MINE CLOSURE, ENVIRONMENTAL AUDITING AND QUALITY MANAGEMENT OF MINES IN THE NORTHERN TERRITORY OF AUSTRALIA

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ABSTRACT

The Northern Territory of Australia has a reputation for innovation in government regulatory initiatives. The Department of Mines and Energy conducts environmental and workplace safety audits of mine sites, ranging from simple compliance to complex management system auditing. Mining companies in the Northern Territory are well aware of international developments and are adopting the principles of quality management in both environmental and workplace safety management tending towards 'whole of life of mine planning' and integrated management on mine sites. A set of generic mine closure criteria designed to encourage best practice has been in use in the Northern Territory for nearly three years. The auditing program has been implemented as a part of a general move towards consultative co-regulation to ensure that industry accepts primary liability arising from their actions in both the environmental and workplace safety areas.

This paper examines the development and consequences of the Northern Territory regulatory initiatives, the influence of global trends on mining and the international implications of the Northern Territory experience. It provides an interesting case-study of the interaction between international changes and a western style economy set against a backdrop of third world development potential.

BACKGROUND

The Northern Territory of Australia is a vast region of 1,346,200 square kilometres with a population of approximately 180,000. The landscape is mainly comprised of ancient and deeply weathered middle to late Proterozoic rocks and the environment varies from tropical savannahs in the north to arid deserts in the south. Its history has been characterised by a series of developmental failures. Despite the inadequacy of the climate and soils for European type land development and farming, the Northern Territory, referred to as the 'Top End' by most Australians, has long held an allure for pastoralists, miners and other hopeful developers.

The Northern Territory has had a political history quite different to the rest of Australia. It was initially considered part of the old British colony of New South Wales, annexed by South Australia in 1858 and then became the responsibility of the Commonwealth Government of Australia upon federation in 1901. In 1978 the Australian Government passed the *Northern Territory (Self-Government)* Act which allowed the establishment of an elected Legislative Assembly to pass legislation like the States, subject to a number of reserved powers the Commonwealth retained for itself. Although funded on a similar basis to the States, the Northern Territory Government does not enjoy the same independence guaranteed to the States under the Australian Constitution. The Commonwealth may pass any

legislation it sees necessary for the Territory, disallow or amend any legislation passed by the Territory Government and could theoretically legislate the Territory out of existence!

The period of Commonwealth administration in the Territory between federation and self-government resulted in little developmental success and has been described as 60 years of benign neglect. Bauer (1964) stated that in 1930 the Territory's "meat industry was defunct, its labour force unemployed, its mines idle, its agriculture a failure, and its residents without hope." This was still the case 40 years later.
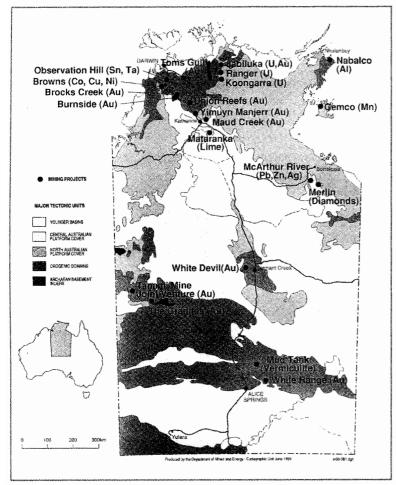

Figure 1. Northern Territory Mines.

But not now! The last 21 years of autonomy has seen an unparalleled period of development characterised by a 'can do' attitude by a locally based and elected government willing to take risks and consider different approach methods. The harsh conditions of the Territory have necessitated considerable experimentation and adoption of new technologies. In line with this, the baggage of the old administration has been discarded to make way for a fresh look at the regulation of mining.

Presently, the Northern Territory mining industry is small by international standards but includes world class uranium, gold, bauxite, manganese, oil and gas and base metal mines. There are also mining ventures of tin/tantalite, vermiculite and other minerals as well as localised extraction of sand, gravel and top-soil (Figure 1). The production total for 1998 was about 1.7 billion Australian dollars or approximately 16% of the Gross State Product.

MANAGEMENT OF OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENT IN THE NORTHERN TERRITORY

Mining in the Territory was traditionally associated with hardship, remoteness and a lack of support infrastructure. It has developed over the last 120 years or so from small manual (typically alluvial) operations to quite complex mining and metallurgical operations with modern management structures. Characteristically, there has been a steady decrease in financial return for almost all minerals offset by improved efficiency of recovery combined with an expanded scale of operations.

