

SAFEX NEWSLETTER

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CONTENTS

Chairman's Message

[NEW]

This is your Captain Speaking

– Mr James Fazzino: Dyno Nobel

Incident performance

– Reporting our performance score

Know the Expert Panel

– Ben Barrett

Research notes from CERL

– Control of Precursors in Canada

Our Regulatory World

– Changes to US Special Permits

Explosives Eco-talk

– Cleaning-up remnants of war

Safety Snippets

– Dust explosion hazards

Inbox

– Explosives vehicle speed limits

– Bad storage practices

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Chairman's New Year Message



Have you wondered what goes on in a football team's dressing room after a game? A lot depends on how the team played and what the result of the match was. If the team won the game, the mood in the dressing room will be distinctly different than if they lost. But winning isn't everything. Even if the team won but did not play well, the celebrations will be muted. In the same way if the team lost, but everyone played well, they will still have reason to celebrate. The mood will be determined largely by how the team played that game.

There is a second element to what goes on in the dressing room after the game - the analysis of the match afterwards. Good moves and successful plans will be excitedly replayed in the conversations. Players will be patting each other on the back. However, if things did not go well, mistakes and lost opportunities will be the focus. With human nature being what it is, players will probably try to find someone or something to blame for what went wrong. "If only" will be uppermost in the thoughts and talk in the dressing room at that moment. It seems to be in our nature to want to do well and if we don't, we want to find out what we can do to improve our performance. There is always the anticipation of another chance to prove ourselves.

Our members' business operations have often been likened to a game such as football. Just as we want to do better as people, our companies also want to improve all the time. When it comes to explosives health, safety and environmental performance SAFEX is there to help members do just that through sharing their experiences.

With the year end approaching, the final whistle of this year's game is about to go. How have you played? Some teams would have done better and will be happy with their performance. Others may feel disappointed at lost opportunities. The match this year has not been easy. The recession and global financial turmoil have had a big influence, just as weather influences a football game.

It is almost time for our companies to retire to their dressing rooms at the end of this year's match. What will the talk be like? I guess we have two choices: Our dressing room talk can focus on the past - on missed opportunities and finding things and people to blame. Or, we can learn from the mistakes we made as well as the things we did well to apply those lessons in next year's game. The latter is the SAFEX way: always searching for the learning points even in the biggest disaster and making sure we apply them so that we do not repeat our unfortunate experiences. We can make a conscious decision to "live life forward". If this is your choice we can look forward in confidence to what the New Year may bring.

Therefore, may I and the SAFEX Board of Governors wish you and your loved ones a very successful 2010. May it be an explosives incident-free year in which our industry makes a positive impact on the world around us.

Claude Modoux

Chairman, SAFEX International

This is your Captain Speaking

James Fazzino – Dyno Nobel Ltd



James Fazzino joined Incitec Pivot Limited (IPL) as CFO in 2003. Since then the company has grown from a fertiliser company operating in two Australian States to a global organisation. IPL is now the world's second largest supplier of commercial explosives and Australia's largest manufacturer and supplier of fertilisers. In August 2009 James became the Managing Director and CEO of IPL, the parent company of Dyno Nobel. Recently Dyno Nobel restructured and its Regional Presidents now report directly to James making him in effect the chief executive of the company. As such James has focused on four key areas: safety, customers, people and efficiency

The success of the IPL Group has been driven largely by strategic financial discipline through programs developed and led by James when he was CFO. He was also very instrumental in the effective merger of Incitec and Pivot in 2003 as well as the acquisitions of Southern Cross Fertilisers in 2006 and Dyno Nobel in 2008.

Prior to IPL, James spent 14 years at Orica/ICI where his roles included CFO of Orica Chemicals Group, Investor Relations Manager, project leader for the highly successful Orica re-structure in 2001 and project accountant for Orica's acquisition of the ICI global explosives business in 1998.

James and his wife Helen have two children, Stefan and Sienna.

As the Managing Director and CEO of IPL and the chief executive of Dyno Nobel, I describe myself as the Chief Safety Officer and it's a role I take very seriously.

Building a safe environment for our workforce is arguably the most important work I do. I'm convinced that if we get safety right, the rest of the business will do well as safety is the best indicator of operational excellence. It is a core organizational Value and it helps define the Culture.

By their nature, explosives have very little margin for error if not managed appropriately. They require constant vigilance. They require good safety systems, procedures, rules, training, engineering, supervision and reinforcement, all working together to manage risk out of the business. Luck should play no part in any company's approach to safety. In doing so, we protect our most valuable asset, our employees, and we become a more productive and profitable industry as well.

Despite the central focus in our industry on its products and services, the heart of the explosives industry is people. It's

about developing, leading and motivating people; challenging them and ensuring they have the competencies and resources to work safely. It's about defining high standards and ensuring every employee in the organization knows what is expected of them relative to those standards. It's about respecting the dignity and necessity of safe work.

But just as each company is responsible for ensuring it manages risk appropriately, personal responsibility and organizational accountability are core competencies of world class safety. Regrettably, I've seen the physical, psychological and economic damage caused by occupational injuries, illness and worse. I've seen how managers change after experiencing the consequences. If these tragedies are the only thing that motivates us to learn the lesson of being truly committed and proactive relative to safety, then our industry will continue to struggle with these incidents.

When it comes to safety, we don't get a second chance. There's no opportunity to turn the clock back—to rewind. Our only option as leaders is to prevent incidents

from occurring in the first place. We must be proactive and invest our time in preventative activities. Our companies must have well-designed safety management systems and our employees must look out for their co-workers.

As the head of a large organisation, I believe it is essential I lead by example. If I'm not acting safely, how can I expect my employees to do the same? My personal behaviour, my adherence to the company's requirements for personal protective equipment, seatbelt use, safe work rules, participation in safety activities, use of personal risk assessment tools, are essential.

Here are some of my other beliefs relating to safety in the explosives industry:

- Personal responsibility in safety is sacrosanct
- Safety is a line function and must be managed accordingly.
- The standard you walk by is the standard you accept.
- We get the level of safety performance we come to expect.

I look forward to working with and learning from other members of the SAFEX organization.

