Mine Closure – Misima Mines, A Case Study
Rowena Petueli*, Patricia Pepena#, Wladyslaw Benko*, William Muntz*

*Misima Mines Limited, PO Box 851, Port Moresby, N.C.D. Papua New Guinea
#Department of Mines, Private Mail Bag, Port Moresby, N.C.D. Papua New Guinea

Abstract

Society has increasingly advocated a paradigm shift in the way business and development is undertaken that has become known as the ‘triple bottom-line’\(^1\). This concept requires a mining operation to achieve the most economic level of production, the highest degree of environmental protection and the most equitable distribution of social benefits, that is, a balanced integration of economic, environmental and social performance\(^2\).

This paper summarizes the programmes, techniques and experiences utilized at Misima Mines Limited to implement the ‘triple bottom-line’ with respect to mine closure planning and implementation.

In particular, a ‘life-of-mine’ approach to mine closure planning will be described. This involves conceptualising a mining venture as a finite operation within the ongoing socio-economic continuum of the host community. Consequences of such an approach in terms of site rehabilitation and revegetation, mine closure planning, lease relinquishment criteria and post-closure commitments are outlined. The importance of stakeholder engagement and the wide range of issues that are now included in the ‘scope’ of mine closure planning are highlighted, and how the concept of ‘sustainability’ is involved.

Introduction

The Misima Mine is owned and operated by Misima Mines Ltd (MML) which is owned 80% by Placer Dome and 20% by Oil Search Limited. The Misima Mine is the first major mining operation in Papua New Guinea to close in a planned, systematic manner. While mining at the Misima Mine ceased in July 2001, the milling of stockpiled ore continued until May 2004 with the final deconstruction and site clean-up being completed in May 2005. This closed another chapter in the long history of mining on Misima Island which started with alluvial gold first being found in 1888.

This cessation of mining on Misima has large implications for local communities, Placer Dome and Papua New Guinea in general. The responsibility and role of MML in the closure of Misima is detailed in the Placer Dome Sustainability Policy which commits the company to “the exploration, design, construction, operation and closure of mines in a manner that respects and responds to the social, environmental and economic needs of present generations and anticipates those of future generations in the communities and countries where we work”. This policy framework resulted in the goal of the closure of the Misima Mine being to ensure that the benefits flowing to the community from the mining development continue after the closure of the mine.

\(^1\) Stigson, B. (1998) “Sustainable Business: Performing Against the Triple Bottom Line”, *ICME Newsletter*, vol. 6, no. 3.
The closure of a mine is arguably more complicated and difficult than starting a mine and requires the same level of commitment, expertise, planning and effort as the design and construction of a mine. This point has been long recognised at Misima and is reflected in the process of mine closure planning beginning five years prior to the actual cessation of operations and the active engagement of stakeholders to ensure issues and expectations are clearly identified to allow the best possibility of ‘win-win’ outcomes. This paper details this mine closure process at Misima highlighting some strategies and techniques used such as the utilisation of partnerships with other organisations, institutional capacity building and in order for the community benefits generated by the mining company to have a higher likelihood of being sustainable, actively assisting the government and community to help themselves rather than being reliant on the company.

Location

Misima Mines is located some 600 kilometers east of the capital Port Moresby in the Milne Bay Province and 190 kilometers east of the Papua New Guinea mainland. The island of Misima is some 40 kilometers long and 10 kilometers wide at its widest point. It is a rugged, mountainous island with the highest point being 1035 meters above sea-level. The mine is located on the south-east end of the island seven kilometers from the District Headquarters, Bwagaoia. The island has a population of approximately 14,000. Climate is tropical and temperature has little variation throughout the year being generally in the range 30-32°C. Rainfall averages approximately 3,500 mm per year. The island is subject to cyclones generally during the period October to April each year and lies in an active seismic region.

Mining Compensation Agreements

Under the PNG Mining Act, MML was obligated to undertake a Social Impact Assessment (SIA). A steering committee, comprising representatives of Placer and both the National and Provincial governments, set the terms of reference and engaged professional researchers and anthropologists. As part of the SIA, a study was undertaken to identify the traditional landowners of the area likely to be impacted by mining. The SIA also evaluated the pre-mining social conditions and identified issues MML would need to address once mining operations commenced.

