



## Rocky Mountain Paranormal Research Society Investigation into the reported paranormal activity at the Stanley Hotel

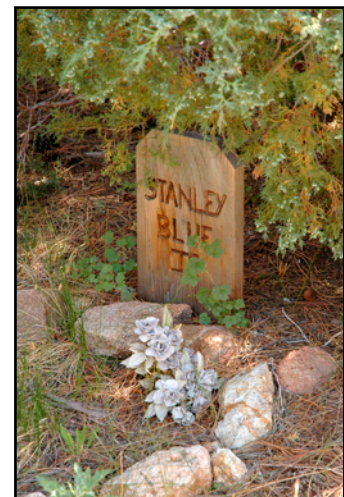


### THE STANLEY HOTEL A STUDY INTO THE HISTORY AND REPORTED HAUNTINGS OF COLORADO'S FAMOUS "HAUNTED" HOTEL.

### This report contains three separate reports looking into the claimed paranormal activity at The Stanley Hotel.

- The first section examines the history of the Stanley Hotel, and an on-site study conducted by the Rocky Mountain Paranormal Research Society.
- The second section is a preliminary report on the investigation into the geology of the area that the Stanley Hotel is located.
- The third section is the official report conducted by The Natural Resources Conservation Service, United States Department of Agriculture, National Soil Survey Center and the Rocky Mountain Paranormal Research Society.

The Rocky Mountain Paranormal Research Society would like to thank all of the people who were involved in this study.





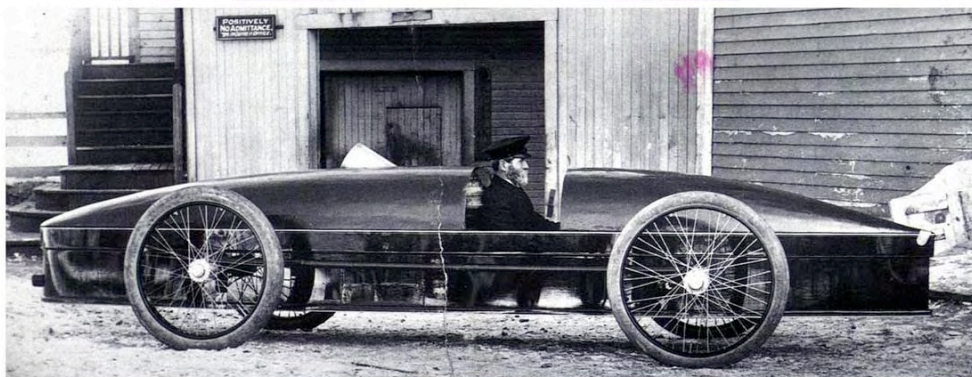
## ***Lord Earl Dunraven***

Dunraven eventually hired agents to purchase the land. There was a total of about 15,000 acres purchased from the government.

Dunraven's claims were contested by twenty-one different parties including R.Q. McGregor. They claimed that Dunraven could not own property because he was not a U.S. citizen. He did have cattle on the property for about 25 years, but never got to build the property to his expectations.

In 1903, Freelan Oscar Stanley was diagnosed with tuberculosis. He was sent to Denver, Colorado but was not expected to live beyond six months. After a month of renting a house at 1401 Gilpin Street in Denver, he was still not showing any signs of change, arrangements were made for him and his wife to stay at a friend's cabin in Estes Park. In 1904 they purchased 8.4 acres of land in Estes Park and built a home.

Freelan Oscar Stanley (1849-1940) was the co-founder along with his twin brother (Francis Edgar Stanley) of the Stanley Motor Company. The company manufactured the Stanley Steamer.





The first steamer was built for the Stanley's however interest grew because in 1898 one of their cars won the hill climbing contest at Charles River Park, and a Steamer that was driven by Mr. Stanley with his wife as passenger, was the first car to climb Mt. Washington. The product and orders grew, they had over 200 initial orders.

In the beginning the advantage of a steam car was the start time, however when electronic ignitions became available for internal combustion engines the race was lost. ( the average time to start a steamer was about 20 minutes)

Production of the Stanley Steamer lasted over 25 years.

The first Stanley Car was made in 1897

The cars were made from 1902-1904 as the Stanley Bros. under the corporate name Stanley Dry Plate Company (later sold to George Eastman) 1902-1924 as the Stanley Motor Carriage Company.





There were approximately 10,500 cars produced.

1899- First car to climb Mt. Washington

1899- First car to be ridden by a U.S. President (McKinley) the car was driven by F.O. Stanley

1903- World one mile steam track record

1904 World one mile/one kilometer steam record

1906- World one mile, five mile, one kilometer records

1906- Broke the two miles in one minute barrier

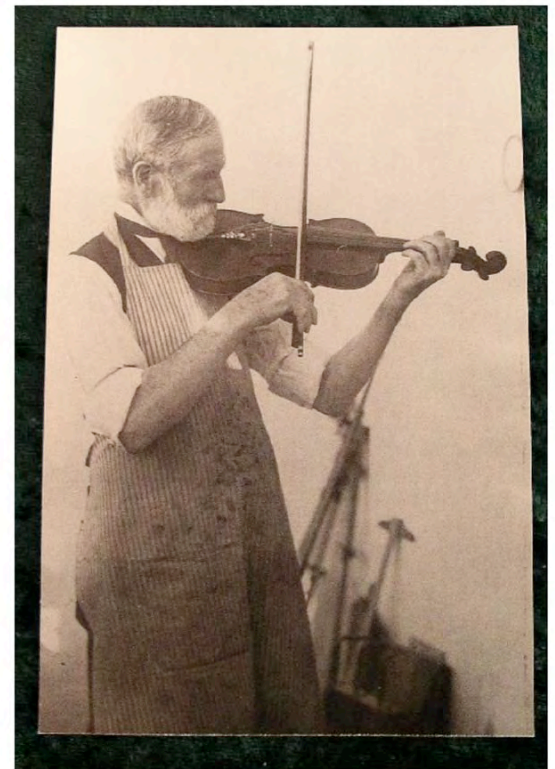
1906- World land speed record 127.659 mph



At one point during production the Stanley's Closed down a section of the manufacturing and started a Violin Business. They had both loved making violins and the Stanley Violin is still one of the most sought after in the world. Freelan traveled to Cremona to purchase spruce for his Violin tops and to Germany for the Bosnian Maple for the back, sides and neck.

F.O. Stanley's brother Francis Edgar Stanley (1849-1918) the co-founder of the Stanley Steamer Motor Company Died July 21, 1918 when he was in a car accident near Ipswich, MA.

Because of the death of Mr. Stanley's brother, the Stanley Steamer Motor Company was sold to Abner Doble in 1918. The company was able to have a few good years but the internal combustion engine won the race in time.







With business partner B.D. Sanborn, Mr. Stanley purchased the Dunraven property and formed the Estes Park Development Company.

In 1914 Mr. Stanley's partner B.D. Sanborn dies.

The Hotel featured all top of the line features including a phone in each room, running water, indoor toilets and even electricity.

The only thing that the Hotel did not offer was heat in each room, the fireplaces on the main floor supplied the heat. This was not a problem because the Hotel was designed to be used as a summer lodge, it was only used in the summer until 1984.

Mr. Stanley was an entrepreneur as well, he and his brother had patents on such items as:  
The Stanley Steamer - his steam powered automobile

The air brush

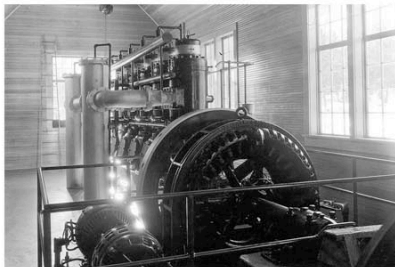
The process of manufacturing photographic dry plates - he later sold the patent to George Eastman (Eastman Kodak)

He also put together a kit for technical drafters that was sold as the "practical drawing set" and sold for \$1.00.



Because of her brothers enterprise in photography, Chansonetta Stanley Emmons (1858-1937) became one of the first women photographers. She is known for her images of landscapes, and Maine life. She also had an interest in hand coloring photographs.

In 1908 Mr. Stanley with the assistance of four partners founded the Estes Park Water Company.



On October 30, 1908 Mr. Stanley started the Estes Park Power

and Light Company. An interesting note about the company was that they had no way to measure the use of electricity that was going to the customers so they charged by the light bulb that they sold to the customers.

He had the hydroelectric plant built in the mountains to provide the electricity. The plant provided power for the Hotel as well as the village. The plant was in operation until 1982 as the result of the Lawn Lake flood. The plant was re-opened as a museum in July 2002 thanks to the State Historic Fund.



Construction of the property was completed in 1909, with the help of architect T. Robert Wieger and Contractor Frank Kirchoff.

Originally Mr. Stanley wanted to call the hotel "The Hotel Dunraven" but because of the reputation that Dunraven had in town he decided not to. In August 1908 Mr. Stanley agreed to a contest that was suggested by a local paper. They offered a \$10.00 prize to the person who would name the Hotel. The winning suggestion with 132 residents signature ( Written on Deer skin) was submitted on October 15, 1908.