Incident Reporting

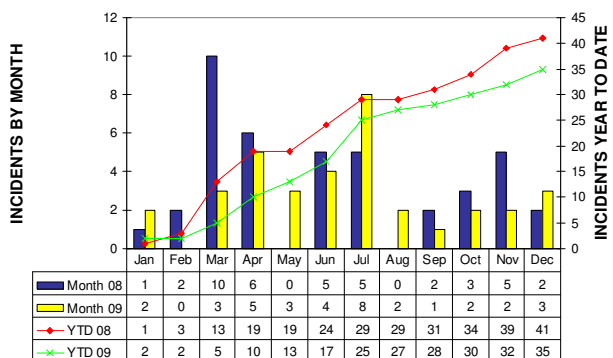
Monitoring our Reporting Performance

“You can make a difference – report every incident from which we can learn!”

Incident reports provide SAFEX with the means of extracting learning points from the experiences of its members. By applying these learning points we can prevent a recurrence of similar incidents. Because of the importance of incident reporting we track our performance using the charts below.

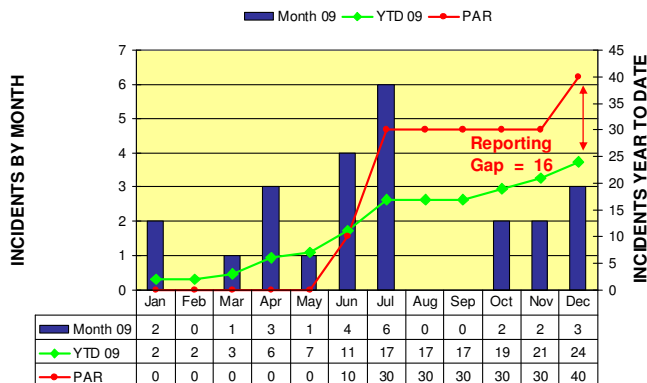
All the incidents reported. This chart compares the number of non-member and member incidents reported to SAFEX every month during this and the previous year. The number of incidents reported in 2008 was down by a 1/3 compared to 2007. Therefore, 2008 provides a significantly lower base for comparing this year’s performance. The number of incidents reported in 2009 decreased further - only 34 incidents were reported compared to 41 in 2008. Every incident not reported is a lost learning opportunity. Remember, it’s never too late to report an incident.

ALL INCIDENTS REPORTED: 2009 vs 2008



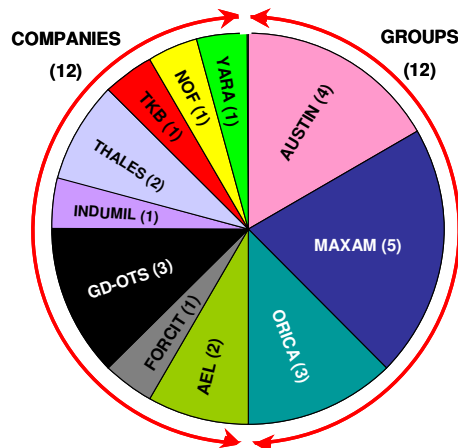
Member incidents reported. Incidents which Members experience are properly investigated. This enables us to extract the learning points from them. Therefore member incidents (MI’s) give us the best learning opportunities. For that reason we track them separately in the chart alongside. The chart also shows an indicator we called PAR (a golfing term). PAR is an estimate of how many MI’s are occurring based on the severity of the MI’s reported. The gap between the number of MI’s reported and PAR is our Reporting Gap. The Reporting Gap this year suggests 16 MI’s were not reported. These are learning opportunities which are going to waste. The number of member incidents reported in 2009 (24) is almost identical to those reported in 2008 (23)

MEMBER INCIDENTS REPORTED: 2009



Contributors of member incidents. This chart identifies those members who have taken the trouble to report their incidents. It shows the number of incidents each of these members have reported relative to the total number of reports received. The chart distinguishes between Groups and Companies merely to indicate the performance of the two membership categories. Each of these categories has about the same number of operating units.

MEMBER INCIDENTS REPORTED: 2009



SAFEX is indebted to these members for making the effort to report their MI’s.

Know the Expert Panel

The Expert Panel comprises individuals who were nominated by members and approved by the Board. Such an individual must be associated with the explosives industry and have acquired expertise in specific fields. He must also be willing to make the same available to SAFEX members on a commercial basis which is agreed between the expert and the member. SAFEX merely “connects” the Expert and the Member who has a need and does not get involved in the detail arrangements.

To access the services of a SAFEX Expert, a client Member accurately defines the need it wishes the Expert to address. This requirement is captured in a Brief which is e-mailed or faxed to the Secretary General. The Member will be notified of the details of Experts that could meet this need. It is then up to the Member to select an Expert and enter into an agreement directly with him.

Ben Barrett

PERSONAL

Position: President
Company: DG Advisor, LLC
Location: Kansas City, MO, USA
Education: BS Eng (Missouri 1988)
Affiliations: NFPA Explosives
 Technical Committee
Languages: English.



CAREER OUTLINE

Hodgdon Powder Co (1989 - 2006):

- Production Supervisor
- Research & Development
- Regulatory & Safety Administrator
- Operations Manager

DG Advisor (2005 - Present):

- Explosives safety regulations
- UN regulatory bodies

EXPERTISE

- Modifying and proposing explosives regulations in the US and at the UN
- Explosives testing and transport approvals
- Mandatory Class 1 transport training materials and instruction
- Miscellaneous projects on explosives compliance

TYPICAL ASSIGNMENTS

<i>1993 – 2006</i>	Engineer for Hodgdon Powder Co., authoring regulatory programs for propellant manufacturing safety, including transport and process safety management
<i>1996 – Present</i>	Member of the National Fire Protection Association, Technical Committee on Explosives, Authoring NFPA standards #495 and #498 on Explosives and Explosives in freight terminals
<i>2005 – Present</i>	Representing SAAMI to the US Department of Transportation, Occupational Safety & Health Administration, American Association of Railroads and International Association of Fire Chiefs
<i>2005 – Present</i>	Head of delegation for SAAMI at the UN Committee of Experts on the Transport of Dangerous Goods and the Globally Harmonized System of Classification and Labeling
<i>2007 – Present</i>	Delegation member of the Dangerous Goods Advisory Council to the International Maritime Organization Sub-Committee on Dangerous Goods, Solid Cargoes and Containers
<i>2009 – Present</i>	Representing SAAMI on Intl. Civil Aviation Organization Dangerous Goods Panel

Research Notes from CERL

Control of Explosives Precursor Chemicals in Canada

Dr Phil Lightfoot

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Introduction

CERL is part of the Explosives Safety and Security Branch (ESSB) of Natural Resources Canada (NRCan) which is responsible for the administration of Canada's Explosives Act (the Act) and Explosives Regulations. Since being set up in 1919, our organization has mostly focussed on the safety of commercial explosives. Over the last twenty years or so and particularly since the September 11, 2001 attacks in the United States, there has been an increasing interest in the security aspects of explosives.

