COLORADO HISTORICAL SOCIETY

COLORADO STATE REGISTER OF HISTORIC PROPERTIES NOMINATION FORM

SECTION I

Name of Property

Historic Name NOTTINGHAM POWER PLANT

Other Names

Address of Property [ ] address not for publication

Street Address NORTH BANK OF THE EAGLE RIVER

City AVON County EAGLE Zip 81620

Present Owner of Property
(for multiple ownership, list the names and addresses of each owner on one or more continuation sheets)

Name TOWN OF AVON

Address P.O. BOX 975 Phone 970 / 748-4000

City AVON State CO Zip 81620

Owner Consent for Nomination
(attach signed consent from each owner of property - see attached form)

Preparer of Nomination

Name RON SLADEK, PRESIDENT Date 8 AUGUST 2006
(for the property owner)

Organization TATANKA HISTORICAL ASSOCIATES, INC.

Address P.O. BOX 1909 Phone 970 / 221-1095

City FORT COLLINS State CO Zip 80522

FOR OFFICIAL USE: Site Number 5EA.2371

_____ Nomination Received Senate # _____ House # _____

__11/17/2007_ Review Board Recommendation
_X_Approval ____Denial

__11/30/2007_CHS Board State Register Listing
__X_Approved ____Denied

Certification of Listing: President, Colorado Historical Society Date

COLORADO STATE REGISTER OF HISTORIC PROPERTIES

Property Name NOTTINGHAM POWER PLANT

SECTION II

Local Historic Designation

Has the property received local historic designation?

[X] no

[ ] yes --- [ ] individually designated [ ] designated as part of a historic district

Date designated _____

Designated by _____ (Name of municipality or county)

Use of Property

Historic INDUSTRY / ENERGY FACILITY

Current VACANT / NOT IN USE

Original Owner EMMETT AND MYRTLE NOTTINGHAM

Source of Information *EAGLE VALLEY ENTERPRISE*, 11 DECEMBER 1980, P. 17

Year of Construction 1928

Source of Information *EAGLE VALLEY ENTERPRISE*, 11 DECEMBER 1980, P. 17

Architect, Builder, Engineer, Artist or Designer EMMETT AND MYRTLE NOTTINGHAM

Source of Information *EAGLE VALLEY ENTERPRISE*, 11 DECEMBER 1980, P. 17

Locational Status

[X] Original location of structure(s)

[ ] Structure(s) moved to current location

Date of move _____

SECTION III

Description and Alterations

(describe the current and original appearance of the property and any alterations on one or more continuation sheets)

COLORADO STATE REGISTER OF HISTORIC PROPERTIES

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SECTION IV

Significance of Property

Nomination Criteria

[ ] **A** - property is associated with events that have made a significant contribution to history

[ ] **B** - property is connected with persons significant in history

[ ] **C** - property has distinctive characteristics of a type, period, method of construction or artisan

[ ] **D** - property is of geographic importance

[**X**] **E** - property contains the possibility of important discoveries related to prehistory or history

Areas of Significance

[ ] Agriculture
[ ] Architecture
[ ] Archaeology – prehistoric
[ ] Archaeology – historic
[ ] Art
[ ] Commerce
[ ] Communications
[ ] Community Planning and Development
[ ] Conservation
[ ] Economics
[ ] Education
[**X**] Engineering
[ ] Entertainment/ Recreation
[ ] Ethnic Heritage
[ ] Exploration/ Settlement
[ ] Geography/ Community Identity
[ ] Health/Medicine
[ ] Industry
[ ] Invention
[ ] Landscape Architecture
[ ] Law
[ ] Literature
[ ] Military
[ ] Performing Arts
[ ] Politics/ Government
[ ] Religion
[ ] Science
[ ] Social History
[ ] Transportation

Significance Statement
(explain the significance of the property on one or more continuation sheets)

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

SECTION V

Locational Information

Lot(s) TRACT C Block ____ Addition NOTTINGHAM STATION PUD, AMENDMENT #2

USGS Topographic Quad Map EDWARDS 7.5' (1962, PHOTOREVISED 1987)

Verbal Boundary Description of Nominated Property
(describe the boundaries of the nominated property on a continuation sheet)

COLORADO STATE REGISTER OF HISTORIC PROPERTIES

Property Name NOTTINGHAM POWER PLANT

SECTION VI

Photograph Log for Black and White Photographs
(prepare a photograph log on one or more continuation sheets)

SECTION VII

ADDITIONAL MATERIALS TO ACCOMPANY NOMINATION

Owner Consent Form

Black and White Photographs

Color Prints or Digital Images

Sketch Map(s)

Photocopy of USGS Map Section

Optional Materials

Use of Nomination Materials
Upon submission to the Office of Archaeology and Historic Preservation, all nomination forms and supporting materials become public records pursuant to CRS Title 24, and may be accessed, copied, and used for personal or commercial purposes in accordance with state law unless otherwise specifically exempted. The Colorado Historical Society may reproduce, publish, display, perform, prepare derivative works or otherwise use the nomination materials for Society and/or State Register

For Office Use Only

Property Type: [ ] building(s) [ ] district [ ] site [x] structure [ ] object [ ] area

Architectural Style/Engineering Type: No Style

Period of Significance: 1928-1942

Level of Significance: [X] Local [ ] State [ ] National

Acreage less than one

P.M. 6th Township 5S Range 82W Section 12 Quarter Sections NE, NW, NW SE

UTM Reference: Zone 13 Easting 369594 Northing 4387712

Site Elevation: 7380 feet
The UTMS were derived from heads up digitization on Digital Raster Graphic (DRG) maps provided to OAHP by the U.S. Bureau of Land Management.

Property Name NOTTINGHAM POWER PLANT

DESCRIPTION and ALTERATIONS

Current Setting and Use

The 1928 Nottingham Power Plant is located along the north bank of the Eagle River in the Town of Avon, Eagle County, just south of Eaglebend Dr. and east of Avon Rd. Adjacent to and on the floodplain of the river, at an elevation of 7,380 ft. above sea level, the site is tucked behind and below the modern Canyon Run Condominiums. On the property are the ruins of the power plant, together with surrounding grounds that contain numerous remnants of its associated features. Although located adjacent to the condominium complex, the site is owned by the Town of Avon. ***(Figure 1)***

