Nunn Hydroelectric Plant
On the Madison River
Vicinity of Ennis
Madison County
Montana

HAER No. MT-87

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29-ENNIS.V,
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PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
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NUNN HYDROELECTRIC PLANT

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I. INTRODUCTION

Location:	On the Madison River, approximately ten (10) miles northeast of Ennis, Montana in Township 45, Range 1E, Section 20, SW¼, NW¼, NE¼
Quadrangle:	USGS Ennis Lake
UTM:	Zone 12 450265 Easting 50345460 Northing
Original Construction:	1900 - 1901
Major Modifications:	1908 - 1909, Hydraulic Power System
	Post 1925 - removal of all hydraulic power and electric generation systems
Present Owner:	The Montana Power Company 40 East Broadway Butte, Montana 59701
Present Use:	Warehouse
Significance:	The Nunn Plant is significant for its association with the early electrification of mining in Butte, Montana and early hydroelectric development generally in Montana. It is also significant for its association with Lucius Lucien Nunn, an early twentieth century developer of hydroelectric systems, primarily in the western United States.
Historians:	Frederic L. Quivik, 1988 James J. Shive, 1990

II. HISTORICAL NARRATIVE AND DESCRIPTIVE DATA

A. Statement of Significance

The Nunn Hydroelectric Plant is significant under Criterion A for its association with the electrification of the mining industry in Butte, Montana, in the early 20th century. The electrification of mining operations permitted significant reductions in energy costs, the savings from which could be reinvested in expansion. John D. Ryan, a leader in the mining and utility industries of this period, writing in circa 1908 (as reported in Kirk, n.d.: 95) noted that:

> The cost of steam power at Butte and Anaconda (Montana...varied from $66...to $150 a horsepower year...the average...not less than $90 a horsepower year. you can readily see (that) if the Mining Companies (sic) had to continue to use steam power they not only would be tremendously affected in the matter of costs, but the inconvenience in the use of steam power as compared with electric power in the operations would have added greatly to the operation difficulties.

Quivik writes that the copper industry of Butte, Montana, was the largest industry in the state at the turn of the century. Continuing expansion of the industry through the late 19th and early 20th century created an increasing demand for energy resources. The Nunn Plant and other hydroelectric plants like it were investment capital enterprises aimed at meeting this demand.

The Nunn Plant represents a period in history of hydroelectric development that Duncan Hay calls the era of innovation and experimentation. Many early hydroelectric plants were well known throughout the industry due to their size or specific technological experimentation, innovation or adaptation. Many other plants, like the Nunn Plant, were relatively small operations aimed at exploring utility production possibilities, and using relatively simple technological systems. It is this process of technical innovation and experimentation, coupled with venture capital experimentation in plants like Nunn, which would contribute to relative technological standardization and the economic growth of the hydroelectric industry during the 1920's and 1930's.

The Nunn Plant is also significant for its association with Lucius Lucien Nunn (1853-1925). His entry into the hydroelectric industry came in 1891 when he supervised development of a hydroelectric plant on the Howards Fork Branch of the San Miguel River, near Ames, Colorado, and the first alternating current electric transmission line in the western United States. This line connected the Howards Fork Plant with the ore stamping mill of the Gold King Mine, outside Ames, Colorado. After this initial success, Nunn and others formed the Telluride Power Company and managed the construction of hydroelectric plants in both Colorado and Utah between 1892 and 1897, and elsewhere in the United States in later years. His primary talents and contributions were as a manager and entrepreneurial capitalist. One of his most noted projects was involvement in the design and construction of the second hydroelectric plant constructed at Niagara Falls, for the Ontario Power Company, between 1902 and 1910 (Quivik, 1988: 11 and Hay, 1987).

L. L. Nunn's association with hydroelectric development on the Madison River in Montana begins in 1895, when he completed an agreement with the Phoenix Electric Company (PEC) of Butte. The agreement transferred PEC's Madison River water rights to Nunn and permitted him use of the PEC corporate franchise. In exchange, PEC would receive one percent of all business developed by the Madison operations and a guarantee that electric power from it would be sold to PEC for $200.00/kilowatt/year. Initial explorations for a development site began almost immediately thereafter. However, in 1898, apparently short of capital to continue the venture, Nunn and several other Colorado investors formed The Power Company (TPC). An investor in, and President of TPC was James Campbell, President of Gold King Mining Company of Colorado. It was for Campbell's company that Nunn had managed the Howards Fork development in 1891.

Recapitalized from TPC, Nunn supervised and managed construction of the original Madison development in 1900-1901. After its completion, he supervised and managed the operation of the Madison development and the business of TPC in dealings with PEC, and its successor company, Butte Electric and Power (BE&P). Nunn supervised the 1901-1904 acquisition of additional water rights on the Madison River and lands in the Madison Valley north of Ennis, Montana for a reservoir site. Further, he supervised the opening phases of construction of the second Madison Dam and powerhouse. Nunn's association with the Madison development generally ended with the 1905 acquisition of TPC by BE&P. However, his involvement in the hydroelectric industry continued through his work with the Telluride Power Company in Colorado. Also, Nunn financed advanced engineering education facilities at Cornell University and in 1917-1918 established the engineering school at Deep Springs, California. It is probable that although the engineering design of the Nunn Plant has been diminished by renovations; L. L. Nunn would still recognize the facility with which he had direct and significant associations as a capitalist and manager.