As part of a review of Canadian security legislation in late 2001, a number of changes to the way explosives were regulated in Canada were considered. One of the potential changes was to regulate not just explosives, but also the chemicals that could be used to make them. It is well known that explosives are the weapon of choice for terrorists and that improvised explosive devices are often constructed using homemade explosives. Obvious examples that we were aware of in 2001 were the first attack on the World Trade Center in 1993 using urea-based explosives and the attack on the Murrah Federal Building in Oklahoma City in 1995 using an explosive charge

based on ammonium nitrate. The latter incident was particularly troubling for the explosives industry, as the ammonium nitrate used was obtained as explosives-grade prill manufactured by a major industry player. Since 2001 there have been numerous terrorist bomb attacks around the world that employed homemade explosives. Significant examples include the 2002 Bali bombings (chlorate-based explosives) and the 2005 London Tube bombings (peroxide-based explosives). Canada was the target of two failed bomb plots in 2006: the attempt to smuggle peroxide-based explosives onto flights from the UK that led to the familiar restrictions on liquids and gels when travelling by air, and the Toronto bomb plot whereby a terrorist cell was plotting an attack on a series of targets using large-scale devices based on ammonium nitrate. There is a lot of discussion in the security world about chemical, biological, radiological and nuclear weapons, but the plain truth is that the bad guys usually blow things up.

Amendments to the Canada Explosives Act in 2002 included regulation-making provisions to ensure the security of explosives precursor chemicals. We now regulate nine precursor chemicals in Canada. The purpose of this

short article is to outline the current regulations and how the scientific research is used as input into the complex process of deciding which precursors to regulate and to what extent.

Which Precursors to Regulate?

There are an enormous number of chemicals that could potentially be used to manufacture explosives and it is clearly impractical to attempt to even list them, let alone regulate them. Fortunately for us, a good deal of work had been done by the U.S. National Research Council (NRC) following the Oklahoma City bombing in 1995 [1]. From a relatively long list, they developed a short list of chemicals which appeared to pose the greatest risk and should therefore be considered for controls. Although this was a U.S. study, the American investigators consulted internationally during the course of their work. Its conclusions also apply to Canada, as industry, products and markets in the two countries are similar. Therefore, the NRC study provided an excellent starting point for our deliberations in Canada. Without going into details on how particular materials were chosen, I offer the following examples for consideration:

- Explosives precursor materials that have been regularly used in large-scale terrorist attacks are at the top of the list for regulation. Ammonium nitrate is a very obvious choice with many examples. It would be a surprise also if chlorates, as used in the Bali bombing and extensively by the IRA in Northern Ireland, were not on the list.
- It is known that ammonium nitrate can be made detonable, even when the ammonium nitrate is diluted in a mixed fertilizer, for example. In order to render AN unusable in explosive mixtures, it must be diluted by more than a factor of two. It is well known that with dilution ammonium nitrate-based explosives become increasingly difficult to initiate and have a larger critical diameter, i.e., are more difficult to use. This is one reason we chose only to regulate ammonium nitrate-based fertilizers that were at least 80% ammonium nitrate.
- If one essential component used to make a homemade explosive is more practical to regulate than another, then it makes sense to regulate it. For example, manufacture of the sensitive primary explosive triacetone triperoxide (TATP) requires both acetone and hydrogen peroxide. Although hydrogen peroxide is widely used by the public in a variety of products, acetone is even more readily available and it makes sense to regulate the peroxide. Similarly, urea nitrate is made from urea and concentrated nitric acid; urea is readily available across Canada as a fertilizer as a de-icing material and would be

very difficult to control, so the decision was taken to regulate concentrated nitric acid.

- Materials that can be used to make a variety of homemade explosives are also strong candidates for regulation. For example, concentrated nitric acid can be used to make a wide variety of homemade (and commercial) explosives, from TNT to urea nitrate (above) to homemade nitroglycerin. Similarly, hydrogen peroxide can be mixed with organic fuels to make large-scale explosives, as used in the London Tube bombings, and is also an essential ingredient in the manufacture of the primary explosives TATP (above) and HMTD (hexamethylene triperoxide diamine), both of which can be used to make improvised initiating devices as well.

The above examples are by no means comprehensive, but do hopefully provide some insight into the thinking behind what materials we regulate.

Science and Technology in Support of Policy

It is important that policy decisions, such as the determination of which precursors to regulate, be based on sound science. We are fortunate in Canada in that our regulatory and scientific organizations work side by side in the area of commercial explosives, so that scientific input to policy questions is relatively straightforward. In the case of explosive precursor chemicals and homemade explosives, there are several other government departments and agencies that have an interest, as one might imagine.

There is a huge amount of readily available information available on the subject of homemade explosives, as a quick internet search will confirm. While much of the available information is credible, a lot of it is incomplete, misleading or even outright dangerous. As one might imagine, there is not necessarily a lot of peer-reviewed literature! CERL is partner to a significant cross-government project in Canada to provide tested scientific information on homemade explosives. The project is led by our military research and development agency, Defence Research and Development Canada; our security agencies are also engaged. The main purpose of the project is to deliver a database, populated with detailed, scientifically sound and validated information. This will provide investigators and first responder organizations with a means for obtaining rapid, evidence-based and scientifically sound assessments of many improvised explosive formulations, compositions and recipes. From the point of view of our organization, the results of the project will be used to inform us on which explosive precursor chemicals might need to be regulated in the future. The list of chemicals that are regulated is not set in stone and will be reviewed every three years to see if any materials need to be added or removed.