The Hotel included the main lodge, 2 Dormitory residence halls, 1 Warehouse, 1 Auditorium and a House, complete with a bowling alley, billiards room and casino, for the total cost of \$5000,000. The rates for rooms at the the Stanley were extremely high compared to other hotels, the range was from \$5.00-\$8.00 per day or \$84.00 per week.



The Manor House was the second building to the East of the main hotel. It includes a dining room, pool hall, kitchen and its own heat, so unlike the main hotel this building could be used in the winter.

The Auditorium was the third building to the east of the hotel. It include the amenities for Concerts, Casino nights, a basement with two bowling lanes.

The Carriage House is the fourth building to the east of the hotel. It was built to house Stanley Steamers

Opening day for the Hotel was June 22, 1909, however construction was not completed until 1910.

In 1979 the addition of water heat to the rooms was added.

During the filming of The Shining mini-series, the addition of a bandstand was added.

The Dining room in the main Hotel is called the Macgregor dining room, named after the man who started the claims against Earl Dunraven.

On the opening day, Mr. Stanley hosted a 20th anniversary for a Pharmacy convention. The convention consisted of 125 members and their wives. The members were escorted in style from the Loveland train station to the "Stanley Hall" (Concert hall) via 22 Stanley Steamers.

The Hotel has hosted several famous guests including: Molly Brown (she stayed in room 217), John Philip Sousa, Theodore Roosevelt, The Emperor and Empress of Japan, and many more.



In June 1911 the Stanley's power had gone out, so a chambermaid (Elizabeth Wilson) went to room 217 to light a lamp. However the gas had been on for quite some time so when she attempted to light the lamp the gas was ignited and she was blown out of the room, sustaining broken ankles. The damage was extreme estimates of up to \$60,000 to repair the damage were given. During the blast four busboys were hurt as well.

Mr. Stanley sold the Hotel in 1926, and it was intermittently open some summers until 1980 however it was closed during World War II.

Flora Jane Record Tileston, later Mrs. Stanley (1848-1939) was born in Maine and died in Estes Park.

She was an active member of the community in Estes Park. She was known for her dressing as a gypsy and telling peoples fortunes as a fundraiser for the Estes Park Women's club.

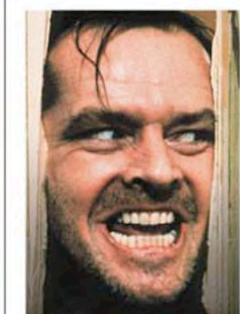
Mr. Stanley Died of "heart complications" October 2, 1940 in newton Massachusetts.

In 1995 the Hotel changed ownership due to a Bankruptcy.

On March 25, 2002 the Concert hall had bee rebuilt and was hosting a grand opening.

STANLEY KUBRICK COLLECTION

### ***The Shining:***



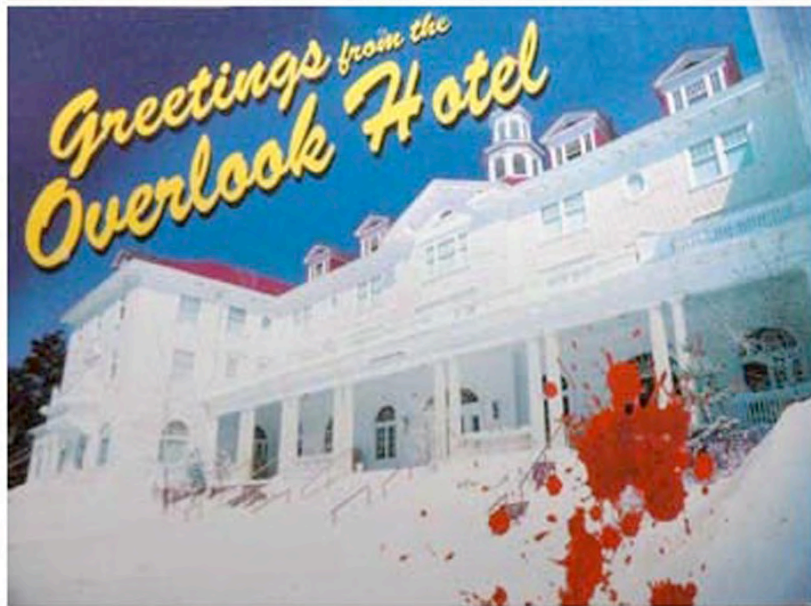
STANLEY KUBRICK'S  
**THE SHINING**

Stephen King stayed at the Stanley in 1974 while he was writing the Shining. He and his wife were the only guests (it was just before the Hotel closed for the season) and they were given room 217. He says that the Hotel did inspire some of the book but it is not based directly on the location.

Mr. King is reported to have said that he did see a small child who was calling out for his nanny on the second floor but there was no child in the Hotel at the time.

Steven king did return to the hotel in 1995 to film the ABC mini-series of The Shining.









On an interesting side note: Bryan from Rocky Mountain Paranormal was hired to photograph a wedding at the Stanley during the filming of the mini-series. When Mr. King found out about a wedding being scheduled at the location during this time he said that it was ok to continue with the wedding, because the production would not be filming that weekend. That was a good experience, because it allowed access to places in the Hotel that are not normally open to visitors. (Such as the tunnel and employee areas)



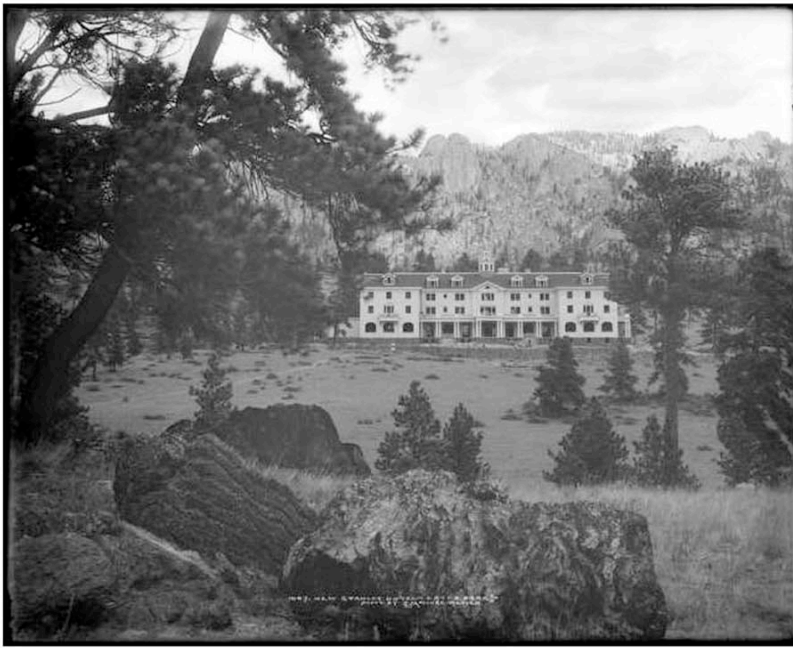


***Photographs taken in the "Tunnels" during the Wedding that Bryan photographed.***

There is also a report that in the mid 1990's a homeless person, who needed a place to stay that found a crawl space under the Auditorium, went in and apparently froze to death.

***Dumb & Dumber:***

The film Dumb & Dumber filmed some of the movie at the Stanley.



### ***Reported Activity:***

The music room has a piano that is reported to play on its own. The story is that either Mr. or Mrs. Stanley likes to play the piano, however there are conflicting stories as to which one it is that plays it.

On December 30, 1970 Arty Robert's a housekeeper was cleaning the dance floor in the McGregor room and stated that she felt "like I had entered another time" she saw what she described as a room full of people in period clothing and attending a party. They did not seem to notice her, so she went to the front desk and asked if they had seen anything. Nobody else had seen anything. She returned to the room and continued cleaning while still seeing the ghostly party. She also reported seeing a woman in a green dress and a broad brimmed hat while she was cleaning the Manor House. Arty also reported that while she was in the Concert hall she was locked in the men's room and "something" grabbed her hand and made her write "Mary Donovan, Aug. 18, 1927" on the mirror. She thought that this was the name of the lady that she saw who was dressed in green.

In 2003 Carissa Delisse a night clerk reported that she was having feeling of being watched and eventually saw what she reported as being Mr. Stanley looking at her from the other side of the counter. She said that he just faded away.

Mark Lorenz a bellman, was behind the front desk around 10:30 in February of 2004 and he says that he heard footsteps from the Bar and stop when they were outside the bar. He says that then he saw the reflection of a woman in the window, but after further looking he could find nobody there. He also had an experience in 1983 when the elevator was working with nobody at the controls.

The fourth floor that was once the servant quarters seems to have the majority of the activity. There have been reports of children playing in the halls. House staff has reported the sound of children coming from room 418. They have also reported seeing the indentations of someone in the bed when there was not. One couple complained upon checkout that the children running around on the fourth floor were very noisy, but no children were in the Hotel.



