THM
GRM

COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY

1313 Sherman Street, Room 215, Denver, Colorado 80203 ph(303) 866-3567

TR07

REQUEST FOR TECHNICAL REVISION (TR) COVER SHEET

File No.: M- M-2012-032 Site Name: Revenue Mine

County Ouray TR# _____ *(DRMS Use only)*

Permittee: Fortune Revenue Silver Mines, Inc.

Operator (If Other than Permittee): _____

Permittee Representative: Dianna Stoopnikoff

Please provide a brief description of the proposed revision:

Rerouting of water from surface discharge to No. 1 Shaft underground.

As defined by the Minerals Rules, a Technical Revision (TR) is: "a change in the permit or application which does not have more than a minor effect upon the approved or proposed Reclamation or Environmental Protection Plan." The Division is charged with determining if the revision as submitted meets this definition. If the Division determines that the proposed revision is beyond the scope of a TR, the Division may require the submittal of a permit amendment to make the required or desired changes to the permit.

The request for a TR is not considered "filed for review" until the appropriate fee is received by the Division (as listed below by permit type). Please submit the appropriate fee with your request to expedite the review process. After the TR is submitted with the appropriate fee, the Division will determine if it is approvable within 30 days. If the Division requires additional information to approve a TR, you will be notified of specific deficiencies that will need to be addressed. If at the end of the 30 day review period there are still outstanding deficiencies, the Division must deny the TR unless the permittee requests additional time, in writing, to provide the required information.

There is no pre-defined format for the submittal of a TR; however, it is up to the permittee to provide sufficient information to the Division to approve the TR request, including updated mining and reclamation plan maps that accurately depict the changes proposed in the requested TR.

Required Fees for Technical Revision by Permit Type - Please mark the correct fee and submit it with your request for a Technical Revision.

Permit Type	**Required TR Fee**	**Submitted** (mark only one)
110c, 111, 112 construction materials, and 112 quarries	$216	☐
112 hard rock (not DMO)	$175	☐
110d, 112d(1, 2 or 3)	$1006	☑

√ AF & Report
√ No Violations

Greg Lewicki And Associates, PLLC

11541 Warrington Court
Parker, CO USA 80138

Phone: (303) 346-5196
E-Mail: info@lewicki.biz

Fax (303)-346-6934

June 16, 2015

Colorado Division of Reclamation, Mining, and Safety
1313 Sherman St, Rm 215
Denver, CO 80203

Revenue Mine (M-2012-032) Technical Revision 07 – Transfer of Underground Water to No. 1 Shaft

Fortune Revenue Silver Mines, Inc. is submitting the following Technical Revision to its Colorado Mined Land Reclamation Board permit M-2012-032 for the Revenue Mine. This technical revision is to allow the pumping of mine water from the Atlas/Cumberland and Yellow Rose Drift to the No. 1 Shaft and lower workings via the F10 Raise.

Current Hydrology

The Revenue mine currently discharges water via the Revenue tunnel and a mine water pond to Sneffels Creek. This discharge is the approved CDPHE discharge point. The bulk of the water in the tunnel is clean water that has entered the mine via fracture and joint sets in the host andesite formation (San Juan Formation) that the Revenue tunnel passes through. Water from mining drifts that enter this tunnel is typically lower in quality, due to sulfides in ore veins altering water with dissolved metals. The presence of carbonates in the host rock (andesite) neutralizes some of the acids that formed during the oxidation of vein sulfides, but the remaining neutral water still contains some dissolved metals. The metals in question will precipitate and drop out of the water flows in time, but at a neutral pH, the time required to do this is greater than the time it takes for these water flows to reach the surface via the Revenue tunnel and discharge into Sneffels Creek.

Table 1 shows the zinc load in the water in the Revenue tunnel ditch at low flow and high flow times of 2014. UG-1 (Yellow Rose sample) and UG-2 (Atlas/Cumberland sample) show the main sources of dissolved metals (represented by zinc). At both extremes of flows, the zinc load decreases substantially downstream in the ditch. This is because, as would be expected, metals like zinc do not stay in solution in neutral pH water. Over time, they precipitate and drop out. This technical revision proposes to collect the water from the Atlas/Cumberland and Yellow Rose drifts and pump them to the No. 1 Shaft, roughly 7900 feet back in the Revenue Mine.

Table 1 – Zinc Metal Load (mg/min) and pH in the Revenue Tunnel Water

Sample Point	High Flow 6/11/2014		Low Flow 12/4/2014	
	Zinc (mg/min)	pH	Zinc (mg/min)	pH
UG-4 Revenue Upstream	0.8	7.9	0	8.1
UG-3 Atlas/Cumberland	109.2	7.7	215.79	7.3
UG-2 Revenue Above YR	2	8.1	97.41	7.9
UG-1 Yellow Rose	0.4	8.1	2.95	8
UG-5 Revenue Portal	1.2	8.1	110.15	7.9

Note: The order of the sample points in the table represents their sequence along the Revenue tunnel from the No. 1 Shaft to the portal. See Map T-5 for the sample locations.

Reducing the dissolved metal content of the Revenue Mine discharge requires facilitating the precipitation and settling of said metals.

No. 1 Shaft

Fortune proposes dealing with this water quality problem in two ways: raising the pH to 10 via lime addition in an underground treatment step, and then pumping the water down the No. 1 Shaft, via the F10 Raise (see Map T-3). Currently, the No. 1 Shaft holds water from far below the Revenue tunnel. The surface level of water in the shaft is at least 500 feet below the Revenue tunnel. Records show that at least 150 gallons per minute (gpm) of dewatering was needed to lower the water level in the shaft [1]. There are not believed to be substantial inflows of water into the shaft from the surrounding rock since the water level has not risen back to the Revenue tunnel since pumping ceased in the 1980s.

The shaft and associated historic workings below the Revenue tunnel will act as a massive settling basin. The lime treated water will precipitate metals into the bottom of old workings, where they will stay. By removing the bad water from the Revenue tunnel discharge, the water discharging from the mine will be clean.

Flows from the Atlas/Cumberland and Yellow Rose drifts are the main source of dissolved metals and are expected to vary between 10 gpm and 125 gpm depending on the time of the year, with an average combined flow of 60 gpm. The maximum flow of bad water would not be sufficient to change the hydrologic balance of the water within the No. 1 Shaft. It is expected that the large amount of open workings between the current water level and the Revenue level would take a long time to fill at 60-100 gpm. By the time the water level would begin to rise precipitously, Fortune anticipates that it will need to drain the No. 1 Shaft anyways to develop ore reserves below the Revenue level. This is anticipated to be 2-5 years from now, at which point a water treatment system will be in place.

However, it is possible that water in the old Revenue Mine workings below the Revenue tunnel can depart the local aquifer at a different point. This will occur either via a potential surface spring, or via other abandoned mine workings in the area.

Discharge - Potential Springs

The elevation of the water table in the No. 1 Shaft is 10,208'. Since water does not flow up hill, water will only appear as a spring at this elevation or lower on the surface. Map T-1 shows where this could be based on USGS topographic data for the region. The nearest potential spring location is over 8,400' away (Route 1). Using Darcy's Law and basic text book values for igneous rock like that of the San Juan Formation, it would take at least 700 years (see Attachment 1) for water to appear on the surface at the end of Route 1. The San Juan Formation is not a permeable formation.

