

The CORESafety® Drone Interview - Rick Gilbert & Erika Fretheim

CORESafety® is the National Mining Association's (NMA) common safety and health framework that relies on a management system approach to improve safety and health performance at mining operations. The goal of **CORESafety** is to achieve zero fatalities and a 50 percent reduction in the rate of injuries in U.S. mining within five years – 0:50:5.

CORESAFETY

To learn more
about the framework, visit
www.coresafety.org



Rick Gilbert is Vice President of Technology and Erika Fretheim is Manager of Mine Technology at Freeport-McMoRan Inc. Along with the Corporate Aviation team, both Rick and Erika are involved in overseeing the UAS (Unmanned Aircraft Systems) Program at Freeport in which drones are used for various safety and business purposes in the company's mining operations. This interview was conducted by Nelson Duffle on behalf of CORESafety in May 2018.

1.) CORESafety: How did Freeport-McMoRan originally decide to use drones? How far back did that go and what was involved with the decision to start the program?

Rick Gilbert: We began about six or seven years ago looking at unmanned aerial vehicles [UAVs] as an R&D type of project and we didn't really know where it would lead at first. Initially we crawled and now we're at the walking stage. Hopefully soon we'll be at the running stage.

Erika Fretheim: Some companies had started using drones at that time, especially internationally. But the U.S. regulations were not yet available. Gradually that changed and we started looking at the U.S. regulations and worked out how we could do it legally here.

Rick Gilbert: I think it's fair to say that drones were being used for recreational purposes back then and mining was not yet on the cutting edge of the technology. We were struggling to find the needs and trying to decide if it was more "want" than need. But I think the recreational piece of it really drove it to the point where we couldn't ignore it anymore. We saw planes that could do some fairly intricate and important tasks, as well as the multi-rotor vehicles. So, looking over the fence at what recreational people were doing, I think that's what inspired the mining industry to start picking up on it.

2.) CORESafety: What finally made you decide that it was time to initiate the Freeport-McMoRan drone program?

Erika Fretheim: There were so many reasons. It's almost like there was no reason not to. We saw that we could receive great benefits from all kinds of applications. We started small and just wanted to look at what we could do. We started with contractors and we're building the program as we go along.

Rick Gilbert: We had some [drone] contractors coming on-site and stockpiles, blasting, as well as new construction, were the first areas that we really looked at for productivity measurements.

Erika Fretheim: Yes, we filed for a 333 exemption in spring of 2015, so we started flying early that summer.



3.) CORESafety: Do you use outside contractors to fly the drones now or do you have Freeport personnel who do it?

Erika Fretheim: We do a mix, but I found it's really important to understand what's involved in flying before you use an outside company. You want to make sure it's done right, and that regulation and safety requirements are being followed.

Rick Gilbert: We've found that's really been helpful for taking blasting photographs. We can photograph an actual blast and then get immediate feedback, real-time feedback, to our drilling and blasting folks so that they can make decisions, make an adjustment, and make a better blast the next time. Initially we had some contractors come in and do the work. They had drones, they had pilots and so on but it wasn't their core strength. They were blasting experts. They weren't drone experts and so we thought we could improve and enhance upon what the contractors were doing, but they certainly filled a very important role for us in the beginning.

Erika Fretheim: We did take videotape of blasts prior to the drones but the difference is that when you're ground-based, you're limited on what angle and distance you can set up at. With the drones, you can get close and be at the right angle, depending on the direction of the blast, to really capture it well.

4.) CORESafety: Do the drones help with regard to safety?

Erika Fretheim: Yes, we have several applications that involve personnel and blasting. Of course, [a drone] can get closer without risking personnel. If a flyrock hits a drone, it's not a big deal because we use really inexpensive drones for those flights. We've also done underground work, where you can send the drone into a tunnel or an underground opening without sending a person in there. And, we can also carry a gas sensor on the drones to send it to leach pads to check for gas without sending a person.

Rick Gilbert: In the early days of mining, they used canaries underground and when the canary would die or get sick, the miners knew the conditions were not conducive to human occupation in the mine and they would get out. In our present day, we can send a drone into some very tight spaces without risking human health and safety. It can sample and it can gather information about what the mine looks like. It's a safer way to investigate and learn what you need to know before you put humans into an underground mine.

Erika Fretheim: Now we can also inspect buildings or roofs where you can't send a person because it may have unsafe structural problems. The drone can fly over it and inspect it. Power lines are another place where we are using drones to do inspections instead of having people go close-up to inspect. And another area that affects personnel is in training. For example, the drones can get a really good picture of the shovel working in the pit where trucks are spotting. In that way, we can use those videos in training. We've also incorporated roundabouts at some of our mines, and by using drones to videotape how the vehicles move through them, we can have that as a training tool.

5.) CORESafety: Do the drones record the video footage on memory cards?

Erika Fretheim: Yes. Most of the drones do have some form of live feed, but the high quality images are saved onboard, on memory cards, and then downloaded after the flights. And there are quite a few different systems available now. For example, we can use the fixed-wing platform vehicle to cover a big area. For smaller jobs, a small multi-rotor drone can do a better job. It's very easy to operate and it's good for a small area, and more flexible on the flight pattern. I think [it's useful] to have a handful of different systems depending on the jobs.