In recent years, we have studied a number of homemade explosives at CERL. A few examples follow. One of the really interesting aspects of the work is that it has given us a renewed appreciation of the hazards of working with explosives! There are very real safety reasons why a lot of common homemade explosives are

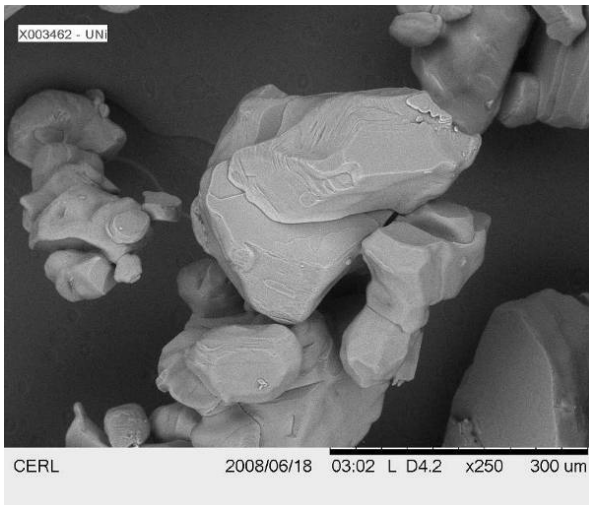


Figure 1: Scanning electron micrograph of urea nitrate

not in the marketplace. As they say, don't do this at home...

Urea nitrate can be made from urea and nitric acid, resulting in a white crystalline solid (Figure 1. above) It is nicely oxygen balanced and detonator sensitive. Its detonation performance is similar to ANFO, with limiting velocities of detonation approaching 4.5 km/s. On the other hand, urea nitrate is thermally not very stable and would not make a great commercial product. It is known that some metal

nitrates can be used to make energetic mixtures, black powder being the most well-known and oldest example. However there are a multitude of other possible compositions based on metal nitrates and much missing information. (Figure 2 above) shows the fragmentation from a pipe bomb we constructed based on potassium nitrate. We have used these and other results to demonstrate that not all metal nitrates are as effective as others in improvised devices. Note that, as well as being useful components



Figure 2: Fragments produced from a pipe bomb containing a potassium-nitrate based homemade explosives.

for explosive mixtures, metal nitrates can be used to manufacture concentrated nitric acid, a key ingredient in the synthesis of many homemade explosives.

We all know that ammonium nitrate is a poor explosive on its own, but that the addition of around six percent of fuel oil renders it a rather effective commercial explosive. Of course, there are many other potential additives that can be used to sensitize ammonium nitrate, but there is not always much credible information on the performance of such mixtures. (Figure 3 on left) shows the results of standard UN detonator sensitivity tests on mixtures of ground ammonium nitrate with different levels of a chemical sensitizer. As the level of sensitizer is increased from left to right and from bottom to top, the increase in detonation performance is clear.

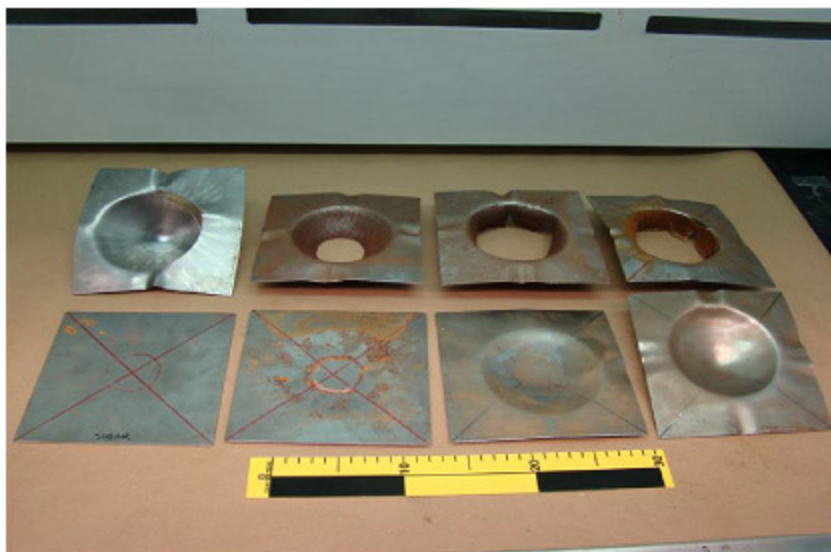


Figure 3: Detonation testing of homemade explosives based on ammonium nitrate with an energetic sensitizer.

Current Regulations

The following nine explosive precursor chemicals are now regulated in Canada:

- ammonium nitrate in solid form containing at least 80% ammonium nitrate (28% nitrogen);
- nitric acid at a concentration of at least 68%;
- nitromethane;
- hydrogen peroxide at a concentration of at least 30%;
- potassium nitrate;
- sodium nitrate;
- potassium chlorate;
- sodium chlorate; and
- potassium perchlorate.

Regulations for AN, which is considered to be the most important to control, have been in place since June 2008; those for the other eight components came into force in March 2009. The key components of this regulatory framework which apply to all nine precursor chemicals include:

- a) enrolment on the list of authorized sellers;
- b) taking security measures to protect the product supply and all related documentation from theft and unauthorized access;
- c) requesting from customers proper identification (e.g. government issued photo ID) and intent of use;
- d) The additional security requirements for sellers of ammonium nitrate include:
- e) informing end users and transporters about how to protect their AN from theft;
- f) provision of an annual inventory report to the Chief Inspector.

Full details can be found in [2]. The burden of these regulations on industry is not expected to be significant, as much of the chemical industry has security measures in place already.

On an international level, regulation of precursor chemicals is in place in a number of countries. For example, in Australia, materials containing 45% or more ammonium nitrate are designated "Security Sensitive AN": to purchase them a licence is needed, which requires a security background check. In the US, the Department of Homeland Security requires facilities that handle dangerous goods to perform a threat assessment and prepare a security plan (the Chemical Facilities Anti-Terrorism Standards program [3]). These documents will then be assessed by DHS to determine whether further action is necessary. Other countries or regions are considering regulations. The EU has formed a joint industry-government task force to develop a list of explosives precursor candidates for control, and to recommend what controls might be appropriate, for example. It is safe to say that the regulation of chemicals that are prime candidates for use in bomb making will be implemented in many areas of the world in the future.

After 18 months, the implementation of the ammonium nitrate regulations in Canada is going well. There has been strong

support from the industry and excellent enrolment of sellers in the program. Follow-up inspections have found some opportunities for improvement, as might be expected from a new regulatory program, but overall, the results are very encouraging.

The regulations for the other eight chemicals have not been in place long enough to assess how things are progressing in any detail, but early signs are good.

Conclusions

In this short article, I have tried to summarize the key aspects of our recent regulations on explosives precursor chemicals in Canada. It seems very likely that control of such materials will be put in place in many areas of the world over the next few years. The article also attempts to provide some insight into how the selection of materials for regulation is done and how scientific research can provide input into policy decisions in this area. Of course, it is not possible to go into great technical detail on this subject in a forum such as an industry newsletter. Nevertheless, I hope the article provides at least a coherent overview of the issues that regulators face when choosing to control explosives precursor materials. Hopefully it is also evident that decisions to regulate materials are based on sound science and only after considerable thought.