Room 407 is reportedly the favorite for Lord Dunraven. He has been seen standing by the bathroom door. The lights in the bathroom also seem to have a mind of their own, they will turn on and off for no reason. Many people have reported that they have seen someone looking out of the window of room 407 as well.

Mr. Stanley is reported to have been seen in the Billiards room.

The Swinging doors in the billiards room have been seen opening and closing as if someone was entering the room by many different witnesses.

Room 217 also has had reports of peoples bags being packed while they were not in the room.

Rooms 219 & 222 have also had reports of noises, opening and closing doors and windows.

In 2003 a housekeeper reported seeing a "see-through person" in room 318, there is also a guest that reported having his mattress move in the room.

Guests reported that in room 340 the bathroom door slammed and the door locking by itself. Rev. Kimberly Henry and her husband were staying in room 401 and they reported seeing a man standing by the closet who had a "distinct bald spot" they also had issues of articles moving by themselves in the room.

There have been reports of Mr. Stanley being seen at the Managers residence.

The Old Gate House has had reports of footsteps and doors being unlocked and opened on their own.

Most of the rooms at the Hotel have had reported activity at one time or another. Reports continue to come in from both staff members and guests.





## ***Rocky Mountain Paranormal Research Society's investigation of the Stanley Hotel***

A production company that is producing a new show featuring different paranormal groups around the country contacted us.

They suggested that we do an investigation at the Stanley Hotel, so we agreed and they sent it up for us.

We preceded the investigation with a look into the history of the location and the people who built it. (See below)

The Investigation:

04/04/2007

8:00p.m. – 5:00 a.m.

Team members present:

Bryan Bonner

William Fontenot

Carol Olivacz

Ginger Inskeep





*Bill, Ginger, Matt, Bryan & Viki are visited by Grant and Jason from Ghost Hunters before the investigation.*

The team had a meeting to determine the best location to set up the equipment as well as the locations for different team members.

We had 4 locations reserved for the investigation:

Room 401

Room 418

Room 1302

And the Concert hall / Theater

We determined that the setup would be:

Matt & Vikki covered the Concert hall with 4 video cameras as well as Audio recording equipment.

Bill, Bryan & Carol covered room 401 as well as the hallway just outside the room, that has had reported activity.

Ginger and her guest moved between locations as well as stayed in room 1302 (that had not monitoring equipment)

We also set up 2 video cameras, a digital voice recorder and an E.M.F. meter in room 418 that was locked in and not bothered for the duration of the evening.









The investigation of room 401 and the hallway was reasonably quiet. On a few occasions the production team broke up the quiet time but it was not too much as to hinder the investigation.

Equipment:

- 1 I/R camera at the head of the bed looking towards the closet
- 2 I/R cameras on the closet side of the room looking at both sides of the bed
- 1 microphone in the middle of the bedroom
- 2 microphones on either side of the doors on the hall side



- 1 microphone at the top of the stairs leading to the attic
- 1 I/R camera looking down to the hall from the top of the stairs leading to the attic
- 1 temperature sensor in the middle of the bedroom
- 1 temperature sensor at the top of the stairs leading to the attic

Temperature readings did not change any more that would be expected with the cooling of the building. (72-66.7 degrees)

E.M.F. readings were taken throughout the evening, but the levels never changed to a degree to suggest abnormal activity. (An average of 1-2.2 Milligauss throughout the room)

At 3:30 there was the sound of a woman (we saw her on camera) leaving the location, she came from the elevator went to her room and then returned to the elevator and left within a 3 minute window. After she left, the sounds of people walking up and down the halls and doors closing were heard but nobody was seen on the video. This continued on and off for about 9 minutes.



Room 418 was left alone during the investigation to have the recordings examined

later.

Equipment:

2 I/R cameras looking from the head of the bed towards the television and the bathroom door

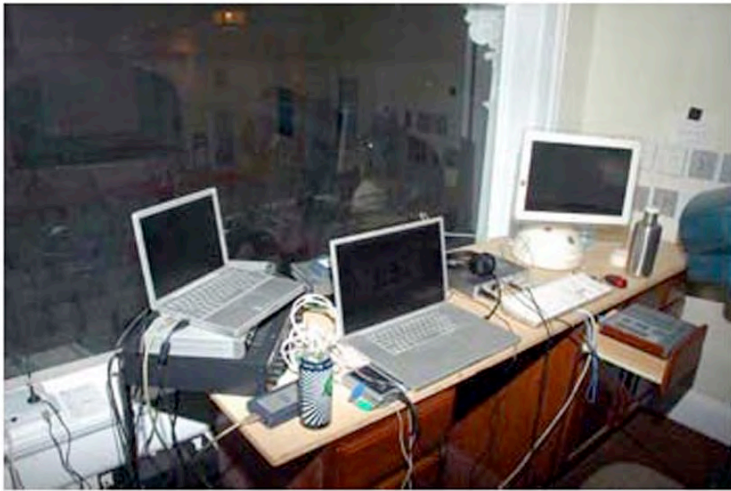
1 E.M.F. sensor located in the middle of the bed in view of the camera

1 digital voice recorder to assist with the 2 camcorders recording at the same time

There were reports of a Hypnotist that had been in the room seated by the base of the bed on the chair that is also near the bathroom door. This area is extremely hot with electromagnetic energy, the meters that we have would be overpowered in some of the areas where the head of the person in the chair would be. When the Hypnotist was in the chair he stood up and almost collapsed, however he was assisted back into the chair by another person in the room. At that point they noticed what seemed to be a "charge" in the body of the man. We tested and determined that the readings were most likely caused by the proximity to the wall and not any residual or stored energy in the body of the man.







## **The Concert Hall**

### **Equipment:**

**1 Microphone located in the middle of the theater (Because of the acoustics of the location it was more than enough to cover the building.**

**1 I/R camera looking towards the front door of the building**

**1 I/R camera looking over the entire Theater room**

**1 I/R camera looking in the storage room in the basement ( there was reported activity there recently so we decided to place it there) The activity was that during a tour with the team from Ghost Hunters, Grant stated that a table that was leaning against a wall suddenly fell from a negatively inclined position. On the following day Bill Murphy of Ghost Town had felt so bad in the room that he had to leave the location.**

**We determined that the building was being rewired because of major electrical problems. We also noticed that there was a very strong smell of natural gas because the room is connected to the room with the gas fired heater.**

**This could account for some of the reported activity in the room but it is inconclusive.**



It was a difficult investigation due to an Electrician working on the main power panned in the basement until just after 2:00 a.m. We were able to spend a little time getting used to the normal sounds of the theater such as the heat turning on and off, pops and cracks due to the temperature changes in the old building, the rare car that would go by, etc... Around 4:00 a.m. we heard what sounded like people talking and walking up to the door getting ready to walk into the hall (however there was a camera looking at the main door and there was no sign of anyone coming to the door) This was the first of an escalating trend of noises. First there were clicks, bustling noises,



slow foot steps, bangs and what sounded like whispering and what sounded like a door creaking open ( closing? ) This was remarkable and unmistakable. That was when we decided to go investigate any possible explanations for the sounds. We attempted to recreate the sound with every door in the building, but were unable to do so. The downstairs had previously been checked to make sure that the electrician was gone. His truck had been parked by the downstairs back entrance and there was no truck in sight.

On an interesting note, while taking E.M.F. readings at the right stairwell to the hall heading to the basement the meter would take a while to settle down (30-45 seconds) before a reading could be read. The needle would spike and slowly settle down.

The E. M.F. readings were consistent throughout the building for the duration of the evening. The only exception was the area by the hallway leading to the basement from the front of the building. It was averaging 0-2 milligauss, however at 12:10 the readings were between 3-6 milligauss





Ginger and her guest went to room 1302 to see if they would notice any activity in the room.

When we visited the room earlier we could not find the light switch to turn on the lights in the entranceway but when Ginger returned they heard sounds of someone outside the room but when they came out there were no people and the lights were now on. It was determined that the lights are on an odd circuit that requires switches to be in specific positions for a certain series of lights to be on.

It was also determined that some of the noises that have recently been reported in the building could have possibly been caused by a "visitor" that we met.

We discovered that the Raccoon (Casper) like to come into the building via open windows on the top floor.





# The “Energy” of The Stanley Hotel



*Large deposits of Quartz and Magnetite have been claimed as the cause of paranormal activity at the hotel*

## A look into the geology of the Stanley Hotel

### The Rocky Mountain Paranormal Research Society looks into the theories of electro-magnetism causing paranormal activity.

Because of the current claims of paranormal activity at the Hotel having a natural cause due to the geological makeup of the property, we decided to study the location and see what the facts were behind the claims.



The initial research into the mineralogical content of the property was done by looking at reports of other paranormal research groups.

This research uncovered many different stories about the rich mineral content of the ground beneath The Stanley. Many different types of electric and magnetic mineral deposits are rumored to be at the location. However, when we contacted the different groups making these claims, it turned out that nobody seemed to know where the original information about the mineral content had come from. Several sources said that they had gotten the information from other paranormal groups while others claimed they had looked up the data on-line.

To find the truth behind the stories of odd mineral content at The Stanley we turned to the internet to see if any type of geological or soil survey had been completed. This effort seemed to be much more difficult than we had

expected. The on-line maps and studies seemed to show nothing.

