



Tensions of Transition:

the Safety Problems of
the Chinese Coal Industry

David Feickert

Victoria University of Wellington
Te Whare Wānanga o te Ūpoko o te Ika a Māui

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the Safety Problems
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David Gordon Feickert

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ABSTRACT

This study examines the safety problems of the underground coal mining industry in China. It situates these problems in the wider context of sustainable development both for China and globally. Chinese mines have the highest accident rate in the world. However, these accidents are caused by factors that are common to coal mining elsewhere in the world such as gas and coal dust explosions, flooding, falls of ground and machinery accidents. After analysing the dominant role of coal in the Chinese energy economy, the study looks at the accident and ill health statistics that are publicly available. It notes that Chinese government policy on mine safety and compensation is being re-focused on a more intensive problem-solving approach. The tragedies faced by mining communities are huge in their human and economic dimensions. They are now firmly in the international public domain, creating a powerful incentive to act. There is a growing willingness to support Chinese initiatives to improve mine safety and health on the part of international bodies. The contemporary international practice in health and safety, especially in the coal industry, is analysed. It shows that many, but not all, of the problems faced in China have been solved elsewhere. Finally, after examining the specific situation of the small mine sector, where the accident rate is highest, some proposals are made for resolving the safety problems more effectively. These proposals, the study declares, should be implemented within the context of Chinese and global sustainable development.

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I would like to thank Peter McNestry, former general secretary of the mine deputies' union, the National Association of Colliery Overmen, Deputies and Shotfirers in the UK. Together, we went through a difficult journey from 1985, while defending the mine safety culture, organisation and supporting legislation in the UK from the onslaught of the Thatcher and Major governments. It was between 1985-1995 that I learned a lot more about mine safety and its practice around the world. Mr McNestry and I travelled subsequently to Washington together in December 2004 to present our written and verbal evidence to the Congressional-Executive Commission on China, on the invitation of that Commission. This is where this study really began and I thank Patricia Dyson of that Commission for arranging our visit.

Norman Jennings, former Deputy Director of Sectoral Activities at the ILO provided advice and information throughout the course of this study and Dr David Creedy of Wardell Armstrong mining consultants did likewise from his vantage point of working on coal mine methane gas projects in China itself and I wish to thank him and his colleagues for translating the case studies of selected accidents into English. Professor Tim Wright, head of the Chinese Studies Department at the University of

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ABBREVIATIONS

ACFTU	All China Federation of Trade Unions
BP	British Petroleum
CLB	China Labour Bulletin
CMA	Central Mining Administration
CNOOC	China National Offshore Oil Corporation
CNPC	China National Petroleum Corporation
CO ₂	Carbon Dioxide
CPC	Communist Party of China
CUCBM	China United Coal Bed Methane Corporation
ECSC	European Coal and Steel Community
ECU	european Currency Unit
EPMU	Engineering, Manufacturing and Printing Union
ETUC	European Trade Union Confederation
EU	European Union
GDP	Gross Domestic Product
GW	Gigawatt
HSW	Health and Safety at Work Act
ICFTU	International Confederation of Free Trade Unions now ITUC International Trade Union Confederation
ILO	International Labour Organisation
IPCC	Intergovernmental Panel on Climate Change
LNG	Liquefied Natural Gas
LNS	Local Non-State
LS	Local State
MSHA	Mine Safety and Health Administration
NACODS	National Association of Colliery, Overmen, Deputies and Shotfirers
NCB	National Coal Board
NIOSH	National Institute of Occupational Safety and Health

NSW	New South Wales
NUM	National Union of Mineworkers
NZ	New Zealand
NZCTU	New Zealand Council of Trade Unions
OECD	Organisation of Economic Co-operation and Development
OSH	Occupational Safety and Health
RMB	Renminbi
RECHAR	Reconversion Economique du Charbon
SAWS	State Administration of Work Safety
SCAMS	State Coal Administration of Mine Safety
SETC	State Economic and Trade Commission
SOE	State Owned Enterprise
SPP	Supreme People's Procurate
TVE	Township and Village Enterprises (equivalent to LNS mines)
TUC	Trades Union Congress
UK	United Kingdom
UMWA	United Mine Workers of America
US	United States of America
USMRA	United States Mines Rescue Association
WTO	World Trade Organisation

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Aim and chapter outline

The aim of this thesis is to investigate the safety problems of the Chinese coal industry. As observed by the State Administration of Work Safety (SAWS), the responsible government ministry, China has the highest accident rate in the world coal industry: it produces 35% of the world's coal and sustains 80% of the fatal accidents. Overall, this study will address two key questions. First, is the sacrifice of miners' lives, health and well-being necessary in all its dimensions and could a different health and safety strategy be adopted in co-operation with other mining countries and industries? Second, as Chinese coal production and consumption is now the single biggest contributor to global warming, can the developed world afford not to engage in the transfer of the expertise required to leapfrog both the 'accident prone' and the 'pollution intensive' periods of industrial development?

The concept of the 'accident prone' period was developed in an important speech by Li Yizhong, Minister of SAWS:

In fact, different countries experienced the "accident-prone period" for a different duration in different phases of economic development. The United Kingdom and the United States each experienced that period for 70 years (1880-1950) and 60 years (1900-1960) respectively when their GDP per capita reached \$1,000 to \$3,000; and Japan experienced that period for 26 years (1948-1974) when its GDP per capita reached \$1,000 to \$6,000. Comparing with developed countries, China enjoys obvious advantages of learning the experiences and lessons from developed countries to allow full play to modern technologies and management and realize leap-forward development. We believe that we can shorten the "accident-prone period" generally experienced by developed countries so long as we dare to face reality and meet the challenges with correct ideas and solid work, and realize fundamental improvement of work safety in China in over a decade.¹

1 Li Yizhong, *Practice Scientific Concept of Safe Development to Promote Social Stability and Harmony*, Opening address and keynote speech at the Opening Ceremony for the 3rd China International Forum on Work Safety, Minister of State Administration of Work Safety, September 20 2006.

The Chinese authorities are equally aware of the need to tackle the problem of greenhouse gas emissions and in particular carbon dioxide from the burning of fossil fuels. As in the case of health and safety in coal mining there is no quick fix solution, but they are aware that the transfer of experience, techniques and technologies from the developed countries will be an essential ingredient for success.

This study will draw on the author's own training and experience, as well as from several study visits to China and its mining regions and many discussions with Chinese officials, managers and workers working in the coal industry there. It will use as a reference point the contemporary debate on occupational safety and health (OSH) in both a general and in a mining sense. It will analyse the data on accidents available, mainly in English, but also some Chinese material which has been translated for the author.

The chapter outline will be as follows. Chapter 1 will put the issues in the context of sustainable development and discuss the tremendous economic changes that have taken place in China over the past three decades. Chapter 2 will look at the energy balance of China, especially the role of coal and examine the economic background influences on mine safety. Chapter 3 will assess the available data on mine accidents and compare the situation in relation to some of the history of the UK coal industry, which has, similarly, gassy mining conditions, threatening gas explosions. It will list the main factors leading behind such a serious safety situation.

Chapter 4 will review government policy on mine safety and compensation, looking at the views expressed by top officials from the President and Prime Minister down. It will look at the increases in government spending on industrial safety. Chapter 5 will review international OSH experience and in particular makes some comparisons with developed country mine accident records and industrial issues. It will look at the 'union effect' on mine safety. Chapter 6 will make a special study of the small mine sector, where accident rates are at their highest and suggest some approaches for solving the problems in that sector.

Finally, chapter 7 will make an interim assessment of mine safety in China and suggest a set of strategic priorities for action. The author is fully cognisant that such a vast and differentiated industry requires a much more systematic study that is possible in the context of an MA thesis. Nevertheless, he would like to record his appreciation to Victoria University of Wellington for accepting the proposal. A journey of a thousand miles begins with one step.

Chapter 1

China's economic transition, the coal industry and its safety problems.

1.1 Introduction

The aim of this study is to investigate the safety problems of the Chinese coal industry. Accidents in the Chinese coal industry are strikingly presented most weeks in the world's media, which reports the terrible disasters taking place – explosions, floods and roof collapses in particular, with often scores of miners killed. This study attempts to situate these tragedies in a much wider context of global sustainable development, and declares that they are not a problem for China alone. The issue of coal production and consumption in China, from the coal face to the power station is now a concern for us all and the environmental well-being of the planet.

The study then analyses the Chinese context of economic transition and the role of coal in the country's energy economy. After examining the Chinese accident data and government policy on safety and compensation, it examines the contemporary, international debate on occupational safety and health. It then takes a special look at the most dangerous, small mine sector. The study ends with an interim assessment, looking at some strategies which could be deployed to improve the safety situation.

1.2 The context of sustainable development

China is a country in rapid transition. Over the past few decades it has been changing from a planned to a market economy, from a country with a communist ethos in society to one that is characterised by more mixed values and from a mainly agricultural economy to a powerful industrialised one, with major environmental impacts, especially in the past 30 years. These three aspects – economic, social and environmental are the main dimensions which require considerable attention, if China is to succeed in developing in a sustainable way. The coal industry is also in transition

in each of these ways and, because it is such a large part of the economy, employs five million people and affects so much of the physical countryside, it finds itself at the centre of this debate.

From the coal face to the energy and emissions outputs of China's innumerable coal fired power plant and other coal burning plant, coal has a dominant environmental impact. In recent years, an average of over 6,000 miners have been killed at work, with possibly five times that number seriously injured and many thousands more suffering from serious occupational illnesses, chiefly lung disease. This is affecting family and social life and creating a huge burden on the developing health system. Every time experienced miners are hit by accident and disease, another economic blow is dealt to China's energy economy.

Moreover, the industrial pollution in local Chinese communities, where coal is burned without proper mitigating technologies, means further hundreds of thousands are affected by a variety of lung diseases. Finally, as Chinese carbon dioxide (CO₂) emissions reach more than 6,000 million tonnes annually, the impact of China's transition has become truly global, and the leading contributor to the warming of the global atmosphere, overtaking the US.² Carbon dioxide emissions ignore national boundaries and create an environmental burden for humankind as a whole, impacting the climate both abroad and in China itself. Having lifted over 200 million of its citizens out of absolute poverty, it is likely that Chinese agricultural production will be hit increasingly by extreme climate change, threatening the country's ability to continue its rapid development path.

This story, however, is not one of unmitigated and looming disaster. Nor are the developed countries without direct responsibility here, as they have transferred much of their industrial production to China, for re-export of manufactured goods, requiring large energy inputs. Jeffrey Sachs has reported that the Chinese authorities are aware

2 International Energy Agency, *The World Energy Outlook 2006 Maps Out a Cleaner, Cleverer and More Competitive Energy Future*, press release 07 November 2006 (06)17 http://www.iea.org/Text-base/press/pressdetail.asp?PRESS_REL_ID=187

of many of these problems and also of their scale.³ Crispin Tickell also reports the view of the Chinese leadership, expressed at the highest level at a meeting of the Chinese government on 12 March 2005, where both President Hu Jintao and Prime Minister Wen Jiabao spoke of the need to adopt a ‘new development mode’ or ‘new economic growth mode’ within the overriding objective of achieving an all-round harmonious society or *xiaokung*. Already the idea of ‘green clean growth’ or ‘green GDP’ is being tested in a number of Chinese provinces.⁴ An action plan on climate change was adopted by China immediately prior to its attendance at the G8 Summit in 2007 based on this approach.⁵ An official, speaking ahead of the release of the action plan said that:

Climate change caused by developed countries had already made China one of its main victims...

He went on to say that China’s reduction by 47% of the amount of energy used per unit of economic output between 1991 and 2005

*...cannot be matched by any other country during this period, including the European Union.*⁶

The action plan restated the country’s intention to increase energy efficiency by 20% by 2010 and to increase the share of renewable energy output to 10%.⁷ It praised the European Union for taking a positive approach but expressed some scepticism about setting a limit of 2 degrees Centigrade on the warming of the planet by the middle of the century.

The authorities are acting on mine safety and local pollution, and ensuring that new power stations use the latest clean technology, but the task is huge. China is a

3 See for example, Jeffrey Sachs, *Survival in the Anthropocene*, BBC Reith Lecture, Beijing Wednesday April 18 2007 www.bbc.co.uk/radio4/reith2007/lecture2.shtml Sachs reports on his ‘excellent’ high level discussions with the Chinese leadership over the past year on these environmental issues.

4 Crispin Tickell, “China’s Environment: Prospects and Hazards”, *China Dialogue* April 2 2007 <http://www.chinadialogue.net/article/show/single/en/896-China-s-environment-prospects-and-hazards>

5 Richard McGregor, “China Vows to Release Climate Action Plan”, *Financial Times*, June 1 2007

6 Ibid

7 Details announced on BBC Radio World Service News, June 4 2007

developing country; it is going through an industrial revolution and it is in need of all the help it can get. The main overall message of this thesis is that the developed countries *can* help, with their technical expertise, but that they *must* help if global sustainability is to be secured. China's energy development is therefore likely to provoke particular technical solutions to growing global energy and environment problems, such is the scale of China's energy demand and future fossil fuel emissions. This is already creating the basis for testing the possibility of a new global energy and environment model. There is simply no choice but to work for such a model, unless the 'anthropocene', as Sachs calls it, is to be continuously degraded.⁸

The specific focus of this thesis, however, is on the coal mine safety dimension of this common challenge for humanity. Producing coal more safely also entails producing it with a better application of mining technology, using a cleaner production process that is both less harmful for miners but also for local communities where coal is burned. Coal combustion is not discussed in any detail in this thesis. The focus is on the extent of injury accident and ill-health and the strategies that could be used to make mining itself much safer.

China's 'socialist market economy' could lead to a 'market society' along US economic lines or a 'social market economy' on European Union lines. If it is the latter, the health and safety problems of the coal industry (which are more than 100 times worse in terms of fatal accidents per million tonnes of output than its nearest comparator by size, the US) are more likely to be solved effectively, and the country is more likely to find it easier to implement sustainable development policies, as indeed the EU has been able to in comparison with the US.⁹

8 Sachs, *Survival in the Anthropocene*, op cit, page 2. Sachs takes the concept, anthropocene, from scientist, Paul Crutzen, who invented the term, "to signify the fact that human beings for the first time have taken hold not only of the economy and of population dynamics, but of the planet's physical systems, Anthropocene meaning human created era of Earth's history."

9 The EU has signed the Kyoto Protocol, whereas the US has not. It has set targets for greenhouse gas reduction and established the legally binding European emissions trading scheme, which could evolve into a global scheme in the coming decade.

1.3 Two key questions

There are two key questions therefore:

- The first key question that is raised by this thesis and which it will investigate in relation to the coal industry is: is this sacrifice of miners' lives and health necessary in all its dimensions? Could a different strategy, using internationally tested methods from the most advanced coal industries, reduce dramatically the toll in China's mines especially with the co-operation of other major mining countries and industries?
- Chinese coal production (just over one third of world output) and consumption is the biggest single factor contributing to global climate change. Can the developed world afford not to engage in the transfer of the expertise required for China's key energy industry to leapfrog the dirty, unsafe period of industrial revolution?

1.4 From planned to market economy

Since 1978 China has been systematically dismantling its planned economy and extending the 'socialist market economy' to more sectors. These reforms began with commodity markets and extended to capital, labour service and technology markets¹⁰. The Minister of the National Development and Reform Commission, Ma Kai said on 12 July 2005 at a high-level forum on reform that China had essentially completed the transition to the socialist market economy¹¹. After a sustained period of reform the highly centralised planned economy has been replaced by a new system wherein the public sector plays a leading role. Nevertheless it co-exists with, and shares opportunities with, various other forms of ownership.

By the end of 2004, more than 50% of the nearly 3000 state-owned or state-controlled major enterprises had become stock-holding companies, albeit often with a significant state share-holding. Only between a quarter and a third of the economy is now directly

10 China Brief , *Socialist Market Economy*, November 1 2005 <http://www.china.org.cn/e-china/market-economy/>

11 People's Daily Online – 1, *China has Socialist Market Economy in Place*, November 1 2005, http://english.people.com.cn/200507/13/20050713_195876.html

state-controlled¹². The output of domestically owned private companies grew five-fold between 1998 and 2003 and created 18 million new jobs¹³. The private sector now provides 80% of new jobs¹⁴. Over the 1998-2003 period, non-mainland owned companies achieved a three-fold increase in output, while the output of the state sector rose by just over 70%¹⁵. The profitability of private companies by 2003 had reached 15% rate of return on their physical assets compared with 8.8% in 1999 and they accounted for 75% of all exports, with the bulk of these being made by foreign-controlled companies¹⁶. Around 90% of retail, agricultural goods and capital goods are priced by the market.

While there is a growing consensus that a major part of the Chinese economy is now in the private sector, there is still some debate about the exact extent, as a result of definitional problems. In China, ownership is normally defined according to the largest shareholder¹⁷. Irregularities and lack of information about company ownership conspire to create the definitional problems. Taking into account these factors and also the underground economy, the private sector is now nevertheless responsible for about three-quarters of economic output and employment¹⁸. The OECD, in its 2005 economic survey of China also referred to the need to modernise the legal framework for business, noting that the government was preparing legislation in three key areas, bankruptcy law, company law and the implementation of the constitutional amendment on property rights. Macroeconomic policy ensures that national planning, fiscal policy and monetary policy are co-ordinated, according to Ma Kai. Fiscal policy has been run in a stabilising fashion but there has been considerable volatility in the inflation rate – almost 8 times that of the US and 4 times that of Western Europe over the past decade¹⁹.

12 OECD – 1, *Economic Survey of China 2005*, Chapter 2, September 16 2005, http://www.oecd.org/0,2744,en_2649_201185_35350582_1_1_1_1,00....20/09/2005

13 Rod Oram, “On the Slow Boat to China” in *Sunday Star Times*, November 6 2005

14 People’s Daily Online op cit

15 OECD 2005 op cit

16 OECD 2005 op cit

17 Richard McGregor, “China Increasingly Dependent on Private Sector for Growth, Report Says”, in *Financial Times*, September 13 2005

18 *ibid*

19 OECD, *Economic Survey of China 2005*, Chapter one, op cit

The economic success of China has been demonstrated in the 9.4% average annual growth rate since 1978 and an increase in overall annual GDP from USD 150 billion in 1978 to USD 1.6 trillion in 2004. New figures published in December 2005, based on a reassessment of the country's GDP, more accurately taking into account the value of private services, added 16.8% or US\$284 billion.²⁰ China recorded a trade surplus of USD 79 billion in 2005, more than twice that for 2004²¹. However, the image of 'booming China' has a number of troubling aspects. While 200 million people have been lifted out of absolute poverty and there is a burgeoning middle class, some of whom are wealthy enough to send their children abroad for a foreign education, there are still 900 million Chinese living in the countryside with average incomes of less than USD 1 per day. The tensions of economic and political transition (especially the impact of membership of the WTO during the transfer of power to a new generation of leaders) are so serious for one observer that he has concluded China could even 'collapse'²².

If growing inequality between the winners and losers of the spectacular economic growth is a serious problem, there are other manifestations of unease. These include much higher rates of rural unemployment than urban, which is probably understated in the official overall figure of 10.10 % in 2003. As the OECD concludes, the rural under-employment of 150 million people creates a situation wherein:

*Protecting workers' rights is intrinsically difficult in a situation of labour surplus.*²³

This is a situation that is likely to persist for some time, where "most job seekers have a weak bargaining position"²⁴. The OECD expects that this will limit the scope of what can realistically be achieved by means of legal regulation of the labour market. Nevertheless, the OECD recommends that the most vulnerable workers in the casual, informal sectors of the economy should be informed about their rights and the

20 The Economist, *China – Catching up*, December 20 2005

21 Economist Intelligence Unit, "Country Background Fact sheet", in *Country Briefings: China*, July 13 2005, <http://economist.com/countries/China>, October 12 2005

22 Gordon G Chang, *The Coming Collapse of China*, Arrow Books 2001, London

23 OECD, "Labour Protection: Challenges Facing Labour Offices and Social Insurance", in *Governance in China*, OECD 2005

24 Ibid

authorities should insist that the minimum wage, working time and safety rules apply even in the absence of formal contracts of employment. Environmental degradation is also seen to be associated with high growth rates and rapid industrialisation. There have been rapid urban clearances to make way for large commercial developments, without the planning procedures seen in most other market economies and thousands of protest demonstrations involving 3 million people over a variety of economic and social issues during 2004.

In the coal industry, there is a sense of the sacrifice of a generation of miners, many recently off the land, through large numbers of fatalities, major injuries and a very high and growing incidence of detected occupational disease. In certain respects and despite the greater availability of newer technologies, China, it seems, is still travelling along the arduous path of development that every other industrialised country has passed through. *The first key question that is raised by this thesis comes in: is this sacrifice necessary in all its dimensions? Could a different strategy, using internationally tested methods in the most advanced coal industries, dramatically reduce the toll in China's mines especially with the co-operation of other major mining countries and industries? Is there, also, with the one-off payments to miners' families on their death, a new workers' compensation system coming into being which starts to value life as developed countries have already done, especially in their coal industries?*

However, in the coal industry liberalisation and privatisation has not gone as far as in some other economic sectors, with large state-owned mines responsible for the largest volume of output. Increasing demand for coal and upward pressure on coal prices has led to the rise in illegal mining in small village mines. There were some 27,000 small private mines operating in the early 1990s.²⁵ Along with the increase in the numbers of small mines there was a corresponding rise in corrupt practices, often involving local officials²⁶. The accident rates in these small mines are worse than those for township and state-owned mines²⁷. In order to drive down the accident rate, the

25 Tim Wright (2000), "Competition and Complementarity: Township and Village Mines and the State Sector in China's Coal Industry" in *China Information* Vol. XIV, No. 1

26 China Labour Bulletin E-Bulletin No. 28 *A Deadly Conflict of Interests*, 16 September 2005,

27 David Feickert, *Coal Mine Safety in China*, Submission to the Hearing of the US Congressional-Executive Commission on China, December 10 2004

government has campaigned to end the collusion between local government officials and colliery owners and had forced 4,758 officials to report their investments (totalling 653 million yuan) by 20 October 2005²⁸. Of the amount declared, 473 million yuan has been withdrawn. Among those who have withdrawn their investment there have been 3,002 civil servants and 1,576 heads of state-owned enterprises.

Elsbeth Thomson's major study of the Chinese coal industry provides a comprehensive description of these trends from the era of reform in the 1980s, through the partial deregulation of prices towards the current situation.²⁹ It shows the balance between the private small mines and the larger state-owned mines in terms of markets as well as output and provides a good example of the dilemmas facing a partly marketised industry which is essential especially for the success of the big export industries as well as keeping the growth machine moving overall. Thomson's description suggests that the coal industry may be evenly divided between the impulse to a market society and the development of a social market economy. The outcome is still in the balance, albeit that the most recent offensives against the private mine sector represent a solid attempt to shift this balance.

1.5 The 11th five year plan – addressing the tensions of transition

The Communist Party of China's (CPC) annual meeting on economic policy of October 2005 signalled a strategic shift: there would be greater emphasis on redressing the inequality and social stress that the market reforms have indirectly or directly caused. The 11th five year plan from 2006 – 2010 aimed to strengthen social services, education and health care in particular. As for the coal industry, Yin Wu, the senior official for the National Reform and Development Commission at a recent coal summit said that the plan meant output would be raised from 2.1 billion tonnes in 2005 to 2.4 billion tonnes by 2010.³⁰ Of this amount, around 60% would be produced by five or six large coal companies, while the number of small mines would be reduced to around 10,000 by 2010.

28 China Daily, *4,500 Officials Report Shares in Coal Mines*, November 2 2005 http://www.chinadaily.com.cn/english/doc/2005-11/02/content_489689.htm

29 Elspeth Thomson (2003), *The Chinese Coal Industry: An Economic History*, London: Routledge Curzon

30 Sinocast China Business Daily News, London 3 November 2005, p 1

For leading Chinese economists the main theme of the new five year plan was improving livelihoods and seeking efficient and sustainable development not just growth. This would be achieved through distributing the benefits of growth more fairly and using measures such as higher taxation of wealthier areas³¹. The task is a considerable one, as illustrated by government statistics: the lowest income families, comprising the bottom 10%, own less than 2% of all resident's assets in China, while the top 10% own over 40% of total assets³².

The income differential between the more than 900 million rural citizens versus the around 400 million urban citizens is 1:20³³. A large number of rural inhabitants have no long term future in the agricultural sector – as many as half of the total rural population according to some³⁴. The population of internal migrants, many of whom are illegal is variously estimated up to 100 million. The employment of poor farm labourers in small rural, village and township coal mines has been an important source of employment. The disastrous accident record of these small mines has led the authorities to crack down on them, in periodic campaigns, closing many. The coal mine safety administration ordered the closure of 4,000 mines to August 2005 while, inclusive of these mines, an overall figure of 12,148 mines were ordered to suspend or end production for safety reasons³⁵. The situation in China's small mines has led Tim Wright to argue:

*The problem of coal safety will not be solved until China's rural population has other, better and safer ways to increase family incomes so that they have the option to refuse to risk their lives.*³⁶

Similarly, given the partial private nature of the industry and the introduction of market

31 Kathy Chen, "China to Tackle Gap Between Rich and Poor", in *The Wall Street Journal Online* 30 September 2005

32 People's Daily Online, *New Five-Year Plan to See Revolutionary Changes*, November 8 2005, http://english.people.com.cn/200510/12/20051012_213909.html

33 Jacques Gravereau, *How Vulnerable is China to Economic and Political shocks?* Promethee/Shell mini workshop on China, Paris June 4 2004, p2, <http://www.hec.fr/eurasia/>

34 *ibid* p3

35 Xinhua, *China to Close at Least 4,000 Coal Mines this Year: official*, August 8 2005, http://www.chinadaily.com.cn/english/doc/2005-11/08/content_492658.htm

36 Tim Wright (2004), "The Political Economy of Coal Mine Disasters in China: "Your Rice Bowl or Your Life", in *The China Quarterly* 179 p 629

economics,³⁷ the new situation of increasing energy demand creates the conditions which can encourage a short-term mentality on the part of investors, with greater concomitant risks for those working in the industry.

The CPC used this kind of evidence to re-order its ‘blueprint’ plan and begin the transition from a policy of development based around ‘getting rich first’ to one of ‘common prosperity’. Premier Wen Jiabao, in introducing the 11th five year plan, warned that the economy depended excessively on increased investment and material input. The inefficient growth pattern was triggering increasingly acute contradictions between resources and the environment³⁸. The ‘scientific concept of development’ would guide the shift in development policy and help create the basis for a more harmonious society, with employment, social security, poverty reduction, education, medical care, environmental protection and safety being given priority, Wen said.

The ‘scientific concept of development’ also involves a rapid increase in spending on R&D which was USD108.9 billion in 2004, third after the US and Japan; it is expected to go up by 30% over the next two years³⁹. This also reflects an intention to take the economy up the value chain, no longer relying mainly on the production of low cost mass production goods. Foreign investment, already slowing in 2005, may be more controlled under the next five year plan. There are signs that, under pressure of competition from foreign competitors, firms like Volkswagen are cutting back themselves. Volkswagen announced that it would cut its investment for the period 2006-2008 by 40%⁴⁰.

It could be asked whether the new emphasis in the 11th plan represents a radical shift or a re-orientation in the guiding policy approach laid down in the ‘Three Represents’. The Three Represents were developed by CPC general secretary Jiang Zemin (1989-2002), after an inspection tour of Guangdong Province in February 2000.

37 Tim Wright (2000), “The Political Economy of Prices in China’s Planned and Market Economies: Competition and Control in the Coal Industry”, in *Asian Studies Review* Volume 24 Number p 371

38 China Daily, *Wen:2006-10 plan ‘Active and Prudent’*, October 20 2005, http://www.chinadaily.com.cn/english/doc/2005-10/20/content_486360.htm

39 Henry Thornton, *China’s New Five-Year Plan Promises “Sustainable Development”*, <http://www.henrythornton.com>

40 Economist.com, *Faintly Declining Investment*, October 2005 27, <http://www.economist.com>

Jiang Zemin later elaborated the meaning of the Three Represents at a meeting celebrating the 80th anniversary of the founding of the CPC on July 1 2001⁴¹:

- Representing the development trend of China's advanced productive forces – the Party's basic nature determines that it must represent the development trend of China's advanced productive forces. Productive forces are the most revolutionary and dynamic factors in social mode of production, and they are the forces that ultimately determine how human society develops.....However, their overall level is still much lower than in the developed countries in the West.
- Representing the orientation of China's advanced culture – Socialist society means a society that develops and progresses comprehensively. A society is truly socialist only when its economic, political and cultural development is balanced and a good job is done in both material and spiritual civilization. Only by always representing the orientation of China's advanced culture and working hard to develop a socialist culture with Chinese characteristics can the CPC achieve this goal.....
- Representing the fundamental interests of the overwhelming majority of the Chinese people – Ever since our Party was founded, its primary aim has been to serve the people wholeheartedly. Over the past 80 plus years, all our successes in both revolution and development have been attributable mainly to the fact that we represent the interests of the overwhelming majority of the people and are able to unite with them in their struggles in their own interests.....

Comparing these policy tenets with the 11th plan suggests that there has been a re-orientation rather than any fundamental change. The Chinese leadership has become aware that rapid growth has thrown up counter-trends which can harm that growth and work to undermine the 'catch-up' strategy itself. This has led to high costs on sections of society and considerable social unrest. Ever mindful of the possibility of the 'Solidarnosc effect' (referring to the rapid rise of the independent trade union, Solidarnosc among disgruntled workers in Communist Poland in 1980), the leadership has acted to deal with important grievances. One of these, widely publicised in the

41 International Department Central Committee of CPC, *On the Three Represents*, <http://www.idpc.org.cn/english/policy/3represents.htm>

Chinese and world media, is the huge fatal and serious injury rate in the country's coal mines. As in other areas of the economy, dealing with these is by no means easy and an increasing level of expert help from overseas is being welcomed⁴².

The Chinese government has also recently adopted a new labour contract law, after considerable debate both inside and outside China and a rising level of workplace disputes through the 1990s to date⁴³. The law makes mandatory the use of written contracts and strongly discourages fixed-term contracts by requiring a severance payment where a fixed term contract is not renewed without an appropriate reason.⁴⁴ The role of labour inspection is enhanced, and employers are required to submit proposed changes for discussion to trade unions, concerning pay, hours, safety, insurance, holidays and training. The new law was subject to intense lobbying by American firms with Chinese operations. It was welcomed by John Monks, General Secretary of the European Trade Union Confederation in the following way:

*The law is a significant step forwards in protecting the rights of individual workers. It now needs to be scrupulously enforced in all areas of activity in China. I am glad to see – as is also now recognised by the European Union Chamber of Commerce in China – that the new law draws from labour provisions in the EU and is not considered to be a brake on competitiveness. This demonstrates that the European Social Model is appreciated worldwide and gives the lie to those who would have European workers give up their hard-won rights in the name of global competition.*⁴⁵

For observers like Gravereau⁴⁶ there are three key economic and social questions that need to be resolved: can the social net be spread widely enough; can China maintain its growth rate, quadrupling GDP by 2020 and, can the infrastructure bottlenecks be sorted out? For Gravereau, the most important one is the latter and in particular energy

42 David Feickert, , *Coal Mine Safety in China* , op cit p 3

43 Chang Kai, *Labour Contract Law in China*, slide 3 power point presentation to European Parliament, 20 June 2007

44 Chang Kai, *Labour Contract Law in China*, slide 11

45 ETUC Press Release, July 3 2007, Brussels

46 Gravereau, *How Vulnerable is China to Economic and Political shocks?* op cit p 5

demand, especially the requirement to import more oil. China is now the second biggest energy consumer in the world, after the US⁴⁷. It is naturally concerned that its economic growth could be undercut by insecure energy resources. In an era of high oil prices and insufficient indigenous oil production, this places increased pressure on the indigenous coal industry, which supplies nearly 70% of the country's energy needs.