References

- [1] Containing the Threat from Illegal Bombings: An Integrated National Strategy for Marking, Tagging, Rendering Inert, and Licensing Explosives and Their Precursors, The National Academies Press, 198.
- [2] Regulation on restricted components. <http://www.nrcan-rncan.gc.ca/mms-smm/expl-expl/com-com-eng.htm>.
- [3] US CFATS http://www.dhs.gov/files/programs/gc_1177001576714.shtm.

Our Explosives Regulatory World

Changes to US Special Permits Ben Barrett

Ben Barrett, an Expert Panel member, is an independent consultant specializing in regulation of explosives. DG Advisor, Ben's consultancy, is dedicated to participation in the development and modification of international dangerous goods regulations and helping clients comply with US and international regulations. Ben also provides training in the handling of dangerous goods including that required by ICAO.

Significant changes are afoot in the US regarding the shipment of dangerous goods in general, and in particular there are changes for explosives approvals and mobile explosive manufacturing units (MEMU's) of the blasting industry, including multi-purpose bulk trucks (**Figure 1**)

Hazardous materials are regulated by the Pipeline & Hazardous Materials Safety Administration (PHMSA), an agency of the Department of Transportation. Another organization within DOT, the Office of Inspector General (OIG), is currently auditing PHMSA's program for special permits and approvals.

Concurrent to this audit, the Transportation & Infrastructure Committee of the US House of Representatives is working to reauthorize funding for PHMSA, and in wake of the OIG audit, launched its own investigation of PHMSA. A hearing was held on September 10th, 2009 where Chairman James Oberstar made an indictment of the agency that they have lost sight of their safety mission and are too cozy with industry. Among the evidence cited are the 4,500 active special permits and 125,000 approvals on file. The "Summary of Subject Matter" for the hearing stated: "Exemptions from regulations in any government regulatory entity are, by definition, supposed to be rare events, and the substitution of that term for the label, "special permit," may have been an attempt



Figure 1: Multi-purpose bulk truck

to make the program appear less controversial." More information on the hearing is available here: <http://transportation.house.gov/hearings/hearingDetail.aspx?NewsID=989>

In some cases permits or approvals may represent an exemption to the regulations, but as a rule they are governed by the principle that they must offer an equivalent or greater level of safety.

Special permits in the blasting industry allow the transport of explosive precursors and initiators on the same vehicle as an alternative to hauling finished explosives. According to Representative Shuster's comments in the hearing, these trucks have never caused an injury or death in transportation in the US. Similar trucks are used world-

wide. An equivalent level of safety is achieved by using special containers for the initiators, controlling the size of initiators, and other factors. A special permit is required because normally explosives are not allowed in bulk and different explosives are not allowed on the same vehicle.

Meanwhile PHMSA was evaluating rollovers of MEMU's. Rollovers of hazardous materials vehicles are a daily occurrence and PHMSA has identified them, along with bulk loading and unloading, as some of the most rewarding opportunities to improve safety. MEMU's suffer rollovers like other tank vehicles, and IME stated in the T&I Committee hearing that they are no more likely than other cargo tank vehicles to overturn.

Following up on a July 2009 Management Advisory issued by the OIG, in August 2009 PHMSA sent grantees of DOT Special Permits Nos. 8554, 10751, 11579 and 12677 a “show cause” letter, with the intent that grantees demonstrate why PHMSA should not take proposed actions to increase the requirements in these permits, and also informing the grantees that they would be evaluated for fitness to use the permits. The basis of PHMSA’s action was that “Recent accidents and incidents involving specialized cargo tank motor vehicles that are used to transport bulk explosives and other hazardous materials under the terms of the above-listed special permits have raised concerns about the level of safety of the transportation of these materials in commerce.” Strengthened requirements were suggested for:

- Driver Qualification and Training
- Vehicle Inspections and Tyre Standards
- Vehicle construction
- Emergency Response
- Accident investigation

PHMSA may also later include measures for reducing the potential for rollover and redesign of the vehicles to enhance their stability.

Specific new requirements are:

- Training on design and operational characteristics of the vehicles authorized under these special permits
- Training on methods of defensive driving and vehicle control to avoid accidents (including roll-overs) and how to recover control in the event the wheels leave the paved surface of the road
- Successful road tests in a vehicle similar to the one the driver will operate prior to being authorized to operate a vehicle under the terms of this special permit
- Training on emergency response procedures including information necessary to communicate to responders in the event of an incident.
- Retraining of any driver involved in a reportable incident or accident before the driver is allowed to resume use of the special permit
- The special permit grantee must perform an annual audit ensure that the requirements for daily and periodic inspections are being properly performed and recorded
- Tyres are rated and sized according to the manufacturer's recommendations for the size and gross vehicle weight

rating of the vehicle.

- Tyres are not more than six years old (**Figure 2**)
- Tyres on the steering axle must have a minimum tread depth of 8/32 inch and are not retreaded tyres. All other tyres on the vehicle must have a minimum tread depth of 4/32 inch (**Figure 3**)
- Tyre pressure is physically checked before each trip, or if monitoring systems are installed, they are on all wheels and functional and a physical check is made at least once in each consecutive seven day period
- Any damaged tyres are replaced before any on-road travel
- IME SLP-22 container(s) must be located within the profile of the motor vehicle and may not be mounted on the front of the vehicle or within 12 inches of the rear bumper of the vehicle.
- Vehicle batteries must be equipped with a disconnect switch that can be activated from a remote location, and is installed in such a way as to ensure it is operational in the event of a rollover. The disconnect switch must be retested every month.
- Each battery must be protected within a fully

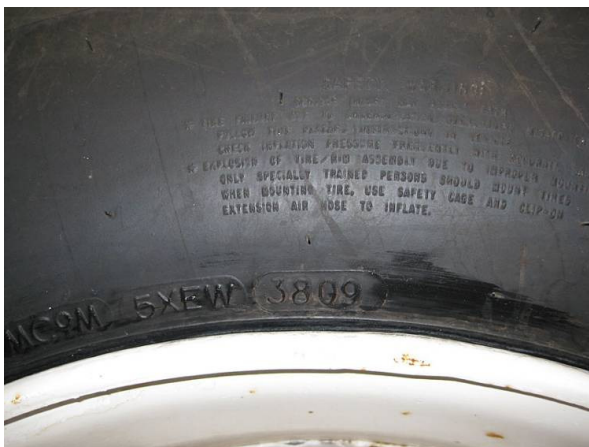


Figure 2: This tyre was made in the 38th week of 2009



Figure 3: Checking tread depth across width of the tyre.



