



Paving the Way for World-Class Performance

Simon Laddychuk

Rio Tinto Alcan

Available online 20 March 2008

This paper outlines the Alcan EHS approach for achieving world-class EHS performance and includes the successful implementation of Prevention through Design principles. Alcan's journey towards EHS excellence is one of commitment, passion, and encouragement. Its path has allowed us to pave the way for world-class EHS performance and has heightened our awareness and ability to eliminate / reduce EHS risks. A key enabler to improving EHS performance globally is the sharing of knowledge. It is hoped that, by sharing some of Alcan's experiences, organizations may either adapt it to improve their own performances and/or it might inspire them to do the same.

1. Alcan

Founded in 1902, Alcan is one of the globe's leading suppliers of bauxite, alumina, and aluminum and a top-ranked provider of engineered and packaging materials. It's also a leading advocate for promoting sustainability as the key to value creation and long-term growth. Each of Alcan's four business groups holds predominant market positions in the Americas and Europe.

Alcan has earned international recognition from some of the world's most prestigious organizations in the areas of corporate responsibility, climate leadership, reporting, environment, health and safety excellence, and governance. These include:

- Recipient of the World Environment Center's 2007 Gold Medal for International Corporate Achievement in Sustainable Development;
- Ranked one of Fortune Magazine's 2006 "Most Admired Companies;"
- 2006 recipient of the United States' National Safety Council's Robert W. Campbell Award for global leadership in integrating environment, health and safety into corporate management system;
- Received the 2006 International Stevie Award for best Corporate Social Responsibility Program;
- One of the top three companies overall and leading company in the metals and mining industry for governance practices in global climate change in the Ceres Investor Coalition 2006 Report;
- Honored as the 2006 Northern Territory Winner of the Prime Minister's Awards for Excellence in Community Business Partnerships;
- Member of the Dow Jones Sustainability Indexes for five consecutive years.

2. Alcan's business groups

Alcan's business groups are:

- Bauxite and Alumina — Alcan ranks globally among the top three producers of bauxite and alumina with worldwide activities related to mining and refining bauxite to produce smelter-grade alumina for Alcan Primary Metal, external customers and specialty-grade alumina for third parties.
- Primary Metal — The Primary Metal group encompasses all of Alcan's aluminum smelting and related facilities and power generation installations. The group produces value-added aluminum in the form of sheet ingots, extrusion ingot, rod and foundry ingot for customers in the transportation, construction, consumer good, and machinery market.
- Engineered Products — EP is a leading provider of innovative customer-focused fabricated aluminum and composite products and technologies. Its leading market positions are a result of strong customer relationships, an extensive product range, deep process knowledge and unique capabilities, technology and equipment.

E-mail address: Simon.Laddychuk@alcan.com.

- Packaging — A world leader in specialty packaging in food, beauty, pharmaceuticals, and tobacco. Currently number one globally in food flexible, pharmaceutical, and beauty packaging, and second in tobacco packaging.

3. Alcan's Integrated Management System (AIMS)

With maximizing value as its governing objective, Alcan began implementing an Integrated Management System (AIMS) in 2001. By aligning four key corporate building blocks into an integrated business management system, we aligned those efforts in pursuit of our objective while ensuring all businesses shared the same priorities. The four key building blocks are:

- *EHS FIRST*, which has introduced common standards, procedures and a mindset for achieving excellence in Alcan's performance in environment, health and safety;
- *VALUE-BASED MANAGEMENT*, the basis for all strategic investment decisions and value-generating initiatives worldwide at Alcan;
- *CONTINUOUS IMPROVEMENT*, a combination of two complementary approaches – Lean Manufacturing and Six Sigma – and aimed at maximizing opportunities by improving the Company's competitiveness and efficiency; and
- *ALCAN'S PEOPLE ADVANTAGE*, focused on the growth and development of our employees around the world.

AIMS and *EHS FIRST* have proven to be key competitive differentiators as well as powerful drivers of integration for Alcan around the world.

