

Perigo Mine Investigation



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COLORADO
Division of Reclamation,
Mining and Safety
Department of Natural Resources

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Introduction

The Perigo Mine currently discharges low pH, metal laden water into Gamble Gulch, a tributary to South Boulder Creek. Recent reclamation efforts have focused on assessing the impact of the Perigo Mine on downstream water quality, and the potential for implementation of source control remedies.

The Division of Reclamation, Mining and Safety (DRMS) conducted an investigation of the Perigo Mine that included a literature search of the geology, history and mine workings, along with site verification of geology and mine workings through field investigations and subsurface drilling. Various methods were employed to quantify geotechnical and hydrogeologic properties of the rock mass surrounding the mine, while subsurface geophysical tools were used to understand the physical properties associated with the mine workings.

Project Location and Background

The Perigo Mine is located in northern Gilpin County, Figure 1, approximately four (4) miles southwest of Rollinsville in the upper reaches of Gamble Gulch, a tributary to South Boulder Creek. The environment is subalpine with site elevations varying from approximately 9,500 to over 10,500 feet above sea level. Topography is dominated by Gamble Gulch, a perennial stream that drains the northeastern flank of Dakota Hill. Slopes in the area are moderate with the site situated in a northeast aspect.

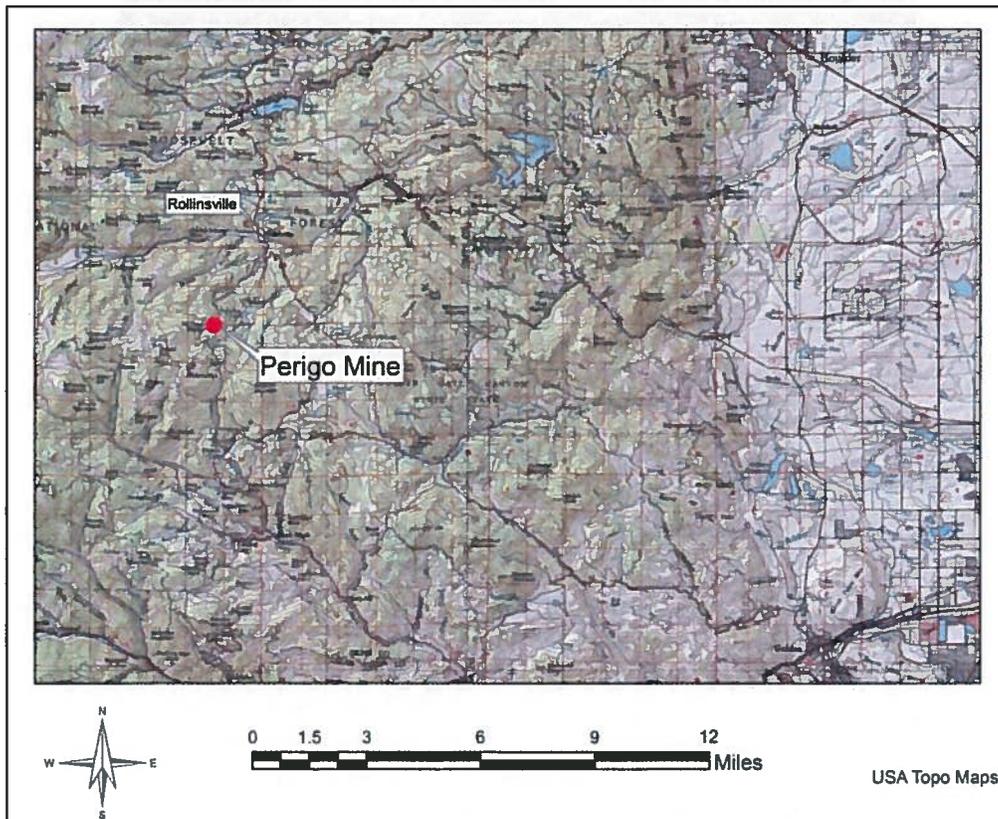


Figure 1. Location of the Perigo Mine.

Geologic Setting

The majority of northern Gilpin County is underlain by metamorphic rocks generally associated with the Idaho Springs Formation. The metamorphic rocks consist mostly of gneisses resulting from high-grade regional metamorphism, but have been intruded by igneous rocks possibly connected with the Boulder Creek Granodiorite and Silver Plume Granite (Gable, 1969). The gneissic rocks vary in composition from rich in biotite to rich in hornblende with areas of granitic composition that dominantly display migmatic texture. Numerous north and northwest trending folds and faults have resulted in a complex sequence of superimposed deformation events and apparent major discontinuities (Gable, 1969). Local geology is shown in Figure 2.

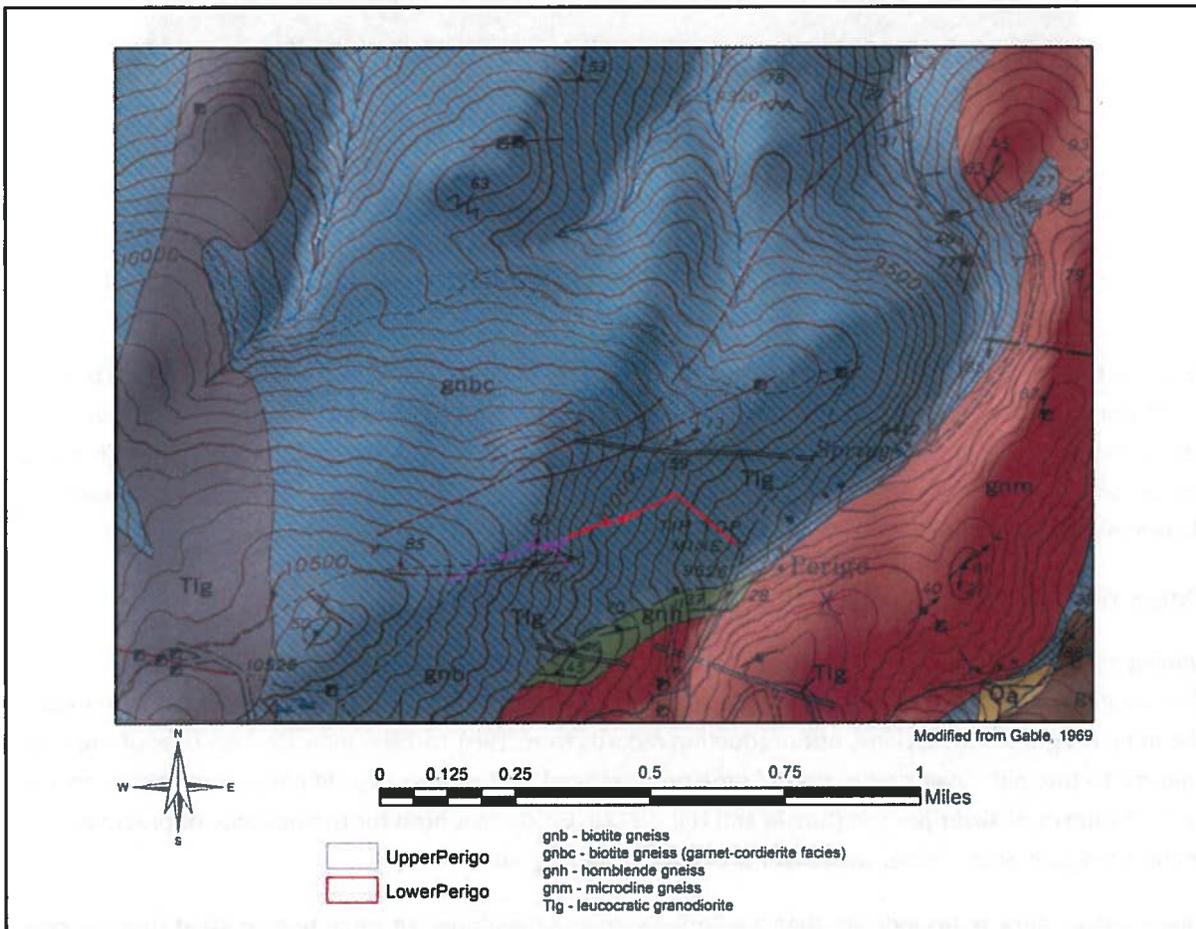


Figure 2. Local geology with overlaid Perigo Mine workings.

Locally, the Perigo mine site lies wholly within a large band of biotite gneiss (Figure 3) with areas of distinct migmatic texture. A zone of garnet-cordierite bearing gneiss lies just to the north of the site, while the site is bounded on the south by a hornblende bearing gneiss and microcline gneiss. An interesting intrusion of leucocratic (light colored) granodiorite underlies a large portion of Dakota Hill to the west, and may possibly be associated with ore deposition along veins in the Perigo District.



Figure 3. Photo of exposed biotite gneiss near Perigo Mine.

Veins in the Perigo District have a general east-northeasterly trend and vary from nearly vertical to a steep north dip. The developed veins consist mostly of the “pyritic gold type”, and were driven on persistent mineralized fracture zones (Lovering and Goddard, 1950). Mineralization along these fracture zones varies in width from merely inches to six (6) feet in some locations, and is defined by extensive dissemination of pyrite.

Perigo Mine History and Workings

Mining at the Perigo began in 1860 and continued sporadically until the early 1940’s, with no documented evidence of mining in the last seventy years. Information regarding early development at the mine is significantly lacking, but production records from 1901 to 1909 indicate 42.5 tons of ore was shipped to the mill. Over that period of time ore averaged 1.23 ounces of gold per ton and between 1.2 and 4.7 ounces of silver per ton (Bastin and Hill, 1917). Gold accounted for the majority of precious metal produced at the mine, with silver providing some payout.

The available mine maps indicate that the Perigo vein was developed through two crosscut tunnels, one termed the Lower Tunnel located near the Perigo townsite at an approximate elevation of 9,610 feet above MSL, and the Upper Tunnel located west of the townsite at an approximate elevation of 10,065 feet above MSL. The lower crosscut tunnel is approximately 780 feet long while the upper crosscut tunnel is approximately 350 feet long. Multiple smaller veins are associated with the larger Perigo vein system and are referred to on the mine maps as the Baker, Daisy, Red Pocket, and Ladysmith veins, and are shown in Figures 4 and 5. Another mine map acquired from a local landowner, Figure 6, depicts a cross section of the mine workings and indicates that the Perigo vein has been stoped over 750 feet

vertically from surface to the Lower Tunnel. The date associated with the Perigo Mine cross section is unknown. All of the available mine maps denote the Lower Tunnel as being the deepest development of the Perigo vein, but mine inspection reports from 1923 to 1937 discuss a 200 feet deep shaft (winze) driven downward from the "crosscut tunnel" (Lower Tunnel?).

Currently, neither of the Perigo crosscut tunnels are accessible, but some stopes along the western end of the mine workings are relatively open but not easily accessible. At this time no openings allow for safe underground exploration of the Perigo mine workings.

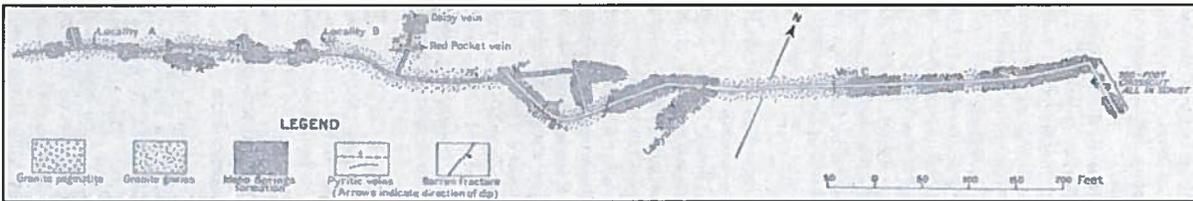


Figure 4. Lower Tunnel, Perigo Mine (from Bastin and Hill, 1917).

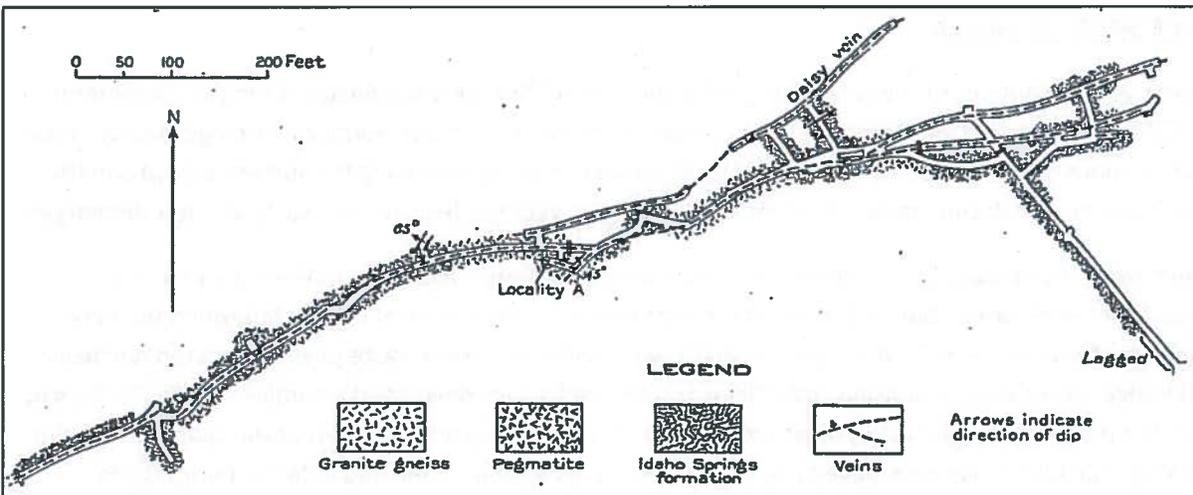


Figure 5. Upper Tunnel, Perigo Mine (From Bastin and Hill, 1917).

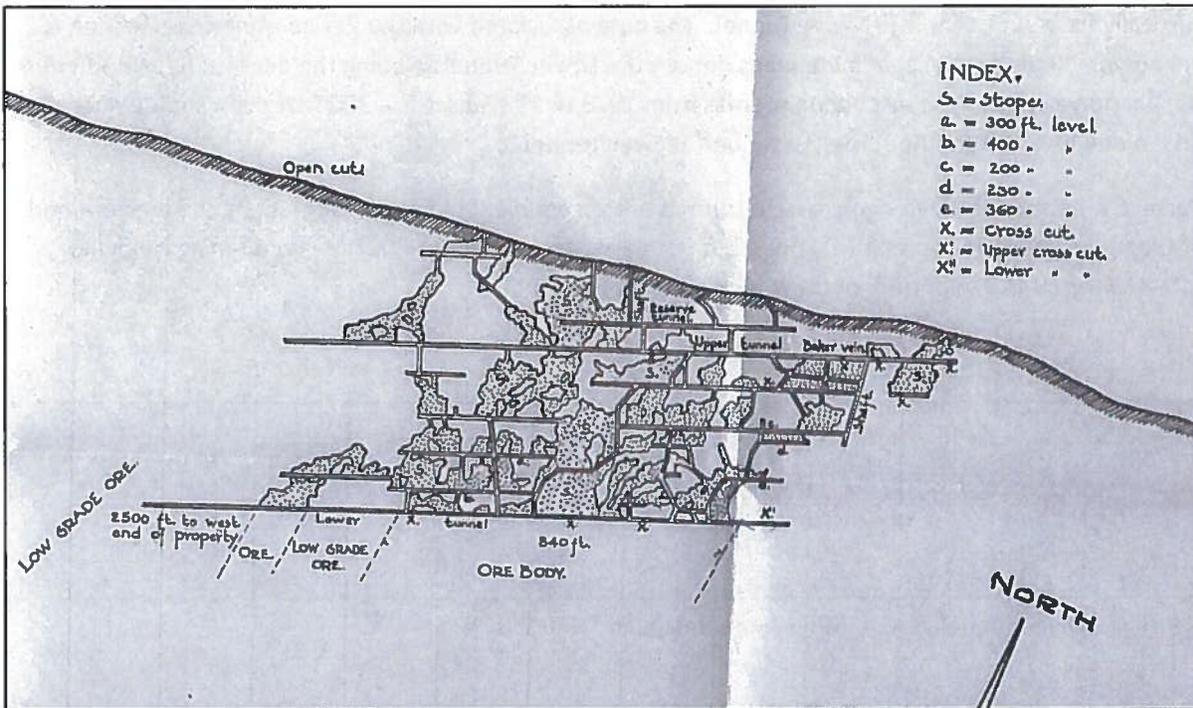


Figure 6. Perigo Mine cross section acquired from local landowner.

Surficial Mine Features

Surface investigations of the area surrounding the Perigo Mine were conducted during the summer of 2013 and 2014 to better understand site geology, mine working layout, surface hydrology, and potential implications of source control. The initial investigation involved traversing the surface area above the Perigo Mine and documenting observed mine workings, geologic features and surface water discharges.

Numerous historic waste piles cover the hillside above the Perigo town site indicating a period of significant exploration, but only a few of the sites observed suggest extensive underground workings and are shown in Figure 7. A number of shafts with reasonably sized waste piles are located northeast of Perigo on the Daisy Extension Lode Claim and appear to have developed a parallel vein to the Perigo, while a much more significant portal and associated waste pile just to the west of the shafts on the Jim Blaine Lode Claim may have developed Perigo veins and possibly connected with the Perigo Mine workings. Another set of relatively significant collapsed portals lies to the southwest of the site, but their subsurface orientation and developed veins are unknown.

There are numerous exploration borings and drill pads east of the Perigo site that likely were constructed in an effort to find the extension of the Perigo structure. One anecdotal story discusses the possibility that the exploration borings were actually drilled to explore and delineate a large porphyry molybdenum deposit that lies deep under Dakota Hill. There is no known evidence to confirm that story other than the discovery of some molybdenum bearing structures on top of Dakota Hill and the presence of so many drill pads.