If water did reach the nearest spring location it would have passed through at least 8,400' of the San Juan Formation. This geologic formation contains some carbonates. Metals picked up from dissolving sulfides will precipitate back out due to carbonate-based neutralization. Spring water, even if it occurred, would very likely be clean.

As can be seen on Map T-2, there is no identified fracture, joint, or fault system that connects the Revenue Mine workings with any available spring location, laterally. The faults that have been identified are vertical in nature, and there is not sufficient head for any water to be pushed up the faults to the surface. Vein structures that the Revenue Mine passes through are similarly steeply dipping, preventing water transmission along them to the surface.

Water from the Revenue Mine is likely never to reach a point on the surface via direct travel through the San Juan Formation, as the igneous rock has too low of a hydraulic conductivity (see Attachment 1), and fault conditions do not exist to expedite the travel of water to the nearest possible spring locations. Route 3 (see Map T-1) does show that a potential route via faults exists, but that is at least 2600' away. It would still take over 200 years for water to reach this fault through the rock directly.

If water from the Revenue mine does reach the surface it will be via existing mine workings in the area, particularly the Idarado Mine.

Discharge - Other Abandoned Mine Workings

The Idarado Mine, southeast of the Revenue Mine, is known to be hydraulically connected to the Revenue Mine via workings and a major mineral vein. When the Penn Tunnel (elev. ~10,400') of the Idarado Mine connected to the Montana vein in the 1940s, the Revenue tunnel drained of water [1]. Currently, the equilibrium level of the water in the Revenue No. 1 Shaft is lower than the Penn Tunnel. However, the Mill Tunnel and the Bobtail Tunnel of the Idarado Mine are both located at lower elevations than this equilibrium water level. Additionally, the Mill Tunnel and the Penn Tunnel are connected by a raise underground.

The Idarado Mill tunnel is documented as having a discharge of 2000-3000 gallons per minute, or greater, of water. This water is primarily from the Idarado Mine's own workings and surrounding geology. It has been estimated that roughly 150 gallons per minute of water transfered from the Revenue Mine to the Idarado Mine via the Montana vein and Penn Tunnel. [1] This is not a direct transfer via open workings, and therefore is limited by the permeability of the vein itself.

Only the Revenue level connects to the Montana vein, lower levels do not, as seen on the Map T-4. Thus, once the Penn Tunnel at the Idarado Mine drained the water from the Montana vein and Revenue level in the 1940s, there was no new water source from the Revenue Mine to drain to the Idarado Mine. The most direct hydrologic connection between the two mines was severed.

The water table is below the Penn Tunnel (10,208' versus 10,400'), but above the Mill Tunnel at Idarado. The Penn Tunnel was connected to the Mill Tunnel via a raise. For any water to drain from the Revenue Mine out of the Idarado Mine, it must pass via the Revenue level, Montana vein, Penn Tunnel, a connecting raise, and then out the Mill Tunnel. This would require the water level in the No. 1 Shaft to rise 500 ft up to the Revenue level. As can be seen on Map T-4 that would require water to completely fill the 350 and 210 levels at the Revenue Mine. This would take a significant period of time at the 60- 100 gpm that Fortune intends to pump into the No. 1 Shaft

To prevent any discharge of Revenue Mine water to the Idarado Mine tunnels, the water table in the No. 1 Shaft will be monitored. This will be done both visually from the top of the shaft, once that is safe to access, but also by monitoring water levels in the F10 raise, where the pump line will discharge. If the water table rises above the 210 level, pumping will cease.

Conclusion

The removal of dissolved metals from the naturally inflowing water at the Revenue Mine is dependent on taking advantage of simple chemistry and time. Using lime to elevate the pH of the mine water will facilitate the precipitation of metals at an accelerated rate. The storage capacity that exists below the Revenue level within the mine will provide the settling basin, and therefore the time needed, for the precipitated metals to settle out of the water. The presence of the naturally high pH $CaCO_3$ in the surrounding rock, combined with the elevated pH of the new input water, will buffer against further acid creation and metal dissolution. The available outlets for this water out of the mine are limited in flow capacity, and even if water takes these courses it is unlikely to reach the surface in the near future in an amount that could negatively affect local watersheds. Finally, in the event that the water level within the No. 1 Shaft rises above the 210 level (200 feet below the Revenue tunnel), pumping will stop in order to prevent this water from leaving the Revenue Mine to the Idarado Mine.

Eventually, Fortune Revenue Silver Mines will pursue the ore located below the Revenue level, and will have to completely dewater the lower workings of the Revenue Mine. This is several years out, at which time a comprehensive water treatment system will be in place at the mine to ensure clean water discharge.

ATTACHMENT 1 – WATER FLOW CALCULATIONS

Any and all water in the Revenue No. 1 Shaft must pass through the surrounding host rock to any potential spring. Map T-1 shows the nearest possible locations at which a spring may occur. Table 1-1 below lists the closest five locations.

Table 1-1 Closest Possible Spring Locations

Distance from No. 1 Shaft to Possible Spring		Description
Route 1	8,585 ft.	Extending southwest towards Telluride, CO beneath Mendota Peak.
Route 2	8,452 ft.	Extending southwest towards Telluride, CO beneath Marshall Basin.
Route 3	11,474 ft.	Extending south towards Bridal Veil Creek and the old Pandora Mill.
Route 4	10,285 ft.	Extending east-northeast towards Camp Bird and Sneffels Creek.

Based on the locations in Table 1-1, and using Darcy's Law, the time it takes for any of the Revenue No. 1 Shaft water to reach the surface and cause a spring is calculated. Table 1-2 shows the results of these calculations, with a breakdown of the calculations shown below.

Darcy's Law

$$Q = KIA$$

$Q = flow\ rate\ (ft^3/sec)$
$K = hydraluic\ conductivity\ (ft/\text{sec})$
$I = hydraluic\ gradient = \frac{h_L}{L}$
$h_L = head\ loss$
$L = flow\ distance$
$A = cross - sectional\ area\ of\ flow$

Assuming a unit cross sectional area of flow (1 ft^2), and no head loss over distance, the amount of time for water in the lower levels of the Revenue Mine to reach any of the nearest spring locations shown on Map T-1 is a direct relationship between hydraulic conductivity and distance.

$$Q = KIA$$
$$Q = VA$$

$V = Flow\ velocity\ (ft/sec)$

$$KIA = VA$$
$$KI = V$$
$$V = \frac{D}{T}$$

$D = Hydraulic\ Distance\ (ft)$
$T = Time\ (sec)$

$$KI = \frac{D}{T}$$

"I" is ignored since there is assumed to be no head loss over the hydraulic distance.

$$KI = \frac{D}{T}$$

$$T = \frac{D}{K}$$

The hydraulic conductivity of dolemite and basalt was used to represent the San Juan Formation [2]. These were used since there was no formation specific permeability data found in a search of publicly available USGS and Colorado Geological Survey information. It is generally accepted that the permeability of the San Juan Formation is so low as to prevent and springs from developing in any period of time faster than hundreds of years. The permeability of the San Juan formation is primarily dictated by faults and fractures in the rock. [3]

Table 1-2 Calculated Time for a Spring to Develop

	Distance from No. 1 Shaft to Possible Spring (ft)	Hydraulic Conductivity (K) (ft/day) [2]		Time Until Spring Appears (days)		Time Until Spring Appears (years)	
		Dolomite	Basalt	Dolomite	Basalt	Dolomite	Basalt
Route 1	8585	0.00328	0.0328	2,617,000	261,700	7,170	717
Route 2	8452	0.00328	0.0328	2,577,000	257,700	7,059	**705**
Route 3	11474	0.00328	0.0328	3,498,100	349,810	9,584	958
Route 4	10285	0.00328	0.0328	3,135,700	313,570	8,590	859

ATTACHMENT 2 – WORKS CITED

[1] R. E. Larson, "Report Regarding the Historical Mining Actitivies in Ouray and San Juan Counties, CO for the Hecla Mining Company," Monadnock Mineral Services, Ouray, CO, 1986.