1.6 A market society or a sustainable, social market economy?

From an economic and social point of view several major questions are therefore constantly re-emerging and demanding political resolution. Should China become a 'market society' on the US or Anglo-American, neo-liberal model (neo-liberal economics, shareholder power, lightly regulated markets, minimal social and health provision by the public sector, only basic employment rights, adversarial industrial relations) or should it become a social market economy on the European social model. This can be defined as a mixed economy between public and private sectors, moderate regulation including on the environment, often extensive state-supported social and health provision, social partnership industrial relations system, extensive employment rights, as first developed in West Germany and Northern European countries but adapted to the EU as a whole⁴⁸. These are the two main economic/social choices for developed and nearly developed economies (albeit that the Japanese variant is not irrelevant to China). Or can China develop a distinctly different framework for a market economy, reflecting its own past?

Approaches to energy and sustainable development illustrate this choice and are sketched out in the two quotations below. The first, by WTO Director General, Pascal Lamy, reflects his Euro-centric views, developed during his period as Chef de Cabinet for former President of the European Commission, the French socialist,

47 BP, *Statistical Review of World Energy 2004*

48 This is spelled out in the Draft Constitutional Treaty for Europe adopted by EU Summit June 2004: in Article I-3 The Union's Objectives, 3. "The Union shall work for sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and with a high level of social protection and improvement in the quality of the environment." p 16, <http://ue.eu.int/igc/pdf/en/04/cg00/cg00086.en04.pdf>

Jacques Delors, and later as European Commissioner for Trade. The other quotation is from the bi-partisan US – China Economic and Security Review Commission. It was repeated again in 2005 by the Chairman of the Commission, the Democrat and former congressional aide, Richard D’Amato just 10 days before President Bush visited Beijing. He wanted Mr Bush to set up a high-level energy group to co-operate on more efficient energy use and stop China’s effort to acquire oil “at the wellhead” in Africa, Central Asia and Latin America.

The alternative is heightened competition for scarce supplies with the danger of collisions over China’s quest for more supplies,
according to the US Commission⁴⁹.

*One important point, however, is that we must move away from the tendency to treat environmental protection and sustainable development as the source of extra costs and therefore impediments to economic development. China has recognised that this approach is counter-productive and not feasible in the long run. Environment and sustainable development cannot be dealt with separately from the management of the economy as a whole. Sustainable development requires fundamental changes in economic management to provide a positive synthesis between the environment, social, regional and economic dimensions of the development process.*⁵⁰

*China’s growing energy needs, linked to its rapidly expanding economy, are creating economic and security concerns for the United States. China’s energy security policies are driving it into bilateral arrangements that undermine multilateral efforts to stabilise oil supplies and prices, and in some cases may involve dangerous weapons transfers.*⁵¹

49 Murray Hiebert, “US Panel Faults Bush for Lax Policy on China”, *The Wall Street Journal Online* November 10 2005, <http://online.wsj.com/SB113156929341692632.html>

50 Pascal Lamy, Director General of the WTO in a message to the Fourth Beijing International Forum on the WTO and China, 15 September 2005. http://www.wto.org/english/news_e/sppl_e/sppl01_e.htm

51 Report to Congress of the US-China Economic and Security Review Commission 2004, 11 US Government Printing Office, Washington

The US Commission's view reflects both an American political establishment view of world resources and actual increased competition for them as the largest developing countries (China, India and Brazil) continue with their rapid economic growth and the increasing energy requirements needed to fuel that growth. Some have even argued that China's need for resources is now driving its foreign policy⁵². However, in regard to the impact on energy prices, an American company view at the same time expressed caution in seeing China as the villain. Lee Raymond, chairman and chief executive of Exxon Mobil Corporation criticised US politicians for unfairly blaming China for high oil prices:

*Washington has to demonise somebody; the demon in the oil market today is China, but this is "malarkey"*⁵³.

While the critique by the US–China Economic and Security Review Commission comes out against bilateral as opposed to multilateral approaches being followed by the Chinese, US external energy policy could scarcely be described as multilateralist, especially in the Middle East and in Iraq, the country with the world's second largest oil reserves after Saudi Arabia. Pascal Lamy, as the head of a multilateralist institution as well as a supporter of the European social model, stresses the positive developments in China, even though his brief includes dealing with some of the most difficult trade issues yet to confront the WTO, such as exports of textiles to the EU and the US from China.

1.7 Sustainable development

However, perhaps the most important point Lamy stresses is the change in environmental policy and sustainable development in Beijing; for China's energy policy has become an issue for global supplies, prices and the global environment, as the second biggest emitter after the US of carbon dioxide, the critical greenhouse gas. Moreover, most coal in China is mined in a less environmentally sustainable way, has a high ash/dirt content when burned in mainly power and other plant with low levels of thermal efficiency. New plants, using supercritical boilers, are an excellent and growing exception to this.

52 David Zweig and Bi Jianhai, "China's Global Hunt for Energy" in *Foreign Affairs* Volume 84 No. 5 September/October 2005

53 The Wall Street Journal Online op cit 1 June 2006

From the sustainable development perspective the significance of the requirement in the five year plan from 2006 for an overall 20% decrease in energy costs per unit of GDP is extremely important. Although not the same as increasing energy efficiency by 20%, this five year plan cost requirement cannot be achieved without substantial improvements in energy-saving and sustainable development.

It is here that this thesis comes to the second key, overarching question:

as Chinese coal production (one third of world output) and consumption is the biggest single factor contributing to global climate change, can the developed world afford not to engage in the transfer of the expertise required for China's key energy industry to leapfrog the dirty, unsafe period of industrial revolution?

Premier Wen Jiabao acknowledged that in recent years the speed of energy consumption has outpaced economic growth rates⁵⁴. This new approach reflects the growing acknowledgement by the Chinese leadership that China cannot sustain its economic growth by moving towards a US level of per capita energy consumption. China would need to use 90 million barrels of oil daily if it had a per capita oil use similar to the US, or 11 million barrels more than entire global production⁵⁵. This is clearly not feasible in a situation where overall global oil reserves have already reached their midpoint and large new fields are proving more difficult to find. The understanding of this energy reality, also applicable in the case of some other raw materials, may become the major stimulus for a distinctive, Chinese route to sustainable development to come into being. If China's five year plan puts forward social, regional and energy elements that appear to resemble a European rather than American model approach to economic, social and environmental policy, it is too early to predict the likely outcome, or what shape a Chinese version of either might take.

The term, "Socialist market economy", it could be argued, should be seen rather as a politically acceptable 'transitional' concept in the move from the planned economy, rather than an accurate description of an emerging real economy. The Chinese leadership has been very mindful of the problems created in the former Soviet

54 China Daily, 20 October 2005 op cit

55 Worldwatch Institute, *State of the World 2004*

Union by a relatively chaotic transition to the market economy (“perestroika”) and even more so by the over-rapid and prior transition to new democratic structures (“glasnost”). In China, there are deep-seated fears of social instability during periods of upheaval and radical change which have been reinforced throughout Chinese history, right up to the Cultural Revolution. The fact that the Cultural Revolution immediately pre-dated the 1978 reforms, explains much of this caution. In such a situation, language, concepts and propaganda become critically important. However, China’s past experience has provided some rich lessons in the governance of the country, as well. These are being tested again. Gravereau, for example, argues that the dual system of Party structure on the one side and state, corporate and civil society structures on the other, “preserves essential forms of central control in what is otherwise a highly decentralised not to say unruly economy”⁵⁶. He also suggests that this dual structure embodies the lesson learnt from the age of QuingShiHuangdi in the second century BC wherein the central inspiration of governance was to find a way to prevent the Middle Empire from unravelling into warring kingdoms.

There are several important global influences playing a role in these developments, too. Perhaps the most influential one in recent years has been Chinese membership of the WTO. From a political point of view, Chinese membership of the WTO and the preparation for it has provided the leadership with a powerful instrument of change, which could reinforce the development of an elaborate regulatory framework for modernisation. For Gravereau,

*The stroke of genius is to have used the WTO as the external agent of change that could substitute for the lack of domestic consensus while saving years or decades of step-by-step regulatory modernisation. By adhering to WTO codes in dozens of sectors, China has embraced world-class best practices. It has done so in a way comparable to the use that Mexico did of NAFTA or that European countries, for all the squeaking and screaming, are doing with Brussels directives. Modernisation is indeed more easily achieved when some external constraint can be invoked to keep domestic best interests at bay.*⁵⁷

56 Gravereau, *How Vulnerable is China to Economic and Political Shocks?*, op cit p 5

57 Gravereau, *How Vulnerable is China to Economic and Political Shocks?*, op cit p 6

In the sense that this is true in relation to the WTO, China's leadership could increasingly invoke the external constraint of the world's warming climate, with its likely impact on Chinese agricultural sustainability via extreme weather events, as a driving force for modernisation in energy. Developed countries are experiencing now the difficulty of mobilising their populations in the drive to a low carbon future. In China, this will be a supreme task, but one which, for global environmental and economic reasons needs to get underway as soon as possible.

The OECD survey of China's economy in 2005 summarised the main changes in economic policy which have driven the modernisation of China. For the OECD the key overall policy shift was to progressively give greater rein to market forces. Apart from membership of the WTO China had previously dismantled price regulation by 2000, started to introduce company law, protecting shareholders against arbitrary property seizures, opened up infrastructure, public utilities and financial services to private investment, reformed the state-owned sector, promoted the gross savings rate (one of the highest for any economy – approaching half of GDP) and improved the quality of the labour force through raising the qualifications and quality of education for young people. The OECD commented that changes in economic policies over the past two decades have led to a long period of sustained expansion, with national income doubling every 8 years. Perhaps its most notable laudatory statement was:

Indeed, by some accounts, over half of the reduction in absolute poverty in the world between 1980 and 2000 occurred in China⁵⁸.

On the other side of the reform balance sheet, the introduction of greater flexibility of labour in the state sector has enabled state firms to shed labour, with 14 million workers made redundant in the five years to 2003. This process was aided by transferring the cost of restructuring from the company to the state, although one of main causes of industrial disputes has been the non-payment of outstanding wages in such situations. If China has been steadily abandoning the old social model, associated with a centrally planned economy, it is not yet clear which social model is likely to be adopted or what the exact shape future changes are likely to take. The 11th five year plan has shifted

58 OECD, *Economic Survey of China 2005*, Chapter one, op cit

the orientation and China is seeking high level expert foreign consultancy advice in the reform of its social security systems (paid largely for by the EU). The scale of the challenge, in designing a new social security system appears daunting. Just in the coal industry alone they are large enough, especially with regard to industrial injury compensation and provision for dependants of miners disabled and killed at work, or for those made redundant.

The EU-China Co-operation agreement, under which the EU has invested euro 350 million for specific development linked projects, shows a generally more optimistic view of Chinese economic and political development than that shared in Washington. US corporations investing in China or using China's exports tend to take a more optimistic view. However, the hiatus over implementation of WTO provisions for imports of Chinese textiles into the EU during the summer of 2005 shook the confidence of European policy makers and exposed the EU to a lecture over free trade by their Chinese opposite numbers, only recently members of that club. Perhaps as much as anything else the key difference between Brussels and Washington is on whether China constitutes a threat – economically and militarily. For the majority of European leaders the answer to both is in the negative. For the Americans it is the opposite, which, of course does not hinder substantial investment by US companies in China or in joint policy initiatives being inspired by Washington. Chris Patten, British Conservative and former EU Commissioner for External Relations, has recently taken a more American view on China as a threat, but without specifying why⁵⁹.

1.8 Conclusion

The sustainable development choice for China may therefore lie somewhere along the continuum between the Anglo-American neo-liberal economic model and the European economic and social model but it would be unwise to project where this is likely to end up. In any event, whatever route is chosen, it will be a Chinese solution as almost every other major change has been in the past two centuries. In the coal industry, given the scale of its problems, it may be that the miners and their families

59 Chris Patten, "Why Europe Is getting China So Wrong", in *Financial Times*, 26 September 2005

would be much better off with a European style social model applied to their industry than a liberalised US one, including privatisation and deregulation.

It remains to be seen whether the transfer of expertise from the world's developed country coal industries will be successful but the seriousness of the situation in China's mines, especially relating to health and safety, warrants an urgent effort here. The Chinese have already embarked on this process, with study teams visiting the US, the EU, Japan, Australia and New Zealand. In the broader domain of social and employment policy, the EU has already begun to formalise this process as Vladimir Spidla, EU Commissioner for Employment, Social Affairs and Equal Opportunities made clear. Perhaps it is particularly significant that Mr Spidla was former Prime Minister of the Czech Republic and grew up in a former Communist country:

This Memorandum of Understanding (MoU) will provide mutual learning opportunities for both sides. China is a rapidly emerging economy and a major player in international trade – it is time for a policy dialogue between the EU and China on employment and social affairs issues. In a globalised world we can all learn from each other. From our side, we look forward to explaining how the European social model works.⁶⁰

Since the signing of the memorandum, Mr Spidla has spelled out the meaning of the new approach in relation to the coal industry in China:

....EU-China co-operation 2007-2010 period explicitly refers to health and safety in general and to health and safety in the mine industry in particular.⁶¹

This means that the European Commission now has a legal base on which to develop a support programme.

Chris Patten, last British Governor of Hong Kong, as well as former EU External Relations Commissioner and Conservative Party Chairman, observed that China has

60 Vladimir Spidla, EU Commissioner for Employment, Social Affairs and Equal Opportunities speaking before the signing of the MoU on September 5 2005 at the EU-China Summit http://europa.eu.int/comm/employment_social/emplweb/news/news_en.cfm?id=64

61 Letter to Stephen Hughes MEP from Commissioner Vladimir Spidla, February 26 2007

been the world's largest economy for 18 of the last 20 centuries⁶². Andre Gunder Frank, in his major work on the global economy in the 'Asian Age' argues that Asian countries, increasingly centred on China, are using the technique that enabled the west to succeed economically: import substitution and export promotion in the world market, to become Newly Industrialising Countries⁶³. This may be creating tensions of transition in China, but it is doing the same in the global economy as well. With respect to the Chinese coal industry there are a number of possibilities that are widely varying. At one extreme there is the possibility of a failure to reform it sufficiently, leading to inadequate energy supplies for continued economic growth. At the other end there is the opposite: a successful modernisation based on highly productive mines, which would necessarily be safer and environmentally more responsible. If energy efficiency is improved substantially in line with the 11th five year plan, then China could become an important player in the international coal export market. After all it is the world's biggest producer and has 11% of proven world coal reserves⁶⁴.

62 Chris Patten, *Why Europe Is getting China So Wrong*, op cit

63 Andre Gunder Frank, *Reorient: Global Economy in the Asian Age*, University of California Press, 1998

64 BP, *Statistical Review of World Energy 2005*, op cit

Chapter 2

Trends in the Chinese energy economy

2.1 Introduction: coal in perspective

This chapter situates coal within China's energy balance, looking briefly at other sources of energy. It does this with reference to the global dimension and then takes a closer look at the evolution and structure of the Chinese coal industry itself. The period of price deregulation and related market changes are then examined. In relation to China's energy balance there are four key statistics that paint the essential picture:

- China is the world's second biggest energy consumer after the US.⁶⁵
- China produces 35% of the world's coal but has 80% of the world's fatal accidents in coal mining.⁶⁶
- China is dependent on coal for 69% of its primary energy demand and is likely to remain at least 60% dependent in 2030, despite plans for diversifying energy supply.⁶⁷
- The percentage share between different fuels has changed relatively little since 1978 in China, with coal making up 69% in 2004 (70% in 1978), oil the same at 22.7%, gas at around 3%. Nuclear is 1.4%. On the other hand, hydro power has doubled from 3.4% to 7%.⁶⁸ The broad balance has remained the same, while growth in demand has rapidly increased.

Between 1994 and 2004 China's energy consumption increased by 70.7% from 811.8 million tonnes oil equivalent (mtoe) to 1386.2 mtoe.⁶⁹ As a share of global energy consumption this represented an increase from just under 10% to 15.1%. In 1994

65 BP, *Statistical Review of World Energy 2005*, p37

66 David Feickert, *Coal Mine Safety in China, Submission to the Hearing of the US Congressional-Executive Commission on China*, December 10 2004

67 China Coal Information Institute, quoted in *The Australian*, December 5 2005 <http://www.theaustralian.news.com.au/0,5942,17459253,00.html>

68 China Internet Information Center, *China Facts and Figures 2005*, <http://www.china.org.cn/english/en-sz2005/jj/jj-gy.htm>

69 BP, *op cit*, p 37

China was already the world's second largest consumer, after the US. Compared with the US, China's consumption was 39.1% of the US figure in 1994 but in 2004 it had become 59.4% of US consumption. China is projected to overtake the US between 2025 and 2030, becoming the world's largest energy consumer and also the largest emitter of carbon dioxide (CO₂), the main greenhouse gas. Some analysts expect this to occur earlier than 2025, with others even saying it has already occurred.⁷⁰ China is already the third largest historical producer of CO₂ since 1900 (Table one) and is adding around 5000 million tonnes per year, or just under the US. Asia as a whole (including the other major contributors, India and Japan) is now very similar to North America: 6,072 million tonnes v. 6,797 million tonnes.⁷¹

Table one: Cumulative CO₂ emissions 1900-2002
Million metric tonnes – top ten countries⁷²

Country	Million metric tonnes
USA	303,033
Russia	86,281
China	80,803
Germany	71,791
UK	54,140
Japan	43,662
France	27,667
India	23,083
Ukraine	23,052
Canada	22,572

China is both the largest coal producer and coal consumer in the world, beating the US into second place in these respects. China's 2004 output was 989.8 mtoe (36.2% of the world total), having increased by 59.7% since 1994.⁷³ Coal consumption in

70 Bill McKibben, "The Great Leap" in *Harper's Magazine* December 2005

71 Energy Information Administration, Table 12 World Carbon Dioxide Emissions by Region, 1990-2030, Chapter 7, Energy-related Carbon Dioxide Emissions, *International Energy Outlook 2006* Department of Energy, US Government, 2006

72 World Resources Institute, *Climate and Atmosphere – CO₂ Emissions: Cumulative CO₂ emissions, 1900-2002* <http://earthtrends.wri.org/text/climate-atmosphere/variable-779.html>

73 BP, *Statistical Review of World Energy 2005*, op cit, p 32. Note. This paper will use both the energy equivalent measure (mtoe) and the physical output figure. For example, physical output is expected to be 2.1 bn tonnes.

2004 was 956.9 mtoe (34.4% of world total), compared with 606.4 mtoe in 1994. Coal makes up 69.0% of China's primary energy consumption.⁷⁴ China's demand for coal (indigenous production and net imports) has been rising fast, in line with increasing energy demand overall but not at the same rate: 57.8% for coal compared to 70.7% overall, over the decade 1994-2004.

China has plentiful reserves of good quality coal, ranking third in the world after the US and Russia.⁷⁵ It has 114.5 bn tonnes or 12.6% of total world reserves.⁷⁶ Of these, 75% are classified as bituminous (high quality coking and thermal coals by energy content), 12% anthracite (highest quality by energy content) and 13% lower quality lignite (low quality 'brown' coal, by energy content).⁷⁷ Coal reserves are widely distributed throughout the country, although 65% of all proven recoverable reserves are in the two northern provinces of Shanxi and Shaanxi (different provinces) and Inner Mongolia. Reserves and mines are fairly widely dispersed throughout other provinces, too, especially in the east. The largest coal production area is Datong in Shanxi province, the leading coal producing and consuming region. Shanxi has consistently produced three times that of the next largest, Henan, Sichuan and Shandong. Steam coal makes up 83% of the reserves total and they are concentrated mainly in the north and north-west of the country. Coal demand is expected to rise still further in China while its share in overall energy consumption falls.⁷⁸ The 11th Five Year plan, running from 2006-2010 aims to take coal production from 2.1 bn tonnes to 2.4 bn tonnes.⁷⁹

74 BP, *Statistical Review of World Energy 2005*, op cit, p 32 and see also US Department of Energy, *China – Country Analysis Brief*, August 2005 <http://www.eia.doe.gov/emeu/cabs/china.html>

75 OECD, *Coal in the Energy Supply of China*, Report of the International Energy Agency (IEA) Coal Industry Advisory Board Asia Committee, 1999

76 BP, *Statistical Review of World Energy 2005*, op cit p30

77 OECD op cit p31

78 China Coal Information Institute, op cit

79 China Daily, *Wen: 2006-10 Plan 'Active and Prudent'*, October 20 2005, http://chinadaily.com.cn/english/doc/2005-10/content_486360.htm

2.2 The role of other fuels in China's energy balance

As noted above, with the exception of hydro power, the balance between different fuels in China has changed little since 1978.

Oil: Oil made up 22.7% of energy consumption in 1978 and the figure for 2004 was exactly the same. China, the world's second largest oil consumer, has 1.4% of global oil reserves.⁸⁰ This compares with 2.5% for the US, the largest consumer. By contrast Saudi Arabia has 22.1%, Iran 11.1% and Iraq 9.7% of world reserves. While Kuwait and the United Arab Emirates both have just over 8% of reserves and Venezuela and Russia have over 6%, it is the reserves to current own production ratio that counts. For the US this is 11 years of supply and for China just under 19 years at current rates of oil production. The US imported 65% of its oil, a figure that will rise further as its own reserves deplete and China imported 48% of its oil needs in 2004. The physical amounts imported still differ considerably: 13.3 million barrels per day (m bbl/d) for the US and 3.19 m bbl/d for China. However, China's oil demand is expected to rise to 14.2 m bbl/d by 2025, with 10.9 m bbl/d imported; China has been the source of around 40% of world oil demand growth, between 2000 and 2004.⁸¹

Over the last decade China's oil and gas industry has been restructured, with state-owned assets vested in two vertically integrated firms: the China National Petroleum Corporation (CNPC) and the China Petrochemical Corporation (Sinopec).⁸² Offshore exploration is handled by China National Offshore Oil Corporation (CNOOC). Minority stakes in CNPC and Sinopec have been sold to BP in the case of the CNPC subsidiary, PetroChina and ExxonMobil, BP and Shell in the case of Sinopec. Shell took a block of shares in CNOOC.⁸³ Several other foreign firms have joined with CNOOC in oil exploration as well, most recently, Devon Energy Corporation of the US in a project in the South China Sea.⁸⁴

80 Source for figures unless otherwise stated, BP op cit, p 4-9, 37

81 US Department of Energy, *Energy Information Administration Country Analysis Brief on China*, p 2 August 2005, <http://www.eia.doe.gov/emeu/cabs/china.html>

82 US Department of Energy, *ibid*, p 2

83 US Department of Energy *ibid* p 3-5

84 Worldwatch Institute, *China, US join in Oil and Gas Development in South China Sea*, December 9 2005 <http://www.worldwatch.org/features/chinawatch/stories/20051209-2>

Oil production is expected to increase steadily but insufficiently to match increased demand. Accordingly, China's strategy has been to invest in projects abroad, with CNPC acquiring oil concessions in a wide range of oil producing countries. Growing dependency on imported oil (more than 50% of which comes from the Middle East) places even greater emphasis on resolving the production and safety problems of the indigenous coal industry, the country's key energy resource. This is especially the case in a period of high oil prices.

Natural gas: China's natural gas consumption more than doubled over the decade 1994-2004 from 16.6 billion cubic metres (bcm) to 39.0 bcm.⁸⁵ Consumption has so far been met from indigenous production but natural gas provided only 2.6% of China's energy needs in 2004 (1.9% in 1994).⁸⁶ China does have sizable gas reserves of 2.23 trillion cubic metres, or 1.2% of world reserves, slightly less than half of US reserves, but only 5% of the reserves of its Russian neighbour, the world's largest holder of gas reserves.

China's gas fields are being developed with the help of foreign investment and consumption is expected to double by 2010.⁸⁷ The largest reserves are in western and north-central China. Shell has been involved in the development of the Changbei natural gas deposit, which will be fed into the 'West-to-East pipeline taking the fuel to areas of high demand in the south-east of the country. Shell's investment is expected to be \$600 million by 2007. BP is a partner in another proposed pipeline project aiming to bring natural gas from Russia's Siberian grid to China and possibly South Korea. BP already owns a 30% stake in Russia Petroleum, the licence holder for the huge Kovykta field in Siberia. Negotiations are currently taking place between the parties over pricing.

Imported liquefied natural gas (LNG) could be an alternative source to meet south-eastern demand. BP has taken a 30% stake in the project to build China's first LNG terminal near Guangdong and a supply contract has been signed with Australia's North

85 BP, *Statistical Review of World Energy 2005*, op cit, p 25

86 China Internet Information Center, op cit

87 US Department of Energy, *Energy Information Administration Country Analysis Brief on China*, op cit p 6

West Shelf terminal. Finally, a second terminal is under construction in Zhangzhou further north, with LNG to be supplied from BP's Tangguh project in Indonesia. The involvement of the oil majors in both oil and gas has considerable significance for the future of China's coal industry. Transnational mining companies are very interested in production possibilities across a range of minerals in China.

Electricity: during the decade 1994-2004 China's electricity industry experienced rapid power station construction and commissioning, with net generation more than doubling.⁸⁸ China is second in the world after the US for both electricity capacity and consumption. However, there was a serious oversupply problem in the late 1990s, as the closure of operations within state-owned industries reduced electricity demand.⁸⁹ A number of smaller thermal power plants were shut and new plant ordering was delayed until January 1 2002. Surging demand once again outstripped supply and electricity shortages led the Government to order many more new plants. Since the second half of 2002, when China overcame the impact of the Asian financial crisis, the economy grew rapidly and along with it energy demand. In 2004, for example, GDP grew by 9.5% but electricity supply increased by 15.3%.⁹⁰ By the end of 2004, China's electricity generating capacity reached 440 gigawatts (GW), second in the world.⁹¹

However, the long lead times for power station construction means that a shortage of generating capacity of around 30 gigawatts (GW) will persist until the 120 GW of ordered plant comes on stream.⁹² The overwhelming bulk of generating capacity remains conventional thermal (mainly coal), more than doubling between 1994-2004, with hydro power increasing slightly more slowly and nuclear tripling, but from a very small base. The Three Gorges hydro-electric project, when complete will include 26 separate 750 MW generators for a total of 18.2 GW, while the Yellow River project will have a total capacity of 15.8 GW.

88 Carbon Sequestration Leadership Forum, *An Energy Summary of China*, December 18 2005, <http://www.cslforum.org/china.htm>

89 US Department of Energy, *Energy Information Administration Country Analysis Brief on China* *ibid*, p 8

90 NDRC News, Speech by Zhang Guobao, Vice Chairman, National Development and Reform Commission to a Press Conference, Beijing, September 13 2005 http://en.ndrc.gov.cn/newsrelease/t20050913_42350.htm

91 *Ibid*

92 *Ibid*

Hydro power makes up nearly 8% of energy production, but, as the Three Gorges project showed it is a huge economic and social project to expand further. It is fraught with social and environmental consequences. The same is true of other forms of renewable energy. Given rapidly increasing energy demand and a lack of the kind of planning consultation regime developed countries worked out over decades, these developments have led to land confiscations. Sometimes this has led to revolts by local people threatened with a loss of land and livelihood, as in Dongzhou in December 2005 over a wind turbine.⁹³ Despite this, the 11th Five Year plan emphasised the further diversification of China's energy supply, with the aim, written into the Renewable Energy Law to increase the proportion of renewable energy in the consumption mix from 7% to 15% in 2020.⁹⁴

China's first nuclear power station became operational in 1991.⁹⁵ By 2005 nuclear contributed only 1.4% of primary energy. However, even with the involvement of Westinghouse and Areva of France, which will help quadruple the number of nuclear power stations in 15 years, the contribution of nuclear will be only 4% in 2020.⁹⁶ However, even with the involvement of Westinghouse of the US and Areva of France (which will quadruple the number of nuclear power stations as at 2005 in 15 years) contribution of nuclear to energy demand will be only 4% in 2020, up from 1.4% in 2005. Moreover, each station will cost \$2 bn.⁹⁶ To go further, the problems of safe operation and waste disposal would magnify greatly. Australia is a likely source of the necessary uranium.⁹⁷

Energy efficiency: While there are conflicting analyses about China's efforts to improve its energy intensity, the past campaigns to do so have had an impact. In an economy growing so quickly, changing its structure and its technology base as well as diversifying into services, it is very difficult to assess the exact effect of

93 The Economist, *Trouble in Chinatown*, 12 December 2005, <http://www.economist.com>

94 NDRC News, Speech by Zhang Guobao, op cit p 4

95 OECD, *China's Worldwide Quest for Energy Security*, Paris 2000 p 29

96 Le Figaro Economie, *Le pari Nucleaire du President Hu Jintao a Shenzhen*, fevrier 28, 2005

97 International Herald Tribue, *Australia's Uranium Attracts China*, September 8 2005

such campaigns.⁹⁸ The ‘virtuous fuel’ is to be tried again: the 11th five year plan sets a target of a 20% improvement in energy efficiency/conservation.⁹⁹ There are ten sub-programmes ranging from upgrading coal-burning industrial boilers, through local cogeneration, use of waste heat, conservation in buildings to improvements in monitoring and optimisation.¹⁰⁰ This is extremely ambitious and few developed countries have achieved it without external shock therapy such as an oil crisis. Japan is the most virtuous, along with some small EU member states and Germany. All are technology rich. However, on 7 December 2005 the State Council adopted an Interim Regulation to speed up industrial restructuring with the elimination of waste and pollution in mind, with coal consuming industries included.¹⁰¹

2.3 The global dimension

On its current economic growth trajectory, China is expected by the authoritative Worldwatch Institute to overtake the US as the biggest world energy consumer sometime after 2025 and also the biggest emitter of carbon dioxide (CO₂), the main Greenhouse gas, although the International Energy Agency is predicting that this could happen in 2007.^{102 103} In terms of individual fossil fuel use China is already at the top of the table. (See Table two) China has been hunting for diversified energy supplies around the world, with its well trained diplomats engaging in discussions globally. This, of course, has been different from the US, Japan or Europe, where economic power, vested in large energy companies has traditionally helped out. However, as has been seen in the case of Shell, the energy reserves of these companies have been dwindling or they have been over-stated.¹⁰⁴

98 Elspeth Thomson (2003), *The Chinese Coal Industry: an Economic History*, RoutledgeCurzon , p 279-283

99 China Daily, *Wen: 2006-10 Plan ‘Active and Prudent’*, October 20 2005, http://www.chinadaily.com.cn/english/doc/2005-10/content_486360.htm

100 Energy Bulletin.net, *China Outlines Ten Programs for Energy Efficiency*, December 16 2005, <http://www.energybulletin.net/3566.html>

101 National Development and Reform Commission, *Major Measures to Promote the Adjustment of Industrial Structure*, December 22 2005., http://en.ndrc.gov.cn/newsrelease/t20051222_54289.htm

102 Worldwatch Institute, *State of the World 2004*

103 Richard McGregor, “China Vows to Release Climate Action Plan”, *Financial Times*, June 1 2007

104 Oliver Morgan, “Shareholders Want to Know Where Shell’s Reserves Went”, *The Guardian*, January 14 2004

Table two: Consumption by fossil fuel and country, 2004

(million tonnes of oil equivalent)

China – coal	956.9
US – oi	937.6
US – gas	582.0
US – coal	564.3
Russia – gas	361.8
China – oil	308.6
Japan – oil	241.5
India – coal	204.8
Russia – oil	128.5
Germany – oil	123.6
Japan – coal	120.8
India – oil	119.3
South Korea – oil	104.8

Source: *BP Statistical Review of World Energy 2005*

Rapidly increasing energy demand from China as well as India and Brazil, the other big developing countries, has led to increased global competition for energy resources. The US, in particular, has been feeling the impact of China's economic power in the energy sector. A powerful campaign was begun against the attempted acquisition of the US oil company Unocal by the Chinese National Overseas Oil Corporation.¹⁰⁵ This was effectively blocked and China withdrew its bid. Robert Zoellick, the deputy Secretary of State, told a September 2005 Washington DC conference on US-China relations that the Chinese must be a "responsible stakeholder" in the global economy and must stop trying to lock up energy resources through overseas investment.¹⁰⁶

This will place even more pressure on the Chinese coal industry, as the main energy choice for China will be to rely mainly on coal, once again making the resolution of that industry's safety problems more urgent. Otherwise it will have to buy much more expensive oil and gas off the world market, while it slowly diversifies its energy economy towards nuclear with some renewables. The effect on the global oil price has already been apparent, with China making up more than 30% of new global oil

105 Business Week, *Play Fair – and Insist that China Do the Same*, July 11 2005

106 Rod Oram, "On the Slow Boat to China", in the *Sunday Star Times*, November 6 2005

demand, something few expected.¹⁰⁷ Unpredicted, except by a few energy analysts was also the lack of supply, which has been critically restricted by the complacency that sets in during periods of low prices, the war in Iraq, the restrictions on foreign investment in the Middle East and the fact that the oil and gas reserve base has been steadily moving eastwards towards the Middle East and the former Soviet Union republics, as Western (mainly US, UK) oil depletes and Mexican oilfields mature.