Figure 4: Battery housing protected by the step



Figure 5: Wetlines on a cargo tank.

enclosed non-conductive, impact resistant housing, capable of protecting the battery terminals and cable connection from shorts (Figure 4).

- Batteries and housings must be located towards the front of the vehicle, within the profile of the vehicle, and marked in such a way as to be easily identified as the battery location to emergency responders.
- The vehicle must have fuel cut-off devices that will stop the flow of fuel from the pump if the vehicle is tilted at an angle of 45 degrees or greater
- The grantee must develop and maintain an action plan for emergency response which, at a minimum, describes the risks associated with a fire involving these vehicles and

actions to be taken to minimize such risks.

- Emergency response guidance developed as part of the action plan must be maintained on each vehicle operating under the special permit and stored in the vehicle like the shipping paper (transport document)
- In the event of a reportable incident (e.g. death, shut down of a transport artery) that results in an overturn of the vehicle: (a) An independent investigation must be performed to determine the cause(s) of the accident. (b) A copy of the police report and a report of the investigation's findings, conclusions, and recommendations to prevent future accidents or incidents must be provided. The report must be completed within 60 days after the accident or incident, unless an extension

of time is granted by PHMSA. A copy of the report must be submitted to PHMSA within 15 days after completion of the investigation.

Permit grantees were given 30 days to show cause as to why PHMSA should not make the above proposed changes. Changes were recently made to the special permits based on this show-cause letter. Not all the changes were implemented, and some were modified. Some are still being debated, for instance disconnecting the battery.

In addition to the changes to special permits, Congress is moving to assess fees for special permits and approvals and to phase out wetlines on trucks, which would affect tankers hauling ammonium nitrate emulsions. Wetlines must be phased out by 2025 (Figure 5).

Explosives Eco-talk

The impact explosives and explosives manufacture has on the Environment fall squarely in the SAFEX domain. We are as interested in the experiences members of the SAFEX community (Members, Associates and Expert Panel) have in minimising explosives' environmental impact as in safety and health. While most of our explosives incidents concern the safety and health impact, we are eager to learn about the environmental side of our activities. By way of this Feature we want to encourage readers to let us have contributions which create awareness of this facet of our operations as well as assist our industry to behave with environmental sensitivity and responsibility.

A new challenge for the explosives community

Cleaning of the environment from explosive residues

Bo Janzon, Hans Wallin, Adrian Wilkinson

Professor Bo Janzon is the founder and CEO of SECRAB which is a Swedish based enterprise working with security, safety and defence research and technology (www.secrab.eu). Hans Wallin is adviser to KCEM which is a corporate Associate Member of SAFEX (www.kcem.se). Adrian Wilkinson is Director of Explosives Capabilities, a UK based company that specialises in disarmament, explosive engineering and explosives ordnance disposal (www.explosivecapabilities.com).

Introduction

The necessity to preserve our planet from ecological disasters has induced a strong ecological trend among inhabitants of our world. Large efforts are made to create a long-term sustainable society based on renewable energy, recycling and reuse of resources. To litter the world with mines, Abandoned Explosive Ordnance (AXO), Unexploded Explosive Ordnance (UXO) and other Explosive Remnants of War (ERW) then seems to be a very counterproductive and unintelligent action.

The world of today must react quicker to the fact that almost all post-conflict environments from the last 100 years contain a substantial risk to public safety as result of unexpected detonations from explosive residues. More resources for remediation are now urgently required.

It is now acknowledged that in many countries the presence of abandoned munitions and explosives presents a physical risk to individuals and communities. In 2006 alone 5,751 casualties from mines, ERW or victim-activated Improvised Explosive Devices (IED's) were recorded (1). The true number may be considerably larger since the quality of recording varies much. By August 2007 it was estimated that there were 473,000 survivors from such

explosive events (1). This number is also likely to be much too low. The numbers are increasing!

Explosives wastes cannot be handled like ordinary wastes from society. Due to their ability to explode or detonate, and sometimes with the additional risk of being toxic to both man and the environment, they constitute a very dangerous type of waste. If not adequately handled they have a high potential to cause severe and fatal accidents.

The use of explosives started with the Black Powder era which lasted 1,500 years and left very small environmental problems since the ingredients — charcoal, nitrates and sulphur — easily lost their explosive properties when exposed to water. About 150 years ago high explosives (HE) were introduced, starting with nitroglycerine, picric acid and TriNitroToluene (TNT). The two latter explosives were very stable in storage, had low sensitivity and quickly became very popular for military purposes. They are equally stable in ambient conditions.

Today explosives are fundamental tools for building our modern society. They are used for blasting in construction, mining and oil exploitation, airbags in cars, in medicine, in fuels and devices for space rockets and satellites, for explosive welding, for pyrotechnics such as emergency

rockets/signals and for defence materiel.

Modern military explosives are synthetic, have very stable properties and are often toxic. They must therefore be recycled, detonated, burned or chemically decomposed as normally they will not lose their explosive properties with time.

Modern warheads, mines and other explosive articles proliferate and, if they remain uncontrolled in the environment, they present a serious risk for accidents and death to all living things!

The most obvious threats are mines and UXO that kill and hurt many thousand people each year but also other types of "lost" explosives, such as AXO, turn up as dangerous pollutants in the environment.

Most of the victims are children or young males, and — if they survive — in many countries they will become and remain expelled from normal life in society.

In order to give a first, coarse introduction to the challenge we present this first article.

Land pollution

The cleaning of battlefields, even those from World War I nearly 100 years ago, will continue for many years to come. Even if all

deployment of UXO and mines stopped today clean-up processes will need to continue for hundreds of years.

Water pollution

A quick and easy way to get rid of old ammunition was to dump it at sea, in lakes, disused quarries or ore mines. This method was used by many countries as recently as 15 years ago. Normally such dumps are not considered serious sources of pollution if they are left undisturbed. However, pollutants may leak out into sea or ground water and cause serious contamination. If the explosives have to be removed at that stage serious problems arise.