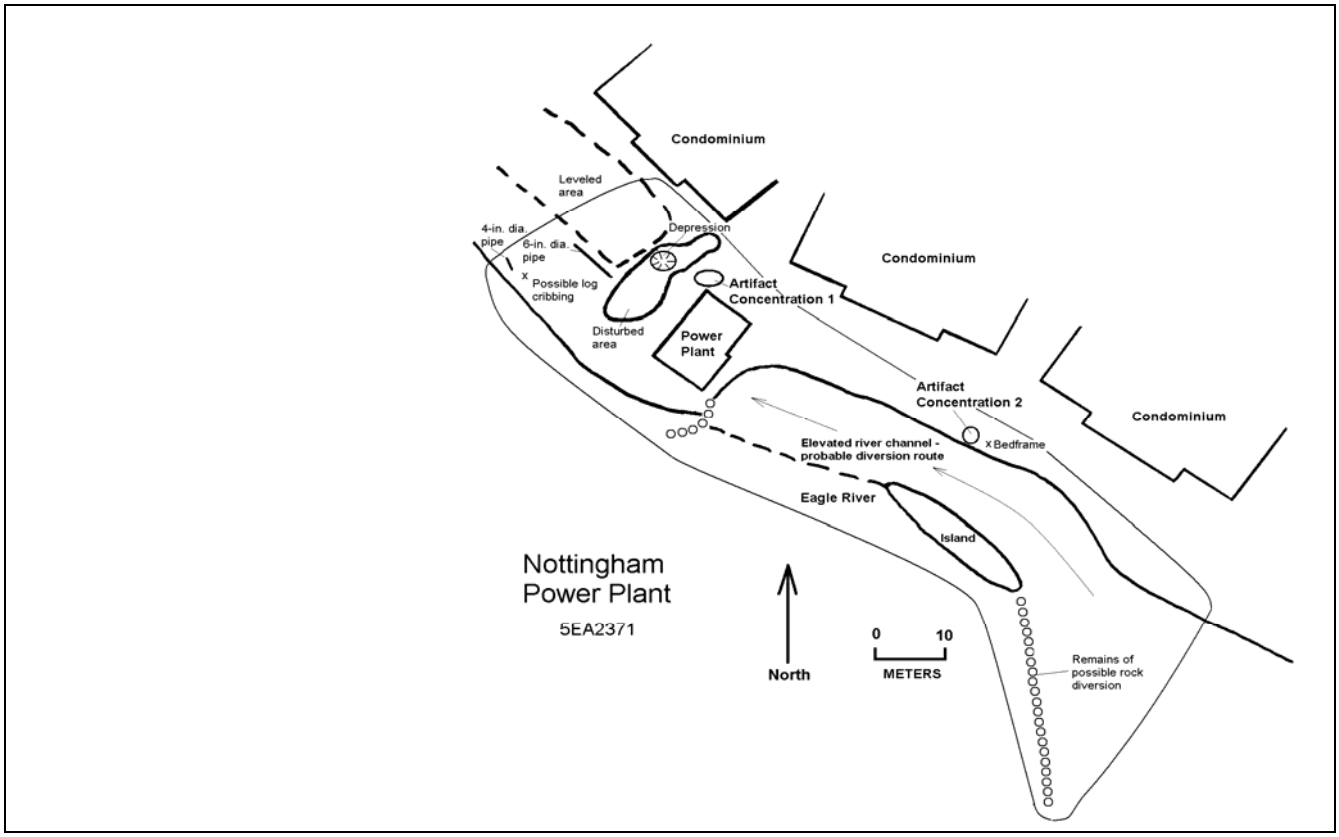
North of the power plant are condominium units surrounded by lawns and urban plantings. Disturbed grounds surround the power plant, particularly to the west and northwest, and additional historic features related to the plant and former ranch operations are found along the riverbank both upstream and downstream from the ruins of the facility. An elevated flat area of ground slightly farther to the northwest marks the previous location of a log barn constructed by the Nottingham family. The Nottingham ranch house and other outbuildings historically sat where the condominiums are found today. To the east along the riverbank is the former head race that provided river water to the plant.

Description of the Resource

The remains of the Nottingham Power Plant are located along the north bank of the Eagle River about 40' below the Canyon Run Condominiums in Avon. ***(Figure 2)*** Found on the site today are the partial walls and floor of an 18' x 32' (generally north-south) wood frame structure that contains a large wooden water wheel along with the metal shafts, gears, and other equipment that made up this former hydropower plant. The wheel was powered by water that, after being diverted into a channel about 100 yards upstream, passed beneath the south end of the structure where the water wheel was mounted. Constructed of rock and timber, the diversion generally washed out with high water and had to be rebuilt annually. Today the channel is evident as a slightly elevated, 30'-wide portion of the north edge of the river. The diversion currently appears as an alignment of boulders extending diagonally upstream into the river from a small island that may be a remnant of the river-side wall of the channel. Upon reaching the power plant, the channel terminates abruptly at the blocked intake to the waterwheel. This intake is flanked by a stone retaining wall, where the channel turns southward to rejoin the main body of the river.

Just east of the waterwheel, the 8'-wide raceway intake is blocked by 6 feet of soil, rocks and vegetation that have naturally accumulated against upright pieces of railroad rail placed across the intake opening. These rails served as a grizzly, or screen, designed to prevent large pieces of ice, driftwood and other debris from reaching the waterwheel. The four upright sections of standard gauge rail, marked "1917 OH" (indicating they were manufactured that year), were spaced at 2' intervals across the intake opening. A concrete block is located on the south side of the intake opening, also serving to stabilize the structure. This block is 3' wide, at least 2½' tall, and is buried by mud and rock on its east end. A stone retaining wall flares southward from the concrete block into the river channel. That this is a manmade retaining wall is indicated by the incorporation of a wagon axle along with metal wagon bed mounting hardware into the rockwork.

Property Name NOTTINGHAM POWER PLANT



Site Plan
Figure 1

Assessment of the woodwork on the site shows that the power plant was constructed of a combination of Douglas-fir, spruce, and red oak. These are present in the form of round posts, squared timbers, and dimension lumber. While the spruce would have been locally available, the Douglas-fir timbers and red oak had to have been imported from outside the Eagle River valley. Only the north and west walls of the power plant remain partly standing. These are leaning heavily inward and have been braced recently to keep them from collapsing completely. The east wall has fallen onto the ground to the east and the south wall is represented only by board remnants scattered along the river bank.

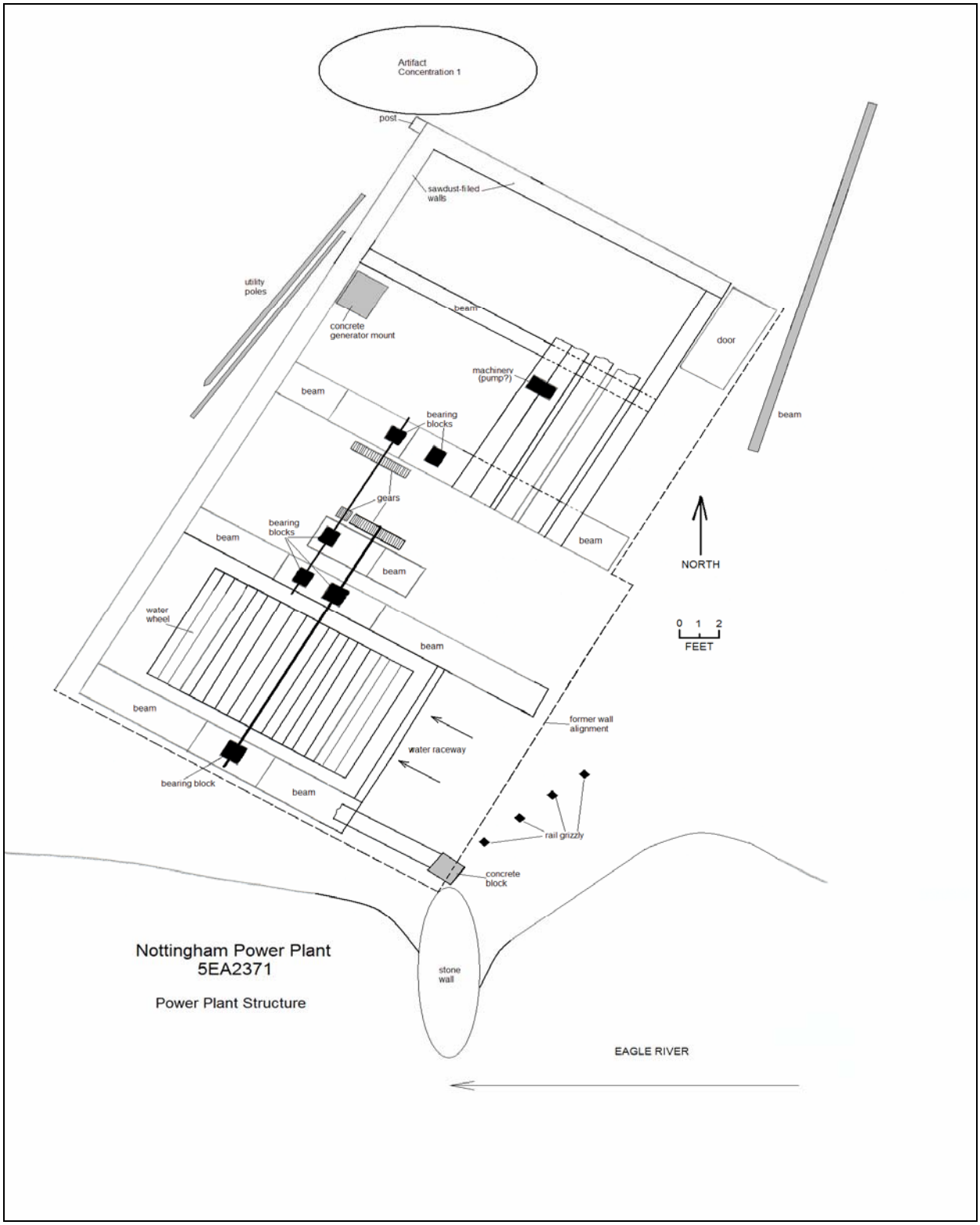
The 12”-thick, 7’-tall walls were constructed of horizontal 1” x 10” boards nailed to the inside of upright board and post supports. The interior space of the walls was kept open with 1” x 10” board spacers and filled with sawdust for insulation. Uprights along the north wall are 2” x 4” boards and on the west wall are alternating 2” x 6” boards and 8”-diameter log posts spaced at irregular intervals 3’ to 4’ apart. The inside and outside upright supports are paired and wired to each other through the walls. Additional support was provided by 7” x 8” posts at the corners. The walls are not set on any sort of sill or foundation, but may have been lined at the base by logs on the interior, to which the wall bases may have been attached. No roof remains on the structure, although remnants of rafters along the top of the north wall suggest that a low-sloped gabled or hipped roof was present. The historic presence of this type of roof was confirmed through interviews with family members combined with an interior photograph from around 1980 that shows a segment of the roofline along the north side of the waterwheel.