4. Seizing an opportunity

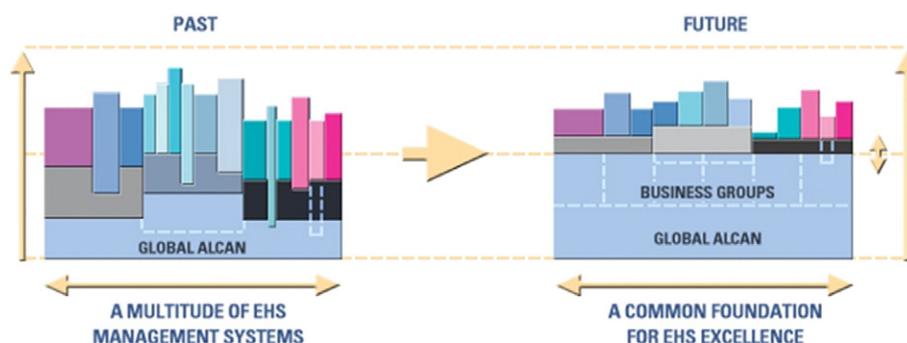
The creation of *EHS FIRST* was driven by the vision and commitment of Alcan's then President and CEO, Travis Engen. Following the merger of Alcan and Aluswisse in 2001, a Call to Action on employee health and safety was launched and an EHS taskforce was formed to develop 'a world class approach to EHS' — one that would improve fundamental performance and act as a business integration process to align the values of the former Alcan and Aluswisse. It was also intended to bring about concrete changes in our behavior, business culture, and management systems. We began conceptualizing a company-wide EHS approach to include pockets of excellence from within the company and benchmark external best practices from companies leading in EHS performance.

This Call to Action involved a top-down, bottom-up approach. We wanted to hear from people on the ground and in the plants to better understand their challenges and EHS realities. A global EHS taskforce was created to develop a framework for a shared Alcan-wide EHS Management System, a common set of metrics which would be used across this system and a method to continuously review/update it to reflect ongoing best practices.

5. Creating a common foundation for EHS excellence

The taskforce realized that Alcan needed to establish a common foundation for EHS excellence throughout the entire organization that would enable us to reduce the diversity in how we do things at Alcan, as well as to embrace best practices throughout the Company.

At that time, there were six significantly different business groups and we wanted to recognize those differences. The concept that emerged was one of a common base, with room for considerable business unit customization on top.



6. Alcan's EHS Management System

One of the key recommendations of the taskforce was the creation of a tangible company-wide EHS Management System — an *infrastructure of support*. Since both ISO 14001 and OHSAS 18001 incorporate best practices and are constantly updated, the decision was made to leverage and integrate these standards into our system. Their inclusion would

enable us to move more quickly to best practices and monitor our progress as we work towards world-class EHS performance at all sites.



A series of workshops were held to build the EHS Management System incorporating internal Alcan best practices and external knowledge. The result of this company-wide collaboration was our EHS Management System, outlining four key components for building EHS excellence within our company and for creating a shared EHS culture. Together, these pieces enabled Alcan to make a series of step changes in its EHS performance. Those four “pieces of the puzzle” are:

- **MANAGEMENT COMMITMENT & LEADERSHIP:** In order to effectively lead a series of EHS step changes, one must be committed to demonstrating leadership and “walking the talk.” This means making EHS a primary focus, leading by example, and inspiring others to do the same.
- **LINE OWNERSHIP & MEANINGFUL EMPLOYEE INVOLVEMENT:** Line managers need to own *EHS FIRST*. Working as strategic partners, EHS specialists play a key support role, providing critical expertise, knowledge, and skills to help achieve our EHS objectives.
- **AWARE, TRAINED & COMMITTED WORKFORCE:** An EHS-aware workforce that is effectively trained and committed to *EHS FIRST* is the result of management commitment, line ownership, and meaningful employee involvement.
- **EFFECTIVE TWO-WAY COMMUNICATION:** This is essential to fostering a learning culture at Alcan. When we listen we learn, develop new skills, and empower ourselves and those around.