Rick Gilbert: One of the things that drones offer is increased speed at which you can do a job. So if you're inspecting a power line or road or a tailings dam, you can do that much faster with an aerial vehicle than you can by setting up and photographing on your own. The other thing is that the quality of the images in the case of photographic media is much better. You can also take measurements that you couldn't take before so quality, speed, those sorts of things have been a big bonus for having drones.

6.) CORESafety: What about the operators who actually fly the drones? Is extensive training required for them?

Erika Fretheim: We have subject matter experts here at the technology center that are our corporate pilots and they fly our more complex systems. For the operations that we already have standardized at the mine sites, we actually have the corporate pilots train the mine site personnel on flying those drones and perform daily missions.

Rick Gilbert: For our company, we have found it beneficial to have both a technology team and an aviation team working closely together. Erika and I oversee the technology side (planes and payloads), and then there's the aviation side, the experts in aviation who help to guide us and look after the regulatory side. They make sure that we have adequate training for our pilots and for those who are managing the vehicles. It's different than recreational. Anybody can go buy a drone and fly it. When it comes to a company, however, there are certain regulations and restrictions that apply. So our goal is to facilitate our employees to be able to get all the tools that they need, evaluate everything that they need to check on, and yet still be within the guidelines and the regulatory requirements of the government.

7.) CORESafety: What are some of those guidelines and regulations?

Erika Fretheim: The regulation has changed since 2015, so the 333 exemption that I mentioned earlier is no longer required. There is now a requirement to have a part 107 license for drone pilots. We require all our pilots to be licensed to operate at our mine sites since as a commercial company, we need to have licensed pilots. The part 107 license is not how to actually fly the drone, that's how to follow regulations flying the drone. The training on flying drones are provided by our experienced pilots and for new complex systems the vendors provide training. Some of the regulations are to fly at or below 400 feet above ground level and fly within line-of-sight. So, for example, we have drones that can fly 12 hours but we can't do that under the regulations because the flight pattern within line of sight is a lot smaller than that.

8.) CORESafety: How many Freeport mining sites are using drones?

Rick Gilbert: We have about seven North American copper operations and each of those are using drones to a greater or lesser extent. We also have molybdenum operations. Our South American properties in Peru and Chile are also looking at drones. Of course, international requirements are different than they are in the U.S., and so we're trying to work our way through those challenges but we're working at all of those sites. Our Indonesian property has a significant group who looks at aviation because there has always been manned aircraft there that help to transport people and equipment and supplies. And now drones are coming into the picture and they also follow under governmental regulations. One aspect of flying a drone in a country is the perceived threat it might impose to military or to commercial aviation and so on. Governments want to ensure that they're protected and that they don't just open the doors wide. So we're respectful of that in the United States plus all the countries in which we operate.

9.) CORESafety: What would you recommend to any mining companies currently considering the use of drones in their operations?

Erika Fretheim: It depends on the application. There are lots of different applications for using drones, as we've talked about. It's also about developing a best practice for using them because you shouldn't just go out and fly like hobbyists are doing. You need to consider the environment and the risks involved, so do a risk assessment.

Rick Gilbert: I think that if we were to offer a recommendation to other mining companies, we would say to get involved with drones for safety considerations. There are so many opportunities to be able to do things safer. The benefits are certainly there to keep mining companies safe and keep their employees from out of harm's way.

10.) CORESafety: CORESafety: Are there any challenges that one might expect in getting a drone program up and running?

Rick Gilbert: Two of the biggest challenges that we've had [with our UAS program] are skepticism and euphoria – so both ends of the spectrum. On one hand, we have some individuals and others who thought it was just another toy and may still feel that way. So that's on the skeptical side. On the other hand, there are folks who thought that it would be the answer to everything. I think the true answer lies somewhere in between, and our biggest challenge is to unite those two groups and find a system that works productively and to the benefit of the company without it having the appearance of being something that's just a novelty or nice to try. I think as time has gone on, people have seen the value and they're getting onboard. And so now that mid-point is being pushed more toward euphoria and less toward skepticism.

11.) CORESafety: What does the future hold for Freeport-McMoRan's UAS Program?

Rick Gilbert: I don't think from our perspective that we're going to see huge technological jumps that are going to open doors that aren't already open to us. I see it as steady progress that will improve, enhance, and help us find ways to do things better through the use in the advancing drone technology. Having said that, the longevity of batteries and the ability to fly longer distances is very important to us. It has really been a bonus to move from 15-30 minute flights to much longer duration flights. So that's a significant step in the right direction.

Erika Fretheim: We try not to focus on the exact brand and model because it's changing so fast. So a year or two years from now, we'll probably use different platforms. We're trying to focus on applications and the product that we get out of it, and then whatever that can provide for the company.

Rick Gilbert: I think the future holds a lot of opportunity and we just scratched the surface. It's difficult to keep up with it really because a lot like the computer industry or smartphone industry, the advances in technology are coming every day and so the challenge becomes to prioritize and select what it is that we need, what is the best application company-wide and then go after that. We try to focus on the mission that we are trying to accomplish. Let's get a vehicle in there that will do the job and it may not be the best available technology, but it will certainly work effectively.

Special thanks to Rick Gilbert and Erika Fretheim of Freeport-McMoRan for taking the time to conduct this interview. To see some of Freeport's drone video footage, watch the May 2018 episode of CORESafetyTV, which can be found at www.CORESafety.org and on YouTube.