MML developed a compensation package for the landowners who would lose access to their land whilst the mine was in operation. A compensation package was endorsed by the PNG Government and a compensation agreement was entered into with the relevant landowner associations. In PNG, sub-surface resources are vested in the National Government for the benefit of all people of PNG, and are not owned by the people who live and farm on the surface land. As is the case with most countries, the PNG National Government has a mechanism in place so that relocation takes place and appropriate compensation is paid for loss of land and productive garden/farming areas.

Applying sustainability principles in a fair and equitable manner within the resource sector has its challenges. Due to the nature of mining a finite ore body, the impact on landowners in the immediate area of the operations can be severe and can include a complete loss of their lands. Those landowners will need to be relocated for the period of mining and, in some cases, may need to be permanently relocated.
For people outside the immediate area of mining operations, the amount of compensation and benefits is usually less. Clearly, the direct impact on their land is less, however the changes within their community and the social impacts may be as significant as those felt by those landowners directly impacted through the loss of their land and the need to relocate. On 27\textsuperscript{th} May 1987, a compensation agreement was signed by MML with traditional owners covering the areas of the Special Mining Lease (SML), the Leases for Mining Purposes (LMP) and other areas that were to be disturbed. Agreements were made with landholders both within and outside the Mining Lease (ML).

Whilst the SML and ML landholders were recipients of direct compensation, Misima Mines worked on providing benefits for the greater region. Throughout the mine life, Misima contributed to sustainability programs through many mechanisms. A notable scheme was the Tax Credit Scheme (TCS) under which the National Government redirected a portion of its income stream from the mine (1\% of FOB mine product value) to the Milne Bay Provincial Government. The provincial government was then obliged to pass on 20\% to the Misima district. The Misimans were also entitled to take up equity in the project up to 25\% of the States 20\% holding of MML (for a 5\% equity interest in the mine). Although this right was never exercised, these terms and conditions set the benchmark for resource developments in PNG\textsuperscript{3}.

**Mine Closure Planning**

The single most important concept about mine closure planning resulting from the experience at Misima is to ensure that the process is begun early enough so that all the issues can be thoroughly examined and consequent courses of action incorporated into the closure plan. Indeed, it is now considered world best practice to begin closure planning at the actual inception of a mining project\textsuperscript{4}. In conjunction, all stakeholder groups must be represented in the closure planning issue identification to ensure all issues are actually identified, but even more crucially, what each stakeholder expects or desires as an outcome for each issue is also clearly stated.

Another important conceptual outcome from the Misima Mine closure is that mine closure planning goes far beyond ‘simply’ removing the residual on-site mining infrastructure and environmental remediation of mining disturbed areas such as various pits and waste rock dumps. The ‘traditional’ definition of mine closure as the act of surrendering the mining lease by the mine operator to a relevant regulatory authority is increasingly being superseded by the mine operator no longer being the sole decision maker on when and how closure will be effected, and that wider societal expectations such as stewardship for future land users must be taken into account\textsuperscript{5}.

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\textsuperscript{3} This right was exercised as part of the Orogen float which has now enabled Misima Landowners to hold equity in Oil Search Ltd


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Such changing expectations and requirements for mine closure planning is part of the overall rapid increase in awareness by society of the social and environmental impacts of mining and consequent demand for change over the previous 10-15 years. Unfortunately, this pressure for change is not necessarily based upon an objective assessment of the issues, nevertheless, such ‘changing goal posts’ increase the difficulty in achieving mine closure planning and outcomes that satisfy stakeholders.

It can be argued that closure planning at Misima did indeed begin at project inception with the selection of deep sea submarine tailings disposal instead of using a traditional tailings dam. In addition to the risks associated with a tailings dam in a high rainfall, seismically active area such as Misima which were totally eliminated by use of deep sea submarine tailings disposal, issues such as land alienation, long-term stability and maintenance, revegetation and future land uses for the tailings and possible poor-quality leachates were also eliminated, consequently removing a ‘traditional’ mine closure issue generally part of a mine closure plan. While deep sea submarine tailings disposal had many benefits at Misima, it is not a panacea and requires the correct set of circumstances to be successful.