At the heart of *EHS FIRST* are Alcan’s policies and values. As we work toward our EHS vision, we use the Plan-Do-Check-Act methodology to continuously improve our performance and spiral upwards toward our EHS vision of being “a recognized leader of environment, health and safety excellence in everything we do and everywhere we operate.”

7. Codifying the learning

To commit to those values, a manual was created and made readily available across the Company. The manual started with a commitment, signed by the CEO, Business Group presidents, line manager, and individual employees as a vow to reach EHS excellence. It also included our policy and the systems, directives, and tools that constituted the EHS infrastructure at Alcan.

The manual covered everything from EHS roles and responsibilities to training and development tools, audit systems and to specific directives (e.g. on mobile equipment safety, hazardous energy control, confined space entry, machine safeguarding, Green house gases, molten metal explosion prevention and other specific risks, aspects and exposures).

8. *EHS FIRST* – More than just a management system

EHS FIRST became more than an approach or a set of guidelines — it represented a mindset and acceptance of responsibility and accountability to achieve world class EHS performance at every Alcan facility. World Class performance means attaining zero

EHS–related incidents/injuries by promoting and protecting the environment, health and safety of employees, contractors, and communities in which we operate.

When we began planting the seeds for *EHS FIRST* in 2000 and 2001, our rallying cry became “doing things better– doing things differently.” We realized that its success would depend on how we would lead and inspire people to change. We soon discovered that with the right approach, anything is possible. With a first-class management system in hand, *EHS FIRST* was ready to be rolled out Company wide.

The official launch in April 2003 signaled a significant shift in Alcan’s corporate culture as the entire Company committed to a vision of EHS excellence, marking the next step in Alcan’s evolution as an organization committed to continual improvement, sustainability, and maximizing value. In a worldwide road show that took the EHS team to four continents and dozens of meetings and training sessions, *EHS FIRST* was officially in the hands of every single plant manager and EHS specialist across the Company in a matter of months.

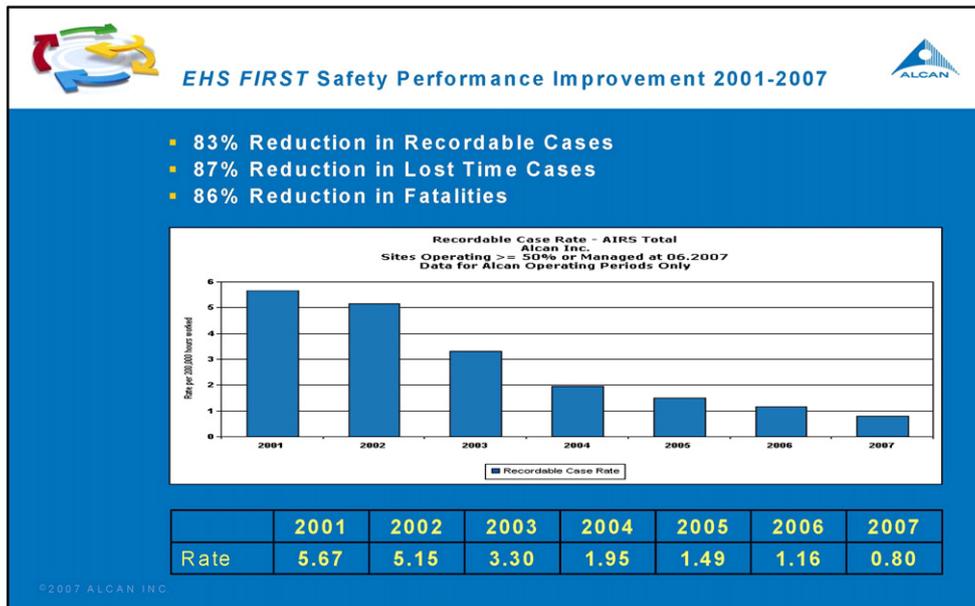
By the end of 2003, all sites were required to complete a gap analysis to compare their own EHS system with the *EHS FIRST* requirements and to allocate sufficient resources to ensure its successful implementation. In early 2004, each site was required to be ISO 14001 and OHSAS 18001 certified and, by the end of 2004, each site was to have a fully operational *EHS FIRST* system in place.