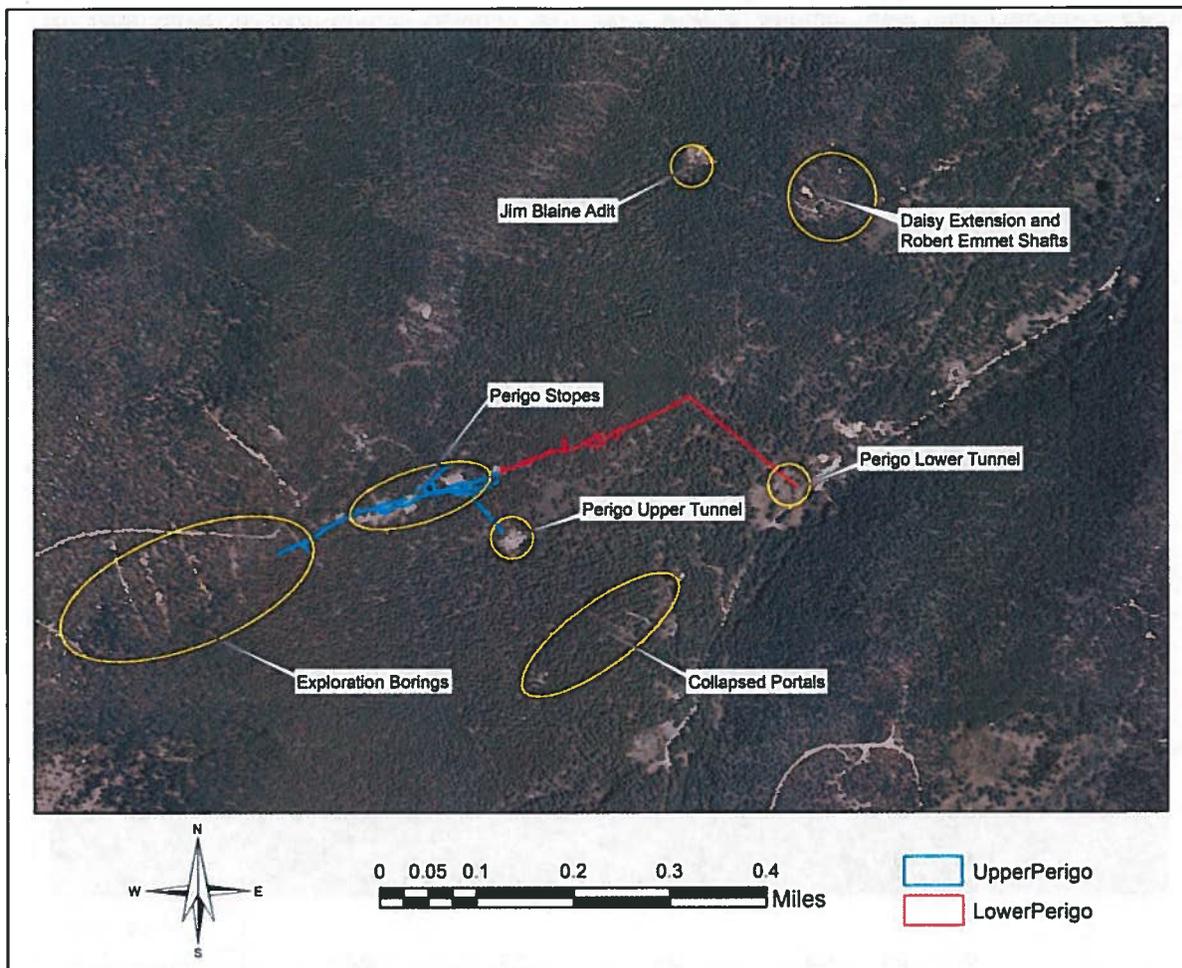


Figure 7. Surficial mine features in the Perigo area.

The Lower Perigo Tunnel and Upper Perigo Tunnel are the most significant waste piles in the Perigo area, indicating that they were the most productive mines. Some open/collapsed stopes and shafts on the ridgeline located due west of the townsite appear to be associated with the Upper Perigo Tunnel, and are likely surface expressions of upper level stoping in the mine. The majority of mining along the Perigo Vein was conducted via access along both the Lower and Upper Tunnels, and not from vertical shafts driven from surface.

Surface Water and Groundwater

During the surface investigation of the Perigo area, spring and adit discharges were documented along with a records search for permitted groundwater wells. Figure 8 depicts the location of all the surface water and groundwater features that were discovered during the investigation. A description of the three household water wells is included in Appendix I, and is taken directly from the Colorado Division of Water Resources website.

Surface water discharges were sampled for flow and water chemistry in June 2014 and September 2014 by EPA and their contractor. Results for those sampling events can be obtained from EPA.

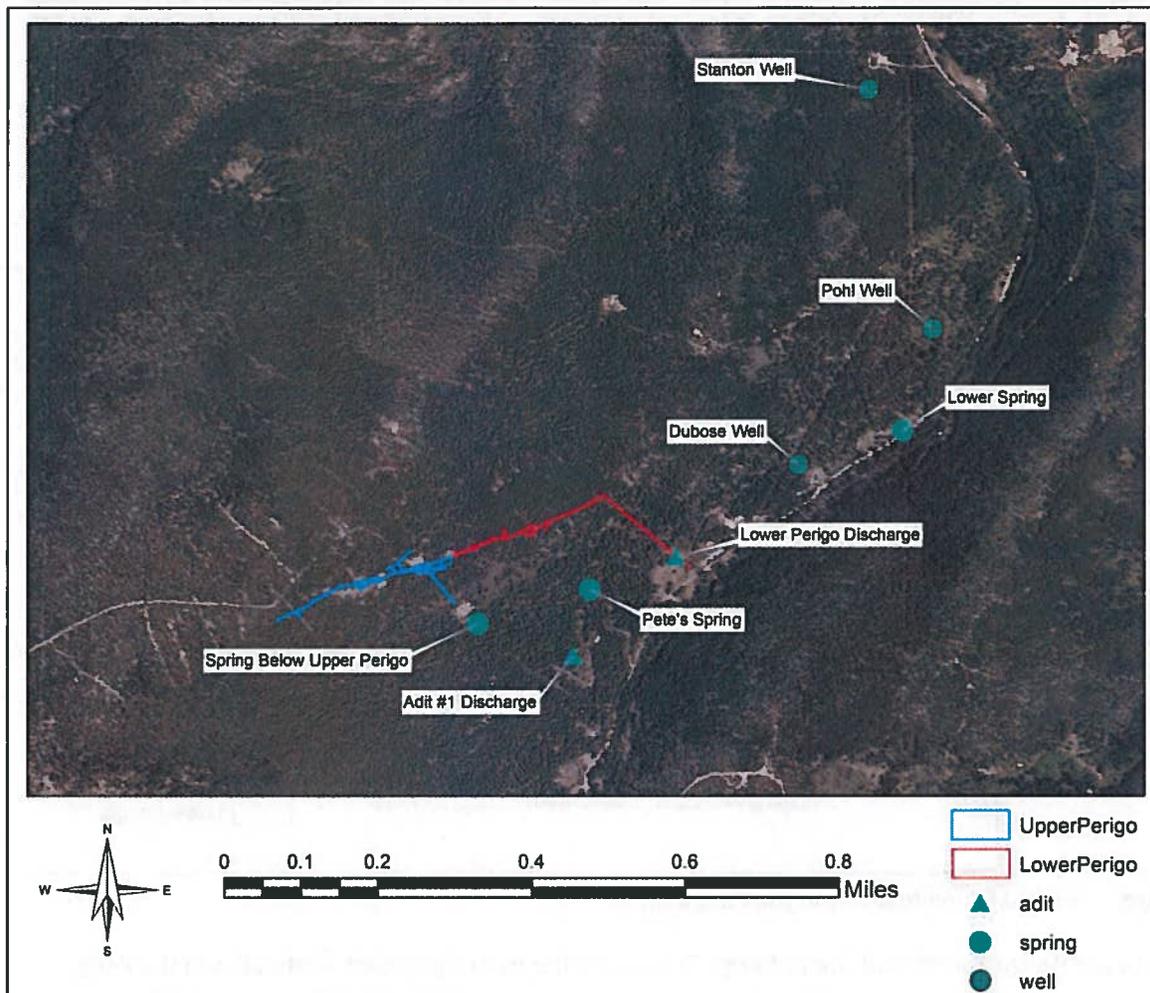


Figure 8. Location of surface water discharges and groundwater wells.

Surface water discharges associated with mining appear to be limited to the Perigo Mine, with the majority of flow emanating from the Lower Perigo Tunnel. All other mines in the area except for the site labeled Adit #1 Discharge were dry during visitation in both spring and fall, and showed no visible signs that flow from those portals has occurred recently. Both the Lower Spring and Pete's spring appear to be perennial, with strong visible evidence for year round flow. The Lower Spring may be associated with an extension of the Perigo structure towards Gamble Gulch, but no bedrock geology is exposed near that location for verification. Pete's spring is more likely associated with a strong break in slope, where exposed bedrock drops into colluvial and morainal cover lower on the slope.

Flow at the Lower Perigo Portal has been measured on various occasions over the last four (4) years during EPA sampling events, and varied between 54 and 512 gpm with an average flow of 174 gpm. On a number of documented cases, the flow rate from the Lower Perigo Portal has increased significantly

for short periods of time, often termed “surges” or “blowouts,” even though the physical condition of the collapsed portal has not changed. The Lower Perigo Portal likely acts as a “French Drain” not only for the mine workings, but also for the surrounding area, while possibly intercepting more regional groundwater.

Drilling Investigation

During October 2013, a drill rig was mobilized to the site to determine the exact location of subsurface mine workings associated with the Lower Perigo Portal and gather hydrogeologic and geotechnical information that could be used for portal rehab design and potential bulkhead planning. Five borings were drilled to find the Lower Perigo Crosscut at two separate locations. This methodology has been successfully deployed at other collapsed portals to gather accurate information that can be used for portal rehab and excavation. Figure 9 shows the location of all five borings, and the likely location of mine workings based on actual intercepts at each of the locations. All drilling was done with a track mounted CME-55 rig with borings advanced using a combination of 6-inch ODEX, 5-inch down the hole hammer (DTHH), and HQ wireline core.

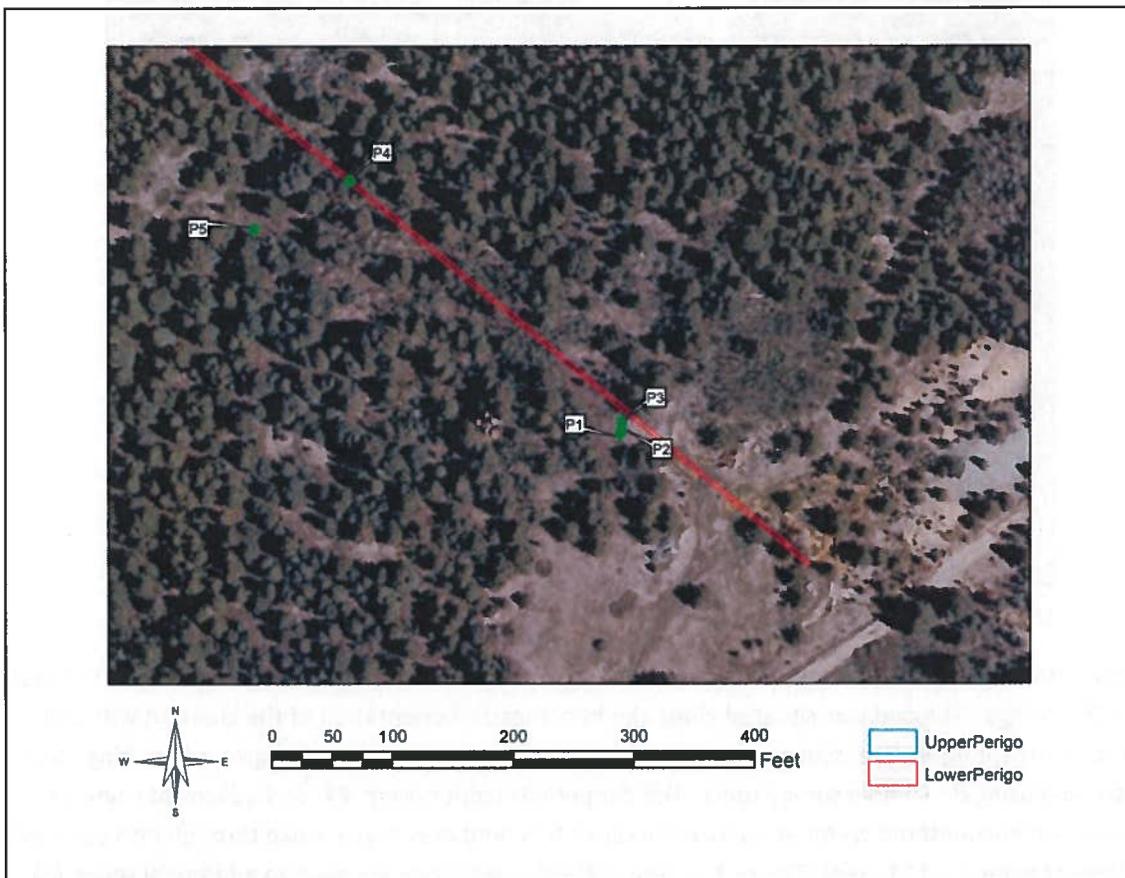


Figure 9. Boring locations.

The lower drill pad was constructed directly above the current discharge for the lower portal (Figure 10), and was intended to determine the subsurface location, orientation and depth of the crosscut at a shallow depth to better direct a much deeper intercept boring farther up the hill. Three borings were advanced to 49, 50 and 53 feet respectively on approximately five (5) foot intervals across the likely location of the crosscut tunnel. The first two (2) borings failed to intercept any mine workings, but the third boring appeared to intercept a six (6) inch void at approximately 49 feet resulting in a loss of circulation and agitation of iron precipitate in the portal discharge. The small void encountered in boring P3 likely indicated that the workings were “nicked” at 49 feet, but the exact location, orientation, and dimensions of the crosscut could not be determined. No additional borings could be drilled at this location to verify the location of mine workings due to the limited area of the constructed drill pad. Boring P2 was completed as a 2-inch monitoring well, while the other two borings were abandoned with grout and bentonite.



Figure 10. Drill rig at lower drill pad above collapsed portal.

An upper drill pad was constructed along an old mine road approximately 300 feet uphill from the first three (3) borings. The pad was situated along the hypothesized orientation of the crosscut with the hope of intercepting the crosscut at a location where the condition of the underground workings could be assessed using down hole survey tools. The deeper intercept boring, P4, was advanced using air hammer and encountered water at approximately 37 feet, and eventually broke through into open mine workings at a depth of 117 feet (Figure 11). The drill string was then lowered an additional seven (7) feet and encountered the mine floor, verifying the height of the crosscut tunnel at approximately seven (7) feet. Fifteen (15) feet of 4-inch, PVC casing was placed in P4 and then grouted. The remaining

portion of the boring was left open to the mine workings to allow for access with geophysical tooling. Upon completion of the well, the water level was measured at 107 feet below ground surface, indicating a water level approximately 10 feet above the back of the crosscut.



Figure 11. P4 boring at time of mine working intercept.

An additional boring (P5) was located along the mine road approximately 65 feet from P4 to provide rock core information and allow for packer testing. The boring was advanced to 49 feet with ODEX and DTTH, and then, HQ core was advanced to a depth of 127 feet. Detailed core logs and photos are provided in Appendix II. All rock encountered was biotite gneiss with varying lenses of granitic migmatite suggesting localized high temperature melting. Strong foliation and banding with a dip of approximately 45 degrees was evident in most recovered core, but some core runs had less discernible foliation. Generally, the recovered core had a very high Rock Quality Description (RQD) with values ranging from 70% to 100% and averaging 91%, and not surprisingly, the rock had relatively few fractures per foot, averaging approximately one (1). A preliminary rock mass analysis of core recovered from P5 is included in Appendix III, and indicates a Rock Mass Rating (RMR) of 67 (Good), and a Q Rating of 12.13 (Good). The RMR and Q rating would suggest that ground conditions within the cross cut portion of the lower tunnel should be good and would only require minimal ground control during rehab. Sections of the lower tunnel cross cut that parallel or cross geologic structures may require areas of increased ground control, but the general rock mass appears to be good. Boring P5 was completed as a 2-inch monitoring well with the screen interval from 107-127 feet, sand pack from 105-127 feet, and grout from 105 feet to surface.

During completion of Boring P5, packer testing was conducted along three, ten (10) foot zones to gain a better understanding of bedrock hydraulic conductivity and aid in bulkhead design. Packer testing was conducted using a single HQ-wireline packer, which allowed testing to be performed without "tripping" out the drill string. At the end of a core run, the drill string was lifted 10 feet, and the packer inserted and inflated, to allow packer testing along that section. Water was pumped down the drill string using a Moyno pump mounted to the rig, while total flow was tracked by an in-line mounted analog flow meter, graduated in tenths of a gallon.

A Lugeon packer testing procedure was followed for each of the three packer tests. The Lugeon test is a pressure step method that measures steady-state water uptake of the formation across three pressures that are increased and then decreased, creating a closed pressure loop. The plotted pattern of flow versus pressure has been shown to represent various flow patterns inherent to the conductive fractures in the bedrock (Singhal and Gupta, 2010), and allow for calculation of a Lugeon value and hydraulic conductivity value across the zone tested. Results from each of the packer tests are included in Appendix IV.

The first packer test interval between 71-feet and 82-feet indicated void filling, with a calculated Lugeon value of 0.2 and a hydraulic conductivity of 2.33×10^{-6} cm/sec. The indication of void filling is probably a result of insufficiently flushing the test section of cuttings prior to conducting the packer test. The conductivity value is likely higher than calculated due to void filling with cuttings that took place. The second packer test conducted between 92-feet and 102-ft was consistent with turbulent flow, and a Lugeon value of 1.5 and hydraulic conductivity of 1.59×10^{-5} cm/sec. The turbulent flow and higher Lugeon value suggest that minor fracture dilation may have occurred at the higher pressure causing flow to increase as the pressures were stepped down. The final packer test was conducted between 117-feet and 127-feet and indicated laminar flow. A Lugeon value of 0.4 and hydraulic conductivity of 4.48×10^{-6} cm/sec were calculated for the final packer test interval.

All of the packer tests indicate that the gneiss bedrock is tight to very tight with low to very low hydraulic conductivities. Interestingly, the final packer test section (117-127-feet) was one of the more highly fractured and jointed zones encountered, but yielded very low Lugeon and hydraulic conductivity values suggesting narrow aperture and limited interconnectedness. Additional packer testing could be conducted to confirm that the calculated conductivities are representative of the bedrock on a larger scale, but initial testing confirms that locally, the hydrogeologic properties would not be a limiting factor on bulkhead effectiveness.

