Welcome Ladies and Gentlemen! Good Morning!

Welcome to one of the most fascinating countries in the world, and to Santiago de Chile for Industrial Minerals’ first Lithium Supply & Markets conference.

Each one of you is to be thanked and congratulated on being here. Nobody is more aware than me, of the investment in terms of time and money, you have all made to participate in this most engaging of events, in a part of the world that is a very long way, from the major lithium markets in the northern hemisphere.

We are here because Chile is the world’s leading supplier of lithium chemicals from continental brines, and because both producing companies in Chile, SQM and Chemetall, have been very generous in hosting a very large group from the conference to visit their operations at the end of the week.
I'll also take this opportunity to thank our other sponsors from outside Chile, FMC Lithium Corporation, and our media partners, Batteries & Energy Storage Technology and Roskill Information Services for their support.

Ladies and gentlemen, please join me in showing appreciation to all our sponsors for their magnificent support and hospitality which, combined, have contributed to making this conference in Chile possible and, I've no doubt, will make everyone's visit to the country a very worthwhile experience and a lifelong memory.

LSM09 Sponsors

SQM SA
Chemetall GmbH
FMC Lithium Corp.

The Industrial Minerals Team
I’m Gerry Clarke* and it is my pleasure and privilege to be your Conference Chairman and Industry Tour Host over the next four days. I'll be assisted in the chair by Simon Moores, Industrial Minerals’ Deputy Editor who joined IM in 2006. Trained as a geographer/geologist Simon is responsible for IM’s recent coverage of the lithium industry amongst other mineral areas and he’s responsible for the title’s news coverage on the web.

We’re supported by our colleagues: Laura Black is responsible for conference administration and the registration desk, Charlie Shelley-Smith looks after the
sponsorship and exhibition side, **Rehia Giwa-Osagie** is IM’s advertisement sales representative, and **Jamie Balderston**, recently returned from a tour of duty in Hong Kong, is the recently appointed Director for Metal Bulletin and Industrial Minerals Events. We are all here to ensure your conference is a success.

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**Industrial Minerals Team**

Gerry Clarke  
Simon Moores  
Rehia Osagie  
Laura Black  
Charlie Shelley-Smith  
Jamie Balderston

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**Setting the Scene – the Seminar**

As a handful of you know, my background with Industrial Minerals goes back over 30 years as the publication’s former Editor and Business Manager in the 1980s.

It was just over 20 years ago, in June 1988 that I came to Santiago for the first time. I had the honour of giving a keynote opening address at *The International Seminar on the Perspectives of Nonmetallic Minerals in Chile* to over 400 delegates, mainly from Chile and its neighbouring countries. That meeting was a cooperative initiative by Banco Concepcion, Corporacion de Fomento de la Produccion (Corfo), National Society of Mining (Sonami), Prochile, and Sociedad Quimica y Minera de Chile SA then known as Soquimich. Ihor Kunasz, here today, was with Sociedad Chilena de Litio Ltda at that time and he, and Pedro Pavlovic, also here today but then with Corfo, gave a joint presentation on their experiences in the development of the lithium resource in the Salar de Atacama. And Keith
Evans, our first keynote speaker was very much involved with the early development of the salars and also a veteran performer at IM Events. A special welcome to you all!

Famous Lithium Names Here Today

Ihor Kunasz  Sociedad Chilena de Litio
Pedro Pavlovic  Corfo
Keith Evans  Amax

Interestingly, a feature then, as now, is Chile’s production of by-product sulphuric acid from the copper industry. It was then described as “plentiful”, inhibiting the development of elemental sulphur deposits, but, as it was inexpensive, it might possibly contribute to the development of Chile’s low grade phosphate and bentonite deposits for acid activation.

How times have changed – it was Chile that recently took its share of the blame for a serious shortage of sulphuric acid owing to the copper industry’s increased capacity and need for leaching and processing oxide ores. Sulphuric acid has more recently become an eye-wateringly expensive commodity in very tight supply for those that have to buy it squeezing margins in reliant industries such as the fluorochemicals businesses around the world.
Industrial Minerals

IM has written about the lithium industry in its pages since it was first published in September 1967. IM has provided a platform for speakers from the industry at its biennial international congress and specialist consumer events over the years. However, this is the first occasion an IM event has been dedicated solely to lithium minerals & chemicals. We’re sure it will be the first of many that will be staged around the world.

These kinds of conferences are a growing trend for IM. They provide more in-depth coverage and networking opportunities for a well focussed group of people coming from all corners of the world.

