

# The CORESafety® Interview with Dr. Michael Karmis

**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.

**CORES**SAFETY

To learn more  
about the framework, visit  
[www.coresafety.org](http://www.coresafety.org)



**Dr. Michael Karmis is the Stonie Barker Professor of the Department of Mining and Minerals Engineering and the Director of the Virginia Center for Coal and Energy Research (VCCER) at Virginia Tech.** His expertise is in the areas of mine health and safety, ground control, carbon sequestration and the sustainable development of energy and mineral resources. He has authored/co-authored over 160 scientific papers and has directed 60 major research projects funded by federal and state agencies, foundations and private companies.

Dr. Karmis is an active consultant to the mining industry who served as the 2002 President of the Society for Mining, Metallurgy and Exploration (SME) and as the 2008 President of the American Institute of Mining, Metallurgical and Petroleum Engineers (AIME). He was elected as the 2002 President of the Society of Mining Professors (SOMP)-Societät der Bergbaukunde and served from 2005 to 2012 as the Society's Secretary General.

## **1.) CORESafety: Dr. Karmis, you've been involved with safety and health management in the mining industry for many years. Have you seen many changes during that time?**

**Dr. Karmis:** Yes, there has been actually a total paradigm shift. Our traditional approach to health and safety was more of a programmatic, reactive type of approach based on two (2) frameworks: the regulatory controls that were there, and the engineering controls. This particular model actually led to a significant improvement in health and safety, until we got to the very late 1990s and early 2000s. Then it became apparent to many that this particular model had reached a plateau, where something totally different was required to get to the next level.

People then began to ask, "What is it that is missing?" If we follow the regulations, if we have the engineering controls, what is missing that we still have fatalities, incidents and accidents in the mine? It was necessary to develop, in addition to those original two controls, something different that would encompass everything and lead us to something by far more proactive, something that is based on developing processes and systems. In other words, on-going live efforts rather than finite programs.

At the end of the day, the decision by everybody was that we really need to emphasize the leadership, the culture which is within the organization (the prevailing force that is moving the organization forward), and processes that continue improvement and risk management that we can get all together in a total engagement process. We are talking about everyone from the board and CEO to the miner. Everybody is working to develop better processes, develop new systems, developing interventions if they have to be. There's not really an end to this process. It's an ongoing continuous improvement process, which led to the term we use today – safety and health management systems (SHMS). This is what was lacking from what we had before, and is the driving force of what we are doing right now.

## **2.) CORESafety: So, you really believe there has been a paradigm shift. But over what period of time? How long has this been taking place?**

**Dr. Karmis:** Some people and some companies, like all other industries, may have been ahead of others. But since the late 1990s and the early 2000s, it has become a much more important and much more focused effort by far. A number of very tragic accidents and events occurred, particularly in the coal mining industry in this country, and it somehow promulgated that effort to develop safety management systems and initiatives like **CORESafety**, which is basically one of the best programs that I've ever seen.



I like that it is a broad based concept that we need for all types of mining industries and communities. It is based on successful experiences in other industries and other people. We have had considerable thinking going on for some years before we reached the majority, if you will, and the recognition via some of the tragic events, that these safety management systems and processes need to be implemented. It is a necessary pillar – over and above regulatory engineering controls.

### **3.) CORESafety: How do you think CORESafety aligns with the implementation of other safety and health management systems that we're seeing in mining companies today?**

**Dr. Karmis:** I think the entire mining industry via NMA developed an exemplary health and safety management system, which is basically the **CORESafety** system as it is termed. In NMA's wording, it is based on the Plan, Do, Check and Act Model. In other words, it emphasizes that you need to have certain components that are primary in order to develop a proper health and safety managing system. **CORESafety** is based on leadership, and leadership drives culture within the organization. It's based on management, which is basically responsible for the systems including risk management and assurance. That means performance is measured, is monitored, is assessed, is audited, and then continuous improvement can come back. That way, you repeat the cycle.

What was unique is that it collected and somehow encompassed best practices. Some of them were existing practices, but they were scattered, if you will. It was able to collect best practices and develop some new ones to form a core process that is based on leadership, management and assurance.

Leadership is a tremendously important aspect because it is the board and the CEO who defines the culture of the company for the organization. The support, acceptance, and creation of **CORESafety** with the engagement of the CEOs of the large mining companies underline the importance of leadership in trying to do this.

Setting goals, challenging goals, like the 0-50-5 that you have on zero fatalities, 50 percent reduction in five years is also something, because goals should be high and goals should be reached with proper planning and commitment. So, I think **CORESafety** is a wonderful program. It aligns all implementations of health and safety aspects that are out there. It really feeds on the leadership and culture of the organization, the management and responsibility within the organization, and the fact that we all recognize whatever we do can always be improved, and that's where the assurance comes through. In my view, this is really quite a unique program.

### **4.) CORESafety: Let's talk a little now about risk identification and risk management.**

**Dr. Karmis:** Risk management's role is to identify hazards, to assess the risk, develop control options, and most importantly, identify responsibility for managing that risk. Usually, under risk management, you perform an exercise where people throughout various levels of the organization look at a particular risk or a particular program. They do something that we sometimes refer to as the "risk registry." This means we are identifying the risk, identifying the hazards and the probabilities, figuring out how to minimize the risks and eliminating them if possible, and then deciding overall who is responsible for taking some leadership in dealing with a particular risk.