*“EMF readings were unreliable as both the geology the hotel is built on (a large deposit of magnetite rock) and the old wiring in the building effected the meters” - A report found on-line about the Hotel*

The many different divisions of the Government that are involved in this type of research seemed to have worked around the location.

At this point we decided to contact the agencies directly to see if we could get the data directly from the source.



# Taking Paranormal research to a new level.

We contacted the U.S.D.A. and they were a great help. The initial contact was something new for the soil scientists. *Apparently, ghost hunters are interested in our data now. It is the most unique and interesting request I have received in my 30 year career!* ”

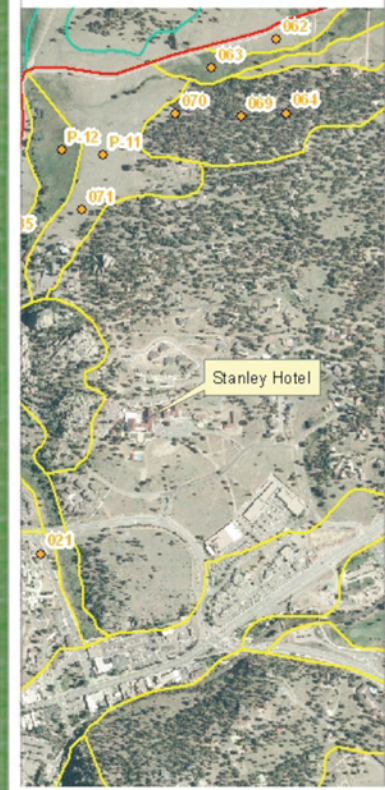
This request was followed up by the recommendation that we look at the data for a satellite survey of magnetic fields that are influenced by geographic components. When we discussed the situation with the scientists the conclusion was “I reviewed the Aeromagnetic data for Colorado. Aeromagnetic surveys detect changes in the earth's magnetic field. The magnetic field is strengthened by the presence of metallic components in bedrock and more so by the presence of minerals with magnetic properties such as magnetite. There is nothing unusual about the aeromagnetic data in the area of Estes Park as compared to that general area of the Rockies. I hope this helps. So at this point it looks like the magnetite (or anything

magnetic) in nature is slowly getting ruled out, but I will continue working.”

At this point we started working with the scientists to see if a soil survey had been conducted at The Stanley. After working with several different divisions of the Government we discovered that the property of the hotel has never had a survey conducted.

The known details to the area were basic but provided some good initial data about the area: “Granitic Rocks of 1,400 M.Y. Age Group - Biotitic Gneiss & Schist, Granite bedrock at approximately 20 inches deep & Water table within 37 inches. Elevation 7,500-8,700 feet. Mean annual precipitation 16-22 inches, Mean annual air temperature 42-46 degrees, frost free period 70-100 days. Vegetative classification - Ponderosa pine/Antelope bitter-brush.”

Estes Park Soil Survey  
Scale 1:12,000



*The only surveys that had been conducted are located inside the yellow areas. the hotel and it's property are just outside of areas*



*What exactly is under the hotel and what does it take to discover it?*

## Ghosts in our Soils?

### **Schist:**

*A metamorphic rock that comes in almost infinite variety, but its main characteristic is hinted at in its name: schist comes from the ancient Greek for "split," through Latin and French. Schist is a rock formed by dynamic high-temperature, high-pressure metamorphism that involves a lot of strain.*

*The high strain aligns the flat or elongated grains of mica, hornblende, and other minerals into thin layers, or foliation. At least 50 percent of the mineral grains in schist are aligned this way (less than 50 percent makes it gneiss).*



## Working with Scientists

After the initial inquiry about past surveys we started communications between the Government soil scientists and The Stanley Hotel.

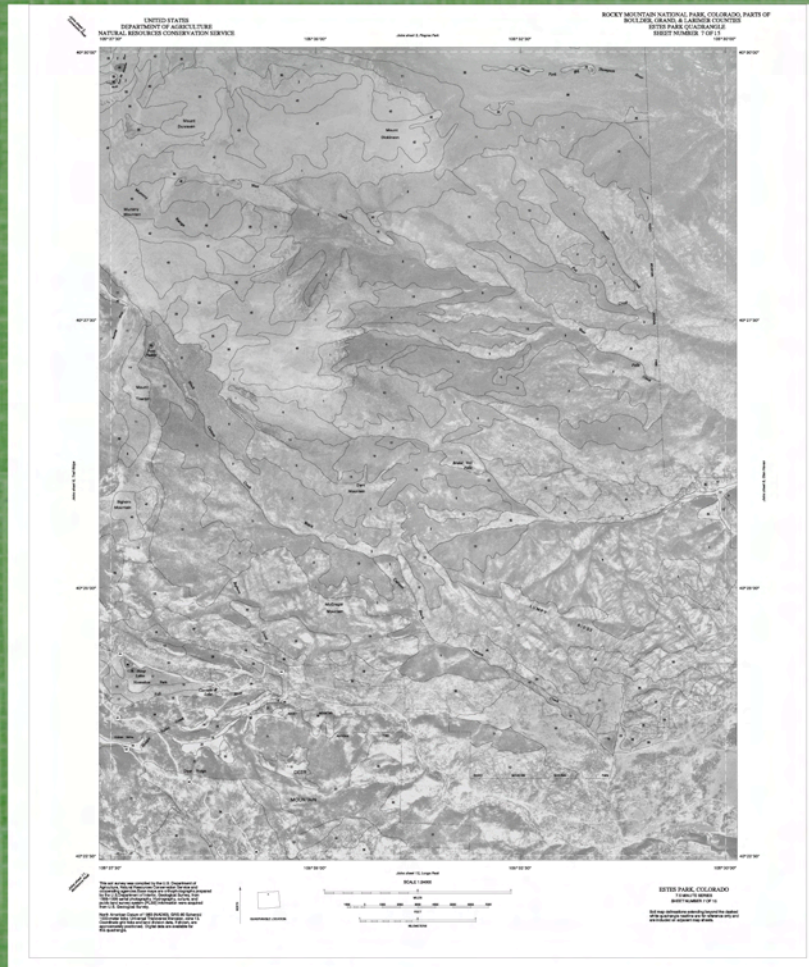
This communication was an effort to complete a soil survey at the location and get the hard data to determine the reality of the mineral contents of the Stanley property.

After getting approval from the owners of The Stanley, we scheduled a time for the soil survey to be completed.

The soil survey would include several different modes of study and needed to be scheduled a few months in advance due to the need to have scientists flown in from another state.

The date for the survey was decided and scheduled with The Stanley. The team was being assembled and we would meet them at the Hotel on July 30th to start a 2 day study into the geology of the property

*The Aeromagnetic survey completed to show changes in the Earth's Magnetic field.  
This survey shows no unusual changes in the magnetic field at the hotel.*



*Soil Scientists start the survey at The Stanley Hotel.*

## The Different types of study

The Government Scientists that conducted a soil study on the property at The Stanley Hotel used several different techniques to determine the contents under the ground of the property.

*Ground Penetrating Radar* - Used to “look” at the different formations under the ground.

*Soil Analysis* - Used to determine the content of the soil at the location

*Electromagnetic Soil Survey* - By using electro-magnetic induction the soil salinity and electromagnetic properties are recorded.



# The Soil Survey Begins



*One of the trucks from the Natural Resources Conservation Service at The Stanley Hotel*



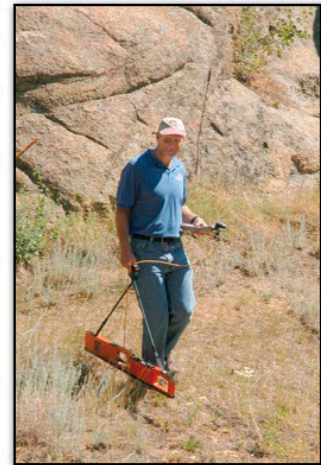
***The soil scientists working with the Ground Penetrating Radar.***

The first day of the survey started with a general mapping of the land using GPS Mapping and continued by collecting soil samples at several different locations on the property.

The first of the digging allowed the team to determine the average depth of the bedrock as well (27 inches).

The first day also included the use of electromagnetic induction. This technique determines the salinity of the soil as well as the electromagnetic properties of the soils.

The studies were conducted on the main property of The Stanley as well as the area near the old "Ice pond", a pet cemetery and a ranch located on the other side of the mountain. This allowed for the data to include a baseline for adjacent areas.





# The second day of the Study...

The following day the team continued with the previous studies as well as adding Ground Penetrating Radar. The Ground Penetrating Radar allows the team to look for underground objects as well as measure the distance to bedrock in large areas.

The team conducted the study for two days and then completed with a Ghost Tour of the building. The tour did have an unusual moment when the team entered the tunnel. When most of the Ghost Tours enter the tunnel area, the stories of ghosts and the history of the hotel are common. However because of the interests of the soil scientists, the conversation went directly to the rock that the tunnel had been carved into.