In 2004, Alcan acquired Pechiney of France. Already very familiar with Pechiney’s assets and systems and, in the spirit of continuous improvement, Alcan quickly recognized the contribution of Pechiney’s best practices in EHS and how they could further strengthen *EHS FIRST*. This proved to be a critical tool in integrating Pechiney into Alcan’s business approach and corporate culture.

9. *EHS FIRST* performance measurement system

An enabler of performance improvement was *EHS FIRST*’S intranet-based Performance Data Management (PDM) System, which standardizes data gathering and reporting at all levels of the organization and at each facility.

In terms of performance, we’ve been able to reduce our recordable cases, lost-time cases, and fatalities by over 80% since 2001. A new category – serious injury – was introduced in order to start addressing how to reduce the severity.



Between 2001 – 2005 US \$30 M in compensation costs have been avoided through H&S incident rate reduction; between 2001 – 2006, 15,000 employees have been trained in Alcan’s global training programs; 20% of CI Black Belt projects are *EHS FIRST* projects; and all Alcan sites are certified ISO ISO14001 and OHSAS 18001.

10. Risks and opportunities

EHS FIRST requires that objectives and targets are set to reduce RISKS and capitalize on OPPORTUNITIES. One of the key focuses of *EHS FIRST* is eliminating potentially high–risk exposures for employees and contractors. All Alcan facilities are expected

to establish and maintain procedures to continuously identify the environmental aspects and health and safety hazards associated with their activities and, where appropriate, their products and services. Alcan's journey with prevention through design started formally in 2002, with the incorporation of the Hierarchy of Controls. *EHS FIRST* requires that the hierarchy of controls (elimination, substitution, isolation, engineering controls, administrative controls, PPE) is applied to risk and environment.

11. The hierarchy of controls

OHSAS 18001 clearly establishes the requirement for effective hazard identification, risk assessment, and risk control (HIRARC) processes. The premise of such a process is that one identifies its hazards, evaluates the current level of risk associated with those hazards, and determines if controls are in place to control the risk to an acceptable level.

In order for a HIRARC process to meet the intent, it must recognize the hierarchy of controls in selecting the appropriate control measures. The single most important outcome that can result from an incident is the implementation of effective, high-level safety controls to prevent or significantly reduce the chance of the incident reoccurring. In spite of a focused effort on significant hazards using the hierarchy of controls from 2002 onwards, although serious accidents overall did decline, they did not decline at the rate expected. An analysis of the key causes of Alcan's events led to the fact that the RISKS associated with the use of mobile equipment were among the leading causes.