Hundreds of thousands (2) of abandoned naval mines in many seas of the world, mostly laid in relatively shallow waters, will add to this problem. Many can remain effective for a hundred years or more, some can break loose and float away while remaining dangerous. Modern, advanced mines are very difficult to find and may in practice be impossible to clear, unless this can be done by the laying party, knowing its exact location.

Explosively contaminated process water must be cleaned before being returned to nature, but that has not always been the case!

It is essential that groundwater is well protected from explosive contamination as it is impossible to clean with available techniques.

Air pollution

Gases and dust from open burning or open detonation (OBOD) often contain minute metal particles. Explosive dust and explosive gas plus many combustion products are also released to the air. Detonation or combustion in a closed vessel with exhaust cleaning is among the best

methods to dispose of explosives when considering air pollution. They are also logistically more effective than OBOD.

Factory sites, storages, dumps

Places where explosives have been produced and stored often create very complex environmental problems, especially if the sites have been in operation for a long time. Normally no one would know what has happened at a factory or ammunition dump 50 years or more ago! Therefore, keeping and preserving accurate records will be exceptionally important.

Civilian use of explosives

Civilian use of explosives affects many areas of society. Expected normal streams of explosive materials can be exposed to deviations that may result in dangerous situations and explosives accumulation in the unprepared society. For instance, an airbag removed from its normal position in a vehicle will constitute a serious risk for harming people. Surplus explosives must be collected and neutralized in a safe and controlled manner and this will require economic resources. In addition explosives can be stolen and used for criminal or terrorism purposes, which necessitates good control of the materials and secure storages.

Economical consequences

Explosive contamination in the territory of a nation will also cause serious economical damage. Even a few uncleared mines or UXO may obstruct large areas from normal use such as agriculture. Also communications, such as roads, rivers, harbours and railways may be non-functional for long periods of time. It will also prevent the population from returning to their former residential areas and resuming normal life. In addition the cost and personnel resources required for clearance may be very high! The nations most gravely affected are developing nations, which will have difficulty finding the necessary resources within their countries. The funding offered by the International Community is still much too small to suffice, and the attention of developed nations seems to subside very quickly.



The photograph shows a deteriorating open-air AXO dump. Since these munitions were temperature-cycled over a long time, they cannot be cleared by moving, but should be detonated *in situ*. (Photo courtesy OSSE)

Clearance and destruction of explosives

This is definitely a task for well trained and equipped professionals, not for amateurs. The general population should only participate in 'mine risk education' (MRE), essentially comprising knowledge of how to avoid exposure to the hazards of mines and UXO. MRE is especially important for children who will often become victims of explosive remnants of war when playing, scavenging for water, food or valuable materials such as metals that can be sold.

In demining operations it is often preferred to destroy the cleared munitions by open-air detonation, either *in situ* or collected close to the area of work. The reasons are that it would be dangerous to move them, and that, if left over-night, there might be a serious risk that they would be stolen and re-used.

Under normal societal conditions the method of choice should be to recycle explosives industrially. Typical military explosives can be melted or cleaned out and then used for instance for production of civilian booster charges or for addition to bulk explosives for rock blasting in order to improve their detonation properties. Recycling plants can be made mobile and be located close to the place where they will be needed.

Cleaning of waste soil and water

The increased interest in a clean and sustainable environment raises a demand for remediation of old mistakes. The problems are often a mixture of different pollutants that threaten the environment.

Resources for research and development of new techniques

are urgently needed.

We must learn from the mistakes from earlier generations in order to avoid continuing to destroy our world.

International efforts

There is limited international legislation, agreements or instruments that refer to or require the mandatory clearance and destruction of ammunition, explosive articles and explosives.

However the Anti-Personnel Mine Ban Treaty (Ottawa Convention), 1997 and the Cluster Munitions Ban of Oslo in 2008, where governments from around the world have pledged to abstain from the use, production, transfer and stockpiling of anti-personnel mines and cluster munitions, do so to some extent. The Convention on Cluster Munitions sets the highest standard to date in International Law for assistance to survivors and their communities. That convention also obliges nations to destroy all stockpiles within eight years and to clear contaminated land within ten. In many cases the latter task will not be possible to fulfil. As with the treaty banning anti-personnel land mines, this treaty will make it difficult also for countries which have not signed it ever to use these weapons again. With time these conventions will also become customary law, binding all! However there will still be non-state belligerents that may see themselves unhindered to use them.

Some good news for the future is that the international community is at last beginning to accept that the problems arising from the accumulation of conventional ammunition stockpiles deserve greater international interest, developmental commitment and

political will. This is demonstrated by the Report of a UN Group of Government Experts (GGE) (3) in pursuance of a Resolution (4) of the UN General Assembly that recommends;

1. the education and training of national stockpile management staff;
2. the development of a set of international technical guidelines in order to assist States in improving their national stockpile management capacities; and
3. the improvement of knowledge resource management on ammunition technical issues within the United Nations system. It must ensure that States have ready access to appropriate technical expertise and guidance for the safe and secure storage of ammunition and the disposal of surplus stockpiles.

The UN General Assembly (5) welcomed the report and strongly encouraged States to implement its recommendations. The very welcome diplomatic engagement of Germany and France on this issue has at last raised the international profile of this threat to an appropriate level, and work on the development of international ammunition guidelines (UN ATG) has commenced in 2009.

Actions for the future

The explosives community (i.e. everyone who professionally handles explosives) must develop ethical rules which call for professional workmanship and prohibit explosive contamination of the environment. The explosive community must also preserve general knowledge from the past, and foster new generations of responsible explosives specialists. Regrettably this seldom happens! Additional research in the field is also needed!

The authors of this short introduction to an existing severe problem hope that the International Explosives Community and SAFEX will contribute with actions and suggestions aimed at reducing

explosives pollution of our environment.

We hope this article will start a process which will engage SAFEX members in actions that will serve

to reduce and minimize the pollution of the environment with explosive remnants of war, abandoned explosive ordnance and surplus ammunition and explosives.