Following completion of the borings, geophysical survey tools were lowered into boring P4 to determine the dimensions of the intercepted open workings. A report completed by Zapata to Shannon and Wilson is included in Appendix V, and provides details associated with the survey. A borehole camera that was lowered into the opening and indicated that the mine workings were nearly filled with iron hydroxides, to the point that only one foot of headspace between the precipitate and back was present. After completing the borehole camera work, a geophysical sonar tool was lowered into the boring to map the dimensions of the drift on 6-inch vertical sections. The sonar tool develops a map of the

workings based on returns from obstructions, so only the unobstructed extent of workings in “line of sight” were mapped. Due to the extensive precipitate filling the crosscut, just the upper two feet of the tunnel were open to mapping. The maximum length of drift surveyed was approximately 74 feet long, with a drift width of approximately seven (7) feet. The estimated height of the drift was approximately seven (7) feet, based on initial drilling. Most of the surveyed drift, 56 feet, was towards the portal, with only 18 feet to the northwest, most likely due to downstream flushing of precipitate during drilling.

It is difficult to determine the extent to which the crosscut is open and accessible based on the sonar and downhole camera survey, since the crosscut was mostly filled with precipitate. It is reasonable to assume that the crosscut is intact but filled with iron hydroxide sludge, based on the core information indicating a competent rock mass, and drilling information confirming hard, intact rock below the surface overburden. The downhole survey does indicate that the crosscut will likely be filled with precipitate for the extent that it is flooded, which may complicate portal reopening and crosscut cleanout.

Remedial Implications

When considering remedial options at the Perigo mine, it is imperative to honestly evaluate the feasibility of implementing a particular remedy and to consider the cost associated with initial construction and long term Operations and Maintenance (O&M). Of particular interest at the Perigo mine is the possibility of implementing source control that could reduce overall metals loading without construction of an active treatment facility and the burdensome O&M associated with perpetual treatment. Initial investigation of the site suggests that source control remedies including reduction of infiltration through collapsed stopes and installation of hydraulic seal bulkheads are viable options that could be implemented.

There are numerous collapsed stopes located uphill from the Upper Perigo mine workings that likely provide pathways for surface water to enter the underground workings, eventually discharging from the lower portal. Diversion ditches and recontoured slopes would provide effective means to move surface water flows away from collapsed stopes. Additionally, near surface seals consisting of low permeability materials (geomembranes, clays, polyurethane foam plugs, ect.) could be installed over the collapsed stopes to further reduce infiltration from snow melt and precipitation. To adequately reduce infiltration near surface seals would have to be installed slightly below the upper bedrock surface to address near surface groundwater flow within the overburden and weathered bedrock zone. These measures could provide a cost effective reduction in overall discharge at the Lower Portal, but will not eliminate discharge completely.

Installation of one or more hydraulic seal bulkheads would likely provide additional reduction in discharge at the Lower Portal. A number of historic “surges” or “blowouts” from the lower portal have been documented in the past, but with installation of a hydraulic seal bulkhead, those events could be eliminated. Bulkheads could also provide a means to return the groundwater system to near “pre-mining” levels, thereby reducing oxidation of sulfides through flooding and the subsequent associated

acid mine drainage. If bulkheads were installed, the option for some type of in-mine treatment to further address acid mine drainage could be explored.

Another alternative to typical hydraulic seal bulkheads would be the installation of “squeeze plugs” along the Lower Perigo crosscut. Squeeze plugs function similar to typical bulkheads, but consist of low mobility grouts pumped into the crosscut from the surface through boreholes at multiple locations. The use of boreholes to install the plugs eliminates the requirement to re-open the collapsed portal, treat the discharge, and handle the iron hydroxide sludge. This remedy would require a number of additional boreholes and likely some road improvements above the collapsed lower portal.

Next Steps

The logical sequence of next steps at the Perigo site would be to design and construct surface water controls at the collapsed stopes, and then open and rehabilitate either or both the Upper and Lower Perigo crosscuts. Depending on the remedial approach, re-opening of one or more of the portals is necessary to allow for information collection to facilitate bulkhead design. These steps could be accomplished simultaneously to facilitate expedited remedial action at the site.

Installation of surface water controls could be accomplished relatively easily since the site would only require minor road improvement to allow access by equipment. The majority of collapsed stopes are well defined in their location and extent by their surface expressions, facilitating effective remedy implementation.

Additional drilling could be conducted along the Lower Perigo crosscut up gradient from the location of boring P4 to provide additional geotechnical information for bulkhead or squeeze plug design. These borings would be sited to intercept the crosscut at potential locations where the bulkhead or squeeze plugs would be installed.

Excavation and rehabilitation of the Upper Perigo crosscut will pose more challenges than installation of surface water controls, but appears to be feasible based on initial assessment. Currently, the portal is completely collapsed, but does not appear to be impounding significant water. A safe and stable portal entry structure will need to be constructed by excavation of the collapse and installation of large diameter culvert. Once the crosscut is accessible, the underground workings can be assessed to determine the amount and degree of rehabilitation required to provide safe underground access. Rehabilitation of the upper portal will allow collection of information that could be used to further refine the remedial approach at the site and specifically the Lower Perigo crosscut.

If a remedial option is chosen that requires access to the Lower Perigo crosscut, a similar process can be followed to establish access to the underground workings, although installation of a portal structure at the lower crosscut poses significant challenges due to the amount of water impounded by the collapse. There appears to be at least seventeen (17) vertical feet of impounded water at the current collapse location. To establish entry into the crosscut at the original crosscut elevation, impounded water will have to be drained or pumped and then treated during excavation prior to release from the site. Discharge from the collapsed portal during excavation will undoubtedly be concentrated with

suspended solids like iron hydroxides, that will require significant settlement ponds to allow polishing before release. Settlement times could be reduced through the addition of flocculants, but that will not eliminate the need for a number of ponds. Once access has been established, the underground workings can be assessed for additional rehab and bulkhead feasibility.

Conclusion

Initial investigation of geology, hydrology and mine workings conducted by DRMS through surface and subsurface methods indicate that the Perigo Mine is a viable location for implementation of source control remedies. The geology and mine layout appear to be favorable for installation of one (1) or more hydraulic seal bulkheads, while collapsed stopes associated with the mine can be addressed through surface means to reduce infiltration of meteoric water into the mine workings. Implementation of source control should provide an effective means of reducing metals loading to Gamble Gulch from the Perigo Mine.

Bibliography

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Appendix I
Groundwater Wells

Colorado Department of Natural Resources

Colorado.gov | Contact Us

Colorado Division of Water Resources

Colorado's Well Permit Search

Well Constructed

[Help](#) Last Refresh: 11/14/2014 12:01:53 AM

Receipt: 0404223 **Division:** 1
Permit #: 197116- **Water District:** 6
Well Name / #: **County:** GILPIN
Designated Basin: **Management District:**
Case Number:
WDID:

[-] Applicant/Owners History

Date Range	Applicant/Owner Name	Address	City/State/Zip
Unknown - Present	STANTON SOLOMAN R	1812 UPPER MOON GULCH ROAD	BLACK HAWK, CO 80422

[-] Location Information

Approved Well Location:

Q40 Q160 Section Township Range PM Footage from Section Lines
 NW SE 11 2.05 73.0W 6th 2765 N 2230 E
Northing (UTM y): 4415545.6 **Easting (UTM x):** 455056.0
Location Accuracy: Spotted from section lines

Physical Address **Subdivision Name**
 City/State/Zip JOHN Q A ROLLINS ET AL PLACER
 Filing Block Lot

Parcel ID: **Acres in Tract:** 5.16

[-] Permit Details

Date Issued: 08/06/1996 **Date Expires:** 08/06/1998
Use(s): HOUSEHOLD USE ONLY **Aquifer(s):** ALL UNNAMED AQUIFERS
Special Use:

Area which may be irrigated:
Maximum annual volume of appropriation:
Statute:

Permit Requirements: **Totalizing Flow Meter** **Geophysical Log** **Abandonment Report**
 No No No

Cross Reference **Permit Number** **Receipt** **Description**
Permit(s):
Comments: PORTION OF

[-] Construction/Usage Details

Well Construction Date: 12/16/1996 **Pump Installation Date:**
Well Plugged: **1st Beneficial Use:**

Elevation	Depth	Perforated Casing (Top)	Perforated Casing (Bottom)	Static Water Level	Pump Rate
9000	220	160	220	18	6

Driller	Lic # Name	Address	Phone Number
	328 SMITH, CALVIN R.	109 GAP ROAD BLACKHAWK, CO 80403	303-642-3339

[-] Application/Permit History

Ownership Change 09/17/2014
Well Construction Report Received 02/07/1997
Well Constructed 12/16/1996
Permit Issued 08/06/1996
Application Received 07/30/1996

[-] Imaged Documents

Document Name	Date Imaged	Annotated
Change in Owner Name/Address/Location	10/24/2014	No
Original File	12/07/2007	No

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FORM NO. GWS-51 10/94

WELL CONSTRUCTION AND TEST REPORT STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

For Office Use only

RECEIVED FEB 07 1997

1. WELL PERMIT NUMBER 197116

2. OWNER NAME(S) Dennis McCoy Mailing Address 4599 N. Broadway City, St. Zip Boulder, CO 80304 Phone () 442-4083

3. WELL LOCATION AS DRILLED: NW 1/4 SE 1/4, Sec. 11 Twp. 2 S Range 73W 6thp DISTANCES FROM SEC. LINES: 2765 ft. from North Sec. line. and 2230 ft. from East Sec. line. OR SUBDIVISION: John O A Rollins Et Al Placer LOT BLOCK FILING(UNIT) STREET ADDRESS AT WELL LOCATION: Moon Gulch Road

4. GROUND SURFACE ELEVATION 9000 ft. DRILLING METHOD Airpercussion DATE COMPLETED 12/16/96 TOTAL DEPTH 220 ft. DEPTH COMPLETED 220 ft.

5. GEOLOGIC LOG: Table with columns Depth and Description of Material (Type, Size, Color, Water Location). Rows include 0-2 ft Black-brown fill dirt, 2-14" Brown dirt, 14-22" Gray granite, 22-27" Brown granite, 27-95" Gray granite, 95-97" Brown granite, 97-181" Gray schist, 181-195" Gray granite, white quartz, 195-220" Gray schist.

6. HOLE DIAM. (in.) From (ft) To (ft) Table with rows for 8 1/2" (0-20) and 6" (20-220).

7. PLAIN CASING Table with columns OD (in), Kind, Wall Size, From(ft), To(ft). Rows include 6 5/8" Steel .188 -1 20 and 4" PVC 200 psi 15 160. Also includes PERF. CASING: Screen Slot Size: 1/8" 4" PVC 200 psi 160 220.

8. FILTER PACK: Material N/A, Size, Interval. 9. PACKER PLACEMENT: Type N/A, Depth.

10. GROUTING RECORD: Material Amount Density Interval Placement. Row: cement 188# 17# 0-20 pour+vibrat.

REMARKS: Water located at: 192 ft.

11. DISINFECTION: Type chlorine (dry) Amt. Used 1 cup

12. WELL TEST DATA: [] Check box if Test Data is submitted on Form No. GWS 39 Supplemental Well Test. TESTING METHOD air Static Level 18 ft. Date/Time measured 12/16/96 Production Rate 6 gpm. Pumping level 215 ft. Date/Time measured 2 p.m. - 4 p.m. Test length (hrs.) 2

13. I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13)(a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]

CONTRACTOR C.R. Smith Drilling Phone (303) 642-3339 Lic. No. 328 Mailing Address 109 Gap Road, Black Hawk, CO 80402 Name/Title (Please type or print) Calvin R. Smith Signature [Signature] Date 1/8/97

INSTRUCTIONS FOR WELL CONSTRUCTION AND TEST REPORT

- Rev. Oct. 94

The report must be typed or printed in **BLACK INK**. All changes on the form must be initialed and dated. Attach additional sheets if more space is required. Each additional sheet must be identified at the top by the well owner's name, the permit number, form name/number and a sequential page number. Report depths in feet below ground surface.

This form may be reproduced by photocopy methods, or by computer generation with prior approval by the State Engineer. Photocopy reproductions must retain margins and print quality of the original form.

The original form must be submitted to the State Engineer's Office within 60 days after completing the well or 7 days after the permit expiration date, whichever is earlier.

A copy of the form must be provided to the well owner.

1. Complete the Well Permit Number in full.
2. Fill in Name and Mailing Address of Well Owner where correspondence should be sent.
3. Complete the blocks for the actual location of the well where drilled. If the owner has more than one well serving this property, provide the identification (Owner's Designation) for this well. **DO NOT USE THE OWNER SUPPLIED LOCATION** unless a survey has been provided. For wells located in subdivisions the lot, block and subdivision information must also be provided.
4. Report the ground surface elevation in feet above sea level if available. This value may be obtained from a topographic map. Describe the drilling method used to construct the well and the date completed. Indicate the total depth drilled and the actual completed depth of the well.
5. Fully describe the materials encountered in drilling. Do not use formation names unless they are in conjunction with a description of materials.
Examples of descriptive terms include:
Grain size—Boulders, gravel, sand, silt, clay.
Hardness—Loose, soft, tight, hard, very hard.
Color—All materials. Most critical in sedimentary rock.
Depth when water is encountered (if it can be determined).
6. Provide the diameters of the drilled bore hole.
7. The outside diameter, kind, wall thickness and interval of casing lengths must be indicated.
8. Indicate the type and size of filter (gravel) pack and the interval where placed.
9. Indicate the type and setting depth for any packers installed.
10. The density of the grout slurry must be reported and may be indicated as pounds per gallon, gallons of water per sack, total gallons of water and number of sacks used, etc. Specify the grout placement method, i.e. tremie pipe or positive displacement. The percentage of additives mixed with the grout should be reported under remarks.
11. Record the type and the amount of disinfection used, how placed and the length of time left in the hole.
12. Report well test data as required by Rule 10.7. Spaces are provided to report all measurements made during the test. The report should show that the test complied with the provisions of the rules. If a test was not performed explain when it will be done. If available, report clock time when measurements were taken.
13. Fill in Company Name and Address of Contractor who constructed the well. The report must be signed by the licensed contractor responsible for the construction of the well.

Form No.
GWS-25

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES

818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203
(303) 866-3661

716

APPLICANT

WELL PERMIT NUMBER <u>197116</u>			
DIV. 1	CNTY. 24	WD 6	DES. BASIN MD

Lot: Block: Filing: Subdty: JOHN Q A ROLLINS ET AL PLACER

DENNIS MCCOY
% GROUND WATER SYSTEMS
4599 N BROADWAY
BOULDER CO 80304-

(303)442-4083

PERMIT TO CONSTRUCT A WELL

APPROVED WELL LOCATION
GILPIN COUNTY

NW 1/4 SE 1/4 Section 11
Twp 2 S RANGE 73 W 6th P.M.

DISTANCES FROM SECTION LINES

2785 Ft. from North Section Line
2230 Ft. from East Section Line

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

- 1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of the permit does not assure the applicant that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
- 2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
- 3) Approved pursuant to CRS 37-92-602(3)(b)(II)(A) as the only well on a residential site of 5.155 acres described as that portion of the John Q. A. Rollins et al Placer, Gilpin County, being more particularly described on the attached exhibit "A".
- 4) The use of ground water from this well is limited to ordinary household purposes inside a single family dwelling. The ground water shall not be used for irrigation or other purposes.
- 5) The maximum pumping rate shall not exceed 15 GPM.
- 6) The return flow from the use of this well must be through an individual waste water disposal system of the non-evaporative type where the water is returned to the same stream system in which the well is located.
- 7) This well shall be constructed not more than 200 feet from the location specified on this permit.

M. M. 8-6-96

APPROVED
MAM

Hal D. Simpson

State Engineer

M. A. Malley

By

Receipt No. 0404223

DATE ISSUED AUG 06 1996

EXPIRATION DATE AUG 06 1998

RESIDENTIAL APPLICATIONS - GENERAL INSTRUCTIONS

There are a variety of uses for ground water in Colorado. This form (GWS-44) can be used when applying for a permit for a new well or replacement of an existing well for the following types of uses:

ORDINARY HOUSEHOLD USE inside one single family residence (NO outside water use allowed)
OTHER RESIDENTIAL USE (sometimes referred to as "domestic" use) which may include use in up to three single-family residences, watering of up to one acre of home gardens and lawns, and watering of domestic animals
LIVESTOCK WATERING on a farm, ranch, range, or pasture

If you are applying for a NEW household use only well, or for a NEW 35+ acre residential well outside the Denver Basin or Designated Basins of eastern Colorado, please use simplified forms GWS-49 or GWS-50. DO NOT use this form for registration of an existing unpermitted well (Use Form GWS-12), monitoring/observation wells (Use Form GWS-46), gravel pit wells (Use Form GWS-27), or for other uses not listed above, including - commercial, industrial, crop irrigation, municipal, etcetera (Use GENERAL PURPOSE Form GWS-45).

FEES Applications must be submitted with the appropriate required non-refundable filing fees. The required filing fee for most well permit applications is \$60. The filing fees for replacement or deepening well permit applications for most previously permitted residential and livestock water wells is \$20. Checks should be payable to the COLORADO DIVISION OF WATER RESOURCES.

Applications are evaluated in chronological order. Please allow approximately six weeks for processing.

APPLICATIONS must be completed clearly, and legibly, in BLACK INK or typed. ALL ITEMS in the application must be completed. Incomplete applications may be returned to the applicant for more information. Do not change or alter the application in any way.

THE LOCATION of the well in item 4 must be correctly and accurately described. The county, quarter/quarter, section, township, range, principal meridian, and distance from section lines must be provided.

NOTE: Distances are not necessarily the same distances as the distances from (your) property lines.

