# Historic Structure Assessment

## Nelson Tunnel/Commodore Waste Rock Superfund Site, Mineral County, Colorado

## Introduction

As part of the Superfund Redevelopment Program, EPA Region 8 requested a historic assessment of the structures associated with the Nelson Tunnel/Commodore Waste Rock Superfund site located near Creede in Mineral County, Colorado. The cluster of structures that make up the Bachelor-Commodore Mine Complex are an iconic first stop along the popular Bachelor Loop Historic Tour, a 17-mile driving tour that loops through Creede's silver mining district and ghost towns. Understanding the condition of the structures and potential eligibility for a national or state historic registry can help EPA when considering future remedial activity to address Nelson Tunnel drainage and potential alignment with the community's future use goals of historic preservation.

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### Current Status

In 2006, Colorado Preservation, Inc. listed the Bachelor-Commodore complex as an Endangered Place due to the deteriorating condition of its standing resources, the destabilization of the south waste rock dump and the need for cleanup of metal contamination in West Willow Creek from the area's mines. As one of the most intact and visible mines seen along the Bachelor Loop when heading north out of Creede, the Bachelor-Commodore Mine Complex is an important resource to convey the impact of the mining industry in Creede and Mineral County.

### Approach

On behalf of EPA, Skeo contracted with historic specialists Clerestory Preservation and Mountain States Historical to conduct a historic structure assessment. The assessment included a tour of the mine complex on October 7, 2020, existing documentation, additional background research and an evaluation of the Bachelor-Commodore Mine Complex based on the National Park Service's National Register Criteria for Evaluation. The evaluation process included:

1. Categorizing the property as a district, a site, a building, a structure or an object.

2. Determining the historic context, or period of significance, the property represents. For eligibility, a property must possess significance in American history, architecture, archeology, engineering or culture when evaluated within the historic context of a relevant geographic area.
3. Determining whether the property meets the four National Register Criteria for significance. This is done by identifying the links to important events or people, design or construction features, or other potential information that make the property important.
4. Determining whether the property retains historic integrity. Is the property old enough to be considered historic (generally at least 50 years old) and does it still look much the way it did in the past? This includes evaluating the aspects of location, design, setting, workmanship, materials, feeling and association that the property must retain to convey its historic significance.
5. Identifying which buildings and structures contribute to the historic period of significance and have a high level of integrity to convey the history of mining in this area.

The sections below provide more information and findings from the evaluation process.

*View of the cribbing and Lower and Upper Ore Sorting House and Aerial Tramway*

# Bachelor-Commodore Mine Complex Historic Context

This section briefly describes the general characteristics of the property, including its historic and current physical appearance (location, setting, size and significant features). Appendix B provides more historic context and historic photographs.

The Bachelor-Commodore Mine Complex, one of the most important producers of silver and industrial metals in the Creede Mining District of Mineral County, Colorado, encompasses 28.7 acres of the valley floor and adjacent steep mountain slopes of West Willow Creek canyon, approximately 1.25 miles north of the town of Creede along West Willow Creek Road (County Road 503, a popular recreational and interpretive route also known as the Bachelor Loop). The Creede Mining District encompasses the Willow Creek drainage basin, on the northern side of the upper Rio Grande River valley, in the eastern San Juan Mountains. Prospectors established the district around 1890 after the discovery of a handful of veins rich with silver, lead and zinc. The district's two principal veins are vertical formations several miles long, encased within volcanic rock along the two forks of Willow Creek; both veins, and their adjacent creek valleys, are generally oriented north-south. The Willow Creek forks exhibit natural qualities characteristic of the eastern San Juan Mountains, including vertical bedrock cliffs, scree fields, steep slopes, and subalpine spruce and lodgepole pine forest. The minor of the two ore veins, the Holy Moses Vein, parallels the eastern side of East Willow Creek. The larger Amethyst Vein parallels the western wall of West Willow Creek. At the southern end of the Amethyst Vein, prospectors staked the adjoining Bachelor and Commodore claims.

The Bachelor and Commodore mines operated separately for the first several decades after their respective establishments in 1891. They shared underground workings after coming under the same ownership in 1900, though independent lessees operated them. In the 1930s, the mines were combined into a single operation and their surface plants were brought into a consolidated process. The Bachelor Mine consisted of two separate surface plants on the southeast-facing slope of Bachelor Mountain organized around the mine's two tunnel portals. The Commodore's surface plant was organized around its tunnel portal at the creek level below, and which expanded across the road to the east and south after the workings of the two mines were consolidated in the 1930s and 1940s (Figure 1, Mine Complex Diagram). In keeping with the boom-and-bust cyclical development of mines across Colorado, the Bachelor-Commodore complex includes an assemblage of mining buildings, structures, objects, and site and landscape features that reflect the different periods of investment and expansion with a high degree of historic integrity. The complex produced almost continuously into the early 1980s. As such, its period of significance is from 1891, when both mines were first developed, to 1971, a point 50 years in the past, in keeping with National Register guidelines.

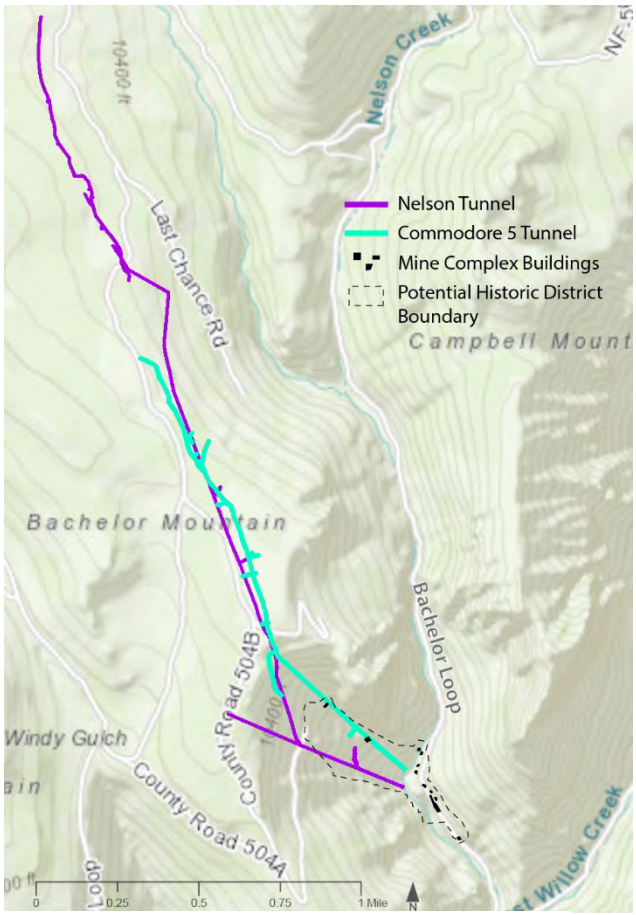



Figure 1. Mine Complex Diagram

The entire complex can be considered as one contributing historic site that displays representative features of hardrock tunnel mines. However, for clarity, the complex is divided into three separate geographical areas, reflecting their corresponding surface plants: the Upper Bachelor Tunnel, the Lower Bachelor Tunnel and the Commodore No. 5 Tunnel. The Commodore surface plant is the largest in area and is oriented along West Willow Creek and the unpaved County Road 503, which traverses on a roughly north-south axis through the complex along the east side of the creek. A collection of buildings sits above the road at the southwest side of Campbell Mountain. A second grouping extends along the creek bed at the north. The two areas are connected by a bridge that spans the road as it passes by walls of cribbing that hold back the remnants of a large waste rock dump that once dominated the creek bottoms immediately adjacent to the Commodore Tunnel portal. 2008 to 2010, EPA substantially removed and recontoured this dump area after a flash flood in 2005 destabilized the dump and flume diversion structure buried underneath it, resulting in a release of heavy metals into the creek. The upper and lower plants of the Bachelor Mine extend westward from the Commodore up the steep flank and scree slopes of Bachelor Mountain, featuring buildings oriented around each level's tunnel and overlooking large waste rock dumps that descend down the mountainside.

Elevation of the complex ranges from 9,040 feet at the southern extent of the complex along West Willow Creek, to 9,200 feet at the northern extent of the Commodore No. 5 surface plant at creek level, to 10,080 feet at the Upper Bachelor Tunnel surface plant above and to the west. Vegetation is mostly concentrated at the north end of the Commodore surface plant and consists of riparian species such as willow and cottonwood. Aspen stands and some evergreens border the Commodore's southeast end at the foot of Campbell Mountain. Blue spruce and fir have established at the stable surfaces of the Bachelor surface plants on Bachelor Mountain, mainly along the pack trail that switchbacks up the mountain slope.

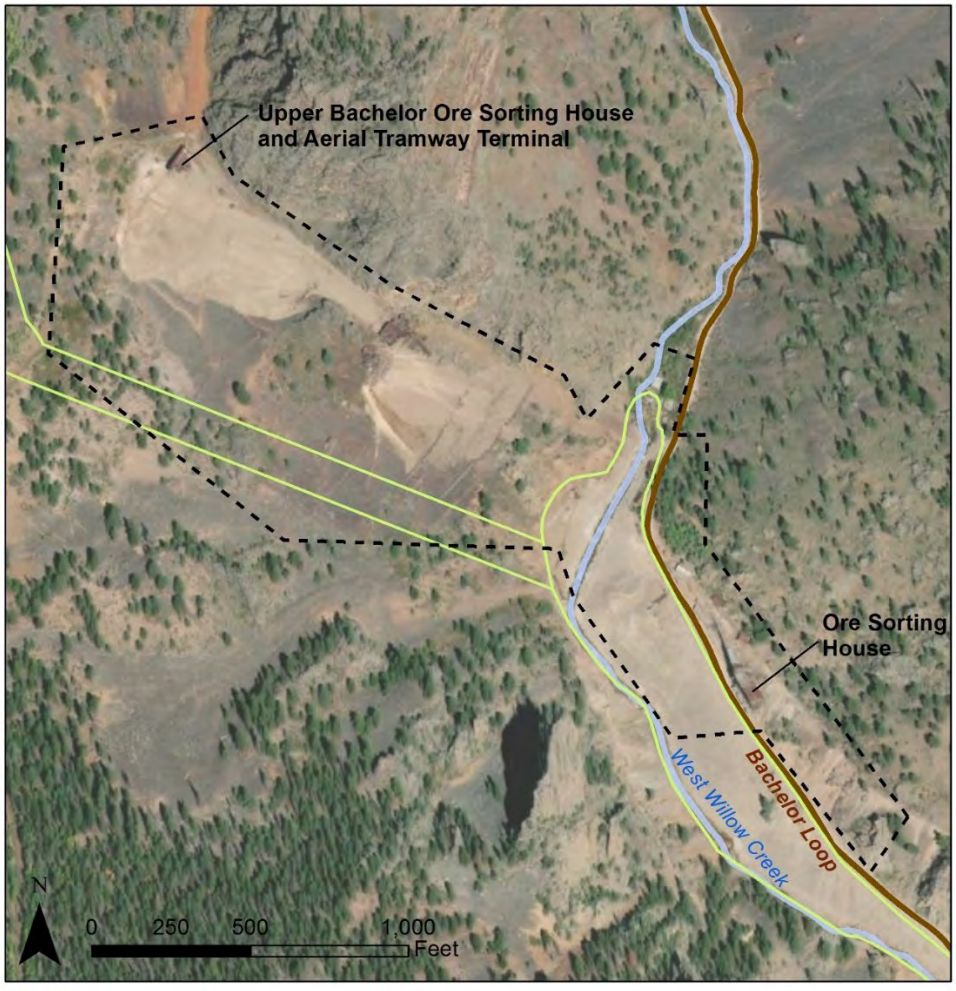
As one of many producers of the Amethyst Vein, the Bachelor and Commodore mines are neighbored by the remnants of several other mine operations, particularly to the south, along West Willow Creek, where the remains of a railway along the west side of the creek transported ore from the Nelson Tunnel (5ML.346).[1] This subscription-service tunnel used by several operations extends just outside the nomination boundary to the Humphreys Mill, the foundations and retaining walls of which are still visible along the southwest side of the creek and road approximately 0.25 miles south of the complex. Remnants of the surface plant of the Nelson Tunnel recorded in 2000 have been almost entirely removed, with the creek mitigation work completed in 2010, and the tunnel portal has long been collapsed. Though the Bachelor Mine at one point used the Nelson Tunnel for access to its underground workings, neither it nor the Commodore Mine used the railway or mill as part of their operations, with their owner(s) preferring to sort and transport their own ore for milling elsewhere. In 1900, the two operations came under the same ownership and were linked underground but leased to different mining operations until the 1930s, when they were operated in conjunction with one another under one operator. As such, the Bachelor and Commodore mines can be treated as their own standalone operations that historically joined into one complex and can be considered as part of the potential historic district (Figure 2, Potential Historic District Boundary).

[1] Nelson Tunnel was originally recorded with History Colorado Office of Archaeology and Historic Preservation under site number 5ML.346.

## Potential Historic District Boundary

The potential historic district boundary of the Bachelor-Commodore Mine Complex, shown in Figure 2, includes all former and existing buildings, structures and site features associated with the historic district during the period of significance (1891 to 1971). The southeast section of the district is at the east side of County Road 503 at the base of Campbell Mountain, and includes the southeast waste rock dump and other landscape features along with the standing mine buildings. Near the southwest corner of the Commodore Ore Sorting House (Resource 4, Table 1), the boundary crosses the road to the east side of West Willow Creek to encompass the historic footprint of the south waste rock dump before crossing the creek westward to encompass the resources of the Lower and Upper Bachelor surface plants on the east side of Bachelor Mountain, including their respective waste rock dumps, pack trails, and mine buildings and structures. The north boundary line follows the south edge of the large bedrock pinnacle that contained the north edges of the waste rock dumps and dictated the placement of surface plant resources on the mountainside. At the creek again, the boundary juts north to encompass the north end of the Commodore surface plant on the west side of the county road. Near the southeast corner of the shop building (Resource 16, Table 1) the boundary re-crosses the road eastward to include remaining mine-related resources on the southwest toe of Campbell Mountain.

## Figure 2. Potential Historic District Boundary



# Historic Buildings and Structures Inventory

The Bachelor-Commodore Mine complex was first preliminarily recorded with History Colorado in 1990 under the site number 5ML.80. A comprehensive survey of the Amethyst Vein's primary mines, including the Bachelor and Commodore mines, was undertaken in 1999 and 2000 by Eric Twitty of Mountain States Historical. Twitty's documentation split the complex into the three sub-areas of Upper Bachelor, Lower Bachelor and Commodore tunnels, recording them separately, each with its own set of map reference numbers. This assessment relies on Twitty's detailed descriptions as a baseline, and updates them to reflect current conditions and integrates the three sub-areas into one larger complex. Table 1 provides an inventory of the complex's resources, presented in geographical order beginning at the southeast end of the Commodore surface plant that is encountered first when traveling north on County Road 503 from the town of Creede (see also Figure 3, Inventory of Historic Structures). The entire mine complex can be considered as one contributing site, with notable site features described as they are encountered geographically moving roughly south to north along the road and creek and then westward up the mountainside, terminating at the Upper Bachelor plant. Nearly all other resources can also be considered as contributing, as they date to the period of significance from 1891 to 1971 and have a high level of integrity. Appendix A provides detailed descriptions of each structure and justifications for non-contributing status.

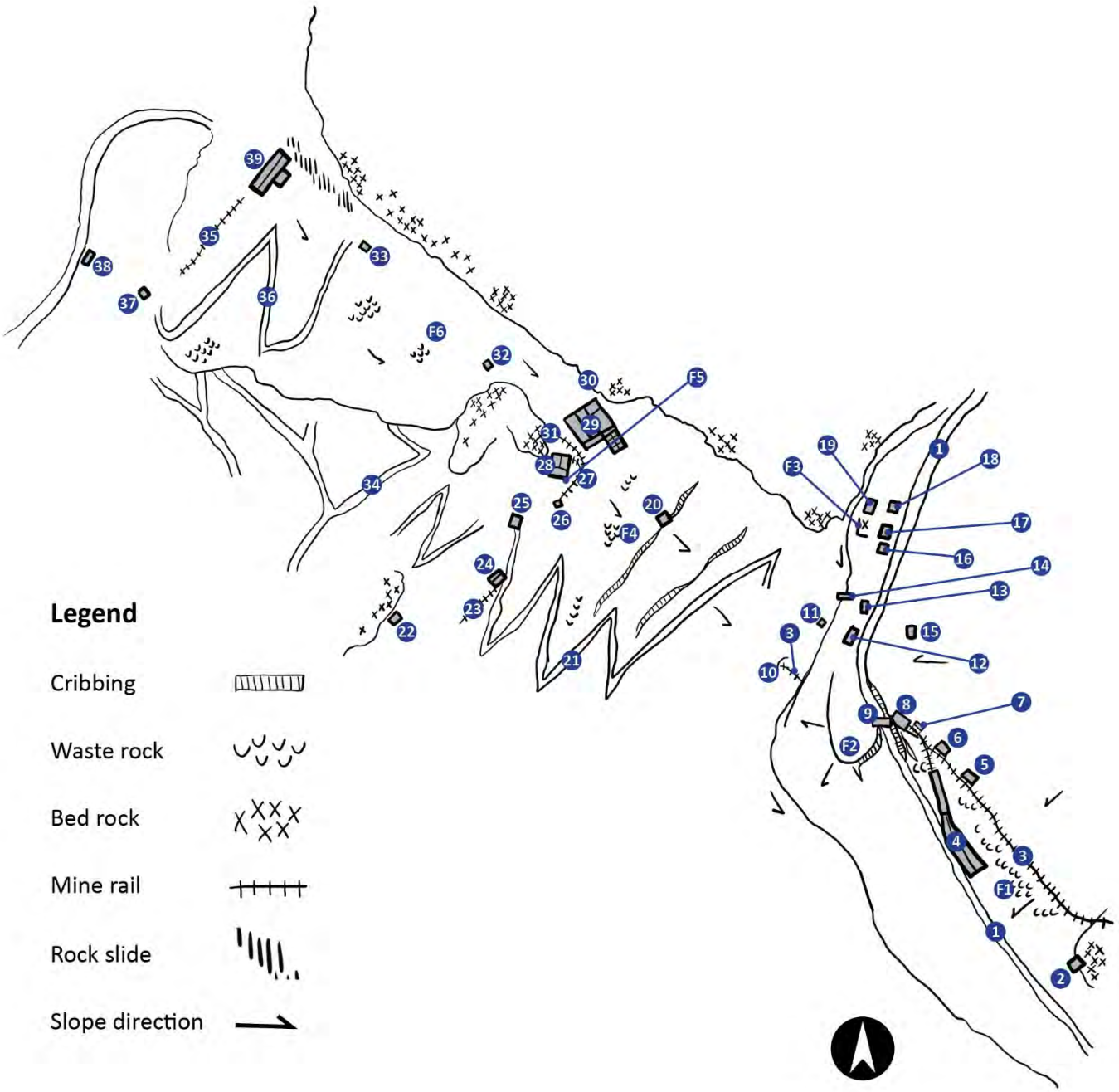
## Table 1. Resources of the Mine Complex