Rocky Mountain Paranormal would like to thank all of the soil scientists that helped conduct this soil survey. It will help to rule out some of the different theories behind the reported paranormal activity at the Stanley Hotel.

The final written report from the Soil scientists is several months away, although we know the basics of the findings. We will update this report when the final written reports become available.



*The soil scientists working to determine the content of the soils at The Stanley Hotel*

## The Results of the Study

The conclusions of the soil survey team were consistent with the data collected from the rest of the Estes Park region.

The soil is primarily crumbled Schist. Schist is a rock formed by dynamic high-temperature, high-pressure metamorphism that involves a lot of strain. The high strain aligns the flat or elongated grains of mica, hornblende, and other minerals into thin layers, or foliation. At least 50 percent of the mineral grains in schist are aligned this way (less than 50 percent makes it gneiss). However the content of any one specific mineral is not noted.

The distance to bedrock in the area ranges from surface level to approximately 27 inches.

The rumors of large deposits of Quartz and Magnetite have been confirmed as false, so the reported paranormal activity needs to be looked at again without the inclusion of this claim.





Natural Resources Conservation Service  
National Soil Survey Center  
207 W. Main Street, Room G-08  
Wilkesboro, NC 28697

Phone: (402) 437-5499  
FAX: (402) 437-5336

SUBJECT: MGT – Trip Reports, Geophysical Field Assistance      October 15, 2008

TO: Allen Green, STC      File Code: 330-7  
USDA NRCS  
655 Parfet Street, Suite 201, Room E200C,  
Lakewood, CO 80215-5517

**Purpose:** To provide site assessment assistance using electromagnetic induction (EMI) techniques and ground-penetrating radar (GPR) in Estes Park, CO.

**Participants:**

Matt Baxter, Researcher/Investigator, Rocky Mountain Paranormal Research Society, Denver, CO  
Bryan Bonner, Researcher/Investigator, Rocky Mountain Paranormal Research Society, Denver, CO  
Chris Fabian, MLRA Soil Survey Leader, USDA-NRCS, Fort Collins, CO  
Mike Moore, Soil Scientist, USDA-NRCS, Fort Morgan, CO  
Steve Park, MLRA Office Leader/State Soil Scientist, USDA-NRCS, Lakewood, CO  
Jason Peel, Irrigation Water Management Specialist, USDA-NRCS, Lakewood, CO  
David Smithey, NRCS Earth Team Volunteer, Wilkesboro, NC  
Andy Steinert, MLRA Soil Survey Leader, USDA-NRCS, Fort Morgan, CO  
Wes Tuttle, Soil Scientist (Geophysical), USDA-NRCS-NSSC, Wilkesboro, NC

**Activities:**

All field activities were completed on July 30 and 31, 2008.

**Summary of Results:**

1. An EMI survey was completed with the Geonics EM38 meter near the Stanley Hotel located in Estes Park, Colorado. Apparent conductivity remained fairly constant across the survey area (except in areas with anomalous spikes in conductivity) with only minor variations suggesting similar soil characteristics. Soil borings across the area revealed similar soil profiles containing dominantly shallow depths to bedrock (<50 cm). A small narrow drainageway was located in the most western portion of the survey area. Increased moisture in this area is thought to contribute to slightly higher apparent conductivity. Several anomalous features resulting in higher and lower apparent conductivity were observed in the EMI survey. These anomalous features were thought to be associated with metallic objects either on the surface or beneath the soil surface. Many of these objects were thought to be underground utilities/utility lines or man-made concrete structures thought to contain metal reinforcement (concrete pads with rebar/wire).
2. Overall spatial patterns resulting from the Dualem-2 meter (mobile survey) were similar to spatial patterns observed with the EM38 meter during the pedestrian survey completed near the Stanley Hotel, Estes Park, Colorado. Changes in apparent conductivity were thought to be associated with changes in soil characteristics. While comparing the Dualem-2 meter and the EM38 meter, both instruments recorded anomalous spikes in conductivity thought to be associated with metal debris and underground utilities. The survey conducted with the Dualem-2 meter resulted in slightly higher apparent conductivity as compared to the survey completed with the EM38 meter. This is thought to be attributed to differences in manufacturer and field calibration of the two different instruments. Also, metal used in the construction of the EMI cart (metal bearings and metal nuts and bolts) is within the electromagnetic field of the EMI meter and is thought to contribute to the slightly higher apparent conductivity, especially in the near-surface geometry (PRP-shallower sensing) of the Dualem-2 meter while comparing geometries. The PRP geometry is more sensitive to





near-surface contributions to apparent conductivity as compared to the HCP geometry. The HCP and the PRP geometries resulted in similar interpretations.

3. There did not appear to be any “unexplainable” spatial patterns of apparent conductivity or “mysterious” anomalous features resulting from the EMI **pedestrian** survey or the EMI **mobile** survey completed near the Stanley Hotel. All observable features associated with changes in apparent conductivity were thought to have reasonable explanations.
4. The majority of the radar records obtained with the 200 and 400 MHz antennas near the Stanley Hotel and at the MacGregor Ranch were of marginal to poor interpretative quality. High rates of signal attenuation (signal scatter) significantly limited observation depths and overall effectiveness of GPR at the sites. Radar records with meaningful interpretations were achieved in only a few areas. Even though interpretations were limited at the two sites surveyed (Stanley Hotel and MacGregor Ranch) with GPR, a combination of soil borings and radar records did reveal shallower depths to bedrock than originally thought. The dominant soils at the two sites were originally thought to be moderately deep to bedrock (50 cm to 100 cm). A significant component of soils containing shallow depths to bedrock (< 50 cm) was observed within the map unit.
5. Geophysical interpretations are considered preliminary estimates of site conditions. The results of all geophysical investigations are interpretive and do not substitute for direct soil borings. The use of geophysical methods can reduce the number of soil observations, direct their placement, and supplement their interpretations. Interpretations should be verified by ground-truth observations.

I would also like to give a special thanks to Jason Peel for providing assistance to our investigative efforts in Estes Park, Colorado. Jason did an excellent job while independently conducting the mobile EMI survey with the Dualem-2 meter. Jason provided the conductivity data for the mobile survey (Dualem-2 meter) contained in this report.

It was my pleasure to work again in Colorado and with members of your fine staff.

Sincerely,

WES TUTTLE  
Soil Scientist (Geophysical)  
National Soil Survey Center  
Lincoln, Nebraska

cc:

M. Golden, Director, Soils Survey Division, USDA-NRCS, Washington, DC  
R. Ahrens, Director, National Soil Survey Center (NSSC), USDA-NRCS, 100 Centennial Mall North, Rm. 152, Lincoln, NE 68508-3866  
L. West, National Leader, Soil Survey Research and Laboratory, NSSC, USDA-NRCS, Lincoln, NE  
B. Bonner, Researcher/Investigator, Rocky Mountain Paranormal Research Society, P.O. Box 350664, Westminster, CO 80035  
J. Doolittle, Research Soil Scientist, USDA-NRCS, Suite 200, 11 Campus Boulevard, Newtown Square, PA 19073  
S. Park, MLRA Office Leader/State Soil Scientist, USDA-NRCS, Lakewood, CO  
J. Peel, Irrigation Water Management Specialist, USDA-NRCS, Lakewood, CO  
A. Steinert, MLRA Soil Survey Leader, USDA-NRCS, 200 West Railroad Avenue, Fort Morgan, CO 80701-2324

#### **Equipment:**

The radar unit is the TerraSIRch SIR (Subsurface Interface Radar) System-3000, manufactured by Geophysical Survey Systems, Inc.<sup>1</sup> Morey (1974), Doolittle (1987), and Daniels (1996) have discussed the use and operation of GPR. The SIR System-3000 consists of a digital control unit (DC-3000) with keypad, color SVGA video screen, and connector panel. A 10.8-volt Lithium-Ion rechargeable battery powers the system. This unit is backpack portable and, with an antenna, requires two people to operate. The antennas used in this study have center frequencies of 200 and 400 MHz.

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<sup>1</sup> Manufacturer's names are provided for specific information; use does not constitute endorsement.



The RADAN for Windows (version 5.0) software program was used to process the radar records (Geophysical Survey Systems, Inc, 2003).<sup>1</sup> Processing included color transformation, marker editing, surface normalization, and range gain adjustments.

Geonics Limited manufactures the EM38 meter.<sup>1</sup> This meter is portable and requires only one person to operate. No ground contact is required with this meter. McNeill (1980) and Geonics Limited (1998) have described principles of operation for the EM38 meter. Lateral resolution is approximately equal to its intercoil spacing. The EM38 meter has a 1 m intercoil spacing and operates at a frequency of 14,600 Hz. When placed on the soil surface, this instrument has a theoretical penetration depth of about 0.75 and 1.5 m in the horizontal and vertical dipole orientations, respectively (Geonics Limited, 1998). Values of apparent conductivity are expressed in millisiemens per meter (mS/m).

