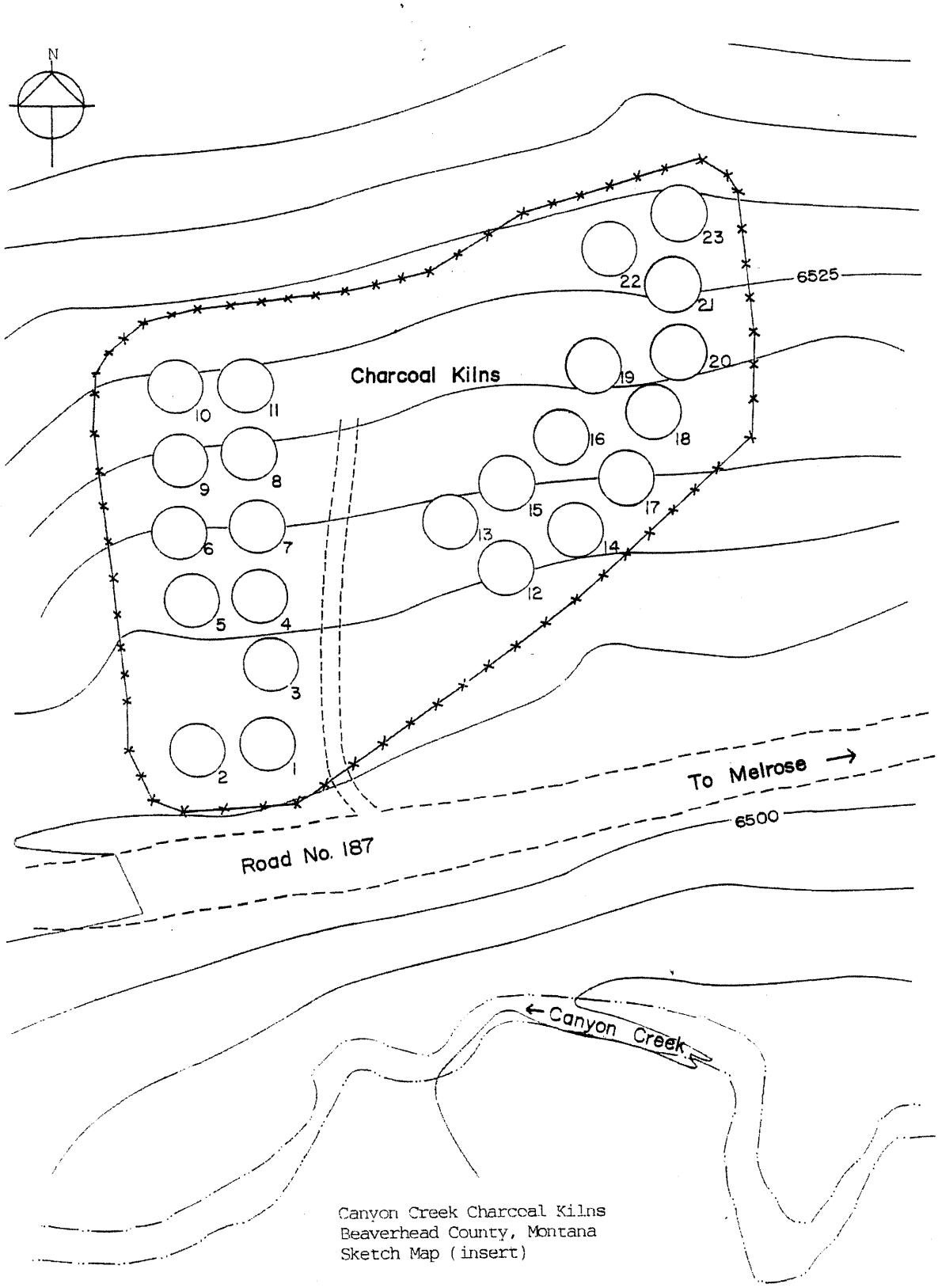
The Atlantis. Glendale, Montana. September 1, 1880, to March 23, 1881.