| Map Ref. # | Resource Name | Resource Type | Date(s) Of Construction | Contributing Status |
|---|---|---|---|---|
| | Mine Complex *(see notable site features below)* | Site | n/a | Contributing |
| **1** | County Road 503 | Structure | ca. 1890s | Contributing |
| **2** | Ore Sorting House | Building | ca. 1930s | Contributing |
| **3** | Mine Rail Line Remnant | Structure | ca. 1940s | Contributing |
| **F1** | Southeast Waste Rock Dump with Cribbing | Feature | ca. 1930s | n/a |
| **4** | Commodore Ore Sorting House and Trestle | Building | 1940 | Contributing |
| **5** | Generator Building/Locomotive Shed | Building | ca. 1930s | Contributing |
| **6** | Generator Building/Locomotive Shed | Building | ca. 1930s | Contributing |
| **7** | Drill-Steel Cutting Bench | Object | ca. 1950s | Contributing |
| **8** | Shop | Building | ca. 1950s | Contributing |
| **9** | Rail Bridge | Structure | ca. 1940s | Contributing |
| **F2** | South Waste Rock Dump Remnant with Cribbing | Feature | ca. 1940s-80s | n/a |

| Map Ref. # | Resource Name | Resource Type | Date(s) Of Construction | Contributing Status |
|---|---|---|---|---|
| **10** | Commodore No. 5 Tunnel Portal | Structure | 1900, ca. 1980s | Contributing |
| **11** | Privy | Building | ca. 1970s | Non-Contributing |
| **12** | Office | Building | ca. 1910s | Contributing |
| **13** | Compressor House | Building | 1949 | Contributing |
| **14** | Bridge | Structure | ca. 2010 | Non-contributing |
| **15** | Electrical Substation Remnant | Structure | ca. 1930s | Contributing |
| **16** | Shop | Building | 1936 | Contributing |
| **17** | Compressor House | Building | 1936 | Contributing |
| **F3** | Powerhouse Ruins | Feature | ca. 1890s | n/a |
| **18** | Aerial Tramway Tower Platform | Structure | pre-1930 | Contributing |
| **19** | Compressor House | Building | 1936 | Contributing |
| **F4** | Lower Bachelor Waste Rock Dump with Cribbing | Feature | ca. 1890s-1940s | n/a |
| **20** | Ore Bin and Aerial Tram Terminal | Structure | ca. 1940s | Contributing |
| **21** | Pack Trail | Structure | ca. 1890s-1910s | Contributing |
| **22** | Explosives Magazine | Structure | ca. 1890s | Contributing |
| **23** | Mine Rail Bed Remnant | Structure | ca. 1890s | Contributing |
| **24** | Dynamite Thaw House | Building | ca. 1890s | Contributing |
| **25** | Stable | Building | ca. 1890s | Contributing |
| **26** | Privy Pit Cribbing | Structure | ca. 1890s | Contributing |
| **27** | Mine Rail Line Remnant | Structure | ca. 1940s | Contributing |
| **28** | Shop | Building | ca.1890s/ca. 1930s | Contributing |

| Map Ref. # | Resource Name | Resource Type | Date(s) Of Construction | Contributing Status |
|---|---|---|---|---|
| **F5** | Shop Clinker Dump | Feature | ca. 1890s | n/a |
| **29** | Lower Bachelor Ore Sorting House and Aerial Tramway Terminal | Building | ca.1890s/ca. 1910s | Contributing |
| **30** | Explosives Magazine | Structure | ca. 1930s | Contributing |
| **31** | Lower Bachelor Tunnel Portal | Structure | ca. 1890s | Contributing |
| **F6** | Upper Bachelor Waste Rock Dump | Feature | ca. 1890s-ca. 1940s | n/a |
| **32** | Ore Bin | Structure | ca. 1940s | Contributing |
| **33** | Aerial Tramway Tower | Structure | ca. 1930s | Contributing |
| **34** | Pack Trail | Structure | ca. 1890s-ca. 1910s | Contributing |
| **35** | Mine Rail Bed Remnant | Structure | ca. 1890s | Contributing |
| **36** | Bulldozed Road | Structure | ca. 1970s | Non-contributing |
| **37** | Explosives Magazine | Structure | ca. 1940s | Contributing |
| **38** | Explosives Magazine | Structure | ca. 1890s | Contributing |
| **39** | Upper Bachelor Ore Sorting House and Aerial Tramway Terminal | Building | 1940 | Contributing |

Figure 3. Inventory of Historic Resources



## Condition of Structures

While many of the structures may not be in immediate danger of collapse or damage, all will require some degree of preservation soon, mostly by reducing their exposure to the elements by enclosing window and door openings and recladding their roofs. Some structures, listed below, are in more dire condition and require treatment as soon as possible.

- Lower Bachelor Ore Sorting House and Aerial Tramway Terminal (Resource #29): the roof of this circa 1890s building is almost completely gone, and its historic additions/appendages to the north and east are nearly collapsed. Due to the loss of the roof, the walls of the building are severely racked to one side with the loss of structural members that would tie them together. The era of this building, its mortise-and-tenon construction, and its visual prominence on the hillside make it particularly important to retain. Not many ore sorting houses of this era and type remain in Colorado.
- Lower Bachelor Shop (Resource #28): the roof is gone, and the walls are beginning to splay outward; features such as the roof's venting cupola have been lost due to the roof collapse.
- Lower Bachelor Stable (Resource #25): the roof is gone, and the walls are beginning to splay outward; in addition, scree from the cut slope above it is pushing into the west wall.
- Commodore Shop (Resource #16): the roof has collapsed and the cut bank of the county road to the east is slumping into the wall.
- Commodore Generator Building/Locomotive Shed (Resource #5/6): a tree has fallen over onto the roof and should be addressed before it causes more damage.
- Upper Bachelor Ore Sorting House (Resource #39): based on a windshield survey, it appears to be in fairly good shape. It should be visited soon to confirm its condition and need for preservation.

*Lower Bachelor Shop (Resource #28) at left, and Lower Bachelor Ore Sorting House and Aerial Tramway Terminal (Resource #29) beyond at right. Camera facing north.*

# National Register of Historic Places Considerations

## Overview[2]

The National Register's standards for evaluating the significance of properties were developed to recognize the accomplishments of all peoples who have made a significant contribution to our country's history and heritage. The criteria are designed to guide state and local governments, federal agencies, and others in evaluating potential entries in the National Register.

*What Qualifies a Property for Listing?*

Properties listed in the National Register of Historic Places possess *historic significance* and *integrity*. Significance may be found in four aspects of American history recognized by the National Register Criteria:

- Criterion A: association with historic events or activities.
- Criterion B: association with important persons.
- Criterion C: distinctive design or physical characteristics.
- Criterion D: potential to provide important information about prehistory or history.

A property must meet at least one of these criteria for listing. Integrity must also be evident through historic qualities, including location, design, setting, materials, workmanship, feeling and association. Generally, properties must be 50 years of age or more to be considered historic places. They must also be significant when evaluated in relationship to major trends of history in their community, state or the nation. Information about historic properties and trends is organized into historic contexts that can be used to weigh the historic significance and integrity of a property.

The Bachelor-Commodore Mine complex was evaluated to better understand its historic integrity and ability to meet the National Register Criteria.

## Historic Integrity

The entire Bachelor-Commodore Mine Complex retains a high level of integrity dating to its period of significance from 1891 to 1971. Individual buildings and structures largely retain their materials, design and workmanship associated with their original construction dates, which range from circa 1890s to circa 1940s. Subsequent alterations to these resources date to the period of significance and convey their continued use in the mining operations of the mine complex. Some earlier resources, such as the Commodore Mine's original powerhouse and tunnel support buildings from the early 1900s, have been removed, largely within the period of significance, to accommodate newer technological systems. The most impactful alteration to the historic district's setting occurred with the 2008-10 recontouring and removal of a large portion of the south waste rock dump within the creek drainage, due to a flash flood and damage to the mine's water diversion system, from 2008 to 2010. This work also required the removal of some contributing resources atop the waste dump. However, the most visible section of the dump along the county road that transects the mine complex still conveys a sense of the scale of the dump due to the still extant log cribbing walls. The waste rock dumps of the two Bachelor tunnel plants on the mountainside also convey this scale and impact of a large mining operation that spanned several decades of production. As such, the entire complex is able to convey a strong sense of feeling and association with the local mining industry from the late-nineteenth century to the mid-twentieth century.

[2] National Register of Historic Places Bulletins: How to Apply the National Register Criteria for Evaluation (NRB 15). Available at: https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf.

## Applicable Criteria and Significance

The Bachelor-Commodore Mine Complex can be considered locally significant under Criterion A for *Industry* for its association with the mining industry that created enormous wealth for its investors, promoted the settlement of the town of Creede and Mineral County, contributed to the local growth of dependent industries, such as farming and ranching, and evolved to encompass changing processes and labor practices. The Bachelor and Commodore mines were two of the biggest producers of ore in the Creede Mining District. Later, when their workings and output were combined, they had the most productive years of all Creede-area mines.

The historic district can also be considered locally significant under Criterion C in the areas of *Engineering and Architecture* from circa 1890s to circa 1950s for its assemblage of resources, reflecting the evolution of the mining industry's maximization of new technologies for cost-effective extraction of ore, providing important examples of mining engineering and architecture that range from the 1890s to the 1950s. Such prominent examples include the ore sorting houses at all three surface plants, dating to circa 1890s and 1943; the remnants of the aerial tramways, which indicated major investment in the mine complex; compressor houses with their machinery left intact; and the large waste rock dumps with their cribbing retaining walls that convey the significant amounts of material processed here and the impact of the mines on the natural setting. As explained in the *Mining Industry in Colorado Multiple Property Documentation Form* (MPDF), the types of resources found at the Bachelor-Commodore Mine Complex and their spatial layout at the surface plants point to the evolution of planning and organization indicative of a sophisticated mining operation over several decades.[3]

Finally, the complex can also be considered locally significant under Criterion D for *Non-Aboriginal Historic Archaeology* for its potential to yield important information through its buried and surficial deposits of artifacts. The period of significance for the district is from 1891, the year both the Bachelor and Commodore claims were beginning to be developed, to 1971, when mining operations were still underway at the complex and a date 50 years in the past, in keeping with National Register guidelines. The historic integrity of the complex's resources and landscape is high and clearly demonstrates the more than 80 years of mining activity that occurred there. The Bachelor-Commodore Mine Complex meets the registration requirements of the *Mining Industry in Colorado* MPDF for the property type Hardrock Mine/subtype Tunnel Mine.[4]

### Criterion A

As two of the principal mines on the Amethyst Vein in the Creede Mining District, the Bachelor and Commodore mines were major contributors to the local mining industry. As such, the complex is directly associated with and significant in the area of *Industry* under Criterion A. Though neither mine had the initial bonanza ore of the nearby Amethyst or the Holy Moses mines, the Bachelor and Commodore mines were both major producers in the mining district, outlasted all other operations, and profitably produced ore well into the late-twentieth century. Due to their location at the apex of the Amethyst Vein, which features extremely steep topography, the Bachelor and Commodore mines were developed as tunnel mines rather than shaft mines, which are more commonly found at the other operations on the vein to the north. Features of a hardrock tunnel mine, as discussed in the *Mining Industry in Colorado* MPDF's registration requirements, are readily seen at the complex, including tunnels, trestles, mine rail lines, explosives magazines, cribbing, air compressors and compressor houses, ore bins, and sorting houses, shops, stables, privy pits and building platforms. The historic district's numerous extant waste rock dumps and cribbing retaining walls along the creek bottom and up the steep mountainside convey the vast

[3] James E. Fell, Ph.D., and Eric Twitty, M.A., The Mining Industry in Colorado, National Register of Historic Places Multiple Property Documentation Form (accepted 2008). On file with History Colorado Office of Archaeology and Historic Preservation; 186.
[4] Ibid.; 187-89.

amounts of material moved through the complex over time, the extreme conditions encountered and overcome through evolving mining processes, and the mining industry's impact on the natural landscape.

Considered individually, the Bachelor and Commodore mines were some of the largest mines in the Creede Mining District, on par with only the Amethyst (5ML.247, tunnel plant and 5ML.349, shaft plant), Last Chance (5ML.345) and Holy Moses mines. The Amethyst Shaft's surface plant ceased operations in 1920, though production continued through the 1950s, using the Amethyst Tunnel and the Commodore No. 5 Tunnel as its main haulage ways. The Last Chance mine ceased surface plant operations in the 1910s, closing for good in 1937. The Holy Moses mine was most active from the 1890s to 1910, followed by a few years of operation in the 1930s and 1950s, respectively, until shuttering in 1958. Using their adjacent surface plants in conjunction with one another beginning in the 1930s, the Bachelor and Commodore mines had the most productive years of all of the mines in the district. Other than the Wagon Wheel Gap Fluorspar Mine (5ML.252, National Register, listed April 22, 2019), a mine that supplied fluorspar for the steel production industry from 1913 to 1950 and is not considered to be in the Creede Mining District due to its location south of the Rio Grande River, no other mines in Mineral County have been listed in the National Register of Historic Places to date.[5]

### Criterion C

The Bachelor-Commodore Mine Complex is further significant in the areas of *Engineering and Architecture*. Its surface plants clearly convey a professional organization of technology and mining processes that maximized economies of scale for extracting profitable ore and provide excellent examples of mine buildings and structures from various eras. Such extant resources date to the first boom of the Bachelor Mine's operations, as seen in the intact Lower Bachelor Ore Sorting House and

Aerial Tramway Terminal from the mid-1890s, which made use of well-organized ore processing methods and the efficiencies of a Bleichert double-rope tramway system that was the most efficient type of aerial tramway at the time and which only large-scale outfits could afford. Furthermore, the 1930s and 1940s resources of the Commodore compressor houses and the Upper Bachelor and Commodore ore sorting houses demonstrate this continued reliance on planning and use of the latest (as well as tried-and-true) technologies at the surface plants to aid in the most cost-effective methods of extracting profitable ore.

Later resources from the late 1940s to the early 1950s, such as the Commodore machine shop and generator/locomotive sheds, reflect a continuing evolution to rely less and less on costly labor to move ore through the complex. Furthermore, the construction techniques of these various resources, ranging from early mortise-and-tenon lumber structural systems to prefabricated steel-frame buildings, display the use of the most efficient construction methods for their respective times and the accessibility of the mine complex. Though some alterations to the complex occurred after the period of significance from 1891 to 1971, namely the recontouring of the south waste rock dump and the removal of the resources on top of it, as well as the bulldozing of the upper reaches of the Bachelor's Upper Tunnel plant, the complex retains a high degree of integrity that is able to convey these associations of evolving engineering and architecture over the district's long period of mining.

### Criterion D

Finally, the Bachelor-Commodore Mine Complex is locally significant for its potential to yield important information in the area of *Non-Aboriginal Historic Archaeology*. Due to its relative lack of vandalism, especially at the less-accessible surface plants of the Upper and Lower Bachelor tunnels, the complex retains a strong

[5] Eric Roy Twitty, *Mining the Amethyst Vein: Selective Cultural Resource Inventory of the Principal Historic Mine Sites on the Amethyst Vein*, Volume I (April 2000); prepared for Willow Creek Reclamation Committee, 26-27.

collection of surficial artifacts and machinery, as recorded in 2000 and re-confirmed in 2020, that may reveal information on the application of mining technology and engineering practices. Research questions that may be able to be answered would include the degree and methods by which miners' comfort and safety were addressed, which may not be found in historical documentation. For example, as noted in the 2000 survey, although "multiple tunnels comprising the Bachelor Mine offered the benefit of improved ventilation through natural circulation, a centrifugal blower located at the lower tunnel [noted again during fieldwork in 2020] indicates that the Bachelor Mining Company supplied fresh air to miners laboring in dead end tunnels. Such a practice was progressive."[6] Furthermore, the existence of intact building platforms, privy pits and clinker dumps at the complex have the potential, through archaeological testing and excavation of buried deposits, to yield information not found in historical documentation, addressing research questions that seek insights into miners' workplace, social structures and lifestyles. Due to the complex's operation over long periods of time with large crews, more privy pits and trash deposits are likely to be found and would be expected to yield similar information as well.

[6] Twitty, 91.

## Summary of Findings

Based on this evaluation process, the Bachelor-Commodore Mine Complex is considered potentially eligible to be listed on the National Register of Historic Places as a historic district. The complex displays an assemblage of mining buildings, structures, objects, and site and landscape features that reflect a high degree of historic integrity. This historic period of significance can be considered to date from 1891, when both mines were first developed, to 1971, a point 50 years in the past, in keeping with National Register guidelines. Nearly all buildings and structures in the Bachelor-Commodore Mine Complex can be considered as contributing historic structures, as they date to the period of significance from 1891 to 1971, and have a high level of integrity to convey the history of mining in this area. Based on this evaluation process, the Nelson Tunnel portal feature is considered outside the Bachelor-Commodore Mine District proposed historic district since it served multiple mines and was historically connected to the rail line on the cliff face, the ore bins along the line, and the termination at the Humphreys Mill (Appendix A provides more information). These features may be eligible as part of an expanded or separate historic district.

To retain the historic integrity of the potential historic district and features within it, buildings and structures should be stabilized to avoid further degradation or loss. Disturbances to or removal of remaining structures should be minimized.

# References


Colorado State Mine Inspectors' Reports, Colorado State Archives:
Bachelor Mine (Box 104053)
Creede Exploration Company (Box 104053)
Emperius Mine (Box 104053)

*Engineering and Mining Journal*, 1898; 1900.

Environmental Protection Agency, "Superfund Site: Nelson Tunnel/Commodore Waste Rock, Creede, CO, Cleanup Activities." (online at https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0802630#bkground, accessed 18 November 2020).

Fell, James E., Ph.D., and Eric Twitty, M.A. *The Mining Industry in Colorado*, National Register of Historic Places Multiple Property Documentation Form (accepted 2008). On file with History Colorado Office of Archaeology and Historic Preservation.

Sanborn Fire Insurance Map, Creede, Colorado, 1904.

Trennert, Robert A. "Aerial Mine Tramways in the West," *Mining History Journal* (1997), 3-13. (online at https://www.mininghistoryassociation.org/Journal/MHJ-v4-1997-Trennert.pdf, accessed 18 December 2020).

Twitty, Eric Roy. *Mining the Amethyst Vein: Selective Cultural Resource Inventory of the Principal Historic Mine Sites on the Amethyst Vein*, Volume I (April 2000). Prepared for Willow Creek Reclamation Committee. On file with History Colorado Office of Archaeology and Historic Preservation.

