

AMERICAN FLAT MILL, FINE GRINDING AND CONCENTRATION
PLANT
(Comstock Merger Mine Mills, Fine Grinding and Concentration
Plant)
Gold Hill vicinity
Storey County
Nevada

HAER NV-48-C
HAER NV-48-C

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
PACIFIC WEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
333 Bush Street
San Francisco, CA 94104

HISTORIC AMERICAN ENGINEERING RECORD
AMERICAN FLAT MILL, FINE GRINDING AND CONCENTRATION PLANT
(Comstock Merger Mine Mills)

HAER No. NV-48-C

Location: One mile northwest of Silver City, Storey County, Nevada. The American Flat Mill Fine Grinding and Concentration Plant is located at latitude: 39.27067, longitude: -119.66164. The coordinate represents the center point of the American Flat Mill Fine Grinding and Concentration Plant. This coordinate was obtained on December 6, 2014, by plotting its location with Geoplaner V2.7 (www.geoplaner.com). The accuracy of the coordinate is +/- 1 meter. The coordinate's datum is WGS 84 (World Geodetic System 1984). There is no restriction on releasing the location to the public.

**Present Owner/
Occupant:** United States Department of Interior, Bureau of Land Management (BLM).

Present Use: Vacant.

Significance: The American Flat Mill Fine Grinding and Concentration Plant is a contributing resource of the American Flat Mill District, an eight building silver ore processing mill complex. The American Flat Mill is significant under National Register Criterion A for its historical importance as the last remaining remnant of what was once the United Comstock and the Comstock Merger mining operations. The mill and its associated mining activities represented the last large scale underground mining efforts on the Comstock. Other early twentieth century mining activities on the Comstock were either much smaller in scale, or reflected the use of alternate technologies such as open pit mining or dredging. The American Flat Mill is also a contributing element to the Virginia City National Register District under Criterion A.

The American Flat Mill is eligible for

AMERICAN FLAT MILL, FINE GRINDING AND CONCENTRATION PLANT
(Comstock Merger Mine Mills)
HAER No. NV-48-C
(Page 2)

listing on the National Register under Criterion B at the local level due to the early and active participation of Royce Hardy and Alex Wise. These two local men were mining engineers who were involved in the formation of the United Comstock Mines Company and worked with the company until its demise in 1923. Wise began developing the "middle mines" which became a key part of the Comstock Merger operation. The American Flat Mill is the largest remaining physical reflection of their actions on the Comstock.

The American Flat Mill is eligible for the National Register under Criterion C at the national level as an early representative of the International Style of architecture, which stressed the metaphor of form following function, rejection of ornament, and use of modern building materials, including reinforced concrete, structural steel, and large window panels. All of these characteristics are strongly expressed throughout the American Flat Mill.

Historian:

Written historical and descriptive data and large-format photographs were prepared by David C. Berg, historian for The Ottery Group in August through December of 2014.

Project Information:

HAER documentation of American Flat Mill is part of the measures to mitigate the adverse effect that will result from demolition of all buildings at the site. The BLM has proposed the demolition of the mill for public safety reasons.

PART I. HISTORICAL INFORMATION

A. Physical History

1. **Date of Erection:** 1921-22.
2. **Engineer:** Walter L. Reid, consulting milling engineer; A. J. Weinig, metallurgist; Lee L. Fillius, superintendent of construction; B. P. Little, chief draftsman in charge of engineering office; and Robert McFarland Doble, in charge of power and electrical engineering.
3. **Original and Subsequent Owners, Occupants, Uses:** United Comstock Mines Company, 1922-24; Comstock Merger Mines, Inc. (subsidiary of Gold Fields America Development Company/New Consolidated Gold Fields, Ltd., of London), 1924-26.
4. **General Contractor:** United Comstock Mines Company.
5. **Original Plans and Construction:** Although original plans of the mill are no longer extant, a basic flow chart of the ore processing within the Fine Grinding and Concentration Plant is shown in the *Engineering and Mining Journal*, along with a photograph of the Allis Chalmers ball mills.¹
6. **Alterations and Additions:** None known.

PART II. STRUCTURAL/DESIGN/EQUIPMENT INFORMATION

A. General Description

1. **Character:** The Fine Grinding and Concentration Plant is a roughly rectangular building. Presently, only the reinforced concrete floors and walls remain, the corrugated metal on both walls and roof having been stripped in 1926. Originally, the building had extensive

¹ George Young. "New Treatment Plant of United Comstock Mines Company," *Engineering and Mining Journal* 114 (1922): 847.

horizontal bands of steel-sash windows, corrugated steel siding, and corrugated steel gable roof. The building was three stories tall with a basement and two small penthouses with hipped roofs that housed motors for four bucket elevators on the southwest side. Ore silos were located on the northeast side. The unadorned, functional nature of the building with long rows of horizontally oriented windows and siding classify the building as a very early example of the International Style.