[2] D. K. Todd, Groundwater Hydrology, Second ed., vol. 1, New York, NY: John Wiley & Sons, 1980, p. 71.

[3] J. Barker, Interviewee, *Chief Geologist, Fortnue Revenue Silver Mines, Inc.*. [Interview]. 15 June 2015.

MONADNOCK
MINERAL SERVICES
Robert A. & Pamela J. Larson
P.O. Box 85
Ouray, CO 81427
(303) 325-4600

July 11, 1986

Mr. Michael White, Legal Counsel
HECLA MINING COMPANY
6500 Mineral Drive
Box C 8000
Coeur d' Alene, ID 83814-1931

Dear Mr. White:

Enclosed is a report regarding the historical mining activities in Ouray and San Juan Counties, Colorado, and the relationship of these activities to the Revenue-Virginius Mine, as per your request.

If there is any additional data that you need regarding this report please do not hesitate to call.

It has been an enjoyable task to review this data once again and to compile it for your needs.

Sincerely,

Robert A. Larson
Cert. Prof. Geol. 4682

Introduction

The following report outlines the principal mining activities in Ouray and San Miguel Counties, Colorado, and the relationship of these activities to the Revenue-Virginius Mine. The purpose of this study is to better understand the configuration of these properties so that an assessment can be made regarding the water discharge from each mine and the relationships between them. The possible affects of the Revenue-Virginius Mine discharge to waters that are currently being studied by the State of Colorado and Idarado Mining Company can also be determined.

Included is a map which shows the principal mine workings and their interconnections, the relative portal elevations of the various haulage and drainage tunnels (adits), and the surface drainage features which are tributaries to the San Miguel River or the Uncompahgre River.

The report is divided into categories as follows:

I. History of Mining

   A. Revenue-Virginius

   B. Idarado Mining Company

   C. Camp Bird

II. Summary of Interconnections/Water Flow/Drainage

III. Conclusions

July 11, 1986

Monadnock Mineral Services

Robert A. Larson
Cert. Prof. Geol. 4682

History of Mining

Revenue-Virginius:

Mining in the area of the Virginius properties began with the staking of the Virginius Claim by William Feland in October, 1876. The property was operated by lessors and different owners until 1878 where work was concentrated on Levels 1 and 2.

The property was purchased by the Caroline Mining Company in 1880, a company whose principals were A.E. Reynolds, Henry Thatcher, and John Maugham. The property has been owned by the relatives of A.E. Reynolds since that time. The Caroline Mining Company began their work by driving the 3 Level Crosscut (Elev. 12,420') to intersect the vein below the previous work. The Virginius Shaft (Winze) was started at the vein intersection and systematic development commenced with levels being developed on 100 ft intervals. A mill was constructed at this location and work continued down the shaft to the 10 Level by the year 1890. Hoisting and pumping costs continued to rise, so a decision was made to develop a lower elevation access, the Revenue Tunnel (Adit). The Revenue Tunnel was started at an elevation of 10,670'and continued a distance of 7600' to the intersection of the Virginius Vein at an elevation of approximately 10,750'. The intersection was made in 1893. Work had continued to the 14th Level in the Virginius Shaft at this time and a raise was driven from the Revenue Level to connect with the workings above. The mill was moved from 3 Level down to the location of the Revenue Tunnel.

Mining continued above and below the Revenue Level until 1906 when it was reported that a fire in timbered ground above the Revenue Level, caused flooding and destruction of the electrical and pumping installations. The Virginius No.1 Shaft had been developed to 700' below the Revenue Level. The Virginius No.2 Shaft had been developed to 350' below the Revenue Level and was located approximately 2600' to the southeast of the No.1 Shaft. The Revenue Level was extended approximately 2,400' farther to the southeast, along the Virginius Vein, to the Montana intersection. Pumping installations were not repaired and mining continued above the Revenue Level with lessors until 1912, the time of a fire which destroyed the mill. Mining of the Montana Vein had also been conducted through the Revenue, until the Montana properties were sold by A.E. Reynolds to the Tomboy Gold Mines Company in 1911.

The total shipments of crude ore and concentrates for the Virginius Mine up to 1912, were reported to be:

TONS	Au oz	Ag oz	Pb lbs
122,223 tons	123,515 oz	14,529,368 oz	63,320,823 lbs

Only a small amount of mining and development was done on the Revenue-Virginius property after this time. Mr. Reynolds died in 1921, the property was leased and a small amoumt of ore was mined in 1922-23,

and no further substantive work was conducted until 1936. Rehabilitation of some of the workings was conducted from the period 1936 to 1938 but no production is recorded. The period from 1943 to 1948 also had further rehabilitation and development at both the Cumberland Vein and the Virginius Vein, but very little production was noted. The mine inspection report for 1947 states that the tunnel was rehabilitated to the Virginius Vein, the shaft station was retimbered, and the shaft reconditioned down to the 210 ft level. It also states that the water was pumped from the 350 level and some examination work was done on that level.

The next work on the property was conducted by Federal Resources, beginning in 1964. Rehabilitation of the Revenue Tunnel was completed and the shaft was once again made accessible to the 350 Level. A footwall drift was driven on the Revenue Level to the northwest and some development work and a small amount mining was conducted on the Monogahela portion of the property. A drift was also driven to the northwest on the 210 Level, below the Monogahela, but no actual mining was done from this level. Limited exploration drilling was conducted on the Revenue, 210, and 350 Levels.

The property remained idle until 1979-1980, when Ranchers Exploration and Development Corporation acquired a lease to conduct exploration and mining. The Revenue Tunnel was once again rehabilitated and the No.1 Shaft retimbered, pumped, and cleaned out to the 700 Level. A drift was driven to the southeast on the 550 Level to approximately 2600' southeast of the No.1 Shaft and drill stations established on regular intervals. An extensive exploration drilling program was conducted on the Revenue, 210, 350, and 550 Levels of the mine, together with surface exploration and drilling. Test mining was conducted between the 210 Level and the Revenue Level to establish costs and mining conditions. The property was put on a standby-status in 1984 due to low metal prices.