Dualem Inc. manufactures the Dualem-2/4 meters.<sup>1</sup> Taylor (2002) describes the principles of operation for these meters. The meters consist of one transmitter and two receiver coils. One receiver coil and the transmitter coil provide perpendicular (PRP) geometry. The other receiver coil provides a horizontal co-planar (HCP) geometry with the transmitter coil. This dual system permits two depths to be simultaneously measured without rotating the coils. The depth of penetration is "geometry limited" and is dependent upon the intercoil spacing and coil geometry. The Dualem-2/4 meters operate at a frequency of about 9 kHz. The Dualem-2 meter has a 2-m intercoil spacing and provides penetration depths of 1.3 and 3.0 m in the PRP and HCP geometries, respectively. The Dualem-4 meter has a 4-m intercoil spacing and provides penetration depths of 2.5 and 6.0 m in the PRP and HCP geometries, respectively. The meter is keypad operated and measurements can either be automatically or manually triggered.

An Allegro field computer (with the EM38 meter) and a Hewlett Packard Tablet PC (with the Dualem-2 meter) were used to collect EMI data. A Garmin GPS Map 76 receiver (with a CSI Radio Beacon receiver, antenna, and accessories) was used in combination with the Dualem-2 meter and an Allegro field computer was used in combination with the EM38 meter to record and store EMI data. The Allegro field computer is keypad operated and measurements can either be automatically or manually triggered. EMI data was geo-referenced with a GM-210 GPS receiver manufactured by HOLUX Technology, Inc.<sup>1</sup>

An EMI cart was towed by a 4x4 ATV. The Dualem-2 meter was mounted to the EMI cart for the purposes of data acquisition during the mobile survey. A pedestrian survey was conducted with the EM38 meter.

To help summarize the results of this study, SURFER for Windows (version 8.0) program, developed by Golden Software, Inc.,<sup>1</sup> was used to construct two-dimensional simulations. Grids were created using kriging methods with an octant search.

#### **Ground-Penetrating Radar:**

Ground-penetrating radar is a time scaled system. The system measures the time it takes electromagnetic energy to travel from an antenna to an interface (i.e., soil horizon, stratigraphic layer) and back. To convert travel time into a depth scale requires knowledge of the velocity of pulse propagation. Several methods are available to determine the velocity of propagation. These methods include use of table values, common midpoint calibration, and calibration over a target of known depth. The last method is considered the most direct and accurate method to estimate propagation velocity (Conyers and Goodman, 1997). The procedure involves measuring the two-way travel time to a known reflector that appears on a radar record and calculating the propagation velocity by using the following equation (after Morey, 1974):

$$V = 2D/T \quad [1]$$

Equation [1] describes the relationship between the propagation velocity (V), depth (D), and two-way pulse travel time (T) to a subsurface reflector. During this study, the two-way radar pulse travel time was compared with measured depths to known subsurface interfaces within each study site. Computed propagation velocities were used to scale the radar records.

#### **Electromagnetic Induction:**

Electromagnetic induction is a noninvasive geophysical tool that is used for high intensity surveys and detailed site assessments. Advantages of EMI are its portability, speed of operation, flexible observation depths, and moderate resolution of subsurface features. Results of EMI surveys are interpretable in the field. This geophysical method can provide in a relatively short time the large number of observations that are needed to comprehensively cover sites. Maps prepared from correctly interpreted EMI data provide the basis for characterizing site conditions, planning further investigations, and locating sampling or monitoring sites.

Electromagnetic induction uses electromagnetic energy to measure the apparent conductivity (ECa) of earthen materials. Current flow is induced into the soil. This induced current flow is proportional to the electrical conductivity of the conducting body (ECa) for a given strength of EM field. The current flow creates a secondary electromagnetic field, the strength of which is proportional of the current flow, and hence, to ECa. ECa may be inferred from the magnitude of the induced secondary EM field generated upon imposition of a primary EM field on the conductor (soil) (Corwin and Rhoades, 1990).



Apparent conductivity is a weighted, average conductivity measurement for a column of earthen materials to a specific depth (Greenhouse and Slaine, 1983). Variations in apparent conductivity are caused by changes in the electrical conductivity of earthen materials. Electrical conductivity is influenced by the volumetric water content, phase of the soil water, temperature, type and concentration of ions in solution, and amount and type of clays in the soil matrix (McNeill, 1980). Apparent conductivity is principally a measure of the combined interaction of the soil's soluble salt content, clay content and mineralogy, and water content. The apparent conductivity of soils increases with increased soluble salts, clay, and water contents (Kachanoski et al., 1988; Rhoades et al., 1976). In any soil-landscape, variations in one or more of these factors may dominate the EMI response.

Though seldom diagnostic in itself, lateral and vertical variations in apparent conductivity have been used to infer changes in soils and soil properties. As EMI measurements integrate the bulk physical and chemical properties for a defined observation depth into a single value, responses can be associated with changes in soils and soil map units (Doolittle et al., 1996; Jaynes et al., 1993). For each soil, the inherent variability in physical and chemical properties, as well as temporal variations in soil water and temperature, will establish a unique and characteristic range of observable apparent conductivity values. Recently, EMI has been used as a soil-mapping tool to assist precision farming (Jaynes et al., 1993; Sudduth et al., 1995).

Electromagnetic induction is not suitable for use in all soil investigations. Generally, the use of EMI has been most successful in areas where subsurface properties are reasonably homogeneous. The effects of one property (e.g. clay, water, or salt content) dominates over the other properties, and variations in EMI response can be related to changes in the dominant property (Cook et al., 1992). Within a given geographic area, most similar soils should have comparable EMI responses. Dissimilar soils should have disparate EMI responses. However, the conductivities of some similar and dissimilar soils will overlap. This occurs where contrasts in EMI responses caused by differences in one property are offset by differences in another property. Some soil properties and soils can be inferred or predicted with EMI, provided one is cognizant of changes in parent materials, topography, drainage, and vegetation.

**Discussion:** The Stanley Hotel has a history of reported paranormal activity over the past years. The hotel was built in the early 1900's by F.O. Stanley. There have been many unexplainable reports of ghostly apparitions, children playing, lights turning on and off, music playing, strange noises coming from empty rooms, and other haunting activities. The Rocky Mountain Paranormal Society is interested in any paranormal activity and measurable electromagnetic energy that may be present near the hotel. An EMI (electromagnetic induction) survey was completed near the hotel to assess the area for patterns of electromagnetic energy, explained or unexplained.

USDA, Natural Resources Conservation Service is currently completing a soil survey of the Estes Park area and is interested in depth to bedrock patterns of the area. An EMI survey and GPR survey will hopefully aid the soil survey team in decision making in the soils mapping project of the Estes Park area. This gained information will aid in map unit composition and naming of map units within the soil survey area.

### **Site 1: Estes Park - Stanley Hotel**

Study site 1 is located in Estes Park, CO on property encompassing the Stanley Hotel. An EMI survey was conducted in an area of Cathedral-Ratake complex, 5 to 15 % slopes (USDA/NRCS update soil survey in progress). The shallow, well or somewhat excessively drained Cathedral soils formed in slope alluvium, colluvium, and residuum from granite or gneiss. These soils are on mountain slopes, ridges, and hills. Cathedral is a member of the loamy-skeletal, paramicaceous, frigid Lithic Haplustolls family. The shallow, well drained Ratake soils formed in materials weathered from igneous and metamorphic rocks on upland hills and ridges. Ratake is a member of the loamy-skeletal, paramicaceous, frigid, shallow Typic Haplustolls family. The site was dominantly grassed with a few sparse trees. Portions of the survey area are used for recreation. An old tennis court is within the survey area but is no longer used and is covered with a thin layer of sand and fine gravel. Underground utilities/utility lines are located within the survey area.

### **Pedestrian EMI Survey**

#### **Survey Design:**

A wildcat EMI survey was completed at the site (refer to *Figure 1*). A grid system survey was not feasible due to the irregular shape of the survey area. A pedestrian survey was completed with the EM38 meter by walking at a fairly uniform pace across the survey area while providing representative areal coverage to accurately capture representative apparent conductivity and spatial patterns. The survey lines were spaced approximately 10 m apart. The EM38 meter was carried at a height of approximately 3 inches above the surface and was operated in the continuous mode with measurements recorded at a 1-sec interval. Measurements of apparent conductivity were collected in the vertical dipole orientation. Apparent conductivity measurements were geo-referenced with a GM-210 GPS receiver manufactured by HOLUX Technology, Inc. and were recorded with the Allegro field computer.

#### **Results:**



A total of 2376 measurements were recorded with the EM38 meter in the vertical dipole orientation. Apparent conductivity averaged -6.8 mS/m and ranged from -1023.5 to 177.5 mS/m. One-half of the observations had an apparent conductivity between -0.25 and 2.63 mS/m.