The power plant apparently had no windows, a fact confirmed through interviews with family members. At the northeast corner of the structure was the north-facing entry door, although today it is found lying on the ground where it fell. This is a 32"-wide, 6'-tall, 6"-thick horizontal board door that is likely to have also been filled with sawdust. It was originally attached to the structure with large iron strap hinges and held closed by pivoting pieces of wood mounted on the adjacent wall. On the ground immediately east of the door is a 23'-long, 5" x 8" beam that appears to have been a structural element. Attached to one side of the beam is fabric-covered electrical wire connected to a duplex outlet and a single-bulb light fixture, both made of tan Bakelite. Fallen outside the plant's west wall are two 6"-diameter utility poles that were originally at least 14' tall. One has two 4"-wide notches near the top for the attachment of cross arms. However, rather than cross arms, two wooden insulator brackets were attached directly to the pole. The second pole has a single piece of heavy galvanized wire attached to its length that served as a ground wire. These two utility poles were found along the opposite side of the wall from where the generator mount is located inside the structure.

The water wheel, 6' wide and 12' in diameter, is mounted parallel to the east-west course of the river within the south end of the plant. At the core of the wheel are two 64"-diameter, cast-iron, six-spoke sheave wheels that are each 3" wide at the rim. These have split hubs that bolt together around a 4"-diameter steel shaft on which the waterwheel rotated. Wooden spokes are bolted to the iron sheaves, radiating outward from their hubs. Each side of the wheel has 24 spokes made of 2¼" x 3" pieces of wood and the outer ends of these spokes support the paddles. The 32"-tall paddles run the full width of the water wheel and consist of three boards: two 1" x 6" boards on the outer edge and one 1½" x 11½" board on the inside. Evidently, the smaller boards on the outer edges were used to facilitate replacement should a paddle be damaged. Full-sized 2" x 4" board spacers support the spokes slightly within the wheel from the paddles. At one time the spokes of the south metal sheave wheel tore away from the hub. This was repaired by bolting various lengths of steel bars to the spokes around the hub.
A 6"-diameter log extends across the raceway between the side walls on the intake side of the wheel. The log is braced by three pieces of steel rebar, one round iron rod, and an octagonal length of drill steel driven into the channel. These are attached to the log by rectangular brackets. A second log was evidently mounted above this lower log by sheet metal brackets attached to boards that extended beyond the raceway side walls. This upper log is still present, but out of place. It has several regularly-spaced bolts projecting from its sides, including one with a length of chain attached. Rotary wear marks on the log suggest that it could be turned and perhaps functioned as a shaft by which a gate hanging below could be raised or lowered to regulate water flow through the raceway to the wheel. This mechanism may also have been designed to block the flow completely when repairs to the wheel were necessary.

The 4"-diameter solid steel shaft through the waterwheel extends 27" beyond the wheel to the south and 56" to the north, where it terminates in a large gear. Heavy pillow blocks support the wheel over the raceway by its shaft on either side of the wheel. The bearing blocks are mounted on two layers of 9" x 18" beams, the lower of which on the south side runs the full width of the structure. The water wheel was leveled by setting the north bearing block into a notch in the beam. Below the beams are two courses of 8"- to 10"-diameter logs on both sides of the raceway. The weight of the wheel and backfill pressure exerted by soil to the north has pushed the logs lining the north side into the raceway and against the side of the water wheel. This caused the support beams on the north side to drop several inches, tilting the waterwheel northward. The logs on the south side of the raceway are adjacent to rock fill and have not been subject to the same loss of stability.

Property Name NOTTINGHAM POWER PLANT



Power Plant Layout
Figure 2

The large gear on the north end of the waterwheel shaft is 33" in diameter and 3¼" wide at its outer edge. It is a keyed cast iron plain spur gear with 73 teeth that are 1" deep and it is marked on the side with "V34." This gear engaged a 7"-diameter, 5"-wide cast iron plain spur gear on its west side that is keyed onto and turned a 10'-long, 2½"-diameter solid steel shaft. The shaft is 63" on center west of the 4"-diameter shaft from the water wheel, and it is supported on its south side by two pillow block bearings set on timber beams. The bearing block on the south end is on the same timber base that supports the north end of the water wheel. The second bearing block is mounted on two stacked 9" x 18" beams that also pass beneath the water wheel shaft but are not attached to it. Near the north end of the shaft is a 38"-diameter cast iron plain spur gear that is keyed onto the shaft. This gear is 4¼" wide with 76 teeth that are 1" deep. After passing through the gear, the shaft is mounted in a pillow block bearing attached to stacked 9" x 20" beams, the lower of which runs the width of the plant. This large gear contacted another small gear that turned another shaft. While the small gear and shaft are no longer in place, the pillow bearing block that held the shaft remains there. This bearing block shows that the 2½"-diameter shaft would have been 20" on center from the shaft of the large gear. This means that the gear on the shaft would have been 5" in diameter with 1"-deep teeth to mesh with the larger gear.

It is presumed that the smallest shaft and gear extended northward across the floor in the northern area of the structure and was mounted on another bearing block. An identical bearing block is present near the north wall, but it is no longer attached to the plank support. It may be important to note that the bearing blocks for this shaft are different from those on the others and are the only ones with manufacturer's marks. They are labeled "MEESE & GOTTFRIED / 2½ / SAN FRANCISCO." Meese & Gottfried were engineers and manufacturers of mechanical equipment in San Francisco from 1880 to the 1920s. It is possible that the different bearing blocks indicate a change of equipment from what was originally installed in the plant. This seems to correlate with the alteration of the plant from AC to DC power after it was constructed.

An earthen pit is found below the northern portion of the plant. This feature is 6' x 18', oriented east to west, and 6' south of the north wall. The pit is 3' deep and lined along the north side by logs, on top of which are two 6" x 8" beams. The south side is lined by the 8" x 20" plank to which the second shaft and isolated bearing cap are attached. A 22" x 28" concrete base, at least 16" tall, was poured in place along the west edge of the pit adjacent to the west wall. On top of the concrete are layers of 2" x 4" and 2" x 6" boards forming a machinery mount. The boards are grease covered and have one upright mounting bolt evident. This was likely the mount for the electrical generator, as it would be of the proper size and two electrical wires are attached to the wall above with their connector ends hanging down.

The eastern portion of the pit is covered by 3" x 12" and 4" x 12" planks with spaces between. Mounted on these planks is a partly dismantled piece of equipment that may have been a pump. It has an identification plate that reads "THE HENDRIE & BOLTHOFF MFG & SUPPLY CO. / MACHINERY / DENVER, COLORADO." Hendrie & Bolthoff were one of the largest equipment supply companies in Denver. The machinery has a horizontal hole for a 1½"-diameter shaft on the east side, with two V-belt pulleys on a shaft a few inches farther east. The pulley on one side is 2½" in diameter and the pulley on the other side is 8½" in diameter. Scattered nearby are numerous pieces of 2"-diameter galvanized water pipe with couplers, including a filter/foot valve. This may indicate that an attempt was made to use the water wheel to run a water pump after it ceased being used to run the electrical generator. Another anomalous piece of equipment is an 11¾'.-long, 1½"-diameter solid iron shaft with a gear at its center and ½"-diameter holes 1" from each end for pin connection. The gear is a solid ratchet type marked "0331" that is 6" in diameter, 1¼" wide, with 16 teeth that are ½" deep. The shaft is the same

diameter as the hole in the Hendrie & Bolthoff machinery, but it is unclear how it would have run the machine or how it would have been driven from the other gears off of the waterwheel.