Idarado Mining Company:

The Idarado Mining Company was organized in 1939 with the consolidation of several properties; the Black Bear, Treasury Tunnel, Barstow, and Imogene. The Treasury Tunnel was extended to intersect the Black Bear Vein in 1943-1944 and operated initially on the Red Mountain side of the property with both mining and milling facilities. A further consolidation of properties in 1956 with Telluride Mines,. Inc. and Tomboy Gold Mines, Inc. created a company which could mine on both the Red Mountain and Telluride sides, with ore transferred underground to the Mill Level Tunnel.

The mines that were consolidated by Idarado were generally individual properties that had been discovered in the late 1800's and worked independently. The Black Bear had been discovered in 1894 and was operated until 1934, when a snowslide destroyed most of the surface facilities. Telluride Mines, Inc. was orginally known as Veta Mines, and was started in 1936 with the properties of the Telluride Holding Company, which included the Smuggler, Flat, Ansborough, and Pandora

properties. Telluride Mines also purchased the Humboldt and the Liberty Bell, and leased the claims of Tomboy Gold Mines, Inc. which included the Montana, Argentine, and Tomboy.

In 1941, Telluride Mines connected the Smuggler workings to the Montana Vein by a 4300 ft cross-cut on the Pennsylvania Level. In a report written by George Garrey, dated October 5, 1949, he states that the heavy flow of water in the workings below the Revenue Level had been greatly decreased through new workings on the Pennsylvania Tunnel. The Penn Level is approximately 500 ft lower than the Revenue. In 1945, the Mill Level Tunnel was started which is approximately 1200 ft below the Penn Level. In 1952, the Master Raise and an ore pass were completed which connected the Mill Level Tunnel to the Penn Level on the Montana vein. In 1956, there was a consolidation of Idarado with both Telluride Mines and Tomboy Gold Mines as discussed above. The Idarado operated until 1978, at which time base metal prices were too low to operate at a profit. The property has been on a care and maintenance status since then.

Early production of the consolidated properties was estimated to be 13,350,000 tons of ore which averaged .26 opt Au, 2.70 opt Ag, and .85% Pb. The production from 1946 to 1976 was estimated to be 10,500,000 tons of ore which averaged .07 opt Au, 2.0 opt Ag, 2.3% Pb, .70% Cu, 3.60% Zn.

Camp Bird:

The claims on the Camp Bird Vein were staked in 1877, and were worked intermittently by various owners and/or lessors until the discovery of high-grade gold ore in 1896 by Thomas Walsh. The mine was operated by Walsh until 1902, at which time he sold the property to Camp Bird Ltd., Inc., an English company. The mine operated until 1916, when it was stated that the combined factors of lower value ores and the heavy inflow of water in the deep shafts made the additional sinking uneconomical. A lower haulage and drainage cross-cut adit was then driven to intersect the vein at approximately 2000 ft below the original workings. Very little gold was discovered at this level, so it has been reported that large scale mining operations were not resumed.

The Camp Bird Leasing Company was formed in 1925 to operate the mine, but was dissolved in 1928. A small company called King Lease Inc. was formed and operated the property successfully until 1956. Camp Bird Limited once again took over the control of the mine, built a new flotation mill in 1960, and then sold the property to Federal Resources in 1963. An 800 ft winze was sunk from the main haulage level to develop base-metal replacement ore in 1970. The sump of the winze is at an elevation of approximately 9100 ft, and was pumped continually during operations from 1970 until 1978. Since 1978, the mine has been operated several times and returned to standby status depending on the price of metals.

Approximately 2.5 million tons of ore was mined from the Camp Bird property. The grade has ranged from 6.6 opt Au in the original

127,700 tons mined by Tom Walsh; to 0.0 opt Au, 1.2 opt Ag, and 8.6% combined base metals for the 562,000 tons of replacement ore.

Summary of Interconnections/Water Flow/Drainage

The following summarizes the chronology of the mine development of the various properties, the connections between them, the possible flow of water, and the drainage of the discharge to the stream system.

1880's: Virginius 3 Level Development including Mill
Pumping from Virginius Shaft - Water to Governor Basin
Development of Smuggler, et al - Water to Marshall Creek

1890's: Revenue Tunnel - Drains Virginius Mine to Sneffles Creek
Virginius Mill to Revenue Location
Upper Camp Bird Development

1900's: Pumping below Revenue Level until 1906
Mining Montana from Revenue
Ophir Tunnel - Drains into Marshall Creek

1910's: Revenue shut-down
Montana sold to Tomboy - Mining from Ophir Tunnel (A statement was made in a 1923 report that a shaft in the Ophir Tunnel below the Revenue Level would encounter water, but this would help the water situation at the Tomboy Mill.
Camp Bird 14 Level - Haulage/Drainage Tunnel into Canyon Creek.

1920's: King Lease at the Camp Bird

1930's: Idarado Mining Co. Organized
Veta Mines - Smuggler et al, Lease on Tomboy, Liberty Bell
King Lease at the Camp Bird

1940's: Telluride Mines (formerly Veta Mines) - Montana Crosscut from Pennsylvania Tunnel - Report states that water below Revenue decreased after the Montana was connected to the Penn. Tunnel.
Mill Level Tunnel started (1200' below Penn. Tunnel) - Drains into Marshall Creek near San Miguel confluence.
Leasors at the Revenue
King Lease at the Camp Bird
Idarado connected Treasury Tunnel to Black Bear - Mill on Red Mountain side - Drains into Red Mountain Creek.

1950's: Raise connected Mill Level and Penn. Level
Consolidation of Idarado/Telluride Mines/Tomboy - Mill moved to Telluride.
Camp Bird Limited back into control of Camp Bird

1960's: Idarado mining from both Red Mountain and Telluride - Milling at Telluride.
Camp Bird Ltd. constructs new Mill
Federal Resources buys Camp Bird
Federal Resources leases Revenue

1970's: Idarado continues mining until 1978

Federal Resources sinks shaft - mines until 1978
Revenue remains idle

1980's: Ranchers Exploration leases Revenue/Virginius - Exploration and Development until 1984.
Superfund Suit against Idarado
Idarado 3rd Party suits to other mine properties

Conclusions

The information, as outlined above and from personal observations, shows that the water and tailings from the original mining and milling on the Virginius Property, was discharged into Governor Basin, a tributary of Sneffles Creek. A small amount of tailings still exists at the head of the basin, just below the site of the original mill. Once the Revenue Tunnel intersected the Virginius Vein and connections were made with upper workings, most of the mine water was discharged through the Revenue portal into Sneffles Creek and later into the holding pond. It is not known when the dam was built to hold the water that is discharged from the Revenue Portal. After the mill was moved from 3 Level to the Revenue area, tailings were discharged into Sneffles Creek until the mill burned in 1912. There are no indications of tailings at the mill site below the Revenue Tunnel.

As mining proceeded below the Revenue Level in the 1890's and 1900's, the water was pumped to the Revenue Level and discharged out the Revenue Tunnel. While the mine was idle, water apparently inundated the workings and filled the No.1 and No.2 Shafts to the collars. After the completion of the Montana crosscut, from the Pennsylvania Tunnel to the Montana Vein, the amount of water in the shafts were reported to be decreased. Additional connections were made with lower elevation mine workings when the Master Raise and an ore pass connected the Mill Level Tunnel to the Penn Level in the Montana workings. The apparent effect of this work was to lower the natural water table to below the Revenue Level. The Pennsylvania Level workings are approximately 500 ft below the Revenue Level, and the Mill Level is an additional 1200 ft below the Penn Level.