# Historic Structure Assessment

**Nelson Tunnel/Commodore Waste Rock Superfund Site, Mineral County, Colorado**

# Appendix A: Description of Structures and Features

## Introduction

The Bachelor-Commodore Mine complex was first preliminarily recorded with History Colorado in 1990 under site number 5ML.80. A comprehensive survey of the Amethyst Vein's primary mines, including the Bachelor and Commodore mines, was undertaken in 1999 and 2000 by Eric Twitty of Mountain States Historical. Twitty's documentation split the complex into the three sub-areas, the Upper Bachelor, Lower Bachelor and Commodore tunnels, recording them separately, each with its own set of map reference numbers. The 2021 Historic Structure Assessment relies on Twitty's detailed descriptions as a baseline, but updates them to reflect current conditions and integrates the three sub-areas into one larger complex.

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The entire mine complex can be considered as one contributing site, with notable site features described in detail below as they are encountered geographically moving roughly south to north along the road and creek and then westward up the mountainside, terminating at the Upper Bachelor plant. Nearly all other resources can also be considered as contributing, as they date to the period of significance from 1891 to 1971 and have a high level of integrity. The figure on the following page identifies all the complex features, followed by a detailed description of each structure and photographs.

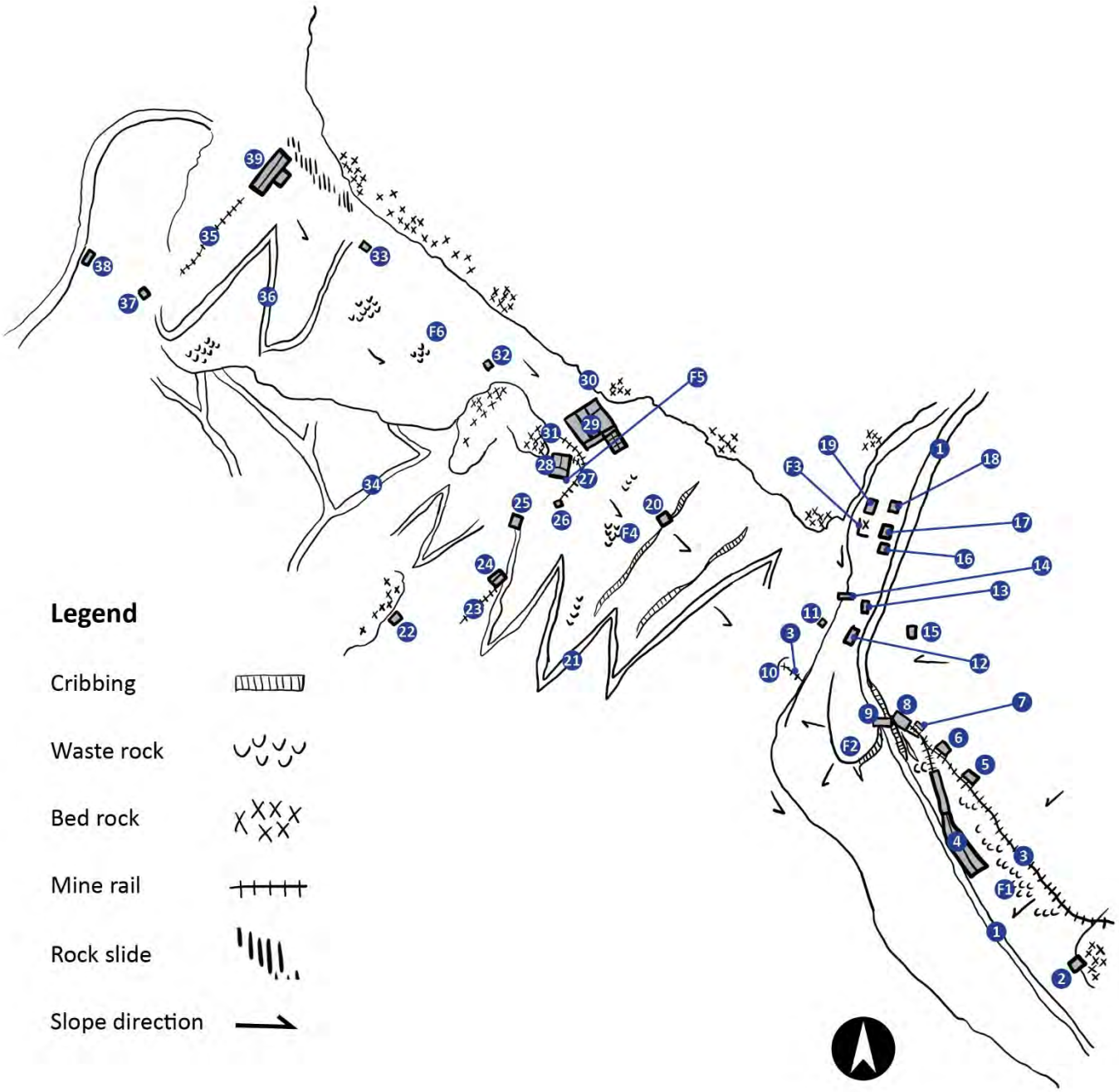


Figure 1. Inventory of Historic Resources

## Table 1. Resources of the Mine Complex

| Map Ref. # | Resource Name | Resource Type | Date(s) Of Construction | Contributing Status |
|---|---|---|---|---|
| | Mine Complex *(see notable site features below)* | Site | n/a | Contributing |
| **1** | County Road 503 | Structure | ca. 1890s | Contributing |
| **2** | Ore Sorting House | Building | ca. 1930s | Contributing |
| **3** | Mine Rail Line Remnant | Structure | ca. 1940s | Contributing |
| **F1** | Southeast Waste Rock Dump with Cribbing | Feature | ca. 1930s | n/a |
| **4** | Commodore Ore Sorting House and Trestle | Building | 1940 | Contributing |
| **5** | Generator Building/Locomotive Shed | Building | ca. 1930s | Contributing |
| **6** | Generator Building/Locomotive Shed | Building | ca. 1930s | Contributing |
| **7** | Drill-Steel Cutting Bench | Object | ca. 1950s | Contributing |
| **8** | Shop | Building | ca. 1950s | Contributing |
| **9** | Rail Bridge | Structure | ca. 1940s | Contributing |
| **F2** | South Waste Rock Dump Remnant with Cribbing | Feature | ca. 1940s-80s | n/a |
| **10** | Commodore No. 5 Tunnel Portal | Structure | 1900, ca. 1980s | Contributing |
| **11** | Privy | Building | ca. 1970s | Non-Contributing |
| **12** | Office | Building | ca. 1910s | Contributing |
| **13** | Compressor House | Building | 1949 | Contributing |
| **14** | Bridge | Structure | ca. 2010 | Non-contributing |
| **15** | Electrical Substation Remnant | Structure | ca. 1930s | Contributing |
| **16** | Shop | Building | 1936 | Contributing |
| **17** | Compressor House | Building | 1936 | Contributing |
| **F3** | Powerhouse Ruins | Feature | ca. 1890s | n/a |

| Map Ref. # | Resource Name | Resource Type | Date(s) Of Construction | Contributing Status |
|---|---|---|---|---|
| **18** | Aerial Tramway Tower Platform | Structure | pre-1930 | Contributing |
| **19** | Compressor House | Building | 1936 | Contributing |
| **F4** | Lower Bachelor Waste Rock Dump with Cribbing | Feature | ca. 1890s-1940s | n/a |
| **20** | Ore Bin and Aerial Tram Terminal | Structure | ca. 1940s | Contributing |
| **21** | Pack Trail | Structure | ca. 1890s-1910s | Contributing |
| **22** | Explosives Magazine | Structure | ca. 1890s | Contributing |
| **23** | Mine Rail Bed Remnant | Structure | ca. 1890s | Contributing |
| **24** | Dynamite Thaw House | Building | ca. 1890s | Contributing |
| **25** | Stable | Building | ca. 1890s | Contributing |
| **26** | Privy Pit Cribbing | Structure | ca. 1890s | Contributing |
| **27** | Mine Rail Line Remnant | Structure | ca. 1940s | Contributing |
| **28** | Shop | Building | ca.1890s/ca. 1930s | Contributing |
| **F5** | Shop Clinker Dump | Feature | ca. 1890s | n/a |
| **29** | Lower Bachelor Ore Sorting House and Aerial Tramway Terminal | Building | ca.1890s/ca. 1910s | Contributing |
| **30** | Explosives Magazine | Structure | ca. 1930s | Contributing |
| **31** | Lower Bachelor Tunnel Portal | Structure | ca. 1890s | Contributing |
| **F6** | Upper Bachelor Waste Rock Dump | Feature | ca. 1890s-ca. 1940s | n/a |
| **32** | Ore Bin | Structure | ca. 1940s | Contributing |
| **33** | Aerial Tramway Tower | Structure | ca. 1930s | Contributing |
| **34** | Pack Trail | Structure | ca. 1890s-ca. 1910s | Contributing |
| **35** | Mine Rail Bed Remnant | Structure | ca. 1890s | Contributing |

| Map Ref. # | Resource Name | Resource Type | Date(s) Of Construction | Contributing Status |
|---|---|---|---|---|
| **36** | Bulldozed Road | Structure | ca. 1970s | Non-contributing |
| **37** | Explosives Magazine | Structure | ca. 1940s | Contributing |
| **38** | Explosives Magazine | Structure | ca. 1890s | Contributing |
| **39** | Upper Bachelor Ore Sorting House and Aerial Tramway Terminal | Building | 1940 | Contributing |

# Description of Structures and Features

## Mine Complex Site, contributing site (Photos 1-9)

The mine complex site consists of the three surface plants at the Commodore No. 5, Lower Bachelor and Upper Bachelor tunnels, which are immediately adjacent and accessible to one another, with the Commodore plant oriented around West Willow Creek on a roughly south-north axis, and the two Bachelor plants to the west on the southeast flank of Bachelor mountain above the canyon floor. A large bedrock pinnacle forms the northern boundary of the complex from the creek to the Upper Bachelor. For clarity, each of the three sub-sections of the plant are discussed as the complex's description moves geographically through the site.

## Commodore Tunnel No. 5 Surface Plant

Nearly all extant resources at the Commodore No. 5 surface plant date from the 1930s to the 1950s, effectively erasing the original, early 1900s plant originally built along the creek. The southeast portion, at the base of Campbell Mountain, is comprised of several buildings and a mine rail line at the top of the southeast waste rock dump covering the toe of the mountainside (Site Feature 1). Debris from removed mine rail lines and trestles is scattered across the area and 1930s-era lumber power poles stand among the buildings. Cribbing walls retain the waste rock from sliding onto the road. The largest building at the plant, the Commodore Ore Sorting House, is at the southwest base of the dump, immediately adjacent to and overlooking the road. Further north, a lumber rail bridge spans the road to access the south waste rock dump.

The south waste rock dump (Site Feature 2) at the Commodore historically featured a flume diversion system that channeled West Willow Creek around and through the dump; though this system was originally installed in the late 1890s to early 1900s, it was effectively replaced by the 1950s. From the 1930s to the 1950s, when the surface plant was redeveloped, aerial tramway towers that brought ore down from the Bachelor tunnels were dismantled and a mine rail line system was established at the top of the dump to connect the tunnel portal with the surface plant across the road at the southeast end of the site (Resources 2-8). A lumber rail bridge is still extant (Resource 9), while another spur that spanned the road by trestle was removed sometime prior to 1999 (see Historic Photos 7-9 in Appendix B). Along with the rail line and its branches on top of the dump were a timber dressing shed and a prefabricated sheet metal locomotive barn, both dating to circa 1950s and which were removed when the EPA mitigation work finished in 2010 (compare Historic Photos 13-14 with Photo 9 in Appendix B). Although the south waste rock dump was largely removed and recontoured with this work, a portion of the dump and its cribbing walls at the west side nearest the road remain (Site Feature 2).

The north end of the Commodore surface plant has another series of buildings along the creek bank, most dating to 1930s and 1940s, and many of which stand on earlier cut-and-fill platforms and building foundations (Resources 10 to 19). Timber power poles stand among these buildings as well. The creek bed has been recontoured and lined with new rockwork and landscape netting as part of the EPA site mitigation work from 2008 to 2010.

The Commodore surface plant is the most altered area of the mine complex site after the period of significance, due to the recontouring and partial removal of the south waste rock dump and the realignment and lining of the creek channel. Despite these alterations, the site continues to convey a large-scale mining operation due to the numerous extant resources and the remaining waste rock dump sections with log cribbing.

## 1. County Road 503, contributing structure, circa 1890s (Photos 8-10)

This unpaved road served as the main artery linking the town of Creede with mines and prospects on the Amethyst Vein, most of which are on the western wall of West Willow Creek. The road was also historically important to the Bachelor-Commodore complex, providing access for wagons, and later trucks, to freight in supplies and haul ore to shipping points. Originally made with cut-and-fill construction for wagon traffic, the road traverses the east side of the drainage, passes by the base of the large ore sorting house (Resource 4), ascends between the log cribbing walls retaining the southeast and south waste rock dumps (Site Features 1 and 2), and continues along the east side of the upper-creek mine complex (Resources 10 to 19). Today the road is about 15 feet wide and maintained and graded by heavy equipment.

## 2. Ore Sorting House, contributing building, circa 1930s (Photos 9-11)

Measuring roughly 24 feet by 22 feet, the ore sorting house stands on a bedrock cliff above the county road at its west side, southeast of the main Commodore No.5 Tunnel plant. The ore sorting house is surmised to have been erected and used by lessees working from within the Commodore Tunnel. Constructed with predominantly salvaged lumber, the building consists of two levels. The upper level is a front-gable ore bin, where crude ore was input for storage. The bottom level, at the bin toe, is a shed-roof sorting station. Inside, workers separated out waste from ore, and dropped the recovered material into a plank chute (no longer extant) descending to the county road. Historic corrugated metal sheeting is the building's roofing material. Most of the beams feature abandoned bolt holes and hardware from their previous use in aerial tram towers. The bin portion is 18 feet by 12 feet in area, 12 feet high and possesses an unusually steeply sloped floor. The ore bin is supported by a post-and-girt frame standing on a timber foundation, and by diagonal braces under the bin's floor. Iron tie rods help bind the frame together. The ore bin's foundation consists of heavy horizontal beams spanning between niches blasted out of bedrock, and also of timber posts placed on bedrock.

The sorting station is 24 feet by 10 feet in area and is enclosed by walls constructed of post-and-girt framing sided with two layers of boards. Rough beamwork within the sorting station lends additional support. The sorting station features a wood panel door and a square sliding window in the north wall, and a 4-foot-wide opening and a similar square sliding window in the west wall; the south side is open. The sorting station's interior features a central plank floor, a 7 foot by 6 foot deck elevated over the floor and a 10 foot by 6 foot extension on the south side. Mineworkers opened the louvered gate in the ore bin, permitting ore to collect on the elevated deck. They sorted the ore and threw waste out through the opening in the west wall and dropped recovered ore onto the floor below. The mineworkers transferred the recovered ore into the south extension, which was 3 feet lower than the main floor. The extension is floored with planks armored by sheet iron.

Ore appears to have been inputted into the building through a chute that descended from the rail line (Resource 3) that traversed the southeast waste rock dump (Site Feature 1). While the chute is gone, niches blasted out of bedrock and spikes remain upslope from the structure. Sorted ore was probably unloaded through a long chute (no longer extant) into trucks parked on the road below.

## 3. Mine Rail Line Remnant, contributing structure, circa 1940s (Photos 12-14)

The mine rail line originally branched off the track that extended out of the Commodore Tunnel portal (Resource 10) across the road and creek, but which was almost entirely removed in 2010 with EPA's mitigation work. This remnant traverses the southeast waste rock dump at the east side of the road and crosses the bridge spanning the road, with another remnant at the tunnel portal. The line forks numerous times, with two branches entering the top and middle levels of the large ore sorting house (Resource 4). Three feeder lines doubled back off the main line and entered a battery-locomotive shed that sat atop the south waste dump (no longer extant). Laid by

one of the mine's late operations, the rail line consists of 25-pound rail spiked 26 inches on center to ties spaced every 18 inches or less. Most of the ties are wood. Some are factory-made steel. Miners placed the steel ties at strategic points on curves in the track, and at switches. Most of the switches feature welded switch frogs; they were controlled by switch stands. "West Virginia" is embossed on some of the steel ties. A plank walkway was nailed between the rails in places. The weight of rail, the breadth of gauge, the spacing of ties and the steel ties reflect the use of heavy battery locomotives for pulling long ore trains.

At the south end of the site, the rail line branch that dead-ended at the southern ore sorting house (Resource 2) has been mostly removed, leaving the rail bed and remnants of in-situ rail ties, several rails and buried trestles in the mine complex's southeast waste rock dump. Waste rock was dumped along the rail line, creating and adding to the southeast waste rock dump (Site Feature 1). The line appears to have consisted of 20-pound rail spiked 26 inches on center, which differs from the other branches of the site's extant track.

### F1. Southeast Waste Rock Dump with Cribbing, site feature, circa 1930s (Photos 14-16)

The dump has a long, elliptical footprint upslope from the road's east side. The steep hillside and location of the road downslope mandated that the dump be expanded across the hillside, rather than in one large mass. Cribbing walls of saddle-notched logs pinned with timber spikes retain the waste rock off the main road on either side of the large ore sorting house (Resource 4), with the most substantial cribbing standing up to 25 feet high at the north end of the dump along the bridge over the road. Remains of trestles and the mine rail line used to deposit the waste rock are visible over much of the dump's length; its top surface is flat and several buildings (Resources 5-8) are superimposed over it. Numerous artifacts, including a characteristic assemblage of mine items, are scattered across the dump. The associated features indicate that the dump was deposited during the 1930s and later.

### 4. Commodore Ore Sorting House and Trestle, contributing building, 1943 (Photos 2, 9, 13-14, 16-21)

The ore sorting house stands along the east side of the road on a steep hillside, downslope from the mine's southeast waste rock dump (Site Feature 1). The timber post-and-girt building measures 80 feet by 35 feet, and consists of three stories totaling about 80 feet in height. An approximately 160-foot-long timber trestle with snow shed connects at the north end of the building, providing access for ore trains to be pulled into the top floor, where ore was input into one of six receiving chutes. The ore dropped down to the sorting floor at the middle level, and after processing was stored in holding bins composing the lowest level just above the road. The gable roof ridge runs the length of the building before it connects with the 80-foot-long gable roof of the snow shed, narrowing down to a smaller gable end at the north. Historic corrugated sheet metal covers the roof.

The exterior of the ore sorting house displays the structural timber posts and girts, sided on the interior with horizontal boards, which are visible between the posts and girts. Diagonal members at the top of each floor's posts indicate the three distinct levels, which vary in height, from 40 feet for the lowest, 18 feet for the middle and about 8 feet for the top. The building stands on 10 inch by 10 inch pilings that are believed to be nailed to timber footers placed on bedrock, but which are obscured by waste rock deposited underneath the building. The six holding bins of the lowest level, which feature sloped floors, are buttressed by additional diagonal 10 inch by 10 inch beams, posts and several log cribbing walls. The southwest and downslope edge of the building stands on a series of pairs of 10 inch by 10 inch timber pilings tied to a timber footer. The pilings are braced by 6 inch by 6 inch diagonal supports and iron tie rods. The timber footer rests on concrete.