Northern Territory mining legislation, in common with the rest of Australia, has its roots in century old concepts of the control of safety on mine sites. Legislation was reliant upon reactive regulations, usually derived from historical incidents (often fatal). The prescriptive nature of such legislation allowed little opportunity for adaptation to new technology or management philosophies.

It is a goal of the Northern Territory Government that the mining industry should adopt principles of best practice in occupational health, safety and environment protection. To that end, the *Mine Management Act 1990*, based on a Robens deregulatory philosophy, was passed. The Northern Territory Government's philosophy of providing a 'one-stop-shop' service to its mining industry clients has achieved legislative control of the majority of operational activities on all mines under the one Act. The *Mine Management Act 1990* comprises aspects of legislation relating to such aspects as construction, handling of dangerous goods, waste management, water control, work health and safety (including electrical, mechanical and radiation safety) and environment protection.

Present occupational health and safety legislation

The Mine Management Act 1990 focuses primarily on occupational health and safety with the new legislative philosophy reducing reliance on prescriptive regulations. The legislation appears to have been successful, with Lost Time Injury Frequency Rates (LTIFR's) on mine and exploration sites in the Northern Territory declining dramatically from a rate of 24 in 1990 to 8 in 1999. There has also been a corresponding drop in fatalities from a rate of 3 to <1 per year now. Supporting this legislative direction has been the voluntary adoption of international standards by industry through codes of conduct. Large companies, particularly those with overseas interests, have implemented corporate strategies and public reporting in excess of the requirements of government.

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The *Mine Management Act* describes a general duty of care for mine managers and employees, with the definition of "employee" including those who perform work or service of any kind at a mine such as contractors or self-employed. The Act provides for the certification of mine managers, ensures notification of accidents and incidents and specifies the functions of inspectors. Inspectors may issue directions to remedy a matter at a mine to ensure health and safety even though the matter may not be covered in the legislation. Monetary penalties exist for contravention of, or failure to comply with, provisions of the legislation. The Act also provides for Codes of Practice, although none have yet been approved by the Minister. Industry is encouraged to adopt 'best industry practice' and use published guidelines and voluntary codes of practice as the minimum standards acceptable.

Present environment protection

Australia has experienced the global changes in environmental legislation over the past few decades. Environmental legislation in the 1970's focussed on pollution control, the 1980's saw a change of focus to pre-development environmental impact assessment (EIA) while the 1990's saw the focus move towards environmental management (i.e. environmental management systems - EMS) and de-regulation. The Northern Territory moved directly to EIA but its legislation has yet to catch up with the change in focus to EMS. Most recently, social issues have been the determining force on many mining projects. For example, no titles have been issued over the past two years following the passage of the *Commonwealth Native Title Act 1993*.

The *Mine Management Act* is weak in its treatment of environmental impact and controls. Despite this, companies have shown a heightened awareness of quality management principles and the advantages of a systems-management approach to environmental protection. This has originated from the aftermath of the Piper Alpha disaster of 1988 and a number of well publicised industry defeats at Fraser Island and Coronation Hill where projects were stopped due to public concern about social/environmental impact. International quality standards such as the ISO 9000 and 14000 series are being increasingly adopted (Mulligan 1996).

The awareness of the mining industry is being heightened by:
- ever-increasing public concern over environmental issues (Kelly & O'Neill 1995);
- acceptance that quality management is necessary to maintain international competitiveness (Threlfall 1996);
- realisation that, in the modern world, companies can incur major financial liability through poor management practices and environmental outcomes (Mulligan 1996 - various case studies).

These developments have impacted on Northern Territory mining companies in a manner similar to the rest of the world, which is not surprising, given that many are subsidiaries of multinational corporations.

The public is demanding that for mining to proceed it must be sensitive to the needs of competing land uses and social values. In the Northern Territory this means that it must be cognisant of the needs of the Northern Territory's other major industry, tourism. The wilderness style environment attracts miners and tourists alike and requires a flexible dynamic approach to regulation allowing for innovation and adaptation to changing community standards. This is not possible if adhering to a prescriptive regulatory philosophy.

PRE-MINING ENVIRONMENTAL IMPACT ASSESSMENT

The pre-mining environmental impact assessment (EIA) process is undertaken in accordance with the *Environmental Assessment Act 1982*. It is conducted jointly by the Department of Mines and Energy and the Department of Lands, Planning and Environment, the latter authority being responsible for environmental regulation.

To ensure that the recommendations of the pre-mining assessment are carried into the operational phase, a focus on 'whole of life of mine' planning is necessary. An integral part of the Northern Territory EIA process is the consideration of the long-term issues of post-mining land use and ongoing environmental and social consequences. EIA is now seen as merely the first step in a holistic approach to environmental management aimed at continual improvement.