*Photo. 1 Wes Tuttle, Soil Scientist (Geophysical), USDA/NRCS/NSSC prepares for an EMI survey near the Stanley Hotel, Estes Park, CO. The survey is being conducted with the EM38 meter, an Allegro field computer and a Holux GPS receiver. This data collection system allows for the collection of much larger data sets in combination with geo-referencing of apparent conductivity measurements.*

Overall spatial patterns observed in *Figure 1* were thought to be associated with changes in soil characteristics. Apparent conductivity remained fairly constant across the survey area (except in areas with anomalous spikes in conductivity) with only minor variations suggesting similar soil characteristics. Soil borings across the survey area revealed similar soil profiles containing dominantly shallow depths to bedrock (<50 cm). Moisture contents appeared to be relatively similar across the survey area, as observed in soil borings. A small drainage area was located in the most western portion (left-hand portion) of the survey area near point C. Higher soil moisture content in this area is thought to result in higher apparent conductivity.

Several anomalous features (points A) resulting in higher and lower apparent conductivity can be observed in *Figure 1*. These anomalous features were thought to be associated with metallic objects either on the surface or beneath the soil surface. Many of these objects were associated with utilities. Very contrasting anomalous features can be observed near the “tennis court” area (underlain with a concrete pad) and the “concrete pad /utilities” area (shuffle board pad). The concrete pads are thought to contain rebar or wire reinforcement resulting in the very high and low conductivity measurements in these areas. A linear feature containing higher apparent conductivity can be observed along the southern portions of the survey area in *Figure 1* (along points B). Higher conductivity in this area is thought to be attributed to an underground utility (electric) line connecting a series of lamp posts along the roadway.

There did not appear to be any “unexplainable” spatial patterns of apparent conductivity or “mysterious” anomalous features resulting from the EMI **pedestrian** survey completed near the Stanley Hotel. All observable features associated with changes in apparent conductivity were thought to have reasonable explanations.



the slightly higher apparent conductivity, especially in the near surface geometry (PRP-shallower sensing) of the Dualem-2 meter while comparing geometries. The PRP geometry is more sensitive to near-surface contributions to apparent conductivity as compared to the HCP geometry. Interpretations were similar while comparing the HCP and the PRP geometries.



*Photo 2. Jason Peel, Irrigation Water Management Specialist, (USDA-NRCS) completes a mobile EMI survey with the Dualem-2 meter at the Stanley Hotel, Estes Park, CO. The EMI mobile acquisition system observed in the photo consists of an ATV, an EMI cart, a Dualem-2 meter, a Garmin Map 76 GPS receiver, and a Hewlett Packard tablet PC. Mobile conductivity surveys are much more efficient than pedestrian surveys in survey areas containing large acreage.*

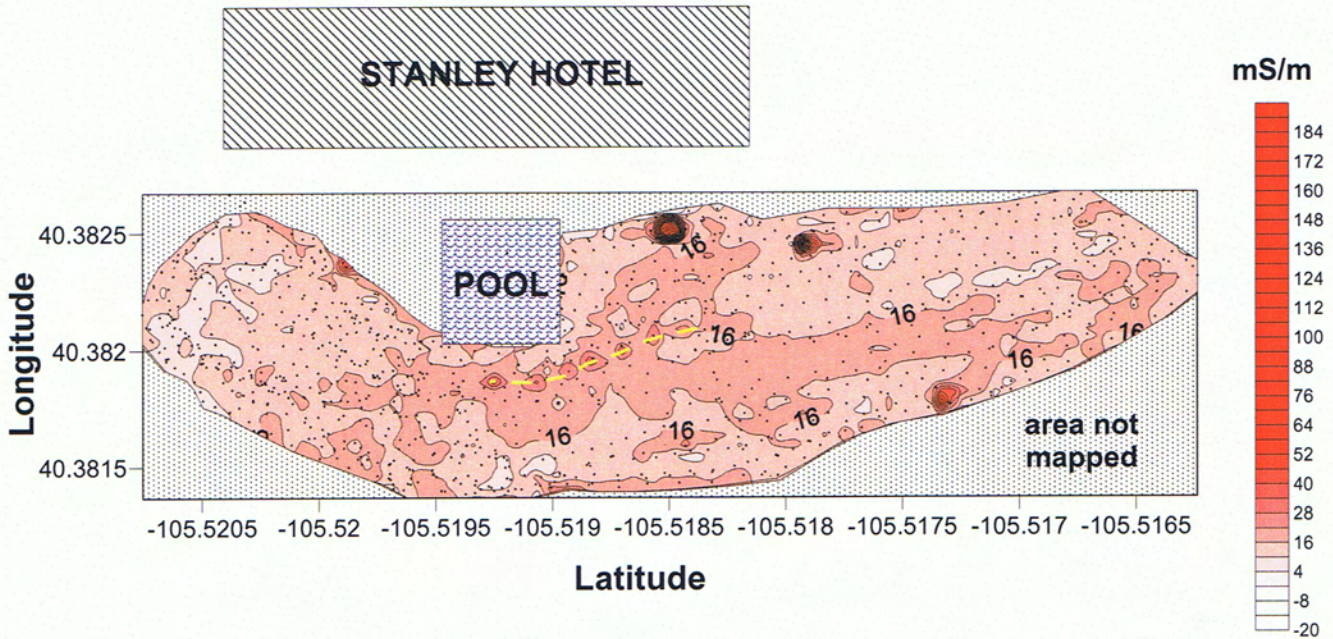
The mobile survey (Dualem-2 meter) encompassed a larger area in comparison with the EM38 meter. Higher apparent conductivity associated with the depressional area (point C) observed in the pedestrian survey (*Figure 1* - EM38 meter) was not observed in the mobile survey (*Figure 2* - western portion) at the same location. This may have resulted from the relatively small and narrow size of the depressional area (2-3 m in width). The EM38 meter was also positioned in closer proximity to the soil surface (8 cm or 3 inches) as compared to the Dualem-2 meter height of approximately 35 cm (14 inches) and may have been more sensitive to small changes in apparent conductivity. Irrigation water from the nearby lawn was observed flowing through the depressional area.

Anomalous features observed in the mobile survey were also thought to be associated with underground utilities. A linear feature (*Figure 2* - yellow dashed line highlights the feature) thought to be associated with an underground utility line can be observed in the mobile survey below (south - southeast) the pool area. The feature is more pronounced in the shallower sensing PRP geometry.

The EMI survey conducted with the EM38 meter (*Figure 1*) resulted in a very large anomalous feature near the “tennis court” area. Anomalously high and low spikes in conductivity in this area were thought to be attributed to metal rebar/reinforcement wire within the underlying concrete pad of the tennis court. This feature was not observed in the mobile survey (Dualem-2 meter) in either the HCP or the PRP geometry. The absence of the feature is unknown. There did not appear to be any “unexplainable” spatial patterns of apparent conductivity or “mysterious” anomalous features resulting from the EMI **mobile** survey completed near the Stanley Hotel. All observable features associated with changes in apparent conductivity were thought to have reasonable explanations.



## Dualem-2 meter PRP Geometry (0 - 1.3 m)



## Dualem-2 meter HCP Geometry (0 - 3.0 m)

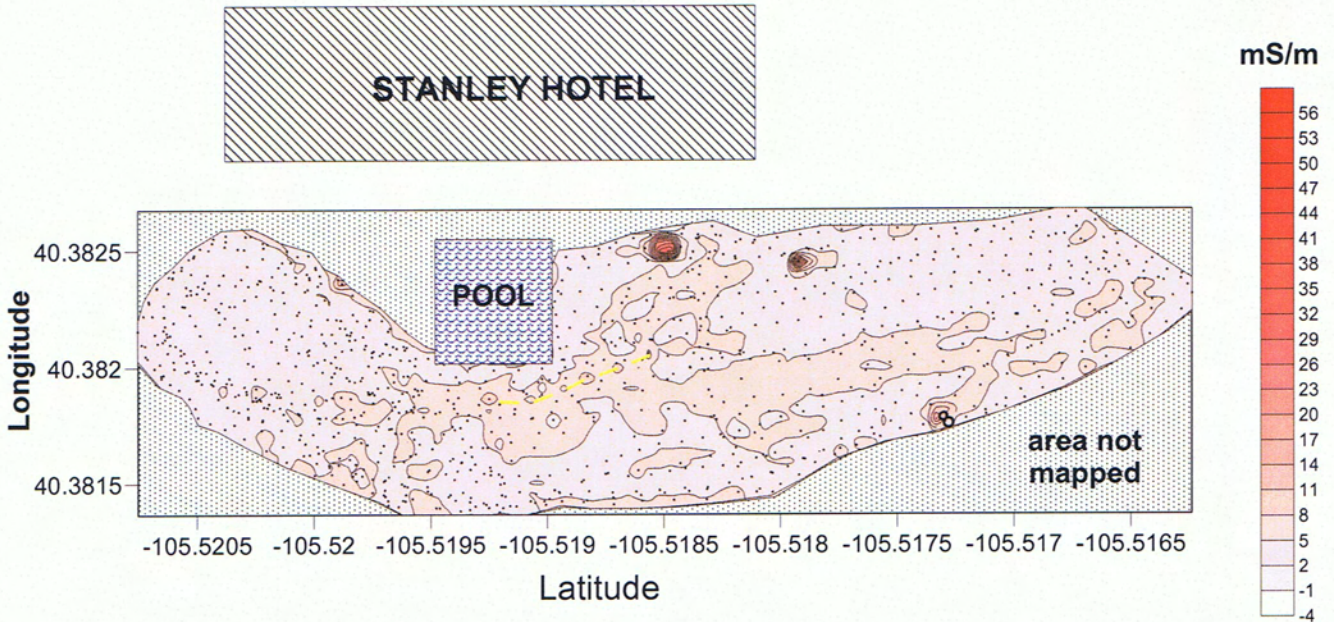


Figure 2 – Spatial pattern of apparent conductivity measured with the Dualem-2 meter in the PRP and HCP geometries in an area of Cathedral-Ratake complex, 5 to 15 % slopes near the Stanley Hotel, located in Estes Park, CO.