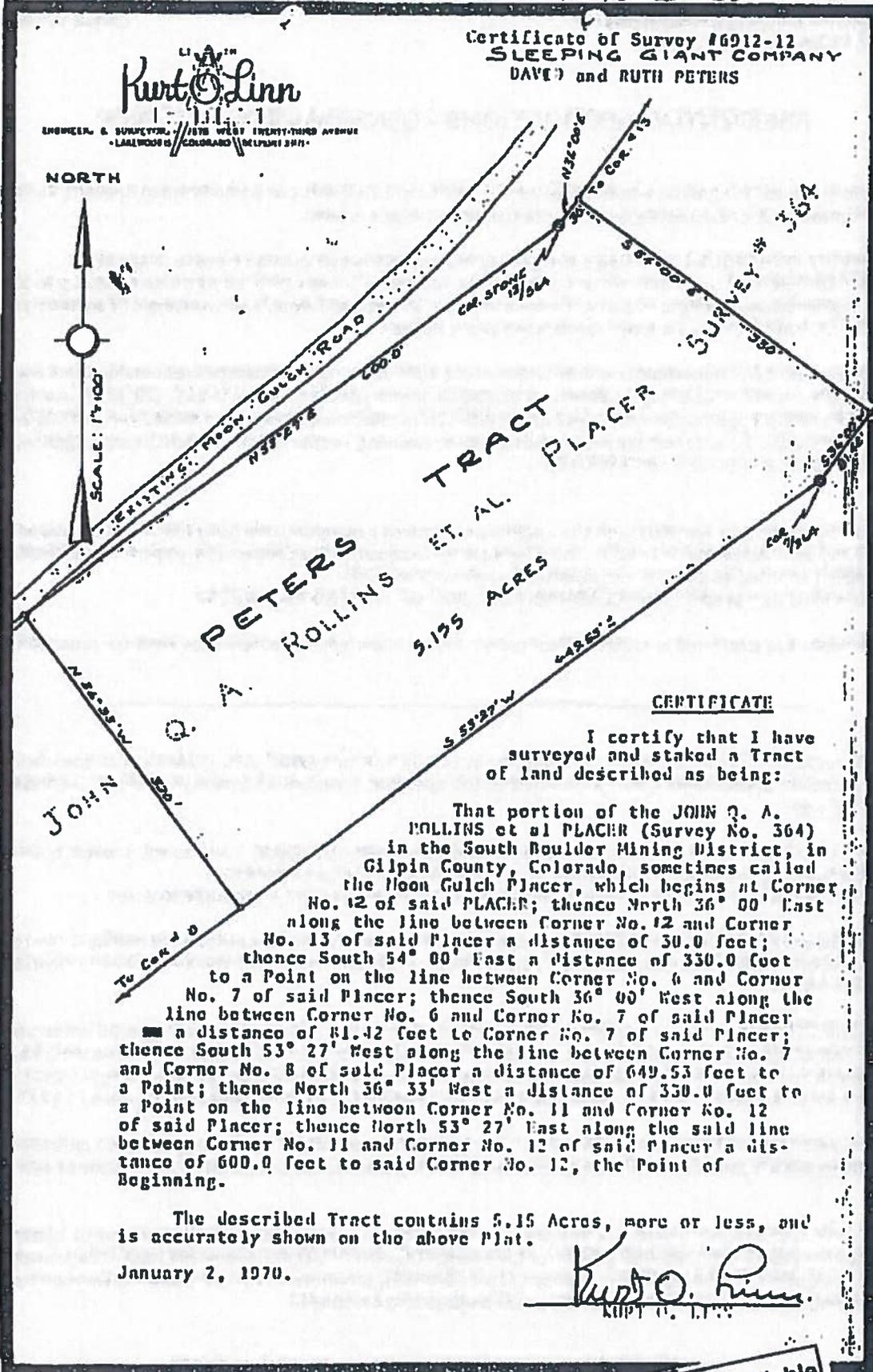
For additional assistance in describing the location of your well, review the publication entitled "How to Determine Well Location" which was provided with your packet, or can be requested from any Colorado Division of Water Resource office.

A LEGAL DESCRIPTION of your lot or parcel of land is required in item 5. For tracts of less than 35 acres approval may depend upon whether the tract was created by a division of land after June 1, 1972. If your lot is less than 35 acres in size, it would be prudent to have a deed or legal description that shows your tract was divided from a larger tract prior to June 1, 1972. This may be accomplished by obtaining a copy of a deed for the tract issued prior to June 1, 1972.

An ORIGINAL signature must be on each application. The applicant's authorized agent may sign the application, if a letter signed by the applicant is submitted with the application authorizing them to act as agent for the purpose of obtaining a well permit.

IF YOU HAVE ANY QUESTIONS regarding any item on the application form, please call the Division of Water Resources Ground Water Information Desk (303-866-3587), or the nearest Division of Water Resources Field Office located in Greeley (970-352-8712), Pueblo (719-542-3368), Alamosa (719-589-6683), Montrose (970-249-8622), Glenwood Springs (970-946-5665), Steamboat Springs (970-879-0272), or Durango (970-247-1845).

DETAILED INSTRUCTIONS ARE AVAILABLE UPON REQUEST



RECEIVED
 JUL 30 1996

WATER RESOURCES
 STATE ENGINEER
 COLO.

Best Copy Available

RECEIVED

JUL 30 1996

WATER RESOURCES
STATE ENGINEER
CCLO.

TO THE COLORADO DIVISION OF WATER RESOURCES

I, Dennis McCoy, hereby appoint Richard R. Wilson of Ground Water Systems, Inc., to act as my Agent of Record in obtaining a well permit on our land located in Section 11, Township 2S, Range 73W of the 6th P.M., County of Gilpin, State of Colorado.

I further request that all future correspondence be addressed to Richard R. Wilson, Ground Water Systems, Inc., 4599 North Broadway, Boulder, Colorado 80304, until the Statement of Beneficial Use is submitted to the State with a new and current mailing address.

Dennis McCoy

7/12/96
Date

Colorado Division of Water Resources

Colorado's Well Permit Search

Well Constructed

[Help](#) Last Refresh: 11/14/2014 12:01:53 AM

Receipt: 0405183 **Division:** 1
Permit #: 198651 -- **Water District:** 6
Well Name / #: **County:** GILPIN
Designated Basin: **Management District:**
Case Number:
WDID:

[-] Applicant/Owners History

Date Range	Applicant/Owner Name	Address	City/State/Zip
Unknown - Present	DUBOSE BEVERLY M	PO BOX 1488	NEDERLAND, CO 80466

[-] Location Information

Approved Well Location:
Q40 Q160 Section Township Range PM Footage from Section Lines
 NE NW 14 2.05 73.0W Sixth 200 N 2510 W
Northing (UTM y): 4414760.6 **Easting (UTM x):** 454908.7
Location Accuracy: Spotted from section lines

Physical Address **Subdivision Name**
City/State/Zip **Filing Block Lot**

Parcel ID: **Acres in Tract:** 1

[-] Permit Details

Date Issued: 10/02/1996 **Date Expires:** 10/02/1998
Use(s): HOUSEHOLD USE ONLY **Aquifer(s):** ALL UNNAMED AQUIFERS
Special Use:

Area which may be irrigated:
Maximum annual volume of appropriation:

Statute:

Permit Requirements: **Totalizing Flow Meter** **Geophysical Log** **Abandonment Report**
 No No No

Cross Reference	Permit Number	Receipt	Description
Permit(s):			
Comments:			

[-] Construction/Usage Details

Well Construction Date: 08/02/1997 **Pump Installation Date:** 05/29/1998
Well Plugged: **1st Beneficial Use:**
Elevation Depth Perforated Casing (Top) Perforated Casing (Bottom) Static Water Level Pump Rate
 9520 80 40 80 25 10
Driller Lic # Name Address Phone Number
 328 SMITH, CALVIN R. 109 GAP ROAD BLACKHAWK, CO 80403 303-642-3339
Pump Installer 1326 SMITH, FRANK 109 GAP ROAD BLACKHAWK, CO 80422 303-642-3339

[-] Application/Permit History

Pump Installation Report Received 06/08/1998
Pump Installed 05/29/1998
Well Construction Report Received 08/11/1997
Well Constructed 08/02/1997
Permit Issued 10/02/1996
Application Received 08/19/1996

[-] Imaged Documents

Document Name Date Imaged Annotated
Original File 12/07/2007 No

FORM NO.
GWS-32
10/84

PUMP INSTALLATION AND TEST REPORT
STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

For Office Use only

HECET

JUN 08 1998

WATER RECORDS
STATE ENGINEER
COLO.

1. WELL PERMIT NUMBER 198651

2. OWNER NAME(S) Bev. Dubose
Mailing Address P.O. Box 1488
City, St. Zip Nederland. Co. 80466
Phone ()

3. WELL LOCATION AS DRILLED: NE 1/4 NW 1/4, Sec. 14 Twp. 2 S, Range 73W 61E PM
DISTANCES FROM SEC. LINES:
200 ft. from North Sec. line. and 2510 ft. from West Sec. line.
(North or South) (East or West)
SUBDIVISION: LOT _____ BLOCK _____ FILING(UNIT) _____
STREET ADDRESS AT WELL LOCATION: _____

4. PUMP DATA: Type Submersible Installation Completed 5/29/98
Pump Manufacturer Aermotor Pump Model No. T12501153W
Design GPM 12 at RPM 3450, HP 11/2, Volts 115, Full Load Amps _____
Pump Intake Depth 75 Feet, Drop/Column Pipe Size 3/4" Inches, Kind Polypipe

ADDITIONAL INFORMATION FOR PUMPS GREATER THAN 50 GPM:

TURBINE DRIVER TYPE: Electric Engine Other _____
Design Head _____ feet, Number of Stages _____, Shaft size _____ inches.

5. OTHER EQUIPMENT:

Airline Installed Yes No, Orifice Depth ft. _____, Monitor Tube Installed Yes No, Depth ft. _____
Flow Meter Mfg. _____ Meter Serial No. _____
Meter Readout Gallons, Thousand Gallons, Acre feet, Beginning Reading _____

6. TEST DATA: Check box if Test data is submitted on Supplemental Form.

Date 8/2/97
Total Well Depth 80' Time 2:4 PM
Static Level 25' Rate (GPM) 10
Date Measured 8/2/97 Pumping Lvl. 75'

7. DISINFECTION: Type _____ Amt. Used _____

8. Water Quality analysis available. Yes No

9. Remarks _____

10. I have read the statements made herein and know the contents thereof, and that they are true to my knowledge.
[Pursuant to Section 244-104 (13)(a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]

CONTRACTOR CR Smith Drilling Phone 642-3339 Lic. No. 1326
Mailing Address 109 Gap Rd. Boulder Hawk. Co. 80403

Name/Title (Please type or print) Frank E. Smith Signature Frank E. Smith Date 6/5/98

INSTRUCTIONS FOR PUMP INSTALLATION REPORT

The report must be typed or printed in **BLACK INK**. All changes on the form must be initialed and dated. Attach additional sheets if more space is required. Each additional sheet must be identified at the top by the well owner's name, the permit number, form name/number and a sequential page number. Report depths in feet below ground surface.

This form may be reproduced by photocopy methods, or by computer generation with prior approval by the State Engineer. Photocopy reproductions must retain margins and print quality of the original form.

The original form must be submitted to the State Engineer's Office within 60 days after completing the well or 7 days after the permit expiration date, whichever is earlier.

A copy of the form must be provided to the well owner.

If this form is submitted in conjunction with the Well Completion and Test Report, form number GWS-31, **ONLY THE PERMIT NUMBER AND OWNER NAME NEED TO BE COMPLETED** in items 1 and 2.

1. Complete the Permit Number in full.
2. Fill in Name and Mailing Address of Well Owner where correspondence should be sent.
3. Complete the blocks for the actual location of the well. For wells located in subdivisions the lot, block and subdivision information must also be provided.
4. Indicate the type of pump installed and complete the requested information. When installing pumps greater than 50 gpm, complete the additional information in this area.
5. Provide the information on other equipment which may be installed in the well.
6. Report test data as required by Rule 13.9. Spaces are provided to report all measurements made during the test. The report should show that the test complied with the provisions of the rules. If a test was not performed explain when it will be done. If available, report clock time when measurements were taken.
7. Record the type and the amount of disinfection used, how placed and the length of time left in the hole.
8. Indicate if a water quality analysis was performed and submit a copy of the report if available.
9. Use the remarks area to note any additional information including additional equipment installed, water supply construction problems.
10. Fill in Company Name and Address of Contractor who installed pumping equipment. The report must be signed by the licensed contractor responsible for the installation of pumping equipment.

FORM NO. GWS-31 10/94

WELL CONSTRUCTION AND TEST REPORT STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

For Office Use only RECEIVED AUG 11 1997 WATER RESOURCES STATE ENGINEER COLO.

1. WELL PERMIT NUMBER 198651

2. OWNER NAME(S) Beverly M. Dubose Mailing Address P.O. Box 1488 City, St. Zip Nederland, CO 8466 Phone () 258-4240

3. WELL LOCATION AS DRILLED: NE 1/4 NW 1/4, Sec. 14 Twp. 2S Range 73W 6th PM DISTANCES FROM SEC. LINES: 200 ft. from North Sec. line. and 2510 ft. from West Sec. line. OR (north of south) (east of west) SUBDIVISION: LOT BLOCK FILING(UNIT) STREET ADDRESS AT WELL LOCATION:

4. GROUND SURFACE ELEVATION 9520 ft. DRILLING METHOD Airpercussion DATE COMPLETED 8/2/97 TOTAL DEPTH 80 ft. DEPTH COMPLETED 80 ft.

5. GEOLOGIC LOG: Table with columns Depth and Description of Material (Type, Size, Color, Water Location). Entries: 0-24' Brown downwash, 24-35' Gray granite, 35-47' Gneiss, granite, 47-80' Gray granite.

6. HOLE DIAM. (in.) From (ft) To (ft) Table with entries: 8 1/2" 0 20, 6 20 80

7. PLAIN CASING Table with columns OD (in), Kind, Wall Size, From(ft), To(ft). Entries: 6-5/8" Steel .188 -1 20, 4" PVC 200 psi 15 40. Also includes PERF. CASING: Screen Slot Size: 1/8" hole, 4" PVC 200 psi 40 80

8. FILTER PACK: Material N/A Size Interval

9. PACKER PLACEMENT: Type N/A Depth

10. GROUTING RECORD: Table with columns Material, Amount, Density, Interval, Placement. Entry: cement 188# 17# 0-20 pour+vibrate

REMARKS:

11. DISINFECTION: Type Chlorine (dry) Amt. Used 1/2 cup

12. WELL TEST DATA: [] Check box if Test Data is submitted on Form No. GWS 39 Supplemental Well Test. TESTING METHOD Air Static Level 25 ft. Date/Time measured 8/2/97, Production Rate 10 gpm. Pumping level 75 ft. Date/Time measured 2 pm - 4 pm, Test length (hrs.) 2

13. I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13)(a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]

CONTRACTOR CR Smith Drilling Phone (303) 642-3339 Lic. No. 328 Mailing Address 109 Gap Road, Black Hawk, CO 80403

Name/Title (Please type or print) Calvin R. Smith

Signature [Handwritten Signature]

Date 8/8/97

INSTRUCTIONS FOR WELL CONSTRUCTION AND TEST REPORT

Rev. Oct. 94

The report must be typed or printed in **BLACK INK**. All changes on the form must be initialed and dated. Attach additional sheets if more space is required. Each additional sheet must be identified at the top by the well owner's name, the permit number, form name/number and a sequential page number. Report depths in feet below ground surface.

This form may be reproduced by photocopy methods, or by computer generation with prior approval by the State Engineer. Photocopy reproductions must retain margins and print quality of the original form.

The original form must be submitted to the State Engineer's Office within 60 days after completing the well or 7 days after the permit expiration date, whichever is earlier.

A copy of the form must be provided to the well owner.

1. Complete the Well Permit Number in full.
2. Fill in Name and Mailing Address of Well Owner where correspondence should be sent.
3. Complete the blocks for the actual location of the well where drilled. If the owner has more than one well serving this property, provide the identification (Owner's Designation) for this well. **DO NOT USE THE OWNER SUPPLIED LOCATION** unless a survey has been provided. For wells located in subdivisions the lot, block and subdivision information must also be provided.
4. Report the ground surface elevation in feet above sea level if available. This value may be obtained from a topographic map. Describe the drilling method used to construct the well and the date completed. Indicate the total depth drilled and the actual completed depth of the well.
5. Fully describe the materials encountered in drilling. Do not use formation names unless they are in conjunction with a description of materials.
Examples of descriptive terms include:
Grain size—Boulders, gravel, sand, silt, clay.
Hardness—Loose, soft, tight, hard, very hard.
Color—All materials. Most critical in sedimentary rock.
Depth when water is encountered (if it can be determined).
6. Provide the diameters of the drilled bore hole.
7. The outside diameter, kind, wall thickness and interval of casing lengths must be indicated.
8. Indicate the type and size of filter (gravel) pack and the interval where placed.
9. Indicate the type and setting depth for any packers installed.
10. The density of the grout slurry must be reported and may be indicated as pounds per gallon, gallons of water per sack, total gallons of water and number of sacks used, etc. Specify the grout placement method, i.e. tremie pipe or positive displacement. The percentage of additives mixed with the grout should be reported under remarks.
11. Record the type and the amount of disinfection used, how placed and the length of time left in the hole.
12. Report well test data as required by Rule 10.7. Spaces are provided to report all measurements made during the test. The report should show that the test complied with the provisions of the rules. If a test was not performed explain when it will be done. If available, report clock time when measurements were taken.
13. Fill in Company Name and Address of Contractor who constructed the well. The report must be signed by the licensed contractor responsible for the construction of the well.

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES

818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203
(303) 866-3581

WELL PERMIT NUMBER <u>198651</u>	
DIV. 1	CNTY. 24 WD 06 DES. BASIN MD

APPLICANT

SUBDIV: LOT SIZE: 1 ACRES
LOT: BLK: FLG:

BEVERLY M DUBOSE
BOX 1488
NEDERLAND CO 80486

(303) 258-4240

APPROVED WELL LOCATION

GILPIN COUNTY
NE 1/4 NW 1/4 SECTION 14
TWP 2S RANGE 73W 6th P.M

DISTANCES FROM SECTION LINES

0200 Ft. from North Section Line
2510 Ft. from West Section Line

PERMIT TO CONSTRUCT A WELL

**ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT
CONDITIONS OF APPROVAL**

- 1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of the permit does not assure the applicant that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
- 2) The construction of this well shall be in compliance with the Water Well Construction and Pump Installation Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
- 3) Approved pursuant to CRS 37-92-602(3)(b)(II)(A) as the only well on a residential site MORE PARTICULARLY DESCRIBED ON THE ATTACHED EXHIBIT A.
- 4) The use of ground water from this well is limited to ordinary household purposes inside a single family dwelling. The ground water shall not be used for irrigation or other purposes.
- 5) The maximum pumping rate shall not exceed 15 GPM.
- 6) The return flow from the use of this well must be through a non-evaporative waste water disposal system where the water is returned to the same stream system in which the well is located.
- 7) This well shall be constructed not more than 200 feet from the location specified on this permit.