Additionally, the bio-physical components of the mine closure such as revegetation and land rehabilitation require considerable resources and more importantly, long periods of time to undertake the work in a satisfactory manner to ensure a stable, biological diverse and resilient ecosystem. A ‘progressive rehabilitation’ strategy was used at Misima involving the revegetation of mining disturbed areas of the lease as soon as possible after mining of each particular area had been completed. So, instead of leaving rehabilitation of the mining disturbed landscape to the end of the mine life, the progressive revegetation resulted in the entire disturbed area at Misima being under vegetation at the same time the final deconstruction was completed.

Progressive revegetation of the Misima Mine site had many benefits including; firstly, it is actually cheaper to get things done, due to economies of scale, while the full support facilities of the operational mine are available for revegetation activities; secondly, considerable goodwill is generated with various stakeholders, as they can actually see the mine closure plan in action, and don’t just have to take the word of the company that actions will eventually be implemented; and finally, lease relinquishment criteria will invariably involve an ecological component, therefore, the sooner the ecosystem is re-established, the sooner a mine operator can expect to get lease relinquishment at the eventual closure of the mine – and this in itself will save considerable money in post-closure monitoring costs.

The deep sea submarine tailings disposal and the progressive rehabilitation are examples of ‘closure planning’ that the company was doing internally throughout the life of the mine. The closure planning with a view to external stakeholders and the actual eventual cessation of all mining related activities resulted in the distribution of a publication titled the “Sustainability Plan – consultation document” in the year 2000.

Rather than having specific plans and details of what we would do as “a company” with regards to closure, this document detailed the various issues, relevant background information and some possible options available to the various stakeholders. This was done consciously by the company in order to “kick-start” various stakeholders into thinking seriously about the eventual closure of the mine and what that might mean for the various groups involved.
A relative surprise arising from the initial attempts by the company to turn from solely internal closure planning to incorporating the aspirations of external stakeholders was the difficulty getting various individuals and organizations to participate in a focused, constructive manner. While some groups were prepared to raise potential issues and problems, nobody other than the company actually seemed too concerned with actually formulating solutions or identifying compromises.

The company was very aware that for a successful outcome, any plans that “the company” may develop would need to try to carefully take into account the wishes of the various groups impacted by the mine closure. So even though the company had been using a ‘life of mine’ approach to closure planning, i.e., during normal operations taking into account how various operational actions, changes and decisions may impact upon eventual bio-physical closure objectives and implementation, the approach was modified to include the idea that closure planning should endeavor to leave lasting benefit for the community, that is, be sustainable, thus looking towards the socio-economic closure objectives as well.

The result of this approach together with the stakeholder consultation that was done subsequent to the document distributed in the year 2000, resulted in a further document being published in 2003 with specific plans and details to actually implement mine closure and provide criteria with which to judge successful completion. One outcome of this process is the recommendation that the mine construction plan, the ongoing operational plans, and the mine closure plan be seen as parts of a continuum and not as separate processes.

**Mine Closure Issues**

The stakeholder consultation resulted in a set of what can be termed ‘typical’ mine closure issues associated with for example:

- Physical removal of obsolete buildings/infrastructure
  - Decommissioning
  - Deconstruction/scraping
  - Asset disposal
- Environmental rehabilitation
  - Revegetation of mining disturbed areas
  - Potential for acid rock draining
- Socio-economic
  - Workforce post-closure employment opportunities
  - Impact on local business

However, stakeholders, and in particular the local stakeholders actually resident on Misima Island, generally viewed these ‘typical’ issues associated with a mine closure as a low priority. Perhaps more correctly, these ‘typical’ issues are of obvious importance to the local stakeholders, but they felt things were being dealt with appropriately and therefore in a relative sense, that these issues were a low priority. This result is probably due to the ongoing community consultation programme regarding routine mine operation
that was in place throughout the life of the mine. For example, mine site tours were regularly conducted for community, school and business groups in which individuals could actually see the land being progressively revegetated.