From personal observations, when the No.1 Shaft was being rehabilitated in 1981 and 1982, the water level was observed to be above the 350 Level, and had to be pumped down to that level to gain access. It was later found that a tight cave in the shaft just below the 350 Level was preventing very much water from draining down the shaft and when it was cleaned out, the static water level was just above the brow of the 550 Level. When pumping was stopped during the shutdown operations in 1984, water filled the 550 level and appeared to stabilize just below the brow of the station. It is not known how much water could be seeping along the fracture systems of the Virginius and associated veins into the Montana area, which has essentially been drained by the mine workings on the Montana Vein, but it is apparent that there is a certain amount of water from the Virginius workings that could possibly reach the Idarado drainage tunnels. The mineral content of this water should, however, correlate very closely with the water that was sampled during the pumping operations in the shaft from 1981 until 1984.

Although a report written by C.P. Tremlett dated September 17, 1976, states that a reduced flow of water in the lower Virginius workings can be attributed to the Pennsylvania and Camp Bird Tunnels, combined with the Idarado and Camp Bird lower workings, it seems unlikely that water would reach the Camp Bird workings unless there was absolutly no flow through the Montana, Pennsylvania, and Mill Level

areas. The majority of the mine water from the Virginius workings, discharges from the Revenue Tunnel and into a settling pond. This water flows into Sneffles Creek by surface discharge in the summer and into the groundwater system the remaining part of the year. Sneffles Creek is a tributary of Canyon Creek and enters the Uncompahgre River at Ouray.There is no water from the Virginius Mine workings that can reach Red Mountain Creek and be a part of that system before it enters the Uncompahgre.

The water that drains into the lower Idarado workings from the Revenue-Virginius Mine could possibly reach the San Miguel drainage system. An estimate of the amount of heavy metals added to the San Miguel system over a given period of time could be calculated. If the amount of water that was pumped from the shaft during the period 1981-1984 is proportional to the amount of water seeping into the lower Idarado workings, this could be correlated to the metal values sampled in the Revenue discharge. The percentage of these values as compared to the total values in the San Miguel system as determined by Idarado and the State of Colorado should be minimal.

TABLE 3.1 Representative Values of Hydraulic Conductivity (after Morris and Johnson[45])

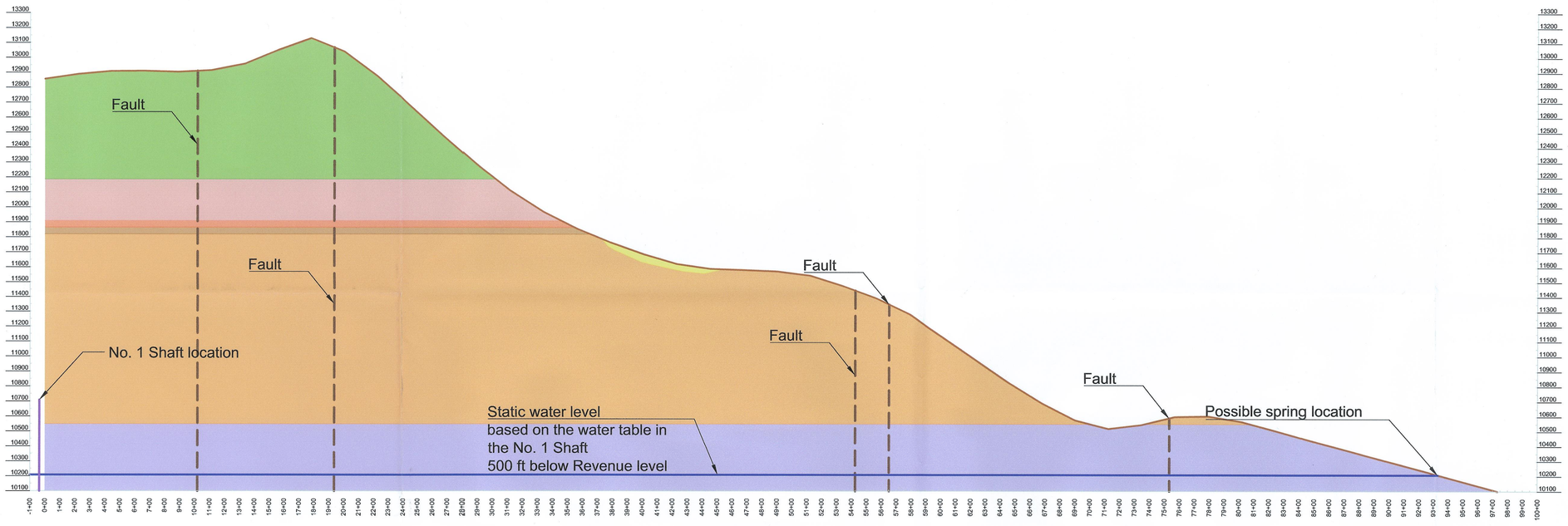
Material	Hydraulic Conductivity, m/day	Type of Measurement[a]
Gravel, coarse	150	R
Gravel, medium	270	R
Gravel, fine	450	R
Sand, coarse	45	R
Sand, medium	12	R
Sand, fine	2.5	R
Silt	0.08	H
Clay	0.0002	H
Sandstone, fine-grained	0.2	V
Sandstone, medium-grained	3.1	V
Limestone	0.94	V
Dolomite	0.001	V
Dune sand	20	V
Loess	0.08	V
Peat	5.7	V
Schist	0.2	V
Slate	0.00008	V
Till, predominantly sand	0.49	R
Till, predominantly gravel	30	R
Tuff	0.2	V
Basalt	0.01	V
Gabbro, weathered	0.2	V
Granite, weathered	1.4	V

[a]H is horizontal hydraulic conductivity, R is a repacked sample, and V is vertical hydraulic conductivity.