The coal choice is having a considerable environmental impact as well, with global ramifications in the case of greenhouse CO₂ gas emissions. China is adding to its coal-fired electricity generating capacity every two years an amount equivalent to the total UK generating capacity. Fortunately much of this is using the cleanest coal technology commercially available – the supercritical boiler, which can improve energy efficiency and reduce emissions by 20% or more. Even better clean coal plant is being proven and will be available in the near future.¹⁰⁸ Both the EU and the US have major technology transfer projects with China in this area, including the technology for carbon capture and storage, also known as carbon sequestration – scrubbing CO₂ during combustion or out of coal in pre-generation and pumping the gas into disused oil/gas wells.¹⁰⁹

The Medium and Long Term Energy Development Plan summarises Chinese energy policy:

....on the basis of energy efficiency, give top priority to conservation; on the basis of coal, pursue diversified energy development; on the basis of domestic supply, expand overseas supply; balance urban and rural energy development and conduct layout rationally; rely on science and technology and make institutional innovation; protect the environment and safeguard energy security. The Plan emphasises energy mix restructuring and the acceleration of nuclear power, renewable energy and hydropower.¹¹⁰

107 US Department of Energy, *Energy Information Administration Country Analysis Brief on China*, op cit p 2

108 see International Energy Agency – IEA Coal Research, <http://www.iea-coal.org.uk/>

109 see European Commission, *Joint Statement of the 8th EU-China Summit*, September 5 2005 <http://europa.eu.int>

110 NRDC News, Speech by Zhang Guobao, op cit p 3

In the coal industry the aim is to base coal production on a group of large-scale combines, upgrade some medium and small mines to guarantee safe production, while some small mines with poor safety conditions are closed. The use of clean coal technologies will be increased.

2.4 A closer look at the coal industry – evolution and structure

With abundant reserves, coal has been used in China for a long time but received a boost in the nineteenth century as foreign companies developed it for their own requirements, such as providing fuel for their trading ships.¹¹¹ The Japanese achieved considerable control after the Russian-Japanese war in 1905 and during their occupation of China in the 1930s.¹¹² After the proclamation of the Peoples' Republic of China in 1949, pre-war production was re-established in three years despite the damage wrought during wartime. Thereafter, production was affected by changing policy but was consolidated by the Sixth Five Year Plan (1981-85) wherein increased coal output was seen as one of the main priorities in economic modernisation.¹¹³ Short and long term targets were set for Central Mining Administration (CMA) or large state-owned mines, Local State (LS) or municipal mines and Local Non-State (LNS) or small private mines.

During this period of consolidation it was hoped that considerable foreign funding would be attracted and that coal exports would bring in foreign exchange but the inadequate transport infrastructure, legal and business infrastructure combined with an incomplete price reform and local corruption to deter investors.¹¹⁴ In villages and towns, where the commune system was dismantled peasants and local entrepreneurs started small mine enterprises. In periods of high demand both then and now, corruption was a consequence, leading to often reckless, risk-taking behaviour on the part of local owners and officials who may have been corrupted. The impact on miners' lives and health has been only too painfully evident for all to see in the enormous accident

111 Thomson, *The Chinese Coal Industry: an Economic History*, op cit p 297

112 *ibid*, p 297

113 *ibid*, p 299

114 *Ibid*, p 299-300

rates in the LNS and LS mines. By 2003 the fatal accident rate in small mines was 9.62 per million tonnes (mt), higher than the average for 1996-2000 (9.31) although lower than the peak year of 1980 (16.88). In the municipal mines it was 3.13 per mt in 2003, compared with 1.08 per mt in the CMA mines that year.¹¹⁵

Industrial restructuring, including in the coal industry, was pursued in the 8th (1991-95) and 9th (1996-2000) Five Year Plans. There was a huge shakeout in the state-owned sector, with many miners being made redundant. The industry was ordered to pay off its debts by 2000.¹¹⁶ The ‘iron rice bowl’, wherein the large state-owned firms were responsible for welfare payments, including pensions came to an end but not without considerable protest: unpaid workers joined forces with the unemployed, organising protests.¹¹⁷ The International Confederation of Free Trade Unions (ICFTU), quoting ILO figures claimed that 59 million workers in state controlled companies have lost their jobs since 1995, while only 16 million new jobs have been created in the private formal sector.¹¹⁸ State coal producers, along with other state-owned industries were converted into state corporations in 1998. Some of the CMAs were converted to shareholding limited liability companies, to be listed on the stock exchange; foreign investors were canvassed and more mine-mouth power stations were planned.¹¹⁹

There was an intense period of foreign investor interest in China’s coal industry during the 1980s and into the early 1990s. Between 1978 and 1999 a total of US\$9.34 billion in contracted foreign capital was arranged, of which US\$4.18 billion had been used.¹²⁰ The experience of foreign investors was mixed, with some notable failures. There were problems in technology transfer, especially with more sophisticated machinery. There

115 Tim Wright (2004), *The Political Economy of Coal Mine Disasters in China: “Your Rice Bowl or Your Life”*, in *The China Quarterly* 179, p 629-646, see Table 1: Fatality rates in Chinese coal mines in international context, p 633

116 Thomson, *The Chinese Coal Industry: an Economic History*, op cit p 300

117 Ibid, p 300

118 ICFTU, *Whose Miracle? How China’s Workers are Paying the Price for its Economic Boom*, December 2005 p 8

119 Thomson, *The Chinese Coal Industry: an Economic History*, op cit p 300

120 Thomson, *The Chinese Coal Industry: an Economic History*, op cit p 252

were inadequate numbers of skilled engineers, maintenance fitters or even storage facilities to protect imported underground equipment from the elements. Heavy duty equipment that was copied and manufactured in China did not have similar levels of reliability or maintenance backup.

A great deal of capital value was wasted, but this was not unusual in the transfer of technology from developed to developing countries.¹²¹ It also ignores the fact that in western countries, standard underground machines were developed over a period of years and often had the full involvement of experienced miners and underground fitters engaged as well. In the case of the UK, nearly 50% of the innovations made to the standard shearer loader cutting machine were suggested by face workers or fitters.¹²² One Australian longwall face machine manufacturer, supplying high tech equipment for Chinese machines estimates that it will be five or six years before reliable equipment can be made in China without foreign input.¹²³

The shake-out in the huge coal consuming industries disrupted the demand-supply patterns, with mines being seriously affected and total coal production falling by 27.4% during the period of the 9th Five Year Plan (1996-2000).¹²⁴ Since 2000 output has nearly doubled from 501.8 mtoe to 989.8 mtoe in 2004. The continuing importance of coal in the country's energy economy was accepted anew and its associated environmental problems were recognised as well, by the Government. A Clean Coal Technology Centre had been established in 1994, with national and provincial organisations making links with international programmes operated by other countries and foreign companies. In 2005 the government announced the investment of US\$716 million in a state-owned company to build a state-of-the-art generating plant based on a coal gasification plant, producing hydrogen and with zero carbon dioxide emissions.¹²⁵

121 Thomson, *The Chinese Coal Industry: an Economic History*, op cit p 251

122 Alan Burns, Dave Feickert, Martin Newby, Jonathan Winterton, *An Interim Assessment of Mine Operating System – MINOS Working Environment Research Group*, University of Bradford, WERG Report No. 4 for the National Union of Mineworkers, 1982

123 Catherine Armitage, "China Coal Fever Seeks a Late Cure", *The Australian*, December 5 2005

124 BP, *Statistical Review of World Energy 2005*, op cit p 32

125 People's Daily Online, *China to Build First Zero-Pollution Coal-fired Plant*, <http://english.people.com.cn/200512/24>

2.5 Coal bed methane – from mine safety to mitigation of climate change

China has the third largest coal bed methane reserves in the world, behind Russia and Canada.¹²⁶ A major coal bed methane programme is also under way. This follows the establishment of China United Coal Bed Methane Corporation (CUCBM) in 1996 to commercialise prospecting, development, transport, marketing and utilisation in China in co-operation with foreign companies such as the US firms, Texaco, ARCO and Philips.¹²⁷ Some 46% of the state-owned mines are estimated to have a high methane content, at over 10 cubic metres per tonne, carrying a higher safety risk. Seven out of every ten coal mine explosions in China have been caused by methane, with more than 40% of the deaths being attributed to those explosions.¹²⁸ The methane programme has three objectives: to improve mine safety, to extract methane as a valuable fuel source and also to reduce greenhouse gas emissions, of which methane is a particularly potent source, much more potent than carbon dioxide in its warming effects.

2.6 Price deregulation and the balance of output between CMA, LS and LNS mines¹²⁹

Much of the current debate about coal mine safety has inevitably become concentrated on the effect of privatisation of production and market deregulation, as it is the small private mine sector which demonstrates the worst safety record. This is a debate that takes place wherever there is such a discrepancy by size of mine, level of technology, as well as in safety organisation. The UK is a good example: a study for the National Union of Mineworkers showed that the small, private licensed mines had a fatal accident rate of 1 for every 600 miners between the years 1986/87-1987/88 compared with 1 in 10,000 in the publicly owned British Coal's much larger mines even though both were regulated under the same legislation.¹³⁰

126 Xinhua, *China to Develop Coal Bed Methane to Meet Rising Demand for Natural Gas*, September 13 2006 <http://www.ittc.com.cn/cdm/NewsView.asp?id=4317>

127 OECD, *Coal in the Energy Supply of China – Report of the Coal Industry Advisory Board Asia Committee(CIAB) of the International Energy Agency*, Paris 1999 p 36 – 39

128 OECD CIAB, *ibid* p 36

129 Researchers use variable classification but this thesis uses the following :CMA or large State-Owned Mines (SOEs); LS, or local/township SOEs; LNS, or local/village non SOEs – small private. Also used is TVE – township and small village enterprises, which includes LS and LNS mines.

130 Labour Research Department, *The Hazards of Coal Mining*, LRD 1989, p 19

In China the much higher fatal accident rate in small, private mines has been blamed on the collusion between owners and local officials in their rush to get coal on the market in order to make substantial profits.¹³¹ Yang Fan, an economics professor and party member has been quoted as saying, “The (Beijing) leadership lacks authority. The collusion between local officials and coal mine owners is too strong. Many officials hold shares in the mines.”¹³² The campaign to persuade local officials to give up their shares in LNS mines was stepped up during the last half of 2005, with the government organising inspection teams from four ministries, especially in regions with numerous small private mines, yet where few officials have reported their stock holding.¹³³ By 1 November 2005, 4,578 officials had admitted they had shares in coal mines, with a capital of 653 million yuan (US\$81.6 million). The debate about private ownership, size of mine and corruption will be the focus of chapter five.

Table Three: Output by Mine Type 1978 – 2004 (million tons)¹³⁴

Year	CMA/ SOE	LS	LNS/ TVE	Total
1978	342	181	95	618
1990	480	206	394	1080
2000	536	194	269	999
2004	922	315	719	1956

(Note. CMA – large state-owned mines; LS – local State-owned mines; LNS/TVE – local non-state-owned/township or village enterprises)

What is certainly the case, however, is that the economic reforms set in train in 1978 led to a huge growth in rural enterprises, including in the coal mining industry. These ‘township and village enterprises’ (TVE mines) began to undermine the monopoly position of the state sector and their share of output grew at the expense of state-owned enterprise.¹³⁵ Wright defines two groups of mines within the TVE sector: “collective” enterprises run by local township or village governments, with a trend towards

131 Tim Johnson, “China’s Rise Fraught with Hope, Fear” in *Knight Ridder Newspapers*, December 21 2005 <http://www.myrtlebeachonline.com/mld/myrtlebeachonline/news/world/13458624.ht>.

132 Ibid, p 2

133 Xinhua, Probe Continues on Officials’ Stakes in Coalmines, December 23 2005, <http://www.china.org.cn/english/government/152513.htm>

134 Tim Wright, “Output by Coal Mine Type in China”, unpublished ms 2006

135 Tim Wright (2000), “Competition and Complementarity – Township and Village Mines and the State Sector in China’s Coal Industry”, in *China Information* Vol XIV, No. 1, p 113

privatisation and private enterprises numbering 27,000 mines in the early 1990s.¹³⁶ The numbers of these mines and their output increased dramatically with the 1983 deregulation of restrictions on permission to mine, the rise in the coal price in the late 1980s and the deregulation of coal prices in 1993.¹³⁷ Annual output in these ‘low tech or no tech’ mines was only an average 6,000 tonnes, compared with the mechanised, state-owned mine average of 750,000 tonnes. The share of overall annual output of the small mines grew from around 5% in 1967 to nearly 50% in the mid 1990s.

The markets the small and large mines served were also different in many cases, with small mines supplying local markets, typically, whereas large CMA mines supplied large SOE’s. Later as demand increased, competition developed for coal at the margin. Small mines, as elsewhere mined a shallow depth, taking smaller reserves that large mines could not mine with mechanised methods. In some cases, where this was in seams near CMA mines, CMA mine managers had an interest in them and miners a second job.¹³⁸ If there was a degree of complementarity between large and small mines rather than competition, there was also a flexibility factor in small mine output, as it rose to meet demand, even in the electricity industry as transportation infrastructure was improved.

As Wright has argued, real competition emerged over access to resources, where a small mine operated within the ‘colliery take’ of a larger mine. This encroachment had safety implications as well:

*In the years up to 1998, small mine encroachment caused 639 floods, and 57 explosions in large mines, leading to RMB2.5 billion losses.*¹³⁹

Competition for resources extended to equipment, too, with the actual theft of materials, electricity supply and the illegal use of ventilation systems of the large CMA mines by breaking through into their tunnels. Where this was resisted by legal means small mine owners encouraged the miners they employed to demonstrate, sometimes violently.

136 Ibid p 114

137 Ibid p 115

138 Ibid p 117

139 Ibid p 119

CMA mine operators used legal means to secure extreme measures, in one case getting 103 small mines blown up.¹⁴⁰ Perhaps the real competition between the LNS and LS mines on the one side and the large CMA mines flowed from the simple fact that the small mines had much lower social and environmental costs (leaving them for wider society to pay, if at all) than the large state-owned mines which were responsible for social welfare (such as ‘social wage’ payments).¹⁴¹ The small mine costs were almost all externalised: they had no welfare responsibilities, higher levels of pollution, evaded taxes, wasted resources and most importantly for this study had lower levels of safety.

Zhu Zhigang, Vice-Minister of the Finance Ministry recently proposed a market pricing solution to some of these questions.¹⁴² The reform of resource pricing, seen as a long term process, needed to recognise the costs incurred by mining enterprises, such as environmental devastation, the cost of restoring land and the health and safety costs, paid for by wider society. The Vice-Minister quoted a figure of RMB50 per tonne as being the estimate by some economists of the resource or rent cost plus the additional externalised costs. With regard to safety, the Vice-Minister developed his argument:

Thanks to making use of resources at a low price or even free of charge and the incomplete calculation of mining enterprises’ costs, the cost of mining market access is so low that various entities have swarmed into the mining market, resulting in disorder in the market, furthermore, due to the chaotic competition, mining enterprises have ignored inputs in safety, which means serious hidden danger in production safety.¹⁴³

The Vice-Minister went on to quote the coal mine accident figures for 2005.

140 Ibid p 119-120

141 Ibid p 120

142 Zhu Zhigang, *China Poised for Pricing Mineral Resources by Market*, China Economic Net, November 21 2005 http://en.ce.cn/Insight/200511/21/t20051121_5269240.shtml

143 Ibid p 2

2.7 Gradual price deregulation

The ‘big bang’ approach to economic reform was not used in China, unlike in the former Soviet bloc countries.¹⁴⁴ ‘Perestroika’ or restructuring also preceded ‘glasnost’, or openness. For the Chinese leadership, the two experiences they learned most from in that part of the world were the Solidarnosc explosion in Poland and the chaos following the introduction of ‘wild capitalism’ and economic shock therapy. Price reform in the coal industry went through several stages, with caution. Under the planned economy coal was substantially under-priced, leading to serious inefficiencies and to large deficits in the CMA coal mines.¹⁴⁵ A dual pricing system developed out of the 1970s, with an increasing proportion of coal – from the expanding small mine sector – being sold at market prices. In the early 1980s some large CMA and LS mines were allowed to sell the coal they produced beyond their target output at market prices.¹⁴⁶

Small mine production continued to expand to nearly 50% of output by the mid 1990s, selling into local markets, often at less regulated prices. A large proportion of coal – mainly produced by the large CMA mines – continued to be sold at fixed prices until the deregulation of prices in 1993-94. Low prices persisted, however, because of excess supply, creating continuing problems for the large CMA mines. Their losses rose from 300 million yuan in 1985 to 5.9 billion in 1992, exacerbated by non-payment for coal supplies by the large using industries.¹⁴⁷ In their turn, large using industries were badly affected where they had to pay, increasingly, market prices for coal, while their own prices were fixed. There was a disjunction between interdependent producing and consuming sectors in the timing of price reform.

From the safety point of view there were, therefore, two threats. First, the large CMA mines experienced constrained income, cash flow and consequently downward pressure on their investment plans, which in large mines always have a safety-related aspect. However, the biggest threat from the new system was the short-term attitude

144 Tim Wright (2000), “The Political Economy of Prices in China’s Planned and Market Economies: Competition and Control in the Coal Industry”, in *Asian Studies Review*, Volume 24 Number, p 371

145 Ibid p 349

146 Ibid p 356

147 Ibid p 358

it engendered in the small mines, where the accident rate was highest. With market prices more than three times as high as the state purchasing price this tended to encourage illegality and corruption between local officials and private small mine owners and generally a 'get rich quick' attitude.

The local authority officials are responsible for the regulatory system on access to reserves, mine size and plans and safety. Wealthy local entrepreneurs either began bribing officials directly or incorporated local officials into their ownership structures. The 'get rich quick' mentality that developed meant that the incentive to maximise output in the short-term at the expense of safety procedures and continuing investment over the medium and longer terms was considerable. The best and easiest coal to get at, using primitive manual methods, is taken, with the rest being left underground. The working conditions of poor, rural migrant labourers in these mines was of secondary or no interest to many of these small mine owners. Safety requires consistent investment and in mining, more than elsewhere, it must be worked at assiduously. As the experience in other mining industries shows, those mines with higher capital investment in modern technology tend to be the safest. 'Rape and pillage' of coal seams, as the practice is known colloquially in the UK mining industry, might bring cash rewards in the short-term but it does not provide a secure foundation for the longer term in an essential energy industry.

Dual pricing became targeted as a cause of corruption. That led to the abandonment of the system and the price deregulation of 1994. From July that year, most of the CMA coal mines sold their output at market prices.¹⁴⁸ With the shake-out in the state-owned industries during the late 1990s, there was a glut of coal. With falling prices and small mines producing at up to 50 yuan a tonne cheaper than CMA mines, many of the latter cut their prices or their output.¹⁴⁹ With a loss of government subsidies at the same time, some large mines were pushed into a serious loss-making position. Control over the large mines was also devolved to the provincial level in 1998 creating more pressure on them. They felt abandoned.

148 Ibid p 363

149 Ibid p 364

In response to these market changes, a debate broke out about the formation of large coal mine groups or conglomerates. The stated intention of the 11th Five Year Plan is now to have around six large coal companies, by 2010, producing at least 100 million tonnes annually. These could take over some of the smaller mines, introducing better technology and reducing accident rates, according to Wu Yin, director-general of the energy Bureau of the National Development Reform Commission, China's top economic planning body.¹⁵⁰ This would still be a challenging task, where demand is outstripping coal supply. In 2002 smaller mines produced 45% of coal output, dropping to 27% in 2003 but surging up rapidly to 38% in 2004 to meet demand. This prompted the re-opening of old and less safe mines.

In the meantime, the largest state coal group in China, Shenhua Energy received an injection of US\$1 billion from China International Capital Group, Citigroup Inc and Morgan Stanley while the second biggest producer, China National Coal Group Corp, delayed its decision to float shares in Hong Kong to 2006.¹⁵¹ Shenhua hopes to strengthen its leading position still further, increasing output as the campaign to close unsafe small mines proceeds. With 85% of its coal sales arranged via long term contracts it has a secure base to build up towards its stated intention of producing 200 million tonnes per year (101.3 mt in 2004) and simultaneously becoming a "clean coal transformation base".¹⁵²

Tough bargaining took place with the using industries, particularly the steel and electricity sectors. Some of them were now in a position to switch suppliers. During the three years to mid 2005 coal prices doubled as domestic demand soared and world coal prices rose.¹⁵³ With 100 million tonnes of new capacity expected to come on stream in 2005 and demand being moderated by the government's macroeconomic

150 Loretta Ng and Wing-Gar Cheng, "Beijing to Consolidate Coal Mining Industry", *International Herald Tribune* November 2 2005

151 Lucy Hornby and Rose Yu, "Chinese Coal Giant Delays HK IPO to 2006", *Reuters* 2 November 2005

152 Xinhua, *China's Top Coal Producer Plans to Lift Coal Price*, November 19 2005, <http://groups.yahoo.com/group/MineRescue/message/2710>

153 Jane Yu, "Asian Business News, China's Coal Prices Fall as Supply and Output Capacity Improve", *The Wall Street Journal Online* August 25 2005, <http://online.wsj.com/article/0,,SB112491315863922149,00.html>

policies supply and demand are expected to be in balance. Yet, this has not resolved the current problems for major using industries such as electricity, or at least, private independent producers within it. The electricity industry does not have market-related pricing and cannot pass on full price increases. While the large state-owned electricity generators are helped out by the government, which brokers deals with the CMA mines to give a lower than market price deal on coal, small independent power producers have to pay the liberalised coal price.¹⁵⁴ However, they are not able to pass on the full costs of exploding coal prices. The profitability of coal producers soared with increasing demand and higher prices: in the state sector 32 of the major producers reported profits of 27.7 billion yuan (US\$3.4 billion) in 2004.¹⁵⁵

2.8 Conclusion

China's energy trends and their importance for the world are demonstrably clearer today than they were even 10 years ago. Explosive growth in GDP and the size of the Chinese economy on the world stage have produced a "Chinese energy and environment effect". Energy and the environment require a strategic view be taken at the national and international levels and doubt is emerging after some years of liberalisation and privatisation in the energy industries of the developed countries, just to what extent the market can play a central role. This is as true for China as elsewhere.

As a result of the cumulative changes in recent years, market pricing has created for China the same dilemmas faced by many other coal producing countries in their home markets: how far to regulate prices and output, in response to fluctuating demand.¹⁵⁶ Where this fails, uncertainty is promoted and in a high risk industry with long time horizons, poor decisions on investment in machinery and in training for skills can have real safety consequences. On the other side there is a question, as there is in other countries, of to what extent there can be an internalisation of external costs, such as Vice-Minister Zhu Zhigang has proposed, how this impacts on safety in

154 Peter Goodman, "Coal Prices Sour China deals", *The Dominion Post*, May 6 2005

155 Loretta Ng and Wing-Gar Cheng op cit

156 Wright, *The Political Economy of Prices in China's Planned and Market Economies: Competition and Control in the Coal Industry*, op cit p 371

particular and on the supply of coal in a situation of increasing energy demand, where the alternative energy sources are constrained. The challenge for energy economists, mining engineers, miners and their union, as well as the country's politicians is more acute and urgent in China than anywhere else.

Chapter 3

Accident statistics

3.1 Global comparisons

The key statistic which places Chinese mine accidents in the global context is: China produces 35% of global coal output but contributes 80% of global fatal accidents.¹⁵⁷ Official statistics indicate that, since the establishment of the People's Republic of China (PRC) in 1949, more than 250,000 Chinese coal miners have died in mining accidents.¹⁵⁸ This compares with the figure for the UK of over 100,000 miners killed since records were first kept in 1850.¹⁵⁹ In terms of fatal accident rates, the UK had a higher rate than China does today, up until the end of the First World War.¹⁶⁰

However, it helps to make a more distinct comparison. Comparing severe accidents in OECD and non-OECD countries one recent study showed how dramatic the differences between these two groups of countries are when China's figures are included. Focussing on those severe accidents which resulted in at least 5 fatalities, the study showed that the Chinese coal industry's fatalities of around 6,000 per year (one third due to severe accidents) produced a fatality rate 10 times higher than other non-OECD countries but 40 times higher than the OECD countries.¹⁶¹

157 People's Daily Online, *China's Mining Accidents Kill 5,286 People in 11 months*, http://English.people.com.cn/200412/15eng20021215_167353.html – figures taken from the State Administration of Work Safety

158 JianJun Tu, "Safety: Achille's Heel of China's Coal Mining Industry", May 2007, unpublished ms submitted to the US Journal, *China Security*, p 1, quoting Editorial Board of the China Coal Industry Yearbook (EBCCIY), *Zhongguo Meitan Gongye Nianjian (China Coal Industry Yearbook)*, various years, Beijing, Coal Industry Press

159 Dave Feickert, *Worker Protection and Economic and Social Sustainability in Coal Mining*, paper to The 3rd China International Forum on Work Safety, Beijing Sept. 19-22 2006, p 2

160 Ibid, p 2

161 Peter Burgherr and Stefan Hirschberg, *Severe Accidents in Fossil Energy Chains: Individual Chain Results and Aggregated Evaluations*, Paul Scherrer Institut, Villigen, Switzerland 2005 p 5 www.gabe.web.psi.ch/pdfs/pasm7/0750.pdf

A comparison with the United States coal industry, the world's second largest producer and nearest comparator by size with just over 1 billion tonnes per year in 2005 (1.13bn tons), China with its 2 billion tonne (2.15 bn tons) output has more than 100 times the fatalities per tonne, averaged over the past four years (27 versus around 3,000 fatalities per 1 bn tonnes). The Australian and New Zealand coal mining industries, although not exactly comparable in scale or type of mining, have accident rates per million hours worked which are around half of the US rate.^{162 163} The New Zealand state corporation, Solid Energy has now set itself a target of a zero accident rate in its underground mines.¹⁶⁴

162 Mine Health and Safety Inspectorate, *South Africa, Annual Report 2002/2003, Appendix B Comparative Data of Mining – SA, USA, Australia* <http://72.14.235.104/search?q=cache:EauAOzs86GEJ:www.dme.gov.za/publications/>

163 Solid Energy, *Annual Report, Operations and health and safety, 2006*

164 Ibid

3.2 Overall accident rates

From 2000, the number of officially reported fatal accidents have fluctuated between 5,670 in 2001 to 6,995 in 2002, with the number of accidents resulting in fatalities fluctuating more widely between 2,863 in 2000 and 4,344 in 2002 (Table 1). The provisional figure of 4,746 for fatalities in 2006 is the lowest for the period between 2000 – 2006.¹⁶⁵

Table 1: Coal mine accidents and deaths in China

Year	Total number of coal mine accidents	Total number of deaths
2000	2,863	5,798
2001	3,082	5,670
2002	4,344	6,995
2003	4,143	6,434
2004	3,639	6,027
2005	3,341	5,986

Source: State Administration of Work Safety^{166, 167}

However, this information of itself provides a limited picture, as coal output has been increasing rapidly in recent years. Total output increased from 998 m tons in 2000 to 1956 m tons in 2005. Of this amount the share of large SOE mines rose from 536 m tons in 2000 to 922 m tons in 2005. Local SOE (township) mine output increased from 194 m tons to 315 m tons and small village/private mine output from 269 to 719 m tons over the same period.¹⁶⁸ The two most significant changes have been in large SOE mine output and in small village/private output. These two groups represent the safest and the least safe mines, respectively.

As there are no statistics for the number of hours worked in the industry it is not possible to analyse the accident rates, using the most objective measure (effectively

165 Mining Journal Online, *China Finds 46 Safety Chiefs Derelict of Duty*, May 24 2007, http://www.mining-journal.com/Breaking_News.aspx?breaking_newsarticle_id=2626

166 Reproduced from China Labour Bulletin News Flash No. 60 (2006-01-06)

167 Minister Li Yizhong announced on December 21 2006 that the deaths in coal mines had fallen to around 4,800 in 2006. This represents a substantial fall, possibly accounted for by the closure of many small mines, but whether the authorities will be able to keep them closed, only time will tell. See for example: Li Fangchao, *Many Mines Flouting Crackdown*, China Daily February 16 2007 http://www.chinadaily.com/cn/china/2007-02/16/content_810679.htm

168 This data has been collected by Professor Tim Wright, Chairman of East Asian Studies Department, University of Sheffield UK.

exposure to work). However, the reducing trend of fatal accidents can be seen in the crude measure of number of fatalities per million tons of output. This has fallen from 5.8 fatalities per million tons in 2000 to 3.06 per million tons in 2005. Undoubtedly it reflects the much lower accident rates in the large SOE mines, although the improvement in the rates per million tons would have been partly cancelled out by the much larger fatal accident rates of the small private mines. The differences between these two groups are huge: for the large SOE mines the fatal accident rate was 1.19 per million tons, between 1992-2001, compared with 9.13 per million tons in small mines during the same period.¹⁶⁹ For all mines it was 4.99.

When measured against increasing coal output the number of coal mines accidents causing 10-29 deaths shows a reducing trend, although there was a substantial reversal of this trend in 2005 (Table 2).