What the local stakeholders wanted to focus on during the mine closure planning consultation is generally accepted to be the responsibility of civil government, for example:

- Education, maintenance of law and order
- Provision and maintenance of public infrastructure
  - Electricity, telecommunications, road maintenance, water supply
- Public health and hygiene
- Provision of medical services

This raises the question of what is expected of the company to include in the ‘mine closure plan’, especially in areas under the responsibility of civil government, over which a private commercial company has little real control, yet would be expected to achieve agreed upon outcomes. This leads to the much talked about concept of “sustainability” that is now inevitably associated in any discussion of mining development. The difficulty with “sustainability” is that it is such a wide concept that various stakeholders can and do interpret it differently to support their own various biases and agendas.

**Community Consultation Process**

The biophysical components of mine closure planning predominately involved technical officers from the company talking with technical officers from the government regulators. While the actual rehabilitation of the mine site involved many unknowns that required solutions and undertaking actual implementation had many challenges, this part of mine closure can at least be dealt with by engineering and science with the ‘way forward’ being relatively unequivocal.

However, planning the socioeconomic aspects of closure involves a much wider group of people, which together with the need for ‘value’ decisions to be made on various ‘soft’ issues, integrating with civil government plans and objectives, incorporating diverse and divergent external organizations as implementing agents, mixed in with the wider socio-economic problems of PNG, are where the real difficulties are faced in mine closure planning.

A formalized community consultation process is an essential tool in managing the difficulties associated in planning for the closure of a mine trying to balance the demands of various stakeholder groups involved. At Misima this involved firstly, the ongoing routine community relations programme previously mentioned that operated throughout the life of the mine involving a two-way communication with the actual landowners of the mining lease concerning ongoing mining operations.

Another important component of the community consultation process for getting information about local community desires and objectives, and then giving feedback on results was the actual workforce. The workforce at Misima was over 90% sourced from the local community. There were also various regular meetings and reporting requirements to various government regulatory bodies such as environmental compliance reporting.
While this formal stakeholder engagement certainly provided information about how mine closure planning should proceed, a more focused process specifically dealing with mine closure was needed. Coinciding with the first consultation document produced in the year 2000, the Sustainability Plan Advisory Committee (SPAC) was formed. This involved various landowner representatives, local community groups, NGOs, etc. The SPAC had a role to help formulate and review actual mine closure planning in conjunction with the company. However, it was found that this group was not functional _per se_, as the participants were not what can be termed the ‘decision makers’. Consequently, the SPAC group was unable to formulate concrete recommendations and had difficulty in moving beyond generalized aims and goals. Further, it was found particular groups involved with SPAC, particularly the NGOs, did not have the trust of the local people who did not think that the NGOs and consequently SPAC was acting on their behalf, but only on their own agendas. Consequently, the Misima Mines Closure Committee (MMCC) was formed.

The MMCC has a similar role in helping formulate and review mine closure as did SPAC, however, this group is composed of representatives from the various PNG National Government regulatory Departments, the Milne Bay Provincial Government and the Misima Landowners. Due to the membership of the MMCC it has the authority and power to actually set mine closure criteria and judge successful completion. Therefore, this group was much more focused on achieving actual outcomes instead of pushing political agendas or other self-interested personal motivations, and continues to this day.

### Mine Closure Planning and the Triple Bottom Line

As discussed above, the scope of mine closure planning at Misima goes far beyond just the environmental biophysical issues of a mine site, and also includes what are more generally thought of as problems to be dealt with by government. This dovetails with the concept of sustainability in which environmental awareness or stewardship must be balanced with social responsibility and the economic viability of a business venture. This has been termed the triple bottom line, in which environmental and social ‘success’, not just financial, must be assessed and be shown to be viable in developing business ventures such as mining operations.

The difficulties associated with such a balancing act are obvious, and unfortunately, there is no guide book that shows how this can be readily achieved. However, one approach that is recommended to tackle the problem successfully is using partnerships as advocated by a collaborative project between the World Bank, CARE International and a number of other organizations in which “managing the impact of natural resource projects on local communities, maintaining a company’s social license to operate and improving the contribution a project makes to long term regional development, present a complex set of issues that may be best solved through a collaborative effort between business and wider society”.