*Photo 3. A GPR survey is being conducted at the Stanley Hotel, Estes Park, CO. Andy Steinert, MLRA Soil Survey Leader (USDA/NRCS) pulls the 200 MHz antenna at a consistent pace across the survey area while Wes Tuttle, Soil Scientist (Geophysical), (USDA-NRCS-NSSC) reviews ground penetrating radar (GPR) survey data. GPR surveys usually require at least two people, one person to pull the antenna and another person to collect and record the data.*

#### **Results: Stanley Hotel**

A GPR survey was conducted in an area of Cathedral-Ratake complex, 5 to 15 % slopes. The majority of the radar records obtained with the 200 and 400 MHz antenna near the Stanley Hotel were of marginal to poor interpretative quality (Refer to *Figures 3 and 4*). High rates of signal attenuation (signal scatter) significantly limited observation depths and overall effectiveness of GPR at the site. The 400 MHz antenna appeared to experience more scattering loss than the 200 MHz antenna. Poor resolution and inconsistency of intelligible subsurface features in radar records resulted in very little interpretive information concerning subsurface soil features. The high amplitude signal (hyperbolic feature) observed below **A** in *Figure 3* is thought to be associated with an underground utility line. The object was contrasting to the surrounding soil material and produced a good reflection. A subtle feature associated with soil/bedrock stratigraphy can be observed below **B** (*Figure 3*). Parallel bands of noise (high rates of signal attenuation) can be observed before and after the subtle feature (below **B**) and make interpretations in this area difficult.

#### **Results: MacGregor Ranch**

A GPR survey was conducted in an area of Cathedral-Ratake complex, 5 to 15 % slopes, Cathedral-Ratake complex, 15 to 35 % slopes and Lobe-Breezebasin complex, 0 to 5 % slopes at the MacGregor Ranch located approximately 3 miles north-northeast of Estes Park, CO. The very deep, poorly drained Lobe soils formed in alluvium derived from mixed sources on flood plains. Lobe is a member of the fine-loamy, mixed, superactive, frigid Cumulic Endoaquolls family. The very deep, moderately well drained Breezebasin soils formed in mixed alluvium on flood plains and flood plain steps. Breezebasin is a member of the fine-loamy, mixed, superactive, frigid Cumulic Haplustolls family.

The results of the GPR survey conducted at the MacGregor Ranch were similar to the results observed at the Stanley Hotel. The inconsistent occurrence pattern and poor resolution of subsurface features in radar records made interpretations less than desired and unreliable in most areas (refer to *Figure 4*). The majority of the radar records obtained were of poor interpretative quality. High rates of signal attenuation and signal scatter significantly limited observation depths and overall effectiveness of GPR at the site. Interpretations improved slightly near small drainageways containing coarser textured soil material and near rock outcrops.





Photo 4. This photo is representative of shallow soils observed at the Stanley Hotel site. Numerous soil borings revealed depth to bedrock dominantly at depths less than 50 cm in the area in front of the Stanley Hotel.

**GPR summary:**

Even though interpretations were limited at the two sites surveyed with GPR, a combination of soil borings and radar records did reveal shallower depths to bedrock than originally thought. The dominant soils at the two sites were originally thought to be moderately deep to bedrock (50 cm to 100 cm). A significant component of soils containing shallow depths to bedrock (< 50 cm) was observed within the map unit.

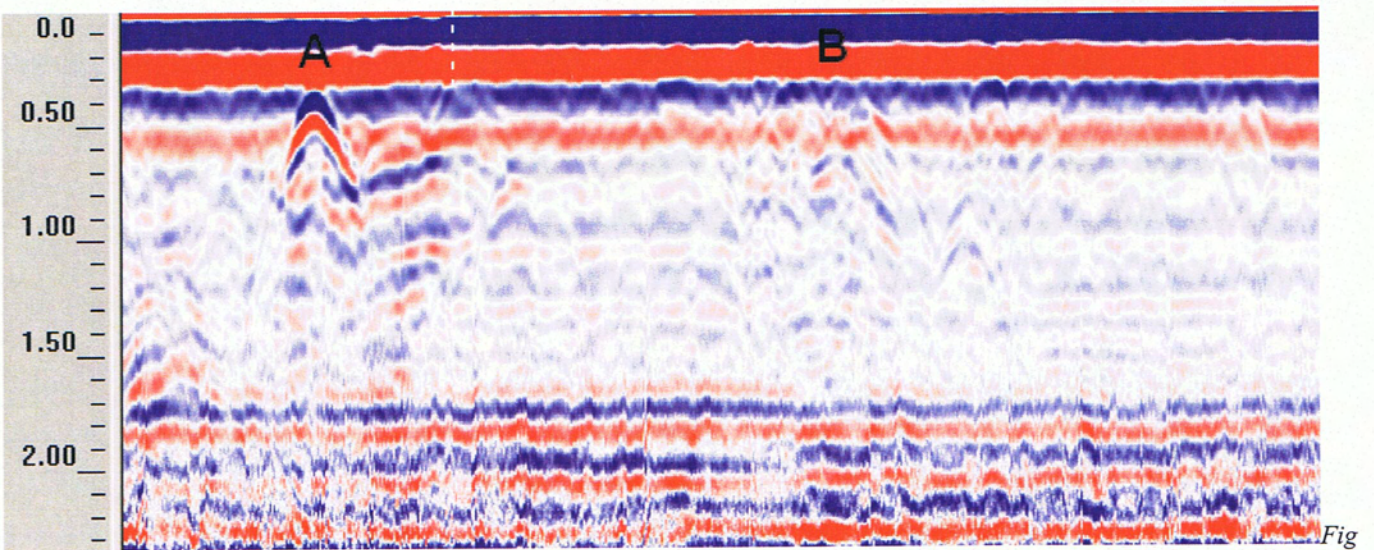


Figure 3. A representative radar record collected with the 400 MHz antenna in an area of Cathedral-Ratake complex, 5 to 15 % slopes near the Stanley Hotel.



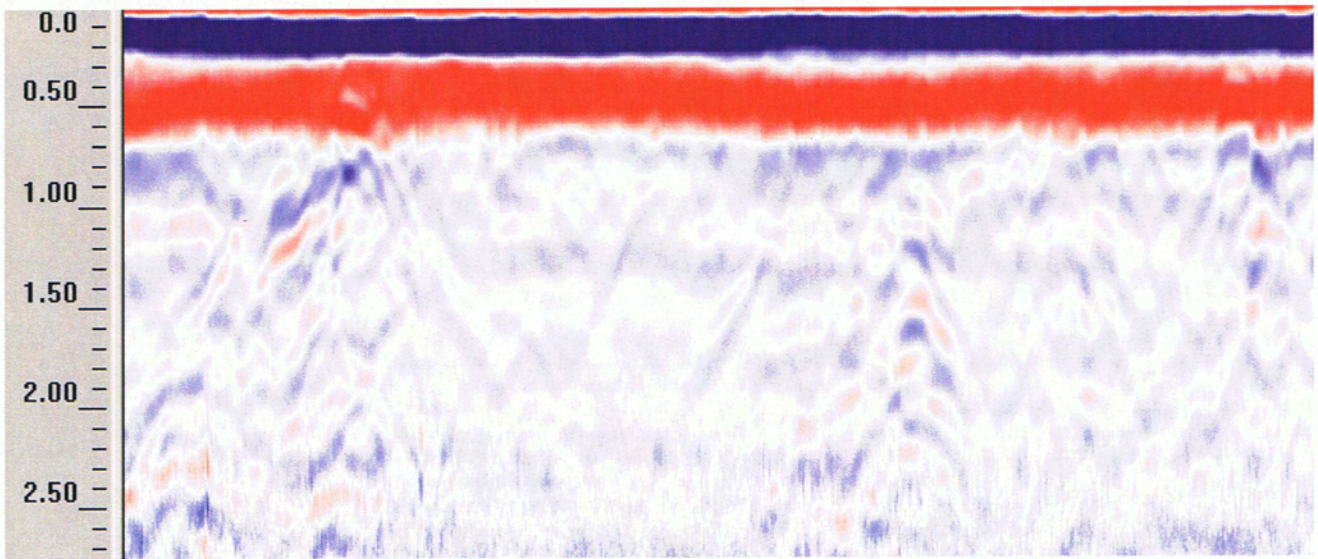


Figure 4. A representative radar record collected with the 200 MHz antenna in an area of Cathedral-Ratake complex, 5 to 15 % slopes at the MacGregor Ranch.

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