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Interview with Nelson King Concerning Rope's Gold Mine.

Mr. Nelson King , who is; could you give me your occupation?

My occupation is unit manager here at the at Calahan Minings Ropes' Gold Mining and facilities and my background is that I have a degree in metalergical engineering.

What type of schooling did you have to get this type of degree?

I went to uh, the Colorado school of mines located in Golden, Colorado, the curriculum there was primarily engineering with an emphasis is minerals processing.

What exactly do you do here at the mine,what do you take care of?

I'm presently in charge of all the personel functions for both the mine and the mill, and also at the same time I am in charge of the milling operation.

O.k., so you can tell us a lot about what is going around here.

I hope so.

First of all, do you know when the first mine was started?

Um, that goes back a long way, Julius Ropes was the name of the fella who initially discovered the property, and this was back in the late 1870's. Julius Ropes was a local pharmasist living in Ishpeming at the time, and he had heard about some

as asbestose minerlas located north of Ishpeming and some marble prospects. Julius Ropes was a fellow who was into lots of different things, he was into geology, although I don't think he was a geologist by degree, he became interested in different types of minerals while he was working as a pharmasist, he was exploring the area north of Ishpeming and came across a quartz vein that contained gold, thus the Ropes' Gold Mine got it's name based on the discovery made by Julius Ropes. The mine was eventually put into production in 1880 and it operated up intil 1887 pretty much full time and then it sat idle mainly due to depressed gold markets in the late 1800's and the fact that they thought that they had exhausted all the extractable gold that they could up until 1887,then the property sat idle until virtually the time that we picked up the property in um, the late 1970's. We picked it up as an exploration site, we did drilling up on the property and put it into production in 1985.

What other types of metals do you get from the mine besides gold?

We also recover silver which is sold along with the gold in the form of a bullion from our processing plant, we also produce a iron, silver, copper, concentrate that is shipped to the copper ranges, Copper Ranges Company, White Pine Copper Facility up in Smelter, Michigan, we sell that as a by-product, so those are the major metals that we produce and sell from here.

Can you tell me approximately how much gold is in the rock before it is extracted when you are hauling it from the mine?

Sure, we process about 15 tons of rock just to get one ounce of gold, and at todays value of gold thats about uh, well golds presently at about 385 dollars per ounce so in order to get 385 dollars back, we have to process 15 tons of rock.

Do you know how pure the gold is, you do process the gold here don't you?

The rock is mined, hauled over here by a contractor, then it is crushed and ground very finely to expose the gold minerals to our chemical process, we go through a flotation process of the gold after it has been crushed to seperate the gold from the waste materials, then we through a sianide leaching process where we actually disolve the gold and the silver using sianide, and then we precipitate the gold and the silver out of the sianide solution using zinc dust to precipitate the metal, the gold and silver that is, and this precipitate is collected in filters and then it is melted down into a bullion, thats basically the process in a nut shell.

How do you get the gold from the mine, how is it extracted, what tpes of equipment do you use?

Theres two ways to get in the mine, one is by driving down a roadway at about a 12 percent grade down to the area that we mine underground which is about fifteen hundred feet below the surface of the ground, we can go down that way to get to the rock, or we can also go down a shaft, which is fifteen hundred feet deep. The

rock underground is drilled, analyzed to see how much gold and silver is in the rock, then if we decide it contains enough gold and silver, then we'll drill it even further, and then we'll blast the rock, and then we pick up the blasted rock underground using five yard loaders and we take it to a station where the rock is dumped into a hopper and then it is hoisted to the surface, we also do haul some of the rock out of the mine that is too big to go into the hoist, and we have 15 ton trucks that run this larger material up to the surface so at the present time we have four loaders hauling the rock and we have six trucks that are used to haul the rock from underground up to the furface, we have the drills and the smaller vehicles for the prople to get around in the mine basically, those are the major types of equipment that we have underground.