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The Misima experience supports the utility of this ‘partnership’ strategy in managing the overall impact of a mining operation. In realization that the Misima Mine is of a relatively transient nature, the company operated with a clear policy of avoiding becoming the defacto government, attempting to build upon existing institutions and programmes. Such a strategy was deemed the most likely to achieve ‘sustainable’ improvements that would continue after the cessation of mining and departure of the company from the Island. While a number of notable successes were achieved, which are detailed in the following discussion, the strategy of using ‘partnerships’ cannot be said to be an unequivocal success per se.

A useful analogy to help explain why ‘partnerships’ were not an unequivocal success at Misima is likening various categories of potential ‘partners’ such as government institutions, community organizations, NGOs etc to the legs of a chair upon which sits the “triple bottom line”. Obviously, it can be seen that if one or more of the “legs” of the “chair” is removed the triple bottom line will come crashing down. This has been one of the major difficulties with the closure at Misima in trying to achieve benefits that go on past the closure of the mine. Previous discussion has highlighted that the biophysical issues have been dealt with successfully, however, the inability of the wider community and government to take up the opportunities presented by the presence of the mine has resulted in a “triple bottom line” outcome that is less than optimal.

Therefore, the major difficulty with this strategy of using ‘partnerships’ is that what happens when one or more of the potential partners is not functioning, or does not wish to participate, or only desires to achieve self-interested goals at the harm of others? This is particularly important if such questions are being asked of ‘necessary’ partners such as government institutions and landowner groups.

Considerable effort is required by a company in identifying suitable partners who are prepared to work in partnership for the good of all the stakeholders. In the case of Misima the logical partners were initially the government and landowners, however, the lack of government capacity and the inability of the landowners to work together meant that the company was required to utilize alternative arrangements such as the tax credit scheme, discussed below, to augment the strategy in order to ensure infrastructure benefits for the local community.

A major learning from the Misima Mine closure is that while ‘partnerships’ are clearly the desirable method to manage the impact of natural resource projects and undertake mine closure planning, such a strategy is not a panacea, requires considerable ongoing effort by all participants, and should be augmented by more ‘traditional’ arrangements to give the best overall likelihood that benefits from a mining operation will accrue to all stakeholders and continue after the final closure of the mine.

However, the question must be asked, whose responsibility is it to make somebody’s life better? What can a company do if individuals and organizations choose to waste opportunities, not hold elected officials accountable or not plan for their own futures? While these questions are somewhat rhetorical, the following sections detail some methods, techniques and partnerships that were successful in providing benefits to the local community at Misima.
Capacity Building

MML realized that it was not enough to provide infrastructure but that MML would also have to bolster the ability of the Misiman people to plan their own future and to improve their business skills so they would be better prepared to manage their destiny once the mine closed. In 1996, MML engaged Harmony Ink, a PNG consultancy company, to create a capacity building program. This successful program was completed in 1998, and resulted in the landowners’ association, local government officers and other administrators gaining skills in planning, director’s responsibilities, transparency and budgeting skills. Harmony Ink and company officers also worked with Local Government officials and assisted in the Local Government developing a 5 year rolling plan for the district.

Partnerships

Eradication of Filariasis

Filariasis is the fourth leading cause of permanent disability in the world with up to 120 million infected. Filariasis was quite common on Misima Island and throughout the region with up to 60% infection rate. Through recent drug research, suitable treatments have become available. MML, in conjunction with James Cook University and the World Health Organisation, undertook a major program to eradicate filariasis throughout Misima Island. The program included training of local health workers so they could identify and treat local communities. The program was expanded to the outer islands and the rest of Milne Bay province.

In addition, the company also partnered with the community in local health programmes, including assisting the hospital and local health centers by procuring drugs and providing shipping, and assisting with staff such as locum doctors and maintenance personnel. However, it must be noted that since the mine closed there has been no doctor at the hospital. This highlights the previous discussion about the importance of all the partners involved to meet their commitments to ensure long term benefits are maintained.