M.M. 10-1-96

Hal D. Simpson

State Engineer

M.A. Malley

By

Receipt No. 0405183

DATE ISSUED OCT 02 1996

EXPIRATION DATE OCT 02 1998

COLORADO DIVISION OF WATER RESOURCES
 DEPARTMENT OF NATURAL RESOURCES
 1313-SHERMAN ST., RM. 818, DENVER CO 80203
 phone - info: (303) 866-3587 main: (303)866-3581

198651 RECEIVED
 SEP 17 1996 AUG 19 1996
 WATER RESOURCES STATE ENGINEER
 STATE ENGINEER COLO.

GENERAL PURPOSE

(Please note: other forms are available for specific uses including - residential, livestock, monitoring/observ., gravel pits, registration of old wells)
 Review instructions prior to completing form **Must be completed in black ink or typed**

Water Well Permit Application

1. APPLICANT INFORMATION

Name of applicant: Beverly M DuBoe

Mailing Address: P.O. Box 1488

City: Nederland State: Co Zip Code: 80466

Telephone number (include area code): 303 258-4240

2. TYPE OF APPLICATION (check applicable box(es))

Construct new well Use existing well
 Replace existing well Change or Increase Use
 Change (source) Aquifer Reapplication (expired permit)
 Other:

3. REFER TO (if applicable):

Water court case # _____ Permit # _____
 Emergency Verbal # -VE- Monitoring hole acknowledgment # MH-

Well name or # _____

4. LOCATION OF WELL

County: GILPIN Quarter/quarter: NE 1/4 Quarter: NW 1/4

Section: 14 Township N or S: 2 Range E or W: 73 Principal Meridian: 6th

Distance of well from section lines: 200 ft from N S 2510 ft from E W

Well location address, if different from applicant address (if applicable): _____

For replacement wells only - distance and direction from old well to new well: _____ feet _____ direction

5. TRACT ON WHICH WELL WILL BE LOCATED

A. LEGAL DESCRIPTION (may be provided as an attachment): _____

8. STATE PARCEL ID# (optional): _____

C. # acres in tract: 1 D. Owner: _____

E. Will this be the only well on this tract?
 YES NO (if other wells are on this tract, see instructions)

6. USE OF WELL (please attach detailed description)

INDUSTRIAL OTHER: mouse hold
 COMMERCIAL
 MUNICIPAL
 IRRIGATION
 FEED LOT - number of head: _____

7. WELL DATA

Maximum pumping rate: 15 gpm Annual amount: 3/3 acre-feet
 Total depth: 300 feet Aquifer: Granite

8. LAND ON WHICH GROUND WATER WILL BE USED

A. LEGAL DESCRIPTION (may be provided as an attachment): _____

(If used for crop irrigation, attach scaled map that shows irrigated area.)

B. # acres: 1 C. Owner: _____

D. List any other wells or water rights used on this land: _____

9. PROPOSED WELL DRILLER (optional)

Name: C.R. Smith Drilling License number: 328

10. SIGNATURE OF applicant(s) or authorized agent

The making of false statements herein constitutes perjury in the second degree, which is punishable as a class 1 misdemeanor pursuant to C.R.S. 24-4-104(13)(a). I have read the statements herein, know the contents thereof, and state that they are true to my knowledge.

Must be original signature: [Signature]
 Title: Owner Date: 7-25-96

OPTIONAL INFORMATION

USGS map name: _____ DWR map no.: _____ Surface elev.: _____

Office Use Only
 CHECKS TR#405185 081996 DIV 60.00
 DIV OF WATER RESOURCES CO 24
 WD 06
 BA _____
 USE(S) _____ MD _____

GENERAL PURPOSE APPLICATION - GENERAL INSTRUCTIONS

This form (GWS-46) should be used for the following well uses: commercial, industrial, agricultural irrigation, municipal, feed lots, central water supply systems, recreation, snowmaking, geothermal, recovery wells and any other uses not otherwise noted in the following list:

RESIDENTIAL use wells - Use Application Forms GWS-44, GWS-49 or GWS-50
LIVESTOCK watering on a farm, ranch, range, or pasture (not feedlots) - Use Forms GWS-44 or GWS-50
MONITORING/OBSERVATION wells - Use Application Form GWS-46
GRAVEL PITS - Use Application Form GWS-27
REGISTRATION of an existing well - Use Form GWS-12 (must have been in use prior to May 8, 1972)

FEES This application must be submitted with the required \$80 non-refundable filing fee.
Checks should be payable to COLORADO DIVISION OF WATER RESOURCES.

Applications are evaluated in chronological order. Please allow approximately six weeks for processing.

Applications must be completed clearly, and legibly, in BLACK INK or typed. ALL ITEMS in the application must be completed. Incomplete applications may be returned to the applicant for more information. Do not change or alter the application in any way.

THE LOCATION of the well in item 4 must be correctly and accurately described. The county, quarter/quarter, section, township and range location of the well, principal meridian and location of the well in feet from section lines must be provided.

NOTE: Distances are not necessarily the same distances as the distances from (your) property lines.

For additional assistance in describing the location of your well, review the publication entitled "How to Determine Well Locations" which was provided with your packet, or can be requested from any Colorado Division of Water Resources office.

Indicate in item 5 or provide as an attachment a complete LEGAL DESCRIPTION of the tract on which the well will be located. Indicate the total number of acres and the owner of that land.

Check the applicable box(es) in item 6 indicating the GENERAL USE of the well AND provide a detailed description of use of the well as an attachment to the application.

If the well is to withdraw water from the DAWSON, DENVER, ARAPAHOE, LARAMIE-FOX HILLS OR DAKOTA AQUIFERS, documentation of claimed landownership or consent of the landowner may be required. Please contact the Division of Water Resources for further information. A copy of the Statewide Nontributary Ground Water Rules are available upon request for \$3.

Indicate in item 8, or provide as an attachment a complete LEGAL DESCRIPTION of the land area on which water from the well will be used. Indicate the total number of acres described and the owner of that land. If agricultural irrigation is a proposed use, provide an accurate map of the land area with proposed irrigated areas drafted or accurately drawn. Section numbers and section lines must be indicated on the map.

Completely describe all OTHER WATER RIGHTS, including wells and surface water rights, used on the described land area. Describe the total land areas irrigated by other wells or water rights. Applicable well permit, well registration or water court case numbers must be indicated. This information may be provided in an attachment.

An ORIGINAL signature must be on each application. The applicant's authorized agent may sign the application if a letter signed by the applicant is submitted with the application authorizing them to act as agent for the purpose of obtaining a well permit.

IF YOU HAVE ANY QUESTIONS regarding any item in the well permit application form, please call the Division of Water Resources Ground Water Information Desk at (303) 866-3587, Ground Water Management District or the nearest Division of Water Resources Field Office located in Greeley (970-352-8712), Pueblo (719-542-3368), Alamosa (719-589-6683), Montrose (970-249-6622), Glenwood Springs (970-945-5665), Steamboat Springs (970-879-0272) or Durango (970-247-1845).

DETAILED INSTRUCTIONS ARE AVAILABLE UPON REQUEST

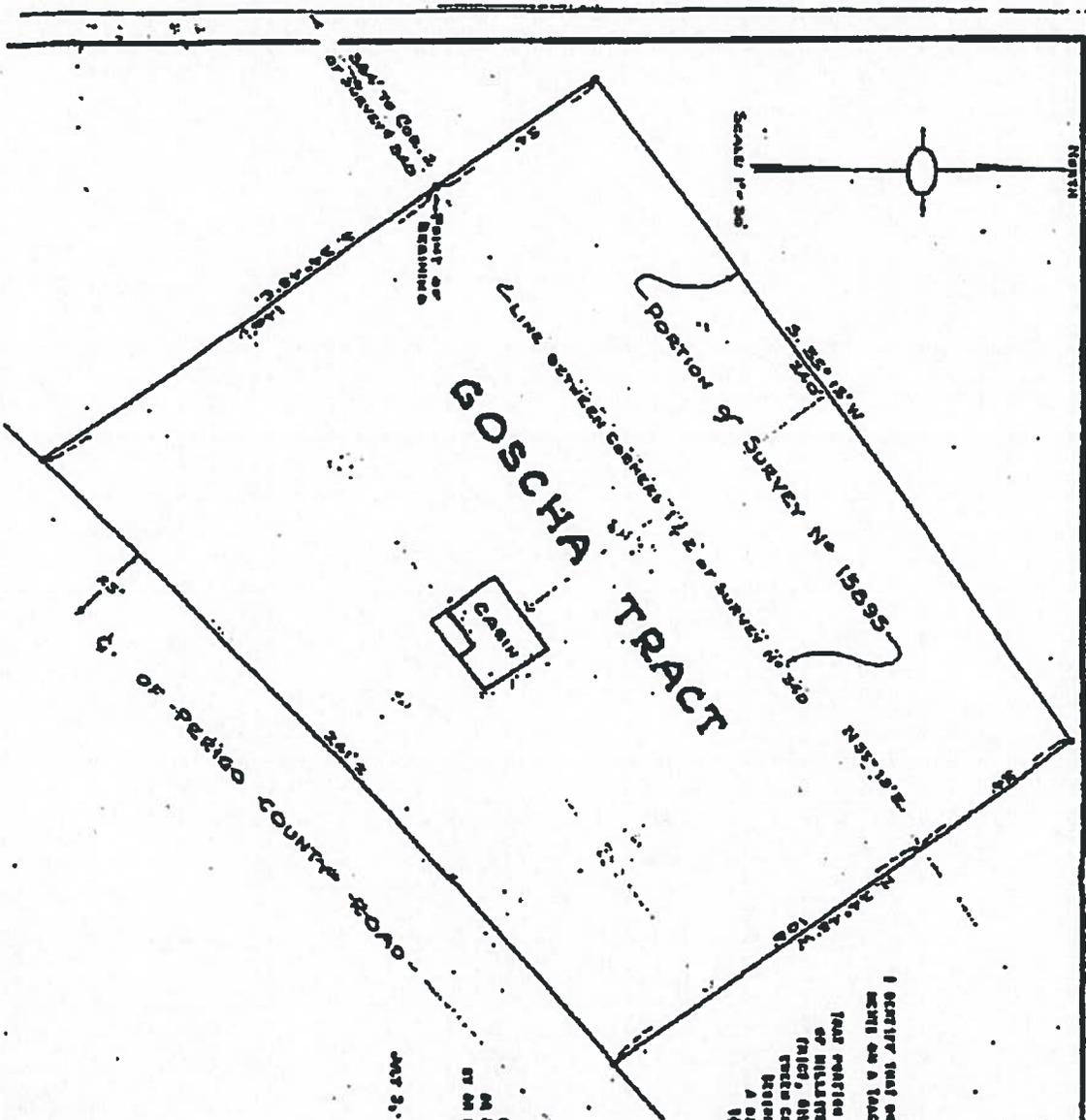
COLORADO DIVISION OF WATER RESOURCES, 1313 SHERMAN STREET, ROOM 821, DENVER CO 80203
PHONE: (303) 866-3587 (Information), (303) 866-3581 (Main), (303) 866-3447 (Well and Water Rights Records); (303) 866-3589 (Fax)

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SEP 17 1996

WATER RESOURCES
STATE ENGINEER
COLO.

Bob's 8:30 Fri 7/5
0562 1st driveway on left
upstairs

Jack 3786



I certify that on July 2, 1983, I surveyed and staked, and inserted the permanent
corners on a tract of land situated as follows:

SECTIONALS

That portion of the town & 1. section 16 (part of 30) and part portion
of Hillside (Survey No. 1465). here shown in the instrument which dis-
tributed, Blaine County, Colorado, which began at a point on the line be-
tween corners No. 2 and 3 of said survey No. 240, from which point or
reference corner No. 2 of said survey No. 240 runs north 89° 15' west
a distance of 340 feet; thence south 24° 45' east a distance of
140 feet to a point on the north-south line of the eastern
range corner road; thence north-south along the north-
western side of said county road a distance of 241 feet;
thence south 24° 45' west 100 feet to a point on the line
between corners No. 2 & 3 of said survey No. 240; thence
north-south north 24° 45' west into said survey No.
1465 a distance of 34 feet; thence south 59° 15' west
a distance of 240 feet; thence north 24° 45' east a
distance of 84 feet to the point of beginning.

The accompanying plat accurately depicts the de-
scribed survey, which commences in area of 1.0 acres
more or less. The instrument shall be in full
character and compliance with the statutory laws, and I declare
on oath that the same are true and correct.

Walter P. ...
Walter P. ...
July 2, 1983.

62507-06
CERTIFICATE OF SURVEY NO. 62507-06
BLAINE COUNTY
(Section 16)

SURVEY NO. 307-06

Best Copy Available

Colorado Department of Natural Resources

Colorado.gov | Contact Us

Colorado Division of Water Resources

Colorado's Well Permit Search

Well Constructed

[Help](#) Last Refresh: 11/14/2014 12:01:53 AM

Receipt: 0451554 **Division:** 1
Permit #: 221918 - **Water District:** 6
Well Name / #: **County:** GILPIN
Designated Basin: **Management District:**
Case Number:
WDID:

[\[-\] Applicant/Owners History](#)

Date Range	Applicant/Owner Name	Address	City/State/Zip
Unknown - Present	POHL, TROY G	PO BOX 848	CENTRAL CITY, CO 80427

[\[-\] Location Information](#)

Approved Well Location:

Q40 **Q160** **Section** **Township** **Range** **PM** **Footage from Section Lines**
 SW SE 11 2.0S 73.0W Sixth 750 S 1750 E

Northing (UTM y): 4415044.6 **Easting (UTM x):** 455191.5
Location Accuracy: Spotted from section lines

Physical Address **Subdivision Name**
City/State/Zip **Filing Block Lot**

Parcel ID: **Acres in Tract:** 5

[\[-\] Permit Details](#)

Date Issued: 11/18/1999 **Date Expires:** 11/18/2001
Use(s): HOUSEHOLD USE ONLY **Aquifer(s):** ALL UNNAMED AQUIFERS
Special Use:

Area which may be irrigated:
Maximum annual volume of appropriation:

Statute:

Permit Requirements: **Totalizing Flow Meter** **Geophysical Log** **Abandonment Report**
 No No No

Cross Reference **Permit Number** **Receipt** **Description**
Permit(s):
Comments:

[\[-\] Construction/Usage Details](#)

Well Construction Date: 12/14/1999 **Pump Installation Date:**
Well Plugged: **1st Beneficial Use:**
Elevation **Depth** **Perforated Casing (Top)** **Perforated Casing (Bottom)** **Static Water Level** **Pump Rate**
 225 145 225 70 6
Driller **Lic #** **Name** **Address** **Phone Number**
 1215 BERGLUND, PETER R. 2127 ELDERBERRY RD GOLDEN, CO 80401 303-421-8766

[\[-\] Application/Permit History](#)

Ownership Change 02/08/2001
Well Construction Report Received 02/09/2000
Well Constructed 12/14/1999
Permit Issued 11/18/1999
Application Received 09/28/1999

[\[-\] Imaged Documents](#)

Document Name	Date Imaged	Annotated
Original File	12/08/2007	No
Change in Owner Name/Address/Location	12/01/2007	No

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FORM NO. GWS-31 11/90

WELL CONSTRUCTION AND TEST REPORT STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

For Office Use only

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FEB 09 2000

WATER RESOURCES STATE ENGINEER COLO

1. WELL PERMIT NUMBER 221918

2. OWNER NAME(S) Lawrence Builders Mailing Address 168 Divide View Dr. City, St. Zip Golden CO 80403 Phone (303) 883-5841

3. WELL LOCATION AS DRILLED: SW 1/4 SE 1/4, Sec. 11 Twp. 2 S, Range 73 W DISTANCES FROM SEC. LINES: 750 ft. from S Sec. line. and 1750 ft. from E Sec. line. OR SUBDIVISION: LOT BLOCK FILING(UNIT) STREET ADDRESS AT WELL LOCATION:

4. GROUND SURFACE ELEVATION ft. DRILLING METHOD Air Percussion DATE COMPLETED 12/14/99 TOTAL DEPTH 225 ft. DEPTH COMPLETED 225 ft.

5. GEOLOGIC LOG: Table with columns for Depth and Description of Material. Entries include backfill, weathered + decomposed granite, granite, weathered granite, and alternating weathered granite + granite.

6. HOLE DIAM. (in.) From (ft) To (ft) Table with entries for 8 3/4, 6 1/8, 9, 41, 225.

7. PLAIN CASING Table with columns for OD (in), Kind, Wall Size, From (ft), To (ft). Entries include steel (.188) and PVC (.214).

8. FILTER PACK: NA 9. PACKER PLACEMENT Table with columns for Material, Size, Interval, Type, Depth.

10. GROUTING RECORD: Table with columns for Material, Amount, Density, Interval, Placement. Entry: Cement 4 sacks, 6 gals/sack, 41, vibration.

REMARKS:

11. DISINFECTION: Type HTH Amt. Used 6 oz

12. WELL TEST DATA: [] Check box if Test Data is submitted on Supplemental Form. TESTING METHOD Air Static Level 70 ft. Date/Time measured 12/14/99 Production Rate 6 gpm. Pumping level 220 ft. Date/Time measured 12/14/99 Test length (hrs.) 1 1/2

13. I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13)(a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]

CONTRACTOR Arrow Drilling Phone (303) 421-8766 Lic. No. 1215 Mailing Address 2127 Elderberry Rd. Golden CO 80401

Name/Title (Please type or print) Signature Date Peter E. Berglund / Driller Peter E. Berglund 12/15

Form No. GWS-25

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES
818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203
(303) 866-3581

LIC

APPLICANT

WELL PERMIT NUMBER 221918
DIV. 1 WD 6 DES. BASIN MD

LAWRENCE BUILDERS
168 DIVIDE VIEW DR
GOLDEN, CO 80403-

APPROVED WELL LOCATION

GILPIN COUNTY
SW 1/4 SE 1/4 Section 11
Township 2 S Range 73 W Sixth P.M.

DISTANCES FROM SECTION LINES

750 Ft. from South Section Line
1750 Ft. from East Section Line

(303) 883-5841

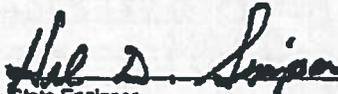
PERMIT TO CONSTRUCT A WELL

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT
CONDITIONS OF APPROVAL

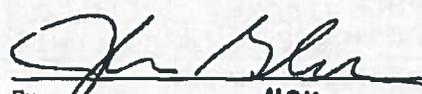
- 1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not assure the applicant that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
- 2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
- 3) Approved pursuant to CRS 37-92-602(3)(b)(II)(A) as the only well on a residential site of 5.00 acre(s) described as the Hatfield Lode Mining Claim, U.S. Survey no. 16456, Gilpin County, more particularly described on the attached exhibit A.
- 4) The use of ground water from this well is limited to ordinary household purposes inside one single family dwelling. The ground water shall not be used for irrigation or other purposes.
- 5) The maximum pumping rate of this well shall not exceed 15 GPM.
- 6) The return flow from the use of this well must be through an individual waste water disposal system of the non-evaporative type where the water is returned to the same stream system in which the well is located.
- 7) This well shall be constructed not more than 200 feet from the location specified on this permit.