About how many miners are in the mine at one time?

at the present time we have about 100 people employed at the mining facility, course they work 7 days a week 24 hours a day, so we split those people up on different crews and we have about, well we have four crews, so there is about 20-25 people per operating shift at the mine at one time, and then we have about 45 people here at the milling facility, and the milling facility runs 24 hours a day, 7 days a week.

What is exactly done at the milling facility?

Once the rock is brought out and hauled up the mine to

the surface of the Ropes' Mine, the rock is picked up by our haulage contractor and is hauled over to the Ropes' mill which is located near Humbolt, Michigan, a distance of about 16 miles. One of the haul trucks carries about 30 tons of rock. At the present time the mill requires about 2000 tons of rock a day from the mine, so they have to haul at least that everyday over the road to the mill. At the mill the trucks dump the rock they haul on the ground and then go back for another load. Here at the mill we pick up the rock that is dumped on the ground, we put it into a crushing facility, now the rock arrives here at uh, about three feet in size or less. Initially we crush the rock to about six inches in size, or diameter, or less and then we crush in a second stage to a half an inch, so we have a facility here that crushes rock at a rate of about two hundred tons per hour and it crushes all the rock we get to less than a half an inch, from there it is conveyed to some storage bins where we go through a, after the ore is stored, we withdraw it from these bins and put the minus half inch ore into ball mills they are called, these are rotating cylinders about 10 feet in diameter, and 16 feet in length, and they are half full of 2 inch steel balls and these balls are used to grind up the rock to a very fine powder, the reason we have to grind it up extremely fine is so that we can liberate the gold and silver minerals from the waste rock, like I said before, we have to process 15 tons of rock just to get out one ounce of gold, so we have to go through lots of rock and grind it extremely fine to liberate these gold and silver particles so they can be extracted, the next step in the process

we can; When I say flotation, what we're doing is we're doing is were actually adding chemicals to this ground up slurry of ore and this chemical makes the gold and silver minerals hydrofobic, which means they don't like water, now our process, after we grind it up, its' now wet, a wet process, we just add water to the rock and grind it up, the gold and silver minerals float to the surface of these tanks that we use for flotation, the minerals are skimmed off and then put into large tanks that are filled with sianide solution, and these fine particles of gold and silver solution get disolved with the sianide solution, the sianide solution is then in turn run through a process by then we add zinc dust to the solution that contains the gold and silver and the zinc, this is an electro-chemical process and the zinc actually replaces the gold and silver in the solution, the zinc goes in the solution, and the gold and silver drop out of the solution, when I say solution, what I say is , what I mean is, the water that you drink contains iron, bits of copper, but you can't see them, same goes for our process, the sianide solution, you can't see the gold and silver in it, but once you add the zinc, it drops out as a very fine powder, and we collect that powder on filters, and we melt the powder down and we make our bullion. So at the present time we're processing 2000 tons per day of rock, and that 2000 tons per day, we extract about 100 ounces of gold per day, and once a week we melt down this fine powder precipitate and pour two bars of gold and silver, the gold and silver are together in this bullion bar, and like I said once

a week we do that, and then we ship the bars to several different refineries where the gold and silver are seperated from the bullion bars and turned into pure metal, thats basically the process here.

These processes seem very costly for how much gold you are getting per rock, what about the wear and tear on the machines, they must cost pretty much compared to how much gold you get.

That's right—for instance last year we sold about 20 million dollars in precious minerals from the Ropes' Facilities, it cost us about the same amount to recover the gold and silver, we have 150 people working here, we have a lot of machinery that wears out and needs to be repaired, this particular gold mine is actually the lowest grade gold mine in North America, and we feel that we are doing a very good job and still making a minor profit, even though it is the lowest grade gold around for an underground mine. Yes, machinery wears out but I can't tell you how much it costs at this point and time how much that is but it's a lot.

How effective are your methods of extracting gold, and crushing it, if you had different types of machinery, if you had the money to buy better machinery do you think you could make more of a profit with the gold that you get?