Except for the mechanical pieces of equipment, few other artifacts are in evidence within the structure. Two 50-gallon steel drums are present, one of them within the pit, although these do not have any clear purpose to the function of the plant. Also in the northern portion of the structure are pieces of rubber hose and electrical wire. The hose may be associated with a later operation of a water pump. Also visible in the pit is an irregular rod and bracket framework of unknown function and a flat belt-type steel sheave. The electrical generator has been removed to prevent its being stolen and is in the possession of Maurice Nottingham, who has it stored in a shed adjacent to his home just east of the power plant. It is a small direct current generator produced by the Sethman Electric & Manufacturing Co. of Denver. The generator was rated at 12 to 40 volts, 15 amps, ½ kw, at 1,700 RPMs. The Sethman Electric & Manufacturing Co. was owned by George H. Sethman and was in operation during the 1920s.

The pit below the northern portion of the structure contains at least 25cm of fill and may hold additional items that could help with functional interpretation of the plant. In addition, the presence of this pit raises questions regarding interpretation of the site because this type of feature is sometimes associated with machinery that requires clearance in its rotation. However a power plant this small in size would typically not have required a pit like the one that is present. Clearly it was in place when the concrete machinery mount was poured on its west end, suggesting that the mount was an adaptation to existing conditions. In addition, the irregular plant floor over the eastern portion of the pit is rather makeshift, consisting of planks of different thicknesses and extending irregularly over the sides. This also suggests a convenient adaptation to pre-existing conditions. Although some other use may come to light through future investigation, it is possible that the pit was simply a natural depression or slope along the riverbank, and that the facility was constructed above this feature.

The two bearing brackets marked “Meese & Gottfried” and the discarded bearing block and cap outside suggest that the final shaft extension over the pit for the operation of the generator may have been a new configuration. This may have been required to successfully link to the DC generator when it was installed and to develop the proper RPMs to run the generator at optimum speed. The walls of the power plant were constructed specifically to be insulated with sawdust. Such construction is usually found in situations where it was important to keep the interior cold during warm weather or warm during cold weather. Because a stove part and a galvanized sheet metal stovepipe roof flange hole were found in the structure, it appears likely that keeping the interior warm during cold weather was the intention.

Outside the power plant, at its northwest corner, is a 6’ by 9’ concentration of machinery and other items. ***(Artifact Concentration 1, Figure 2)*** Some, if not all, of these appear to have been associated with the plant. Included among these items are 1½”-diameter threaded iron pipe; a piece of burst 1½”-diameter iron pipe; a long section of 2¼” outside diameter, 1¼” inside diameter rubberized canvas hose with a galvanized clamp on one end; a 6”-long, 4½”-diameter keyed collar for a 2¼”-diameter shaft; a 6”-long bearing cap for a 3”-diameter shaft; a 9”-long bearing pillow block for a 2½”-diameter shaft having a 6” by 17” base and a thrust bracket to one side; a 42”-diameter wooden split pulley with a 6”-wide face and a hub for a 2¼”-diameter shaft; a portion of a 10”-diameter, 9”-wide paper pulley made of layers of durable fiber held in place by wooden pegs; a mostly buried 6”-wide angle iron bracket; a 6”-diameter steel pipe with a threaded end that may be well casing; a 50-gallon drum that contains hardened tar; corrugated sheet metal; and a centrifugal pump marked “AMERICAN.”

The pump is a single-stage, belt-driven, high-pressure pump manufactured by the American Well

Works of Aurora, Illinois. It has a cast iron housing with a 1½"-diameter threaded outlet, was operated by a 4"-diameter, 4¼"-wide flat pulley on a 2'-long, 1¼"-diameter shaft held by a bearing block marked "T 537." A nearly identical pump is illustrated in the 1927-1928 edition of the *Condensed Catalogues of Mechanical Equipment* (American Society of Mechanical Engineers 1927:608). This reportedly was suitable for up to 125 feet of head. Paper pulleys of the type found on the site reportedly reduced belt slippage, decreased belt tension, and transmitted more power than wood or iron pulleys. The presence of the pulleys, bearing block and cap, and pump suggest that a variety of equipment may have been attached to, and driven by, the water wheel over time.

Immediately west of the power plant is an irregularly shaped, heavily disturbed area that is mostly depressed below the surrounding ground level. The area is heavily vegetated with grasses and willows, making it difficult to discern its actual configuration and if it had any functional connection to the power plant. Noted in this area is a section of 6"-diameter steel pipe with a threaded end. This pipe is about 20' long and runs parallel to the river. Immediately below this along the bank of the river, a piece of 4"-diameter iron pipe is partly exposed, as is a small portion of what appears to be log cribbing.

A second artifact concentration ***(Artifact Concentration 2, Figure 1)*** was observed on the river bank about 125 feet upstream. Present there on the surface are cast iron stove parts, an iron bed headframe, and a fragmentary hand-finished purple glass bottle neck. The various unrelated items found in this artifact concentration suggest the presence there of a ranch dump used by the Nottingham family.

Previous Investigations of the Site

Prior to 2005, no archaeological or historical investigations of any kind had been completed into the background or condition of the Nottingham Power Plant. The site has been known locally for decades as a place of historical interest, and appeared periodically in Eagle County newspaper articles and histories. Its notoriety was largely drawn from the facility's association with the Nottinghams, a prominent pioneer ranching family of the area. By 2005, the plant's deteriorating condition was noted by the adjacent condominium residents and members of the Nottingham family. Their concern about its survival spread to the Town of Avon and its newly-appointed Historic Preservation Commission, which in September 2005 obtained a grant and arranged for the completion of an Archaeological Assessment. This study was completed by Ron Sladek of Tatanka Historical Associates Inc., Jonathon Horn of Alpine Archaeological Consultants Inc., and Ron Anthony of Anthony & Associates Inc. The project report was delivered to the Town of Avon and the Colorado Historical Society in May 2006, and portions of this nomination are based upon the results of that study.

SIGNIFICANCE STATEMENT

The 1928 Nottingham Power Plant is one of the few surviving remnants of the pioneer agricultural hamlet of Avon, dating from the period prior to the area's post-1970 transformation into a heavily developed ski resort destination. As such, it is one of the most important historic resources left in Avon. In recognition of this facility's design and construction, and its role as the source of electrical power for both the Nottingham family ranch and the adjacent Avon Depot of the Denver & Rio Grande Railroad, this document seeks to nominate the site for listing in the State Register of Historic Properties.

Because the facility consists of ruins, the Nottingham Power Plant is nominated under Criterion E for the following reasons:

Criterion E – According to Colorado Historical Society guidelines, "When properties contain information that may answer important research questions, those properties may be eligible for nomination under Criterion E. If a site has already yielded information it may still be eligible for nomination if the importance of that information can be documented. The most common sites nominated under Criterion E are prehistoric and historic archaeological sites. However, buildings, structures and objects may also be eligible for their information potential." (*State Register Bulletin: How to Apply the Nomination Criteria*, April 2005, p. 3) In light of these standards, the Nottingham Power Plant is nominated under Criterion E in the area of Engineering for its design and its association with the localized generation of electrical power in remote rural areas of Colorado during the first half of the twentieth century.

Although the facility is in ruins today, the waterwheel (its most defining feature) remains standing, two of its walls and the floor are deteriorated but remain in place, and the structure is occupied and surrounded by numerous artifacts related to its original construction, layout and operation. An archaeological assessment, completed in 2006, documented much about this facility. Historical research, combined with archaeological analysis of both standing features and the surrounding artifacts and surface characteristics, allowed the site to substantially convey its historic significance relative to the context of engineering in early 20th century rural Colorado. Yet even with all that has been learned, the property exhibits the potential to reveal much additional information through the continued study of its artifacts and features.