Geographical Data

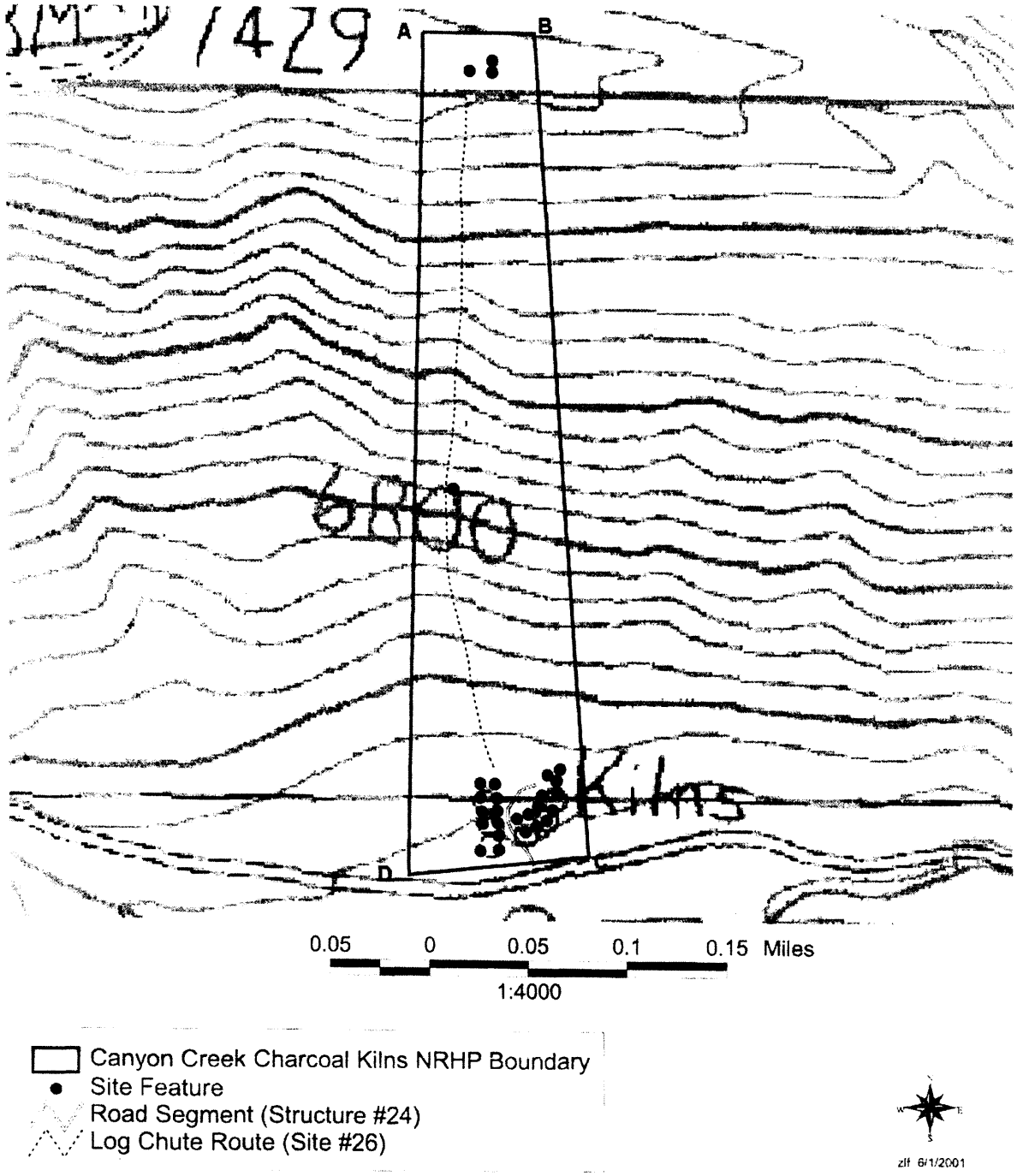
Verbal Boundary Description: The Canyon Creek Charcoal Kilns are located in Township 2 South, Range 10 West, SE ¼ SE ¼ SW ¼, and SW ¼ SE ¼ SW ¼ Section 5; and all of the NE ¼ NW ¼, and SE ¼ NW ¼ of Section 8. The boundary is delineated by a polygon drawn to connect the following UTM Points (all points are in Zone 12, and are derived from NAD 27): A 12 354394E, 5060632N; B 12 354527E, 5060640N; C 12 354574E, 5059970N; D 12 354398E, 5059941N. Refer to the attached USGS 7.5 minute topographic map for the delineation of the boundary. The UTM references correspond with the four corners of the polygon, starting with the NW point and working clockwise.

Boundary Justification: The boundary is drawn to include the kilns, road segment, remains and location of the log chute, cull pile, the loading platform, and the horizontal log habitation and dump remains that have historically been part of the Canyon Creek Charcoal Kilns operation and that convey the significance of the site.


A
B
C
D
0.05 0 0.05 0.1 0.15 Miles
1:3000
Canyon Creek Charcoal Kilns NRHP Boundary
Cull Pile
Dump
Kiln
Loading Platform
Log Habitation
Road Segment (Structure #24)
Log Chute Route (Site #26)
Interpretive Sign
Jack-leg Fence around Kilns
N
W
E
S
zlf 12/14/2001



Canyon Creek Charcoal Kilns
Beaverhead County, Montana
Sketch Map (insert)


A
B
D
0.05 0 0.05 0.1 0.15 Miles
1:4000
Canyon Creek Charcoal Kilns NRHP Boundary
Site Feature
Road Segment (Structure #24)
Log Chute Route (Site #26)
zlf 6/1/2001