Electricity Generation

Following the decision by PNG National Electricity not to install or provide power to Misima once the mine closed, MML and the Misima Landowner Company, Matahikan, built a 250kW hydroelectric power generation station which is operating from water sourced from Tonowak Mine pit. The infrastructure provided will enable the community to enjoy a reliable reticulated power supply. A joint venture agreement has been facilitated between the landowners and provincial government in order to ensure ongoing sustainability of the project.

Employment

Oyatau Limited is an employment company that has been setup by Misima Mine Workers Union. The goal is to provide labour hire and outsource workers trained by Misima Mines over the years to gain further employment within PNG and internationally after the closure of the mine.
Agriculture

Over the years a range of business development activities were encouraged such as sawmilling, fishing and various agricultural ventures. However, the remoteness of Misima and the consequent high transportation costs make such ventures likely to be uneconomical in the long term. In realization of this, the business development team focused on existing cash cropping by establishing the Samurai Murua Agricultural & Rehabilitation Training Centre, also know as the SMART Centre. The SMART Centre is a joint project between Cocoa and Coconut Research Institute and Milne Bay Department of Agriculture and Livestock and was initiated by MML. The centre provides high grade seed stock and a training and marketing reference area for farmers. This was developed to promote and rehabilitate cash crops on the island such as cocoa and high value, low weight products such as vanilla, nutmeg and other spices.

Another project developed by the SMART Centre that is directly targeted at improving the lives of women is the kitchen gardens project. This project was to demonstrate that the gardening systems traditionally used by the Misimans could be improved, enabling women to grow more food from the same plot of land meaning less labour required.

Infrastructure and Social Contributions

Education

By far the major contribution of the Misima Mine to the local community was training of people. The success of the training and localization program can be seen by the fact that, at closure at the end of 2004 there were only 23 expatriate staff out of 320 total employees – in other words, 93% PNG localization of the workforce. MML had expended over K12,000,000 on training and education. During the training program MML indentured 86 apprentices to qualified tradesman, with 2 of the apprentices winning PNG Apprentice of the Year. Company sponsored training also resulted in 13 trained nurses, 21 university students obtaining diplomas and degrees in mining and allied industry professions, 128 students attending university, and a further 169 sponsorship to school and college students.

Such was the strength of the training that a recent survey has indicated that, after mine closure, at least 100 ex-Misima employees are working at other mines in PNG including Lihir, Ok Tedi and Porgera with a small number employed overseas. This demonstrates sustainability in action, with these workers having valuable skills and repatriating wages back into the Misiman community.

A scholarship programme was also started in 2005, to fund high school places for Misiman children through till 2010.

Health

The company identified the development and support of local health services as a major program that could have tangible benefits not only to employees and their families, but to the population in general. This was embraced at Misima with the program supporting medical infrastructure including the hospital and several Aid Posts, through to staffing and staff skills training, including university training for 13 nurses. The level of medical facilities and facilities at mine closure means the people of Misima enjoy a very high level of medical attention, resulting in vastly improved health compared to the situation prior to MML’s involvement.
MML, through the TCS, upgraded the hospital and built a dedicated maternity ward. In order to keep hospital services at a high level, an agreement was struck with James Cook University, Townsville and University of Papua New Guinea for the use of the hospital as an undergraduate training school in tropical medicine. Further capacity support was given in training the administrators so they could provide high quality planning and medical services. The TSC also funded development of 10 Aid Posts and housing for each of the Aid Post personnel.

**Housing, Road and Bridges**

Over the years that the company operated, a wide range of infrastructure was built, like housing, community halls and schools. It was the local communities that requested the type of project and the location where it was to be built. These requests were then prioritized and built by the company. Other projects included bridges and wharfs.

One of the concerns that the company had in building such infrastructure was the capability of the local community and or government to fund the ongoing maintenance that would be required. That is, exactly how sustainable are such infrastructure projects. The company expended considerable effort to ensure stakeholders were aware of what their obligations would be post-closure of the mine, and think very carefully about what they requested. For example, bitumen sealing the roads on Misima would have resulted in the local level government needing large amounts of money for ongoing maintenance compared to the existing unsealed roads, yet provide little improvement or extra benefit in provision of transportation for business or agricultural endeavors.