A condition of grant for mining to proceed is that the proponent company is required to provide reports on the management of the mine throughout the life of the project including progress towards commitments agreed to in the EIA stage. Successful demonstrable achievement of environmental and other agreed outcomes is facilitated by a systematic approach to mine site management. This fact has not been overlooked by the companies examining the benefits of quality management systems.

AUDITING OF MINING OPERATIONS

Mining audits aim to determine the performance of the operation against stated commitments, community standards and recognised best practice. Auditing by the Northern Territory Department of Mines and Energy commenced in 1996 as conceptually simple environmental compliance audits on large mines and environmental site assessments of small operations (Fox et al., 1998). From early 1998 onwards the focus has shifted towards audits of mine management systems. Environmental management system audits have been based on the AS/NZ ISO 14001 and 14010 standards (Standards Australia 1996a, 1996b) and audits of mine occupational health and safety management systems (OH&S) have been based on AS/NZ

4804 (Standards Australia 1997). Auditing has now become an integral feature of mining in the Territory.

The audits are not underwritten by any legislation and there is no presumption that Northern Territory mining companies should seek accreditation against AS/NZ ISO 14001 (Standards Australia 1996a) or any other code. There is evidence that the auditing initiative has been more effective than the traditional mine inspection system with detailed tangible environmental outcomes from audits undertaken by the Department of Mines and Energy (Fox et al., 1998). Benefits of the OH&S system audits are less easy to quantify as they can only be measured in terms of changed human behaviour. It is well recognised, however that desired outcomes are more likely to result from effective management regimes.

ENVIRONMENTAL MANAGEMENT AUDITS PROCEDURES AND PROTOCOLS

Environmental management audits are usually undertaken during the operation of mines where:
- significant environmental management documentation exists;
- company environmental commitments are able to be extracted;
- performance assessments can be made.

The auditing procedure is as follows:

Company notified and audit scope negotiated

The company is formally notified of the Department of Mines and Energy's (DME) intention of undertaking an audit at least a month in advance. The notification includes an invitation to the company to suggest the scope and objectives of the audit. Typically an audit team may select, preferably through negotiation with the company, a specific element of the management system, such as water management, to form the scope of the audit.

DME determine specific audit criteria

In earlier environmental auditing, the audit team would determine the audit criteria by selecting, on a sample basis, aspects of the company's environmental management documentation. This may be referred to as 'vertical slicing'. Performance would be assessed against commitments made in company mission statements, company policy, planning, operational procedures as well as "ground truthing" within the agreed scope (e.g. water management) of the audit. Currently criteria tend to be determined against the relevant sections of the standard, ISO/NZ ISO 14001 (Standards Australia 1996a). The defined criteria are included in a check sheet which together with logistical and other considerations forms the audit plan.

Audit plan sent to company prior to DME arrival

The completed audit plan is sent to the company at least a week prior to the arrival of the auditors on site enabling the operators to view the audit scope, objectives and criteria before-

hand, assemble relevant documentation and to consider responses. Informal contact between DME officers and relevant company personnel continues up until the audit to ensure logistic details are organised. The process is designed not just to ensure there are no surprises for the company, but to maximise the co-operation and involvement of the company in the process.

Audit undertaken on site as per ISO 14010 final audit report sent to company in 10 days

Auditors usually work in pairs and it has been found that 2-3 days is the minimum time required to undertake an environmental management audit on a large mine site. While not always logistically possible, the preferred modus operandi is for the audit team to discuss the objectives and logistics of the audit at an entry meeting with the site manager and other relevant personnel and to present the same group with a preliminary audit report at an exit meeting. The company is given an opportunity to comment on the report before the final version is formally sent to the company. While there are some delays, particularly with larger or problematic audits, efforts are made to ensure that the final audit report is dispatched within ten working days of leaving the site.

Dealing with issues found outside of the agreed scope of audit

Auditors may become aware of deficiencies in management outside of the agreed scope and objectives of the audit whilst on site. Such situations need to be handled with discretion as they have the potential to undermine the level of trust and openness that typifies the environmental audits undertaken by the DME. Experience has indicated that the best way they can be handled is to raise the matters as general observations in the report and not to list them as non-conforming or unacceptable issues.