Table 2: Breakdown of China's major coal mine accidents and deaths per accident

Year	Number of coal mine accidents causing 10-29 deaths	Number of deaths in coal mine accidents causing 10- 29 deaths	Number of coal mine accidents causing more than 30 deaths	Number of deaths in coal mine accidents causing more than 30 deaths
2001	49	1015	8	373
2002	47	750	9	417
2003	44	701	7	360
2004	34	492	7	487
2005	58	1739	11	961

Source: State Administration of Work Safety

An analysis of the list of very serious accidents (10 or more fatalities) for 2002, compiled by the United States Mines Rescue Service, reveals the following breakdown: private mines with permits (3); private mines without a permit (9); township mines, sometimes with a linked private mine (16); township/private mines linked without a permit (3); SOE mines (14); non-permitted activities such as sub-contracting in SOE mines (2) – see Appendix One. The large number of individual and small number fatalities in small private mines is not picked up by this analysis or the larger scale accidents.

¹⁶⁹ Tim Wright (2004), *The Political Economy of Coal Mine Disasters in China: "Your Rice Bowl or Your Life"*, in *The China Quarterly* 179, p 629-646 See table 1 page 631

An analysis by Creedy of the fatalities by causal category for 2001, shows that the percentages identified by Wright for 1994-1999 have continued (Table 3)^{170, 171}. (Explosions: 42.9% v. 48.8%; roof falls: 33.1% vs 29.1%; flooding: 7.6%; coal transport: 8.7% v. 6.8%)

Table 3: Fatalities from coal mine accidents in China in 2001

Category	Total	KSOCM	Small mine owned by KSOCM	SOCM	TVCM	Coal mines under construction
Gas explosions	2436	165	80	375	1801	15
Falls of ground	1879	287	36	392	1149	15
Flooding	432	25	19	56	318	14
Transport	495	159	5	103	217	11
Mechanical and Electrical	99	36	0	25	37	1
Blasting	70	17	1	14	36	0
Fire	84	8	54	4	17	10
Others	175	52		38	70	27
Total fatalities	5670	749	200	1007	3645	69
Fatalities/Mt	4.9	1.2	-	4.6	11.8	NA

(Note. KSOCM – large state-owned mines; SOCM – local state-owned mines; TVCM – local township and village non-state-owned mines)

Taking the single largest category – explosions – it is difficult to analyse this further without access to the records of disasters. However, it is understood that these have been kept since 1949. Anecdotal evidence indicates that blasting, electrical faults and illegal smoking underground are common causes of gas explosions. In addition, there are serious gas source/accumulation problems rising from ventilation and gas drainage failures, gas flow through stopped off areas, sudden emissions from the mine floor and outbursts.¹⁷² Experience in the UK and other developed countries shows why accurate information is essential, especially as causes of explosions vary over time with the change in production technology and as old problems are solved and new ones arise (see Chart 1 for the UK analysis 1860s-1970s).

170 Personal communication from David Creedy, Wardell Armstrong Consultants, Beijing, August 17 2006

171 Wright, *The Political Economy of Coal Mine Disasters in China: Your Rice Bowl or Your Life*, op cit, table 3 page 634

172 Personal communication from David Creedy, Wardell Armstrong Consultants

The State Administration of Work Safety provided the author with a short set of case studies of recent gas and coal dust explosions, as recorded through its accident reporting and investigation system.¹⁷³ This kind of data has been collected since 1949, but it does not appear to have been analysed for trends. This, together with the establishment of an accurate accident reporting system would be very valuable in providing useful trend analysis for company and regional level action. The summary details of four cases are:

Caijiagou Mine: In May 2004, 33 miners were killed at this small private village mine, employing 92 miners on two shifts, established 1987 but operating with overdue licences after 2003. Originally it was designed for 20,000 tons annual output, increased to 60,000 but actually producing at 300 tons per day (approximately 90,000 tons/yr). The accident was a coal dust explosion (it was known that the coal dust explosion index was very risky), killing 33 and causing an indirect economic loss of RMB 2.933 million. The immediate cause was a heavy build up of dust from underground transport and miners carrying out high temperature working (unspecified). There was no effective monitoring or control action by the local government supervisory authority. The report recommended administrative fines, demotions of 27 officials with shared responsibility and the closure of the mine.

Xinjian Mine: In December 2001 20 miners were killed and 28 injured in this gassy state owned mine, with an annual output of 600,000 tons per year. The direct economic loss was RMB 1.843 million. The report noted that the measures needed to prevent gas outbursts were not taken, ventilation was ‘in disorder’ and miners in adjacent areas were not withdrawn to the safe area.

Gangzi village mine: In July 2001 92 miners were killed in a combined gas and coal dust explosion in this village mine with an annual capacity of 40,000 tons per year. A permit had not been obtained and the ventilation system was badly designed, with many dead end roadways. The ignition source of the explosion was from blasting.

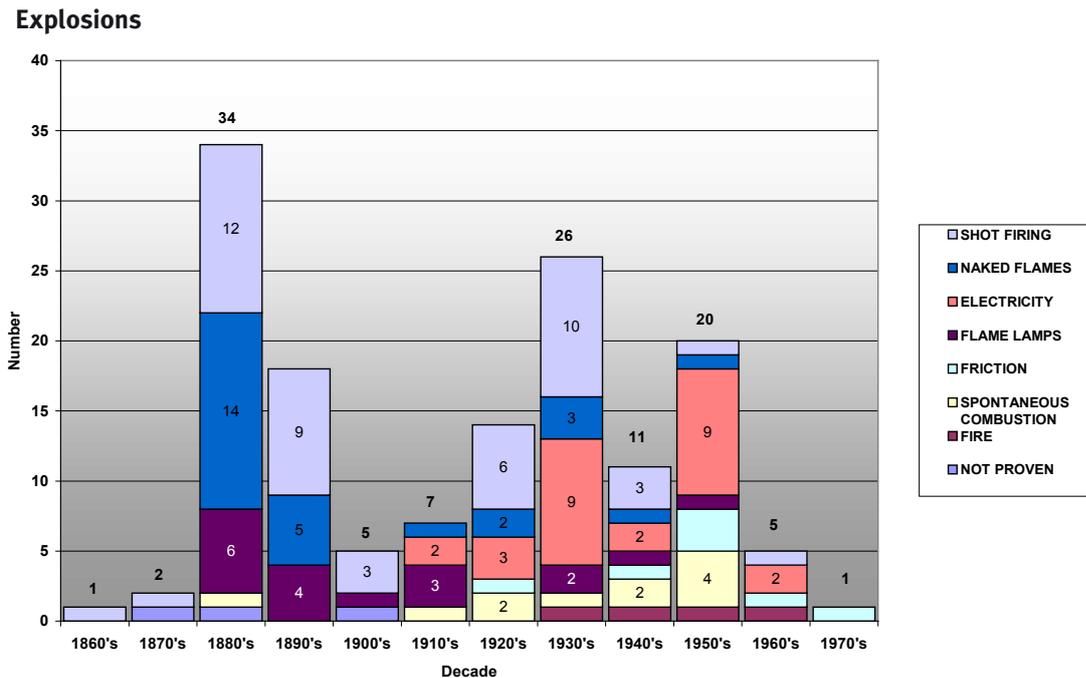
173 State Administration of Work Safety, *Case Studies – Accident Investigation Reports, 2001-2006*, emailed to the author.

Chengjiashan Mine: In April 2001 there was a gas explosion in this state owned mine, producing 1.5 million tons per year. The explosion killed 38 miners and injured 16. The direct economic loss was RMB 1.36 million. The ventilation system was in poor condition and the explosion took place near to a conveyor, with a likely ignition source being electrical sparking.

The report summarised the causes of these and other gas and coal dust explosions as being attributable to:

- Illegal mining,
- Township and village mine management in disorder;
- Working coal face design rules not followed, especially regarding ventilation; no gas monitoring systems installed;
- Mines working more faces than permitted, sending more men underground than permitted, some of whom are not registered as being underground;
- Local government supervision not in effect.

As China is going through a speeded-up industrial revolution in its coal industry several different problems, which were dealt with step by step in the UK and elsewhere, are occurring simultaneously. As can be seen in the UK chart, blasting (shot firing in the UK) and naked flames were predominant ignition sources early on in the UK, whereas electrical sparking came later when electricity was introduced from the 1910's and later still frictional ignition, as a result of mechanised cutting at high speed. The appearance of different factors over time, as new technologies are introduced, which both cause explosions and also help to control or prevent them, explains why an expected bell type curve in Chart 1 is actually skewed. By the 1970's the problem of explosions was largely solved in the UK's deep mines, but only through the systematic vigilance flowing from good safety organisation embedded in a strong safety culture.

Chart 1: UK fatal coal mine explosions by cause – 1860s – 1970s¹⁷⁴

3.3 Short case studies of some severe accidents in recent years

The USMRA has collected press reports of serious accidents for some years. Appendix Two includes some representative cases over the 2005/06 year.

3.4 Summary of major factors behind the high accident rates in China's mines

The following list is the author's own and is not in any ranked order at this stage. There is a variable mix of these factors in each accident but an attempt to rank these factors will be made in Chapter seven when discussing alternative safety and health approaches.

Risk Assessment: Overall there is an inadequate system of risk assessment in place at any level, although some state owned mining groups, such as Shenhua are implementing some of the basic elements of such an approach – with good effect. However, risk assessment requires quite a sophisticated safety culture and organisation to carry it through and has only relatively recently been introduced in developed country law. At one large mine visited by the author this system was clearly

174 Peter McNestry, *UK Coal Mine Fatal Explosions by Cause 1866-1975*, evidence presented to the Roundtable on Coal Mine Safety in China held by the Congressional-Executive Commission on China, Washington, 10 December 2004, <http://www.cecc.gov/pages/roundtables/121004/McNestry.php>

in practice. Operated by the Xinwen Company, China's tenth SOE producer by size, it was sunk in 1993. It was equipped with computer-based control for underground coal transport and monitoring of the mine environment, with key parts of the transport of men and materials systems on camera, in the surface control rooms. Since start-up in 1996 the mine had experienced no fatal accidents, very few major injuries and had a comprehensive health monitoring system, with annual lung function check-ups. The surface and underground layouts were among the best seen by the author in any country visited. For other SOE mines and certainly township and small village mines, the picture is sharply different.

Regulatory environment: China's safety regulations are quite good (especially those adopted in the 1990s covering technology and management)¹⁷⁵ but the enforcement of them via inspection is poor, especially at local authority level and in particular with regard to smaller private and township mines. National political leadership from the President down and via SAWS cannot be criticised. There is a clear determination to improve the situation substantially, with clear targets set, with a reduction in accident rates stipulated. Some improvements could be made to the legislation but it is the area of inspection and enforcement which needs strengthening. Penalties (fines, dismissal, disciplinary action, mine closures), on the other hand, are quite severe but they are not likely to solve the problems by themselves.

Lack of investment: characterises small mines in particular, less so the large mines, where investment levels are increasing. Uneven development results from the already differentiated nature of the industry and the lack of funds, especially in the small mine sector. However, investment in engineering solutions are a necessary yet not sufficient condition for success.

Inadequate training and other manpower aspects: at all levels means that the people with the right skills are not always available, or not attracted to work in the industry, once they have been through university, as the image of the industry is poor. SAWS and other agencies are involved in extensive training but it remains insufficient and,

175 See Tim Wright, *The Political Economy of Coal Mine Disasters in China: Your Rice Bowl or Your Life*, op cit p 635, for a list of the laws adopted between 1994 – 2001. On ventilation, for example, proper ventilation systems are specified in order to reduce the danger of gas explosions.

so far, foreign expertise in training is being applied only to a limited degree. Migrant workers, who form around half of the workforce, are trained in large SOE mines but often not at all in small mines. In the Xinwen mine visited the migrant workers work on a one year renewable contract for 8 years. These migrant workers are then free to return to their villages or to work elsewhere in the booming province of Shangdong (south east to the coast from Beijing). The company would like to extend this state/provincial rule to a longer period, as these miners become skilled in their highly mechanised operations. The occupational health problems seem to be dealt with in SOE mines by setting a 15 year optimal/maximal period of underground working life exposure, at least in the Xinwen company.

Insufficient use of the partnership approach – the key safety triangle: means that the maximum organisation of knowledge and skills among the whole workforce is not being used, especially among experienced miners. This partnership must be constructed as a triangle between the manager (usually deputy manager), who is responsible under the law, the government inspector and the worker safety representative. Each must be supported by strong organisations – company, government and trade union. There has been insufficient involvement of worker safety representatives in state-owned mines where they do exist and in township and village mines were, until recently they have not existed (although they are now being appointed to township and some village mines). The overall union role needs to be strengthened.

Without the safety triangle operating effectively, there is a temptation for mining engineers among the large mine management at mine and area level to define problems as engineering ones and fail to see the solutions as organisational as well as technical, thereby helping to create a strong safety culture. At the best mines, like the Xinwen one visited, the rather narrow engineering safety culture is so strong alongside high investment in mechanisation that the safety performance compares well with developed countries, but this is not replicated across the SOE sector, let alone the medium sized and smaller mine sector. For example, the balance at Xinwen between technically qualified ‘engineers’ and production employees (miners) is 500

to 2,000, much higher than many other mines could aspire to. As developed country mining industries have and are concluding, for a sound system of risk management to work there must be a bottom-up approach, not merely a top-down one.¹⁷⁶ Ideally, everyone in a mine needs to be trained to the degree needed for daily engagement in risk assessment. This, of course, is a huge task for a workforce of the size and diversity as China's miners.

The impact of marketisation in the state sector, too, is likely to change the emphasis on the balance between factors in company and mine cost structures, with less expenditure on social and labour-related costs. As has been seen with marketisation – both liberalisation and privatisation – in Western coal industries, new pressures have been created for safety performance. The management at the Xinwen mine expressed some doubt about the capacity of their operations to continue with relatively high labour costs (40-60%) while at the same time continuing a high capital investment strategy, especially if the present high coal prices were to fall. The new mines being constructed by the company will have much lower manpower levels. They are designed around an international standard 500 employee/3 million tonne annual production model from one or two coal faces.

Pressure for production: as a result of high energy demand and high prices, often safety is sacrificed for production and profit. The incentive of fluctuating and high coal prices to over-produce in small mines is great. The large SOE mines are caught in a dilemma – whether to invest in production expansion, under central government pressure, if, coal demand and prices fall, they would be left with surplus capacity and manpower. Their present cost structure is: total costs make up \$40 per tonne, against a selling price of \$55 per tonne, with this price only partly determined by the international price, as China is not exporting much coal (this is discouraged by central government) nor importing much.

176 See for example most recently, the report of the Mine Safety Technical and Training Commission of the US National Mining Association, *Improving Mine Safety Technology and Training: Establishing US Global Leadership*, December 2006, ed L Grayson. This commission was set up in the aftermath of the Sago Mine disaster in January 2006. This disaster severely shook the US mine safety establishment.

Worker compensation: the former 'iron rice bowl' system is finished and the new arrangements are still under construction. The question of which route to take (public, public/private or private) and how to operate it is as yet undecided, with a very uneven situation operating in practice. Consequently there are great differences in approach between employers, with injured miners and their families left with considerable uncertainties. Effective worker compensation and rehabilitation systems, such as the New Zealand Accident Compensation Corporation scheme, have a powerful function in accident prevention through cost pressure (raising money via levies, fees on employers etc; offering advice to employers, setting up worker safety training and training of worker safety representatives).

3.5 Conclusion

Serious as the situation in China's coal industry is, its officials are committed to solving the underlying problems as effectively as possible. The definition of these problems is crucial, as well as the extent to which technology, technique and safety culture experience from overseas can be incorporated into the national effort. There needs to be an improved partnership approach in implementing the safety strategy: simply, all of the actors are needed to co-operate together in building a strong safety culture and organisation.

The interplay between the consequences of economic transition, speed of growth and increased industrialisation of the coal industry is undoubtedly important and possibly even more important is the persistence of a model of safety regulation which is largely administrative and inherited from the days of central planning. As the complexity of coal mining technology increases along with the scale of mining, such methods alone are inadequate to the task. The response needs to be co-operative and participative with the responsibility of the different players within the core safety triangle of manager, worker inspector and government inspector clearly identified and encouraged. The possibilities for developing this model in China today will be examined in Chapter seven.

Chapter 4

Current Chinese government policy on mine safety and compensation

4.1 Government policy

Officials from the President of China down admit that the frequency of mine accidents is too high and must be reduced. Wang Xianzheng, director of the State Administration of Work Safety acknowledged that China lags far behind the developed countries in mine safety.¹⁷⁷

However, in line with experience in other countries following major mine disasters or rising accidents the Chinese authorities have enacted new legislative measures in response. On 19 June 2006, Li Yizhong, Minister of the State Administration of Work Safety (SAWS), said that lax laws, rules and regulations and inefficient enforcement had contributed to the grim work safety situation that had plagued the country for years.¹⁷⁸

Li Yizhong went on to say, “Compared with punishment in other countries, there is plenty of room for our legislature to revise Criminal Law and other laws.” China’s law, he noted, stipulates that work safety criminals can be given only a seven year maximum prison sentence and companies can be fined only a maximum of 200,000 yuan (US\$ 25,000). By comparison, the Minister in charge of work safety observed that in the US executives could face life-time imprisonment and in Australia executives could be barred from the mining business. Higher fines also applied elsewhere. He concluded that , “In a maturing market economy, the legislature and the government should set up a strict but fair legal framework for companies and require them to protect labour rights.”¹⁷⁹

177 China Labour Bulletin, *Safety Standards in Chinese Mines – What are the International Standards?*, 2004, www.china-labour.org.hk/iso/article_pv.adp?article_id+6114

178 Fu Jing, *Improvement Promised on Work Safety*, China Daily, June 19 2006, p2

179 Ibid, p 2

The Minister also addressed another dimension of the safety problem in a keynote address to the 3rd China International Forum on Work Safety, held in Beijing on 19-21 September 2006. He emphasised the prevailing political emphasis of the Chinese political leadership on the need to create a harmonious society:

*“Safe development is an essential condition of a harmonious society and an important aspect for exertion of efforts. The fundamental characteristics of a harmonious society, such as democracy and rule by law, equality and justice, honesty and fraternity, vitality, stability and order; and man in harmony with nature, etc. are all closely related to safe development and should be reflected in work safety.”*¹⁸⁰

He also placed the overall state of work safety in an historical context, comparing China with developed countries and the routes they have travelled:

“Analysis of the process of work safety development in other countries also indicates that in addition to the restraints of the above-mentioned factors, the intensity of government regulation and the development of safety culture have a most important bearing on work safety. ‘Proneness to accident’ does not necessarily mean frequent occurrence of accidents. In fact, different countries experienced the ‘accident-prone period’ for a different duration in different phases of economic development. The United Kingdom and the United States each experienced that period for 70 years (1880-1950) and 60 years (1900-1960) respectively when their GDP per capita reached \$1,000 to \$3,000; and Japan experienced that period for 26 years (1948-1974) when its GDP per capita reached \$1,000 to \$6,000. Comparing with developed countries, China enjoys obvious advantages of learning the experiences and lessons from developed countries to allow full play to modern technologies and management and realize leap-forward development. We believe that we can shorten the ‘accident-prone period’ generally experienced by developed countries so long as we dare to face reality and meet the challenges with correct ideas and solid work, and realize fundamental improvement of work safety in China in over a decade.”

180 Li Yizhong, *Practice Scientific Concept of Safe Development to Promote Social Stability and Harmony*, Opening address and keynote speech at the Opening Ceremony for the 3rd China International Forum on work Safety, Minister of State Administration of Work Safety September 20 2006

Minister Li also laid out the safety targets which have been set for the country:

“The establishment of the guidelines for safe development has effectively promoted the cause of work safety in China. The program adopted at the 4th plenary session of the 10th National People’s Congress for economic and social development in the 11th Five-year Plan period has a special section on work safety, which sets two main objectives of reducing the workplace fatality rate per hundred million yuan GDP value by 35% and the workplace fatality rate per 100,000 workers of industrial and trading enterprises by 25% during the period and includes these two objectives together with the road traffic fatality rate per ten thousand vehicles and the coal mine fatality rate per million ton production in the national system of statistical indicators.”

Both the Minister and Professor Huang Shengchu, president of the China Coal Information Institute, have observed that there was a need to improve safety awareness among workers in coal mining especially, where more than half the workforce is made up of migrants. Professor Huang described the situation facing poor farmers who migrated to coal mines for work as one of finding themselves in death traps with dangerous conditions with poverty pay.¹⁸¹ He went on to say that, “The most important thing is that poorly-educated farmers-turned-miners receive training and guidance.” Government statistics show that nearly half of China’s 5.5 million miners are migrant workers from northern Sichuan, southern Shaanxi and the mountainous regions of Jiangxi, Fujian and Henan provinces.

The director of SAWS, Zhao Tiechui said that because of poor safety awareness and substandard equipment, the situation in the mines is as bad as ever. Less than 10% of university graduates from mining-related universities choose to work in mines.¹⁸² One consequence of the serious situation in China’s mines, has been that the authorities have announced the strict enforcement of the laws guaranteeing workers the right to refuse dangerous work, something already written into China’s labour law, but left largely un-enforced.¹⁸³ SAWS and the All China Federation of Trade Unions have

181 Ibid p 2

182 Ibid, p 2

183 China Daily June 21 2006, *Right to Refuse Dangerous Work* p 4

joined forces in a campaign to implement this right, especially in the realisation that it would be difficult for workers to use this right without strong support, through fear of dismissal. These two organisations express a particular concern that of the thousands killed in 2005 in mines and on construction sites, over 75% were migrant workers.¹⁸⁴ What these decisions reveal is that China's main response to the serious safety and health situation in its basic industries remains 'administrative' and bases itself on two aspects: strict supervision and enforcement and tackling corruption by cutting the ties between profit-hungry bosses and their "guardians" within the government, at whatever level. In the coal industry SAWS recognises that safety training of coal industry employees, especially at management levels, is essential and several programmes have been established with international partners to achieve this, in addition to training carried out in the nation's own institutes and universities.¹⁸⁵

It is also worth looking at the views of a critic of Chinese government policy on safety in coal mines, too. The China Labour Bulletin (CLB), an oppositional organisation based in Hong Kong campaigning for independent trade unions on the mainland, keeps a watching brief on developments in employment relations and on safety in particular. It has a formal policy position which can be summarised as: labour law and safety regulations guarantee workers the right to a safe working environment, but these are often ignored by employers; without independent trade unions and worker safety committees, miners cannot be effectively protected.¹⁸⁶ CLB observed, on the implementation of a new 131 page, 751 article regulation, "Rules and procedures on coal mine safety" on 9 December 2004 to come into force on 1 January 2005, that it would make an important contribution over time but that the urgent need was actually to implement existing law and regulations.¹⁸⁷

184 Ibid, p 4

185 Interview with Mr Bai Ran, Director General of SAWS National Center for International Exchange and Co-operation on Work Safety, June 20-21 2006, Beijing

186 China Labour Bulletin, *Safety Standards in Chinese Mines? What are the International Standards?* December 21 2004 http://www.china-labour.org.hk/iso/article_pv.adp?article_id=6114 p 2

187 Ibid p 2

Pringle and Frost developed this view further, concluding that there was an absence of rigour and a failure of implementation in occupational health and safety in China.¹⁸⁸ They concluded that Chinese workers faced barriers to securing their safety as a result of several factors, including the decline in government authority, the responsibility for health and safety resting with numerous and diverse local authorities, the lack of investment in safety systems, the inadequacy of the inspectorate and the failure of the All China Federation of Trade Unions to organise workers around safety, the complexity of administrative changes flowing from government restructuring, the lack of freedom of association and the influx of an impoverished and untrained migrant workforce into many sectors.¹⁸⁹ As a solution, Pringle and Frost took the view that imposing a top-down structure of rules and regulations was unlikely to succeed and favoured a long term, patient approach, building up committees and training leaders from the bottom up. The appointment of 100,000 worker safety supervisors in China's coal mines can be seen as a major step in this direction. There are signs that the US coal industry after the 2006 Sago mine explosion, is re-orienting its safety strategy towards a bottom-up one (see Chapter Five). However, given the complexity of the industry and its range of problems, much else will need to be done, as sketched out in Chapter Seven.

The need to implement existing law is a view broadly shared by Norman Jennings, former ILO Deputy Director for Sectoral Activities (including coal mining) but in a framework which included “more joined up thinking”. His view is that China has, essentially, enough regulations, although some small additions could be made in various areas.¹⁹⁰ On the other hand, all those responsible for implementing safety needed to work more effectively together. This was the ‘social partnership’ message of the new ILO Code of Practice. In relation to regulations, SAWS introduced, on 1 December 2000, Regulations on Safety Inspection in Coal Mines, laying out

188 Tim E. Pringle and Stephen D. Frost (2003), The Absence of Rigour and the Failure of Implementation: Occupational Health and Safety in China, *International Journal of Occupational and Environmental Health* ; 9:309-316

189 Ibid, p 316

190 During discussions with the author

what each level of government needed to do in order to ensure safe practice. These provided for fines on mine owners up to 150,000 Yuan, suspension of operation and criminal prosecution in case of non-compliance.¹⁹¹ The Chinese authorities, via the State Economic and Trade Commission (SETC), referring to the ILO Guidelines on Occupational Safety and Health Management Systems, prepared its own “Guidelines on Occupational Safety and Health (OSH) Management Systems” to encourage all employees to adopt good OSH practice.¹⁹²

4.2 Current safety structure in China

The State Administration of Work Safety (SAWS) has been promoted to ministry level and decisions have been taken by the Chinese leadership all the way to the level of the Prime Minister to ensure that safety standards are improved substantially and coal mine accidents are reduced. Within SAWS there is a state inspection authority over coal mining safety, the State Administration of Coal Mine Safety Supervision. SAWS is organised as follows:

1. General Office (including Foreign Affairs Department)
2. Policy and Legislation Department
3. Information, Technology and Equipment Department
4. Personnel and Training Department
5. No 1 Coal Mine Safety Supervision Department (SOE’s coal mines)
6. No 2 Coal Mine Safety Supervision Department (local coal mines and TVE coal mines)
7. No 1 Safety Supervision and Management Department (non-coal mine safety)
8. No 2 Safety Supervision and Management Department (10 industries without ministries like chemical industry)
9. No 3 Safety supervision and Management Department (other sectors with ministries like construction, railways etc)

191 China Labour Bulletin, *Safety Standards in China’s Mines: What Are the Standards?* op cit, p 2

192 China Labour Bulletin, *Safety Standards in China’s Mines: What Are the Standards?* , op cit, p 2

The main duties of the State Administration of Coal Mine Safety (SCAMS) are listed in appendix one. There has been a considerable amount of government re-organisation of coal mine safety and there has been a persistent shortage of inspectors. In the 1990s, there were around 30,000 mine inspectors, most of them employed at state-owned coal mines.¹⁹³

SCAMS is following a very activist policy in health and safety, led by the knowledgeable Minister in charge of the whole SAWS Ministry, Li Yizhong.

4.3 Financial issues

Compensation for accidents

In China there is a general reassessment of welfare support schemes taking place, with the end of the 'iron rice bowl' system of compensation and welfare payments made via large state-owned organisations to their workers. A rudimentary compensation payments system has been established in the coal industry, to compensate miners' families for each miner killed at work: from December 2004 this was set at 200,000 Yuan, as a negative incentive. However, it is unlikely that this sum is actually paid in every case, particularly as local authority owners have said that they simply do not have the funds.¹⁹⁴ On the other hand the owners of Daxian Sankeng Colliery, site of a gas explosion which killed 33 miners on 9 December 2004, did pay out 6.6 million Yuan to bereaved families, according to Xinhua.¹⁹⁵ More recently, payments of 200,000 Yuan were also made after a number of mine disasters such as the mine floodings in Shandong province.¹⁹⁶

China will no doubt need to consider, as other countries have done, whether a national framework for workers' compensation needs to be established, whether this is based on compensation claims, via a state level scheme, with private insurance companies involved (US model) or by a no-fault public scheme such as is operated in New

193 JianJun Tu, *Safety: Achille's Heel of China's Coal Mining Industry*, May 2007, unpublished ms, submitted to China Security, the US journal.

194 China Daily, *Improvement Promised on Work Safety*, June 17 2006

195 China Labour Bulletin, *Safety Standards in China's Mines: What Are the Standards?* p 2

196 Personal communication, 4.7.2006 Google alert, *China Coal Mine Accidents*

Zealand. It may be that the current levy per tonne fund-raising scheme for safety measures will come to include that, rather than see the burden fall on local authorities. At present Liberty Mutual, the biggest provider of private insurance based worker compensation, has conducted a comparative study for the Chinese Prime Minister. It has been sponsoring a series of work safety conferences in China as part of this advice work. ACE, another US insurance company is presently proposing to carry out training on risk management in the coal industry. Leading officials from other public schemes in the EU countries have also been explaining how their systems work, as well. China has yet to make a decision whether to go the private-based US or the public-based continental European route, or to develop a new system of its own.

Some large accidents result in the death of many miners and the compensation required at 200,000 Yuan per person can be very large indeed. Clearly designed to be a negative incentive on employers to improve safety, it can be an overwhelming cost in some cases. However, the history of worker compensation legislation, which raised the cost of accidents to employers, shows that safety improvements have been a clear result.¹⁹⁷ For example, between 1911 and 1921, 44 states in the US passed compensation laws, repeating European experience with legislative initiatives and stimulating business interest in safety improvement. Tighter employers' liability and the rising costs of accidents became a major factor in the long-term decline in accident and injury rates.

The overall cost of occupational illnesses and work-related injuries in China has been estimated at 100 billion yuan (US\$12.5 billion) in direct losses every year.¹⁹⁸ The indirect costs, according to Li Tao, head of Occupational Health and Poisons Control Institute of China's Center for Disease Control and Prevention, could be double that figure, reaching 200 billion yuan. Li criticised many local authorities for ignoring prevention and control of occupational disease. One model of health at work, which China could consider, is the New Zealand one, based on powerful safety and health legislation, with a strong provision for participation by the stakeholders and linked

197 See, for example, Mark Aldrich, *History of Workplace Safety in the United States, 1880-1970*, EH.net Encyclopedia <http://eh.net/encyclopedia/article/aldrich.safety.workplace.us>

198 China Labour Bulletin, *Occupational Illnesses and Injuries Cost China 100 Billion Yuan Per Year, Official Warns*, July 21 2006, <http://www.china-labour.org.hk/public/contents/news?revision%5fid+38699&item%5...21/07/2006>

into a no-fault compensation system for injury and occupational ill-health, with a linked in rehabilitation programme.