That's a good question. There are a lot of gold mines in North America, we're just one of them, and each particualr operation processes the rock slightly differently, we felt that

the way we are doing it was the most ecconomical for us when we designed and built the facility. At the present time we recover about 85 percent of the gold that is in the rock, I think that if you look at the infromation on all the gold mines in North America, or in the world for that matter, thats about an average efficiency, or recovery we call it, so I guess we're relatively satisfied, but I think you can always do better, but like you said before, it takes a lot of money to recover a higher amount than that, sometimes your lucky and you can get up abouve 90 percent efficiency, but it is very rare that you see a company do better than 90 percent.

I understand there are different types of workers here, like your job, then there are miners, the foreman, the truck drivers, can you tell me what a foreman does?

We have administrative personel, those are the people that work in the office paying the bills and making up the paychecks and keeping track of the day-in, day-out paperwork, those we call administrative functions. We have hourly personel who do the back breaking work, I guess you could say, breaking up the rock at the mine driving the trucks, running the machinery at the plant, those are certianly the guys that work the hardest, physically, and inbetween them, we have the people we call the foreman, the foreman is basically responsible for getting across to the hourly personel exactly what the companies day-to-day objectives are, they are to make sure that the people out there on the front lines understand what the company wants from them as

far as production objectives, and I guess a foreman is a leazon between the corporate person and the hourly worker, and its' a very difficult position to be in, theres a lot of pressure on a foreman, but the foreman that we have working for us and with us are excellent people, they do an excellent job in the areas that they are working. At the mine we have a superintendant, and then a general foreman, and under the general foreman at the mine we have four shift foreman, and under each shift foreman, he has about 20-25 people working for him at the mine. Here at the mill we have a slightly different structure, we have a superintendant wich at the present time is myself, we have four shift foreman working in the plant, so obviously here at the mill we don't have as many people, so we don't require as many workers nor does any foreman here at the mill have as many people working for him as they do at the mine. The ore haulage from the mine to the mill, since they operate two shifts a day, they have a foreman for each crew of trucks, so thats basically the number of administrative foreman-type that we have.

What about the workers, the miners, what qualifications must they have before they can get hired at this mine, do they have to have any knowledge of mining?

Good question, we initially started the mining operation with a, uh, the mine was actually developed by a contractor who supplied to Calahan experienced mining people, then we took over the operation of the mine January 1 of 1985, and at that time we had to go out a hire people who were'nt as experienced as the people the contractor had, so we had to hire a lot of local individuals who did'nt have a lot of mining background, and as far as education goes, a lot of underground mining education is handed down through generations of miners, there used to be a lot of underground mines here and it was just in they're blood. There is a lot of on the job training in underground mining, you have to be aware of what is going on around you at all times, what the rock conditions are, it's not something you can learn in a class room very well. As far as the type of educational background that one needs, we do like to have our workers to at least obtain a highschool education. The main thing about us is that we like people who are willing to work and like to learn, there's a lot to learn in our business, it's not something you can learn in a highschool, and the people who are at the engineers levels are people who are more likely to be needed to work in the plant or in the mine.

You were talking about before blasting in the mine for gold, what

types of safety precautions should they take in the mine for blasting, you know it seems kind of dangerous.

It's not a business for people who are by nature very nervous.

If not it can make you nervous!

That's right. Though if handled properly, an explosive is, and can be safe. The methode that we do our blasting, the materials that we use today are not like the materials that were used for blasting in the old days. You're familliar with a stick a dynamite, maybe you've seen them in the movies, or you've seen them in person, that's not really what we use anymore what we use today is a chemical solution which is injected into the holes that are drilled into the rock and then a powder is put into the holes and all that is needed to ignite them is a small blasting cap, which is an electric charge so once the miners drill they're perspective holes out then they fill them with the powder or slurry and then everyone is removed from the area, and then the miner in charge will lay out all the blasting materials in the various holes and set up the blasting caps and then back off to an area that is safe and then connects the wires and then the area is detonated. There are a lot of unseen safety precautions that are taken, for instance whenever they are getting ready to blast, they evacuate areas that are anywhere close to, they evacuate people from areas that are anywhere close to the blasting area. Sometimes the miners are all removed from the mine before the blast is detonated, it's not like the old days

where the miners used to carry sticks of dynamite around in their pocket and throw them in the hole, you don't see much of that any more, we do have requirements for a stick, though those areas are rare these days, if we get a rock too large in size in an area and the rock is too large to extract, perhaps they'll throw in a stick of dynamite in that particular rock, it's not like the old days.