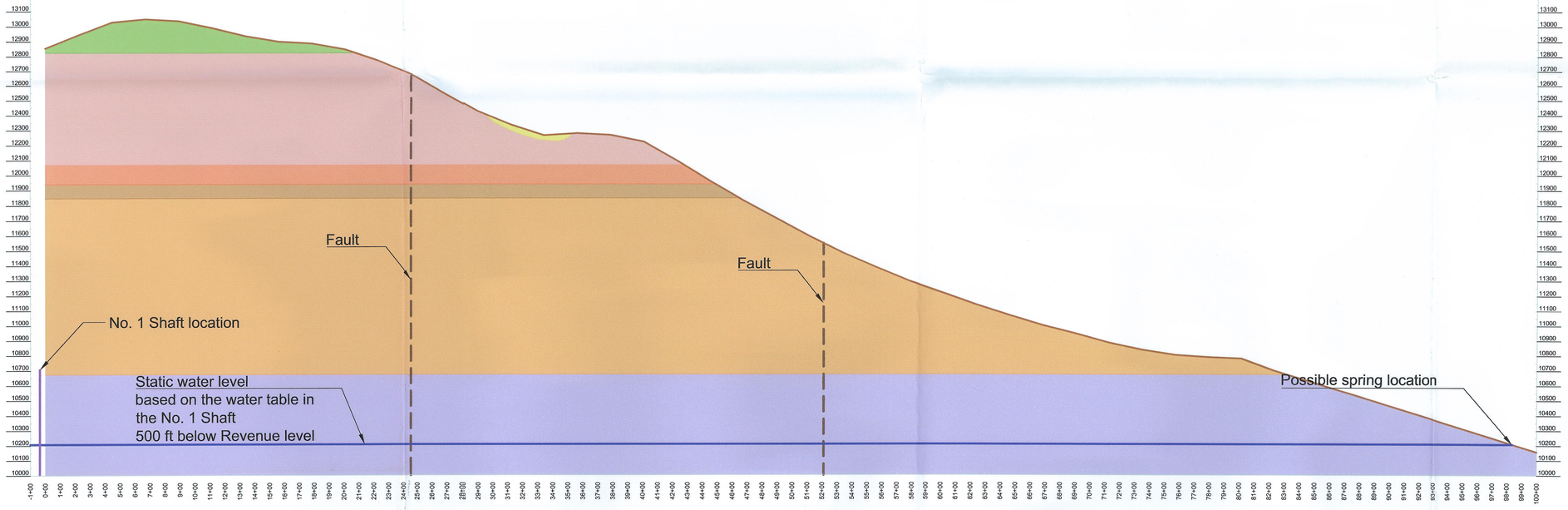
ATTACHMENT 3 - MAPS

Map T-1 Possible Spring Locations
Map T-2 Possible Spring Routes
Map T-3 Virginius North F9 Stope and #1 Shaft Area
Map T-4 Revenue Virginius Mine – Virginius Long Section with Plan View.
Map T-5 Mine Water System

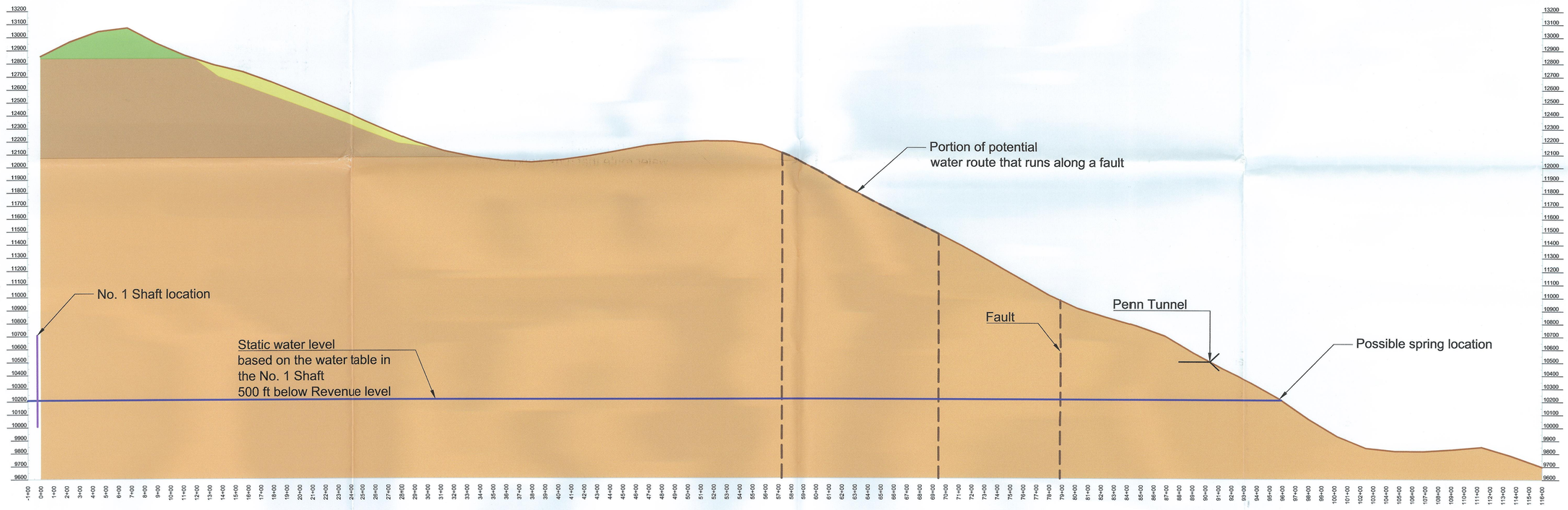
Route 1



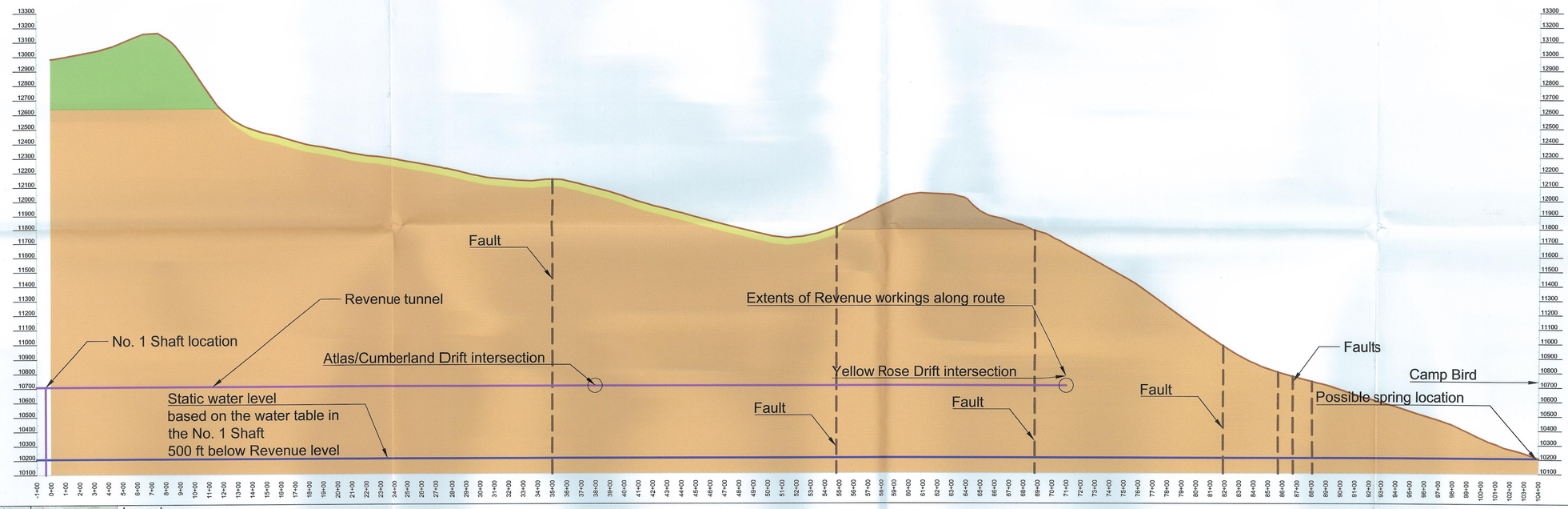
Route 2

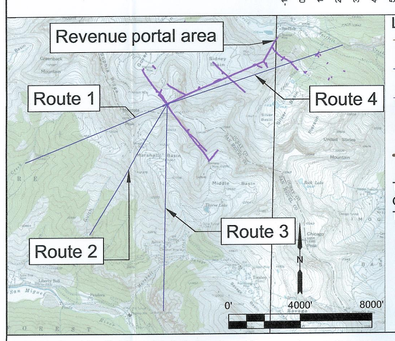


Route 3



Route 4





Legend

- Baseline Topography
- Static Water Level in the No. 1 Shaft
- Revenue Mine Underground Workings
- Mine Tunnel Portal
- Faults

Topographic data from USGS Ironton, Telluride, Ouray, and Mt. Sneffels Quadrangles. Geologic cross sections extrapolated from USGS Ironton and Telluride Geologic Quadrangles.