This concept of occupational health, inclusive of injury through compensation and rehabilitation has been described in the following way¹⁹⁹:

Healthy Worker		Symptomatic worker		Injured worker		Compensated worker
Injury prevention *redesigning work *training and supervision *limiting exposure to hazards (Solicitor)			Rehabilitation *retraining *redesign of work *restricted duties			

China is at the stage of development in its coal industry where the size of the ill-health problem is still being defined. It has been estimated that some 300,000 miners at the large SOE mines alone are suffering from various lung diseases, that 3,000 of them are dying annually from these diseases and that annually, 12,000 new cases in the SOE mines and a further 60,000 new cases in the smaller township and private/village mines are being added.²⁰⁰ The average age of those contracting pneumoconiosis has been falling – now 40 years and even miners as young as 20 years old have contracted the disease. However, the full extent of this problem remains unknown as monitoring is inadequate. The Chinese Centre for Disease Control and Prevention estimates the direct costs of pneumoconiosis to be about 8 billion yuan per year, with indirect costs of some 40-50 billion yuan, with coal miners accounting for about half of that.²⁰¹ Additionally, there will be many miners already suffering from and in the development stage of other lung diseases such as chronic bronchitis and emphysema. In the UK, the cost of compensating 300,000 former miners with these diseases has already amounted to £1.7 billion or 25 billion yuan and is likely to reach around £7 bn.²⁰²

Not only is training required across the Chinese coal industry to limit this health damage but also a transfer of expertise on dust measurement and control, already

199 Interview with Hazel Armstrong, Safety and Health Solicitor, Wellington, New Zealand, April 3 2007

200 A J Smith, *Respiratory Lung Diseases in Coal Miners*, paper to 2006 International Conference on Occupational Safety Training, August 9-10, Beijing. Conference Proceedings, National Institute for Occupational Safety, Beijing, p 250

201 Ibid, page 250

202 Ibid, page 246

learned in the developed country coal industries. Treatment of injured miners is made more difficult by the transition of the health system in China away from mainly state provision to a more privatised model. This suggests that an industry based insurance system will be required if the problems are to be handled effectively and the economic costs are to be controlled. The importance of controlling dust in mining regions extends much further than the mining process itself, as many other people on and nearby mine surfaces are affected, too. Fine dust is found in the air of coal mining towns, as well as the pollution from coal combustion and processing, from coking plants especially but also substantial coal use in the large cities. Many thousands of non-miners are affected by lung disease, as was the case in the developed countries before clean air legislation was enforced. The extent of this ill-health remains unquantified but its costs are bound to be very large indeed.

4.4 Special funding for safety

On 5 March 2006, Prime Minister Wen Jiabao announced in his work report to the National People's Congress that the government would invest 3 billion Yuan (\$NZ 600m) from the sale of treasury bonds on technical solutions to gas explosions in coal mines.²⁰³ Wen attributed the poor safety record in the country's coal industry to "the economy's huge demand for coal, the poor implementation of safety measures, lax controls by local authorities and rampant corruption among officials and mine owners". Official figures show that the cost of workplace accidents is 25 billion (£1.8 bn) Yuan a year or 2 per cent of GDP.²⁰⁴

On 28 August 2006 the Chinese Government announced that it would invest nearly \$US 60 billion to cut the industrial accident rate over the next five years.²⁰⁵ The aim would be to reduce the death rate per 100 million yuan (12.5 million US dollars) of gross domestic product from 0.70 last year to 0.45 in 2010. The policy target for accident rate reduction per 100,000 employees is set to drop from 3.85 in 2005 to 2.8

203 China Labour Bulletin, *Premier Wen pledges 3 Billion Yuan for Coal Mine Safety*, March 6 2006
<http://www.clb.org.hk/public/contents/news?revision%5fid=36327&item%5fid=36323>

204 Ibid

205 People's Daily Online, *China to Invest Nearly 60 Bln USD to Reduce Industrial Accidents*, http://english.people.com.cn/200608/29/_297656.html

in 2010. The State Administration of Work Safety intends to reduce the number of accidents with more than 10 deaths by 20%. In 2005 there were 73 such accidents. The top priority task will be coal mine accident prevention, out of nine safety projects. A substantial proportion of the money will be spent on training. The programme aims to solve the poor production conditions, management and frequency of accidents in small mines within three years. Other industries targeted include non-coal mines, chemicals and fireworks production.

Aligned with the increased investment in safety was the legal interpretation by China's Supreme People's Court and Supreme People's Procurate on penalties for coal mine accidents. Coal mine managers and de facto owners will be sentenced to imprisonment for up to three years, if illegal production leads to accidents killing more than one person or injuring more than three, or causing economic losses of more than one million yuan. They will face imprisonment of up to seven years if casualties exceed three dead or ten injured, or economic losses of three million yuan. Government officials will be "severely dealt with" if they violate the strict prohibition on them investing in coal mines.²⁰⁶

In May 2007, 46 local safety officials were found guilty of dereliction of duty in not enforcing laws and preventing the deaths of 270 miners.²⁰⁷ One former deputy director of a safety bureau was jailed for three years. However, an investigation by the Supreme People's Procurate (SPP) into mining disasters found that of 95.6 percent of those charged with dereliction of duty or abuse of power were given either a suspended sentence or received no punishment at all.²⁰⁸ In April 2007 in a statement marking World Day for Safety and Health at Work, Wang Xianzheng, deputy director of SAWS, said that "China will develop better policies, increase supervision, make risk evaluations and education and training."²⁰⁹

206 Xinhuanet, *China Issues New Legal Interpretation to Improve Coal Mine Safety*, March 3 2007 <http://www.cctv.com/english/20070302/10161.shtml>

207 Mining Journal Online, *China Finds 46 Safety Chiefs Derelict of Duty*, May 24 2007 http://www.mining-journal.com/breaking_news.aspx?breaking_news_article_id=2626

208 AsiaNews.it, *No One Guilty for the Thousands of Mining Deaths*, May 25 2007 <http://www.asianews.it/view4content.php?1=en&art=9366> This information was taken from China Labour Daily, among other sources.

209 China Daily, *China to Improve Employees' Safety, Health Conditions*, April 28 2007 http://www.chinadaily.com.cn/china/2007-04/28/content_863204.htm

The deputy director went on to say that China will increasingly co-operate with international organisations to help improve its standards. Chinese officials also estimated that some 200 million Chinese workers are at risk from dangerous or poisonous environments and that occupational diseases, especially lung diseases would continue to increase over the next 10-15 years before work safety measures began to seriously take effect.²¹⁰ An official with the Ministry of Health reported that since the 1950s, China had a cumulative total of 677,000 occupational disease cases, more than 90% of which were pneumoconiosis.²¹¹ The official noted that in 2006 621 pneumoconiosis cases reported last year were in labourers under the age of 18.

4.5 Conclusion

The Chinese authorities are devoting considerable resources and effort to solving the safety problems of the coal industry. There are signs that this effort is beginning to pay off, in the reduced number of accidents declared for 2006. However, this is possibly more attributable to the closure of thousands of illegal small mines, where the fatal accident rate is highest. This is not necessarily going to be an enduring solution, as the demand for coal climbs ever higher, without the state-owned companies producing much more coal themselves. It is among the state-owned mines that most progress has been made, especially with a much better understanding of what needs to be done by mine managers and safety engineers. It will take time to make some of the recently decided policy initiatives work, such as the appointment of government paid (to maintain their independence) worker safety supervisors to township and some small mines. A process of continuous review will be needed at all levels of the evolving structure of safety supervision, if this vast industry is to be made substantially safer, in a very large country. As Minister Li observes, a greater use of foreign expertise from the developed countries, allowing full play to new technologies, hard work and commitment to a strategy is likely to succeed, possibly within a decade.

210 Ibid

211 People's Daily Online, *Coal Mining Biggest Cause of Work-related Lung Disease: Ministry*, April 30 2007 http://English.people.com.cn/200704/30/content20070430_370938.html

Chapter 5

International experience in health and safety and its applicability to the Chinese coal industry

5.1 The long fight for statutory safety standards in mines

It may seem obvious that legislation to provide for proper safety practices in any sphere of employment is the quickest and most effective method of attacking the problem and that, consequently, there would be little difficulty in bringing it into force. This view has not been accepted by those in authority, since the history of the achievement of statutory standards is one of continuous struggle.

John L. Williams, *Accidents and ill-health at work 1960* ²¹²

This general observation certainly held true in 1960, when John L. Williams wrote his book. However, he, more than most, appreciated the history of mine safety law in the UK, and the fact that the ‘bible’ of UK mine safety law, the Mines and Quarries Act had recently been put on the statute book in 1954, after a protracted campaign. Williams, who died in 1993, was for many years the leading health and safety lawyer in the UK, working mainly as an advocate for trade unions, but in particular the safety supervisors’ and miners’ unions, National Association of Colliery Overmen, Deputies and Shotfirers (NACODS) and the National Union of Mineworkers (NUM). He was actively involved in this right up until his death.

5.2 The safety triangle

Williams’ book and his legal activities as a health and safety lawyer, placed him at the forefront of the law of health and safety at work in the UK. It prepared the way for the major piece of UK workplace safety legislation of the 20th century, The Health and Safety at Work Act (HSW), 1974 and its forerunner report, “Safety and health at work”, prepared in 1972 under the leadership of Lord Robens, the Chairman of the National Coal Board. Robens was chosen to lead the preparation of this report

212 John L. Williams LL.B (Lond) (1960), *Accidents and Ill-health at Work*, London: Staples Press, p 70

for several reasons – because of his national stature, his position as head of one of the largest industrial organisations in the country but also because UK coal mining had come to be the safest coal industry in the world, having developed such a sound safety culture and organisation after nationalisation in 1946. It was felt that that this experience could be generalised to the rest of employment in its essential features at least. At its core, as analysed by Williams, there was the safety triangle: responsible management, participating workers and an enforcement agency. In National Coal Board (NCB) mines there was a triangular relationship between the mine manager, the workmen's inspector (elected by his trade union) and the government mines inspector. It was set up as a mutually reinforcing partnership, where each of the three actors was supported by a strong organisation – NCB, union, government. This structure was supported at area and national levels. It was reproduced in the HSW Act, albeit the safety representative did not have the extensive powers of the mine workmen's inspector under that Act.

Williams is not known in China, but British safety standards have been well known there, especially in coal mining during the post-war period. Until recently, they have remained among the best in the world. Sadly, in recent years, after privatisation they have been slipping, as can be seen in the three separate fatal accidents at Daw Mill Colliery in Warwickshire in 2006/07. This very large, highly productive mine, had, in that year, a fatal accident rate similar to the state-owned sector in China. It stands as a warning, like the Sago disaster in West Virginia in 2006, of the need for continual vigilance and maintenance of standards. In coal mining, the risks are ever present, with an explosion, roof fall, flood or machinery accident.

William's book was one of the first detailed and well researched assessments of health and safety law and practice not only in the UK but around the world, unsurpassed by much subsequent work in the power of its analysis. He understood the practice of mine safety and proposed lessons for industry generally, especially in the role of worker safety representatives, which have existed in British mines since 1879.

His critique of the inadequacies of the overall British system of health and safety in 1960 can be formulated in a positive summary of the essential features of an effective system:

- A general plan for occupational safety and health providing for central direction and co-operation of the various agencies;
- Prevention methods to apply to the whole working population;
- Medical supervision to apply similarly with a general occupational health service;
- A centralised system for recording and analysing accident and sickness statistics;
- A well-functioning research arrangement with constant reassessment and evaluation;
- Statutory minimum standards applying to the whole working population, administered by a unitary authority and ministry;
- A unitary inspectorate to enforce minimum statutory standards, with standards formulated in line with a common policy, not adhoc;
- A sound system for amending statutory standards;
- Worker involvement in the development and enforcement of standards;
- Availability of compensation to all;
- Well organised education and training in safety;
- The relative failure of voluntary workplace safety organisation by itself;
- The need for well developed safety knowledge and organisation within trade unions.²¹³

Williams further distilled seven essential features from his list:

1. Central direction and co-ordination;
2. Coverage of all forms of employment;
3. Active participation of employees and employers;
4. Integration of accident prevention and occupational health services;
5. Continuous review of operations;
6. Facilities for expeditious amendment of statutory standards;
7. Comprehensive research.

²¹³ John L. Williams, *Accidents and Ill-health at Work*, p 453-6

Of these points the UK has made major progress on most, following the adoption of the Health and Safety at Work Act 1974 and the Safety Representatives and Safety Committee Regulations, 1977. The 1974 Act imposed a general duty on employers: “2. (1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees.” Moreover, the UK, like the European Union member states as a whole has benefited from the adoption of a whole package of health and safety law, based on Article 118A inserted into the European Union’s Treaty of Rome by the Single European Act 1986.²¹⁴

The new European law followed a specific strategy based on risk assessment and a preventive approach. The key measure was the ‘Framework Directive’ of 1989. It prescribes that the employer is bound in Article 6.1 to “take the measures necessary for the safety and health protection of workers, including the prevention of occupational risks and provision of information and training, as well as provision of the necessary organisation and means.....”²¹⁵ The new European directive introduced an approach to all member states designed to anticipate risk rather than protect against danger or to put it another way – by anticipating risk and preventing danger it aimed to provide pre-emptive protection.

For the European Trade Union Confederation’s health and safety department the central element of the European approach is that it “spells out the employers’ preventive obligations” – with the essential principles summarised in the following way:

- Prevention;
- An order of precedence of prevention measures;
- Employers’ responsibility;
- Social dialogue and participation of employees;
- Continuous improvement; and
- Multidisciplinary preventive services with holistic approach to work.²¹⁶

214 Bercusson, Brian, “*European Labour Law*”, Butterworths, 1996 p 305

215 Bercusson, *ibid* p 348

216 European Trade Union Institute Health and Safety Department, *Finding Your Way in the European Union Health and Safety Policy – a Trade Union Guide*, 2006 <http://hesa.etui-rehs.org>

After several years of implementation of this health and safety approach, opinions vary about its effectiveness. First, there is a view that if the risk assessment requirement were properly transposed and implemented there would have been no need for the daughter directives attached to the Framework directive.²¹⁷ Others have reservations. For example, it is felt by some health and safety specialists that, as enforcement practices vary so widely across the EU, it is difficult to hold the risk assessment procedure up as a model for other countries.²¹⁸ Furthermore, ill-health is ignored in the assessment and worker involvement is the key to the success of such an approach, but it remains to be fully developed in all the Member States.

Another positive contribution arising from European law has been the inclusion of psychosocial risk factors. This arises from the fact that at the time of insertion of Article 118A in the Treaty the Council of Heads of State and Government accepted the Danish definition of health and safety at work which included not only physical hazards in the working environment but also psychological, social and organisational factors.²¹⁹

Overall, the EU package is seen as among the best, but other countries, such as Australia have explicit laws on particular risks.²²⁰ Although the EU approach is seen as better than most, this has not stopped the European Commission from seeking further improvement. In 2002 it published a new Community strategy on health and safety at work for 2002-2006.²²¹ This new strategy adopts a global approach to well-being at work, taking account of the changes in the nature of work, the emergence of new risks, especially of a psycho-social nature and aims to improve the quality of work. It seeks to consolidate the culture of risk prevention and proposes a combination of instruments including legislation, social dialogue and various other measures and by

217 Interview with Stephen Hughes MEP, Employment spokesperson for the Socialist Group, European Parliament, May 9 2006

218 Telephone interview with Simon Pickvance, Sheffield Occupational Health Practice, May 9 2006.

219 Stephen Hughes, *ibid.*

220 Several interviews with Rory O'Neill, Editor of "Risks", the UK Trade Union Congress e-bulletin on health and safety during 2006-2007.

221 European Commission, *Adapting to Change in Work and Society: a New Community Strategy on Health and Safety at Work 2002-2006*, Commission of the European Communities, Brussels 11.03.2002, COM (2002) 118 final, p 3

building partnerships between all the players on the health and safety scene. It has led to the publication of an assessment of the cost to society of not having such a policy approach, reversing the more usual approach of calculating the cost of compliance with health and safety law, favoured by some governments. In its background work for the strategy the Commission noted that accidents between 1994 – 98 had fallen by 10% and yet in 1998 the number of fatal accidents was still too high at 5,500, with 4.8 million accidents resulting in three or more days off work.²²² These figures are for the EU-15, pre-enlargement.

5.3 Health and safety law in coal mining

Britain was among the first countries to adopt mine safety regulations, albeit attempts to control the shameful conditions prevailing in mines followed some time after early regulations for factories, the first of which was in 1802. This was despite the fact that abuses had been apparent in mines long before the factory system got underway.²²³ The first four factory inspectors were appointed in 1833 and it was not until a Royal Commission headed by Lord Shaftesbury was established in 1840 to examine the employment of women and children in mines that determined safety action was taken. The Mines Regulation Act 1842 laid down the principle of state regulation and inspection. A series of Mines acts followed throughout the remaining part of the 19th century, culminating in the 1911 Mines Regulation Act, establishing a comprehensive safety system. These regulations were updated in some detail in the 1954 Mines and Quarries Act, the final provisions of which were drafted to a considerable degree by the National Union of Mineworkers and its safety engineering department, staffed by experienced mining engineers who had come from senior management positions in the industry.

The main international arena of this long campaign to improve mine safety became, ultimately, the ILO although the first major initiative was taken by the forerunner of the EU – the European Coal and Steel Community (ECSC). The ECSC established by the Treaty of Paris 1951 set up a high authority (the forerunner of the European

²²² European Commission, *Adapting to Change in Work and Society: a New Community Strategy on Health and Safety at Work 2002-2006* op cit, p 3

²²³ John L. Williams, *Accidents and Ill-health at Work*, op cit, p 72

Commission) and a bipartite structure of equal numbers of employer and trade union representatives serviced by the high authority. The Consultative Committee of social partners was organised into a series of sub-committees, several of which covered health and safety and health safety related research. A large programme of technical and safety research, including an ergonomics stream got underway, funded by the levy on EU coal and steel output. All this experience was transferred naturally into legislative form in the Extractive Industries Directive, one of a series of daughter Directives of the overarching Framework Directive of 1989.

The ILO adopted Convention C124 on Medical Examinations of Young Persons (Underground Work) in 1965, a Code of Practice on Safety and Health in Coal Mines in 1985 and a major Convention C176 on Safety and Health in Mines in 1995 and an accompanying Recommendation R183. However, so far, only a relatively small group of countries have ratified the convention (See Table). In accordance with the decision taken at the Governing Body of the ILO at its 288th Session in November 2003, a Meeting of Experts on Safety and Health in Underground Coal Mines was convened on 8-13 May 2006 to update the 1985 code. The experts' report will go to the ILO Governing Body for decision in November 2006. An Expert representing the Chinese Government was present at the meeting. A separate code also exists for surface mines, "Safety and health in opencast mines (1991)". The 1995 Convention and Recommendation and the new Code will be examined in more detail in Chapter Seven, in relation to both the international coal industry and current attempts to improve the safety situation in China itself.

The latest initiative from the ILO introduces a new debate, as the Press Release on the redrafting of the code of practice issued on 8 May 2006 noted:

The new draft code would update 20 year old occupational and safety recommendations, reflecting major developments in underground coal mining that have seen new technologies, investment, training and regulations cut the mine death toll in some countries, especially in the developing world.

Nevertheless the incidence of coal mining fatalities reveals considerable differences between countries. While the United States, the United Kingdom and Australia have significantly reduced fatalities, rates in India and China are considerably higher.

The draft code to be discussed by the Meeting reflects the many changes in the industry over the last 20 years – a leaner, multi-skilled workforce and new technologies in the developed countries at least – and follows a less prescriptive framework, more systems-oriented approach. It addresses, with a national framework, the responsibilities, duties and rights of the competent authority, the labour inspectorate, employers, workers and their organisations, suppliers, manufacturers and designers, contractors, and occupational safety and health (OSH) management systems and services and OSH reporting.²²⁴

The Code of Practice deals with the hazards specific to coal mining: coal dust and methane gas explosions and subsequent fires, falls of ground, floods, machinery and electrical accidents and accidents involving the use of explosives. While these have been the traditional hazards facing coal miners, the code updates practice on the base of recent technological developments and new knowledge such as in the areas of ergonomics and chemical hazards. Another important part of the current debate is an old one: how prescriptive should safety legislation be? The consensus that has existed throughout the mining industry, up until recent times, and as a result of the long struggle for improved safety (as described earlier by John L. Williams above) has been that mining is an industry of special risk and therefore statutory duties should be absolute (“must”, “will”) rather than qualified (“may”, “can”). Especially in those countries which have moved towards a less prescriptive system (US, UK) the intense debate continues and each major accident that has occurred since is rigorously assessed by either side.

²²⁴ ILO, *ILO Meeting of Experts to Discuss New Code of Practice on Coal Mine Safety*, Note to correspondents, May 8 2006, ILO/06/17 Geneva

In the UK, there was a protracted argument between the mining unions and their safety engineers on the one side and the Thatcher and Major Conservative governments on the other over the introduction of new codes of practice (based on guidance and qualified duties), where previously they had not been prevalent and even more so over the splitting of the role of the mine deputy into two distinct elements, separating the safety and production functions.²²⁵ The Government decision to do this stemmed from the support the pit deputies union, NACODS, gave to the main mining union, the National Union of Mineworkers (NUM), in its long campaign to stop the pit closure programme of successive Conservative Governments. At one point, eight months into the year long miners' strike for jobs in 1984/85, NACODS balloted its members for strike action and won an over 80% result in favour. A pit deputies' strike would have shut down the whole industry, including those areas where miners were working; for mines could not be legally operated without deputies present.

Ever since 1911 the pit deputy had a dual role, unique in industry, in which safety took precedence over production. They had been compared earlier in the last century to Non-commissioned officers (NCO's) by Winston Churchill. The men could not enter a mine until the deputy carried out a pre-shift inspection to ensure that it is safe to do so. Without the deputy present, the mine could not operate and it was this power that the Thatcher Government wanted to attack. The supervisory/production role was given to a new post of Command Supervisor, a role firmly placed higher up the management structure, with the safety/inspection role left with an inspector.²²⁶ The change also fitted in with the move towards self-regulation of safety taking place across all workplaces, something that was continued by the Blair government.

225 Dave Feickert, "Coal Privatisation: Revenge Tragedy or Romantic Irrelevance", *Financial Times Conference on coal Privatisation: Who Gains, Who Loses*, London, June 1992

226 Health and Safety Commission, *The Management and Administration of Safety and Health at Mines* HMSO 1993. See in particular Regulations 10, 12.

5.4 The debate between regulation and self-regulation

The debate over regulation or self-regulation has been revived, too in the United States, following the Sago mine accident at New Year 2006, in which 12 miners were killed by carbon monoxide fumes, after a fire and explosion.²²⁷ Commenting on the efforts of the US Congress to deal with a series of fatal accidents in US coal mines in the first half of 2006, the New York Times editorialised:

*But the sad truth is that safety equipment and rescue procedures have been scandalously neglected for years under company-friendly regulations that have been laxly enforced by government agencies stocked with political appointees who have come from the coal industry.*²²⁸

The sole survivor of the Sago mine accident, once he had recovered, reported that several men had had problems with poorly functioning self-rescuers, the emergency breathing apparatus miners carried. As a result the Senate bill sought to address this and other issues such as better systems of underground communication in event of disaster, strengthened seals for worked out areas to prevent the seepage of methane gas build up into working districts and higher penalties for violations of safety regulations by companies.²²⁹

There can be lax enforcement of the existing law but there can also be a process of deregulation which weakens law. It is more commonly couched today in phrase like ‘simplification’ or ‘reducing the burden on business’. In the UK coal industry there are indications now that the deregulation process has changed the safety culture of the deep mine industry. This is evidenced in the case of Daw Mill Colliery, where there were three separate fatal accidents during 2006-07. This puts that highly productive, ‘big-hitter’ mine into the same accident league table as Chinese state owned mines. Full reports on each of these accidents have not yet been issued but early indications suggest that the previous safety culture and organisation has been eroded. It is also

227 The best source for general documentation on this debate is the United States Mines Rescue Association website: www.usmra.com

228 New York Times, *Death in the Mines, Action in Congress*, May 29 2006 www.nytimes.com/2006/05/26/opinion/26fri3.html?_r=1&oref=slogin

229 US Mine Rescue Association, see article from the Herald-Leader, “Deaths this year renew talk of measures heard before” 28 May 2006 in *Digest Number 1061*, May 29 2006

a devastating situation for the families of the men concerned, for the workforce and for a relatively small mining company, operating only four deep mines, albeit technologically advanced ones, which have in recent times enjoyed one of the best safety records in the world.

Perhaps the most recent salutary lesson on the erosion of safety culture and organisation, however, can be found in the oil giant, BP. In 2005 an explosion ripped apart the Texas City refinery, killing 15 and injuring 180. The US Chemical Safety and Hazard Investigation Board have been highly critical of the company in its operation of its North American refineries generally and at Texas City in particular:

*Cost cutting, failure to invest and production pressures from BP Group executive managers impaired process safety performance at Texas City.*²³⁰

The way in which the regulation versus self-regulation debate is resolved determines in turn the statutory and other roles of the various actors in mine safety organisation.. Thus the ILO Code of Practice and its originating Convention and Recommendation go into some detail about these roles and the relationships between the competent authority (including mine inspectors) and the employers, workers, manufacturers, suppliers and their organisations and how they consult or are consulted, how they co-operate.

5.5 The experience of industrialisation in the West and its relevance to the evolving safety structure in China

In trying to locate the safety structure of the Chinese coal industry in the international context of practice and debate, it is worth referring to the analysis by Tim Wright of Theo Nichols' work in *The Sociology of Industrial Injury*.²³¹ Wright observes that changes in working conditions of workers in industrial societies closely reflect the position of workers within the broader political economy.²³² Nichols had argued that industrial health and safety reflects the balance between labour and capital in a

230 US Chemical Safety and Hazard Investigation Board, *Investigation Report: Refinery explosion and fire (15 killed, 180 injured) BP Texas City, March 23 2005* Report No 2005-04-1-TX, March 2007 p 25

231 Theo Nichols, *The Sociology of Industrial Injury*, London 1997 Mansell Publishing Limited

232 Tim Wright, The Political Economy of Coal Mine Disasters in China: "Your Rice Bowl or Your Life," in *The China Quarterly* 179, p 629-646

society and his research was an attempt to locate industrial injuries in the dynamics of a capitalist society.²³³ In his turn, Wright observes that such an approach:

*can also throw light on China's transitional economy at it moves from socialist planning towards a capitalist market.*²³⁴

The Chinese authorities themselves seem to take the view, following an extensive study of the industrialisation process in other countries, that occupational accidents will keep on rising in China before levelling off and falling.²³⁵ They seem to see this as a factor of industrialisation rather than a transition from a centrally planned economy to a market one although a major debate has broken out about the general economic and social tensions of transition and has resulted in a new emphasis in the next Five Year Plan on social questions.²³⁶ Minister Li, in particular, sees the opportunity for China to shorten what he describes as the “accident-prone period” of development and GDP growth by enjoying the obvious advantages of learning from the experiences of developed countries, by daring to face reality meet the challenges and do a lot of hard work, thus shortening the period to 10 years from now.²³⁷

An analysis of the history of workplace safety in the United States provides some support for both the industrialisation thesis and the thesis that the boom created by economic transition has led to increased accidents.²³⁸ Comparing the US record with the British one, Mark Aldrich concluded that the American path of industrialisation led to a development of production methods which were both highly productive and very dangerous, within a looser legal and regulatory framework.²³⁹ Aldrich concludes that the economic boom

233 Nichols, *The Sociology of Industrial Injury*, op cit p 98-112

234 Wright, *The Political Economy of Coal Mine Disasters in China: “Your Rice Bowl or Your life”*, op cit p 629

235 Li Yizhong, *Practice Scientific Concept of Safe Development to Promote Social Stability and Harmony*, Opening Address and key-note speech at the Opening Ceremony for 3rd China International Forum on Work Safety by the Minister of State Administration of Work Safety, September 20 2006 p 5-8 An “accident-prone” period is identified for the UK (1880-1950), the US (1900-1960) and a shorter time for Japan (1948-1974)

236 Ibid p 1

237 Ibid p 8

238 Mark Aldrich, *History of Workplace Safety in the United States, 1880-1970*, EH.net Encyclopedia <http://eh.net/encyclopedia/article/aldrich.safety.workplace.us>

239 Ibid p 1

and associated labour turnover during World War II worsened safety in nearly all areas of the economy and that, after an improvement in the immediate post-war period, the economic boom of the 1960s led to an increase in injury rates, with political pressure developing as a result in Congress, achieving the establishment of the Occupational Safety and Health Administration and the Mine Safety and Health Administration in 1970.²⁴⁰ In China, economic change from one model of economy to another, increased industrialisation and economic boom are associated together after 1978. It is probably not possible to separate each of these to test which factor is predominant.

In relation to coal mining the level of capital investment in mechanisation, which normally increases with industrialisation, is a more critical factor in improved safety, as observed by the ILO and as shown in the developed country coal industries.²⁴¹ Yet there are contradictions in this trend as well. While in the UK, greater mechanisation following nationalisation in 1946, especially in the 1950s and 1960s, produced a steady reduction in the fatal accident rate even as productivity per man shift increased.²⁴² However, the overall accident rate actually increased to a peak in 1966 in the middle of the mechanisation phase. Burns et al concluded that this counter-intuitive effect possibly had more to do with the collision between rapidly increasing mechanisation and the prevailing piece-rate payments system.²⁴³ Piece-work ended in 1966 with the adoption of a measured day work payments system in the National Power Loading Agreement, a comprehensive wage and technology agreement signed between the NUM and the National Coal Board and the overall accident rate fell rapidly from this point on.

The level of industrialisation in a society in general does not necessarily flow through automatically into improved safety in all mines, as the contrast between much higher accident rates in the small private sector UK mines compared with the large state

240 Ibid p 6

241 ILO Press Release on code of Practice, op cit

242 Alan Burns, Dave Feickert, Martin Newby, Jonathan Winterton, *An Interim Assessment of MINOS, Working Environment Group No 4*, Working Environment Research Group, University of Bradford, Report on new mining technologies for the NUM National Executive Committee, 1982 Section 3-1

243 Ibid Section 3-1

owned mines also showed.²⁴⁴ For the years studied – 1986/87 to 1987/88 showed, the risk of being killed in a small private mine was 1 in 600, compared with 1 in 10,000 in a state-owned British Coal mine. A US study by the National Institute of Occupational Health (NIOSH), comparing the fatal accident rate in small mines with 50 employees or less and that for mines with 250 employees or over revealed a rate 4.24 times higher in the small mines for the years 1988-1997.²⁴⁵ In the US employment in small mines makes up 25% of total underground production. As seen in Chapter two, this ratio is similar in China as well.