References

- 1: Landmine Monitor, 2009, <http://lm.icbl.org/index.php/publications/display?url=lm/2009/>
- 2: http://www.havet.nu/dokument/HM_2006_hela.pdf
- 3: UNGA Report A/63/182 dated 28 July 2008, <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N08/441/77/PDF/N0844177.pdf?OpenElement>
- 4: UNGA Resolution 61/72 of 03 January 2007, <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N06/498/75/PDF/N0649875.pdf?OpenElement>
- 5: Resolution 63/61 of the UN General Assembly (02 December 2008), <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N08/474/45/PDF/N0847445.pdf?OpenElement>

Some other links:

<http://lm.icbl.org/index.php/publications/display?url=lm/2009/maps/casualties.html>

http://lm.icbl.org/lm/2009/maps/resources/LM_09Casualties_eng.pdf

Safety Snippets

Dust explosion hazard

Andy Begg encountered this report following the release by the US Chemical Safety Board (CSB) of a video on the dust explosion in the Imperial Sugar Refinery, Port Wentworth, Georgia in February, 2008. Andy points out “This particular incident involves a sugar dust explosion. I see dust accumulations such as those described here in many explosives plants - sometimes the dusts are just combustible but sometimes they are also explosive.”



Aerial view of the Imperial Sugar Refinery at Port Wentworth, after the blast

The U.S. Chemical Safety Board (CSB) today (7 October 2009) released a new nine-minute safety video on the combustible dust explosion at the Imperial Sugar refinery in Port Wentworth, Georgia, which claimed the lives of 14 workers, injured 36, and caused extensive property damage on February 7, 2008.

Entitled “Inferno: Dust Explosion at Imperial Sugar,” the video includes a new four-minute 3-D computer animation depicting the first explosion – known as a “primary event” – that likely occurred inside a recently enclosed sugar conveyor, which was followed by massive secondary dust explosions that

destroyed the plant's sugar packing buildings. As CSB Chairman John Bresland noted in the video, "The accident at Imperial Sugar was the deadliest industrial dust explosion in the United States in decades. It illustrates the extremely serious nature of combustible dust hazards."

The video is available for viewing and downloading on the CSB's website as well as the agency's YouTube channel. The CSB's final report on the accident was approved at a public meeting in Savannah on September 24, 2009. At the meeting the CSB recommended that OSHA move

forward expeditiously with a new combustible dust standard, as the CSB first recommended in 2006, and urged Imperial Sugar and several trade associations to take other actions to reduce the hazard.

CSB investigators determined that the explosion resulted from ongoing releases of sugar dust from inadequately designed and maintained dust collection equipment, conveyors and handling equipment. Inadequate housekeeping practices allowed highly combustible sugar dust and granulated sugar to build up throughout the refinery's packing buildings.

The CSB is an independent federal agency charged with investigating industrial chemical accidents. The agency's board members are appointed by the president and confirmed by the Senate. CSB investigations look into all aspects of chemical accident. This includes physical causes such as equipment failure, inadequacies in regulations, industry standards and safety management systems. The Board does not issue citations or fines but does make safety recommendations to plants, industry organizations, labor groups, and regulatory agencies such as OSHA and EPA. Visit our website, www.csb.gov.

[Inbox @ SAFEX-International.org](mailto:secretariat@safex-international.org)

From time to time we receive e-mails from members of the SAFEX community on a variety of issues. It is important we share such experiences and insights and if necessary debate them. Our quarterly Newsletter may just be the forum for doing so.

We therefore invite ALL readers to drop us a line at secretariat@safex-international.org if they want to raise an explosives health, safety or environmental issue or comment on any of the opinions received from our correspondents.

Speed limit for transporters of explosives

SAFEX recently issued an Investigation Report on the rollover of a porous prill ammonium nitrate (PPAN) transporter. The member concerned employs a Contractor to transport the PPAN to customer sites. The Investigation Report emphasized the action the member and customer took to ensure the Contractor adopts good practices.

Maurice Bourgeois (GD-OTS Canada) comments:

There was no mention in the report of the speed at which the vehicle travelled when the accident happened. In Canada maximum speed for carriers of explosives is 90 km/h and many vehicles are locked at that speed. Also load stability and bracing, product packaging and protection given by the box of the vehicle would be of interest in such accidents. I think the response was very good and the lessons learned will be shared with our transport people.

Bad storage practices can have disastrous consequences

Andy Begg brought the following media report to our attention in the belief that we can also learn some valuable lessons from it. (The report has been edited to protect the identity of the persons involved):

A POLICE firearms instructor nearly killed a man after accidentally shooting him in a classroom safety demonstration, a court heard yesterday. The instructor blasted a former champion rifle marksman at point blank range after mistakenly plucking live ammunition from old Quality Street sweet tin containing bullets. The instructor was attempting to show civilian police workers how the chamber spins in a Magnum .44 revolver. Shot in the stomach, the victim was thrown back into a chair from the force and collapsed as horrified students looked on. The bullet passed through his body and the chair before lodging in the arm of the chair behind him. He was taken to hospital where doctors performed life-saving

surgery on his bowel and kidney. The 51-year-old victim did not regain consciousness for 12 days, and has never returned to work. The firearms instructor now faces a massive fine after admitting breaching health and safety laws.

The court heard how instructors at the force kept assorted ammunition in 'makeshift containers' including a baby food tin, a Quality Street sweet tin and a tupperware container. The court was told that

there were 22 rounds of live ammunition in the Quality Street tin, which had been used by instructors for ten years. The Judge criticized the force's use of containers for ammunition. He said: 'The aggravating features seem to me the fact that those tins had been in existence for so long and nobody had done anything about it, and also the serious injury caused.'

Andy Begg (Individual Associate) comments:

This is the kind of stupid incident we could have with detonators, etc. I recall an incident many years ago when a live detonator was used in a demo where a dummy should have been used. This is another example of sloppy practices where "makeshift containers" are used to store an assortment of articles. We see it in our garages, our homes and then in the workplace. Let's stamp out such "informal containers" and regard their contents with suspicion.

SAFEX International thanks the following for their contributions to this Newsletter:

- **Claude Modoux**, Chairman of SAFEX
- **James Fazzino**, CEO Incitec Pivot Ltd, parent of Dyno Nobel Ltd
- **Ben Barrett**, SAFEX Expert Panel member
- **Dr Phil Lightfoot**, Manager, Canadian Explosives Research Laboratory
- **Prof Bo Janson**, CEO of SECRAAB, Sweden
- **Hans Wallin**, Adviser to KCEM, Sweden
- **Adrian Wilkinson**, Director, Explosives Capabilities
- **Maurice Bourgeois**, GD-OTS, Canada
- **Andy Begg**, Individual Associate and Director, EXSAR Consulting



SAFEX thanks all Newsletter readers for their support and encouragement during 2009. May we wish you all compliments of the Season and an incident free 2010.



Boet Coetzee

Boet Coetzee
Secretary General, SAFEX International