Just as important as the cohesive programme of speakers is the opportunity to refresh well established relationships and to make new ones, to exchange ideas and progress common understanding, and to engage in business at the same time as respecting each and everyone’s position in the business. A great opportunity to exploit to the full.

Other events in IM’s series include Bauxite & Alumina being staged in Jamaica next month, Magmin taking place in Amsterdam in May and the recently held Fluorspar 2008 held in Montreal last October that attracted 175 delegates from approaching 30 countries. Last year’s 19th Industrial Minerals International Congress was staged in Athens was attended by over 600 delegates and in 2010 it will be in Miami.
These events, and others over the years, time and again prove what a global business these wealth creating industries are, how technologically sophisticated they have become, and, in many ways, how small the world actually is.

Emanating from the creativity and knowledge base of Industrial Minerals' long-established editorial expertise these events reflect the raison d'être of the publication itself. IM has always been a journal of record and a first port of reference for readers to understand the commercial nature of a vast array of minerals that are neither exploited for any metallurgical use or any fuel application – approaching 60 generic commodities and countless varieties of them around the globe. Lithium is but one of them. IM is now complementing its in-depth features orientated coverage with a daily on-line news service as described by IM’s editor, Mike O'Driscoll, in the January issue that you’ve all received.
Lithium -- in the spotlight

It is quite astonishing how something so small, as is element number three, in Mendeleev’s Periodic Table of Elements, and so geologically elusive, as is lithium right to the end stages of geochemical differentiation in primary and secondary environments, has commanded such feverish attention around the world.

Everyone will appreciate that this event has been catalysed by technological evolution in the automotive battery sector. And volatile, unevenly distributed, oil that is about to peak has played its part.

All kinds of media have made comment on electric cars, and the role lithium might or might not play, to the extent that lithium has become almost as much a household word as, copper or lead or even gold, given some of the hyperbolic comment in some less well informed quarters and some with clear vested interest!

And yet, a plethora of applications for lithium minerals and chemicals persists with good growth prospects in glass, ceramics, a vast array of chemicals especially in
pharmaceuticals and, in aerospace technology, there is much research in the field of aluminium-lithium alloys.

In 2008 over 95,000 tonnes of lithium carbonate equivalent was produced whereas ten years earlier it was less than half that size – and the automotive challenge is yet to come. Compared with other commodities such as copper, however, the production volume for lithium is hardly bigger than the margin of error for annual copper production! Little wonder then that element number three isn’t even mentioned in some reviews of Chile’s minerals industry. That appears about to change.

On seeing all of this IM decided to stage this conference. We have 150 delegates from nineteen countries gathered for this conference with 27% from South America (Chile, Brazil, Bolivia); 24% each from Asia (Japan, China, South Korea) and North America (Canada, USA); 18% from nine countries in Europe led by Germany, 6% from Australia, and 1% from Africa thanks to our two friends from Nigeria.
Lithium in context in Chile

The Republic of Chile is without doubt one of South America’s most stable and prosperous nations with extraordinary natural resources reflecting extraordinary differences in climatic regime from hot dry desert, through warm wet Mediterranean, to the cold Antarctic reminiscent of Norway. Its 4,300 kms length, 25 times its 175 kms average width, spans 38 degrees of arc in the southern hemisphere hugging the Andean Cordillera from arid Arica to cold Tierra del Fuego.

The country’s wealth comes from mining and growing and owes much to diversity of climate as well as to youthful geology.

Best known as the world’s largest producer of copper, with 5.7m tonnes produced in 2007, Chile is regarded as the mining capital of Latin America with virtually every global name in the phonebook from Anglo American to Phelps Dodge, BHP to Placer Dome, Barrick Gold to Rio Tinto, Falconbridge to Newmont Mining and that’s before we get to Codelco.

It’s not just copper, it’s also molybdenum, silver, zinc, manganese and iron. And it’s not just metals either. Chile is the world’s sole miner of nitrate and iodine minerals for the world’s agrochemicals industries and an important producer of potash, sodium sulphate and borates, and other industrial minerals geared more for domestic and regional markets.

But, the subject of this conference, lithium, is relatively new in Chile’s repertoire. It was not until the mid-1980s that the lithium-rich continental brines beneath the Salar de Atacama began to capture attention and a new industry began to emerge -- a fusion of the disciplines of chemistry and geology. The future was well signposted and Chile’s lithium industry had a massive and dramatic impact on the lithium industry elsewhere to become the world’s largest producer today.
The high altitude and relief of the Atacama desert of northern latitudes has allowed the sun and the wind to do the work of preserving unusual minerals and concentrating brines in the Salar de Atacama that wouldn’t survive in other environments. This is the driest region on the planet!