- 2. Condition of Fabric:** The Fine Grinding and Concentration Plant is presently in near ruins. Time and vandalism have played their part. However, as part of salvage efforts soon after the mill's close in 1926, all machinery and metal was removed from site. This included the ball mills, classifiers, launders, bucket elevators, steel structural members, roof materials and even any useable wood. All that remains are the decaying foundations and reinforced concrete walls.

B. Description of Exterior

- 1. Overall Dimensions:** Approximately 240' long and 89' wide. Height from foundation to original metal roof was approximately 83'.
- 2. Foundations:** Reinforced concrete.
- 3. Walls:** Presently, reinforced concrete walls and structural members, corrugated steel siding prior to salvage efforts in 1926.
- 4. Structural System, Framing:** Reinforced concrete frame.
- 5. Openings:** Original openings consisted of continuous bands of Fenestra steel sash windows supported by reinforced concrete frame.

C. Description of Interior

- 1. Floor Plan:** The building is basically three stories tall with a basement. The southwest side of the building has two elevator shafts that housed four bucket elevators that ran the height of the building. Two small penthouses

with hipped roofs housed motors for the elevators. The northeast side of the building is comprised of 3,200 ton capacity concrete receiving bins or silos. A one-story, shed roofed section for housing additional machinery is located on the exterior side of the receiving bins. The center aisle of the building is open for two stories. This area still has its concrete bases for the ball mills. The southwest side of the building contains the basement and stairways to upper and lower levels. There is a partial floor above the central two-story ball mill room.

2. **Flooring:** Reinforced concrete.
3. **Wall and Ceiling Finish:** None.
4. **Openings:** Since the steel walls and windows have been removed, the building walls have no openings as such, but consist of a matrix of reinforced concrete posts and beams. Floor openings consist of holes for the movement of ore through the various stages of crushing and grading.
5. **Conveyors:** All conveyors were removed during salvage in 1926. A 30" wide belt conveyor brought ore from the Coarse Crushing Plant up to the receiving bins in the Fine Grinding and Concentration Plant. Five 24" wide belts conveyed ore to the classifiers and ball mills.
6. **Elevators:** Two elevator shafts with a total rise of 65'. Each elevator had one bucket elevator powered by a 30 horsepower motor and 30" belt connected to a Fawcus herringbone gear reducer that reduced the speed from 900 to 26 revolutions per minute.²
7. **Machinery:** All machinery has been removed, but the building originally housed ten 56" Akins classifiers for primary wash to remove soluble salts, six 7' x 6' Allis Chalmers ball mills, each connected to herringbone gears to a 150 horsepower motor, one 5' x 12' ball peb mill for

² Walter L. Reid "Design and Construction of United Comstock Mills," *Mining and Metallurgy* 191 (1922): 44-47.

regrinding concentrate, one 3' x 6' ball mill for grinding lime, two Dorr classifiers, two 25' Dorr bowl classifiers and 30" feeder belt conveyors to transmit ore to the classifiers and mills. A 20-ton crane was attached to a rail above the ball mills and ran from the machine shop at the Coarse Crushing Plant, over the supply yard and into the Fine Grinding and Concentration Plant. This crane was at right angles to the crane at the Coarse Crushing Plant to facilitate a direct link between the two buildings.

The bucket elevators brought oversized ore from the Dorr bowl classifiers to the upper level of the building which contained 32 Deister Machine Company Plat-o tables that made a concentrate of the ore for further sorting and grinding.³

D. Site Layout

The Fine Grinding and Concentration Plant is oriented northwest to southeast. It is located directly southeast of the Coarse Crushing Plant and was originally connected to it by a belt conveyor system supported by reinforced concrete block frame which is mostly in ruins.