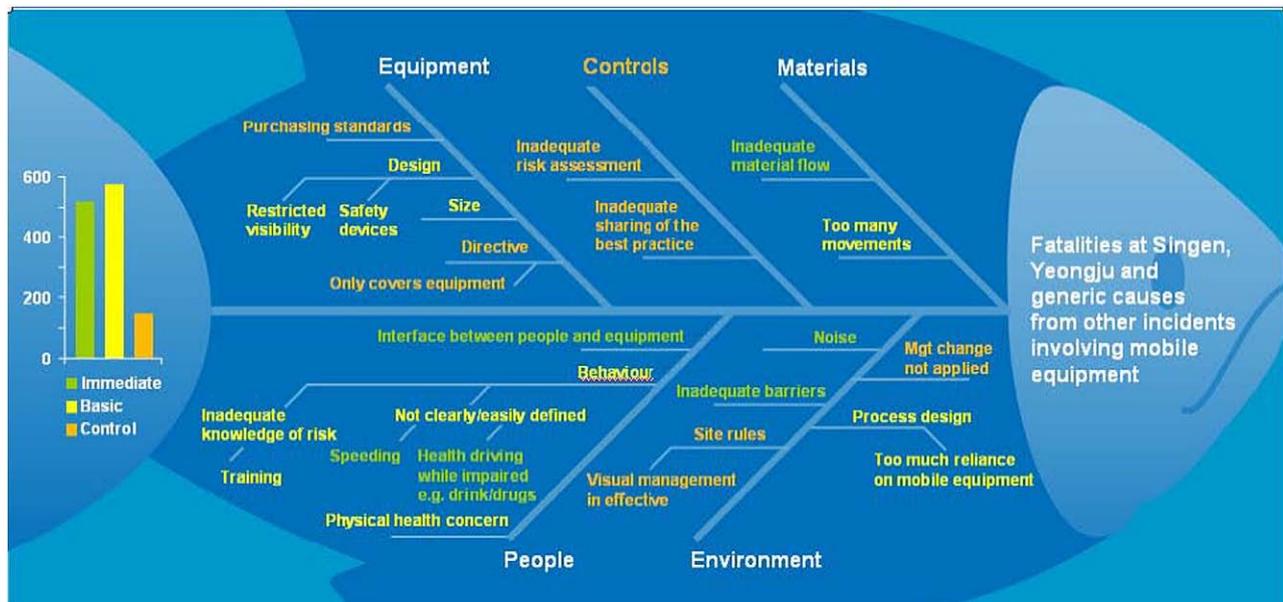
12. *EHS FIRST* case study: Mobile equipment

Operating and working near mobile equipment is a particularly high-risk activity at all our sites, from upstream activities in the Bauxite and Alumina group to downstream activities in Packaging. In spite of considerable efforts focused on mobile equipment from 2002, 25% of significant safety events in 2004 resulted from mobile equipment.

As a result, an investigation into mobile equipment-related injuries and deaths was conducted that same year. Alcan's key learnings for managing mobile equipment risks were derived from three sources:

- a thorough investigation of the Singen and Korea employee fatalities and other mobile equipment related incidents;
- a fact base analysis and survey at all Alcan sites using Continuous Improvement tools; and
- internal and external benchmarking to identify best practices.

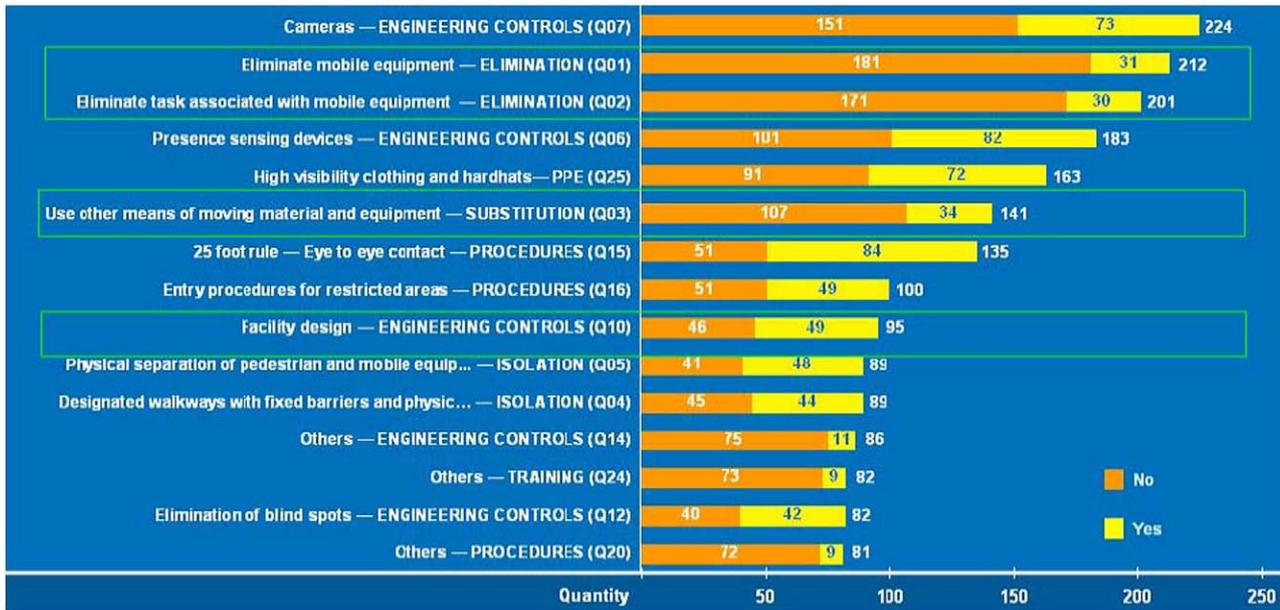
The fishbone diagram below represents the root causes that we started to investigate in more detail.