- **Talus**
- **Gilpin Peak Tuff** — Predominantly quartz latitic welded ash-flow tuffs divisible locally into six principal units. Unit no. 4 is tuff containing some fossil plant fragments.
- **Burns Formation** — Medium to thick dark massive flows, flow breccias, tuffs, and fluidal banded flows of mainly rhyodacitic composition.
- **San Juan Formation** — Predominantly massive rudely bedded rhyodacitic tuff breccia (andesite bearing). Foreign inclusions in lower few hundred feet: thin flow of rhyobasalt.
- **Picayune Formation** — Dark porphyritic and amygdular flows, breccias, and tuffs of andesitic to rhyodacitic composition.
- **Telluride Conglomerate** — Reddish gray to red-brown conglomerate with some sandstone, siltstone, and shale.
- **Eureka Tuff** — Medium to dark rhyodacitic to quartz latitic welded ash-flow tuffs containing abundant inclusions of flow rocks.

NOTES: See Map T-1 for a detailed plan view of these springs routes.

REVISIONS	BY	DATE

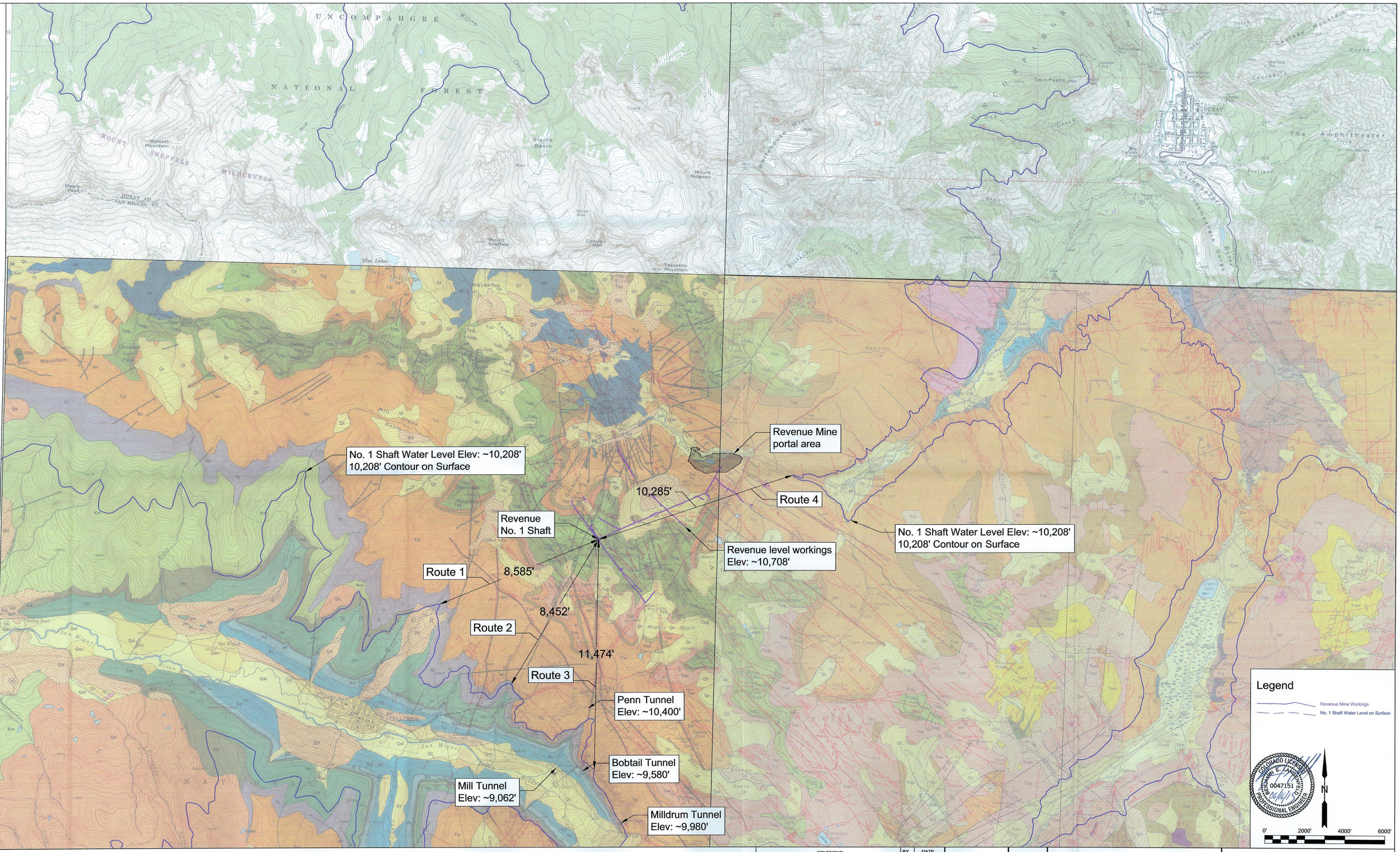
DRN: BL
CHK:
APPD:

DATE 06/09/15

SCALE 1":400'

Greg Lewicki And Associates
11541 Warrington Court
Parker, CO USA 80138
Phone (303)-346-5196
E-Mail - info@lewicki.biz

Map T-2: Possible Spring Routes
Revenue Mine
Fortune Revenue Silver Mines, Inc.



NOTES:

REVISIONS	BY	DATE	
RECEIVED			DRN: BL
JUN 22 2015			CHK:
DIVISION OF RECLAMATION MINING AND SAFETY			APPD:

DATE 06/09/15

SCALE 1":2000'

Greg Lewicki And Associates
11541 Warrington Court
Parker, CO USA 80138
Phone (303)-346-5196
E-Mail - info@lewicki.biz

Map T-1: Possible Spring Locations Revenue Mine Fortune Revenue Silver Mines, Inc.