The south-facing side of the ore sorting house shows the sloping floor of the lower-level ore bins over the waste rock underneath. At the top level near the gable peak, there are two square window openings on either side of

the truss king post. The east window has been boarded over. The west window has remnants of a screen. At the floor level of the top floor are four additional openings. A circa 1955 photo shows these openings as windows with screens (see Historic Photo 5 in Appendix B), but sometime between 1955 and 2000, they were boarded over. At the sorting level, smaller intermediate posts are visible between the five main posts. At each apex of the diagonal bracing at the top of the posts is a wood-sash slider window (glazing missing) with screen, for a total of four openings (Photo 13). At the right half are two additional window openings lower down the wall, one of which still retains its sash and screen.

At the lowest level on the west side, the six ore bins each feature a chute that projects out over the road (Resource 1), where mine workers loaded trucks with ore. The loading area is protected from the elements by an overhanging shed roof with corrugated metal sheeting that spans the length of the building. Above this shed roof is a second, shallower shed roof that is missing its cladding. The sorting level has six wood-sash slider windows at the top of the level, which are spaced regularly between the posts. Directly above these openings are six additional windows at the top level, which are larger and are double- or single-hung wood sashes with screens.

The north side of the ore sorting house is dominated by the trestle with snow shed that provides access to the building's top floor for the first pass at separating ore from waste rock. Underneath where the snow shed terminates at the north wall is a deck at the second floor, from which workers entered the building through a doorway at the northeast corner, which is the main entry into the building. One spur of the rail line also enters through this opening; the corresponding trestle of this spur that crossed the road south the of the rail bridge was removed sometime between circa 1955 and 1999 (see Historic Photos 7-9 in Appendix B).

The top level of the east side has three windows of the same type as the west side and which pierce the north half of the wall (most sashes are now missing). At the second level are three windows of the same type and placement as the floor above. A doorway (door now missing) is toward the south end. The lower level of the ore bins is not visible from this side.

The interior of the top floor features a row of receiving chutes along the west wall. Ore trains entering the building from the trestle dumped their loads into the chutes from an adjacent rail line. Each chute is illuminated by light admitted through one of the corresponding six windows in the west wall. A second rail line extends down the length of the floor's east side. A stairway descends from the top floor's northeast corner and terminates at a door to outside decking at the second floor.

The interior of the second floor features a row of six grizzlies with corresponding sorting tables where mineworkers separated ore from waste. When miners dumped ore into the receiving chutes on the top floor, the payrock slid onto one of the six grizzlies.[1] Cobbles smaller than 6 inches passed through the grizzlies and dropped into the holding bins below. Large cobbles rolled down the grizzlies and stopped on one of the sorting tables, where mineworkers knocked off waste and threw recovered ore either under the table, or through a port by the table, where it dropped into the holding bins below. Each grizzly consists of a sloped screen made from salvaged mine rail. The sorting tables, at the foot of each grizzly, were once armored with sheet iron. Once the ore had been removed, remaining waste rock was loaded into an ore car parked on rail line along the east wall, inches away from the table's edge. A stove once stood in the northeast part of the level, near the stairway connecting to the top floor. One of the mine's more recent operators installed modern lighting circuitry, circa 1950s.

[1] A grizzly is a large grate used to coarsely sort ore rock as it falls into ore chutes.

## 5. Generator Building/Locomotive Shed, contributing building, circa 1930s (Photos 22-23)

The building stands on the center portion of the site's southeast waste rock dump (Site Feature 1). Built in two episodes, the front-gabled building is oriented northwest-southeast. The building possesses a rectangular footprint and is 27 feet long by 25 feet wide, 7 feet high at the roof eaves and 14 feet high at the peak. The walls are based on a 2 inch by 6 inch post-and-girt frame sided with two layers of planks, the outer oriented vertically and the inner oriented horizontally. The roof consists of rafters braced with tie beams and a ridge board, with board decking clad by historic corrugated sheet metal.

The building features an original rectangular core measuring 16 feet by 15 feet in area with a front-gabled roof. During one of the mine's operations, circa 1946, workers moved the southwest wall out 5 feet, and they added a gabled extension 11 feet long by 24 feet wide to the building's southeast end. The south corner of the expansion tapers to provide clearance for a curved mine rail line adjacent and to the west. The frame and siding for the expansion is the same in materials and style as the core's original walls and roof. To adequately cover the enlargement, workers raised the roof. The eaves for the core's original roof are visible within the building.

Numerous door and window openings are found on the building. The southwest wall features one multi-light fixed wood window and a multi-light sliding wood window. The northwest wall features a vertical-board door and a multi-light sliding wood window. The northeast wall also features a multi-light sliding wood window. The southeast wall has a double door of diagonal boards and a single vertical-board door.

The building's interior features a petroleum-powered generator foundation located in the original core, and it includes three mine rail spur lines. A water line for the engine's coolant extends out of the earth floor adjacent to the foundation. Two of the rail lines terminate in a room in the building's southeast corner, and the other track extends along the southwest wall. Mine workers built the structure to house the generator, and they expanded it to also serve as a locomotive shed. The association between the two functions suggests that locomotives on the west track were recharged by the generator. The other tracks were for storing other locomotives. The building's northwest wall is fitted with high voltage wire connections. The building features early electric wiring, a modern circuit and compressed air plumbing. Machine parts from varying eras of operation are scattered in and around the building. Trees have grown up around the southeast side, and another on the northeast side has fallen over onto the roof.

## 6. Generator Building/Locomotive Shed, contributing building, circa 1930s (Photo 24)

This building stands on the north portion of the site's southeastern waste rock dump (Site Feature 1) and shares many of the same features as the generator building/locomotive shed (Resource 5) to the southeast. The building, constructed in two episodes, is oriented northwest-southeast and is front-gabled. The building has an L-shaped footprint and measures 27 feet long by 20 feet wide, 7 feet high at the roof eaves, and 14 feet high at the gable peak. The walls are based on a 2 inch by 6 inch post-and-girt frame sided with two layers of planks, the outer oriented vertically and the inner oriented horizontally. The roof consists of rafters braced with tie beams and a ridge board, with board decking clad by historic corrugated sheet metal.

The building features an original rectangular core measuring 16 feet by 15 feet in area with a shed roof. During one of the mine's operations, workers moved the southwest wall 5 feet out, and added a shed extension 11 feet long by 13 feet wide to the building's northeast side, creating a gable roof at the north side. The frame and siding for the expansion is the same in materials and style as the core's original walls and roof. To adequately cover the enlargement, workers raised the roof. The eaves for the core's original roof are visible within the building.

Numerous door and window openings are found on the building. The southwest wall features two multi-light fixed wood windows of slightly different sizes. The northwest wall features a wood board door. The northeast wall has a multi-light fixed wood window, while the southeast wall features a double door, one of the leaves of which has fallen off and is on the ground nearby.

The building's interior features a petroleum-powered generator foundation located in the original core, and includes two mine rail spur lines which enter through the wide doorway in the southeast wall. An exhaust pipe for the generator projects up through the roof. Mine workers constructed the building to house the generator, and they expanded it to also serve as a locomotive shed. The association between the two functions suggests that locomotives were recharged in the building. The building's northwest wall is fitted with high-voltage wire connections, electrical conduits and insulator pegs. The building features early electric wiring, a modern circuit and compressed air plumbing. The mine's last operation (circa 1980s) used the building to store core-drilling samples, which currently occupy most of the interior. Machine parts from varying eras of operation are also scattered in and around the building.

### 7. Drill-Cutting Bench, contributing object, circa 1950s (Photo 25)

Measuring 12 feet by 12.5 feet, the bench stands on the south side of the shop building (Resource 8). The bench has a drill-steel cutting and grinding machine bolted onto the south end. The grinder, which features Ingersoll-Rand builder's plates, was powered by compressed air. A welded drill-steel rack, made from salvaged mine rail, stands adjacent. A shop worker would use the cutter to dress and remanufacture damaged drill steels.

### 8. Shop, contributing building, circa 1950s (Photos 26-27)

The shop stands at the north end of the site's southeast waste rock dump (Site Feature 1) and measures 40 feet by 25 feet. The gable-roof shop is a prefabricated steel building on a concrete slab floor with corrugated metal sheet roofing and siding oriented horizontally; all windows on the building are six-light fixed steel-sashes. A mine rail line stub enters a large sliding corrugated-metal door on the southeast side for delivery and removal of heavy items; a steel crane hoist straddles the rail line. The southwest side has a double sliding door of corrugated metal at its center, with a single window on its north and a double to the south. The northwest side has a personnel metal door with a large single light in the upper half, flanked by a window on either side. The northeast side has four regularly spaced windows. The interior encloses a forge, parts bins and a steel frame for hoisting and moving heavy machines. Machine and rockdrill parts are scattered on the floor.

### 9. Rail Bridge, contributing structure, circa 1940s (Photos 27-28)

The bridge spans the road (Resource 1) where it bisects the site's southeast and south waste rock dumps (Site Features 1 and 2). The structure consists of two layers of 3 inch by 10 inch planks nailed onto heavy lumber stringers, which are in turn fastened onto log cribbing wall abutments and supported by welded steel plates. The bridge features heavy lumber handrails and was intended to bear the weight of mine locomotives and ore trains.

### F2. South Waste Rock Dump Remnant, site feature, circa 1940-80s (Photos 1, 9, 28-29)

As described above, the south waste rock dump associated with the Commodore Tunnel No. 5 was significantly reduced in size and recontoured in 2008-10 as part of an EPA mitigation project. The waste rock dump originally fanned out southeast from the tunnel portal across the West Willow Creek drainage and essentially filled the creek's channel, and over time developed an overall footprint of 330 feet by 210 feet. A flume directed water across the dump's top, with a series of drop chutes controlling the water's descent over the dump's west shoulder. A hewn-log cribbing wall, still extant, retained the dump's toe at the southeast end. A second log cribbing wall from a later operation retained the north portion of the dump at the creek. Several surface plant components were on the surface of the dump, including a rail line, a timber dressing shed, and a locomotive

charging building. As recorded in 1999-2000, industrial and mining artifacts found scattered across the dump's surface typically reflected the most recent era of the mine's operation from the 1960s to the 1980s.

Today, the waste rock dump and its associated surface components have been largely removed except for the southeast edge of the dump along the road, where the log cribbing and an intersecting timber wall are still in place to retain remaining waste rock off the road and an adjacent ore loading area. The rest of the dump has been recontoured to provide a narrow parking area on top, with a slope down to the creek channel, which now flows unimpeded past the tunnel portal on a curving southwest-to-southeast trajectory. The extant portion of cribbing consists of saddle-notched logs pinned in place with timber spikes. At its highest, the cribbing wall stands 20 feet tall. An open ore chute that is integral to the wall is armored with mine rail; ore trains would have pulled alongside the chute and dumped rock onto the loading area below, which is contained at the west by a second wall constructed of 10 inch by 10 inch timbers.

### 10. Commodore No. 5 Tunnel Portal, contributing structure, 1900, circa 1980s (Photos 3, 30)

Initially driven on the Amethyst Vein in 1900, Commodore Tunnel No. 5 is situated near West Willow Creek's west bank, and extends northwest into bedrock just above creek level. An arched scree shed, with a modern corrugated metal roof supported by 3 inch by 6 inch plank walls and 3 inch by 6 inch steel channel beams and measuring 9 feet high by 10 inches wide, protects the tunnel portal and is believed to have been installed circa 1980s. The tunnel proper probably possesses dimensions similar to the shed. Remnants of a mine rail line extend out of the portal. The tunnel is currently gated and draining water.

### 11. Privy, non-contributing building, circa 1970s (Photos 4, 31)

The privy stands over a log-lined pit near the Commodore Tunnel portal, on the west side of the creek. The building measures 6.5 feet by 5 feet in area and stands 8 feet at its highest. It is of frame construction with board-and-batten siding, and a roof clad with corrugated sheet metal. The interior features a plank floor and a rectangular opening over the pit bordered by a plank rail. Believed to date to the 1970s based on the apparent age of its construction materials, the privy is considered non-contributing due to its construction after the period of significance.

### 12. Office, contributing building, circa 1910s (Photos 4, 9, 32)

The office is a front-gabled building on the east side of the creek, across from the privy (Resource 11), and adjacent to the county road. The office faces south and measures 29 feet by 12 feet in area, 8 feet high at the roof eaves and 12 feet high at the gable peak. The frame walls have board-and-batten siding, and the roof is clad with historic corrugated sheet metal. The south side has a wood staircase and plank walkway that access a wood paneled door and a multi-light, double-hung wood window, since removed after recordation in 2000, leaving only the openings. The west side features three window openings which originally also had multi-light double-hung wood sashes; another two windows have been infilled with board-and-batten siding at an unknown date. The north side has another door opening. The east side has a shed-roof, a 17 foot by 9 foot addition that originally served as a coal bin and which was later used for storage. A board door provides access from the south side, while a hatch in the corrugated metal roof was used to input coal from trucks parked on the adjacent road.

The building's interior, divided into an entry and a main room beyond, has painted beadboard paneling. As recorded in 2000, the entry was retrofitted with a closet and a register box with a hinged lid. The main room includes a counter along the south wall, and another counter and a notice board with a glass front on the south wall. A gas heater stands on a concrete pad in the center of the room, where there had previously been a wood stove. The building is floored with planks nailed to joists, which appear to rest on bare earth. A pile of ash, nails and mine rail spikes were recorded in 2000 outside of the north door, the result of repeated deposition of ash

removed from a woodstove in which scrap lumber impregnated with the items was burned. As suggested in the 2000 recording, the lack of domestic trash indicates that the building was not used as a residence.

The building stands on a cut-and-fill platform constructed with rock rubble retained in places by hewn-log cribbing. According to a background artifact assemblage, the platform originally supported a mine shop erected by one of the early operations. Recorded artifacts such as anthracite coal and coke (forge fuel), rockdrill parts, fire and red bricks, and the standing coal bin reflect the former presence of a blacksmith and machine shop, a conclusion supported by mine inspection reports from the 1910s. The shop-related artifacts lie around the platform's shoulder. Further, the concrete pad in the center of the building's floor exhibits scars left by mortared bricks and is believed to have supported a forge. Repeated grading of the adjacent county road has deposited gravel against the coal bin's east wall, pushing it in. One of the mine's late operators used a bulldozer to truncate the southern and northern portions of the cut-and-fill platform.

### 13. Compressor House, contributing building, 1949 (Photos 4, 8-9, 33)

This shed-roof frame building measures 18 feet by 15 feet in area, 12 feet high at the east wall, and 8 feet high at the west wall and is sided with vertical boards. The roof frame features rafters with tie beams and braced by diagonal posts, and is clad with historic corrugated sheet metal. The west side features a tripartite sliding wood window and a second, smaller sliding wood window; both were recorded in 2000 to have multi-light glazing, which is now missing. The east side featured a casement window, the sash of which is now missing. The north and south sides each have a vertical-board door and window openings that originally had multi-light wood sashes, now missing. Electrical wires for the compressor's drive motor and conduit for lighting circuitry extend through the south wall. A 3 inch-diameter air output line extends out of the west wall. A water tank is fastened onto the east wall, and a 0.5 inch-diameter water pipe for the compressor's coolant extends into the building. Mineworkers erected the compressor house on a cut-and-fill platform that may have supported an earlier building. The platform's west portion, which is unoccupied by the building, had plank decking, since removed. Wall slump from the platform's cut bank is beginning to push in the east wall, and erosional material is being washed into the interior.

The building encloses a belt-driven duplex Ingersoll-Rand four-V-cylinder compressor, which is bolted to a steel frame mounted onto two parallel concrete pylons, and a Waukesha six-cylinder diesel utility engine on skids. Workbenches and shelving accommodated a small repair shop. A Mine Inspection Report from 1949 confirms the installation of this compressor house in addition to the other two already in use by the mine.

### 14. Bridge, non-contributing structure, circa 2010 (Photos 4, 8, 34)

This pedestrian bridge crosses over West Willow Creek to the west of the compressor house (Resource 13). Constructed in conjunction with the 2010 creek mitigation work precipitated by the 2005 flash flood, this modern bridge has steel channel stringers set in concrete anchors with wood plank decking. Due to its date after the period of significance, it is considered non-contributing.

### 15. Electrical Substation Remnant, contributing structure, circa 1930s

The electrical substation remnant stands on a platform across the road and upslope from the office and compressor house (Resources 12 and 13) on the toe of Campbell Mountain amidst trees. The substation measures 13 feet by 7 feet and consists of two power poles on a concrete foundation. The power poles are linked by three cross members that anchored electrical input and distribution lines, and transformers stood on the concrete foundation. Power was stepped down and wired to the Commodore tunnel portal. The poles are stamped with "K Co D-51 LPC 30 6," which may indicate a date.

## 16. Shop, contributing building, 1936 (Photos 5, 8, 35)

This front-gabled building faces south and measures 20 feet by 16 feet in area, 9 feet high at the roof eaves, and 13 feet high at the gable peak. The frame walls are sided with vertically nailed boards. The roof, now collapsed within the building interior, had rafters nailed to a ridge board and braced by tie beams, and was clad in tarpaper, as recorded in 2000. The west side had a doorway that has been boarded over, and otherwise lacks any openings. The north and south sides each have a vertical-board door, a window opening that historically had multi-light fixed wood sashes (since removed), and frameless openings. The north side also features small ports for compressed air lines plumbed from the adjacent compressor house to the north (Resource 17). The south side had holes under the eaves for electrical wiring. Mineworkers erected the building on a cut-and-fill platform, also shared by the compressor house to the north, and they placed the shop's wall footers on bare earth. The shop's floor is also earth.

The building's interior was recorded in 2000 as having heavy workbenches along the east and south walls, a jumble of machine parts and mining equipment dating from several of the mine's operators, and generator and drive engine foundations in the west half; the petroleum drive engine's foundation located in the southwest corner was a 4 foot by 8.5 foot concrete pad, while the generator's foundation, located near the center of the west wall, consisted of two parallel concrete piers. The building platform's cut bank has slumped, pushing the east wall in. In addition, alluvium has buried the foot of the north and south walls.

The building was erected in this location in 1936 when a state mine inspector required Wilson Leasing Company, the mine operator at the time, to relocate its shop and compressors away from the tunnel portal due to safety concerns.