It’s not just metals and minerals. **Wine**, a product of the warm and wetter climate of the central regions surrounding Santiago, reaches tables across the world; though less so in France perhaps! **Cut flowers** are also a major export revenue earner and all kinds of **fruit** are in abundance. Sound like the Mediterranean? Take a trip to Vina del Mar, an hour-and-a-half from Santiago and you’ll appreciate the point even more than here in this intriguing city.

Less well appreciated internationally is that **Fishing** is big industry here. Chile is the world’s second largest exporter of salmon after Norway – industry exports worth $2.2 billion in 2007. **Forestry** is another major industry with long established bilateral co-operation with New Zealand.

Sound like Scandinavia? Take a look at the coastline of southern Chile with its countless islands and fiords and you’ll appreciate the diversity of this
extraordinary nation of 16.8m. people – 2m. less than that of Sri Lanka which has one twelfth the land area.

So, Chile’s diverse climate, high relief, and young geology has endowed rich resources. Despite all this, Chile also has its challenges. Amongst them is a lack of indigenous fossil fuel resources and therefore reliance on importing energy. Being in an earthquake zone seems to inhibit the nuclear option although that has been no deterrent for Japan. But, Chile is one of few countries with the option for large scale solar energy development.

**Chile**

*A World Class Primary Wealth Creator*

Young Geology & Diverse Climate
Mining, Growing, Harvesting

Metals and Minerals
Fruit, Wine, and Flowers
Forestry and Fish

Energy Import Dependent

Having provided some background colour of what makes this country interesting from the perspective of resources I'll turn to look at what has brought us here.

**The Conference**

This conference programme has many dimensions to it. We have 19 highly qualified speakers that will give you unrivalled insights.
Today, you will hear from established lithium companies about their operations, their views on present markets, and the challenges ahead. All the large players are here – SQM, Chemetall, FMC, Talison, Chengdu Tianqi Group – to give their insights.

**LSM09 Programme**

Lithium Resources – are they adequate?

Established Lithium Operators

The Automotive Challenge

Sustainability – the decade ahead

They are followed by consideration of the requirements of the automotive industry. The state of play in the development of lithium-based automotive batteries will be brought into sharp focus by two leading authorities from the USA and Germany.
Today concludes with what will be a thought provoking look at sustainability of lithium supplies over the next decade taking into account the complex web of factors that influence lithium availability beyond considerations of physical resource.

Tomorrow will focus on what is the extractive industry’s response to rising lithium raw materials prices and the much vaunted prospective increased demand. There are presentations on new and emerging lithium producers and resources in China, Canada, USA, Finland, Serbia, and Bolivia. And there are others that are represented here that are developing lithium resources elsewhere including Australia and Argentina and, I’m sure, other places too.
This conference will conclude by taking a look at the overall economics of the lithium industry and some searching as to what might be the likely path for lithium over the medium to long term.

**Limits to Growth**

On so many levels this conference touches on many issues that encompass technological change, climate change, overshoot, sustainability, limits to growth, political will, and pressures from growing and emerging populations to sustain automotive mobility for individuals as the world approaches peak oil production.
The late Donella Meadows, Dennis Meadows, Jorgen Randers and William Behrens III published Limits to Growth in 1972 – the product of a Massachusetts Institute of Technology project commissioned to examine questions by the Club of Rome funded by the Volkswagen Foundation in Germany. Those questions were:

1. “Are current policies leading to a sustainable future or to collapse?
2. What can be done to create a human economy that provides sufficiently for all?

Whilst the 1972 report drew much criticism, particularly concerning the wide misinterpretation as to its message concerning depleting non-renewable resources, the authors’ thirty-year update** in 2002 made the message crystal clear. It makes for compelling reading in today’s global circumstance across many sectors including the financial plight infecting the global economy. In your pursuit of this extraordinary lithium market I commend this text to you all -- two paragraphs from the 30-year update are worth reading as overture to our first keynote speaker’s topic; and I quote:
“More than 80% of year-2000 commercial energy use came from the non-renewable fossil fuels: oil, natural gas, and coal. The underground stocks of these fuels are going continuously and inexorably down. To determine whether that is a sustainability problem on the source side of the flow (sinks are related consideration) we need to ask how rapidly these resources are being depleted and whether renewable substitutes are being developed fast enough to compensate for the decline.