Although the nominated resource has given up much information to date, it retains the potential to answer the following important research questions through additional archival research and archaeological analysis:

- How did the structure originally fit together and what changes took place during its years of operation?
- How did the machinery in the facility originally interconnect to operate the electrical generator, and how was it later adapted for the change to DC power generation?
- Did the various pieces of machinery lying outside the walls of the structure fit into its operation in some way, and exactly what did they do?
- Are the disturbed grounds to the west of the facility somehow related to its operation?
- How did the waterwheel operate and what controlled the flow of water through the

plant?

- Did the pit beneath the floor serve some purpose or was it simply a natural feature?

- How was it possible for a ranching family with no formal training in engineering to design and construct an operational electrical power plant? Did this require specialized knowledge in electrical and mechanical engineering or was the facility of a type that the average rancher or farmer could have devised and installed by the 1920s?

- Did the Nottinghams take the design of their power plant from a specific source, such as historical or technical literature of the 1920s or earlier?

The *Colorado Engineering Context* (King, 1984) describes, in general terms, the various types of hydropower facilities that have been developed throughout Colorado history. Precedent for the water-driven electrical power plants of the west is found in numerous mill and factory applications of the 1700s and early 1800s throughout the eastern states. Many of these facilities employed wooden water wheels to drive machinery. In each case, the energy of a passing river was diverted to turn the waterwheel, and through mechanical connections move its associated equipment. Three types of waterwheels were developed, each defined by the way it made contact with the water. One of these was the undershot wheel, which had wooden paddles installed along its circumference. The paddles made contact with the water as it passed through a channel running underneath the wheel. As long as the water kept flowing and contacting the paddles, the entire wheel would rotate on its axis, converting the kinetic energy of the river to mechanical power for the plant.

The California gold rush, followed by mining booms in Colorado and other western states, resulted in the installation and improvement of water wheels by western mine and mill operators to power hoists, electric generators, stamp mills, air compressors, and water pumps. The technology of these systems improved during the later decades of the nineteenth century through engineering refinements, as various forms of hydraulic turbines were developed for a range of uses. Hydropower was first used for the production of electricity at a small facility in Grand Rapids, Michigan in 1880. Its success there led to construction of the first commercial hydropower plant in Wisconsin two years later. Over the following decades, the technology spread across the country, spurred initially by intense competition between Thomas Edison and George Westinghouse. The wooden water wheels of earlier years were inadequate to the demands of commercial electricity production, which required engineered metal turbines capable of withstanding high speeds of revolution and intense hydraulic pressures. By the time the Nottingham Power Plant was constructed in Avon decades later, wooden water wheels were a thing of the past, at least for commercial applications.

Compared to wooden wheels, the technologically sophisticated turbines of the 1920s were expensive and more complicated to install and maintain. They were also designed for electrical production on a large scale, far beyond what was needed for a ranch operation. For a ranching family like the Nottinghams, a wooden water wheel provided a much more affordable and achievable method of harnessing the power of the Eagle River. The Nottingham Power Plant was constructed using the concept of the undershot water wheel of a century earlier, employing typical features such as the vertical mounting of the wheel on a horizontal axle, the installment of wooden paddles on a wood wheel framework, and the construction of a headrace and tailrace to divert river water into the facility and under the wheel. The remainder of the plant involved a combination of shafts and gears that converted the slower revolutions of the water wheel to the high revolutions per minute required to operate the

generator. This interconnected system, together with the electrical transmission lines outside the facility, made use of both mechanical and electrical equipment common to small-scale industrial operations of the late 1800s and early 1900s. Because the Nottinghams utilized the wooden water wheel to provide power for their electric plant, the facility essentially straddled the technologies of these two centuries.

In general, the Nottingham Power Plant represents the creative efforts of rural ranchers and farmers statewide, who brought electrical power to their isolated localities during the years before rural electrification reached them. In the years prior to the arrival of electric lines, many either did without the benefits and conveniences of electricity or turned to gasoline-powered engines that were connected to farmyard-based electric generators. In this case, the Nottingham family turned to an earlier technology, the water wheel, and went about generating electrical power utilizing the availability of the nearby current of the Eagle River. This effort represents a feat of electrical and mechanical engineering, one that presented its own unique challenges as the facility was designed, constructed and maintained by determined and resourceful amateurs rather than professionals. As such, the site presents an opportunity to fill a significant data gap in Colorado history. The Nottingham Power Plant's period of significance runs from 1928, when it was constructed, to 1942 when it was placed out of service due to the arrival of rural electrification.

HISTORY OF THE NOTTINGHAM POWER PLANT

For centuries prior to the arrival of Euro-American fur trappers and explorers, frontier guides and miners, merchants, ranchers and families, the mountainous area that was to become Eagle County served as the unspoiled home of the Ute Indians. A nomadic tribe with a rich cultural heritage, the Ute came to places such as the Eagle River valley to hunt and establish their winter camps. In various locations they erected wickiups and tepees, temporary structures that were dismantled and hauled away as the bands moved on to new camping grounds, leaving little trace of their presence on the land. Although small numbers of fur trappers, surveyors and explorers visited the western mountains of Colorado in earlier years, Euro-Americans did not enter the region in larger numbers until the Colorado gold rush began in the late 1850s and early 1860s. Over the following years, the Ute came into increasing conflict with the strange rugged men from afar who were single-minded and sometimes brutal in their pursuit of gold and silver.

Prospectors, miners and surveyors flooded the mountains from the 1860s to the 1880s, followed closely by another wave of merchants, investors, professionals, prostitutes, town builders and families. As rich veins of ore were located, some of the mining camps, initially filled with tents, grew into towns of log buildings. Those with successful mines nearby and the prospect of longevity morphed again into permanent towns with substantial buildings of milled lumber, stone and brick. While some of the mining camps withered and died, others saw a continued influx of determined, hopeful, hard-working men and women who swelled the populations of mountain communities such as Central City, Idaho Springs, Georgetown, Leadville, Cripple Creek and Aspen.

The growing numbers of these interlopers into Ute territory changed the landscape and the lives of the natives forever. The Ute saw their centuries-old freedom and folkways threatened by the establishment of Indian agencies, the arrival of the army, and the signing of treaties beginning in the 1860s that restricted them to reservations. By the 1870s they were struggling to survive and had become dependent upon government handouts. The 1879 Meeker Massacre, which resulted in the death of Nathan Meeker, agent of northern Colorado's White River Agency, was the final clash in the ongoing

conflict between the Ute and the US government. The following year, the Ute were removed from most of Colorado to reservations in the southwest corner of the state and to the west in Utah, thus ending their long presence in Eagle County and the surrounding mountains and valleys. American citizens were now free to lay claim to the state's rich alpine lands without fear of conflict with the native population.

Mineral wealth, or at least the prospect of finding it, lured Americans to venture across the high peaks and into the area now known as Eagle County during the late 1870s. Occupying the eastern and southeastern reaches of the county are the lofty mountains of the Gore and Sawatch ranges, which for a time acted as a barrier to migration into the Eagle River valley. However, prospectors were a determined bunch, and in 1878 and 1879 a number of them ventured out of Leadville and over Tennessee Pass into the headwaters of the Eagle River seeking evidence of silver and gold. Their efforts were successful, and before long the towns and mines of Red Cliff, Gilman and Minturn became fixtures on the landscape. Although mineral extraction appeared to represent the area's future, other industries soon rose in importance. Logging and milling came into play on the heels of the mining discoveries, as enterprising men noticed the rich stands of timber that were available for the taking. Soon the area's forests were providing Leadville and the insatiable new mining districts among the headwaters of the Eagle River with mine timbers, saw logs, shingle logs, rail ties, construction lumber and cordwood.