JMW 11/17/99

APPROVED
JMW


State Engineer

DATE ISSUED **NOV 18 1999**


By

EXPIRATION DATE **NOV 18 2001**

Receipt No. 0451554

COLORADO DIVISION OF WATER RESOURCES
 DEPARTMENT OF NATURAL RESOURCES
 1313 SHERMAN ST., RM. 818, DENVER CO 80203
 phone - info: (303) 866-3587 main: (303) 866-3581

Pres. Received
 9/28/99
 (on other form)

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 NOV 02 1999
 WATER RESOURCES
 STATE ENGINEER
 COLO

NEW HOUSEHOLD USE ONLY
 Review instructions prior to completing form

Water Well Permit Application
 Must be completed in black ink or typed

SWM of the SE 1/4 (See distances)

1. APPLICANT INFORMATION				6. USE OF WELL	
Name of applicant <u>LAURENCE Builders L.L.C.</u>				ORDINARY HOUSEHOLD PURPOSES INSIDE ONE SINGLE FAMILY DWELLING (NO OUTSIDE USE)	
Mailing Address <u>168 Divide View DR</u>					
City <u>GOLDEN</u>	State <u>CO</u>	Zip code <u>80403</u>			
Telephone Number (include area code) <u>303 883 5841</u>				7. WELL DATA	
2. TYPE OF APPLICATION				MAXIMUM PRODUCTION RATE OF THE WELL WILL NOT EXCEED 15 GPM	
CONSTRUCT A NEW HOUSEHOLD USE ONLY WELL ON LESS THAN 35 ACRES				8. TYPE OF RESIDENTIAL SEWAGE SYSTEM	
3. REFER TO (if applicable):				<input checked="" type="checkbox"/> Septic tank / absorption leach field	
Monitoring hole acknowledgment # <u>MH-</u>				<input type="checkbox"/> Central system	
4. LOCATION OF WELL				District name: _____	
County <u>GOLDEN</u>	Quarter/quarter <u>S1/4</u>	Quarter <u>S1/4</u>	Name <u>Arrow Drilling</u>		
Section <u>11</u>	Township N or S <u>2</u>	Range E or W <u>73</u>	Principal Meridian <u>6th</u>	License number	
Distance of well from section lines <u>750</u> ft. from <input type="checkbox"/> N <input checked="" type="checkbox"/> S <u>1750</u> ft. from <input checked="" type="checkbox"/> E <input type="checkbox"/> W				<input type="checkbox"/> Vault	
Well location address, if different from applicant address (if applicable) <u>HATFIELD ROAD CO. RD. 15 ROLLINSVILLE CO 80403</u>				Location sewage to be hauled to: _____	
5. TRACT ON WHICH WELL WILL BE LOCATED				<input type="checkbox"/> Other (attach copy of engineering design)	
A. You must check one of the following - see instructions				9. PROPOSED WELL DRILLER (optional)	
<input type="checkbox"/> Subdivision: Name _____				Name	
Lot # _____ Block # _____ Filing/Unit# _____				License number	
<input type="checkbox"/> County Exemption (copy of county approval & survey must be attached)				10. SIGNATURE of applicant(s) or authorized agent	
Exempt. name/# _____ Tract # _____				The making of false statements herein constitutes perjury in the second degree, which is punishable as a class 1 misdemeanor pursuant to C.R.S. 24-4-104(13)(a). I have read the statements herein, know the contents thereof and state that they are true to my knowledge.	
<input type="checkbox"/> Mining claim (attach copy of deed or survey)				Must be original signature <u>Ken Jansen</u>	
Claim name/# <u>16456</u>				Date <u>10-31-99</u>	
<input type="checkbox"/> Other (attach legal description to application)				Office Use Only <u>WLV</u> <u>Curlov</u> <u>CRV</u>	
B. STATE PARCEL				Rec# <u>451554</u>	
ID# (optional): <u>16</u>				DWR Map No.	
C. # of acres in tract				DIV <u>1</u>	
<u>5</u>				CO <u>24</u>	
D.				WD <u>6</u>	
THIS WILL BE THE ONLY WELL ON THIS TRACT				BA _____	
				USE MD	

HOUSEHOLD USE ONLY - GENERAL INSTRUCTIONS

There are a variety of uses for ground water in Colorado. This form (GWS-49) is to be used when applying for a permit for a NEW well that would be USED FOR ORDINARY HOUSEHOLD USE IN ONE SINGLE-FAMILY DWELLING. This type of well CANNOT be used for outside uses such as the watering of domestic animals and the watering of home gardens and lawns.

This form should not be used in the following cases:

REPLACEMENT of an existing well - Use form GWS-44
If OUTSIDE use is proposed - Use form GWS-44

FEES The application must be submitted with the required \$60 non-refundable filing fee.

Checks should be payable to the COLORADO DIVISION OF WATER RESOURCES.

Applications are evaluated in chronological order. Please allow approximately six weeks for processing.

APPLICATIONS must be completed clearly, and legibly, in BLACK INK or typed. ALL ITEMS in the application must be completed. Incomplete applications may be returned to the applicant for more information. Do not change or alter this application in any way.

THE LOCATION of the well in item 4 must be correctly and accurately described. The county, quarter/quarter, section, township, range, principal meridian, and distance from section lines must be provided.

NOTE: Distances are not necessarily the same distances as the distances from (your) property lines.

For additional assistance in describing the location of your well review the publication entitled "How to Determine Well Locations" which was provided with your packet, or can be requested from any Colorado Division of Water Resource office.

A LEGAL DESCRIPTION of your lot or parcel of land is required in item 5. If your lot is not in a recorded subdivision, attach a copy of a deed or legal description that shows your tract was split from a larger tract prior to June 1, 1972.

An ORIGINAL signature must be on each application. The applicant's authorized agent may sign the application, if a letter signed by the applicant is submitted with the application authorizing them to act as agent for the purpose of obtaining a well permit.

IF YOU HAVE ANY QUESTIONS regarding any item on the application form, please call the Division of Water Resources Ground Water Information Desk (303-866-3587), or the nearest Division of Water Resources Field Office located in Greeley (970-352-8712), Pueblo (719-542-3368), Alamosa (719-589-6683), Montrose (970-249-6622), Glenwood Springs (970-945-5685), Steamboat Springs (970-879-0272), or Durango (970-247-1845).

DETAILED INSTRUCTIONS ARE AVAILABLE UPON REQUEST

COLORADO DIVISION OF WATER RESOURCES, 1313 SHERMAN STREET, ROOM 821, DENVER, CO 80203
PHONE 303-866-3587 (Information), 303-866-3581 (Main), 303-866-3447 (Well & Water Rights Records), 303-866-3589 (Fax)

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SEP 28 1999

WARRANTY DEED

WATER RESOURCES
STATE ENGINEER
COLORADO

\$6.00
.80 *OC*

THIS DEED, Made this day of April 14, 1998, between

MARY R. REINKE

of the County of ~~ESSEXVILLE~~ ^{Bay (MA)} in the State of MICHIGAN, grantor, and

WILLIAM A. HILLAS AND JUDITH E. HILLAS

Gilpin County
State Documentary Fee
\$.80

whose legal address is of the County of In the State of COLORADO, grantees:

WITNESSETH, that the grantor, for and in consideration of the sum of Eight thousand exactly (\$ 8,000.00) DOLLARS, the receipt and sufficiency of which is hereby acknowledged, has granted, bargained, sold and conveyed, and by these presents does grant, bargain, sell, convey and confirm unto the grantees, HIS heirs and assigns forever, not in tenancy in common but in joint tenancy, of the real property, together with improvements, if any, situate, lying and being in the County of GILPIN and State of COLORADO, described as follows:

THE HATFIELD LODGE MINING CLAIM, U.S. SURVEY NO. 16458, DESCRIBED IN UNITED STATES PATENT RECORDED IN BOOK 320 AT PAGE 481, EXCEPTING THEREFROM ANY PORTION IN CONFLICT WITH SURVEY NO. 237, AS EXCEPTED IN SAID PATENT.

Best Copy Available

also known by street and number as VACANT LAND GILPIN COUNTY, COLORADO

TOGETHER with all and singular the hereditaments and appurtenances thereto belonging, or in anywise appertaining and the reversion and reversions, remainder and remainders, rents, issues and profits thereof; and all the estate, right, title, interest, claim and demand whatsoever of the grantor, either in law or equity, of, in and to the above bargained premises, with the hereditaments and appurtenances.

TO HAVE AND TO HOLD the said premises above bargained and described, with the appurtenances, unto the said grantees, HIS heirs and assigns forever. And the grantor, for themselves, HER heirs and personal representatives, does covenant, grant, bargain and agree to and with the grantees, HIS heirs and assigns, that at the time of the enrolling and delivery of these presents, he is well seized of the premises above conveyed, has good, sure, perfect, absolute and undisturbed estate of inheritance in law in fee simple, and has good right, full power and lawful authority to grant, bargain, sell and convey the same in manner and form aforesaid, and that the same are free and clear from all former and other mortgages, bargains, sales, liens, taxes, assessments, encumbrances and restrictions of whatever kind or nature so ever, EXCEPT FOR TAXES FOR THE CURRENT YEAR AND SUBSEQUENT YEARS, EASEMENTS, RESTRICTIONS, RESERVATIONS, COVENANTS AND RIGHTS-OF-WAY OF RECORD, IF ANY.

The grantor shall and will WARRANT AND FOREVER DEFEND the above-bargained premises in the quiet and peaceable possession of the grantees, HIS heirs and assigns, against all and every person or persons lawfully claiming the whole or any part thereof. The singular number shall include the plural, the plural the singular, and the use of any gender shall be applicable to all genders.

IN WITNESS WHEREOF the grantor has executed this deed on the date set forth above.

Mary R. Reinke

MARY R. REINKE

STATE OF COLORADO)
COUNTY OF GILPIN)
) ss.

The foregoing instrument was acknowledged before me on April 14, 1998 by:

MARY R. REINKE

My commission expires: June 5, 2000
8/26/2000
LH

Witness my hand and Official seal.
Lynn M. Hansen

LYNN M. HANSEN

Notary Public
NOTARY PUBLIC, GILPIN COUNTY, MICHIGAN
MY COMMISSION EXPIRES AUGUST 25, 2000

GRANTEES ADDRESS : Mont-Vale, N.J. 07645

11998

Doc Recd

NRS

[REDACTED]

<p>[Faint text and stamp]</p>	<p>[Faint text and stamp]</p>
<p>[Faint text and stamp]</p>	<p>[Faint text and stamp]</p>
<p>[Faint text and stamp]</p>	<p>[Faint text and stamp]</p>
<p>[Faint text and stamp]</p>	<p>[Faint text and stamp]</p>

The main body of the page is dominated by a large, rectangular area that appears to be a very faint or overexposed scan of a document. It contains a grid-like pattern of lines, but the lines are so light that they are barely visible against the background. The grid covers most of the page's width and height, with some darker, more distinct lines visible in the lower half. There are also some small, dark specks and artifacts scattered throughout the area, possibly due to the scanning process or the original document's texture.

Appendix II
Core Logs and Photos

PROJECT:

ROCK CORE LOG

BORING NO. 75		PROJECT NO.		LOCATION Parigo Mine				SHEET 1 OF		
TIME START		DRILLING CONTRACTOR Precision		DRILLING EQUIPMENT CME 55				DATE 10/23/13		
TIME STOP		DRILLER Tim		DRILLING METHOD Core				SAMPLING METHOD HQ core		
TOTAL DEPTH		BACKFILL MATERIAL		WATER FIRST ENCOUNTERED				FINAL DEPTH TO WATER		
DEPTH (FT)	CORE RUN (IN)	RECOV. CORE LENGTH (IN)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	ROD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
41										
42										
43										
44										
45										
46										
47										
48										
49							1146			Gneiss, w/ pegmatite zones, unaltered
50										
51	2.7'	2.7'	100%			2.5/2.7	93%			Gneiss, w/ pegmatite lenses
52	0.3	0.3	100%			0	156			
53	5.0	5.0	100%				1312	4/165		Most fairs appear healed
54	5.0	5.0	100%			2.45/5.0	90%	120		
55						4/5'	0.8/ft			
56										Core mech broken
57							125			
58							340	20-0-0		rough, irregular, Fe, Py (minor in rock)
59	5.0'	5.0'	100%			4.8/5.0	96%	120		healed, cemented
						3/5'	0.6/ft			

LOGGED BY _____ OFFICE _____ DATE _____

PROJECT:

ROCK CORE LOG

BORING NO.		PROJECT NO.					LOCATION				SHEET OF	
TIME START		DRILLING CONTRACTOR					DRILLING EQUIPMENT				DATE	
TIME STOP		DRILLER					DRILLING METHOD				SAMPLING METHOD	
TOTAL DEPTH		BACKFILL MATERIAL					WATER FIRST ENCOUNTERED				FINAL DEPTH TO WATER	
DEPTH (FT)	CORE RUN (ft)	RECOV. CORE LENGTH (ft)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	ROD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS		
60										irregular, rough, minor Fe		
61												
62							1355 1412					
63												
64	5.0'	5.0'	100%		5.0/5.0	100%						
65						1/5'						
66						0.2/ft				very rough, irregular, minor Fe, may be rock break		
67							1422 1450					
68								81/90		Fe + SiO ₂ coating		
69	5.0'	5.0	100%		5.0/5.0	100%		50		Fe, smooth		
70						3/5'						
71						0.6/ft						
72							1505 1514					
73												
74	5.0'	5.0'	100%		5.0/5.0	100%						
75						no fractures						
76						0/ft						
77							1524 1530					
78								35		slight foliation, smooth, trace SiO ₂		
79	5.0'	5.0'	100%		4.8/5.0	96%		45/95		possible fract along foliation / smooth / iron staining		
80						3/5'						

LOGGED BY _____

OFFICE _____

DATE _____

PROJECT:

ROCK CORE LOG

BORING NO.		PROJECT NO.					LOCATION				SHEET OF	
TIME START		DRILLING CONTRACTOR					DRILLING EQUIPMENT				DATE	
TIME STOP		DRILLER					DRILLING METHOD				SAMPLING METHOD	
TOTAL DEPTH		BACKFILL MATERIAL					WATER FIRST ENCOUNTERED				FINAL DEPTH TO WATER	
DEPTH (FT)	CORE RUN (M)	RECOV. CORE LENGTH (M)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	ROD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS		
80												
81										same		
82							1541 1228			Gneiss		
83										disseminated Py / Steep 80-90° healed fractur (4" zone)		
84	5.0'	5.0'	100%	100%	100%	no features	0/ft			granitic banding		
85										-----		
86							down					
87							1238 1248					
88												
89	5.0'	5.0'	100%		4.4/5.0 88%	(4/5')	0.8/ft			Zone w/ high angle fractures (smooth, minor silts, clay, Py)		
90										Py zone (epidote alteration)		
91										-----		
92							1257 1309			stepped healed fracture healed fracture set (stepped, Fe smooth, SiO2 coating, replace)		
93										smooth SiO2 healed smooth		
94	5.0'	5.0'	100%		3.8/5.0 76%	(9/5')	1.8/ft			wavy, smooth, Fe		
95										rough, stepped, minor Fe (both)		
96										rough - semi smooth, Fe		
97							1318 1331			-----		
98	5.0'	5.0'	100%		5.0/5.0 100%	(2/5')	0.4/ft			Py (slightly altered)		
99										65/ - SiO2 coat, chl. minor Py, smooth		
100												

LOGGED BY _____ OFFICE _____ DATE _____

PROJECT:

ROCK CORE LOG

BORING NO.		PROJECT NO.				LOCATION				SHEET OF	
TIME START		DRILLING CONTRACTOR				DRILLING EQUIPMENT				DATE	
TIME STOP		DRILLER				DRILLING METHOD				SAMPLING METHOD	
TOTAL DEPTH		BACKFILL MATERIAL				WATER FIRST ENCOUNTERED				FINAL DEPTH TO WATER	
DEPTH (FT)	CORE RUN (in)	RECOV. CORE LENGTH (in)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	ROD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS	
100											Healed fracture, chert alteration
101											Angular Gneiss
102							1313 1448				Rough, no coating
103											Waxy along foliation, minor SiO ₂
104	5.0'	5.0'	100%		86%	(5/5)	1/ft				Minor py. stringers 2mm
105											
106											Very smooth, x foliation, minor SiO ₂
107							Drilling slawd 1500 1504				Very smooth, along foliation, sil. coat/pillars
108											Smooth, along foliation, SiO ₂ /Fe
109	5.0'	5.0'	100%		80%	(5/5)	1/ft				Smooth stepped, minor SiO ₂
110											py string in pyg. 10r
111											Very smooth, x foliation
112							1519 1526				rough, irregular, minor SiO ₂
113											Very smooth, through pyg some step, SiO ₂ /pyrite
114	5.0	5.0	100%		92%	(5/5)	0.6/ft				appears to be broken by drill action
115											
116											
117							1541 1545				Smooth, along foliation, clay, ferr (greasy)
118											Smooth, x foliation, epidote/SiO ₂
119	5.0	5.0	100%		70%	(7/5)	1.4/ft				
120											

LOGGED BY _____ OFFICE _____ DATE _____

PROJECT:

ROCK CORE LOG

BORING NO.		PROJECT NO.					LOCATION				SHEET OF	
TIME START		DRILLING CONTRACTOR					DRILLING EQUIPMENT				DATE	
TIME STOP		DRILLER					DRILLING METHOD				SAMPLING METHOD	
TOTAL DEPTH		BACKFILL MATERIAL					WATER FIRST ENCOUNTERED				FINAL DEPTH TO WATER	
DEPTH (FT)	CORE RUN (W)	RECD. CORE LENGTH (W)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	ROD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS		
120									1/80	very smooth, xfoliation, SiO ₂ /epidote		
121									1/35 1/40	smooth, xfoliation, SiO ₂ smooth, xfoliation, -healed, siliceous		
122							1623 1609		1/30	smooth xfoliation		
123									1/30 1/20 1/10	rough, xfol, epidote smooth, SiO ₂ /epidote/Ry stepped smooth SiO ₂		
124	5.0'	5.0'	100%		9.1/50 (92%)	(10/5)	2/ft					
125									1/30 1/20	semi smooth - along fol, SiO ₂ x-fol, smooth, SiO ₂ (tr)		
126												
127							1621					
128												
129												
130												
131												
132												
133												
134												
135												
136												
137												
138												
139												
140												