Before the miners can start working when you first hire them, is there any type of training they have to go through, do you inform them on what to watch out for, anything like that?

Before any person starts work at the mine or the mill, they go through an 8 hour classroom course on basic safety habits, we review first aid training, cpr, general hazards, electrical hazards, some review of the mining operation, or milling operation, so yes each individual is required even by law to have an 8 hour class on safety before they ever start working and then every year they have to have a refresher course, so it's not something that's done once and then forgotten about, every year each employee thats with us goes through additional safety training.

Are the workers required to have a physical every few years, or when they initially start working?

For us we require that each individual pass a physical examination before they start working for us, but we don't

require them to have one every year-no.

You said the mine was first milled in 1880 through 1887, and then it shut down, do you know the reasons for it shutting down?

The reason that it shut down as I understand it is the company that was operating Ropes' gold mine was not extracting enough gold from the rock to cover the costs, they felt also they had exhausted the suppply of gold and they possibly could, they mined from the surface to about 900 feet deep where they followed quartz veins where the gold was in the rock. Today we mine it differently, we mine lower grade , not only the quartz veins that we found since it was shut down, but also the surrounding rock, rock that's called greenstone it's not the rock that the old miners were following so basically the economics were not good for them, so thats why they shut it down.

How many years did the mine lye dormant before it was reopened, approximatly what year was it re-opened?

From the late 1880's when Rope's shut it down until Calahan mining corporation re-opened the mine in 1983.

What was the reason for re-opening the mine, was it intended for a gold mine, or?

Yes, it was, between the years that the Rope's initially shut down in the late 1880' until we picked it up there were I

believe three different owners, the latest owner tried to turn the Ropes' Gold Mine into a tourist attraction, though unsuccessful people still knew that it was an old gold mine, but they did'nt know how much gold was still under ground until we took a lease on the property in the mid 1970's where we did additional exploration and then decided to re-open the mine in 1983.

Had you any knowledge of how much gold would have been in the mine, or were you just trying your luck and hoping?

Based on the geological reports that we reviewed, that were available from the old mining operation, and also from a local firm that was evaluating the property the local firm's name we dealt with was the Resource Exploration Company, they are still in business here in Marquette, they aproached Calahan Mining Company with the information that they had gathered up in the early 1970', thats when we became interested after we reviewed their reports on the geological reserves that they felt were still in the mine, we reviewed their information and felt there was good potential there for re-opening the mine and we did some more underground drilling and looked at that information and decided that there was enough gold there available for us to re-open the mine.

In your first year here in production at Calahan, was there any doubts that there would be enough gold here for the mining operations after your first year for the profits?

When we decided to re-open the Rope's Gold Mine we felt

that, with the information that was available to us, we felt that we would be able to operate, we felt that there was enough gold in that mine to operate from five to ten years, that was a guess based on the information that we had gotten, and uh, we've been operating, we've been operating the plant since 1985- yes, 1985, so uh, we feel like that we will at least be in the five to ten year range, that is all the information that we have now.

It seems like a pretty expensive guess to take though.

Mining is a risky business.

Are there any problems you ever run into, do you ever hit any undergroung springs, any flooding underground?

There are some natural leakeages of water in the mine, but we have'nt run into anything that has caused us a lot of problems as far as underground water goes, it depends on the time of year, we do have to get rid of a little bit of water that is leaking into the mine.

When your mining the tunneling that you do, is this all recorded, so in the future if there is anything going up through here, they know where the tunnels are for any cave-ins or anything like that the setteling of the ground or shifting?