## 17. Compressor House, contributing building, 1936 (Photos 5, 8, 36-37)

This side-gabled building faces west and measures 30 feet by 18 feet in area, 10 feet high at the roof eaves, and 15 feet high at the gable peak. The frame walls are sided with vertically nailed boards. The roof frame features rafters nailed to a ridge board and braced by tie beams. The roof is clad with tarpaper and historic corrugated sheet metal. A pipe for the compressor's air intake projects out of the roof's east side. The west side features a vertical-board double door, a single door and a fixed wood window. The east and south sides feature sliding wood windows. The north side also features a sliding window and a second fixed wood sash. The glazing of all windows, recorded as multi-light in 2000, is now missing. A heavy electrical conduit for the compressor's drive motor extends out of the west wall, and electrical guy-line insulators are screwed in nearby. One of the mine's late operators rewired the building's interior with modern circuitry. A 4 inch air output line from the compressor extends out of the east wall. A pipe box is fastened onto the south wall, and a 2 inch water main for the compressor's coolant extends into the building from the box. Mine workers erected the building on the same cut-and-fill platform that also supports the shop (Resource 16). The platform is covered by alluvium, which obscures the building's foundation and possible artifacts. Slumped earth from the platform's cut bank is beginning to push in the east wall.

The air compressor is a belt-driven duplex Ingersoll-Rand Imperial Type 10 model featuring two multi-stage cylinders. The low-compression cylinder is on the machine's east side, and the high compression cylinder is on the west. The compressor is bolted to a characteristic concrete U-shaped foundation 8 feet by 8 feet in area and 3 feet high. The drive motor, a Westinghouse unit, is bolted to a separate concrete foundation 3 feet by 4 feet in area and 1 feet high.

The building was erected in this location in 1936 when a state mine inspector required Wilson Leasing Company, the mine operator at the time, to relocate its shop and compressors away from the tunnel portal due to safety concerns.

### F3. Powerhouse Ruins, site feature, circa 1890s (Photos 5, 8, 38-39)

Located on the bank of West Willow Creek is the foundation of a large frame building that enclosed a boiler, generator, and compressor, and which served as the original circa 1890s powerhouse for the Bachelor Mine. Currently, alluvial deposits overlie most of the foundation. A bulldozed pile of structural debris and a few industrial items cover most of the alluvium deposits.

The red-brick boiler setting remnant (18 feet by 16 feet) is at the northwest corner of the foundation. An articulated rear wall, segments of side and center walls, and a pile of bricks characterize the remnant. The setting's size indicates that two return tube boilers, probably each 5 feet in diameter and 16 feet long, supplied steam to mine machinery, including an air compressor. The boilers faced north. The fireboxes were located in the north portion of the setting. Cleaning ports are visible in the setting remnant's rear wall (south). Fire bricks lined the fireboxes, reflecting professional workmanship. One of the mine's late operations reused some of the bricks to erect a small chamber in the setting's remains. The chamber, 4 feet by 7 feet in area, 4 feet deep and roofed with planks, may have been an explosives magazine.

When recorded in 2000, the compressor foundation (10 feet by 4 feet) was still visible at the north portion of the ruin. It is currently covered in debris and alluvium. The compressor foundation, constructed of mortared rock, was observed as having three pairs of 1.5 inch anchor bolts in a rectangular footprint. More bolts may be buried under alluvium. The rectangular footprint and the size of the bolts indicates that the foundation anchored a multi-stage steam-driven straight-line compressor. The foundation had been damaged by heavy equipment at the time of first recording.

### 18. Aerial Tramway Tower Platform, contributing structure, pre-1930 (Photo 40)

The tramway tower platform is located at the north end of the Commodore surface plant of the mine complex. The platform consists of a hewn-log cribbing structure, 18 feet by 9 feet in area and 11 feet high, filled with boulders as ballast. The cribbing, constructed with saddle-notched logs pinned by timber spikes, features a single cable anchor and the remains of framing on top. The tramway appears to have been a single rope reversible system for hauling light loads along the creek drainage and is believed to be unrelated to the workings of the Commodore or Bachelor operations, as it does not correspond to the aerial tramways of the Bachelor tunnels to the west; the location of the upper terminal is unknown. However, its presence indicates how various mining operations would overlap each other as they moved ore from their respective workings to established transportation nodes along the road or at the Nelson Tunnel's rail line south of the complex. Based on materials and hardware, the structure appears to pre-date the 1930s.

### 19. Compressor House, contributing building, 1936 (Photos 5, 8, 41-43)

This side-gabled building faces east and stands in the far northern portion of the Commodore plant. It measures 26 feet by 20 feet in area, 9 feet high at the roof eaves and 14 feet high at the gable peak. The walls consist of balloon framing sided with horizontally nailed boards clad by clapboards. The corners of the walls are armored with custom-cut sheet iron strips. The roof frame features rafters nailed to a ridge board, and braced by tie beams, while the exterior is clad by tarpaper on board decking. A cupola with hinged sides stands at the center of the roof, and several stovepipe ports are located on the roof's east side. The east and west walls feature two diagonal-board double doors. The north and south walls feature multi-light sliding wood windows. In addition, the south wall also features two knob insulators and tubes for electrical wiring, and two electrical conduits added

later. Two 55-gallon drums, which served as water tanks, are bolted over wood framing on the outside of the north wall. Mine workers erected the building on a foundation of cribbing constructed at an earlier date; its close proximity to the original Bachelor powerhouse platform (Feature 3) suggests that the foundation may have been part of the early mine surface plant. The building was erected in this location in 1936 when a state mine inspector required Wilson Leasing Company, the mine operator at the time, to relocate its shop and compressors away from the tunnel portal due to safety concerns. The foundation's hewn-log cribbing was assembled with saddle-notch joints and timber spikes, and filled with rubble. The fill material includes several sandstone blocks from an early machine foundation. Two concrete machine foundations are visible underneath the building's west wall footer.

The building's interior features two V-cylinder compressor foundations. Each foundation consists of a steel frame, 8 feet by 4 feet in area, bolted onto 12 inch by 12 inch timbers, and a small adjacent concrete pad. A 0.75 inch-diameter water pipe for the compressors' coolant and a 4 inch air output pipe project out of the floor between the foundations. The mine's last operators, circa 1980s, erected shelving throughout the building interior to store core-drilling samples. Numerous boxes and bags of crushed rock are still in the building.

## Lower Bachelor Tunnel Surface Plant

The Lower Bachelor Tunnels' surface plant sits atop a large waste rock dump that cascades down the side of Bachelor Mountain above West Willow Creek. The top of the dump sits between the bedrock pinnacle to the immediate north and a bedrock outcrop to the southwest, into which the tunnel portal has been driven. Associated resources sit further away on the scree-covered slope to the southwest of the dump. The surface plant remains essentially as constructed in the mid-1890s, with some changes in the 1940s.

## F4. Lower Bachelor Waste Rock Dump with Cribbing, site feature, circa 1890s to circa 1940s (Photos 3, 6-7, 44-45)

The waste rock dump is very large and blankets an area about 500 feet by 265 feet on the hillslope below the Bachelor's Lower Tunnel portal, at an elevation of approximately 9,800 feet. Originally, the dump's top surface, which miners graded flat, was relatively small in area. A rail line was laid along the dump's shoulder in circa 1940s (Resource 27), from which waste rock was dumped that greatly contributed to the dump's volume. During the operation's early years, miners deposited much of the waste rock in log cribbing cells that support the ore sorting house and tram terminal (Resource 29). Mine workers also erected, circa 1890s, two large log cribbing walls on the dump's flank to prevent waste rock from cascading down onto the Commodore No. 5 plant located directly below. The walls are visually prominent elements of the site.

The log cribbing walls extend across the mountainside at two different levels, with the lower wall about 310 feet above the creek drainage, and the upper cribbing about 130 feet above the lower cribbing. Each wall of cribbing consists of cells measuring 8 feet deep by 4 feet wide, about 360 feet long and up to 20 feet high. The cells consist of saddle-notched hewn logs pinned in place with timber spikes. Over the course of several decades after the tunnel was driven, workers sorting the waste rock dump for low-grade ore filled the northern two-thirds of the lower cribbing wall cells, while the south third, located on scree, remains empty (Photo 45). The upper cribbing wall is almost completely filled.

## 20. Ore Bin and Aerial Tram Terminal, contributing structure, circa 1940s (Photos 6, 44)

Measuring 12 feet by 10 feet in footprint, the combination ore bin and tram terminal stands on the edge of the upper cribbing wall of the Lower Bachelor's waste rock dump. Erected by parts salvaged from an earlier aerial tramway, the structure consists of an ore receiving bin and a loading area for tram buckets. The tram was a double-rope reversible system, which allowed for one bucket to ascend while another descended, but not to be

confused with the earlier Bleichert tramway system originally employed at the Lower Bachelor. Miners input ore by dumping it into a chute that extended up to the waste rock dump's shoulder. The rock slid into the receiving bin, and was tapped through two small chutes into one of the tramway's two buckets.

### 21. Pack Trail, contributing structure, circa 1890s to 1910s (Photo 46)

The 6 foot-wide pack trail ascends Bachelor Mountain via switchbacks from West Willow Creek to the Lower Bachelor surface plant, terminating at the dynamite thaw house. Mine workers constructed the trail by clearing a path through the scree slope, erecting dry-laid rock walls to retain the cut and fill banks, and graded the space between with sorted rock. The lower portion of the pack trail has been effectively erased by slumped earth, scree and waste rock, and also by evergreen trees taking advantage of the stable surface. The sorted waste rock provided a uniform surface for pack animals crossing otherwise sharp and unstable scree.

### 22. Explosives Magazine, contributing structure, circa 1890s (Photo 47)

The explosives magazine stands at a substantial remove from the rest of the Lower Bachelor surface plant, as was common for this type of facility. The magazine is on a cut-and-fill platform at the southeast side of an exposed bedrock outcrop, about 400 feet southwest of the Lower Bachelor's tunnel portal area (Resources 26-31), at the top of the waste rock dump (Feature 4). The platform was originally associated with a small prospect adit. The front-gabled post-and-girt frame building measures 12 feet by 9 feet in area, 9 feet high at the roof eaves and 12 feet high overall. It is sided with vertical boards. The south wall features a stout board door hung on three strap hinges, with an iron ring handle and iron bar and hasp for security. A pack trail connects the building with the rail bed extending south from the mine complex (Resource 23). As of 2000, the building's roof had fallen in and the west wall had collapsed. It continues to stand today, in much the same condition.

### 23. Mine Rail Bed Remnant, contributing structure, circa 1890s (Photos 48-49)

The rail bed extends south from the Lower Bachelor's tunnel portal complex and traverses a scree slope. Mine workers constructed the rail bed by clearing a path through the scree, erecting dry-laid rock walls in places to retain the cut and the fill banks, and filling the void between with sorted waste rock for solid footing. Miners used the rail line to transport explosives from the thaw house (Resource 24) to the mine. The portion of the bed adjacent to the thaw house features a series of in-situ ties and a plank walkway. The remainder of the rail line has been dismantled.

### 24. Dynamite Thaw House, contributing building, circa 1890s (Photos 47-50)

The dynamite thaw house stands on a platform cut out of the scree slope located along the rail bed extending south from the main mine complex (Resource 23). The side-gabled frame building measures 16 feet by 8 feet in area, 6 feet high at the roof eaves and 8 feet high overall. The walls and roof are clad with historic corrugated sheet metal, although the corrugated metal was removed from the north wall sometime after 2000. The east and west sides each have a door opening at the north end, which have both been removed at an unknown date. At the center of the roof is a louvered cupola, 1 foot by 1 foot in area and 1 foot high, for ventilation.

Although the building's interior features floor joists, the floor consists of well-sorted sand and gravel instead of planks. The joists may have been a means of tying the wall footers together for a tighter building capable of resisting snowslides from the slope above. A rock masonry hearth (7 feet wide by 6 feet long by 4 feet high) occupies the south portion of the thaw house and features sheet metal surfaces on top along with a receptacle for a dynamite thaw box, which has been removed and placed on the floor of the thaw house. The box, 21 inches wide by 26 inches long by 22 inches deep, is made of zinc-coated sheet iron and features a water jacket surrounding an inner void. The void is tapered and fitted with brackets to hold a series of pans. Miners filled the jacket with water, placed frozen dynamite in the pans, closed the trap door lid, and stoked a fire in the hearth.

The fire heated the water, which warmed the inner void, thawing the dynamite. The hearth features a stovepipe port in the rear that vents through the roof.

At an unknown date sometime after the building was erected, mine workers added a shed for storage to the south side. Now collapsed, the shed was originally 8 feet by 8 feet in area, with rockdrill parts and hardware still lying inside, as recorded in 2000.

### 25. Stable, contributing building, circa 1890s (Photos 48, 51)

The log stable measures 12 feet by 10 feet in area and was built on a cut-and-fill platform about 90 feet north of the dynamite thaw house (Resource 24). The platform's cut-bank has slumped in and pushed earth again the building's walls, forcing them inward with a destabilizing effect. Mine workers built the stable to accommodate pack mules for ore hauling, using saddle-notched log walls pinned by heavy nails, and plank roofing nailed to log cross beams. The gaps between the logs were not filled with chinking and daubing, but rather with interior planks. When recorded in 2000, the stable's floor was noted as made of earth and blanketed by decayed manure. A tether ring and oat box were also noted on the interior.

### 26. Privy Pit Cribbing, contributing structure, circa 1890s (Photo 52)

The privy pit is countersunk in the Lower Bachelor waste rock dump's south shoulder, and is defined by a hewn-log structure 10 feet by 5 feet in area and 9 feet high. Miners assembled the logs with square-notch joints and pinned them in place with large wire nails; the interior was sided with salvaged boards and corrugated iron. The privy building was removed or lost at an unknown date prior to recordation in 2000, at which time humus and paper were observed in the pit bottom. Waste rock fills the interior. Farther down, the pit might harbor meaningful archaeological deposits.

### 27. Mine Rail Line Remnant, contributing structure, circa 1940s (Photo 52-53)

The mine rail line extends out of the tunnel portal (Resource 31) and curves south along the Lower Bachelor's waste rock dump's shoulder. The mine's last operators installed the line for dumping waste rock and ore, constructing it by spiking 25-pound rail 25 inches on center to ties spaced every 2 to 3 inches, indicating its use by a mine locomotive. A rail spur branches off the main line and doubles back into the shop building (Resource 28).

### 28. Shop, contributing building, circa 1890s / circa 1930s (Photos 54-55)

The shop building stands on a cut-and-fill platform south of and adjacent to the Bachelor Mine's lower tunnel portal, next to a bedrock outcrop. The platform's surface is concurrent in elevation with the waste rock dump (Feature 4) and rail bed (Resource 27) to the immediate east. Mine workers erected a hewn-log cribbing wall to retain the platform's cut bank and prevent scree from sliding onto the building. The footprint of the two-story, gabled-roof post-and-girt frame shop measures 40 feet by 29 feet in area, encompassing a one-story gabled-roof blacksmith area with shed addition at the south end. The two-story portion enclosed a machine shop at the lower level and a changing and warming room at the upper level.

The post-and-girt frame of the building is buttressed by king posts. All sides of the building feature nailed vertical boards, while the roof has historic corrugated sheet metal. Since recordation in 2000, the roof of the two-story portion has collapsed, resulting in the walls of the building splaying outward. A louvered cupola for ventilation of the blacksmith area was noted at the lower gable roof, which has since fallen into the interior. The south side has no openings at the lower level, but the face of the one-story gable has two double windows of four-light square wood sashes; the south face of the two-story gable has two square window openings, the sashes of which are now gone. The east side at the one-story blacksmith section has an opening for double doors, since removed, while the two-story portion features two additional large double door openings, one of which has been infilled

with horizontal boards. The north side has a door opening at the west end that leads directly to the upper level via a stairway; a second door opening has been boarded over with horizontal boards. As with the south gable face, the gable at the north side has two square window openings, which currently lack their sashes but were recorded in 2000 as being multi-light double-hung wood sashes. Due to the bedrock pinnacle directly west of the building, no openings are on the west side.

Recordation of the interior in 2000 noted the following details, believed to be intact but not accessible at the time of re-recording in 2020. The blacksmith work area features a 5 foot by 5 foot by 2 foot gravel-filled wood box forge with a nearby anvil block. Blacksmithing refuse, especially upset drill-steel blades and pick tine points, lie scattered around the anvil block's base. Parts bins were nailed to the blacksmith room's west wall, and shelving was nailed to the south wall. A coal bin, integral with the building's frame, stands along the shop's south wall. The bin, 17 feet long by 5 feet wide by 7 feet high, features a doorway in its south wall for inputting coal. The interior of the machine shop room features a stout workbench, punctuated by holes for a vice and small shop appliances, along the east wall. The rest of the original shop facilities were removed in the 1940s to accommodate two stub rail lines that terminate at locomotive recharging stations. Although the recharging equipment has been removed, three storage batteries were recorded in 2000. The shop's changing and warming room at the top story is accessed only by the staircase ascending along the building's northwest corner. A gravel-filled stove pad near the center of the room, corrugated metal sheet lining the walls, and two electrical insulators nailed onto a mount over the doorway were recorded in 2000.

### F5. Shop Clinker Dump, site feature, circa 1890s

The roughly 30 foot by 12 foot clinker dump lies east and adjacent to the shop's blacksmith area's doorway. The dump consists of nails and a few industrial items in a matrix of clinker generated in the shop's forge.

### 29. Lower Bachelor Ore Sorting House and Aerial Tramway Terminal, contributing building, circa 1890s / circa 1910s (Photos 3, 44, 54, 57-63)

The two-story ore sorting house stands northeast of and adjacent to the Lower Bachelor tunnel portal on a platform of waste rock retained by hewn-log cribbing, with steep slopes of more waste rock on either side. The upper floor is at the same elevation as the tunnel portal. The gable-roof building measures 50 feet by 46 feet in area and has a shed-roof extension on the north side measuring 25 feet long by 15 feet wide. This extension, added sometime during the 1910s for additional ore sorting capacity, was converted in the 1940s into a lower aerial tramway terminal that accepted ore from the Upper Bachelor ore sorting house (Resource 39) about 650 feet up the mountainside. In the first decades of the Lower Bachelor ore sorting house, it also served as the upper terminal for another aerial tramway that brought ore down the mountain slope; the remnants of this tramway are comprised of a shed-roof terminal at the north side, east of the 1910s north extension, and a series of tramway frameworks that extends east down the mountain slope from the building.

The gabled-roof building's structural system consists of a 12 foot by 12 foot square-set frame assembled with mortise-and-tenon joints. Some of the frame's horizontal beams are spliced with scarf joints. The roof is made of rafters supported by queen posts nailed to the building's square sets. The exterior, including the north extension, is clad with board-and-batten siding, and the roof, now largely collapsed or missing, is clad with historic corrugated metal sheeting nailed to purlins. The south side of the building's upper level has four door openings, two of which accommodated rail lines for hand-pushed ore cars bringing in crude ore for a first pass at sorting. Other doorways provided access from an exterior deck (now collapsed) to elevated interior warming rooms (all doors have since been removed at unknown dates). A set of double windows with square four-light wood sashes,

with all glazing and some muntins missing, is at the approximate center of the south side. A doorway at the southeast corner, below the level of the deck, provides access onto the main sorting floor of the lower level.