LOGGED BY _____ OFFICE _____ DATE _____

PROJECT:

ROCK CORE LOG

BORING NO.		PROJECT NO.				LOCATION				SHEET OF	
TIME START		DRILLING CONTRACTOR				DRILLING EQUIPMENT				DATE	
TIME STOP		DRILLER				DRILLING METHOD		SAMPLING METHOD			
TOTAL DEPTH		BACKFILL MATERIAL				WATER FIRST ENCOUNTERED		FINAL DEPTH TO WATER			
DEPTH (FT)	CORE RUN (IN)	RECOV. CORE LENGTH (IN)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	ROD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (F/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS	
1											
2											
3											
4											
5											
6											
7											
8											
9											
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											

LOGGED BY _____ OFFICE _____ DATE _____

Gamble Gulch, Perigo Mine, HQ Core from Boring P5



Boring P5: 49.0'-52.0'



Boring P5: 52.0'-65.9'



Boring P5: 65.9'-74.3'



Boring P5: 74.3'-83.0'



Boring P5: 83.0'-91.5'



Boring P5: 91.5'-99.0'



Boring P5: 99.0'-109.0'



Boring P5: 109.0'-117.8'



Boring P5: 117.8'-126.2'

Appendix III

Rock Mass Ratings

The input data given and the calculated results



Project: Perigo

Date: 10-Feb-15

Tunnel: Lower Crosscut

Location: Gamble Gulch, Gilpin County, Colorado

Observer: Jeff Graves

Note: Data based on recovered core from Boring P5

Rock(s): Biotite Gneiss, Granite Migmatite

Input parameters		Input values and ratings used			
		RMR 1989	Q 1993	RMI 2008	
Tunnel data	Tunnel span (m)	Span = 2.13	Span = 2.13	Dt = 2.13	
	Wall height (m)	Wall = 2.13	Wall = 2.13	Wt = 2.13	
A. Rock	A1 Compressive strength of intact rock:	A1 = 7	-	$\sigma_c = 100$ MPa	
B. Degree of jointing	B1 Rock Quality Designation (RQD):	A2 = 20	RQD = 91	-	
	B2 Block volume:	-	-	Vb = 0.105 m3	
	B3 Joint spacing:	A3 = 10	-	-	
C. Jointing pattern	C1 Block shape factor:	-	-	$\beta = 27$	
	C2 Number of joint sets:	-	Jn = 6	Nj = 1.2	
	C3 Orientation of main joint set in roof:	B = -2	-	Co = 1	
	C4 joint set in walls:	-	-	Co = 1	
D. Joint characteristics	D1 Joint smoothness:	A4c = 1	Jr = 2	Js = 1	
	D2 Joint undulation:	-		Jw = 2	
	D3 Joint alteration	roughness:	A4e = 6	Ja = 1	JA = 1
		weathering:	A4d = 6		
	D4 Joint length or persistence:	A4a = 4	-	JL = 1.5	
D5 Joint separation or aperture:	A4b = 5	-	-		
E. Interlocking	E Compactness of rockmass:	-	-	IL = 1	
F. Ground water	F Ground water inflow:	A5 = 10	Jw = 1	GW = 1	
G. Rock stresses	G1 Stress level:	-	SRF = 2.5	SL = 0.1	
	G2 Stress ratio/ground competency:	-		Cg = -	
H. Weakness zones	H1 Type of weakness zone:	-	-	-	
	H2 Thickness or width of zone:	-	-	Tz = -	
	H3 Orientation in roof:	-	-	Co = -	
	H4 of zone in walls:	-	-	Co = -	

Note that swelling rock is not included

RESULTS FROM CALCULATIONS (for conditions in tunnel or cavern)

		RMR	Q	RMI
Continuity of rockmass (related to tunnel) →		-	-	Continuous // discontin.
Interlocking of rockmass structure →		-	-	Tight structure
Rock mass quality (approx. strength, σ_{cm})		-	-	$\sigma_{cm} \approx$ RMI = 17.7 High
Ground quality (related to stability)	in roof	RMR = 67 Good	Q = 12.13333 Good	Gc = 1.77 Fair
	in walls	RMR = 67	Q _{wall} = 60.66667	Gc _{wall} = 8.87
Blockiness (related to block instability)	in roof	-	-	Sr = 3.8 Very favourable
	in walls	-	-	Sr _{wall} = 3.6 Very favourable
Weakness zone		-	-	
Rockmass stresses	Potential stress problems →	-	Very low stress level (in portals) Poor interlocking	
Limitations				

Sr = Size ratio (geometrical factor involving block diameter, tunnel span, plus number of joint sets and orientation of joints)

Gc = Ground condition factor

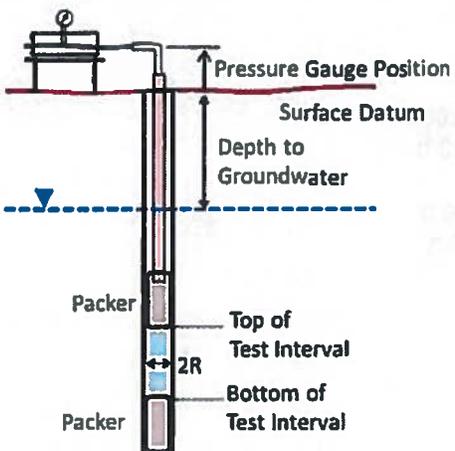
Cg = Competency of ground ($Cg = \sigma_{cm} / \sigma_0 = RMI / \sigma_0$)

Reference: A. Palmström, Q-RMR-RMI, version 3, RockMass AS, November 2012

Appendix IV

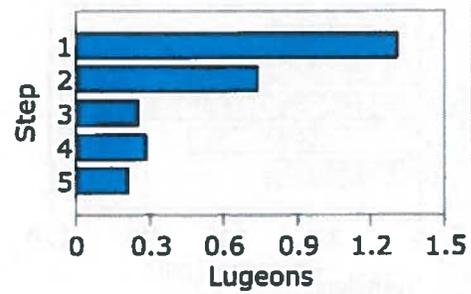
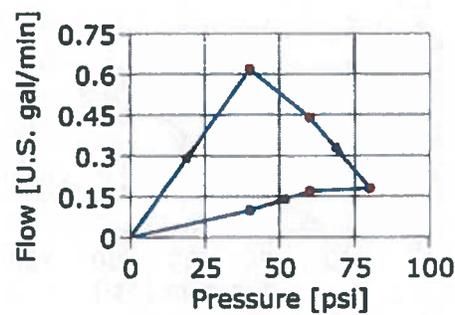
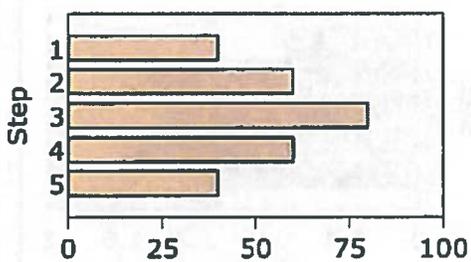
Packer Tests

Location: Adjacent to Perigo Crosscut	Lugeon Test: Lugeon Test 1	Tested bore: P5
Test Conducted by: JTG		Test Date: 10/24/2013
Analysis Performed by: JTG		Analysis Date: 11/4/2014
Lithology: Granite Gneiss		



Top of Test Interval: 71.000 ft
 Bottom of Test Interval: 82.000 ft
 Length of Test Interval: 11.000 ft
 Gauge Position: 4.000 ft
 Depth to Groundwater: 83.000 ft
 Radius of Test Section: 0.158 ft

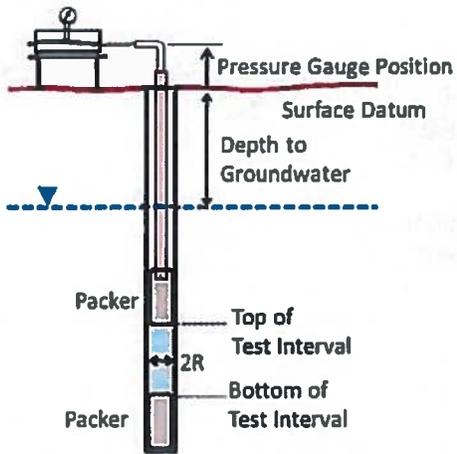
Step	Pressure [psi]	Flow Meter Readings [U.S. gal]						Average Flow Rate [U.S. gal/min]	Hydraulic Conductivity		
		1	2	3	4	5	6		[cm/s]	[ft/d]	Lugeon
1	40	8892.40	8893.20	8893.80	8894.40	8894.90	8895.50	0.62	1.44×10^{-5}	0.041	1.3
2	60	8896.70	8897.10	8897.50	8897.90	8898.40	8898.90	0.44	8.14×10^{-6}	0.023	0.7
3	80	8902.30	8902.50	8902.65	8902.80	8903.00	8903.20	0.18	2.77×10^{-6}	0.008	0.3
4	60	8903.40	8903.60	8903.75	8903.90	8904.10	8904.25	0.17	3.15×10^{-6}	0.009	0.3
5	40	8904.40	8904.50	8904.60	8904.70	8904.80	8904.90	0.10	2.33×10^{-6}	0.007	0.2
								Average	6.16×10^{-6}	0.017	0.6



Void filling
 Lugeon: 0.2
 Hydraulic Conductivity: $2.33E-6$ cm/s
 Hydraulic Conductivity: 0.007 ft/d

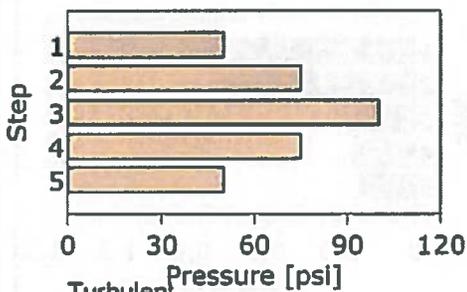
Location: Adjacent to Perigo Crosscut	Lugeon Test: Lugeon Test 2	Tested bore: P5
Test Conducted by: JTG		Test Date: 10/24/2013
Analysis Performed by: JTG		Analysis Date: 11/4/2014

Lithology: Granite Gneiss

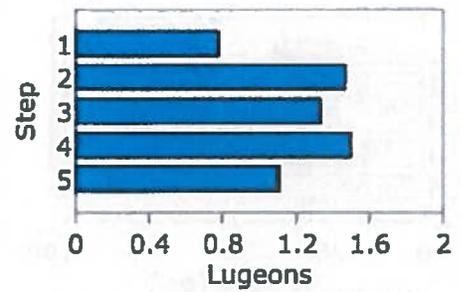
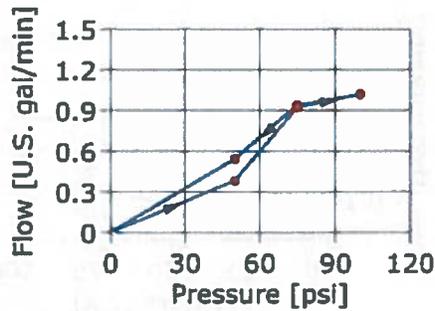


Top of Test Interval: 92.00 ft
 Bottom of Test Interval: 102.00 ft
 Length of Test Interval: 10.00 ft
 Gauge Position: 4.00 ft
 Depth to Groundwater: 83.00 ft
 Radius of Test Section: 0.16 ft

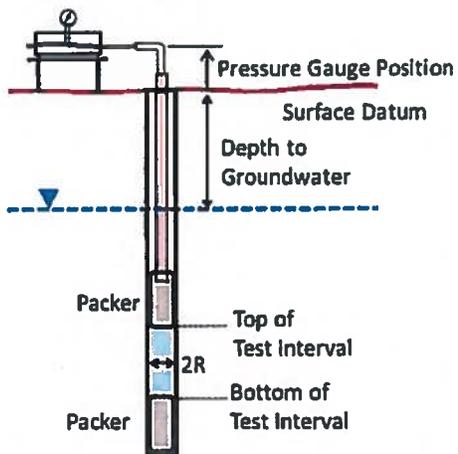
Step	Pressure [psi]	Flow Meter Readings [U.S. gal]						Average Flow Rate [U.S. gal/min]	Hydraulic Conductivity		
		1	2	3	4	5	6		[cm/s]	[ft/d]	Lugeon
1	50.0	8908.70	8909.05	8909.45	8909.75	8910.15	8910.60	0.38	8.43×10^{-6}	0.02	0.8
2	75.0	8911.50	8912.45	8913.30	8914.20	8915.25	8916.10	0.92	1.59×10^{-5}	0.05	1.5
3	100.0	8917.00	8918.10	8919.20	8920.05	8921.10	8922.10	1.02	1.44×10^{-5}	0.04	1.3
4	75.0	8923.00	8923.90	8924.80	8925.90	8926.80	8927.70	0.94	1.62×10^{-5}	0.05	1.5
5	50.0	8928.80	8929.05	8929.70	8930.30	8930.90	8931.50	0.54	1.20×10^{-5}	0.03	1.1
Average									1.34×10^{-5}	0.04	1.2



Turbulent Lugeon: 1.5
 Hydraulic Conductivity: 1.59×10^{-5} cm/s
 Hydraulic Conductivity: 0.05 ft/d

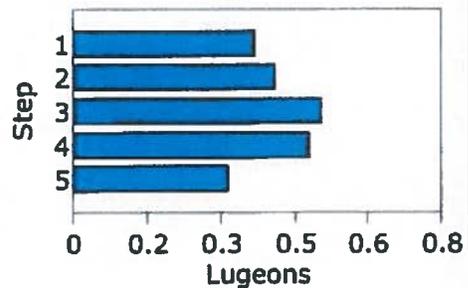
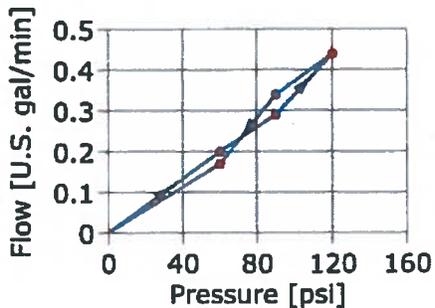
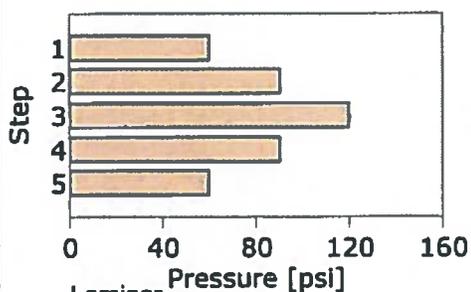


Location: Adjacent to Perigo Crosscut	Lugeon Test: Lugeon Test 3	Tested bore: P5
Test Conducted by: JTG		Test Date: 10/24/2013
Analysis Performed by: JTG		Analysis Date: 11/4/2014
Lithology: Granite Gneiss		



Top of Test Interval: 117.000 ft
 Bottom of Test Interval: 127.000 ft
 Length of Test Interval: 10.000 ft
 Gauge Position: 4.000 ft
 Depth to Groundwater: 83.000 ft
 Radius of Test Section: 0.158 ft

Step	Pressure [psi]	Flow Meter Readings [U.S. gal]						Average Flow Rate [U.S. gal/min]	Hydraulic Conductivity		
		1	2	3	4	5	6		[cm/s]	[ft/d]	Lugeon
1	60.0	8947.300	8947.600	8947.800	8948.000	8948.200	8948.300	0.200	3.98×10^{-6}	0.01	0.4
2	90.0	8948.800	8949.100	8949.400	8949.700	8950.000	8950.250	0.290	4.42×10^{-6}	0.01	0.4
3	120.0	8950.600	8951.000	8951.500	8951.900	8952.400	8952.800	0.440	5.43×10^{-6}	0.02	0.5
4	90.0	8953.000	8953.500	8953.800	8954.100	8954.400	8954.700	0.340	5.18×10^{-6}	0.01	0.5
5	60.0	8954.800	8955.000	8955.150	8955.650	8955.500	8955.650	0.170	3.38×10^{-6}	0.01	0.3
Average									4.48×10^{-6}	0.01	0.4



Laminar
 Lugeon: 0.4
 Hydraulic Conductivity: 4.48×10^{-6} cm/s
 Hydraulic Conductivity: 0.01 ft/d

Appendix V

Subsurface Geophysics Report



November 15, 2013

Matt Grizzell
Senior Geologist
Shannon & Wilson, Inc.
1321 Bannock Street, Suite 200
Denver, Colorado 80204
Phone: (303) 825-3800, Direct: (720) 258-4110, Fax: (303) 825-3801, Cell: (720) 202-9081
mtg@shanwil.com

Re: Project Deliverables – Final Letter Report for Geophysical Sonar Survey Mapping of Water-Filled Mine Void, Perigo Mine Crosscut, Rollinsville, Colorado. Project No. 0060300

Dear Mr. Grizzell:

Zapata Incorporated (ZAPATA) is pleased to submit this letter report, including three hard copies, and one electronic copy on DVD including figures and borehole video records for the above-referenced project. The sonar survey was conducted in the abandoned Perigo Mine Crosscut (drift) located southwest of Rollinsville, Colorado. ZAPATA performed the work under a subcontract agreement to Shannon & Wilson, Inc., in support of the Colorado Division of Reclamation Mining and Safety (DRMS). The objective of the sonar survey was to determine the drift void space size, orientation, and volume. The survey was performed in a borehole designated as P4. The borehole coordinates were provided by Jeff Graves of DRMS and listed below. This borehole intersected an open, water-filled drift, the top of which was measured at 116 feet below ground surface (bgs), and the bottom of the tunnel measured at 123 feet bgs. This survey was performed on October 31, 2013. Figure 1 presents photographs of the mine site, and field setup of the sonar survey.