I'd have to say that we do uh, a very good job of keeping track of where we're going and where we've been, the old timers, based on the information that we got, they're maping was not very

good, though they made a good attempt at it, engineering techniques have changed considerably in the last 50 years, information is a lot more accurate these days than it used to be.

Can you tell me approximatrely the size of the mine, how extensive is it?

At the present time, the ore that is underground, the ore zone we call it, is about 50 feet wide, and about 5 or 6 hundred feet long and 800 feet deep or high, at the present time we are mining from 1000 feet below the surface to about 1600 feet below the surface.

Do you do any types of tunneling or channeling, or do you keep pretty much of where you are excavating in one spot?

We stay within pretty much within the boundaries of the dimensions I was just telling you about, we have to in order to drive from one level to the other to go down, we have to drive tunnels, we call it decline tunnel to get down to the next ore tunnel, thats the only major tunneling that we do.

You talked about there was a 12 percent decline about approximately how long would it take to get to the bottom of the mine driving? and you mentioned there was another way to get to the bottom of the mine.

To put this into perspective, to go from the surface dawn to the bottom of the mine, for instance at a 12 percent decline, you have to drive about 8000 feet to get there because of the slope

or a mile and a half or more than a mile and a half just to get down a thousand feet. It's a lot easier to go down than it is to come up especially because they are hauling rock out of the mine.To get down is about 20 minutes, and to get back up is about twice that, so rite now sometimes we are coming up from fifteen hundred feet below the surface so thats two or three miles in tunnels so that takes about an hour.

How much rock do they haul up from the mine at one time, and how do they haul it, it's not hauled by truckers is it, trucking devices?

About 25 percent of the rock hauled out of the mine is hauled up this decline, and 75 percent of the rock is taken out using our hoist up through the shaft,the ore comes up through the ground in ten ton skips we call them, so like I said, 75 percent is hoisted, and 25 percent is too big to be put into the hoist or skip cars so that 25 percent is driven out of the mine.

I thought you would use the rail type car method to bring the rock up from the mine.

These are all rubber tired trucks, they're 15 to 20 ton capacity trucks.

About how much rock do you take out at one time?

Over a mans 8 hour shift, one of those truck drivers will make about 5 or 6 trips so he'll bring out 70 or 80 tons of rock in one shift with one of the trucks on a daily basis 24 hours a

day we will bring out about 6 or 7 hundred tons of rock with the trucks, and about 2500 tons with the hoist and skip cars in a 24 hour period.

After the gold is processed, do you by any chance know where it goes, is it sold to companies, or anywhere locally?

The bullion bars that we ship from here go out by armored car, and at the present time we are shipping our bullion to uh, the Royal Canadian Mint located over in Ottowa Ontario Canada, what they will do is purify the metal from the bullion, they're not actually the buyers of the materials all that they do is refine it, we deal with half a dozen or so dealers nation wide so the refiner will take our bullion, refine it, and pass it along to the company or bank that purcahses our metal.

I would just like to sum this up with your views on the outlook on the future of this mine what will be happening in the future for it.

Calahan Mining will be here as long as we possibly can there are so many things that go into deciding how long you will be here, I guess first of all is how much gold is there, we still don't know how much there is, we know that we have several more years of ore already located, drilled, and blasted, we're continuing operation deeper in the mine, at the same time we have other properties in the area, not only in the Rope's Mine, we have the Michigan Gold Mine, the Penninsula mine where we are continuing exploration on key sites, someday we hope to do a lot

more drilling on these sites, so we have a lot confidence that eventually we will have another mine in the area it takes a lot of money to find it at least find an area that has enough gold in it, at least as much gold as the Rope's did to re-open it, so uh, we've got a lot of confidence that this is a good area to be in, we have still got a long way to go as far as exploration goes, also depends on the price of gold, how high is it going to go , or how low is it going to go, we're comfortable that if it stays somewhere close to 400 dollars an ounce as it is today that uh, we can economically extract the gold from the ore, again it's a risky business.

I want to thank you for your time, and it's a good interview

Alright thank you.