Part III. Operations and Process

Mine ore was delivered from the Coarse Crushing Plant to the silos of the Fine Grinding and Concentration Plant via a 30" belt conveyor. The ore traveled through one of ten 56" Akins classifiers for primary wash to remove soluble salts. Resulting primary slime was separated from the sand and sent directly to the thickeners at the Cyanide Plant where aluminum sulfate and magnesium sulfate were used to dissolve out the ore. The remaining sand was then to five 7' x 6' Allis Chalmers ball mills for further crushing, sent through the bowl classifiers, washed, and the secondary slime was sent to the thickeners at the Cyanide Plant. The de-slimes product was then sent up one of two 65' high bucket elevators to the table concentrators where the ore was mixed with a strong cyanide solution creating a concentrate. This concentrate was classified in the Akins classifiers and sent back to a 5' x 12' ball peb mill for re-grinding the concentrate and a 3' x 6' ball mill ground lime to

3 Walter L. Reid "Design and Construction of United Comstock Mills," *Mining and Metallurgy* 191 (1922): 44-47.

add to the concentrate. Two Dorr bowl classifiers then separated ore to be re-ground in the middling ball mills. The resulting product was sent through underground conveyor tunnels to the Cyanide Plant.⁴

PART IV. SOURCES OF INFORMATION

A. Architectural Drawings

Selected drawings depicting process flow charts, plans and sections of buildings at the mill may be found in: George Young, "New Treatment Plant of United Comstock Mines," *Engineering and Mining Journal* 114 (1922): 846-853.

B. Early Views

Early views of the American Flat Mill are available from the Nevada Historical Society, Special Collections and University Archives Photographs at the University of Nevada, Reno. The views during operation range in date from approximately 1922 to 1926, with some later views dating from the 1940s and 1950s, representing a total of 86 views. An additional private collection owned by Mr. Joseph Curtis of Virginia City represents approximately 50 views of the mill during its operating years. Some unique views of the building and its machinery may be found in George Young, "New Treatment Plant of United Comstock Mines," *Engineering and Mining Journal* 114 (1922): 846-853. One aerial view of the mill ruins from 1947 is available from the University of California, Davis, in the Eastman's Originals Collection, Department of Special Collections, General Library.

C. Interviews

Glass, M. Royce Aller Hardy: *Reminiscence and a Short Autobiography*. Oral History Program, University of Nevada, Reno, 1965.

4 A. J. Weinig, "A General Study of United Comstock Metallurgy," *Papers Related to the Geology, Mining, Metallurgy and Milling of the Comstock Orebodies of the United Comstock Mines Company*, (San Francisco: American Institute of Mining and Metallurgical Engineers, 1922): n.p.

D. Selected Sources

- Bray, John L. *The Principles of Metallurgy*. Boston: Ginn and Company, The Athenaeum Press, 1929.
- Gavazzi, I., and R. Kendall. *American Flat: Stepchild of the Comstock*, Virginia City, Nevada: Mark Twain Bookstore, 2001.
- Goin, P., and E. Raymond. *Changing Mines in America*. Santa Fe, New Mexico: The Center for American Places, 2004.
- Hamilton, E. M. *Manual of Cyanidation*. New York: McGraw-Hill Book Company Inc., 1920.
- Hardesty, D. *National Register Evaluation of the East Yellow Jacket Mine and the American Flat Mill Sites, Storey County, Nevada*. Report prepared by University of Nevada, Reno. Submitted to Bureau of Land Management, Carson City Field Office, 1998.
- Kendall, Robert E. "American Flat: Stepchild of the Comstock Lode - Part II," *Nevada Historical Society Quarterly* 41(2): 1998.
- Lincoln, Francis Church. *Mining Districts and Mineral Resources of Nevada*. Reno: Nevada Newsletter Publishing Company, 1923.
- Morse Brothers Machinery and Supply Company. "Mining and Milling Machinery of The Comstock Merger Mines and Mills at Virginia City, Nevada" Catalog by the Morse Brothers Machinery and Supply Company, Denver, Virginia City, Reno, ca. 1927. Located in the Special Collections and University Archives, University of Nevada, Reno.
- Reid, Walter L. "Design and Construction of United Comstock Mills," *Mining and Metallurgy* 191 (1922): 44-47.
- Weinig, A. J. "A General Study of United Comstock Metallurgy," in *Papers Related to the Geology, Mining, Metallurgy and Milling of the Comstock Orebodies of the United Comstock Mines Company*, San Francisco: American Institute of Mining and Metallurgical Engineers, 1922.
- Young, George. "New Treatment Plant of United Comstock Mines Company," in *Engineering and Mining Journal* 114 (1922): 846-853.

Zeier, Charles, Michael Drews and Ron Reno. "An Architectural and Archaeological Inventory of the American Flat Mill, Storey County, Nevada." Clinton, Tennessee: Zeier and Associates, 2009.

E. Likely Sources Not Yet Investigated

Newspaper clippings on file at the Nevada Historical Society,
Subject Card Index: "American Flat".