Before the century was out, many of the miners had discovered that their lives were exceedingly difficult and their prospects for acquiring wealth not as great as they had hoped. Their lot only worsened as a consequence of the mining downturn that followed the Silver Crash of 1893. While some gave up on Colorado and returned to their eastern states of origin, others preferred to remain in the new state and build a future from some other line of work. Much of the western two-thirds of Eagle County is occupied by open river valleys, rich bottomlands, and high plateaus that offered no lure of mineral riches. As the Eagle River exits the high, rugged mountains and mining districts north of Minturn and turns toward the west, the land opens into a broad valley of low slopes, rich soils, and milder temperatures conducive to ranching and farming. Many of the miners were raised on farms and understood agriculture as a way of life. Among those residing in the towns of Red Cliff, Gilman and Minturn were men, some with wives and children, who gazed downstream and realized that the available land flanking the Eagle River held characteristics that would allow them to reinvent their lives.

From its confluence with Gore Creek all the way to the county's western boundary just west of Dotsero and the confluence of the Colorado River, the fertile Eagle River valley became the hoped-for paradise of ranchers and farmers of the late 1800s and early 1900s. Numerous single men and families gave up on the struggle and ventured out of the mining camps during the 1880s and 1890s to seek their fortune and a more settled way of life raising beef cattle and cultivating fields of hay, oats, alfalfa, wheat, rye and barley. Many filed homesteads or purchased property and became ranchers, raising livestock and crops to support their herds. However, before long they discovered that the land and climate were suitable for growing food crops such as potatoes, lettuce, carrots, cabbage, apples and a host of other fruits and vegetables.

Eager to see their efforts succeed, the early settlers of the Eagle River valley built ranchsteads and farmsteads, improved their lands, and excavated irrigation ditches to bring river water to the fields during the growing season. As time passed, the enterprising pioneers replaced their original log structures with more suitable homes and outbuildings of milled lumber. By 1900, with 10,000 acres under cultivation, hundreds of thousands of acres used for grazing, a rail line providing transportation for farm products and passengers, and the logging industry operating six sawmills in the area, the 35-

mile-long valley had emerged as one of Colorado's thriving agricultural districts.

Prior to the early 1880s, the Eagle River valley was part of Summit County, one of the sixteen original territorial counties established in 1861 to encompass much of northwestern Colorado. Eagle County was carved off and created by the state legislature in 1883, with the county seat initially established at the town of Red Cliff (this was moved to Eagle in 1921). Four years later, the agricultural market towns of Eagle and Gypsum were founded, and smaller hamlets such as Avon, Wolcott and Dotsero had emerged along the Eagle River valley. Among the Avon area's earliest settlers was George Townsend, an English immigrant who migrated out of Leadville in 1882 to homestead in the vicinity of today's Beaver Creek. He received title to his 160 acres of land under the Homestead Act in 1887 and by 1889 had managed to amass patents for 400 acres. Townsend began to raise beef cattle and opened a post office and stage station that were initially based in his residence. During the decade he was joined by other former miners, many of them from Gilman and Red Cliff, such as William Swift, William Nottingham, John Metcalf, Peter Puder, Ernest Hurd, John Berry, Oscar Kendrick, and C.A. Stone. While some of these men and their families were immigrants from foreign lands, most were American-born citizens who had come to the Eagle River valley from eastern states by way of mining camps in the Colorado Rockies.

Transportation was an immediate concern among the early settlers striving to establish an agricultural district along the Eagle River. A wagon road initially ran the length of the valley in the late 1870s and 1880s, following the course of the river. Stage service was initiated between Red Cliff and Dotsero in 1883, with Avon serving as a stop along the line. However, America of the 1880s was a modern country served increasingly by railroads, and competition among the railroad companies for routes through the Colorado Rockies was fierce. For the pioneers of the Eagle River valley, rail service was needed to ship livestock, agricultural products, and loads of timber harvested from the county's mountainsides. In 1881 and 1882, a narrow gauge line of the Denver & Rio Grande Railroad (D&RGRR) was completed from Leadville over Tennessee Pass, terminating at Rock Creek near Gilman about ten miles southeast of Avon. For several years afterward, it appeared that the railroad had no intention of continuing the line down the Eagle River valley. This left residents of the valley dependent upon their wagon road and unable to ship larger quantities of agricultural products, livestock and timber to market. However, they didn't have to wait very long for the situation to change.

Railroad records show that a preliminary survey of a possible route from Rock Creek down the Eagle River to the Colorado River, and then on to the Roaring Fork River at Glenwood Springs, was surveyed between the fall of 1881 and spring of 1882 by D&RGRR employees. Four years later, in late 1886, the final route of what was termed the Eagle River Extension was surveyed and mapped. Because the land was already held by numerous ranchers and farmers, the railroad had to negotiate with each owner to create a right-of-way. Eager to reach the booming mining town of Aspen via Glenwood Springs before its competitor, the Colorado Midland Railroad, had done so, the necessary rights were secured and the D&RGRR extended its narrow gauge line down the Eagle River as rapidly as possible.

Construction began at Rock Creek in January 1887 and reached Gypsum that August. Approximately 1,000 men and numerous horse teams were reported to have participated in the endeavor. The new line followed the northwest course of the river along its north bank from Minturn to Avon, Edwards and Wolcott, where it curved toward the west and continued on toward Glenwood Springs. The entire route was completed and opened for traffic on 6 October 1887. In 1890, the railroad converted the track to standard gauge, most likely by adding a third rail. Within a matter of months the residents of the Eagle River valley were suddenly connected to the rest of the state and nation. Each day, they experienced the passage of numerous passenger and freight trains along what became a major transcontinental

route. Travel to Denver and other destinations became a thing of ease, and the area's farmers, ranchers and loggers celebrated and took advantage of the convenient shipping access the rail line provided to get their products to market.

Avon received its name sometime between 1882 and 1888, most likely from pioneer Englishman George Townsend. Because Townsend operated the local stage station and post office, the name may have already been in use prior to the arrival of the railroad. Local folklore states that the choice of name was due to Townsend's affinity for the Avon valley around Stratford, England, and the fact that the Eagle River valley reminded him of that foreign place. The earliest documented use of the name Avon for this area of Colorado dates to 1888, when it appeared on the first route map produced by the D&RGRR following its completion of the Eagle River Extension. The railroad listed Avon as a station along the Eagle River, and a wood-frame depot was soon constructed there. On 26 November 1900, the US Post Office provided the hamlet with its official designation as Avon.

William Henry Nottingham and his wife, Nancy Angeline, came to Colorado from Guthrie, Iowa, journeying across the prairie in a covered wagon during the summer of 1882 with their three young children. The couple settled at Bell's Camp near Gilman, just a few years after silver was discovered in the vicinity and the Battle Mountain Mining District was established along the rugged upper reaches of the Eagle River. William went to work hauling ore from the mines with a wagon and team of mules. He also filed a timber claim on Battle Mountain that he appears to have worked. In 1886, the Nottinghams gave up on mining and paid $800.00 to purchase the rights to a previously-filed 160-acre homestead a few miles downstream along the north side of the Eagle River where Eagle-Vail is located today. That same year, William filed a certificate of stock brand in Red Cliff, recorded by the Colorado Secretary of State in the official brand book, so he could begin purchasing and branding cattle. The patent deed on the homestead was issued four years later in 1890.

On their new ranch, the family (by then with five children) began to raise cattle and cultivate crops such as oats, wheat and hay. Before long, William began to acquire adjoining ranch and farm properties, adding substantially to his original acreage. Eventually the family owned much of the land along the Eagle River, consolidating large tracts extending from Gore Creek on the east to Squaw Creek west of Edwards. In addition to ranching and farming, William participated in the establishment of Avon's first school district and the construction in 1890 of a one-room schoolhouse at the confluence of Beaver Creek and the Eagle River at the village of Avon. He invested in mining and timber properties upstream in the Battle Mountain District, and the family evidently maintained a second home in Gilman. By the mid-1890s, William Nottingham had achieved success and was elected to serve as an Eagle County commissioner.

In 1887, Nottingham joined resources with two ranching neighbors, Peter Puder and Ernest Hurd, to form Nottingham & Co., an enterprise devoted to purchasing, developing and managing their widespread area farming, ranching, mining and timber interests. Although the business was aggressively pursued and held many assets, it declined into financial trouble by 1893 (possibly exacerbated by the silver crash that year) and the partners' hopes failed to be realized. With accusations of mismanagement flying, Puder succumbed to the stress when he committed suicide in April 1896. Bitter disagreement and antagonism between the two remaining partners resulted in Nottingham's death by gunfire in December of that same year, the trigger pulled by Ernest Hurd in self defense. With two of the three partners deceased within months of one another, the remaining assets of the company ended up in the hands of Hurd and Angeline Nottingham. In a dramatic twist to the story, Angeline then married Hurd in 1899, creating a union of families that also kept the company's assets intact.