The west side has two door openings and multiple square window openings in a row above (all windows and doors are now missing). Heavy piles of structural and industrial debris are scattered along the west wall. The north extension is almost entirely collapsed, though suspended tram cables from the Upper Bachelor still extend into the interior. The sorting house's north side has a row of square window openings (sashes missing) near the top of the wall. The east side looks out over the mountain slope below, with a wood plank deck at the upper level, which is accessed via a double doorway flanked by four-light wood windows (glazing and muntins missing). At the upper half of the top floor's wall are six window openings, all of the same square, four-light configuration as the windows found elsewhere on the building.

The building's interior is mostly open with exposed support beams. The upper story features remnants of a rail system for inputting crude ore for sorting, as well as two warming rooms. Elevated above the lower floor, the rooms provided enclosed spaces for workers to warm themselves in winter, and were accessed only through exterior doorways in the south wall. The purpose of the rail system was to deliver crude ore from the tunnel in cars, to the heads of two sorting stations, where waste rock was separated out. Ore cars traversed through the sorting house's open interior across trestles (of which only the westernmost trestle remains) that terminated against the north wall. The two trestles were in turn connected by a lateral trestle extending 90 degrees along the north wall, crossing in front of the sorting station heads. Steel turntables at the intersection points allowed mineworkers to spin ore cars 90 degrees and switch them from one rail to another. The miners then pushed the cars to the heads of two grizzlies descending diagonally from the north wall to sorting stations at the lower level below. Fine ore passed through the grizzlies and collected in holding bins underneath the building's lower level. Waste-laden cobbles rolled down the grizzlies and stopped at the sorting stations. The floor around the sorting stations is armored with boiler plate iron to resist wear. There, mine workers sorted ore from waste, threw recovered ore through openings flanking the grizzlies and into the holding bins below, and shoveled waste into parked ore cars for disposal outside.

The workers used a combination of natural light admitted through the numerous windows and augmented by kerosene lamps placed in sconces nailed to the building's frame timbers, as observed in 2000. A timber dressing and carpentry work area occupied the south portion of the bottom floor, which is blanketed with sawdust and cut wood scraps. Prior to 2000, the eastern-most warming room was dismantled and most of the interior rail lines were removed. During the 1930s, the mine's operators laid a new track across the west trestle into the building's north extension.

The building's north extension, now mostly collapsed, housed two additional sorting stations, one of which projected from the extension into the main part of the building. During the 1940s the fourth sorting station in the extension was removed to accommodate the terminal for the aerial tramway descending from the upper tunnel, which used a double-rope reversible system constructed from salvaged materials. Although the miners removed the fourth sorting station, they left the associated ore bin intact and adapted it in conjunction with the new tram. They also extended the remaining rail line within the main building to provide access for dumping ore taken out of the lower tunnel.

The holding bins lie underneath the grizzlies and sorting stations of the lower level, and were designed to feed ore to the mine's original aerial tramway terminal standing at the sorting house's foot on the northeast corner. The 14 foot by 14 foot by 18 foot-deep bins, supported by heavy post-and-girt framing, feature sloped floors armored

with plate iron. Mine workers tapped the bins through chutes stopped by louvered gates, and into aerial tram buckets in the terminal below.

The original system installed for the Bachelor was a Bleichert double-rope tramway, a type designed during the 1870s that became popular in Western mining districts in the 1890s. At the Bachelor, the original tramway terminal is a two-story shed-roof component at the ore sorting house's north base. The terminal is also clad in board-and-batten siding with a corrugated sheet metal roof, but is now collapsed. The top floor housed the tram operator's station, while the bottom floor had the sheave system, rail circuit for the buckets, and stations for transferring ore from the holding bins into the buckets. The Bleichert tramway at the Bachelor remained in use through the 1940s.

A 75 foot-long framework descending east from the terminal guided incoming and outgoing buckets. The framework is composed of a series of five gallows frames 18 feet wide by 20 feet high that descend down the hillslope. The frames, made with 8 inch by 8 inch timbers, feature three pilings, cap timbers and diagonal bracing, and are spaced 15 feet apart, linked by stringers and intermediate cross members. Hanging rails for the tram buckets are suspended from the stringers. The last and eastern-most frame features the union between the tram system's track cable and the hanging rail. Incoming buckets, pulled by the system's traction cable, rolled off the track cable and onto the hanging rail, and ultimately into the terminal. Outgoing buckets, also pulled by the traction cable, exited the terminal, rolled down the hanging rail, and transferred onto the track cable for the journey down to the lower terminal. The track cable passes across special iron brackets bolted to stout cross members on the three eastern-most frames, and to heavy eye bolts hammered into bedrock. Two of the frames feature rollers that guided the traction cable as it dipped down through the beamwork. The tram cables leading to the bottom terminal are down and have been removed for use elsewhere.

### 30. Explosives Magazine, contributing building, circa 1930s (Photos 59, 64)

The explosives magazine consists of a wooden frame erected inside of an alcove blasted out of the south face of the large bedrock pinnacle to the north of the ore sorting house. As recorded in 2000, the chamber is 5.5 feet by 2.5 feet in area and 4 feet tall and lined with historic corrugated sheet metal. The rear wall features two small tin-armored shelves for blasting caps. A nail projects 6 inches up from the bottom shelf, surmised to hold a coil of safety fuse so that miners could unspool it and cut desired lengths. A corrugated sheet metal armored plank door, with a hasp for security, encloses the magazine and is flush with the bedrock face. Proper explosives handling practices dictated storing dynamite separately from blasting caps and fuse. Hence, dynamite was stored in the complex's other magazine (Resource 22).

### 31. Lower Bachelor Tunnel Portal, contributing structure, circa 1890s (Photo 65)

The Bachelor Mine's lower tunnel portal is open with a modern metal bar-and-mesh gate installed to obstruct access (though it currently stands open). Miners drove the tunnel, which is 5 feet wide by 7 feet high in-the-clear, directly into a bedrock outcrop. The tunnel's interior is supported by 10 inch by 10 inch cap-and-post timber sets spaced every 4 feet. A rail line and a 4 inch-diameter compressed air pipe extend out of the portal. A hand-forged iron hanger, probably for a ventilation tube, has been driven into a drill-hole in bedrock directly over the portal, and the surrounding rock face features several hand-drilled holes.

### Upper Bachelor Tunnel Surface Plant

The Upper Bachelor Tunnel Portal, originally located at the northwest corner of the mine complex near the top of the scree slope along the bedrock pinnacle, completely collapsed sometime prior to 1999 and is now covered in rockslide debris. A fire in 1939 destroyed much of the surface plant's original buildings, such as a large shop facility with blacksmith shop that stood on a still extant cut-and-fill platform (see Historic Photo 1 in Appendix B)

to the northwest of the 1940 ore-sorting house (Resource 39). A timber dressing shop was also on site. Remnants and foundations of these facilities remain to a degree, though bulldozing of the area created some disturbance. The waste rock dump was also graded for a road halfway down its flank.

### F6. Upper Bachelor Waste Rock Dump, site feature, circa 1890s to 1940s (Photos 66-67)

The upper tunnel's waste rock dump fills a drainage adjacent to the bedrock pinnacle at the northwest boundary of the mine complex on Bachelor Mountain. The dump measures roughly 600 feet long by 450 feet wide. Originally, its top surface, which miners graded flat, possessed a crescent-shaped footprint extending 260 feet east from the tunnel (now collapsed). In the 1970s, however, a bulldozer was used to scrape down the dump's top surface and cut switchbacks down the flank, impacting many of the dump's historic surfaces. Despite this major alteration, however, the dump continues to contribute to the mine complex' significance. The undisturbed portions of the dump's flanks exhibit characteristics of having been hand-sorted for low-grade ore. They feature hummocky textures, several small, isolated ore bins, and sheets of battered sheet metal on which workers sorted ore. Artifacts were observed scattered across the dump when recorded in 2000.

### 32. Ore Bin, contributing structure, circa 1940s (Photo 66-67)

The 12 foot by 10 foot ore bin stands on the Upper Bachelor's waste rock dump (Feature 6) adjacent to the tramway line between the Upper and Lower surface plants. Standing on a hewn-log and waste-rock platform, the ore bin consists of planks nailed to a variety of salvaged posts. It features a sloped floor, a chute in the west wall, and no roof. The bin was constructed by a low-grade ore recovery operation engaged in sorting through the waste rock dump; recovered ore was transferred into empty tram buckets passing by on the tramline.

### 33. Aerial Tramway Tower, contributing structure, circa 1930s (Photo 67)

The tower is of steel in the shape of a "T" to accommodate the double-rope reversible tramway that ran between the respective aerial tramway terminals at the Upper and Lower Bachelor plants. Timber towers also supported the tramway, but have collapsed since 2000.

### 34. Pack Trail, contributing structure, circa 1890s to circa 1910s

The 6 foot-wide pack trail ascends via switchback from the Lower Bachelor surface plant's stable (Resource 25) to the top of the Upper Bachelor waste rock dump. The trail disappears occasionally due to falling scree. Mine workers constructed the trail in the same manner as the pack trail leading from the Lower Bachelor to the creek, by erecting dry-laid rock walls to retain the trail's cut and fill banks and grading the space between with sorted rock.

### 35. Mine Rail Bed Remnant, contributing structure, circa 1890s

The rail bed is evidence of a well-organized rail system at the Upper Bachelor plant, requiring more extensive construction than cut-and-fill rail beds due to the steep scree slopes at this area of the mountainside. Mine workers cut a path through the scree slope and paved it with fine waste rock fill. When recorded in 2000, the bed featured imprints left by ties, with several in-situ ties trapped under scree boulders. Miners used the rail line to transport logs, dressed timbers, and explosives to the tunnel.

### 36. Bulldozed Road, non-contributing structure, circa 1970s

In the 1970s, a bulldozer was used to scrape down the Upper Bachelor waste rock dump's top surface and cut switchbacks down the flank of the dump. Due to its construction after the period of significance and its impact on the dump's historic surfaces, the road is considered non-contributing.

## 37. Explosives Magazine, contributing structure, circa 1940s

The 8 foot by 8 foot explosives magazine stands along the rail bed extending from the upper tunnel complex west to a former timber dressing shed (removed prior to 2000). The magazine is a front-gabled, post-and-girt frame structure placed on a platform constructed of fill retained by a dry-laid rock wall. Both the interior and exterior are sided with historic corrugated sheet metal, as is the roof and the door in the west wall.

## 38. Explosives Magazine, contributing structure, circa 1890s

The 10 foot by 8 foot post-and-girt frame explosives magazine stands along the mine's recently graded access road. The side-gabled structure stands on a platform constructed of fill retained by a dry-laid rock wall. The exterior sides are clad by historic corrugated sheet metal, as is the roof. A plank door is at the west side.

## 39. Upper Bachelor Ore Sorting House and Aerial Tramway Terminal, contributing building, 1943 (Photos 66-67)

The three-story, frame ore sorting house was constructed after the surface plant was largely destroyed by fire in 1939, and stands on a flank of the waste rock dump south of where the tunnel portal once was, with an aerial tramway terminal at its southeast side facing out over the dump. The ore sorting house utilized gravity to sort ore as efficiently as possible, with the top level receiving ore from loaded cars running on a rail line extending across a deck abutting the building's northwest side and through a wide doorway. The second level encloses two sorting stations, where ore dumped at the top floor slid through chutes onto grizzlies, with the finer ore dropping through to holding bins at the lowest level, and large cobbles sorted at stations of raised plank tables. Recovered ore was tossed below into the holding bins, and waste rock was shoveled into ore cars. The post-and-girt structural systems of the different floors vary in dimensions of the structural members, with the larger members making up the lowest level and respectively diminishing in size at the upper levels.

The building is clad entirely in historic corrugated sheet metal, as is the side-gable roof. The ore sorting house's top two floors feature a variety of windows and doors. The upper-most floor features two multi-light fixed wood windows at the east and west sides, and a doorway at the north. The second floor features the same type of windows as above, with two at the east side and four at the west. When recorded in 2000, the middle-floor windows had been recently covered with plexiglass, and two of the doorways infilled with boards and modular panel doors. The south side features a large top-hung sliding board door and a square fixed window. The north side features a personal door made of vertical boards.

The two-story frame aerial tramway terminal stands at the toe of the sorting house, where it facilitated the transfer of ore from the sorting house's holding bins into tram buckets. As with the rest of the building, the terminal is sided with historic corrugated sheet metal. The upper floor features ore chutes extending from the holding bins down into the terminal's bottom floor. The east wall features a rectangular window opening set high in the wall.

The terminal's bottom floor features the area where miners transferred ore into tram buckets. Two ore chutes descend through the room's ceiling and terminate over a central loading chute. The tramway was a double-rope reversible system, and when one bucket ascended into the terminal, a mine worker opened the ore chute gate, the payrock slid into the central chute, and poured into the waiting tram bucket. A second mineworker manipulated a long brake lever in the terminal to stop the system and hold the bucket in the loading position. When full, he released the brake and the full bucket coasted down the tram line and pulled the opposing empty bucket up into the terminal, where the process was repeated. The tram terminal's upper floor features plank flooring for the mine workers opening and closing the ore chutes and for the worker manipulating the brake. The track cable is fixed to anchors at both the top and bottom terminals, and it passes through the upper terminal's

bottom floor. In the upper terminal, the traction cable passes over several pulleys and around a 4 foot-diameter sheave fixed onto the ore bin's foundation framing, adjacent and west of the terminal's bottom floor.

# Photos of Structures and Features

Photo No. 1: Overview of Bachelor-Commodore Mine Complex site, with bedrock pinnacle of Bachelor Mountain at center. Lower and Upper Bachelor tunnel surface plants visible on mountain slope. Commodore Mine waste rock dump and cribbing walls in foreground. Camera facing northwest.

Photo No. 2: View of southeast portion of Commodore surface plant, with county road and waste rock dump cribbing walls in foreground. Commodore ore sorting house and generator/locomotive sheds beyond. Camera facing southeast.

Photo No. 3: View of Commodore tunnel portal and Lower Bachelor waste rock dump and ore sorting house beyond up mountain side, with rockwork lining of West Willow Creek in foreground. Camera facing northwest.

Photo No. 4: View of northern section of Commodore Tunnel No. 5 surface plant; office, compressor house, bridge, shop and compressor house (Resources 13-17) from right to left on opposite side of creek bed. Camera facing north.

Photo No. 5: Northern section of Commodore surface plant; shop and compressor house (Resources 16-17) at right, compressor house (Resource 19) beyond evergreen trees, and powerhouse ruins (Site Feature 3) in front. Camera facing north.

Photo No. 6: View up southeast flank of Bachelor Mountain, with base of bedrock pinnacle at right, and Lower Bachelor waste rock dump with cribbing walls to left. Camera facing west.

Photo No. 7: Close-up view of Lower Bachelor ore sorting house, top of Lower Bachelor waste rock dump, with Upper Bachelor ore sorting house beyond. Camera facing west.

Photo No. 8: View of north section of Commodore surface plant from mountainside above. Camera facing east.

Photo No. 9: View of southeast section of Commodore surface plant from side of Bachelor Mountain; note recontoured waste rock dump at parking area and along road. Camera facing southeast.

Photo No. 10: View of ore sorting house (Resource 2) on cliff face above road. Camera facing southeast.

Photo No. 11: West and north sides of ore sorting house (Resource 2). Camera facing east.

Photo No. 12: View of mine rail remnant (Resource 3), looking southeast. Roof of ore sorting house (Resource 2) to right in distance.

Photo No. 13: South and east sides of Commodore ore sorting house (Resource 4), with mine rail remnant (Resource 3 in foreground. Camera facing northwest.

Photo No. 14: View southeast toward Commodore ore sorting house (Resource 4) at right and two generator buildings/locomotive sheds (Resources 5-6) at left.

Photo No. 15: View from road looking up toward south end of southeast waste rock dump (Site Feature 1) on mountainside. Camera facing northeast.

Photo No. 16: View of cribbing walls of southeast waste rock dump (Site Feature 1) with road in foreground and ore sorting house with trestle (Resource 4) in distance. Camera facing southeast.

Photo No. 17: Commodore ore sorting house, south and west sides. Camera facing north.

Photo No. 18: West side of Commodore ore sorting house with detail of trestle. Camera facing northeast.

Photo No. 19: West side of trestle of Commodore ore sorting house; snow shed at top. Camera facing northeast.

Photo No. 20: North and east sides of Commodore ore sorting house. Camera facing south.

Photo No. 21: East side of trestle of Commodore ore sorting house; snow shed at left. Camera facing west.

Photo No. 22: North side of generator building/locomotive shed (Resource 6). Camera facing southeast.

Photo No. 23: South side of generator building/locomotive shed (Resource 6) with mine rail line remnant (Resource 3) in foreground. Camera facing northwest.

Photo No. 24: South side of generator building/locomotive shed (Resource 6) with mine rail line remnant (Resource 3) at left and shop building (Resource 8) beyond. Camera facing northwest.

Photo No. 25: Drill cutting bench (Resource 7); camera facing north.

Photo No. 26: South side of shop building (Resource 8). Bachelor Mountain in distance. Camera facing northwest.

Photo No. 27: West and north sides of shop building (Resource 8), with rail bridge (Resource 9) and top of remaining section south waste rock dump (Site Feature 2) in foreground. Camera facing east.

Photo No. 28: View of rail bridge (Resource 9) from road below, with cribbing walls of southeast and south waste rock dumps at either side. Camera facing south.

Photo No. 29: View of top of remaining section south waste rock dump and cribbing wall with ore chute (Site Feature 2). Camera facing west.

Photo No. 30: Commodore Tunnel Portal (Resource 10). Camera facing west.

Photo No. 31: Privy (resource 11), looking west.

Photo No. 32: West and south sides of office (Resource 12). Camera facing east.

Photo No. 33: South and west sides of compressor house (Resource 13). Camera facing north.

Photo No. 34: Bridge crossing West Willow Creek (Resource 14). Camera facing west.

Photo No. 35: South and west sides of shop (Resource 16). Camera facing north.

Photo No. 36: South side of compressor house (Resource 17). Camera facing north.

Photo No. 37: Interior of compressor house (Resource 17), showing the belt-driven duplex Ingersoll-Rand Imperial Type 10 compressor. Camera facing east.

Photo No. 38: View of powerhouse ruins (Site Feature 3) with debris on top and boiler setting remnant to left. Compressor house (Resource 19) beyond. Camera facing north.

Photo No. 39: Detail of boiler setting remnant at powerhouse ruins. Camera facing west.

Photo No. 40: Aerial tramway tower platform (Resource 18), camera facing east.

Photo No. 41: South and east sides of compressor house (Resource 19). Camera facing northwest.

Photo No. 42: West side of compressor house. Camera facing northeast.