The investigation identified both technical and people-related as the root causes. This included restricted visibility of forklift drivers, the simultaneous use of traffic ways by fork lifters and pedestrians, high noise levels, and employee behavior. We recognized that people were not putting enough effort into the basic problems — changing the speed of vehicles, reducing equipment, or rerouting their movements to lessen encounters. The essential components of facility change in design were not being done.

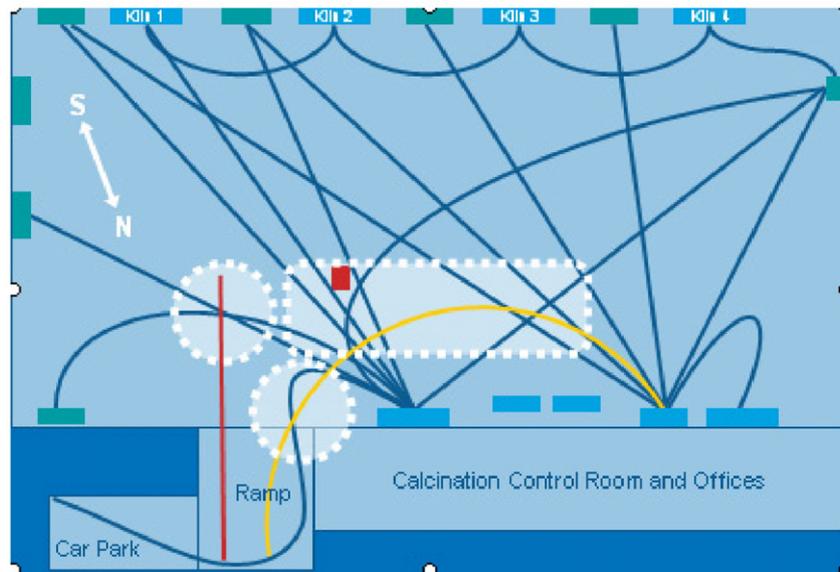
Surveys at all Alcan sites also provided important feedback from the operations. Our employees came up with ideas to improve design — from the floor workers to the engineers. Internal and external benchmarking pinpointed current best practices and revealed areas where the *EHS FIRST* Mobile Equipment Directive needed strengthening — such as in pedestrian awareness.

The key conclusion was that, in reality, the application of the hierarchy of controls was not effective — there was too much reliance on the lower levels of control and not enough on elimination of/substitution (as shown below).



So we did a Call to Action on Mobile Equipment. We made a case for elimination, substitution, and isolation. We made it a priority, made practices available, and focused on changing the design of the process.

Using Alcan’s hierarchy of controls, the *EHS FIRST* team developed recommendations to address the root causes. As the highest value alternative the team concluded that using equipment wherever possible, or to design solutions such as barriers that effectively separate people from machines were keys to success. We examined the movements of workers and equipment in the facility with spaghetti diagrams. As illustrated in the example (Calcination Firing Floor Area Plan), looking for hotspots of intersection and eliminating them in design. This approach was systematically implemented across all Alcan sites worldwide.