Following William's 1896 death and that of Ernest Hurd in 1901, their properties were split by court order between Angeline Nottingham Hurd (one-half interest) and her children (one-half interest), and management of the ranch operation fell to the oldest son, Clyde. Over the next twenty years, through numerous property transfers, Clyde Nottingham and his brothers Harry and Emmett acquired their mother's and sisters' shares, eventually dividing the properties into three separate holdings. In 1919, Clyde left Avon for Glenwood Springs, selling his ranch assets to his brothers. Harry and Emmett stayed in the Eagle River valley, where they staked their futures. The two men set to work on their ranches and over time acquired additional properties in the Avon and Beaver Creek areas, spreading the Nottingham family's ownership of Eagle River valley lands far and wide.

During the late 1800s and early decades of the 1900s, the unincorporated hamlet of Avon served as the center of the surrounding agricultural community. Located there above the south bank of the Eagle River were a small number of houses, along with a school, lumberyard, post office, general store, and a large hall operated by the Avon Amusement Association. Above the north bank of the river were the Avon Depot, Avon Siding, and other features located along the railroad tracks. A 1919 map of the D&RGRR right-of-way through Avon details the presence of a 22' x 42' depot, an 8' x 16' coal shed that included an outhouse, an 80' x 130' stockyard for cattle and sheep, a wooden mail crane, and two box car bodies used as a tool house and bunk house. Not shown on the map but also present in this area was the Section House, the residence of a railroad employee tasked with overseeing the depot and siding.

In addition to these features, large sheds were built adjacent to the Avon rail siding where produce could be stored prior to shipment. These were primarily used to hold lettuce, a crop that at its peak of production during the 1920s and 1930s swelled the population of Avon beyond its 200 year-round residents as hundreds of migrant workers moved in for the harvest season. Also of importance throughout these years were the potato crops planted by area farmers. Many growers along the Eagle River valley benefited from the presence, a few miles east of Avon, of the State Experimental Farm. This facility, with 100 acres under cultivation, was established in 1925 to investigate commercial techniques for high altitude crop production. Operated by Colorado Agricultural College's (now CSU) Horticulture Department in Fort Collins, the Avon facility was referred to by locals as the "College Farm." By the mid-1920s, the valley was progressing and succeeding as an agricultural district based upon the dreams and hard work of its pioneers and their successors. However, with all of the advances over the years, one important form of modern technology and convenience had never reached Avon: electricity.

Electric power plants were first constructed in Colorado during the 1880s in places such as Glenwood Springs, Denver, Georgetown, Leadville and Aspen. In a number of these locations, the development of power plants was spurred by the myriad uses of electric motors in mining. However, many commercial enterprises, municipalities and homeowners saw electric power as something they also desired to utilize. While some of the early electric plants operated through the generation of steam power, facilities in the mountains were typically hydropower plants that took advantage of mountain watercourses and the distinct variations in elevation provided by the rugged terrain. Using the natural force of gravity, the designers and builders of these facilities were able to harness the power of moving water to create electricity.

By 1900, all of the state's larger cities and towns were furnished with electric power from nearby plants over standardized grids. Nationwide, by 1907 eight percent of homes in the country were wired for electricity and the number was growing daily. During the 1920s, a combination of private and public

utility companies provided not only many municipalities, but also homeowners and businesses, with the power to light building interiors, install outdoor lighting, and operate appliances and machinery. One of Colorado's most important hydropower plants of this era was completed in 1919 by the Colorado Power Company in Glenwood Canyon west of the Eagle River valley. The Shoshone Plant provided electricity to Denver over a high tension line that was 153 miles long and crossed three mountain passes. Although the plant brought electricity to a number of towns along the route, Avon was not one of these.

Throughout the 1920s and 1930s, many rural residents across Colorado were still without electric power and held little hope for its arrival any time soon. In 1937, a Cooperative Extension Service survey found that 69% of all farms in the state lacked access to electricity. For the farmer and rancher of the 1920s, this meant that they were still living without items such as electric milking machines, water pumps, nighttime lighting, and other household and agricultural appliances. The introduction of electricity to any community allowed for use of the numerous domestic gadgets and appliances that were being marketed nationwide. In addition to incandescent lighting, homeowners were able to purchase electric radios, irons, fans, sewing machines, vacuum cleaners and telephones. Electric cooking ranges and refrigerators were also on the market, along with mixers, toasters, and a host of attractive kitchen devices. Developments in the use and generation of electricity provided farmers and ranchers with small motors that could be employed for a variety of tasks to make their lives easier and their work more efficient. Without access to electricity, many rural residents felt as if they were left behind as the urban areas of the nation progressed into the future.

By the 1920s, William Emmett Nottingham, the sixth and youngest child of William and Angeline, was ranching and raising a family at Avon. Emmett was born in 1893 in Bell's Camp near the mining town of Gilman. Fond of ranch life, he became increasingly occupied throughout the 1910s by the family's operations in the Eagle River valley. In 1923 he married Myrtle McGrady, a native of Aspen who was born in that silver-mining town in 1898. The couple settled on 35 acres of land owned by Emmett along the north bank of the Eagle River just east of the Avon Bridge. A short distance to the north of their ranch house was the main line of the D&RGRR. To the northwest along the tracks was the Avon Depot, and beyond the rail line to the north were Nottingham family lands and other ranching neighbors. Across the river to the southwest of Emmett and Myrtle's place was the hamlet of Avon with its school, houses, community hall, and general store.

In 1928, Emmet was 35 years old and Myrtle was 30, and the couple was busy running the ranch and raising three children. That year, they decided that they were tired of waiting for electricity to come to Avon. And, as remembered by their son-in-law Frank Doll years later, they "wanted to have things not fancy, but convenient." The town of Eagle, nineteen miles down the river, was provided with electricity the previous summer (on 5 July 1927) by the Eagle River Electric Company. Although a power plant was not too distant geographically, Avon was a much smaller place and it had been overlooked by the power companies for years. The small ranching community was missing out on much of what modern technology had brought to many Americans decades earlier. Taking matters into their own hands, the Nottinghams set to work designing and constructing a hydropower plant of their own. While some area ranchers acquired electricity through the use of gasoline-driven generators, Emmett and Myrtle had another idea: they would use the current of the Eagle River, just yards south of their home, to create their own private power plant.

Myrtle had learned much about electricity from her brother, who worked as an electrician in Leadville. With a natural aptitude for mathematics, she set to work determining how the plant would operate. Below their home, along the north bank of the Eagle River, Emmett and his son Willis assembled all of the supplies and equipment needed to erect the hydroelectric plant that would provide their home,

ranch buildings, and the depot with power. While some of these items appear to have been purchased or scavenged locally, others were brought by train from outside the Eagle River valley. Together with hired hands, during the summer of 1928 and into the early winter, the father and son constructed the wood-frame structure, erected the waterwheel over the raceway, shaped the water channel from the northern bed of the river, and installed all of the equipment needed to make the plant function.
The 18' x 32' facility was erected with hollow horizontal wood plank walls filled with sawdust for insulation, protected by a low-sloped gabled roof covered with layers of wood sheathing and sheet metal. The roof space, or plenum, between the sheathing and sheet metal was insulated with straw. Near the northeast corner was a north-facing entrance containing an insulated wood plank door. The structure had no windows, most likely to help insulate it from the cold of winter. The sawdust and locally-cut lumber were probably obtained from sawmills operating along Gore Creek to the east where Vail is found today. When it was completed, the structure enclosed all of the electricity-generating equipment, including the water wheel, protecting and insulating them from the elements. The only exception was the water running through the raceway below the south end of the plant.