The existing unsealed roads mean that the company was able to donate equipment that the local level government will be able to use to cost effectively maintain a good road system without large amounts of ongoing funds being required. This is a sustainable solution to the problem of allowing community members to be able to bring their produce to market and gain cash for their families and provide ready access to other infrastructure such as schools and hospitals.

**Water Supplies**

Water supplies are another example of infrastructure provided by the company to the villages at the request of the community. These types of project make life easier, in particular for women in the village whose role it is to collect water for domestic use. Prior to the building of such water supplies, some women would have to walk up to half a kilometer just to get drinking water. This is not only more convenient, but such ready access to water in the village means that people can practice much better hygiene. This means that the water supply projects have improved the health and well being of the people.

**Tax Credit Scheme and Trust Funds**

The well being of individuals in the local community is obviously greatly influenced by economic opportunities. These opportunities have been provided and supported by infrastructure built by the company such as schools, medical centers, roads, water supplies etc that have been previously discussed.
The tax credit scheme is an initiative developed by Placerdome and approved by the PNG National Government. This initiative enabled companies to provide infrastructural support that otherwise would not have been provided by the Government, as the PNG public institutions are not capable of providing such services in such a remote location.

This is a further example of a partnership between the government and the company that means the lives of particularly women and their families at Misima were improved by the infrastructure that was provided, that otherwise would not have been available.

Another area that provides economic opportunities that greatly improves the life of individuals on Misima are the future generations trust fund and the initiatives produced by the MML business development group.

The benefit of the future generation trust fund is that it provides for things such as school fees for the children of the people of Misima. The fund is established so that principle is maintained in secure investments such as term deposits, while it is only the income generated over time that is used for payment of school fees for example. This means that the people of Misima should be able to enjoy these benefits in perpetuity.

However, this fund was attacked by a minority Misiman group which resulted in a considerable income loss and will greatly impact on the ability of Misiman Landowners to fund their children’s education in the future. This demonstrates the need for the community to stand-up for their rights and hold their leaders accountable in order for opportunities provided by mining companies to leave lasting benefits.

**Woman’s Business Development**

A previous section discussed the importance of using the strategy of ‘partners’ to help ensure “sustainability” becomes a reality. The most important ‘partner’ is that of the individual and the community they form, in order for them to control their own future. This control of the future must involve income creation so that they can continue to enjoy the benefits of health, education and law and order. Since a mining project by nature is transitory, cash cropping and other business opportunities post closure of the mine are of crucial importance.

In 1996 the Louisiade Women’s Association approached the company for assistance in running their guest house located at Bwagaoia. The Business Development Section for the mine embarked on a refurbishment of the guest house. A experienced manager was employed on behalf of the Women’s Association. This manager was instructed to provide regular reports to the Women’s Association and to involve the women as much as possible in the running of the business. A representative of the mine also attended these meetings and conducted courses in management. The guest house was successfully operated in this manner for three years during which time the women developed their own five year business plan and were actively engaged in the day-to-day management of the business.

After three years of instruction and training in management systems the Women’s Association then felt that they could operate the guest house by themselves and decided to take over total control. They terminated the manager, requested and received all records from the mine’s business development section and took over control of a business that had several thousand’s of Kina in the bank, established control systems and experienced staff. Within four years the business was basically bankrupt.
Other initiatives were also begun through a Women’s Affairs Officer employed on a full-time basis by the mine. These involved various training courses and practical demonstrations. At the request of local women’s groups, a drum oven training and construction project was undertaken. This resulted in women at the village level obtaining an income through baking bread and scones. Interest in the project however was soon lost after it was established, for various reasons such as traditional and family commitments. The drum ovens still exist but remain unused by the various women’s groups, however, some are used by individuals but at a non-commercial level.

A further project requested by various women’s groups was sewing training to enable them to make clothes. This resulted in the mine purchasing a number of sewing machines and sourcing a qualified trainer who conducted courses in both sewing and maintenance of the sewing machines. Once again, the sewing machines were not used by the women’s groups since when the machines broke, they were not fixed.