Sonar Borehole Coordinates (UTM Zone 13 N NAD83)

Borehole ID	Coordinates		Elevation*
	Easting, m	Northing, m	
P4	454568	4414642	
<i>*Not available</i>			

Borehole Video Camera

Before the deployment of the downhole sonar into borehole P4, a borehole video camera was deployed to assess mine conditions and ensure the safe retrieval of sonar equipment. The camera encountered groundwater at 106 feet bgs, and then entered into the drift at 116 ft. bgs. The water within the drift contained quite a bit of suspended material, limiting visibility to within a few feet

of the camera. A video of the tunnel roof was recorded at this time, and is included on the accompanying DVD.

The borehole camera was deployed deeper into the drift to assess the limits of sonar deployment. Two feet above the bottom of the tunnel, the camera encountered a layer of soft material, presumably the same material that was suspended in the water column above. The camera was able to penetrate into this layer, but visibility was reduced to zero. The camera hit solid rock at 123 feet bgs.

Borehole Sonar Survey

The borehole sonar survey was conducted using an Imagenex Model 881A Digital Multi-frequency Profiling Sonar System which consists of a digital sonar unit, internal magnetic compass, and an end-mounted tether connector. The unit is capable of taking distance measurements up to 300 feet (line of sight) in 360-degree horizontal planes, referred to as scans. Scans are referenced using the depth from the ground surface, borehole surface coordinates, and the internal magnetic compass (azimuth from magnetic north (MN)). All sonar images were adjusted for geographic north (GN) using a magnetic declination of 8.9° E.

After some experimentation with the borehole sonar at different levels within the mine drift, it became evident that the line of sight down the tunnel was obstructed on either side by piles of debris (rubble). This, in conjunction with the soft layer of material lying on the floor of the tunnel, restricted the range where the sonar could see long distances on either side of the drift. This narrow window occurred at roughly 117 feet bgs, at which point the sonar produced and received returns measuring nearly 60 feet from the sonar instrument.

Figure 2 shows an example of the sonar scan field record, and processed data corrected to true north at depth of 117 feet bgs. Sonar data was recorded using scan range of 12 ft/division, as is noted in the figure.

Figures 3 and 4 show two plot windows of the AutoCad drawings representing the boundaries of the Perigo Mine Crosscut (Roosevelt Crosscut and the Canterbury Tunnel). Figure 3 shows only the polygons "composite sonar scans" for each depth slice at 116.75, 116.9, 117, and 117.5 feet bgs. Figure 4 shows the data point clouds representing high reflectivity in the sonar data and the layer polygons defining the boundary of the visible open void space for each depth slice. As shown in the figures, the alignment of the Roosevelt Crosscut and Canterbury Tunnel and from the sonar data compares well with the historic map (USGS Professional Paper 235, Plate 11). The alignment of the drift/tunnel was determined to be approximately 310° (50° NW).

The volume of the drift was determined based on the maximum and minimum areas mapped by the sonar, which are calculated to be:

Total drift length 60 ft

Maximum drift volume = drift plan view area 5,404 ft² x 7 ft = 37,828 ft³ (4,203 yd³)

Minimum drift volume = 37,828 ft³ x 50% = 18,914 ft³ (2,102 yd³)

Mr. Matt Grizzell
11/15/2013
Page 3 of 3

A brief error analysis of the sonar data includes two main sources of error: angular error and ranging error. Angular error occurs in the azimuth measurement of the sonar unit which uses an internal magnetic compass to delineate magnetic north. The range of angular error is the sum of contribution of error from the inherent accuracy of the internal compass, effect of magnetic minerals/ferrous metal present in close proximity to the sonar tool, and error due to small movement of the sonar tool suspended on a wireline during scan recording. Ranging error is the sum of the contribution of error from water velocity time-to-distance conversion, timing/event picking accuracy and the effects of scattering typically due to rugosity and incidence angle of the reflecting surface, and the beam width which increases with distance from the sonar head. Based on an analysis of the data, the angular error is on the order of approximately $\pm 1^\circ$ and the ranging error is on the order of ± 0.5 ft. Due to the type of error involved, the absolute accuracy is highest in close proximity to the sonar unit and decreases with distance from the sonar unit.

The deliverables include three hard copies of the report and one electronic copy of the report, figures, and video record on DVD.

We appreciate the opportunity to be of service to Shannon & Wilson, Inc., in support of the DRMS project. Please feel free to contact us if you have any questions.

Sincerely,
Zapata Incorporated

By: _____
Steve Hodges
Senior Geophysicist

By: _____
Kanaan Hanna
Senior Mining Engineer

Enclosures

Mine Site and Sonar Data Acquisition Equipment



Borehole 4-inch PVC and Sonar Void Imaging Tool



301 Commercial Road, Suite B Golden, Colorado 80401
 303-278-8700 Phone
 303-278-0789 Fax
 zapata@zapatainc.com www.zapatainc.com

Shannon and Wilson
 Denver, Colorado

Project No
 00603-00

Date
 November, 2013

Drawn By
 JMN

Checked By
 KH

Scale
 NOT TO SCALE

Figure
 1

Geophysical Sonar Survey
 Mine Site and Sonar Field Setup Survey
 Perigo Mine Crosscut
 Rollinsville, Colorado

Field Record

Borehole P4 Coordinates

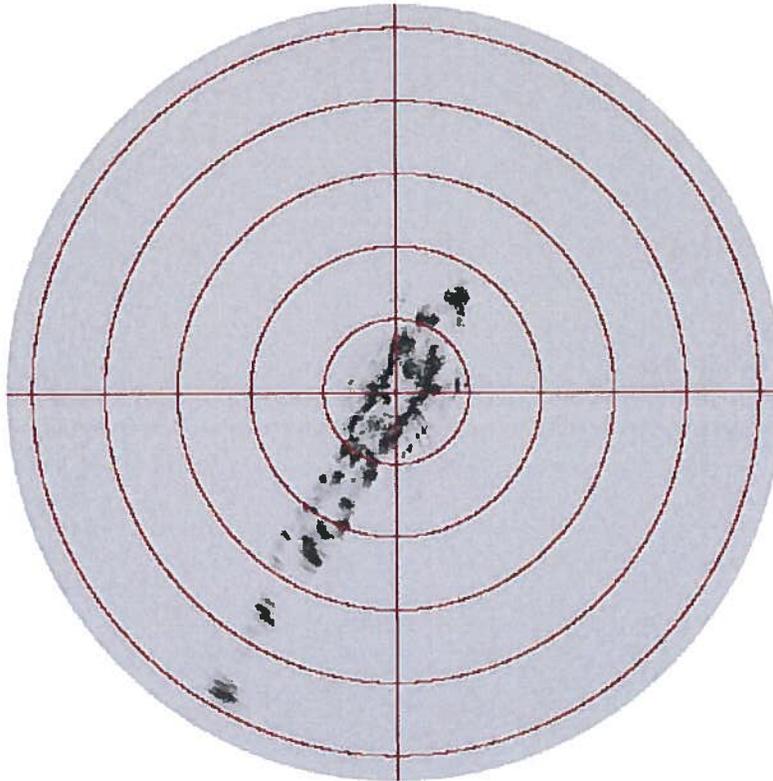
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N=4414642 m

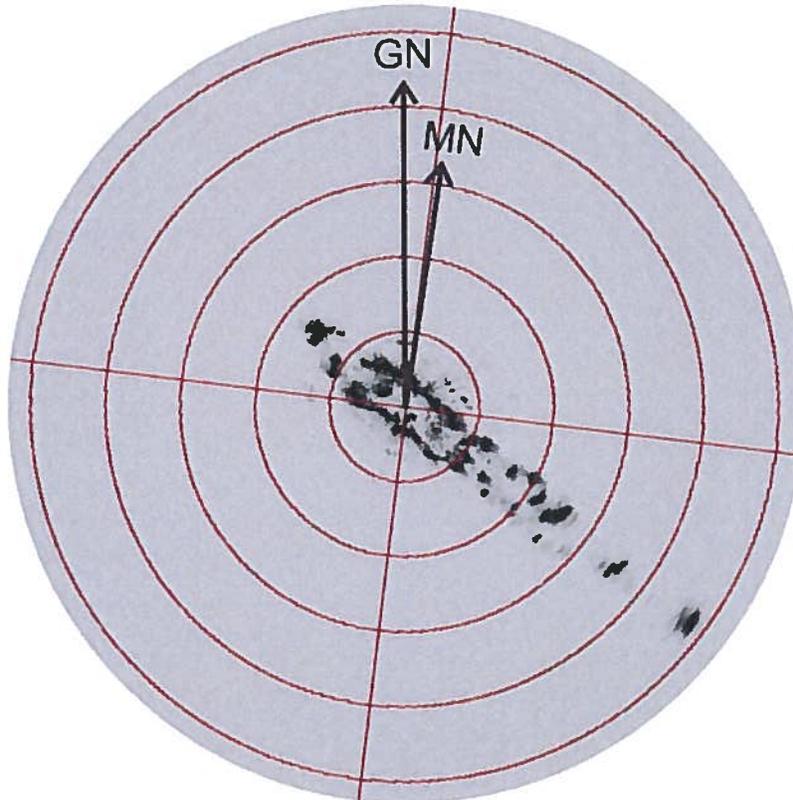
UTM Zone 13N NAD83

Scan Depth = 117' bgs

Scan Division = 12'



Processed Scan



301 Commercial Road, Suite B
Golden, Colorado 80401
zapata@zapatainc.com

303-278-8700 Phone
303-278-0789 Fax
www.zapatainc.com

Shannon and Wilson
Denver, Colorado

Project No
00603-00

Date
November, 2013

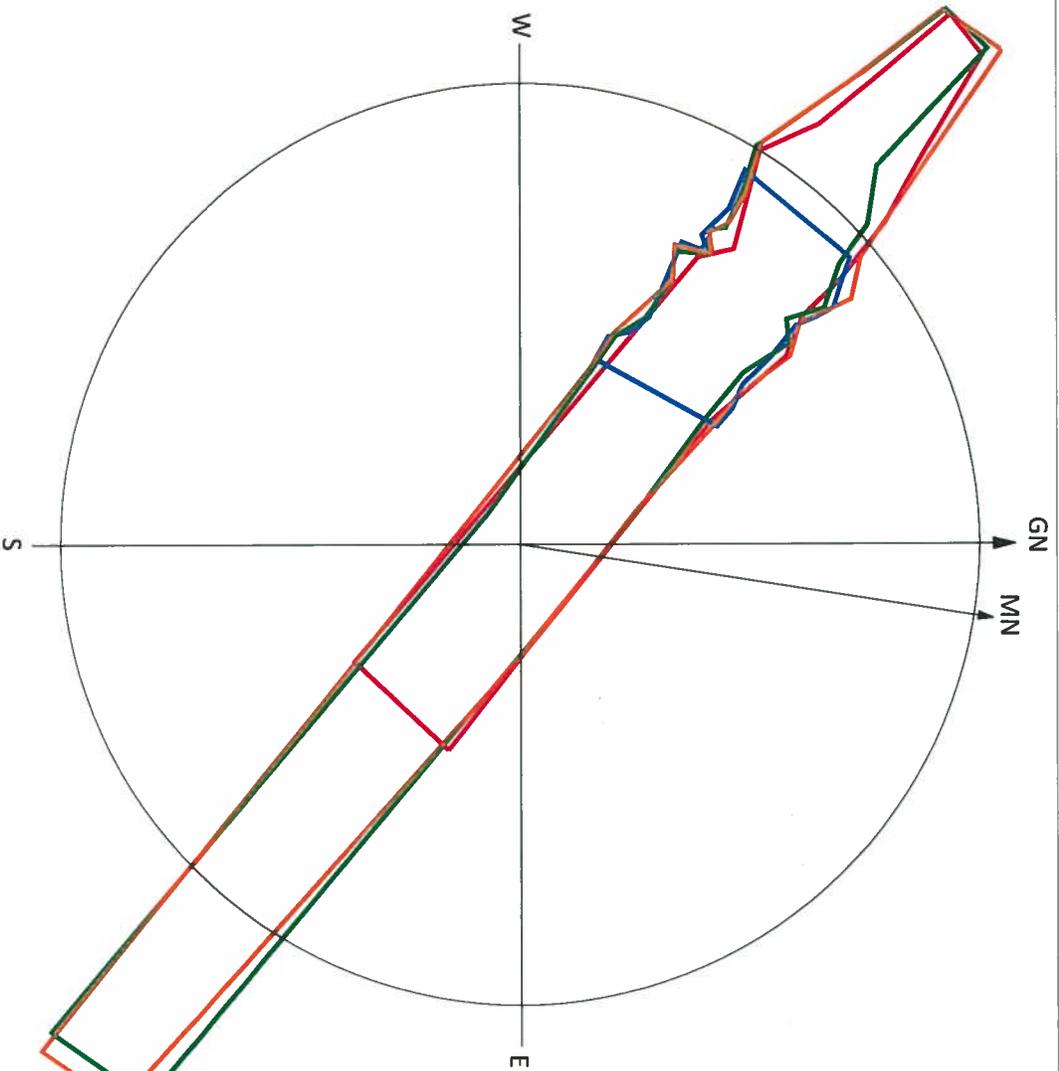
Drawn By
JMN

Checked By
KH

Scale
NOT TO SCALE

Figure
2

Geophysical Sonar Survey
Field Record & Sonar Scan
Perigo Mine Crosscut
Rollinsville, Colorado



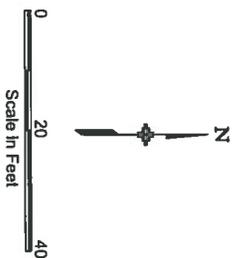
Borehole P4 Coordinates

E=454568 m
 N=4414642 m
 UTM Zone 13N NAD83

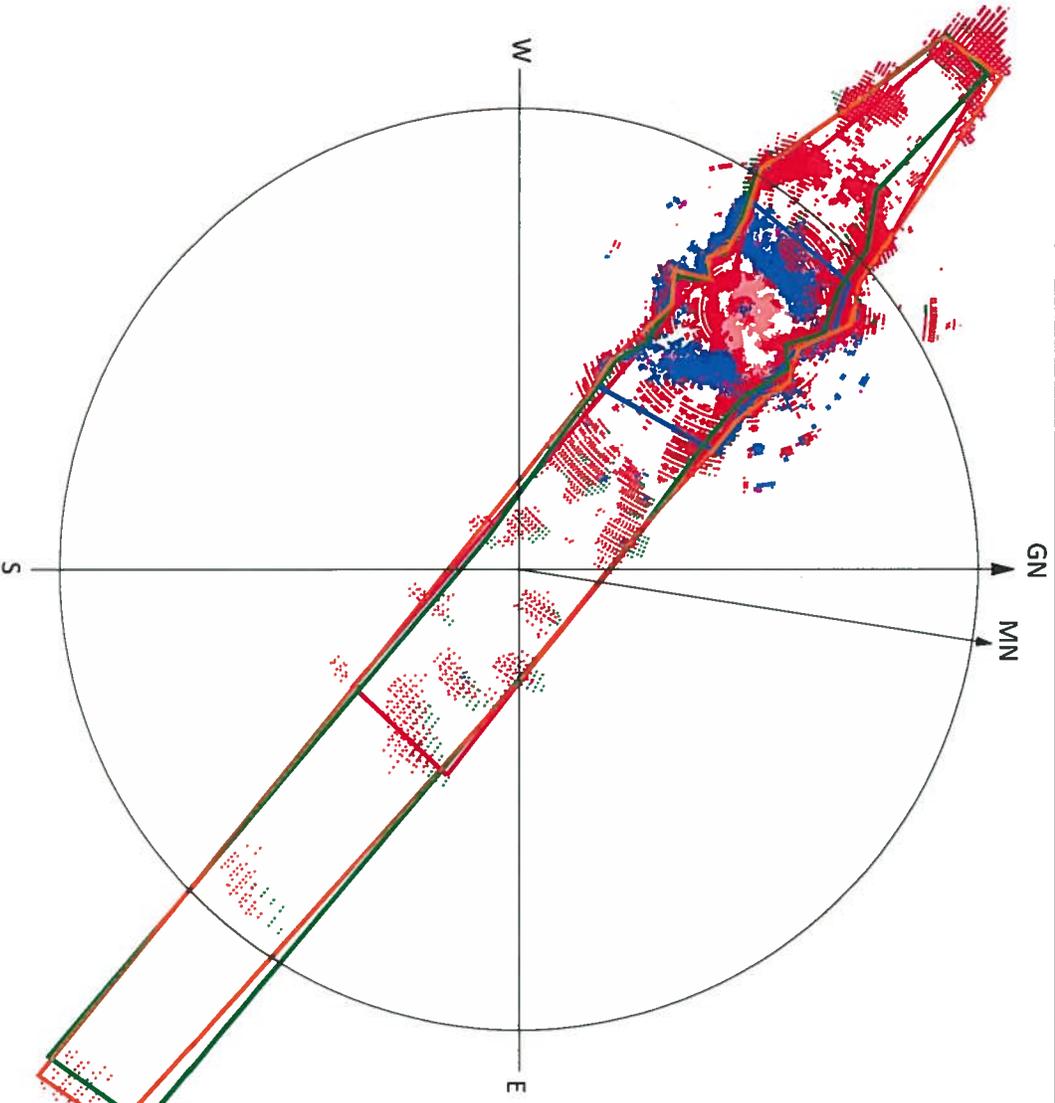
**Horizontal Scans
 Depth Below Ground Surface**

116.75 ft - bgs
 116.9 ft - bgs
 117 ft - bgs
 117.5 ft - bgs

Maximum Mapped Area (orange line)
 5403.5 sqft



Shannon & Wilson, Inc. Denver, Colorado		Compassia, Sonar Data Plot	
PROJECT #:	000603-00	DATE:	11/20/2013
DRAWN BY:	AM	CHECKED BY:	JP
SCALE:	1"=20'	FIGURE:	3



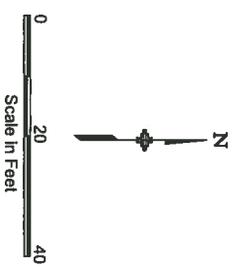
Borehole P4 Coordinates

E=454568 m
 N=4414642 m
 UTM Zone 13N NAD83

**Horizontal Scans
 Depth Below Ground Surface**

- 116.75 ft - bgs
- 116.9 ft - bgs
- 117 ft - bgs
- 117.5 ft - bgs

Maximum Mapped Area (orange line)
 5403.5 sqft



PROJECT #	DATE	DRAWN BY	CHECKED BY	SCALE	PAGE
00003-00	11/09/2013	JMM		1"=20'	4
Shannon & Wilson, Inc. Denver, Colorado			Composite Sonar Data Plot Borehole Mine Point Clouds Rollinsville, Colorado		