Size influences the level of mechanisation, as small mines cannot use heavy duty face technology, for example. Similarly, the structure of ownership – private, semi-private (state corporation) and fully private seems to have little discernible effect by itself, as is seen in the similarly lower accident rates in UK mines during the state-owned period, New Zealand state corporation mines, partially private German mines and privately owned American and Australian mines. However, during periods of transition existing safety systems can be disrupted as management changes, altering priorities. Market changes are also important as noted in Chapter Two. Wright also emphasised this point recently referring to China:

*They have difficulties enforcing the regulations even on the big State mines, where the recent massive disasters have taken place. The incentive to cut corners is increased with the high price and strong demand for coal.*²⁴⁶

Surging demand is part of the same debate about mine safety in the United States, where demand for coal has surged, in response to rising oil and gas prices:

With coal prices at record highs, mining companies have been pushing to increase production, adding overnight and weekend shifts to keep conveyor belts rumbling, and generating more overtime hours for miners who have some of the most physically gruelling jobs in the country.....' It is something that needs to be

244 Labour Research Department, *The Hazards of Coal Mining* 1989 p 18

245 Kris Maher, "As Demand Rises, Risky Mines Play a Bigger Role", *Wall Street Journal* June 1 2006

246 Christian Science Monitor, *In China: Energy Needs vs. Mine Safety*, January 26 2006 www.csmonitor.com/2006/0126/p07s02-woap.htm

*looked at', said Bill Caylor, president of the Kentucky Coal Association. 'If we are cranking out more production with the same number of employees, miners may be working six or seven days a week, instead of five, and potentially not getting enough rest.'*²⁴⁷

Five miners were killed at the Darby No 1 mine in Kentucky on 20 May 2006, when an explosion ripped through the mine, travelling 5000 feet to the surface and puncturing oil cans 200 feet from the mine entrance.²⁴⁸ The mine had been cited by the Mine Safety and Health Administration for 257 violations in 2005 of which 99 were serious, including high levels of explosive coal dust. The 34 miners had produced 118,052 tons and \$3.4m in profit for the owners in 2005.²⁴⁹

Mine safety organisation develops through the often complex interplay of state regulation, level of investment and technology, the mining system adopted in relation to the geology, the degree of training and the professional engineering skills of managers, the efficacy of inspection and the involvement of the workforce. An illuminating historical comparison between late nineteenth and early twentieth century coal mining in Britain and the United States reveals some critical differences. Aldrich showed how the US mines were more than twice as dangerous as their British counterparts although being more productive and these dangers actually worsened in American mines by 50% between the two periods studied while in Britain accident rates improved by 20%.²⁵⁰

Moreover, British mines were deeper, had more difficult geology but were more closely supervised. In any event the leadership shown by both the public authorities and management are key to achieving the best outcome and today the comparative accident rates are not that different between the two countries. The union role, while hotly debated, is also crucial to a successful outcome, in the view of the author and

247 US Mine Rescue Association, op cit p 9

248 Denise Winebrenner, US Coal Accident Crisis, in *Edwards People's Weekly World Newspaper* May 25 2006

249 Ibid

250 Mark Aldrich, *History of Workplace Safety in the United States, 1880-1970*, op cit p 2

this is introduced below as it forms part of the ‘eternal vigilance’ required for good safety practice. A good example of leadership at the management level is in the Xiwan mine near Shanghai. It is now 60% owned by Anglo American plc. The Anglo head of safety, health and environment, John Groom described the transition after their involvement began:

*This was a morass of pits operated by contract miners but we shut it down and restarted it as one modern pit operation. Since then we have had only one lost time injury in two years.*²⁵¹

In South Africa, mining companies like Anglo American went through a major learning curve on mine safety, post apartheid and the accident rates in the mining industries of that country have been substantially cut.

5.6 The ‘union effect’ on health and safety

In a thorough assessment of health and safety practice in the European Union, perhaps the most advanced in the world, the ETUC remarks on the EU preventive strategies in the following way:

*...the big issue is how they work in practice. The existing rules and knowledge about prevention would help prevent much health damage. The ability of trade unions to marshal rank-and-file energies around workplace health issues is arguably the defining factor in giving a new impetus to public policy in this area. This is because ‘top-down’ reforms tied in with the need to carry the Community directives over into law have largely run out of steam. In this struggle, co-operation between trade unions in the old and new States of the European Union, and in the applicant countries, will be of make-or-break importance.*²⁵²

If the very experienced European trade unions have arrived at this general assessment, how much more problematic is it for the Chinese trade union movement, based in the All China Federation of Trade Unions (ACFTU)? Of course the situation is not

251 Paul Moore, *Safe and Sound?* Mining Magazine, July 2006, Feature on safety management, London
 252 ETUC, *Finding Your Way in the European Union Health and Safety Policy – a Trade Union Guide*, op cit, p 11

directly comparable either by economic development but in some respects China is not that far behind some of the new EU member states, and has a similar political and economic history. Many different trends impact on health and safety approaches and therefore on trade union roles, as can be seen in the EU. The pressure from employers' organisations and the more 'liberal' parties for less regulation on business has a direct impact, as health and safety compliance can impose real costs, although mainly in the short term. The EU assessment of the cost of the absence of health and safety law, referred to earlier, suggests that economic gains are made in the long term. Intense global competition, especially for those companies operating in global markets also causes management to re-assess the costs of health and safety compliance. Equally, in a countervailing sense, the pressure for companies to act with corporate social responsibility especially in their overseas operations, has often focussed on working conditions, accidents and the lack of trade union rights to enable workers to address these issues. Consumer pressure over these issues in the wealthy importing countries is growing.

In all the developed countries trade unions have a general influence on health and safety policy development, but is there a discernible "union effect"? A wealth of research has been conducted on this in the last decade and the clear conclusion is that the influence of trade unions on accident rates and injuries is direct.²⁵³ In a study of British manufacturing it was shown that those companies which had trade union health and safety committees had half the injury rate of those which managed safety without unions or joint arrangements.²⁵⁴ Another study, analysing the same figures reached the conclusion that arrangements where management deals with health and safety without consultation lead to higher injury rates.²⁵⁵

253 TUC, *The Union Effect*, www.tuc.org.uk/h_and_s/tuc_8382-fo.cfm

254 Reilly, Paci and Holl, *Unions, Safety Committees and Workplace Injuries*, *British Journal of Industrial Relations* Vol 33, 1995 quoted in TUC, *ibid*

255 Beaumont and Harris, *Occupational Health and Safety*, 23,1993 quoted in TUC *op cit*

Nichols discusses the impact of unions on health and safety extensively both in his book²⁵⁶ and together with others.²⁵⁷ In the former he refers to a point made by another commentator that the assumption cannot be made that the mere presence of trades unions in the workplace will necessarily have a beneficial impact on health and safety. He then observes that an active union presence does ensure:

*that the membership is confident of its strength and that unions actually do make for greater job control.*²⁵⁸

In the latter joint analysis, Nichols et al, in analysing the data referred to earlier comment that:

*the general conclusion that health and safety should not be left to management should be supported.*²⁵⁹

In a study of potential relevance for China's smaller mines, the UK Health and Safety Executive (HSE) ran a number of pilots where trade union appointed 'Worker Safety Advisors' went to non-unionised organisations. As a result over 75% of the employers made changes and 70% of workers saw an increase in awareness of health and safety.²⁶⁰ It is this experience together with Swedish practice which suggests that 'roving safety representatives' could help where there are many small workplaces, without the capacity to deal with health and safety themselves. The TUC study shows the union effect in many other countries as well.

In relation to coal mining the debate about the union role has surfaced again in the US after the Sago, West Virginia and Darby No 1, Kentucky mine disasters. Neither of these two mines was union-organised and the present weakness of the United Mineworkers of America (UMWA) compared with its former strength has almost certainly been a factor in the current worsening trend in US mine safety. Of the 33

256 Theo Nichols, *The Sociology of Industrial Injury*, op cit , see Chapter 5, Injuries/Accidents and the Social Sciences Today: Sociology and Political Economy

257 Nichols, Walters and Tasiran, *Working Paper Series No 48*, School of Social Sciences, Cardiff, 2004, quoted in TUC, *The Union Effect*, op cit

258 Nichols, *The Sociology of Industrial Injury*, op cit Chapter 5 p 92

259 Nichols, Walters and Tasiran, *Working Paper Series No 48*, op cit

260 <http://www.hse.gov.uk/research/rrhtm/rr144.htm>, quoted in TUC op cit

killed in US mines in the first five months of 2006 only three worked in union mines.²⁶¹

The Government Mines Safety and Health Administration (MSHA), responding to the recent disasters has said:

*Miners also have to become more responsible for their own safety. They have to be more aggressive in their efforts to point out potential hazards in the workplace and take action to remove those hazards before someone is hurt or killed. No one in the mining environment is more aware of the potential hazards than the workers who are actually there on the scene.*²⁶²

Such action by individual workers, in the absence of union support or statutory protection against dismissal is unlikely in non-union mines. The earlier history of US coal mining trade unionism confirms this: a study by William Boal of the effect of unions on accidents in early twentieth century mining analysed two datasets – a state-level dataset where unionism is measured by membership, and a mine-level dataset where unionism is measured by contract coverage.²⁶³ In both datasets unionism lowered accidents by around 40% and was most effective at mine level, possibly through miners refusing to work in unsafe workplaces.

For these reasons among others, a structured system of rights buttressed by protections against dismissal for safety representatives has been designed into European law and the health and safety regulations in other countries.²⁶⁴ In Australia, for example the District Check Inspector (union safety official covering several mines in a district) has the power to suspend operations in the event of operator non-compliance with the law leading to danger to workers and in New Zealand, worker safety representatives can issue a hazard notice and advise workers to refuse dangerous work when faced with imminent danger (See Appendix 1 for a description of the role of mineworker inspectors in the UK, Australia and New Zealand). It is noteworthy, too, that the 72

261 Kris Maher, “As Demand Rises, Risky Mines Play a Bigger Role”, op cit

262 David Dye, acting Assistant Secretary of the MSHA, quoted in “Safe and Sound?”, *Mining Magazine*, July 2006 op cit

263 William M. Boal (2003), *The Effect of Unionism on Accidents in Coal Mining, 1897-1929*, ms Drake University

264 Dave Feickert, *Training For Worker Safety Representatives in Coal Mines*, paper to International Conference on Occupational Safety Training, Beijing August 2006

miners trapped underground by a devastating fire at a Canadian potash mine shortly after the Sago disaster, were not only rescued 24 hours later but credited their survival to the safety training they had received.²⁶⁵ Their union, the Communications, Energy and Paperworkers, had pressed for training and paid time to prepare for underground disasters. Similarly, the union role was apparent in the Beaconsfield gold mine accident in Tasmania, Australia in May 2006, during which one man was killed but two other miners were rescued after being trapped for nearly two weeks.²⁶⁶

It is interesting, too, that industry-wide discussion on mine safety in the US, following recent disasters, has concluded that:

- The industry needs a better safety culture based on managing risk; and a culture of accident prevention.
- Today, safety decisions are routinely made at every mine; but now they must be made proactively and systematically.
- Safety must start with a mine-specific, bottom-up approach that analyzes the individual risks of each mine independently of the others and then develops safety plans accordingly.
- Each mine must be treated as a series of separate training and technology safety challenges, much as a physician examines each patient's condition before prescribing treatment. This way safety threats can be better anticipated and action taken before they become accidents.
- The aim should be for a zero lost time accident rate.²⁶⁷

265 TUC Safety Bulletin, *Risks 244*, February 18 2006

266 Press Association, *Independent Inquiry Into Mining Tragedy*, Wanganui Chronicle May 11 2006

267 See for example, Mine Safety Technology and Training Commission, *Improving Mine Safety Technology and Training: Establishing US Global Leadership*, December 2006 including observations by the Commission Chair, R. Larry Grayson

5.7 The role of unions in health and safety in China

In China, the role of unions in health and safety has recently been the subject of discussion and decision at the National People's Congress, where the Prime Minister called on trade unions at all levels to bring their role into full play "especially in work safety supervision" to better safeguard workers' interests.²⁶⁸ Premier Wen Jiabao, referring to a series of serious work safety accidents said it was imperative to strengthen work safety training. He said "We shall promote their awareness of safety and strengthen their ability of self-protection. Trade unions in China are workers' own organisation, and they are not set up by employers," when answering a question by a French journalist about the 'independence' of China's trade unions.

As far as Chinese occupational health and safety law is concerned the rights given to Trade Union Occupational Health and Safety Inspectors are very clear.²⁶⁹ Under Article 5.8 of the Regulations, for example inspectors are entitled to recommend to management to take urgent measures and evacuate workers in the event of immediate danger and, if management does not take such action, to organise workers to take the necessary measures to avoid risk and to submit reports right away. However, these are professional inspectors graded higher than an assistant engineer or with qualifications higher than college graduates, or have been trade union officials working as section heads and have more than five years occupational health and safety experience.

In May 2005, the Chinese leadership announced that the appointment of 100,000 worker inspectors in coal mines would take place, beginning immediately.²⁷⁰ These would be workforce safety supervisors or inspectors. In practice many of these worker inspectors have been appointed to township mines and some small mines and

268 People's Daily Online, *Premier Stresses Role of Trade Unions in Work Safety Supervision*, http://english.people.com.cn/200603/14eng20060314_250521.html

269 All China Federation of Trade Unions (ACFTU), *The Regulations for the Trade Union Inspections on Occupational Health and Safety*, April 1997 www.ilo.org/public/english/region/asro/bangkok/asia-osh/country/china/tradeun...

270 This was initially announced by Wang Zhaoguo, President of the ACFTU and member of the Politburo of the CPC, to a delegation from the NZ Council of Trade Unions, led by Ross Wilson, President, in May 2005 and later announced in a press release.

their wages are paid by the state, to maintain their independence from the owners.²⁷¹ In the large state-owned mines, the safety structure already includes worker and union involvement, although this could be substantially improved if the safety triangle system (referred to above and in Appendix one), based on worker inspectors, managers and government inspectors, were to be adopted. At the core of the ‘worker inspector’ concept is the view that everyone must be involved in safety organisation and that those who are most directly affected by safety failures, must have a voice.

Moreover, in 2006 the State Administration of Coal Mine Safety and the All-China Federation of Trade Unions announced that they would join forces in a campaign to boost the migrant workers’ health and safety, part of which is to guarantee workers the right to refuse risky assignments.²⁷²

The campaign is based on Chinese labour law which entitles workers to refuse dangerous work and is focussed particularly on migrant workers, as official statistics show that 75% of those killed in 2005 in coal mines and on construction sites were migrant workers.²⁷³ It is estimated that half of the coal miners in the country are migrant workers from the countryside. The two organisations acknowledge that it would be difficult for workers to refuse dangerous work, in practice, without strong support and that workers acting according to their rights could be dismissed. Therefore, effective law enforcement is seen as necessary to sustain the enactment of this right. Its nature as a campaign was also emphasised by China’s safety authorities as a way of re-enforcing the exercise of this right.²⁷⁴ The joint campaign by the two organisations will also deal with inadequate safety training of migrant workers and the employers who force workers to take on unsafe assignments.

271 Information reported to the author by the Chinese delegation attending the China-New Zealand Mine Safety Co-operation Seminar, April 16-26 2007, Huntly, New Zealand.

272 China Daily June 21 2006, *Right to Refuse Dangerous Work*

273 Ibid

274 Interview with Mr Bai Ran, Director General of the National Center for International Exchange and Co-operation on Work Safety, State Administration of Work Safety, Beijing 21 June 2006.

5.8 What health and safety system is best in hazard management?

What approach should be followed by China, overall? While the ILO Code provides good, general guidance, any mine or mining company will need to develop its own more detailed system. During the course for Chinese coal industry delegates in Huntly, New Zealand in April 2007, the tutor team put forward a model, based on New Zealand law and experience.²⁷⁵ This involved hazard management (hazard identification, control, information, monitoring); employee involvement; training and supervision; emergency readiness; incident and injury reporting and investigation; contractor management; provision of protective equipment and injury management, rehabilitation and safe return to work. As the Chinese delegates observed, their mines were following a similar approach but there were some important differences, too. In the course evaluation they reported that in their opinion the NZ health and safety system, emergency preparedness and active participation of the employees was at a high and advanced level. The attitudes of the Government and different levels of management and employees were also at a high level. NZ was a very developed country and people-orientated.²⁷⁶

A further discussion of these issues took place in Inner Mongolia, China in June 2007. The leading coal company in that province, Yitai invited 50 of its own senior staff and local State Administration of Work Safety Inspectors to a week long seminar with New Zealand and British tutors. Yitai has a fatal accident rate similar to the US rate: 0.036 fatal accidents per million tonnes of coal produced, over the two years 2005, 2006, compared with a range for the US of between 0.018 – 0.040 over the last 10 years²⁷⁷. Yitai is a successful, diversified company producing solar panels, pharmaceuticals but also developing coal liquefaction and growing its coal business rapidly. It demonstrates a commitment to mine safety from the Board level to the coal face. Its senior management asked SAWS for the seminar to be arranged so

275 Hazel Armstrong, *Health and Safety System in New Zealand*, course study materials, April 2007, NZCTU

276 NZ-China Mine Safety Co-operation: course evaluation, unpublished ms, NZCTU, April 2007

277 Frank Warner, *US Coal Mining Deaths 1980-2006*, http://frankwarner.typepad.com/free_frank_warner/2006/01/us_coal_mining_.html

that their senior staff could benefit from foreign experience. There was a vigorous discussion about comparative approaches and the delegates felt that they had learned a considerable amount about New Zealand and British approaches to mine safety, the nature of safety culture, risk assessment and the system of worker health and safety involvement and representation.

5.9 Conclusion

China's coal mining industry has to face all the major hazards that exist elsewhere: gas and dust explosions causing fires, floods and inrushes of water when miners break into old workings, falls of ground, machinery accidents and the whole range of occupational ill-health that is now so well documented, after more than two hundred years of systematic mining throughout the world. While none of the problems it faces are new, either in the geological and working conditions encountered or the organisational issues raised, the sheer size and differentiation of mining in China create special problems of their own. The challenge to find a solution to these is consequently that much greater and therefore the relationship between safety law, the role of all those with safety responsibilities including trade union and worker safety inspectors and the accident rates in coal mines are crucial ones.

The lesson from the developed countries is clear: there must be strong organisations sustaining the key safety triangle – managers (companies), mines inspectors (governments) worker representatives (unions). Strong unions are necessary at all levels, including underground, or the government inspection authorities come under increasing pressure to ignore poor safety management by companies, not to prosecute and to permit a slide towards self-regulation alone. This has been a persistent feature where the union safety role has been absent or is in decline or where companies come under severe competitive or production pressures. This can happen in both market and centrally planned economic systems.

There must be a worker's watchdog, to encourage the government watchdog, with both encouraging best practice in managers. But the three must work also as a partnership

for success: both watchdog and partner. The temptation, especially among managers operating in market economies, under considerable senior management pressure to produce and make profits, becomes too great to let things slide or to even become drawn into corruption. The latter is a serious problem in the Chinese small and medium sized mine sector, where relatively vast wealth can be made. The campaign to establish a properly functioning safety culture and organisation is essential if China is to short-cut the arduous road to development and its 'accident prone period' to a minimum in its coal industry. The model being used in New Zealand offers some excellent features from which the Chinese coal industry can learn. In any event, a Chinese solution to the safety problems of its coal industry will be found.

Chapter 6

The safety problems of the small mine sector

6.1 The worst accident rate

The small private mine sector has by far the worst accident rate, measured in fatalities per million tonnes of output. This has been well-documented by different observers such as a group of 10 Hunan Normal University students who interviewed 545 miners over a two year period. Their report ended up on the desk of Minister Li Yizhong.²⁷⁸ The miners, some of whom were also working on their land as well, worked long hours and were fatalistic about the likelihood of death or serious injury. Tim Wright has provided a clear overall analysis.²⁷⁹ As the annual production cycle came to a close in November-December 2006, the number of accidents rose to the highest level in these mines for five months.²⁸⁰ During November more than 150 accidents killed 420 miners, most of these in small mines.²⁸¹ Coal demand was soaring as winter approached and the central government had already put back its 2008 deadline for closing the unsafe and inefficient small mines to 2010. It is no easy task to get reliable and accurate statistics for injuries in small mines. Wright's figures from official sources for the three years 2001-2003 are:

278 Asia Times 5.3.07 www.atimes.com/atimes/China_Business/EO3Cb01.html

279 Tim Wright (2004), *The Political Economy of Coal Mine Disasters in China: "Your Rice Bowl or Your Life*, in *The China Quarterly* 179, p 629-646 Cambridge University Press. See table 1 page 631 and table 2, p 633

280 Bloomberg-USA, *China Coal- Mine Deaths Rise as Owners Resist Closure*, December 7, Untied States Mine Rescue Association www.usmra.com

281 Ibid p 1

Table 1: Fatal accidents per million tons in Chinese Coal Mines 2001-2003²⁸² and numbers killed in 2003

Year	All mines	Large state owned mines	Local state owned mines	Township and village mines
2001	5.20	1.59	4.63	14.82
2002	4.64	1.26	3.79	11.73
2003	4.17	1.08	3.13	9.62

Numbers killed²⁸³

2003	6,434	892	881	4661 (72%)
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However, the figures for 2001 and 2002 may well be unreliable, due to under-reporting of output from the sector. Wright has discussed this in some detail, noting that some commentators calculate that official figures understate output by up to 250 million tonnes in 2000.²⁸⁴

As can be seen in Table 1, in 2003, 72% of the recorded fatal accidents took place in small mines. These mines produced about a third of total output. It is the special safety and economic problems of the sector which make it a candidate for a separate analysis. The small mines cannot be understood only in terms of mining practice in the context of the energy economy but have to be seen in the special frame of reference of rural China, where most of them are located. This stands out when examining the success of sequential government campaigns to close down as many small mines as possible. The most recent campaign in 2006 has more or less ground to a halt as gathering resistance by local authorities, owners and managers has deepened. It has foundered also on China's vast demand for energy in a booming economy. However, initial official statistics for coal mine fatalities in 2006 suggest there has been some impact. SAWS reported that by April 2006 5,931 coal mines failing to meet safety standards had been closed helping to bring about a fall in the fatal accident rate of 27.4% in 2006 compared with 2005. The total deaths for the industry fell in 2006 to 4,746.²⁸⁵

282 Tim Wright (2004), *The Political Economy of Coal Mine Disasters in China: "Your Rice Bowl or Your Life"*, in op cit p 631

283 Asian Development Bank, *People's Republic of China: Coal Mine Safety Study, Technical Assistance Report*, October 2006 p 1

284 Tim Wright (2006) *State Capacity in Contemporary China: 'Closing the Pits and Reducing Coal Production'*, University of Sheffield, p 26

285 Guan Xiaofeng, "Mine safety to improve further, says minister", in *China Daily* January 25 2007 http://www.chinadaily.com.cn/china/2007-01/25/content_791886.htm

On the one side, the price of coal at around \$US 50 per ton means that small fortunes can be made in the relatively impoverished countryside where coal measures outcrop or are in easy reach at shallow depths. On the other side the sector employs around 2 million people – mainly poor farmers, who would otherwise be buried in poverty or be forced to migrate to the cities along with millions of others. In addition, local authorities draw a great deal of revenue from the small mines operating in their territory, while also being responsible for supervising both production levels and mine safety in their areas. Local government officials face warnings, demotions, dismissal and prosecution for production safety transgressions under new rules jointly issued by SAWS and the Ministry of Supervision.²⁸⁶

In November 2006, in response to the increasing fatality rate in Shanxi Province, the Provincial Government and SAWS imposed a new rule, limiting to 100 the maximum number of people allowed underground during any shift in state-owned Township and Village (TVE) medium sized coal mines. This was done in order to prevent the mad rush for production, with managers going beyond agreed mine capacity, based on safety limits. The difficulty in enforcing closure orders was revealed by Li Yizhong, the Minister for SAWS and Zhao Tiechui, the head of the SAWS Coal Mine Safety Supervisory Bureau in November 2006.²⁸⁷ Zhao challenged a County head, asking why they had not shut a particular mine down. The official replied that they had blockaded the mine, but not blown up the entrance, as required. The mine had been re-opened and later 32 miners were killed in an accident.²⁸⁸ In addition, in an attempt to divert the national officials, the local government had shut another smaller mine and claimed they had closed the targeted mine. The two officials gave other examples of where mines with a design capacity to produce 50,000 tons per year were certified to produce 150,000 tons by local officials.²⁸⁹ In such situations, reporters investigating

286 Xinhua, *Four County-level Officials Dismissed for Fatal Mine Accidents in North China*, People's Daily Online, http://english.people.com.cn/200611/24/content20061124_324893.html

287 Xinhua, *Local Officials Often Behind Colliery Accidents*, China Daily, November 30 2006, http://www.chinadaily.com.cn/china/2006-11/28/content_745325.htm

288 Ibid p 1

289 Ibid p 2

fatal accidents have also been detained by the local authorities, as in the case of the Luweitan mine gas explosion which killed 24 men in Shanxi Province.²⁹⁰

In yet another bizarre twist, 80 people were arrested for claiming to be “reporters” and for extorting money from officials and owners of illegal mines by threatening media exposure.²⁹¹ The national media regularly reports on official cover-ups of fatal accidents, which are in turn followed often by prosecution of the officials involved. This incident echoes the story line in the award winning film about small Chinese mines, *Blind Shaft*.²⁹² This shows two rogue miners searching out naïve poor young farmers looking for work, pretending they are their relatives, then murdering them underground and threatening the small mine managers (working their mines without permits) with exposure to the authorities if they are not compensated for the loss of their ‘relative’. Yet another example of the exposure/extortion phenomenon reached the very top with China’s President Hu Jintao becoming involved: the incident occurred in January 2007 when a reporter for the *China Trade News*, based in Beijing, was murdered by some thugs at an illegal mine he was investigating in Shanxi Province.²⁹³

290 Reporters Without Borders, *Journalist Reportedly Arrested for “Illegal Interviews” With Coal Miners After Accident*, http://www.rsf.org/php3?id_article=19960

291 Reuters foundation, *China Mining Town Rounds up Fake Reporters*, Reuters December 10 2006, <http://www.alertnet.org/thenews/newsdesk/PEK275760.htm>

292 <http://www.kino.com/blindshaft/>

293 Washington Post.com, *China’s Hu Takes Up Case of Dead Reporter*, <http://mail.google.com/mail/?view=page&name=gp&ver=sh3fib53pgpk> Story from Reuters January 24 2007

The most recent overall statistical breakdown of manpower and output by sector in the industry has been calculated as:

Table 2: Numbers employed and output by sector in the Chinese coal industry 2004^{294, 295}

Mine type	Manpower (millions)	Output (million tons)
Large state owned (SOE)	2.63	922
Local state owned (LSOE)	0.25	315
Small mines (TVE)	2.02	719
Totals	4.90	1956

Small mine output was 37% of the total in 2004. Feng Zhang, an analyst for J P Morgan Chase Co, Hong Kong, suggested that the campaign against the small mines had not affected sector total production in 2005.²⁹⁶ Some mines have been closed and later they have been re-opened. New ones have opened as well or existing mines have stepped up production to meet demand.

6.2 Socio-economic tools for evaluating the role of small scale mines

As was noted in chapter three, coal producing countries with small mines, whether developed or less developed economically, face some common dilemmas. Accident rates in small mines in both the UK and the US were between four to ten times as high as larger mines, in the periods examined by quoted studies – in other words similar to the relationship in China (see Table One). Yet, small mines fulfil other important needs, employment being one of them, often in more remote communities where other employment is scarce. This is also clearly the case in China, where small mines provide employment for two million directly and possibly up to twice that number indirectly, with these workers supporting whole families in many cases, including parents in retirement and other siblings with their education fees.

294 China Statistical Year book 2005, www.stats.gov.cn/tjs/nds/2005/indexeh.htm

295 Tim Wright (2005) table , unpublished ms

296 Bloomberg, *China Coal- Mine Deaths Rise as Owners Resist Closure* op cit, p2

The coal economy is much wider than just the mines themselves. Wider economic multipliers in the UK coal industry have been extensively researched, calculated and presented in evidence in the statutory Modified Colliery Review Procedure (which existed during the rapid closure programmes of the 1980s and 1990s), revealing various estimates ranging between one to two associated jobs being lost for every direct mining job.²⁹⁷ Larger mines, like those operated by the UK National Coal Board and its successor company, British Coal had greater call on other resources and a larger economic footprint than China's small mines, but it would be surprising if the positive and negative economic multipliers did not fall between one and two. This is indicated by Wright in the study quoted above.²⁹⁸

One major study of policy formulation for small mines has summed the situation up accurately:

*The effective management of small-scale mines is one of the major challenges for governments in the mining sector. Small-scale mining may bring tangible, short-term benefits to the communities involved. However, these benefits are frequently outweighed by the costs incurred in terms of illness, injury, pollution, waste of natural resources and market distortions.*²⁹⁹

The same study then notes that governments and other policy makers are quite able to draw up action programmes to deal with problems but then find it difficult to

297 See, for example: Andrew Glyn (1984), *The Economic Case against Pit Closures*, Oxford University/NUM 1984 and Trades Union Congress (1993), 'Pit closures: the costs to the taxpayer', March 1993, which both provide sector analysis, while Chas Critcher, Dave Parry, David Waddington (1995), *Redundancy and after: a study of ex-miners from Thurcroft In the Aftermath of Pit Closure*, Sheffield Hallam University, looks at a case study.

298 Tim Wright (2006), *State Capacity in Contemporary China: 'Closing the Pits and Reducing Coal Production'*, op cit p12 – Wright calculates that TVE mines provided employment for 2 million farmers in 1985 and wages of Yuan 2.5 billion, with the wages of workers in related construction and transport industries equivalent to Yuan 1 billion. This does not calculate the impact of the whole coal economy on wider employment, such as the provision of local services such as shops and government services or the mining equipment industry.

299 Philip Andrews-Speed et al (1) (2002) A Framework for Policy Formulation for Small-scale Mines: the Case of Coal in China, *Natural Resources Forum* 26, pp 45-54. a United Nations Journal p 45

implement them.³⁰⁰ It identifies two requirements for success, with reference to Chinese experience. These are the alignment of interests and the attitude and effectiveness of government. Once this is clear it is necessary to identify key blockages and those parties who need to be influenced for success.³⁰¹

The authors of this study propose a two by two matrix designed to show the alignment of interests depending on whether the small mines are needed for the coal itself as an energy source or the mining process for socio-economic and employment reasons.³⁰² The matrix is established to identify the factors policy makers need to take into account in designing a small mines policy for particular communities and regions. It does not represent an optimal set of conditions as such but rather provides a possible method for identifying and balancing different interests.

The authors provide some examples by province, such as Shanxi where there is an alternative coal source from large mines but where the socio-economic need is high; Yunnan, Guizhou and Sichuan where there is a high need for both factors and Hebei and Jiangxi, where there is a low socio-economic need but a high energy need. The study finally develops another tool, also a two by two matrix, to assess government effectiveness and commitment as the two critical factors.³⁰³ Effectiveness is broken down into two further factors: socio-economic issues, such as per capita GDP of the area, and characteristics of the TVE's themselves such as size and geographical proximity to urban centres and large mines. Commitment is analysed in terms of socio-economic factors such as level of unemployment, level of education and the local energy economy.

Andrews-Speed, together with another group of collaborators also analysed the impact of the Chinese government's small mine closure programme of 1998-2002.³⁰⁴ The impact, the study suggests, was disastrous, with hundreds of thousands losing their jobs

300 Ibid p 45

301 Ibid p 45-46

302 Ibid p 50

303 Ibid p 52

304 Philip Andrews-Speed et al (2005) , Economic Responses to the Closure of Small-scale Coal Mines in Chongqing, China, *Resources Policy* 30 , pp 39-54,

and many local governments seeing immediate declines in revenue.³⁰⁵ The study itself focussed on the Chongqing Municipality in south-west China where many hundreds of the 75,000 to 80,000 mines were closed. It reviews, but only partially the literature describing and analysing the experience of socio-economic impact of closure in selected countries and regions, mainly in Asia, with some reference to Germany. It is strange that there is no reference to the European Union's RECHAR programme set up in response to a powerful lobbying campaign by the European coalfield communities (local and regional governments) and funded via the European Structural Funds.³⁰⁶

6.3 Eligible measures under the EU RECHAR Programme (Summary)

1994-1999

The RECHAR programme provided in the second period for the following measures, which have some relevance for China:

- Environmental improvement and restoration to other commercial uses of old mining buildings in seriously damaged areas, renovation of social and economic infrastructure in mining villages (community facilities, water, electricity, etc.) as part of an economic re-deployment strategy.
- Promotion of new economic activities, and in particular those undertaken by small firms, through various supporting measures (new industrial premises and advance factory units, productive investment, access to risk capital, common services, market studies, co-operation networks and innovation in products and processes).
- Promotion of tourist activities, particularly those based on the industrial heritage.
- Assistance to bodies concerned with economic conversion and regional development.
- Assistance for training and employment, particularly in small firms whose activity is essential for the development of the area, and for the retraining of miners and former miners.