There is tremendous confusion about this matter. The confusion comes from paying attention to the wrong signal. Resource is a concept related to the total quantity of a material in the crust of the Earth. Reserve is a concept related to the amount of the material that has been discovered or inferred to exist and that can be used, given reasonable assumptions about technology and price. Resources go inexorably down with use, but reserve figures may go up, as discovery proceeds, prices rise, and technology improves. There has been a tendency to make statements about resources based on observations about reserves.”

Resources & Reserves

“There has been a tendency to make statements about resources based on observations about reserves.”

Limits to Growth – The 30-year Update, 2004
It is apparent that in some statements concerning the capability of the lithium industry to meet growing demand there has been the same confusion between what are resources and what are reserves. Resources are finite and not completely known whereas reserves are variable and not completely identified. This conference will make the position clear with regard to lithium.

In somewhat lighter mood I’d like to conclude by sharing with you some quotations from some famous people. Amongst our number here we have economists, scientists, and business men and women. Ponder these as we focus on lithium:

**Quotation**

“If economists could manage to get themselves thought of as humble, competent people on a level with dentists, that would be splendid.”

John Maynard Keynes

“If Economists could manage to get themselves thought of as humble, competent people on a level with dentists, that would be splendid.”

From the world’s most famous economist, John Maynard Keynes, perhaps musing that there are probably as many views on the economic outlook as there are economists!
“If scientists knew what they were doing, it would not be called research, would it?”

Albert Einstein

“If Scientists knew what they were doing, it would not be called research, would it?”
From arguably the world’s greatest scientist, Albert Einstein, encapsulating the essence of the forefront of research – a poignant thought as scientists grapple to safely harness the promise of lithium in large battery applications.

“People say that money is not the key to happiness, but I always figured if you have enough money, you can have a key made.”

Joan Rivers
“People say that money is not the key to happiness, but I always figured if you have enough money, you can have a key made.”

From one of America’s best known comedienne’s, Joan Rivers, nicely capturing the notion of aspiration merging into greed begging the question as to whether that is a sustainable principle for all as people in developing nations aspire to car ownership.

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**Quotation**

“This is the first age that’s paid much attention to the future, which is a little ironic since we may not have one.”

Arthur C Clarke

“This is the first age that’s paid much attention to the future, which is a little ironic since we may not have one.”

From probably the world’s best known science fiction novelist, Arthur C. Clarke expressing an entirely pessimistic thought with which the authors of the Limits to Growth – The 30-year Update, entirely disagree but caution that the shape of that future is in the hands of the world’s policy makers and leaders and that new directions are overdue.
“We will harness the sun and the winds to fuel our cars and run our factories”

This entirely optimistic statement is from President Obama’s inauguration speech. Unwittingly, I’m sure, in one sentence President Obama hit on two of the essential parameters, the sun and the wind, that makes the continental brines of South America and elsewhere such a major source of lithium and connected that with the element’s major growth market as a very important growing constituent in batteries to fuel cars of the future. On some other level, lithium itself might be thought as a natural “middle-man” in storing the energy from the sun and the wind that led to its pre-concentration in continental brines. President Obama ought to close the loop and visit the Salar de Atacama?

Having pondered these quotations it’s time to move on with the first day. Don’t forget, ladies and gentlemen, this is now your conference. Make the most of it. Your speakers have invested substantial time and effort in their preparations. Do not allow any speaker to leave the platform without any question or debate. As Conference Chairman I’m here to assist with that but I need your help to ensure it happens. We’re all here to listen, question and learn.

Simon, please introduce our first Keynote Speaker. Thank you.
Gerry Clarke, Consultant Editor Industrial Minerals, is your Lithium Supply & Markets 2009 Conference Chairman.

Gerry is a former lecturer in Applied Mineralogy, University of Plymouth, UK (1974-1978); a former Editor and Business Manager of Industrial Minerals (1978-1989), and Executive Director of Metal Bulletin plc (1990-2005). A graduate in Mining Geology from the University of Wales in Cardiff, Gerry also completed postgraduate research on the mineralogy and geochemistry of the bismuth sulphotellurides – an even more exotic subject than lithium somewhat removed from the centre ground of the world of industrial minerals! He is also a Chartered Engineer and a Member of the Institute of Materials, Minerals & Mining.

Gerry has written many features across the spectrum of industrial minerals and in the course of doing so visited countless extractive and mineral processing operations around the world including lithium minerals operations in Australia, Zimbabwe and the USA in the 1980s. Today he writes occasional articles for Industrial Minerals and assists in the organisation and running of IM’s annual series of conferences on fluorspar and fluorine chemicals as well as the biennial Industrial Minerals International Congress last held in Athens 2008.