Administrative recommendations included procedures or rules that limited pedestrian access to certain areas. Training also proved to be an effective tool, with interactive training where employees actually sitting in the driving seat of mobile equipment to see what

the driver could not see, having had the most lasting impact on behavior. High visibility clothing was introduced for all people on our sites — this increases their visibility to mobile equipment drivers and other co-workers.

A comprehensive mobile equipment DVD was also distributed to all Alcan sites in early 2005 as part of the *EHS FIRST* continual improvement process. The DVD recounts the fatal mobile equipment incident involving an Alcan Singen office employee and the impact of that tragic event on her co-workers. It also covers the learning from the application of the hierarchy of controls. This includes Alcan's mobile equipment guidelines, minimal requirements, and outlines appropriate pedestrian behavior, such as using designated walkways, establishing eye contact with drivers, and always trying to stay a minimum distance away from mobile equipment. As a result, we:

- > decreased the mobile equipment inventory by 15%;
- > increased the area of facilities where separation/isolation used;
- > increased productivity by eliminating process steps; and
- > reduced the frequency of mobile equipment-related events by 70%.

Our facilities changed how they were using their resources and today we continue to identify and evaluate newly acquired knowledge through internal and external benchmarking. The key component to change is management support and leadership. When we look at fundamental change, we always ensure that it is part of the business management process.

Using the hierarchy of controls to deal with event severity required focusing on changes — not only in the design of equipment, but in the processes as well. Doing this enabled us to generate an appropriate fact base using Lean Six Sigma (CI) tools, raise awareness of the findings and provide implementation tools, make this a strategic priority through our Value-Based Management business process (AIMS), and lock the learning into our *EHS FIRST* standards. Each employee is engaged in ensuring that all mobile equipment guidelines and measures continue to be respected daily at their facility. Since 2001, at least \$50 M of direct cost reduction has been delivered by the implementation of *EHS FIRST*.

13. Our continuous journey toward *EHS FIRST* excellence

This journey has taken us from a global organization with no integrated EHS management system to being a recognized leader in our field. Effective leadership is vital in the creation of a culture that recognizes and encourages the implementation of an EHS program. It is much more than a set of processes, standards, and shared practices. This is championed by our board and CEO, Mr. Richard Evans. It requires us to be proactive, solution oriented, accountable, and accept our individual and collective responsibilities to do things better and differently. It is a mindset that encourages and supports employees to reach higher whenever possible. A mindset that is, above all, focused on reinforcing our culture of EHS excellence.

As we work toward our vision of being a recognized leader of EHS excellence, we must constantly assess where we stand with *EHS FIRST* and leverage that knowledge to ensure we continue to evolve and become the best in EHS. Planning for the future is multifaceted, and includes ongoing management reviews of *EHS FIRST* at all levels of the organization. Our goal is to drive continual improvement by evaluating our performance and results, identifying new trends and establishing stretch objectives and action plans. If this mindset can be shared more widely across the globe we will surely be able to raise the bar on EHS performance.

Born in South Wales, United Kingdom, Mr. Laddychuk has numerous engineering qualifications, a Bachelor of Science Degree in Materials Science and an MBA. **Simon Laddychuk** is currently Vice President, *EHS FIRST* at Alcan Inc. He is based at Alcan's world headquarters in Montreal, Canada. In this position, Mr. Laddychuk oversees the global development and deployment of *EHS FIRST* – Alcan's approach to Environment Health and Safety.

Mr. Laddychuk joined Alcan in 1991. During his career he has held a number of strategic and manufacturing roles, managing Alcan sites and businesses in Europe and North America. Prior to joining Alcan, Mr. Laddychuk was engaged in the Domestic Appliance manufacturing business and Aluminum Extrusion industry in the United Kingdom, undertaking a variety of engineering, manufacturing and strategy based assignments.

It should be noted that after accepting this offer from The National Institute for Occupational Safety and Health (NIOSH) to submit our presentation, Alcan became part of the Rio Tinto family. The combination has created Rio Tinto Alcan - the new global leader in aluminum, with a diverse talent pool of 73,000 employees including joint ventures, in 61 countries and regions worldwide.