Photo No. 43: North side of compressor house. Camera facing south.

Photo No. 44: Close-up of Lower Bachelor waste rock dump with lower cribbing wall (Site Feature 4) in foreground and ore bin and aerial tram terminal (Resource 20) at left at upper cribbing wall. Lower Bachelor ore sorting house and aerial tram terminal (Resource 29) beyond near bedrock outcrop, and Upper Bachelor ore sorting house (Resource 39) in distance at right. Camera facing west.

Photo No. 45: Detail of unfilled cells of lower cribbing wall at Lower Bachelor waste rock dump. Commodore surface plant below at creek side. Camera facing northeast.

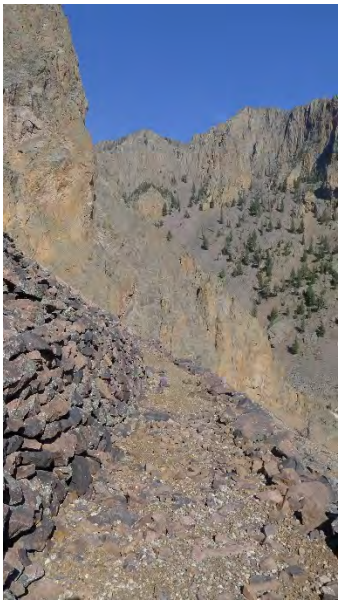

Photo No. 46: Section of pack trail (Resource 21) leading from Commodore to Lower Bachelor surface plant. Camera facing northeast.

Photo No. 47: View of explosives magazine (Resource 22, at left) and dynamite thaw house (Resource 24) on scree slope. Camera facing west.

Photo No. 48: South and east sides of dynamite thaw house (Resource 24). Camera facing northwest.

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Photo No. 50: Interior of dynamite thaw house (Resource 24), with thaw box on floor. Camera facing southwest.

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Photo No. 52: Privy pit cribbing (Resource 26) with mine rail line remnant (Resource 27) at left. Camera facing southeast.

Photo No. 53: Detail of debris on top of Lower Bachelor waste rock dump. Camera facing north.

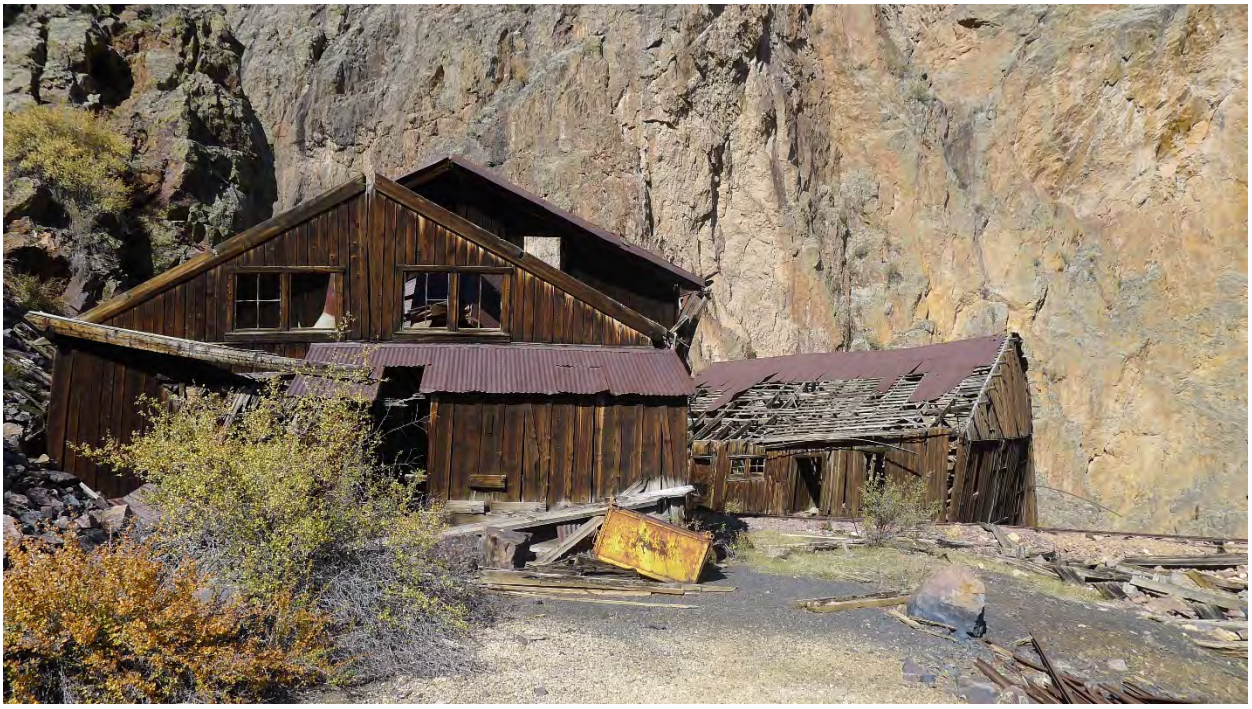

Photo No. 54: Lower Bachelor shop (Resource 28, at left) and ore sorting house and tramway terminal (Resource 29) beyond at right. Camera facing north.

Photo No. 55: East side of shop (Resource 28). Camera facing west.

Photo No. 56: North side of shop (Resource 28), with wall of bedrock outcrop at right. Camera facing south.

Photo No. 57: East and south sides of Lower Bachelor ore sorting house and aerial tramway terminal (Resource 29). Camera facing north.

Photo No. 58: Aerial tramway framework at east side of ore sorting house and aerial tramway terminal. Camera facing north.

Photo No. 59: Detail of south side of ore sorting house and aerial tramway terminal with view to interior along ore cart rail. Explosives magazine (Resource 30) in distance at left in bedrock face. Camera facing north.

Photo No. 60: West side of ore sorting house and aerial tramway terminal with debris and artifacts on adjacent waste rock. Note cables of aerial tramway to Upper Bachelor are still suspended. Explosives magazine (Resource 30) in distance at left in bedrock face. Camera facing north.

Photo No. 61: Detail of aerial tramway bucket and other artifacts on surface next to ore sorting house and aerial tram terminal. Camera facing north.

Photo No. 62: Detail of west side of north extension of Lower Bachelor ore sorting house. Note ore bucket hangers still suspended on aerial tram cables. Camera facing southeast.

Photo No. 63: Interior of Lower Bachelor ore sorting house. Camera facing southeast.

Photo No. 64: Explosives magazine (Resource 30) in bedrock face. Camera facing north.

Photo No. 65: Lower Bachelor Tunnel Portal (Resource 31) in bedrock outcrop. Camera facing west.

Photo No. 66: View up Upper Bachelor waste rock dump (Site Feature 6), with ore bin (Resource 32) at left and Upper Bachelor ore sorting house and aerial tram terminal (Resource 39) beyond at right. Camera facing west.

Photo No. 67: Detail of ore bin (Resource 32) at left and Upper Bachelor ore sorting house and aerial tram terminal (Resource 39) beyond at right. Camera facing west.

# References


Colorado State Mine Inspectors' Reports, Colorado State Archives:
Bachelor Mine (Box 104053)
Creede Exploration Company (Box 104053)
Emperius Mine (Box 104053)

*Engineering and Mining Journal*, 1898; 1900.

Environmental Protection Agency, "Superfund Site: Nelson Tunnel/Commodore Waste Rock, Creede, CO, Cleanup Activities." (online at https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0802630#bkground, accessed 18 November 2020).

Fell, James E., Ph.D., and Eric Twitty, M.A. *The Mining Industry in Colorado*, National Register of Historic Places Multiple Property Documentation Form (accepted 2008). On file with History Colorado Office of Archaeology and Historic Preservation.

Sanborn Fire Insurance Map, Creede, Colorado, 1904.

Trennert, Robert A. "Aerial Mine Tramways in the West," *Mining History Journal* (1997), 3-13. (online at https://www.mininghistoryassociation.org/Journal/MHJ-v4-1997-Trennert.pdf, accessed 18 December 2020).

Twitty, Eric Roy. *Mining the Amethyst Vein: Selective Cultural Resource Inventory of the Principal Historic Mine Sites on the Amethyst Vein*, Volume I (April 2000). Prepared for Willow Creek Reclamation Committee. On file with History Colorado Office of Archaeology and Historic Preservation.

# Historic Structure Assessment

**Nelson Tunnel/Commodore Waste Rock Superfund Site, Mineral County, Colorado**

# Appendix B: Additional Historic Context and Historic Photos

## Introduction

The Historic Structure Assessment for the Nelson Tunnel/Commodore Waste Rock Superfund Site provides a brief overview of the historical context of the Bachelor-Commodore Mine Complex. Additional historic context is provided in this appendix to include more detail of the growth of the mining industry in this region and how the mine complex developed overtime. The additional historic context organized the themes listed below followed by key historic photos of the mine complex. When compared with the current images included in Appendix A, it is evident that the high level of integrity the mine complex continues to have today conveys the history of mining in the area.

## Contents


- Introduction
- Additional Historic Context
- Figures and Historic Photos


Additional Historic Context Themes:

- Discovery of Silver
- Development of Creede Mining District
- Bachelor Mine
- Commodore Mine
- Combined Workings
- Emperius Mine
- Ore Sorting House Processes
- Bleichert Aerial Tramways

# Additional Historic Context

## Discovery of Silver

The San Juan Mountains of Colorado, the eastern reaches of which include Mineral County and the Creede area, were long occupied by the Ute people prior to the discovery of ore and the subsequent extraction and exploitation of natural resources. In 1865, gold was found in the Animas River drainage, about 40 miles west of present-day Creede, by a party of prospectors led by Charles Baker. After a decade of further prospecting by trespassers on Ute land, the richness of the area's mineral veins and the potential for profitable hardrock mining led to the 1873 Brunot Treaty between the U.S. government and the Utes, ceding 4 million acres for mining while allowing for the Utes to continue hunting.

The next major hurdle to overcome was the area's remoteness and ruggedness, which hindered transportation into and through the region. Soon, however, a network of roads was created by those seeking to profit from the area's growing mining development, including freight haulers, mining companies and the road-builder Otto Mears. Wagon Wheel Gap, a way station along the popular Rio Grande River route in Mineral County, became a Denver & Rio Grande Railroad (D&RG) terminus in 1883. It largely brought tourists to the nearby Wagon Wheel Gap Hot Springs Resort (5ML.22, National Register, listed September 26, 2019) but also encouraged exploration of the nearby mountains.

In the early 1880s, John C. McKenzie and H.N. Bennett prospected in the area of present-day Creede and staked the Alpha claim in the nearby Sunnyside area, followed soon after by McKenzie staking the Bachelor claim (named after his marital status) in 1884 on the western side of West Willow Creek. While the Alpha claim was eventually sold, McKenzie retained title to the Bachelor claim; subsequent attempts to work the ore were unsuccessful, and both claims were set aside for several years. In 1889, however, the area finally attracted interest following the discovery of bonanza ore at the Holy Moses claim on Campbell Mountain by Nicholas C. Creede, E.R. Taylor and G.L. Smith. Creede proved himself a savvy prospector and discovered or aided in the discovery of several other rich claims in the area, including the Amethyst and Last Chance mines. Creede, Taylor and Smith sold the Holy Moses in 1891 (with Creede retaining a large share) to the mining investment syndicate composed of David H. Moffat, the mining and railroad magnate, U.S. Army Captain L.E. Campbell and D&RG general manager Sylvester T. Smith, thereby creating an impression of legitimacy for the mining potential of the area and inviting a wave of prospectors and the investors eager to back them.

## Development of Creede Mining District

First named the King Solomon District, the Creede Mining District quickly became known for its wealth as concentrated in its three main veins of silver ore: the Alpha, Amethyst and Holy Moses. The drainages of East and West Willow creeks provided easiest access to the Holy Moses and Amethyst veins, respectively, and soon attracted a high volume of traffic and makeshift settlements as prospectors rushed to stake claims. A few of these settlements would eventually coalesce into the town of Creede, while others that sprang up in conjunction with their mines were abandoned when the industry's busts would eventually hit. The principal mines of the district in the early boom years between 1891 and 1893 were the Bachelor, Last Chance, New York and Amethyst mines on the Amethyst vein, and the Holy Moses (5ML.104), Solomon (5ML.200) and Ridge (5ML.201) mines on the Holy Moses vein. Of these, the Amethyst and Last Chance mines produced a combined 80% of the silver ore extracted from the district in 1892, while the other mines remained primitive in their development and output. Most mines on the Amethyst vein had discovered ore but not proved their extent, while the mines on the Holy Moses vein would exhaust their rich ore fairly quickly.

Excitement in the wealth just beginning to flow out of the district in the early 1890s led to increased investment in the area, attracting relatively progressive engineering and technology. For example, in 1892, the manager of the Denver Consolidated Electric Light Company, John W. Flintham, erected an electrical generating plant in Creede for the area's mines, providing enough direct-current power for light circuits and simple mine machinery, one of the earliest such plants to be built in the American West. Creede's high density of profitable mines within a compact area lent itself to such power distribution.[1] That same year, Charles F. Nelson, discoverer of the Solomon Mine, organized the Nelson Tunnel Company in order to service and connect the principal mines on the Amethyst vein, which tended to suffer from a high water table, poor ventilation and a resulting higher cost of mining at depth.

Nelson's tunnel was intended to serve as a prospect bore, drain and ventilation duct, and haulage way for ore trains. Profit was to come from the subscription fees and tonnage tolls mines would pay to use the tunnel. As the first mine workings that would be encountered by the Nelson Tunnel, Moffat's Bachelor Mining Company was the first subscriber. Around this same time, the D&RG had established a railhead at the town of North Creede near the confluence of East and West Willow creeks to transport the large amounts of ore the district was producing. Yet just as this excitement reached new heights, the silver mining industry in Creede, greater Colorado and other Western states collapsed with the Silver Panic of 1893, the result of reform efforts to correct silver's high prices set by the 1890 Sherman Silver Purchase Act. With this collapse, only the Last Chance and Amethyst mines continued operations due to the amount of profit they could generate even at the ore's drastically reduced prices, whereas other mines were either made idle or abandoned completely.

When the economy recovered in the following years of the mid-1890s, mining resumed at all of the district's principal mines, and development began in earnest at new claims. With a new commitment to extracting ore as efficiently and economically as possible, the district's mines relied heavily upon mining engineering to resume profits, and new and faster equipment was installed. Reduction mills, used to eliminate as much waste rock as possible before transporting ore to smelters for refinement, were built by several of the biggest mining operations in the district. The work of driving the Nelson Tunnel resumed, and the Last Chance, New York and Amethyst mines subscribed for service in 1897 (with the first encountering of their workings in 1899).

Eventually, all major operations on the Amethyst vein except for the Commodore would connect with and subscribe to the Nelson Tunnel, and most operations' surface plants were rendered obsolete by the 1910s, with the Nelson Tunnel becoming the principal access point to most of the underground workings. Even the district's towns were affected. During the 1890s, the settlement of Bachelor (5ML.29, also known as Teller), came to life on a relatively level grassy area near the mountaintop of its namesake mine. The town was a center of commerce and workers' housing for mines along the Amethyst Vein, being within commuting distance from the Amethyst, Last Chance, Happy Thought and other operations. When the Nelson Tunnel made it unnecessary for miners and teamsters to live near the shafts along the vein, most people left Bachelor.

A recession in 1907 forced most of the district's mines to temporarily close, but mining soon resumed again, only to realize by 1910 that the area's ore deposits were becoming depleted. The outbreak of World War I stimulated the district's mines for a time due to an increase in the value of silver and the demand for industrial metals such as the zinc and lead that were also encountered along with the area's renowned silver deposits. However, the large corporate structures of the district's mines were becoming untenable due to high operating costs and the exhaustion of the ore bodies. As a result, mining in the district continued in the 1910s under a new operating

[1] Fell and Twitty, 140.

structure wherein corporate mine owners leased their holdings to second-party companies or portions of an ore body to individual miners, shifting the burden of minimizing operating costs to the lessees, and collecting a royalty or flat fee through the lease. Though they were able to turn a profit more easily than the large corporate owners, lessees did not waste time or resources on exploring for new ore bodies, choosing instead to extract as much as possible through the extant workings.

As the twentieth century progressed, the district's mines cycled through booms and busts, leaving many mines abandoned then revived years or decades later, only to be neglected again and closed for good. Of the district's dozens of mines, only the Amethyst, Bachelor and Commodore mines were the most consistently in operation, particularly through the mid-century and later.

## Bachelor Mine

In 1884, John C. McKenzie discovered another ore deposit after his first success in the area with the Alpha claim. In late 1891 or early 1892, the Moffat syndicate purchased the Bachelor claim from McKenzie, giving him a handsome profit, and began developing it by further driving the 350 foot-long tunnel left by prospectors at what is now the Upper Bachelor Tunnel. In support of the work, the syndicate funded a simple surface plant, though the mine remained relatively small compared to the district's main producers at the time.[2] Just before the financial crash of 1893, at the advice of his engineers, Moffat committed to subscribing to the Nelson Tunnel, as well as driving another tunnel lower down the mountainside to allow extraction concurrently through different levels connected vertically underground. In 1893, the Bachelor became idle for a few years, but quickly picked up again in the mid-1890s, expanding the two tunnel surface plants with shops, ore sorting houses, and stables for ore-car draft animals. In addition, an air compressor plant (for powering rockdrills), and a small electric generation plant (to power ventilation blowers and lighting) went up on the creek bank down the mountainside. The upper tunnel served as the mine's principal entry and the lower tunnel as the main haulage way. A Bleichert double-rope aerial tramway was constructed from the lower tunnel to the creek bottom in this same era to move the mine's large amount of ore off site to the railhead at North Creede.

## Commodore Mine

Like the Bachelor, the Commodore was also prospected and claimed by John C. McKenzie, who had renewed his search for additional strikes in the early 1890s after the success of his earlier finds. After staking the claim for the Commodore in 1891 and finding economic ore in 1892, McKenzie and partner W.V. McGillard sold it to A.E. Reynolds, an influential investor in Colorado's San Juan Mountains mines, in 1892. The Commodore's first tunnel was an adit on the northeast flank of Bachelor Mountain (5ML.344), half a mile away from the later surface plant on West Willow Creek.[3] In 1893, Reynolds' Commodore Mining Company had encountered the Amethyst Vein, but was waylaid by the financial panic of that same year. By the late 1890s, ready to increase production but believing the Nelson Tunnel too costly, Reynolds would move to hire an engineer to drive a haulage way for the Commodore alone. Due to the restrictive topography of West Willow Creek's canyon, the location identified as the best and only option was directly north of the Nelson Tunnel along the creek and would require boring through the Bachelor Mine in order to access the Commodore's workings beyond. The two operations were on good terms, and the Commodore secured the right to drive its tunnel, probably for a royalty. While one crew drilled and blasted the tunnel (first known as the Manhattan Tunnel due to the name of the claim at that location), another crew worked on erecting a surface plant around the portal, for a total of 250 men employed in

[2] Twitty, 13.