Risk management is not there to replace other issues. For example, the regulatory controls or the engineering controls. What it does is it emphasizes the risk component of a particular operation and the way to deal with it. That is very important.

Some mining countries are a little bit farther ahead than others: Australia being a good example. But also some mining companies are better than others. Everybody's learning. To me, the importance of risk management is that it brings various people and disciplines and work entities within the organization to look critically at the particular issue. Through that critical review, it is amazing when you get experiences of people, when you get solutions from people, how well you can identify what may go wrong, the probability of going wrong, how you can reduce or eliminate, and how you can manage.

So, risk management is an important component of the health and safety management system.

### **5.) CORESafety: Based on your experience, where do you see safety and health management systems evolving to over the next five to 10 years? Can we project out that far?**

**Dr. Karmis:** Yes we can. I think we can go even farther than that. I'm quite involved in a number of research and studies on this, so I'll give you a longer perspective.

If you look at the health and safety in the next decade and even beyond, we will still have engineering controls, meaning

we still need to do better engineering or do innovations, etc. We will still have regulations and we will still have health and safety management systems. Hopefully what we have developed now can continue and improve.

But you and I know that the mine of today may not be the same as the mine of the next 10 or 15 years. It's amazing to go to a mine and see the technological changes, the control, and the automation that has happened in just 10 years. If you look at it from this prospective, then you have to see how the mine of the future will be impacted. I usually see two issues that need to be considered – what I will call the “hard” or technical issue, and then the “soft” issue.

The technical issue is that mines in general will tend to be deeper, the coal seams will potentially be thinner, and the grade of ores could be lower. All these lead to a technological revolution within mining to ensure that you can do an increased scale mining, meaning mining by far more material. We are already doing automation, but I think from automation we'll move to autonomous units, at least for certain parts of the operation.

This means we're introducing some new areas that are not necessarily prominent right now. First, the human-machine interaction is going to become far more important as we move on. Secondly, we already monitor a lot in our mines, but if you look at it 10 years from now, a mine will be totally instrumented with sensors, controls, and monitors. We'll have a humongous amount of data, but we may not know exactly what is important and what is not. <sup>1</sup>

So basically we'll be wanting to change the productivity of the mines based on new technological developments. This is the “hard” part.

The “softer” part has to do with how the mining industry evolves and deals with the local communities, issues of responsibility, transparency, and post-mining land usage. Some international companies talk about issues with indigenous people and remote locations. In essence, over and above the technical issues, you have what we usually term the “social license” to operate.

So you're looking at two issues in the mines of the future: technology that will lead to better productivity, and also if you don't have a license to mine or a social license, you won't be there in the first place. I believe something like 25 billion dollars of mining projects are stagnating either because of community, government, or both being in opposition to a particular project. <sup>2</sup>

If you look at the technical advancements and the community aspects that are expected over the next 10 years, what you see is that health and safety crosses both – productivity and social license.

I think that our entire work force (white collar, blue collar, everybody from the miners to the engineers to the managers) will have greater sensitivities to the communities. They will need to have different skills, and they will need to be able to operate in a different mining environment. This means the way we train people in skills, and how we teach them and what we teach them, will have to be changed quite a bit to reflect where this thing goes.

The mine of the future is a concept maybe 10 to 20 years ahead, but we need to be preparing now.

We need to be cognizant that the mining industry is moving via technology, culture and community well-being. Health and safety itself is not going to change, but it has to be able to adapt and somehow implement in a different way.

## **6.) CORESafety: Finally, is there anything you might suggest to a mining company that isn't currently using CORESafety as a component of its SHMS?**

**Dr. Karmis:** I would suggest they take advantage of the tremendous information that NMA has collected. It is freely available to everyone, and includes manuals and workbooks that explain these processes very well.

They can make an assessment of where they are now and then compare where they can go, using a **CORESafety** approach. They may see significant differences, or they may already have a program with all these great components. In most cases, many companies can actually gain tremendous insight and good results by embracing the **CORESafety** process developed by NMA.

At the university level, we use quite a bit of the **CORESafety** materials in our health and safety classes. Through NMA, we have also had access to speakers, lecturers, and others that can come and enhance the student experience on safety.

I think it's important to know that all that material and all that work that has gone on has been made available to everybody, not just the mining companies but to us as well.

**7.) CORESafety: Thank you very much for your time today, Dr. Karmis. We appreciate it.**

**Dr. Karmis:** You're very welcome.

### **References:**

1. In fact, "The Future of Mining in a Data-Drive World" was the theme of the 2016 Annual Meeting of the Society for Mining, Metallurgy and Exploration, Inc., held in Phoenix, AZ, on February 20-25, 2016.
2. "...Currently, there is an estimated \$25 billion worth of projects around the world that have been stopped as the consequence of a dispute or disagreement with their communities, the government or some other stakeholder."
  - Mining Engineering, January 2015, (Mark Cutifani, CEO, Anglo American and Peter Bryant, Kellogg Innovation Network)

### **Contact information for Dr. Karmis:**

#### *Mailing Address –*

Department of Mining and Minerals Engineering  
Holden Hall 100  
Virginia Tech  
Blacksburg, VA 24061

#### *Telephone/Fax –*

540-231-5273/4078

#### *Email –*

mkarmis@vt.edu