B. Location Information

The Nunn Hydroelectric Plant is located in Madison County, approximately 10 miles northeast of Ennis, Montana; in Township 45, Range 1E, Section 20, SW1/4, NW1/4, NE1/4 (Figure 1). The center-point, UTM location for the plant is:

Zone	Easting	Northing
_1|_2	_4|_5|_0|_2|_6|_5	_5|_0|_3|_5|_4|_6|_0

The plant structure and tailrace area encompasses approximately 0.5 acres. The setting of the Nunn Plant consists of both natural and man-made features. To the east and west of the plant rise the gneiss and schist walls of the Madison River Canyon. Overstory vegetation on the slopes of the canyon consists of mixed evergreens, primarily Douglas fir. Understory on the canyon slopes consists primarily of mixed grasses with scattered, low shrubs. Vegetation at the plant is generally restricted to grass growing over the footings of the standpipes in the Water Turbine Section.

The plant is situated on what appears to be at least a partially man-made bench, cut from and/or terraced in places along the Madison River bank. On the east side, lies the Madison Canyon Road, and directly above that, the existing water flow-line from Madison Dam to Madison No. 2 powerhouse. On the west side is the Madison River. To the north lies a man-made terrace of piled stone and formed concrete. In part this terrace was constructed as site preparation for the Nunn Plant. To the south lies the wooden bridge crossing the existing flow-line.

Taken together, these natural and man-made features demonstrate the industrial function of the plant and the processes of site modification necessary to construct it. The current setting contributes to the recognition of associative qualities. Setting is ranked sixth inasmuch as it contributes to recognition of associative values, but is not essential to that recognition.

The plant consists of two sections.

C. Powerhouse Section: Physical Description

This section of the plant consists of a single story, 40 feet x 90 feet structure built in 1900-1901. The walls are of rubble masonry construction, surmounted by steel trusses supporting a gable roof. The gable ends are wood frame, covered in vertical wood siding. The original floor of the structure is reported to have been of wood and the foundations for generators and electric switchboard being concrete. The current floor is a concrete slab. The north wall contains a conventional four panelled wooden door, two, 2/2 double hung wood sash windows and a metal, overhead-type garage door installed in 1989. The east wall contains a conventional door and four other openings with paired, double hung wood sash. The west wall contains a conventional door and at each end, a single 2/2 double hung, wood sash window. Also on the west wall are the openings for turbine shafts from the water turbine section of the plant, now boarded over. The south wall contains a track-mounted, laterally-sliding garage type door, not original to the structure.

The powerhouse historically contained two, 1,000 kilowatt, 1,500 volt, General Electric Company generators and all electric governance and transmission equipment. Presently, the only equipment in the plant is a 20,000 pound overhead crane, manufactured by the Whiting Foundry of Chicago, Illinois, and a mortise and tenon framework suspended from the ceiling, which once carried electrical transmission equipment. During operation, transmission lines exited the structure through the south gable. No lines are present today. (Quivik, 1988: 13-14 and 34-35).

D. Water Turbine Section: Physical Description

This section of the plant originally consisted of a two section, rectangular, wooden penstock structure, each section containing a single, 50-inch diameter, 1,300 horsepower Leffel-Sampson water turbine. Water was supplied to the penstock by means of a wooden box flume from the Madison Dam. Turbine shafts exited the east side of the penstock sections, entering the west wall of the powerhouse section, and were directly connected to the generators by flexible couplings. The penstock, turbines and wooden box flume are no longer present.

The wooden penstock was replaced in the 1908-1909 renovation of the hydraulic system. It was replaced by two circular steel standpipes, each 25 feet in diameter. They were originally mounted inside a concrete curb, surmounting a vaulted, concrete foundation approximately 25 feet above the bedrock on which they were constructed and approximately 16 feet above river level. Centered in each standpipe were openings to the concrete foundation, fitted with steel draft tubes, permitting the discharge of water to the plant raceway under the vaulted foundation. The curbing and vaulted foundation are still in place. The standpipes are no longer extant. The draft tubes are submerged in the discharge raceway.

Twenty-five feet west and parallel to west wall of the standpipe foundation is a stone foundation wall with a slotted concrete cap slab. This wall apparently supported the west side of a structure spanning an overflow water channel between this wall and the west wall of the standpipe foundations. A piled-stone wing wall extends downstream of the west wall of the overflow channel (Quivik. 1988: 13-14 and 34-35).

III. PROJECT INFORMATION

The Montana Power Company (MPC) filed an application with U.S. Army Corps of Engineers, Omaha District (COE) for a permit authorizing work to relocate approximately 200 linear feet of the Madison Canyon road at the Nunn Hydroelectric Plan (Nunn Plant), Madison County, Montana. Relocation of the road was necessitated by replacement of the flowline from the Madison Dam to Madison Hydroelectric Generating Plant. Replacement of the flowline was necessitated by collapse of a section of the flowline in a rock slide on March 8, 1990.

The application for permit was reviewed by the COE and the Montana State Historic Preservation Officer under the provisions of Section 106 of the National Historic Preservation Act of 1966 and 36 CFR 800. MPC prepared an inventory and assessment of the Nunn Hydroelectric Plant for listing in the National Register of Historic Places (NRHP); as assessment of adverse effect to the Nunn Plant as a result of the proposed undertaking, and a management plan addressing adverse effect to the setting of the Nunn Plant. Documentation of the Nunn Plant setting was chosen as the treatment of effect.

IV. REFERENCES CITED

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