[3] Due to its distance away from the Commodore's main surface plant on the creek and very different scale of operation as a small adit, the Commodore Tunnel No. 1 site is not included within the Bachelor-Commodore Mine Complex nomination boundary.

1898, far more than the median crew of 25 at other mines in the district that same year.[4] This plant was made possible by the diversion of West Willow Creek through a flume, covered over by waste rock generated from driving the tunnel, which in turn was held back by cribbing walls. A shop, change house and other frame buildings were erected around the portal, and a powerhouse, timber dressing building and ore bins sat across the flume. By 1900, the tunnel reached a length of 4,000 feet and became the principal haulage way for the mine, and the first tunnel and its small plant on the other side of the mountain was abandoned except for access to the upper workings.[5]

## Combined Workings

In 1900, the Moffat syndicate purchased a controlling interest in the Commodore Mine, and the underground workings of the Bachelor and Commodore were linked with numerous passages. Subsequently, the various tunnel portals were renamed, such that the Commodore's first tunnel on the other side of Bachelor Mountain became No. 1; the Upper Bachelor Tunnel, No. 2; Lower Bachelor Tunnel, No. 3; the Nelson Tunnel (still used by the Bachelor), unofficially No. 4; and the Manhattan Tunnel, No. 5. A focus to increase efficiency of ore extraction at the turn of the twentieth century led to expansion of Tunnel No. 5's surface plant with a generator and air compressor plant, and the abandonment of the original Bachelor powerhouse; tunnels No. 1 and 2 were also abandoned.[6]

In 1902, the Moffat syndicate leased the Bachelor to another mining outfit, the Creede Home Mining Company, led by President C.C. Hord. Meanwhile, the Commodore Mining Company had a workforce of 400 and was profiting. By around 1910, both mines' most profitable ore (i.e., the richest and most accessible) had been extracted, but when Norman Corson took over the Bachelor's lease in 1915, his outfit managed to do well due to the high metal prices of World War I, until the collapse of prices in 1918 forced him to shut the mine down. The Commodore at this time was operated by the Creede Exploration Company, which gambled on an exploratory shaft that failed to encounter sufficient ore, resulting in the closure of the Commodore at around the same time.

Fits and starts of mining continued through the 1910s and 1920s, driven by fluctuating prices and the economic viability of the two leasing operations. By 1920, with the end of World War I ending the high prices of metals, mines on the Amethyst vein had ceased production, and the surface plants and tunnels were left to decay, with the exception of the Bachelor, Commodore and Nelson Tunnel. When the Pitman Act of 1922 mandated the federal government purchase silver at a price of $1.00 per ounce, mining resumed on the vein's principal mines, with all work conducted through the Nelson and Commodore No. 5 tunnels. When the Pitman Act expired in 1923, some mines went dark again, though the Commodore continued production and lessees conducted some exploration of the Bachelor; the Nelson Tunnel was effectively abandoned by this time.

In 1924 Clarence Withrow formed the Withrow Leasing Company and reopened the Commodore at a low scale, focusing on extracting low-grade ore left behind by previous operations and exploration for additional ore bodies. Withrow had success when an ore-rich fault parallel to the Amethyst vein was encountered. The economic fallout of the Great Depression once again halted mining at the Commodore and across the district, but a significant upswing occurred with the 1934 Silver Purchase Act that set silver prices artificially high. As a result, the Bachelor and Commodore mines saw a new wave of exploration by the Withrow Leasing Company, accessing the underground workings through the two Bachelor and Commodore tunnels and using the surface plants in conjunction with one another. Though some smaller operations reverted to hand-drilling as an economical way to

[4] *Engineering and Mining Journal*, (9 July 1898), 47.
[5] *Engineering and Mining Journal*, (16 June 1900), 718.
[6] Ibid.

explore deep underground, the Commodore (and Amethyst) was able to continue using mechanical rockdrills by means of the air compressors at the surface plant.

## Emperius Mine

In 1935, the Emperius Mining Company purchased the Bachelor and Commodore mines and the Nelson Tunnel; the company would then go on to create a virtual monopoly in the area by leasing the Last Chance and New York mines in 1937 and buying the Amethyst in 1939. The Emperius Mining Company was founded in 1934 and led by Herman Emperius (1873-1932), a former mayor of Alamosa, Colorado who became one of the largest landowners in the San Luis Valley, and Benjamin T. Poxson (1893-1990), a businessman who began his career as a teacher in Alamosa in 1914 and became politically connected while serving as an aide to Colorado Governor William "Billy" Adams (in office 1927 to 1933).[7]

During the 1930s and 1940s, a succession of lessees operated and maintained the surface plants of the Bachelor and Commodore. Emperius eventually took over operations in 1943, due in part to the circa 1939 discovery of the OH Vein, considered by geologists to be the most significant find since McKenzie encountered the Amethyst in 1878, and began a campaign of new development and construction. Emperius equipped the Commodore with compressors for drilling and hoisting and constructed an ore sorting house, with another at the Upper Bachelor to replace an earlier one lost by fire in 1939. The Lower Bachelor surface plant became a hub of activity with the moving of ore from its own haulage and that of the Upper tunnel. Former miner John Jackson recounted in a letter to author Richard C. Huston that:

> In reopening Commodore 5 Tunnel [in the early 1940s], one of the first jobs was to replace rail with switch from the main track to shuttle cars of waste rock south to be dumped in West Willow Canyon. My father and I were digging into the bank of the former waste dump to set a sill for timbers supporting rail when we happened on a treasure trove of old drills, books and a mining magazine with an article and pictures of a continuous mining machine to be used in the driving of Commodore 5 Tunnel and touted as an invention that would revolutionize mining…It proved to be unsuccessful in such hard rock and the first 1,000 feet of the tunnel was driven using conventional drills called "sluggers" and explosives.[8]

Huston recounts that the December 1941 issue of *Mining World* reported on Emperius' success in a story titled "Emperius Revives Mining in Once Fabulous Creede," stating that "[t]oday the Emperius Mining Co., with B.T. Poxson as President, has brought Mineral County second place among Colorado silver producing counties."[9] With the richness of the OH vein its main driver, mining continued apace through World War II and the rest of the 1940s, though it began to slow down at the end of the decade, when it appeared the ore bodies were becoming truly depleted. Yet another boom occurred, however, with the economy's rise in the late 1940s, combined with new milling technologies that made low-grade ore, previously considered too costly to bother with, now economically profitable. During this time, Emperius shifted surface plant activity almost completely to the Commodore at the creek bottom, reconditioning the No. 5 Tunnel and replacing the mule trammage with

[7] Richard C. Huston, *A Silver Camp Called Creede: A Century of Mining*. Montrose, Colorado: Western Reflections Publishing Company (2005), 363.
[8] Huston, 156.
[9] Huston, 366.

battery-powered locomotives in 1946.[10] The aerial tramways appear to have been removed at about this same time. However, evidence of some continued use at the two Bachelor tunnels is seen in the conversion of the Lower Bachelor's rail line to the electric locomotives and some 1970s-era alterations to the Upper Bachelor plant.

Emperius continued mining the Bachelor-Commodore workings until 1974, when the Minerals Engineering Company took over, at which time the Upper Bachelor surface plant was heavily altered by bulldozers scraping down the area and grading a road partway down the waste rock dump. In 1983, both the Commodore and Bachelor mines, the longest-paying claims in the Creede Mining District, finally ceased operations entirely.

## Ore Sorting House Processes

In general, the primary functions of ore sorting houses were both the concentration and the storage of ore. In keeping with the gravity-flow engineering typical of mining, engineers usually designed sorting houses with multiple levels for input, processing and storage. These buildings usually featured a row of receiving bins or chutes on the top level, a sorting floor under the receiving bins, and a row of holding bins underneath the sorting floor. Receiving bins usually had sloped floors, as did the holding bins in most cases. The sorting floor was fully enclosed and heated with a wood stove. The building usually stood on a foundation of heavy timber pilings or log cribbing walls. The general path the ore followed began when miners underground characterized the nature of the ore they were extracting. They communicated their assessment via a labeled stake, a message on a discarded dynamite box panel, or a tag placed in the ore car. A trammer then hauled the loaded car out of the mine and pushed it into the sorting house. He emptied the contents into one of several receiving chutes or bins, depending on how impure the ore was.

High-grade ore went into a small and special bin at one end of the building; run-of-mine ore, which was not particularly rich but required no sorting, went into another bin at the opposite end. Low-grade payrock combined with waste rock, known as mixed ore, went into one of several chutes or bins located in the center of the ore sorting house. When released from the car, the mixed ore slid onto a heavy grate known as a grizzly. The principle behind the grizzly was that the rich portions of the ore fractured into fines, while the large cobbles that remained intact after blasting and shoveling contained waste rock that needed to be cobbed, or knocked off by surface laborers. The valuable fines dropped through the grizzly directly into the holding bins at the bottom of the building, while the cobbles rolled off the grizzlies and into chutes that fed onto sorting tables. There, laborers worked by daylight, or kerosene or electric lighting, to separate the ore from waste.

## Bleichert Aerial Tramways

As discussed in the *Mining Industry in Colorado Mining Industry Multiple Property Documentation Form* (MPDF), Bleichert double-rope tramway systems were limited to heavily capitalized operations due to their cost, though they were also the most efficient in moving ore.[11] The Bleichert system utilized a track rope spanning a series of tram towers, and a separate traction rope that tugged ore buckets around a circuit. The track rope was fixed in place and the buckets coasted over it on special hangers featuring guide wheels. Bleichert double-rope tramways relied on top and bottom terminal stations where the buckets were filled and emptied, and they ran by gravity. In the terminals, mine workers uncoupled the buckets when the vehicles arrived, they pushed them across a

[10] Colorado State Mine Inspectors' Reports, Emperius Mine (Box 104053), Colorado State Archives.
[11] Fell and Twitty, 179.

hanging rail, and stopped them underneath chutes where the buckets were filled with ore. Once full, a mine worker recoupled the buckets onto the cable, and the buckets left the upper terminal. Workers in the bottom terminal uncoupled the buckets and emptied them.

## Figures and Historic Photos

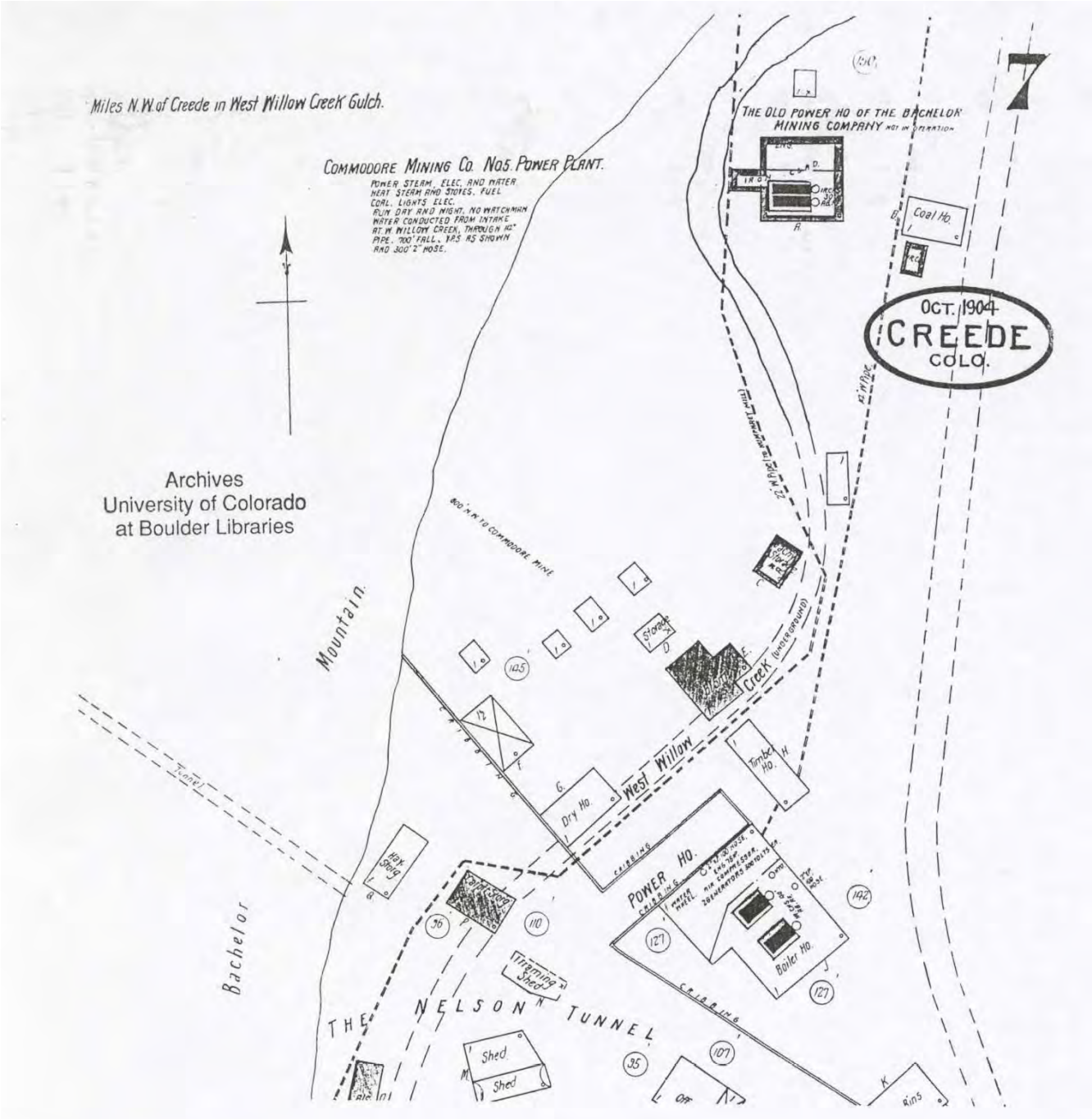


**Figure 1.** 1904 Sanborn Fire Insurance map of Commodore Mine Surface Plant, from Mining the Amethyst Vein, 104. None of the buildings shown on this map are extant today, though the foundation of the Bachelor power plant at top remains (Site Feature 3).

Historic Photo 1. Circa 1895 photo showing wagon road (now County Road 503) passing through West Willow Creek canyon, with surface plants of the Commodore No. 5, Lower and Upper Bachelor tunnels in distance. Powerhouse and other buildings at Commodore plant removed prior to 1930s. Photo courtesy of Denver Public Library Special Collections, call number X-61954.


Historic Photo 2. View of Upper Bachelor Surface Plant from circa late 1890s, camera looking northeast, with bedrock pinnacle in background. Building at left was tunnel house and blacksmith shop. Building at right foreground was likely a machine and carpentry shop; all buildings shown are no longer extant. Photo courtesy of Denver Public Library Special Collections, call number X-61952.

Historic Photo 3. Circa 1920 view of southeast flank of Bachelor Mountain with Commodore and Lower and Upper Bachelor surface plants ascending up mountainside. Aerial tramways bring loads of ore to railroad terminus in foreground. Photo courtesy of Denver Public Library Special Collections, call number X-61954.

Historic Photo 4. Photograph showing aerial tramway tower in foreground of West Willow Creek and Bachelor Mine surface plants on mountainside. The 1942 photograph is by Theodore Fisher. Photo courtesy of Denver Public Library Special Collections, call number X-61937.

Historic Photo 5. Photograph by Muriel Sibell Wolle, circa 1955, showing Lower and Upper Bachelor waste rock dumps and surface plants on mountainside, with 1940 Commodore Ore Sorting House in right foreground. Photo courtesy of Denver Public Library Special Collections, call number X-5152.

Historic Photo 6. Photograph by Muriel Sibell Wolle, circa 1955, showing southeastern portion of Commodore surface plant, with rail bridge over road, machine shop and ore sorting house beyond. Building at right centerground no longer extant. Photo courtesy of Denver Public Library Special Collections, call number X-5147.

Historic Photo 7. Photograph by Muriel Sibell Wolle, circa 1955, taken from under rail bridge over road looking south toward 1940 Commodore Ore Sorting House. Trestle in foreground of ore sorting house carrying mine rail spur over road no longer extant. Photo courtesy of Denver Public Library Special Collections, call number X-5151.

Historic Photo 8. Photograph by Muriel Sibell Wolle, circa 1955, view south toward trestle carrying mine rail spur over road from tunnel portal to ore sorting house; rail line no longer extant. Photo courtesy of Denver Public Library Special Collections, call number X-5151.

Historic Photo 9. Photograph by Muriel Sibell Wolle, circa 1955, view northwest toward trestle carrying mine rail spur over road from tunnel portal to ore sorting house (in foreground). Photo courtesy of Denver Public Library Special Collections, call number X-5153.

Historic Photo 10. Lower Bachelor Shop, 1999; camera facing northwest. Photo by Eric Twitty from *Mining the Amethyst Vein*, 79.

Historic Photo 11. Lower Bachelor Ore Sorting House with Aerial Tramway Terminal, 1999; camera facing southwest. Photo by Eric Twitty from *Mining the Amethyst Vein*, 79.

Historic Photo 12. Upper Bachelor Ore Sorting House, 1999; camera facing north. Photo by Eric Twitty from Mining the Amethyst Vein, 87.

Historic Photo 13. Commodore surface plant, showing south waste rock dump and locomotive charging shed on top, 1999; camera facing southeast. Photo by Eric Twitty from Mining the Amethyst Vein, 105.

**Historic Photo 14.** Same view as Historic Photo 13, after 2005 flash flood and in the midst of recontouring south waste rock dump. Photo by Eric Twitty, 2009.

# References


Colorado State Mine Inspectors' Reports, Colorado State Archives:
Bachelor Mine (Box 104053)
Creede Exploration Company (Box 104053)
Emperius Mine (Box 104053)

*Engineering and Mining Journal*, 1898; 1900.

Environmental Protection Agency, "Superfund Site: Nelson Tunnel/Commodore Waste Rock, Creede, CO, Cleanup Activities." (online at https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0802630#bkground, accessed 18 November 2020).

Fell, James E., Ph.D., and Eric Twitty, M.A. *The Mining Industry in Colorado*, National Register of Historic Places Multiple Property Documentation Form (accepted 2008). On file with History Colorado Office of Archaeology and Historic Preservation.

Sanborn Fire Insurance Map, Creede, Colorado, 1904.

Trennert, Robert A. "Aerial Mine Tramways in the West," *Mining History Journal* (1997), 3-13. (online at https://www.mininghistoryassociation.org/Journal/MHJ-v4-1997-Trennert.pdf, accessed 18 December 2020).

Twitty, Eric Roy. *Mining the Amethyst Vein: Selective Cultural Resource Inventory of the Principal Historic Mine Sites on the Amethyst Vein*, Volume I (April 2000). Prepared for Willow Creek Reclamation Committee. On file with History Colorado Office of Archaeology and Historic Preservation.