Handling of non-conformances

An imperfect understanding of the audit process often leads management (either company or DME) to expect recommendations from auditors to remedy problems uncovered in the audit. Experience has indicated that assuming an "expert" role can compromise the independence and objectivity of an auditor. Care is taken to explain at the entry meeting that the auditors are not experts and that their role is to assess company environmental management performance against stated commitments. Nevertheless it is reasonable for a company to expect some generic indication of DME expectations and audit reports contain summary lists of non-conforming issues together with expected outcomes. Corrective action requests are issued in respect to breaches with agreed commitments. If serious breaches of environmental management are discovered the audit team will alert the appropriate DME officers to the existence of a problem but fault finding is not an objective of any audit.

Audit reports are confidential

Care is taken to ensure the confidentiality of audit reports particularly preliminary reports. At present, it is left to the company to make audit reports publicly available, but it can be argued that publicly funded reports should be made available to the public by government agencies. DME considers that industry acceptance of an audit system would be unnecessarily compromised by public disclosure of audit reports.

Site closure or rehabilitation audits procedures and protocols

DME has conducted a limited number of mine site closure audits consisting of assessments of rehabilitation status of sites nearing completion and relinquishment. The outcomes have been detailed reports on deficiencies in rehabilitation that need to be addressed before title can be relinquished and security returned. Compliance with lease conditions may or may not be involved. Site closure or rehabilitation audits are effectively assessments of the current state of environmental management on mine sites and document progress towards a list of mine 'close-out', or closure criteria (Norris et al., 1997) currently issued by DME.

The technique has also been used successfully with operational small mines and quarries to provide companies with objective feedback on their environmental management. Environmental audits are inappropriate on many of these sites in the Northern Territory as environmental management documentation is either non-existent or too limited to be useful. Audits of such sites are effectively on-site assessments of the mine's progress towards the close-out criteria. Procedures and protocols are essentially the same as described for environmental management audits.

DECOMMISSIONING

Decommissioning of mines, partly as a consequence of the contemporary economic climate, has become a major issue in the Northern Territory. A significant number of abandoned mines serve as a reminder of the regulatory failures of the past. The Department of Mines and Energy has issued a guideline on mine closure criteria to all mines. The criteria are generic in nature, designed as an aide memoir and include:

- compatibility with agreed post mining land use;
- physical safety;
- low risk to biota;
- stability;
- rubbish clean-up;
- revegetated or otherwise improved;
- visual amenity;
- heritage or archaeological sites.

The basic principle of establishing mine closure criteria is that they should be taken into consideration at the earliest planning stage recognising that post mining land use is a critical issue and that stakeholder involvement in the planning process is essential.

LEGISLATION REVIEW

After almost ten years of operation, the *Mine Management Act* is being reviewed to bring it more into line with modern industry practice. It is hoped the review will be completed this year incorporating the principles of risk management, quality assurance, audit, continual improvement, best practice and sustainable development.

The combined influence of public opinion and legislation have either encouraged or forced companies to incorporate occupational health, safety and environment protection measures into their business activities. Industry has demonstrated that it can improve performance without coercion and is now calling for legislation based upon goal setting and achievement plus transparency of government procedures.

The Northern Territory Government is aiming to maintain an advisory, monitoring and auditing role with companies being responsible for planning, implementation, reporting and review. The legislative review is addressing ways of developing a culture of safety which ensures that accountability for the health and safety aspects of activities on mine sites rests with those undertaking those activities rather than being shared with a regulatory body prescribing processes and methodologies.

Despite industry support there is some resistance from smaller operators and other individuals who are more comfortable in having Government inspectors play the role of safety officer on their mines. There are also those within industry who anticipate that greater accountability will result in greater financial liability and hence reduced profitability.

Some resistance from government officers has been encountered to date. The reasons include a perceived loss of power and confusion about the intent of legislation. A common perception is that the primary objective of mining legislation is to control industry thus confusing process with outcomes.

IMPACT OF INTERNATIONAL TRENDS ON MINING IN THE NORTHERN TERRITORY

Concern regarding global environmental degradation has resulted in unprecedented international co-operation on a range of agreements, conventions and strategies. Australia has been quick to sign international agreements and tends to act in support of them. In Australia, the implementation of international agreements made by the Federal Government is generally passed to the States and Territories.

Internationally, the development and application of environmental law has been proceeding at a staggering pace. The Framework Convention on Climate Change, the Basel Convention on Transboundary Movement of Waste and the Desertification Convention all have the potential to impact on the Mining

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Industry. Other agreements, which could affect the mining industry, include the Greenhouse and Ozone depleting substances reduction schedules, World Conservation Strategy, UNCED (Earth Summit Rio 1992) and World Heritage Listings. The effectiveness of all this activity may be questionable as the environmental movement and the response to it has been focussed on the *symptoms* of environmental deterioration and too little on the underlying *causes* (Ehrlich & Ehrlich 1991). Sustainable development is ostensibly the fundamental principle of these initiatives.