305 Ibid p 39

306 See European Commission website – http://ec.europa.eu/regional_policy/funds/prord/prordc/prordc9.htm

- Interest subsidies on ECSC loans, particularly those for small firms, and any conversion measures eligible for an EIB loan.
- Promotion of cross-border co-operation between coal-mining areas.

Funding 1994-1999

- ECU 459 million, of which ECU 142 million was allocated to Objective 1 regions. 307

A similar programme existed for the steel industry and these two became models for handling restructuring in industrial regions which were dominated by one or two traditional industries. Chinese delegations have visited the European regions on a number of study trips and continue to do so. The Chongqing study sketched out the reasons for the explosive growth of small mines in the 1980s when China faced a crisis of energy supply:

- The exploitation of small, marginal coal deposits which could not be mined by large mines;
- Proximity of coal to local markets;
- Fuel substitution, especially where deforestation had removed the other main fuel source;
- The role of small mines in providing competitive pressure on large mines.

During this period, as both Andrews-Speed and Wright have observed, the new laws and regulations for mines drafted in the 1980s and 1990s were often ignored in the interest of economic growth and profit.³⁰⁸ These regulations were not implemented widely in the small mine sector until the late 1990s when the closure campaign began.

307 Ibid p 1

308 Philip Andrews-Speed (2005), *Economic Responses to the Closure of Small-scale Coal Mines in Chongqing* op cit p 42; Tim Wright (2004), *The Political Economy of Coal Mine Disasters in China: "Your Rice Bowl or Your Life"*, in *The China Quarterly* 179, p 629-646. See table 1 page 631-632

6.4 Closure campaign 1998

Wright identifies several factors behind the closure campaign of 1998.³⁰⁹ The sweeping economic reform programme made the SOE mines and their workforces more vulnerable to competition from the TVE mines; there was excess supply of coal and the poor working conditions and the environmental degradation associated with the small mines was attracting more attention. As noted in earlier chapters, the deregulation of coal prices in 1994 had led to more fierce competition between the mines at the opposite end of the size continuum. A closure policy was elaborated by the Beijing government in 1997, requiring the closure of all mines without the two requisite permits for mining, and for output. Any small mines threatening the safety or long term development of large mines were to be closed. The State Economic and Trade Commission set targets for the closure by 2000 of 18,900 small mines.³¹⁰ Following a major disaster in June 2001 the State Council ordered the closure of all small pits operated by large ones.

However, by 1999 efforts to implement the closure policy became increasingly sporadic, although there had been a shift in emphasis to safety, environmental and conservation issues rather than output reduction owing to the former surplus. By mid 2000 the coal market was improving and overall output has climbed steadily since, more than doubling from 1,000 million tons per year to 2,100 millions tons, according to official figures. According to Wright, however, the production from the small mines was under-reported by nearly 300 million tons.³¹¹ The small mine closure programme foundered on the rising demand for coal on the one side, but equally, on the other, it failed through lack of state capacity to carry it through and for socio-economic reasons (need for employment in villages, revenue for local authorities). The ability of the centre to enforce its will on local populations has been an age-old question in Chinese history and even if the centre has had its way at the outset, the effect quite often lessens over time. The same phenomena have been observed once again in the small mine closure programme of 2005. This programme, as before, has now been suspended.

309 Tim Wright (2006), *State Capacity in Contemporary China: 'Closing the Pits and Reducing Coal Production'*, op cit p 4

310 Tim Wright (2006) *ibid*, p 6

311 Tim Wright (2006) *ibid*, p 21

6.5 Environmental degradation

Small mines, with their primitive techniques, inefficiencies and poorly trained workforces, combined with the ‘get rich quick’ mentality of many of the owners or rentiers also bring major environmental damage to rural China. Andrews-Speed lists the following specific environmental impacts:

- Destruction of arable and grazing land through;
- Accelerated erosion of top soils;
- Landslides;
- Collapse of old workings;
- Dumping tailings;
- Lowering of water tables;
- Contamination of soils by mine dusts;
- Increased levels of sediment load and flooding in adjacent rivers;
- Disturbance of local water tables leading either to flooding of land or to a shortage of water.³¹²

The pollution from small mines cannot be easily separated, in Government statistics, from the pollution coming from other township and village industrial enterprises, but the totality of the environmental degradation from these industries is very large indeed. These enterprises produced 50% of China’s total industrial output in the 1990s.³¹³ To clean up these regions will take an enormous effort, so extensive has been the damage. They do not have the resources or focus that cities like Beijing may have, where natural gas is used for space heating and atmospheric pollution is controlled much more strictly. The wider health impact on regional populations must also be assessed if the true picture of health and safety damage is to be arrived at in coal mining practice in China.

312 Philip Andrews-Speed et al (2003), The Regulation of China’s Township and Village Coal Mines: a Study of Complexity and Ineffectiveness, *Journal of Cleaner Production* 11, p 186 Elsevier

313 Philip Andrews-Speed, (2003) *ibid*, p 187

6.6 Conclusion

Even though the statistics for coal mine accidents in the small mine sector are notoriously unreliable, it can be said that, on the basis of a measure of fatalities per million tons, small mines are at least 8 times more dangerous than the large SOE mines. Medium sized mines are around three times more dangerous than large mines. The toll of serious and less serious injuries is presently unknown, but, given a relationship of 5:1 for major injuries to fatal injuries, around 28,000 of the 2 million workforce would have been taken out of the small mine sector through death or serious injury in 2003, or 14 of every 1,000 employed. Added to these figures must be the health damage to both miners and residents living in mining regions.

With demand and prices as high as they are at present and inadequate state capacity to follow through local closure programmes, it is likely that this scale of damage will persist unless there is a significant policy change. Any policy shift must address both local government dependencies on mining for revenue and their capacities to implement national closure policies, the need for extra or alternative employment for poor farmers and the fuel requirements of local economies. One possible alternative policy would combine a socio-economic appraisal with a safety programme adapted to fit this appraisal both with the active involvement of the local government, industry and the people directly concerned. The first element: socio-economic policy would see small coal mines as part of the rural economy, perhaps even more than part of the national energy economy, identifying the need for perhaps the only local fuel available. It would also start from the premise that poor farmers require positive agricultural policies to help build the other part of their economic lives, especially where they move between the two, according to the agricultural rhythms.

Any safety policy must include basic miner training for the rural farmers working in the industry, before they enter their first mine. This could be done at low cost, simply, and funded by a revenue stream taken by the local authority in the form of existing levies. This would require teams of skilled trainers and a training package

specifically adapted to small mine conditions. At the same time, where possible, appropriate mining technologies will need to be introduced to make these small mines more efficient and less damaging of the environment. The ACFTU qualified labour inspectors should have a regional presence, but the Scandinavian idea of roving worker safety representatives could also be tried. They could cover groupings of small mines and secure greater protection from discrimination by ruthless owners than if they were employed individually in a small mine. They could work with the labour inspectorate and the local authorities as well. This would add a bottom-up approach to safety organization, which is one of the most important deficiencies of present safety practice throughout the Chinese coal industry.

Finally, what of the owners? Why should they co-operate in a programme, which looks likely to increase their costs and reduce their profits? Here, a mixture of the stick and the carrot could be tried, rather than just the stick or nothing as at present. Here the stick would remain the threat of closure and blowing up of their undertakings, fines, imprisonment but the new carrot could be business advice, small loans for investment in new machinery and safety and perhaps, should the owners be interested, assistance in diversification into regional agricultural industries, the other main local source of wealth, when their mines need to be shut for safety reasons. As long as the small mine owners do not have 'buy in' and as long as energy demand keeps coal prices high it will prove extremely difficult to solve the safety problems of China's small mines. It is the state capacity to facilitate this kind of economic solution, supported in turn by its weak regulatory powers, that is critical to the outcome. A bottom-up safety organization could prosper and reinforce such a new dynamic. Here, there is grounds for optimism, as there are a growing number of examples of new or re-organised agricultural enterprises springing up, aided by both Chinese and foreign experts.³¹⁴

314 Discussions with Peter Feickert, Agricultural Adviser to Sichuan Province for 12 years

Chapter 7

Conclusions and Recommendations

7.1 Main issues

In Chapter one a discussion of the development of China's coal industry in the context of sustainable development was introduced, although the specific focus of this thesis is coal mine safety. The main issues could be presented as:

(1) longer term and partial:

- China's 'socialist market economy' could lead to a 'market society' along US economic lines or a 'social market economy' on European Union lines. If it is the latter which emphasises partnership and co-operation at work, the health and safety problems of the coal industry (which are more than 100 times worse in terms of fatal accidents per million tonnes of output than its nearest comparator by size, the US) are more likely to be solved more effectively.
- In the process China's energy development will increasingly provoke a solution to growing global energy and environment problems, such is the scale of China's energy demand and future fossil fuel emissions. This is already creating the basis for testing the possibility of a new global energy and environment model. Safety in mining cannot be separated from this, either, as the emerging culture will need to concern itself with human ecology in the workplace, cleaner production to minimise the pollution of immediate surroundings (village/township/city health and environment) as in global ecology.

(2) nearer term and more detailed:

- Developed country safety technology and techniques need to be transferred to China if the health and safety problems are to be solved quickly.

- The ILO Convention on mine safety can be a useful benchmark to guide both foreign assistance and local action; and
- Together these measures will determine whether China, as a developing country can leap-frog the arduous road to development at least in the coal industry, thereby providing a social benchmark for the rest of the economy. In the developed European coal producing countries, this arduous period lasted for at least 150 years, before accident rates began to fall rapidly. Coal mining in China has been substantial for around half of that time already and the major transfer of technology and techniques has been taking place for only a few decades.

These, in turn were summarised as two key questions:

- 1) Given the present human and economic cost of injury and disease, could a different strategy, using internationally tested methods in the most advanced coal industries, reduce dramatically the toll in China's mines, especially with the co-operation of the major mining countries and industries?
- 2) As China's coal production/consumption is the biggest single factor contributing to global climate change, can the developed world afford not to engage in the transfer of the expertise required for China's key energy industry to leapfrog the dirty, unsafe period of industrial revolution?

7.2 Societal choice and sustainable development – the longer term

After more than a decade of very rapid economic growth, China increasingly faces a societal choice: does it go in a more neo-liberal economic direction on a US model or does it opt for a more 'social' model, perhaps along the lines of the European Union. This is referred to in Chapter One. It is still too early to say in which direction the country will go. This is not a choice to be made during the life of a two year thesis. One interesting illustration of the real life debate occurred recently, with the publication of the draft proposals for labour law revision.³¹⁵ The draft law was translated by Western lawyers and circulated by the American Chamber of Commerce in Beijing. Many American and some European companies with large operations started to lobby strongly against some of the draft proposals. American and European trade union

315 Squire, Sander and Dempsey Beijing Office, *Labor Contract Law of the Peoples Republic of China (Draft)* unofficial translation 2006

organisations became involved in a counter-lobby and the European Trade Union Confederation and its affiliated unions successfully persuaded some of the European firms to desist.³¹⁶ European trade unions, together with those in New Zealand and Australia are engaging in practical projects with their Chinese counterparts in the ACFTU or directly with the Chinese Government.³¹⁷

The Chinese labour law proposals are, compared to existing EU law, minimal standards, albeit improvements and clarifications of existing employment rights. Whatever the outcome of this and a more general societal debate, it will be a distinctive Chinese solution which emerges. This can be seen in the decision to appoint 100,000 ‘worker safety supervisors’ a role which is entirely new but one which is not yet clearly located in the mine safety structure. Similarly, the debate over what system of worker compensation and rehabilitation after accidents is stepping up, but as yet it remains unresolved. The outcome will have to do with the weight of China’s history, the depth of its institutions and enduring value systems as well as its recent political history, its size, economic capacity and role in the global economy. In some ways these are, individually, well known factors, but the interaction between them all and the country’s present industrial revolution is not yet well understood, especially outside China, but even within.

Such is China’s weight in the global economy that other nations and especially the global institutions need to take heed of Chinese developments. This is especially the case from the viewpoint of sustainable development – economically, socially and environmentally. China is likely to be the world’s largest economy in the latter half of this century. It is already the world’s second largest energy user and producer of carbon dioxide emissions, the main greenhouse gas. It will soon be the first. Some of these issues are summarised in Chapter Two. The basis of the energy economy in China and the origin of most of the CO₂ emissions is coal, reserves of which it

316 Interview with Tom Jenkins, International Adviser to the General Secretary, ETUC, Brussels several occasions, 2006-7.

317 Perhaps the best example is the two week seminar for Chinese coal mine delegates on mine safety, co-ordinated by the New Zealand Council of Trade Unions (NZCTU) and the Engineering, Manufacturing and Printing Union (EPMU) together with the State Administration of Work Safety (SAWS) and supported by Solid Energy, the New Zealand state coal corporation, and the New Zealand Government in April 2007 in Huntly, New Zealand. A further training seminar took place in Inner Mongolia in June 2007.

has in abundance. The need for global sustainability, and China's role within that, is recognised increasingly by international institutions and international experts.³¹⁸ The Chinese, Indian and Brazilian Foreign and Environment Ministers attended the G8 summit in Germany in July 2007, to discuss action on global warming.

This thesis argues for a *new*, integrated approach which unites mine safety into sustainable development and, moreover, that a sustainable development approach at the country, regional and global levels will not succeed without including coal mine safety and health in China and India the key, very large producers and users of coal among developing countries. The need to do this is not only for environmental reasons but also for directly economic ones. Energy demand in China, India and Brazil, the three large developing countries, is growing rapidly and the growing oil demand of the two former especially is having a global impact on oil prices. This influence is likely to increase further, with the upward price pressure partly depending on the abilities of both Asian giants to develop further their coal industries.

In the light of the fourth assessment report by the Intergovernmental Panel on Climate Change Chinese energy policy needs to become much more sustainable for the planet, for China generally and miners in particular. China cannot do this alone, in the time frame now clearly identified by the IPCC. In a real sense it is possible to talk of the safety of Chinese miners being inseparable from the safety of the planet. And the latter concerns us all. A systematic approach to improving safety in Chinese coal mines will require both much cleaner and safer coal production and consumption. The mining communities, as well as millions of other Chinese inhabitants living in high coal consumption regions, suffer from ill-health caused by pollution.

While CO₂ emissions (unlike coal dust and other types of gaseous emissions) do not normally result in direct ill-health effects locally, the warming of the global atmosphere is already resulting in observable climate change. This is likely to be characterised

318 Both the UNEP and OECD have written about this, with the Intergovernmental Panel on Climate Change researching China's role along with every other country. In the post 2012 phase of the Kyoto Protocol, it is likely that the large developing countries such as China will be brought in, too. The Clean Development Mechanism and the Joint Implementation approach, linking action in and by developed countries with developing countries will become more firmly established, too.

by more extreme changes in the future. The upper end of predicted range of global temperature increase: 1.1 – 6.4 degrees C by the end of the century would, with a high probability, produce extremely severe weather impacts in every region, including in China, drastically affecting its economic and social sustainability.³¹⁹ Although not the main focus of this thesis, action to make energy production and consumption much cleaner in China, with cleaner coal production (less dirt/ash), cleaner local combustion (dealing with sulphur dioxide and oxides of nitrogen as well as soot particles), clean coal technology and carbon capture and storage fitted to large power generation and industrial plants is an essential requirement for a comprehensive local and global solution. The EU has a programme of aid for a ‘zero emissions plant’ in China precisely because it has already set for itself an objective of keeping the planet with an average increase of mean temperature of 2 degrees C.³²⁰ To succeed it will need to persuade the rest of the world to co-operate.

7.3 The coal industry – nearer term

In coal production, what makes it more difficult is the character of the industry: it is so vast and so differentiated between small village private mines, township mines and large mechanised mines in the state sector. Different solutions are needed for each of these, with closure of the worst culprits regarding accidents being attempted now in the small mine sector. And yet the market is fuelling illegality, as demand pushes prices higher in a partially deregulated market. The longer term strategy must involve several aspects. Within wider economic, energy and environmental policy the coal industry has to be a major area of interest. The main effort of the authorities is concentrated on rebasing the industry on large, efficient mines working good seams. This is being done by the kind of reorganisation into large coal combines, envisaged in the 11th five year plan. It requires a large injection of capital. China has considerable capital reserves (US\$1,000 billion, nationally) but capital could come from the West as well as China via joint ventures, or more likely on a basis similar to Western firms

319 Intergovernmental Panel on Climate Change, *Climate Change 2007 – IPCC 4th assessment report*, WMO/UNEP February 2007 <http://www.ipcc.ch/>

320 European Commission, *Second Report of the High Level Group on Competitiveness, Energy and the Environment – Contributing to an Integrated Approach on Competitiveness, Energy and the Environment*, 30.10.06 paragraph one http://ec.europa.eu/enterprise/environment/hlg/hlg_en.htm

taking shares in large Chinese oil companies and banks. This is already starting to happen, with Chinese state-owned coal companies floating some of their shares.

China is unlikely to entirely privatise its coal companies, for the same strategic reasons that the US would not allow China to buy its oil companies. With regard to the township and small private mines, as their coal will be required for some time, a special programme will be needed. The worst safety/environment culprits among these will need to be closed, as the government is presently doing. Elements of a more comprehensive approach for the small mine sector were suggested in Chapter Six and are summarised in conclusion format below.

From a safety point of view, what is also needed is the transfer of best practice, expertise and technology both within China and from abroad. China's most advanced mines are not much less mechanised than Western ones, and its mining engineers no less skilled. However, the management of safety can be improved in China itself. Mining engineers, in particular, need to learn, as they had to in the West that technical improvements certainly help but are insufficient by themselves. Without proper training and use they can be ineffective or even introduce new hazards in the absence of proper controls, as mechanised mining did at first in the West. Incidence of 'black lung' climbed as machine cutting speeds and dust levels rose and before dust suppression technology was developed.

The developed countries took decades – more than a century in the case of the European countries – to learn first, why for societal reasons they should improve safety substantially and secondly, how to do it. The dreadful accident rate in Chinese coal mines is now in full public view both in China and throughout the world in a way that it never was in early industrial Britain, Germany, France or the US. Quite simply, there was no television or radio in 19th century Europe. Television, in particular, brings the images of Chinese disasters to world screens in seconds on the 24 hour satellite news programmes.

The Chinese authorities have embarked on the colossal project of improving mine safety with an increasing amount of international help from the US (US\$2.5m

Department of Labor training for managers, government inspectors and mine rescue brigadesmen), Australia (Federal Government and mine companies – technology transfer), Japan (training for underground foremen), New Zealand (training for managers, underground foremen and coal face safety representatives) and, hopefully in the near future, the EU.³²¹ A number of other international organisations such as the Asian Development Bank and two of the largest global insurance companies are also setting up consultancies on safety and health in mining. The ILO is also, crucially, involved, with a tripartite initiative established between the Chinese government/ILO and the international mining companies and trade unions. In addition to all of these initiatives are the normal trading deals, transferring advanced technology to Chinese mines which work away on a daily basis and the purchase of shares by some multinational firms in Chinese state-owned enterprises which have floated a minority of their shares.

The Chinese authorities are genuinely beginning to grapple with the very difficult issues involved. As was the case in the UK, for example, the various interests – Government (politicians, government energy economists, mines inspectors), owners, mining engineer/managers and unions are being forced to find new ways of working together. What will help here more than anything else is the development of a concept of safety organisation which includes joined-up thinking and co-operation between these groups. Miners' safety representatives, 100,000 of whom have been appointed recently, need to be given clear powers and properly trained. It is in the miners' most direct interest to help solve these problems and it is clearly in the interests of the country to do so, too.

321 See for example reports of the co-operation on mine safety with China with the US Department of Labor and the New Zealand Council of Trade Unions to be published in the near future: Dave Feickert and Eastern Research Group, Inc, *Final Evaluation of the Program to Improve Mine Safety in China*, 2007 and Hazel Armstrong and Dave Feickert, *Report of the China-New Zealand Mine Safety Co-operation Seminar*, 2007 New Zealand Council of Trade Unions

7.4 Improving the safety and health of Chinese coal mines: an integrated approach

a) The international context – ILO Guidance, ILO code

China is engaged in re-organising its industrial safety systems. This is being led from the top, with regular references to it by both the President and Prime Minister. A major investment programme in heavy industry safety and health is underway. This is no easy task in such a large country and in huge industries. Deep cultural change is required in organisations which were created in a different time, in a different economic system and in conditions of arduous development, with little capital available. However, the transfer of international expertise and technology is made easier by China's active participation in international bodies like the ILO. A good starting point, providing an underlying framework, is the ILO position paper, *Guidelines on occupational safety and health management systems – ILO OSH 2001*³²² The thrust of this document is that occupational safety and health (OSH), within the national laws and regulations of each country, are the responsibility and duty of the employer. Moreover, the employer is required to show strong leadership and commitment to OSH in the organisation and make appropriate arrangements for the establishment of the OSH management system.³²³ “The system should contain the main elements of policy, organising, planning and implementation, evaluation and action for improvement.”³²⁴ There should be a process of auditing these stages, with the aim of continuous improvement.

The ILO has also recently produced an industry specific code of practice on safety and health in underground coal mines.³²⁵ A Chinese representative sat on the Committee of Experts, responsible for drawing up the code. The status of the code is not made legally binding through adoption, as it is with other instruments, such as conventions. It is designed as a guide, applicable to all underground coal mines and governments,

322 ILO (2001), *Guidelines on Occupational Safety and Health Management Systems – IL- OSH 2001*, International Labour Office

323 Ibid, p 5

324 Ibid, p5

325 ILO (2006), *Code of Practice on Safety and Health in Underground Coalmines*, International Labour Office p 5

workers and employers organisation and to “all those individuals at the level of the coal mine”.³²⁶ It provides minimum standards advice and “more stringent applicable requirements should have priority over the provisions of this code”.³²⁷ The code suggests that, where national regulations do not exist on an issue, then the provisions of the code should be used. The three first objectives listed in the code embody the *partnership* approach to safety and health:

“1.2.1 This code of practice should contribute:

- to protecting workers in underground coalmines from workplace hazards, and
- to preventing or reducing work-related injuries and diseases, ill health and incidents;
- to assisting and facilitating the improved management of OSH issues at the workplace;
- to promote effective consultation and cooperation between governments, employers, workers and their organisations in the improvement of OSH in the production of coal from underground mines.”³²⁸

The code provides very good guidance on the practice of safety and health and on control strategies for all the specific risks associated with underground coal mines. Together with the guidance on OSH management systems it can help to provide a framework for the re-modelling of China’s mine safety and health approach. Adoption by China of the ILO Safety and Health in Mines Convention (176), 1995 would help to secure the overall ILO approach in Chinese law. The benefits of doing this would include the reinforcement of a practical approach to solving the difficult problems faced by the industry and a wider and deeper transfer of international expertise, partly co-ordinated by the ILO itself. These ILO measures have not yet become, but could become a useful collective benchmark for the safety performance of the Chinese coal industry and indeed the world mining industry.

326 Ibid, p 5

327 Ibid, p5

328 Ibid, p4

b) The National and Regional Levels

Summary of major safety factors which need to be addressed:

In Chapter 3, the following list was not in any ranked order as it concentrated on the variable mix of factors in each accident. In discussing alternative safety and health approaches, it is more valuable to suggest a ranking, which, however, will need to be constantly reviewed.

7.5 Strategic issues – immediate factors

There are three strategic factors which require immediate action:

Factor one

Risk Assessment, hazard identification and hazard management:

Conclusion: There is an inadequate system of risk assessment in place at any level, although the best mines and companies are now implementing the basic elements of such an approach. Risk assessment and hazard management require quite a sophisticated safety culture and organisation to carry it through and it has been introduced only relatively recently in developed country law. However, SAWS is promoting the study of the safety culture approach to mine safety and this new understanding is being diffused throughout the large mines at least.

Recommendation: The forthcoming EU-China mine safety programme could focus on the risk management/assessment and hazard identification approach, as it has been embodied in EU law for nearly two decades. Technical study visits in EU countries could help here, with groups of senior managers, safety engineers and government inspectors. A simplified system of risk management should be developed for the medium and small mines.

Factor two

An inadequate partnership approach:

Conclusion: The lack of an adequate partnership approach (the safety triangle – manager-worker safety inspector-government inspector) means that the maximum available safety knowledge and skills among the whole workforce are not being used, especially the skills of experienced miners.

Recommendation: The key safety triangle, which is present in outline form in the Chinese coal industry, should be encouraged, with training courses for each of the three groups separately and with some jointly. It needs to be institutionalised in mine safety committees, to which government inspectors should be invited on a regular basis. Miner safety representatives need to be able to report independently to the government inspectors, as well as to the mine manager.

Factor three

Pressure for production:

Conclusion: as a result of high energy demand and high prices, safety is sacrificed sometimes for production and profit. The incentive of high coal prices to over-produce beyond the design capacity in small mines, is great, in taking as much coal, as quickly as possible.

Recommendation: The Chinese government is considering creating a new Energy Ministry. The National Reform and Development Commission currently oversees energy developments. The strategic thinking, currently being done on a medium and longer term energy plan, needs to concentrate even more in improving energy efficiency. At the same time a study should be launched on the impact of the rapid increase in coal production on medium and long term coal reserves. These measures would help lessen the pressure for production and be in the interest of the country's miners, its environment and its long term energy security.

7.6 Strategic issues – longer term factors

There are four which require longer term effort:

Factor four

Regulatory environment:

Conclusion: China's safety regulations are quite good (especially those adopted in the 1990s covering technology and management)³²⁹ but the enforcement of them through effective OSH management systems and backed up by state inspection is

329 See Tim Wright, *The Political Economy of Coal Mine Disasters in China: "Your Rice Bowl or Your Life"*, op cit p 635, for a list of the laws adopted between 1994 – 2001. On ventilation, for example, proper ventilation systems are specified in order to reduce the danger of gas explosions.

often poor. This is especially the case at local authority level and in particular with regard to smaller private and township mines. The enforcement powers of government inspectors need to be strengthened, to require an immediate shutdown in event of danger. At present, if a mine has all of its operating licences the owner/manager can object to an immediate shutdown and withdrawal of men.

Recommendation: Apart from appropriate legislative modifications to strengthen the mines inspectors' powers, an investigation of a mixed system of positive and negative economic and financial incentives should be carried out, especially for the smaller mines.

Factor five

Lack of investment:

Conclusion: A large-scale programme of company-led investment is underway in the large mines, while a lack of investment characterises the small mines. Uneven development results from the already differentiated nature of the industry. For all mines, investment in engineering solutions is a necessary condition, but it is not a sufficient condition for success.

Recommendation: The lack of funds for the small mine sector needs to be reviewed in the context of financial incentives to improve safety and environmental performance, as well as to sustain local communities with inadequate alternative employment possibilities.

Factor six

Inadequate training and other manpower aspects:

Conclusion: at all levels inadequate training provision means that the people with the right skills are not always available, or not attracted to work in the industry, once they have been through university. The image of the industry is poor; improving safety and health will aid recruitment and incentivise training.

Recommendation: There is more that could be done on training. SAWS could try to co-ordinate the international input in a more systematic manner. It would be valuable,

at this stage, to call the foreign advisers to an informal conference or seminar to see if a 'brain-storming session' might produce added value.

Training programmes for the main professional groups in the industry are already well advanced but migrant workers, who form around half of the workforce, need to be more systematically trained. A special package should be developed for training new miners.

Factor seven

Worker compensation:

Conclusion: The former 'iron rice bowl' system is more or less finished and the new arrangements are still under construction. The question of which route to take (public, public/private or private) and how to operate it is as yet undecided in any detailed way, with a very uneven situation operating in practice.

Recommendation: China needs to develop a worker compensation and rehabilitation system which can act as a negative cost incentive on mines with poor safety records, to improve safety and health and a positive incentive to help injured and ill miners to recover and to be rehabilitated for economic activity, wherever possible.

7.7 The special case: the small private mines

Conclusion: On the basis of a measure of fatalities per million tons, small mines are at least 8 times more dangerous than the large SOE mines. Medium sized mines are around three times more dangerous than large mines. The toll of serious and less serious injuries is presently unknown, but, given a relationship of 5:1 for major injuries to fatal injuries, around 28,000 of the 2 million workforce were likely to have had to leave the small mine sector through death or serious injury in 2003. This is 14 of every 1,000 employed. Added to these figures must be the health damage to both miners and residents living in mining regions.

With demand and prices as high as they are at present and inadequate state capacity to follow through local closure programmes, it is likely that large scale damage will persist unless there is a significant policy change.

Recommendations: The following proposals could make up a strategy for the small mine sector:

- Any policy shift must address both local government dependencies on mining for revenue, their capacities to implement national closure policies, the need for extra or alternative employment for poor farmers and the fuel requirements of local economies.
- One possible alternative policy would combine a socio-economic appraisal with a safety programme adapted to fit this appraisal both with the active involvement of the local government, industry and the people directly concerned. The first element: socio-economic policy would see small coal mines as much a part of the rural economy as of the energy economy. It would also start from the premise that poor farmers require positive agricultural policies to help build the other part of their economic lives, especially where they move between the two industries, according to the agricultural rhythms.
- Any safety policy must include basic miner training for the rural farmers working in the industry, before they enter their first mine. This could be done at low cost, simply, and funded by a revenue stream taken by the local authority in the form of existing levies. This would require teams of skilled trainers and a training package specifically adapted to small mine conditions.
- At the same time, where possible, appropriate mining technologies will need to be introduced to make these small mines more efficient and less damaging of the environment.
- The ACFTU qualified labour inspectors should have a regional presence, but the Scandinavian idea of roving worker safety representatives could also be tried.
- Regarding the owners – a new system of positive and negative incentives could be tried: on the one hand, the threat of closure and blowing up of their undertakings, fines, imprisonment but on the other hand – the new carrot could be business advice, small loans for investment in new machinery and safety and perhaps, should the owners be interested, assistance in diversification into

regional agricultural industries, the other main local source of wealth, when their mines need to be shut for safety reasons.

- It is the state's role to facilitate this kind of economic solution, supported in turn by its regulatory powers. Here, there are grounds for optimism, as there are a growing number of examples of new or re-organised agricultural enterprises springing up, aided by both Chinese and foreign experts.³³⁰

7.8 Worker safety representatives

Conclusion: the full involvement of worker safety 'supervisors' in the country's coal mines is a very important feature of an effective OSH policy. This is needed to reduce substantially accident rates in China. The issue which needs to be clarified here is that the worker safety inspector must carry out inspections on behalf of his/her fellow workers and represent them to management. This is both an independent role and one which is integrated into the safety management system. It is not adversarial but co-operative and representative. The best systems are those where the workforce themselves appoint their own worker safety inspector. Different countries handle this in different ways – some are elected by trade union members but in all some kind of provision is required for non-union workplaces. The important point, as the ILO code suggests is that they need to be "collectively selected" by the workforce.³³¹

Recommendation: The proposal, led by the ILO Beijing Office, to train the worker safety representatives in coal mines, should be taken up.