To provide motive power for the equipment, the Nottinghams chose the method of constructing an undershot water wheel. They obtained two cast-iron industrial sheave wheels that formed the inner spokes of a large wooden paddle wheel mounted on a sturdy steel axle atop heavy timbers and placed parallel to the river. Water was brought into the facility through a diversion channel excavated from the north bank and bed of the river about 100 yards upstream from the plant. The 24 wooden paddles that connected the side-by-side wheels, essentially forming a structure similar to a riverboat paddlewheel, dipped into the current of the river below the floor of the plant. In this way, the wheel harnessed the power of the running water to turn the system of shafts and gears that were connected initially to an alternating current generator.

Visitors to the plant when it was in operation were treated to the "slap-slap-slap" sound the wheel made as its paddles came into contact with the river water below. In addition, they would have noticed the humming noise produced by the spinning shafts and gears inside the dark, cool structure. By design, the force of the water caused the wheel to turn at a rate of 24 revolutions per minute, and it appears that this speed could be regulated by lowering or raising a water gate mounted in front of the wheel. The generator had to operate at a speed of 2800 revolutions per minute to produce two kilowatts of 110 volt electricity. To achieve this, in accordance with Myrtle's calculations, the water wheel was connected to the generator through the necessary combination of gears that would cause the shaft attached directly to the generator to spin at just the right speed.

The Nottingham Power Plant operated nicely when the river's current flowed at a modest rate and volume. However, during the heavy spring runoff each year the river swelled and carried debris such as ice and driftwood that blocked the inlet to the facility. Sometimes this debris made its way through the grizzly constructed of segments of rail and broke the paddles on the water wheel or caused it to jam. In the winter months, especially during periods of extreme cold, the river flowed at a greatly reduced rate and power could sometimes not be generated. The Avon Depot, in addition to the ranch, was dependent upon electricity from the small plant. With the railroad paying $5.00 each month for electric power, the Nottingham family had to regularly maintain the facility and keep it operational. Consequently, they found that the plant required frequent attention and much effort was expended making repairs to the facility. The family was constantly clearing debris from the inlet, fixing broken woodwork on the water wheel, maintaining machinery, and moving rocks around in the river to ensure that water flowed adequately through the diversion channel.

Whenever water flow into the plant was inadequate and the wheel could not turn at the necessary

speed, the lights and appliances in the ranch house and depot flickered and sputtered and struggled to operate properly. This problem was solved by the Nottinghams when they converted the plant to a direct current system. To achieve this, they installed a direct current generator that evidently required some reworking of the smaller shafts and gears inside the northern end of the power plant. The generator was connected via wiring strung along power poles to two banks of sixteen storage batteries located in a small shed near the house. These poles were placed outside the power plant, at the battery shed, next to the house, and outside the depot. With this new system in place, power could be stored in the batteries and then reliably drawn by the house and depot as needed. With one set of batteries in use as the other was charging, reliable electrical power was available at all times. Through their ambition, determination, hard work, and a degree of resourcefulness and ingenuity characteristic of successful ranching families of the era, the Nottinghams succeeded in their effort to bring electricity to their corner of Colorado.

As many of the struggling farms and ranches along the Eagle River valley failed during the 1930s, their lands were purchased by Emmet Nottingham. Acquisition of these properties continued beyond the Great Depression, so that by 1950 many of the valley's farms and ranches were under the ownership of the Nottingham family. In the 1940s, the Nottinghams shifted away from cattle to the raising of sheep and the growing of potatoes, which they continued to focus upon for many more years. Eventually, Emmett became vice-president of the Eagle County Livestock Growers Association.

The Nottingham Power Plant operated for fourteen years before it became obsolete when rural electrification reached the Avon area in 1942. Physical evidence found on the site today suggests that the water wheel may also have been used to power a water pump, possibly at the same time it was generating electricity, although exactly when this took place is no longer known. What is known is that since 1942 the water wheel has sat motionless, no longer turning and generating electricity. Once placed out of use, the structure and all of its equipment began to deteriorate, of little utility to its owners or the surrounding community. Eventually, heavy winter snows caused the roof to sag and collapse, and the walls bowed and spilled their sawdust insulation onto the ground. The river silted in the raceway under the water wheel, and debris eventually clogged the intake at the grizzly. To the southwest of the plant, the tail race also silted in and disappeared under a cover of vegetation. Gradually, pieces of the Nottingham Power Plant succumbed to the elements and were scattered among the surrounding grounds. The large water wheel, however, survived intact upon its supporting timbers, and today remains the facility's most identifiable and defining characteristic.

The Nottingham family continued their ranching activities until 1972, when their extensive holdings were sold to Benchmark Companies and Vail Associates Inc. for recreational development. Avon and the Eagle River valley began to experience tremendous change in the 1960s and 1970s after Vail opened ten miles to the east and Interstate 70 was completed through the valley. Plans were also made to hold the 1976 Olympics in Colorado, with some events scheduled for the new ski resort at Beaver Creek above Avon. Growth resulting from the nearby ski resorts led the Town of Avon to finally incorporate in 1978, and two years later it claimed a population of 1,500 residents. By 1998 that number had risen to 3,000 and just a few years after that the population had jumped to more than 5,500 people. In the early 2000s, with ski resort development and second homes overtaking the landscape, so much of the area's historic ranch land has been changed that it is now difficult to imagine Avon as a once-remote, isolated agricultural settlement populated by a small number of rural folk and suffused with quiet beauty. Yet the Nottingham Power Plant remains there, tucked along the north bank of the river, to remind today's visitor of the valley's agricultural heritage and its resourceful pioneers of the early twentieth century.

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GEOGRAPHICAL DATA

VERBAL BOUNDARY DESCRIPTION

The boundaries of the nominated property are limited to Tract C, Nottingham Station PUD, Amendment #2, in the Town of Avon, Eagle County, Colorado.

Property Name NOTTINGHAM POWER PLANT

PHOTOGRAPH LOG

The following information pertains to the black-and-white photographs:

Name of Property: Nottingham Power Plant
Location: Avon, Eagle County, Colorado
Photographer: Ron Sladek
Date of Photographs: 10 November 2005
Negatives: Tatanka Historical Associates Inc.
612 S. College Ave., Suite 21
P.O. Box 1909
Fort Collins, CO 80522

Photo No.	Photographic Information
1	General view of the setting of the 1928 Nottingham Power Plant from across the Eagle River. View to the northeast.
2	Downstream view of the water diversion channel that starts about 100 yards upstream from the Nottingham Power Plant. The main body of the river is off the left edge of the photograph, and is separated from the channel by the narrow island on the left. View to the northwest.
3	Downstream view along the north bank of the river and the water diversion channel just before it reaches the Nottingham Power Plant. The intake to the waterwheel raceway is located under the debris at the center of the photograph. View to the west.
4	Upstream view of the water diversion channel from the intake to the raceway. The main body of the river is off the right edge of the photograph. View to the east.
5	Detail view of the debris-clogged intake to the raceway, showing a concrete abutment, somewhat dislodged members of the rail grizzly, and boards that have collapsed from the southeast corner of the structure. View to the northeast.
6	General view of the Nottingham Power Plant from the river. View to the north.
7	General view of the Nottingham Power Plant from the northeast. View to the southwest.
8	General view of the west elevation of the Nottingham Power Plant, showing the bowed west wall and power poles on the ground.

9	General view of the waterwheel from the south. View to the north.
10	View showing construction details on the south (river) side of the waterwheel. View to the northwest.
11	View showing construction details on the interior of the waterwheel. View to the northwest.
12	View showing construction details on the interior of the waterwheel. View to the west.
13	View of the interior of the northern area of the Nottingham Power Plant, north of the waterwheel. View to the southwest.
14	View of the shafts and gears projecting northward into the plant from the waterwheel. View to the west.
15	Detail view of shafts and gears projecting northward into the plant from the waterwheel. View to the south.
16	View of the floor in the northern area of the structure. The concrete mount for the generator is at the center of the photo. View to the northwest.
17	View of the DC generator from the plant in storage in Maurice Nottingham's shed east of the facility.

Property Name NOTTINGHAM POWER PLANT

USGS TOPOGRAPHIC MAP
Edwards Quadrangle, Colorado
7.5 Minute Series, 1962 (photorevised 1987)