Sustainable development for mining is defined as that development which is environmentally sensitive, conserves resources and allows for future needs. It requires that the rate of use of a resource should not exceed the capacity either to find new deposits, or to develop acceptable substitutes or to recycle.

In addressing the issue of sustainable development in Australia, the Commonwealth, States, the mining industry and environmental organisations agreed that the following principles need to be applied to project assessment:

- decision making processes should seek to integrate economic and non-economic considerations;
- decision making processes should be transparent (open to scrutiny) and allow participation by the industry and the public;
- information should be made available early in the approval process to ensure that major issues are addressed in a timely fashion;
- the exercise of discretionary powers should be minimized;
- decision making processes should be embodied in legislation or regulatory arrangements which include sustainable development objectives; and
- there should be a standardization of processes throughout Australia.

There is a necessity for companies to internalise all costs (environmental, social, health) into project costs.

Land use conflicts create controversy even in the remote and sparsely inhabited Northern Territory. In 1988, a mission representing the World Heritage Commission (UNESCO), spent a week in Australia and recommended that mining on a major uranium project at Jabiluka be stopped for fear that the mine would endanger the "sweeping landscapes" of the surrounding Kakadu National Park (approximately 20,000 square kilometres) and because it was a threat to a living indigenous culture. This was despite the fact that it had undergone a two and a half year Environmental Impact Assessment, been given Aboriginal consent and had been approved to proceed by the Commonwealth and Territory Governments. The final report was not endorsed by the Australian representatives, was rejected by the Australian Government as being biased and yet it has the capacity to challenge the sovereignty of the Australian people in an area where best practice principles have been adopted. This was the first case of the direct intervention of an international

body in Australian mining regulation and final resolution of the issue remains outstanding at the time of writing.

Two major Territory mining companies have announced their intention to seek accreditation against AS/NZ ISO 14001 (Standards Australia 1996a) for their environmental management, one of which is also seeking AS/NZ ISO 9001 (Standards Australia 1994) accreditation for its refinery. Others have shown interest in developing management systems, not necessarily for accreditation purposes, along the lines of AS/NZ ISO 14001 for environment and AS/NZ 4804 for OH&S (Standards Australia 1996a, 1997). Almost, if not all, Territory mining companies employ some form of critical self-assessment usually by internal and/or external auditing.

In Australia, the Minerals Council of Australia has developed a "Code for Environmental Management" (Minerals Council of Australia 1997) which requires its members to become signatories. The Code is a set of principles and processes that provide a framework for continual improvement in environmental management (Gould 1999). The Code requires signatory companies to continually review the environmental management of each of their operations around the world and to produce publicly available annual environmental reports that document their performance and implementation of the code (e.g. Normandy 1999, Rio Tinto 1997, WMC 1997, WMC 1998). Most major mining companies operating in the Northern Territory are signatories to the MCA Code for Environmental Management.

IMPLICATIONS FOR THE INTERNATIONAL ARENA OF THE NORTHERN TERRITORY EXPERIENCE

Without the development of flexible and outcome focussed legislation, industry and unofficial government initiatives can rapidly outstrip extant legislation. This can create situations where outdated legislation constrains the achievement of mutually agreed goals.

Small mining operators in particular resent the extra "paper war" involved in the improved reporting and planning integral to quality management. This has the potential to be a significant problem particularly if the benefits of a quality assurance philosophy are not immediately apparent.

Despite overwhelming evidence to the contrary (e.g. area of land impacted by all industrial activities in the Asia – Pacific Region 0.1%, UNEP 1997) mining is still viewed as one of the major environmental threats. Any analysis of community concerns would undoubtedly discover a widespread deep distrust of both the mining industry and the government regulators. Most people tend to favour ever increasing controls of the miners and support for self or co-regulation is rare in the general community. Politicians tend to mirror community feeling and reaction to an environmental or safety incident is usually in the form of a knee jerk call for tighter regulation. This is a pheno-

menon not restricted to the mining industry but unfortunately common across all legislation and jurisdictions. Industry organisations need to become more effective in informing the community about wise legislative philosophy because surely the best outcome is an improved environment rather than control of industry?

The Northern Territory of Australia is progressively reviewing legislation, standards and procedures to reflect its unique political/social/environmental make-up with a view towards improving the economic competitiveness of the Territory but in such a way that the environment and future generations are real beneficiaries.

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