7.9 Conclusion

Serious as the situation in China's coal industry is, its officials are demonstrating a commitment to solving the underlying problems as effectively as possible. The definition of these problems is crucial, as well as the extent to which technology, technique and safety culture experience from overseas can be incorporated into the national effort. Some of the large coal companies are developing an exemplary approach themselves, which can be transferred within and between China's coal regions.

330 Interviews over 2006-07 with Peter Feickert, Agricultural Adviser to Sichuan Province for 12 years

331 ILO (2006), *Code of Practice on Safety and Health in Underground Coalmines*, op cit, p 11 (f)

This thesis has set out to test another hypothesis, too, that the most effective route to a safe industry depends not only on these factors but on developing a European-style risk assessment and social partnership approach in implementing the safety strategy, which is present also in the British, Australian and New Zealand coal industries. Simply put, this is the safety triangle of manager, government inspector and worker inspector. Around these three are grouped others with key safety functions and each of the three must be supported by strong organisations. In essence, all of the key actors are needed to co-operate together in carrying through systematic risk assessment, building a strong safety culture and creating a sound safety organisation.

The interplay between the consequences of economic transition, the speed of growth and increased industrialisation of the coal industry are undoubtedly important factors and possibly even more important is the persistence of a model of safety regulation which is largely administrative and inherited from the days of central planning. As the complexity of coal mining technology increases along with the scale of mining, such methods alone are inadequate to the task. The response needs to be co-operative and participative with the responsibility of the different players identified and encouraged. It does require strong government, industry and employer leadership, but without a bottom-up approach designed in, the journey to a much improved safety and health performance will be longer. Many more miners, their families and communities will suffer needlessly.

To answer the first question set in this thesis: is it likely that China will leap-frog the arduous road to development in its coal industry, avoiding the length of pain suffered by miners in western countries as they industrialised? The conclusion reached in this study is that the signs are increasingly there that this enormous country and enormous industry can do this. But it will take a considerable amount of determination on the part of the authorities and a level of help from other mining countries greater than that which is presently deployed. This would represent a greater qualitative transfer of knowledge and expertise than has been revealed, hitherto, in relation to any other

comparable industry in the history of industrial societies. As SAWS Minister Li Yizhong has said, the ‘accident prone’ period of the Chinese coal industry can be much shorter than it was in the UK, the US or Japan. On the positive side the factors essential for this to succeed are now present or coming into being. The challenge to all concerned is to make it happen. Finally, there is a growing understanding that China’s coal industry and its coal consumption are the single biggest factor in global climate change. We help ourselves if we help China.

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Interview with Mr Bai Ran, Director General of the National Center for International Exchange and Co-operation on Work Safety, State Administration of Work Safety, Beijing 21 June 2006

Interviews over 2005-07 with Peter Feickert, Agricultural Adviser to Sichuan Province for 12 years

Interview with Stephen Hughes MEP, Employment spokesperson for the Socialist Group, European Parliament, May 9 2006

Interviews with Tom Jenkins, International Adviser to the General Secretary, ETUC, Brussels on numerous occasions, 2006, 2007.

Telephone interview with Simon Pickvance, Sheffield Occupational Health Practice, May 9 2006

Several interviews with Rory O’Neill, Editor of “Risks”, the UK Trade Union Congress e-bulletin on health and safety during 2006-2007

Seminars with Chinese coal industry participants in Huntly New Zealand, April 16-25 2007; Ordos, Inner Mongolia, China June 18-23 2007.

Frequent meetings with Mr Bai Ran and colleagues from the State Administration of Work Safety, in particular in November 2006, June 2007.

Tables and charts

Chapter two

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Chapter six

Table 1: Fatal accidents per million tons in Chinese Coal Mines 2001 – 2003 and numbers killed in 2003

Table 2: Numbers employed and output by sector in the Chinese coal industry 2004

Appendices

Chapter 3: Appendix One: Representative Sample Year 2002 – list compiled by United States Mines Rescue Association (USMRA)

List of Coal Mine Accidents in China, 2002

In terms of fatalities, accidents are categorised into three types: serious – 3 deaths or above; very serious – 10 deaths or above; extremely serious – 30 deaths or above.

Date (mm-dd)	Province/ Municipality	Name and Location	Type	Fatalities	Mine ownership/ Legal status
12-23	Guizhou	Sanchahe Coal Mine, Qiannanbuzhou District	Blast	17 dead, 2 injured	Privately run with permit
12-22	Gansu	Xiaonangou Coal Mine, Lanzhou City Jincheng Tourism Co., Baiyin City	Blast	11 dead	Check passed but permit not issued yet
12-21	Guizhou	Zhongxin No.3 Coal Mine, Bijie District	Gas build-up	12 dead	Township and village mine with permit
12-06	Jilin	Wanbao Mining Bureau Coal Shaft No.2, Taonan city	Fire	30 dead	State-owned; victims' families put in different lodgings to prevent collective action
11-14	Yunnan	Guoshuigou Coal Mine, Kunming City	blast	11 dead	Privately run; official check passed; permit not issued yet
11-10	Shanxi	Taixi Coal Mine, Jinzhong city	Blast	37 dead, 17 survivors	Village mine with no permit
11-08	Shanxi	Xipan Village Coal Mine, Yangquan city	Blast	26 dead, 9 survivors	Township and village mine with permit
10-31	Inner Mongolia	Changsheng Coal Mine, Baotou City	Blast and blaze	14 dead	Township and village mine with permit
10-29	Guangxi	Ertang Coal Mine, Nanning city	fire	30 dead, 5 survivors	State-owned
10-23	Shanxi	Zhujiadian Coal Mine, Luliang District	blast	44 dead, 22 survivors	State-owned
09-10	Henan	Daluzai Coal Mine, Hebi City	blast	13 dead, 22 survivors	Township and village mine with permit
09-03	Hunan	Qiuhe Mining Co. Ltd, Loudi city	Gas build-up	39 dead, 16 survivors	Shareholding mining co., check passed
08-29	Guizhou	Sixiang Coal Mine, Bijie District	Water leakage and flood	16 dead	Privately run with no permit; 16 missing, presumably dead
08-14	Jiangxi	Yongshan Coal Mine, Jingdezhen city	blast	13 dead	State-owned but illegally subcontracted; ordered to close down
08-12	Heilongjiang	Lixin Coal Mine, Jixi City	blast	11 dead	Township and village mine with no permit

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Date (mm-dd)	Province/ Municipality	Name and Location	Type	Fatalities	Mine ownership/ Legal status
12-23	Guizhou	Sanchahe Coal Mine, Qiannanbuzhou District	Blast	17 dead, 2 injured	Privately run with permit
12-22	Gansu	Xiaonangou Coal Mine, Lanzhou City Jincheng Tourism Co., Baiyin City	Blast	11 dead	Check passed but permit not issued yet
12-21	Guizhou	Zhongxin No.3 Coal Mine, Bijie District	Gas build- up	12 dead	Township and village mine with permit
12-06	Jilin	Wanbao Mining Bureau Coal Shaft No.2, Taonan city	Fire	30 dead	State-owned; victims' families put in different lodgings to prevent collective action
11-14	Yunnan	Guoshuigou Coal Mine, Kunming City	blast	11 dead	Privately run; official check passed; permit not issued yet
11-10	Shanxi	Taixi Coal Mine, Jinzhong city	Blast	37 dead, 17 survivors	Village mine with no permit
11-08	Shanxi	Xipan Village Coal Mine, Yangquan city	Blast	26 dead, 9 survivors	Township and village mine with permit
10-31	Inner Mongolia	Changsheng Coal Mine, Baotou City	Blast and blaze	14 dead	Township and village mine with permit
10-29	Guangxi	Ertang Coal Mine, Nanning city	fire	30 dead, 5 survivors	State-owned
10-23	Shanxi	Zhujiadian Coal Mine, Luliang District	blast	44 dead, 22 survivors	State-owned
09-10	Henan	Daluzai Coal Mine, Hebi City	blast	13 dead, 22 survivors	Township and village mine with permit
09-03	Hunan	Qiuhu Mining Co. Ltd, Loudi city	Gas build- up	39 dead, 16 survivors	Shareholding mining co., check passed
08-29	Guizhou	Sixiang Coal Mine, Bijie District	Water leakage and flood	16 dead	Privately run with no permit; 16 missing, presumably dead
08-14	Jiangxi	Yongshan Coal Mine, Jingdezhen city	blast	13 dead	State-owned but illegally subcontracted; ordered to close down
08-12	Heilongjiang	Lixin Coal Mine, Jixi City	blast	11 dead	Township and village mine with no permit
08-10	Henan	Guowan Coal Mine, Zengzhou Mining Bureau	Water leakage and flood	10 dead	State-owned

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Date (mm-dd)	Province/ Municipality	Name and Location	Type	Fatalities	Mine ownership/ Legal status
08-04	Shanxi	A mine shaft owned by Chiyu Labour Services Co., Houzhou city	fire	18 dead, 1 survivor	Check not passed yet
07-24	Guizhou	Taojiawan Coal Mine, Liupanshui city	blast	18 dead, 7 injured	Privately run with no permit
07-15	Shanxi	Dayangquan Coal Mine, Yangquan city	blast	12 dead	State-owned
07-08	Heilongjiang	Dingsheng Coal Mine, Hegang city	blast	44 dead	Township and village mine; check passed; business permit not issued yet
07-07	Guangdong	Lianda Coal Mine, Shaoguang City	blast	10 dead	Township and village mine with permit
07-04	Jilin	Fuqiang Coal Mine, Baishan city	blast	39 dead	Privately run with no permit
07-03	Shaanxi	Xigou Coal Mine, Weinan city	Water leakage and flood	15 dead	Township and village mine with permit; 15 trapped, presumably dead
06-28	Chongqing	Shuijiang Coal Mine, Nanchuan County	blast	10 dead, 3 injured	Shareholding company
06-24	Hebei	Yongfa Coal Mine, Zhangjiakou city	Rain storm and flood	16 dead	Township and village mine; check not passed; to be closed
06-20	Heilongjiang	Chengzihe Coal Mine, Jixi city	blast	124 dead	State-owned
05-30	Liaoning	Guanshan Coal Mine, Beipiao Mining Company	blast	14 dead	State-owned
05-26	Hunan	Qingshu Coal Mine, Loudi city	Gas build-up	15 dead	Township and village mine with permit
05-23	Heilongjiang	Jiacheng Coal Mine, Shuangya city	fire	17 dead, 4 survivors	Privately run, check not passed yet
05-15	Hunan	Xinyuan Coal Mine, Loudi City	Gas build-up	18 dead	Township and village mine; city and county check passed; provincial check not passed yet
05-15	Hunan	Hongqi Coal Mine, Shaoyang City	Water leakage and flood	12 dead	Township and village mine with permit
05-04	Shanxi	Fuyuan Coal Mine, Hejin city	Water leakage and flood, followed by fire	21 dead, 2 survivors	Township and village mine without permit; cover-up attempts by mine boss
05-04	Guizhou	Shaft in Liying Village, Bijie District	blast	23 dead	Privately run without permit
05-04	Hunan	Saihai No.2 Mine, Loudi City	Gas build-up	13 dead	Township and village mine with permit

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Date (mm-dd)	Province/ Municipality	Name and Location	Type	Fatalities	Mine ownership/ Legal status
04-25	Hebei	Linxi Coal Mine, Kailuan Mining Bureau, Kailuan City	roof collapse	11 dead	State-owned
04-24	Sichuan	Huashan Coal Mine, Panzhihua Mining (Group) Co. Ltd., Panzhihua City	blast	23 dead	State-owned
04-22	Chongqing	South Mine, Zhongliangshan Coal Field and Gas Company	Gas build-up	15 dead	State-owned
04-19	Shanxi	Hanjiagou Village 7.1 Coal Mine, Changzhi City	blast	12 dead, 12 survivors	Township and village mine with permit
04-08	Heijongjiang	Donghai Coal Mine, Jixi Mining Bureau	blast	24 dead, 14 seriously injured, 23 injured	State-owned
03-29	Henan	Xinfeng Mining Bureau No.2 Mine, Xuchang City	blast	23 dead, 3 injured	State-owned
02-28	Liaoning	Sanduhao Coal Mine, Fuxin City	fire	22 dead	Township and village mine with permit; 3 dead, 19 missing, presumably dead
02-11	Inner Mongolia	Hongqi Coal Mine, Hulunbeierkeshi City	Fire and carbon monoxide poisoning	14 dead	Township and village mine; check passed
01-31	Chongqing	Nantong Mine, Nantong Mining Bureau	Gas build-up	20 dead, 2 injured	State-owned; 4 dead, 16 missing, presumably dead
01-28	Hunan	Shantangchong Coal Mine, Hengyang City	blast	14 dead, 6 injured, 2 survivors	Township and village mine; 3 dead, 11 missing, presumably dead
01-26	Hebei	Nuanerhe Coal Mine, Chengde City	blast	28 dead, 12 injured	State-owned; 19 killed in the first blast; 8 killed in the second blast the next day, and 1 missing, presumably dead
01-21	Hubei	Tanjiadong Coal Mine, Jingzhou City	fire	12 dead	Township and village mine; check passed
01-14	Yunnan	Shuijie Village, Wenshan Zhou	Gas build-up	25 dead (7 women)	Privately run with no permit

Sources: China Labour Bulletin, State Administration of Coal Mine Safety Supervision (SACMSS at <http://www.chinacoal-safety.gov.cn>) and State Administration of Work Safety (SAWS at <http://www.chinasafety.gov.cn>).

Chapter 3: Appendix Two: USMRA Case studies from Press reports**Gas leak kills 18 miners in Shanxi (Xinhua)****Updated: 2006-08-05 13:36**

TAIYUAN -- Eighteen miners were killed in a coal mine gas leak in Ningwu County, North China's Shanxi Province.

A collapse happened in the ground within the mining area of Dahuiyao Coal Mine in Ningwu County around Friday noon, which opened a permanently closed area beneath the coal mine shaft and caused a fire, producing large amount of harmful gas, said sources from Shanxi Provincial Bureau of Work Safety.

Altogether 34 miners were working beneath the shaft when the accident happened. Three of them escaped the site of the accident.

Rescuers later lifted 14 more miners out of the shaft, of whom, one died in hospital. By 10 a.m., the rescuers found the remains of the 17 other miners trapped in the mishap.

United States Mine Rescue Association
www.usmra.com

MINE BLAST DEATH TOLL RISES

Special Broadcasting Service – Australia
July 17, 2006

The death toll from a coal mine explosion in northern China has risen from 20 to 50, Chinese state television has reported. Seven other miners remain missing.

A preliminary investigation blamed Saturday's blast on airborne coal dust that caught fire, the Xinhua News Agency said.

The mine manager is reported to be in police custody.

The underground explosion occurred at the Linjiazhuang Coal Mine in Jinzhong, a city in Shanxi province.

China's coal mines are regarded as the most dangerous in the world. According to official figures, 6,000 miners died last year.

But workers' rights groups, such as the Hong Kong-based China Labour Bulletin, dispute this figure, claiming the industry's annual death toll could be as high as 20,000.

United States Mine Rescue Association
www.usmra.com

Death toll in Chinese mine blast rises to 27

Times of India – India
June 28, 2006

BEIJING: Rescue workers have found five more bodies of miners killed by a gas explosion in a coal mine in northern China, raising the death toll to at least 27, the government said on Thursday.

Only four miners were reported missing after the blast Wednesday in the Wulong Coal Mine in Fuxin, a city in Liaoning province, but rescuers found bodies of the four plus an additional one, the official Xinhua News Agency reported, citing a local official.

The mine is owned by the Fuxin Mining Group, a state enterprise that also owns the Sunjiawan mine where 214 people were killed in a Valentine's Day blast last year.

That was China's worst mining disaster in 60 years. The entire Fuxin group has stopped coal production in order to review safety, Xinhua said.

The disaster on Wednesday occurred some 900 meters (3,000 feet) below ground, according to Xinhua.

"I suddenly felt a gust of hot wind rushing towards me and was immediately thrown out," said one survivor, Wei Zhenxue, quoted by Xinhua.

"I could not remember what happened after that. When I opened my eyes, I saw many people around me," Wei said.

"I struggled to crawl towards the mouth of the mine and was saved after managing to drag myself 20 meters."

China's coal mines are the world's deadliest, with more than 5,000 fatalities reported every year in explosions, underground floods and other disasters.

Fatal accidents often are blamed on failure to enforce safety rules or lack of required equipment such as ventilators to remove explosive gas that seeps from the coal bed.

United States Mine Rescue Association

www.usmra.com

Chinese Find Only One Body in Mine Flood

The Associated Press

Wednesday, June 14, 2006; 11:41 PM

BEIJING -- Chinese rescuers have recovered just one body after a monthlong search for 56 miners lost in a mine flood, the government said Wednesday

The official Xinhua News Agency said "the rescue operation encountered great difficulties because the owner of the mine destroyed all the design drawings and others documents of the mine" after the accident.

Xinhua said one body was retrieved from the mine early Wednesday after water was pumped out but 55 others remained missing.

The mine about 200 miles west of Beijing was flooded on May 18 while 266 workers were underground, and 210 managed to escape.

So far 19 people, including the mine's owner, labor contractors and bank officials have been detained by police in connection with the disaster, according to Xinhua.

The case underscores the chaos and ineffective management of China's coal mining industry, the world's deadliest with some 6,000 fatalities a year from fires, floods, explosions.

Earlier Xinhua reports said officials had ignored complaints from miners that water was seeping into the shaft before the flood and that mine managers initially reported only five miners died in the accident.

Efforts to pump water out of the shaft did not begin until five days after the flood, reportedly because of technical problems and lack of power to run the giant pumps.

United States Mine Rescue Association

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Rescue work ends in Hunan coal mine accident

LENGSHUIJIANG, Hunan, April 14 (Xinhua) -- Rescuers decided on Friday to end their search for two missing miners in a coal mine gas outburst that occurred on April 6

in central China's Hunan Province as the mine showed signs of more outbursts.

Chances for survival are slim for the missing miners, the rescuers said Friday. They made the decision with the consent of the miners' family and approval of the local government.

The ventilation system was ruined and tunnels blocked and seriously damaged during the outburst, while gas remained dense underground and more outbursts were highly possible, the rescuers said.

Seven people were confirmed dead in the accident at the Dongtang Coal Mine of Lengshuijiang city, when 14 miners, including six females, were working underground.

Five miners including two females managed to escape.

China's labor law forbids women from working in shafts.

The owner and investors of the coal mine have been detained by local police, however, the one who was in charge of production and his wife have fled.

Further investigation into the cause of the outburst is underway.

United States Mine Rescue Association

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Death toll of Shanxi colliery flooding rises to 28

TAIYUAN, April 1 (Xinhua) -- All the 28 miners trapped in the coal mine flooding accident that occurred on March 18 in Linxian County, north China's Shanxi Province, were confirmed dead Saturday.

The last body of the miners was carried out of the mine at 8:30 a.m. Saturday, and rescuers planned to announce the end of rescue work Sunday.

Some rescuers were still pumping water out of the mine to determine whether the mine could restart production.

The accident took place at 3:30 p.m. on March 18 at the Fanjiashan Coal Mine in the county, when 58 miners were working underground. Only 30 managed to escape.

The families of the dead will get 200,000 yuan (25,000 U.S. dollars) in compensation, a local government official said.

United States Mine Rescue Association

www.usmra.com

Coal mine blast kills 23 in north China

China Daily

February 2, 2006

A gas explosion has killed 23 workers in a state-owned coal mine in northern China and more than 50 miners suffered carbon monoxide poisoning.

The powerful blast ripped through the Sihe Coal Mine in Shanxi province at about 7:00 pm (1100 GMT) Wednesday, the Xinhua news agency reported, citing local coal mine authorities.

"Twenty-three were killed," Fan Yongming, an official at state-run Jincheng Mining Group, which runs the mine, told AFP.

At the time of the blast, nearly 700 miners were working underground, and 53 of them were hospitalized with carbon monoxide poisoning, according to Xinhua, which said one was in serious condition.

Eight remained hospitalized Thursday, Xue Junzheng, an official at the mine, told AFP.

Search and rescue efforts in the mine were completed by early Thursday morning, Xinhua reported.

Coal mining production continues to surge and goes on even as the rest of the nation celebrates the week-long traditional Lunar New Year, with the country reliant on coal for 70 percent of its energy needs.

“The miners had had four days off for the Lunar New Year,” said Xue. “Wednesday was their first day back at work.”

He said the coal mine’s ventilation system had been operating throughout the holiday period, and that gas density and equipment had been checked before the miners returned with no problems discovered.

China’s national safety administration reported last month that 5,986 workers died in the nation’s coal mines in 2005.

United States Mine Rescue Association

www.usmra.com

12 trapped coal-miners confirmed dead in Anhui

HEFEI, Jan. 10 (Xinhuanet) -- The 12 trapped miners in the last Thursday gas explosion in east China’s Anhui Province have been confirmed dead, according to sources with the rescue headquarters Tuesday.

As of 2:45 p.m. on Monday, the rescuers reached the disaster site and found all the trapped miners buried in exploded coal powder, no chances of survival.

The blast occurred at 1:49 p.m. last Thursday at the Wangfenggang Coal Mine in Huainan City, which was under construction at the time of explosion.

Two of the dead are gas density inspectors and the other 10 are workers of a construction team under the Jixi Mining Administration, said sources of the coal mine.

The rescuers are now searching for the remains of the dead. The investigation and aftermath work are underway.

87 dead, 21 missing after China mine explosion

December 9, 2005

BEIJING – The death toll from a coal mine explosion in northern China climbed to 87 on Friday, with 21 other workers still missing, state media said.

The explosion occurred on Wednesday at the Liuguantun mine near Tangshan city in Hebei province, with dangerous levels of methane the most likely cause of the blast.

Xinhua news agency, citing the local emergency rescue headquarters, said 87 people had been confirmed dead, up from a figure of 72 earlier in the day.

Twenty-one people were still missing, compared with a figure of 34 given earlier, it said.

The total potential number of fatalities has therefore risen to 108, from 106.

Xinhua had previously said the colliery’s management was very poor and the official number of people registered as being in the mine at the time of the blast was not reliable.

The mine, 165 kilometres (100 miles) from Beijing, was formerly state-owned but is now privately run.

It had an official output of 150,000 tons of coal a year, but state press said it had doubled its allowed production in the quest for greater profits.

Death toll rises to 171 in Heilongjiang coal mine blast

QITAIHE, Heilongjiang, Dec. 6 (Xinhuanet) -- Rescuers on Monday night found remains of the last miner killed in the major coal mine blast taking place late last month in Titaihe, northeast China's Heilongjiang Province, sources from rescue headquarters said.

By press time, altogether 171 miners were confirmed dead. The killed included 169 miners working underground and two others working on the ground generator room.

The blast went off at 9:40 p.m. last Sunday at the Dongfeng Coal Mine run by the Qitaihe branch of the Longmei Mining (Group) Co., Ltd. in Heilongjiang.

Latest figures said that 242 miners were working underground when the explosion occurred, but only 73 of them escaped the site of the blast or were saved.

34 miners killed in Henan coal pit explosion

Updated: 2005-10-04 07:08

Thirty-four miners were killed in a gas explosion in the early hours of yesterday at a State-owned coal mine in Hebi, a city in Central China's Henan Province

The accident occurred at 4:45 am when 53 miners were working underground at the No 38 pit of Mine 2 of the Hebi Coal Industry (Group) Corporation Ltd, the Xinhua News Agency reported.

The 34 miners were found dead after the gas was ignited, while another 19 scrambled to safety.

"Considering the damage of a gas explosion, the possibility of any survivors underground is slim," said a local official, who only gave his surname, Xiao.

Zhao Tiechui, director of the State Coal Mine Safety Supervision Administration, went to the scene yesterday.

Senior provincial government officials, including Henan Provincial Party Secretary Xu Guangchun and Vice-Governor Shi Jichun, also went to supervise the rescue and investigation.

The cause of the accident remains under investigation.

As the largest State-owned coal mine in Hebi, the company consists of eight production mines and generates an output of more than 7 million tons a year.

Mine 2 has 3,800 employees.

The accident renewed questions over the safety of coal production in Henan Province.

On October 20, 2004, a gas explosion in the Daping Coal Mine of Pingmo County in the city of Xinmi killed 148 people and injured 32.

By August 31, 17 people had been killed this year in 13 accidents in State-owned collieries and small mines in Henan, according to statistics from the provincial Division of the State Coal Mine Safety Supervision Administration.

The latest tragedy came amidst a nationwide crackdown on corruption to prevent rampant coal mine accidents.

In late August, a harshly worded notice ordered local officials and State company executives with investments in coal mines (not including shares in coal-producing public firms) to withdraw their money by September 22.

By September 26, 497 officials and State company executives had withdrawn investments in coal mines.

3 bodies recovered, 120 still missing in flooded coal mine in Guangdong

XINGNING, Guangdong, Aug. 22 (Xinhuanet) -- Three bodies have been recovered from the flooded Daxing Coal Mine in Xingning City in south China's Guangdong Province, rescuers said Monday.

As the rescue operation enters its 16th day, there is little hope for any of the remaining 120 victims buried in the mine to survive.

The water level significantly dropped in the mine within days of commencing draining work. However, most of the tunnels and equipment inside the colliery had been devastated.

The accident occurred at 1:30 p.m. on Aug. 7 in the Daxing Coal Mine, trapping 123 miners.

Death toll rises to 81 in Xinjiang coal mine blast

URUMQI, July 13 (Xinhuanet) -- The death toll in a gas blast in a colliery in northwestern China's Xinjiang Uygur Autonomous Region rose to 81 Wednesday but two miners remained missing, government officials said.

Rescuers have found the bodies of the 81 victims as of 11:00 a.m. Wednesday and are searching for the two who are still trapped underground after the blast happened in the Shenlong Mine of Fukang County, 62 km away from the regional capital of Urumqi, early Monday morning.

Only four out of the 87 people working underground when the accident took place survived.

China's work safety watchdog has blamed the coal mine blast on a number of safety loopholes, including overproduction, lack of a work safety license and ill-management.

Li Yizhong, director of the State Administration for Work Safety, said that overproduction had led to an extremely high gas density in the colliery shaft, and the management staff failed to take effective measures to prevent casualties after finding the gas density problem.

Li also criticized the colliery management for sending an exceedingly large number of miners underground in order to increase production.

Chapter 4: Appendix One

Main Duties of SCAMS

- To develop policies for coal mine safety; to participate in drafting laws and regulations governing coal mine safety; to develop rules and standards for coal mine safety; and to propose programs and objectives for coal mine safety.
- To exercise lawfully the state authority of mine safety regulation based on the principle of mine safety regulated by the central government and supervised by local governments, and mine safety responsibility borne by mining enterprises; to supervise mining enterprises over their implementation of work safety laws and regulations, their work safety conditions, the safety of equipment and facilities, and workplace hygiene; to be in charge of managing the issuance of occupational safety and health licenses; and to perform targeted, specialized and/or regular mine safety inspections and to take on-the-spot measures to deal with or inflict administrative punishment on violations at coal mines.
- To organize or participate in investigating and handling major accidents in coal mines; to be in charge of collecting and analyzing data on nationwide coal mine accidents and occupational hazards and releasing information on coal mine safety across the country.
- To direct scientific researches on mine safety and to organize inspection of the safety of equipment, materials and instruments used in coal mines.
- To be in charge of managing the issuance of work safety licenses to coal mines, certifying the safety qualifications of mine managers, and training and certifying workers on special jobs in coal mines, including special equipment operators.
- To organize review of the design and acceptance examination of safety facilities of mine construction projects and to deal with coal mining enterprises which do not conform to safety standards.
- To inspect and direct coal mine safety supervision in various regions and to supervise various regions over their implementation of mine safety laws and standards, closing of mines without proper safety conditions, mine safety

supervision and enforcement, specialized mine safety campaigns, correction of mine hazards and reexamination, and to provide opinions and proposals to relevant regional governments and agencies.

- To organize, direct and coordinate mine emergency rescue operations.
- To undertake other tasks as entrusted with by the State Council and its Work Safety Commission, and the State Administration

Chapter 5: Appendix 1: Role of mineworker safety inspectors in three countries

United Kingdom: The role of ‘workmen’s inspector’ was recognised as early as 1872. By 1911 the UK had a well-structured system of statutory safety inspection, a statutory role for pit safety supervisors (deputies) and a statutory role for worker inspectors who were elected by the workforce, through the union representing the majority of the workers. Candidates must have five years’ experience as miners. As required by law, after their regular safety inspections, a copy of their statutory inspection report is sent to the Government Mines Inspector covering their mine. The role of workmen’s inspector, which was strengthened further in Section 123 of the Mines and Quarries Act, 1954 became a model for general worker safety representatives. This was embodied for the other workplaces in the 1977 Safety Representatives and Safety Committees Regulation and the 1995 Health and Safety Consultation with Employees Regulations. This legislation is, in turn, supported by the EU Framework Directive on Safety and Health 1989 and its linked Extractive Industries Directive 1992. In addition, when the UK coal industry was nationalised in 1946, the legislation required the National Coal Board (NCB) to consult the miners’ unions on operational questions and on health and safety. A safety consultation system was built up from the mine level to the national level based on safety committees. The National Union of Mineworkers employed qualified mining engineers, with extensive safety and production experience. The NCB and Inspectorates were professionalized. With such a safety organisation the accident rate fell rapidly from 1946 to the point where the

UK could claim to have the safest coal industry in the world. Training for workmen's inspectors was organised by the union's safety engineers, in co-operation with the NCB Safety Department and the Mines Inspectorate.

Australia: In Australia, the legislation is similar to the UK but is applied at state rather than federal level. The following is taken from the revised proposals for New South Wales (NSW), although most of the provisions only slightly modify existing law. Check inspectors are located at both site level and district level. The site check inspectors are elected by the workforce. Candidates must have three years experience at the site or at a similar site. Electrical site check inspectors are also elected. The employer must assist the check inspector to carry out his inspection responsibilities and allow sufficient time to do so during normal working hours. The district check inspector is paid and full-time. The site check inspector has access to the Mines Inspector and reports to him through the district check inspector as well as to the manager. If the site check inspector reports a dangerous occurrence the operator must immediately inform the Chief Inspector. The district check inspector has the power to suspend operations in event of operator non-compliance with the law leading to danger to the workers. The site check inspectors must undertake a course of training in occupational safety and health that is accredited by the Minister. The NSW Department of Primary Industries covers the cost of the training.

In **New Zealand**, up until 1992 there were workmen's inspectors, similar to those in British mines. The Health and Safety in Employment Act 1992, as amended in 2002 and 2003 replaced them with worker safety representatives at the same time the latter were introduced throughout NZ workplaces, in many for the first time. The Act lays out the rights of worker safety representatives. These must be elected by the workers themselves, with any unions organising them involved in the election. The overall approach to health and safety is based on worker participation, with the objective of securing an agreement between workers and the management, via a trade union. Mining is covered by these arrangements. Worker safety representatives must

be trained on a course which is certified by the Minister. They have the right for two days paid training. The Council of Trade Unions' Course is the certified course commonly used and since the Act was introduced, 13,000 safety representatives have been trained. Trained representatives can make recommendations regarding safety to their employers, who have a legal duty to either adopt the recommendation or explain why they will not do so. Worker representatives can also issue hazard notices and can advise workers to refuse dangerous work when faced with imminent danger.