M-2012-032 - TR07

Legend

- SW-1 (Atlas Mine Water) — Water sampling point
- DRMS Permit Boundary
- Sneffels Creek

Mine Workings

- Caved Workings
- Future Drift or Stope Excavation
- Existing Openings
- Existing Openings Not Rehabilitated

94,000 E
95,000 E
96,000 E
97,000 E
98,000 E
99,000 E
100,000 E
101 000 E
102 000 E

98,000 N
97,000 N
96,000 N
95,000 N
99,000 N

Sneffels Creek
SW-2 Upstream Sneffels Creek
GW-1A&B
GW-2A&B
OF001A Mine Water Pond Discharge
SW-3 Seep from Old Revenue Pond
SW-4 Downstream Sneffels Creek
MINE WATER POND
MINE WATER TO POND
SW-1 Atlas Discharge
UG-5 Main Drift Exit
Mill Water Can Enter Ditch
Coffer Dam for Water to Mill
UG-2 Main Drift
UG-1 Yellow Rose Drift
Yellow Rose S.E.
Exit to Surface But Caved
Clean Water Spring 5-100 gpm
Mug Wump Drift
Anglo Saxon X-Cut
Cumberland Drift N.W.
REVENUE LEVEL
UG-3 Atlas/Cumberland Drift
UG-4 Revenue Tunnel above Atlas
Caved
Atlas Drift S.W.
Virginius North Drift N.W.
Terrible Drift N.W.
F10 Raise
Pipe from Atlas/Cumberland and Yellow Rose Drifts

COLORADO LICENSED HUMMIT ENGINEER 0047151 REGISTERED PROFESSIONAL ENGINEER

N

0' 300' 600' 900'

Notes: Details of Workings from Underground Mine Ventilation Map

Coordinate system: Mine Grid

Revisions	By	Date
	GL	
	GL	
	GL	

DES: GL
DRN: GL
CHK: GL

DATE 05/13/15

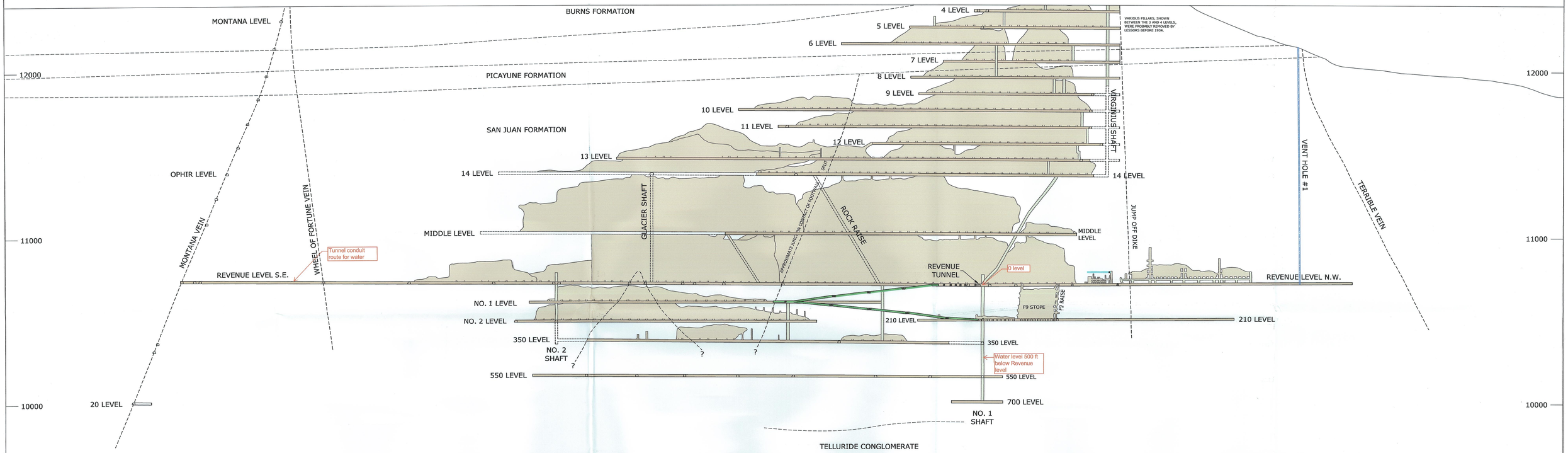
SCALE 1" = 300'

Greg Lewicki And Associates
11541 Warrington Court
Parker, CO USA 80138
Phone (303)-346-5196
E-Mail - info@lewicki.biz

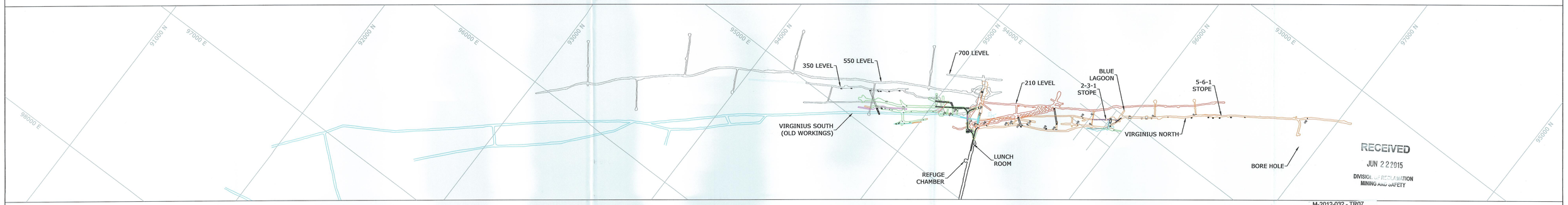
Map T-5: Mine Water Sources Revenue Mine Fortune Revenue Silver Mines, Inc.

M-2012-032 - TR07

LONG SECTION VIEW VIEW



PLAN VIEW



RECEIVED
JUN 22 2015
DIVISION OF RECLAMATION MINING AND SAFETY

M-2012-032 - TR07

Map T-4

SCALE 0 400 800 Feet

REVENUE VIRGINIUS MINE
VIRGINIUS LONG SECTION
WITH PLAN VIEW

FORTUNE MINERALS (USA), INC.
OURAY, CO

DRAWING NUMBER: 1 OF 1		
SCALE: 1" = 200		DATE
DESIGNED BY:		
DRAWN BY:	GSJ	06/11/2015
CHECKED BY:		


FedEx
803
DRMS
1313 SHERMAN ST
STE 215
DENVER,CO
W 108 04:56 PR-1D 2418356
80203-2236-99
425-6531
ETP:1
PD:MR:100:Y
Page 1 of 2
From: (303) 346-5196
Greg Lewicki
11541 Warrington Court
Parker, CO 80138
US
FedEx Ground
J151215022301uv
ate: 16JUN15
gt: 5.0 LB
Dims: 10 X 13 X 2 IN
CAD: 101989836/INET3610
Ref # Revenue
Invoice #
PO #
Dept #
Ship ID
SHIP TO: (303) 866-3567
BILL SENDER
DRMS
DRMS
1313 Sherman Street
Room 215
DENVER, CO 80203
US
TRK# 7738 4875 5831
80203
9622 0019 0 (000 341 3787) 7 00 7738 4875 5831
537J16A0E/EE4B

Division of Reclamation, Mining, and Safety

Fee Receipt for M2012032

Fortune Revenue Silver Mines, Inc

000000000

Receipt #: 19766
Date: 06/22/2015
Permit: M2012032

Payment Method	Revenue Code	Fee Description/Notes	Amount
1158 msr	4300-MTR0	Minerals Technical Revision M2012-032	$1,006.00
		Receipt Total:	**$1,006.00**