These projects demonstrate that a company can provide all the tools, money and training necessary to embark upon a “sustainability” project, but if the community is not really committed to the project, it is doomed to eventual failure. Again, the question must be asked, whose responsibility is it to make somebody’s life better? What can a company do if individuals and organizations choose to waste opportunities with which they are presented?

**Conclusion**

In early May 2004, the National Executive Council and the Right Honorable Sir Michael Somare, Prime Minister of PNG approved the mine closure plan. At his address to the National Executive Council, the Prime Minister stated:

“Misima Mine is the first major mine in PNG to properly plan its closure. This sets the benchmark for other mines to formulate a proper mine closure plan from here on. The Mine Closure Plan was produced collaboratively by all relevant stakeholders under the auspices of the Misima Mine Closure Committee. The input from stakeholder risk assessment workshops formed the basis of the Plan.

This (the closure process) also provides certainty to investors that PNG is ready to accommodate new economic thinking relating to sustainable development and industry best practices. The approval paves the way for the implementation of various biophysical and socio-economic projects and programs under the Plan”.

Overall the benefits of the opportunities provided by the mine greatly outweigh the negatives. The individuals that form the local community must be responsible for taking the opportunities provided. Unlike some groups advocate, just because not all individuals have benefited, or in-effect choose not to benefit, does not mean that all individuals should be stopped from having the opportunity at reaping the benefits potentially provided by a mining operation and improving their lives. Particularly in remote locations such as Misima in which government or other agencies cannot provide similar opportunities.

In order for the benefits of a mining operation to continue after mine closure, begin planning for eventual mine closure as soon as possible. Stakeholder engagement is crucial, the wide scope of the sustainability concept and the varying interpretations possible places emphasis on stakeholder engagement to get consensus about what sustainability means for a particular mining project.
Everybody involved needs to be clearly aware of the issues and what others are expecting, and then “win-win” situations can hopefully be identified. The overall goal should involve trying to ensure that the benefits flowing to the community from a mine development continue after the closure of the mine. Further, in order for the community benefits generated by a mining company to have a higher likelihood of being sustainable, form partnerships and assist the government and community to help themselves.

The views in the paper are personal reflections of the authors and not necessarily that of Misima Mines Limited and PNG Department of Minings
• Over-View of the Misima Mine Project
  • Location, milestones, achievements

• Outline Mine Closure Planning
  • Highlight the ‘life of mine’ approach used
    • progressive revegetation as example

• Closure Planning Success Criteria/Objectives
  • Aka “lease relinquishment criteria”

• Importance of Stakeholder Engagement

• Process used for closure planning
  • One outcome = ‘scope’ of closure planning goes beyond just physical removal/rehab of mine site and is now involved with the concept of “sustainability”
Regional Location Map

PDG

Map showing the location of Misima Island in the Solomon Islands region.
The Misima Project

- Open Pit/CN leach/CIP process
  - Submarine Tailings Disposal

- Milestone
  - Jan 1988  Construction commenced
  - June 1989  Official opening by Prime Minister Rabbie Namaliu
  - July 1992  Production reached 1,000,000 ozs of gold
  - July 1995  Production reached 2,000,000 ozs of gold
  - Nov 1999  Production reached 3,000,000 ozs of gold
  - May 2001  Mining from open-pits ceased
  - May 2004  Milling of ore ceased
  - April 2005  Deconstruction completed

- 3,700,000 oz Au produced in total
  - Taxes, duties and levies paid to Government  K285,000,000
  - Salaries and wages paid to PNG Nationals  K 85,000,000
  - Royalties paid to governments and landowners  K 36,000,000
  - Expenditure on training and education  K 12,000,000
Closure Planning Overview

- Start closure planning ASAP
- Consultation document produced 5 yrs prior closure
  - “Kick-Start” Stakeholders thinking about mine closure
  - No legislative process, being developed
- “Life of Mine” approach
  - Deep-sea Tailings Placement
  - Progressive Revegetation Strategy
- Philosophy of planning for the future benefit of the community as opposed to a narrow focus on simply physically closing the mine.
“Scope” of Mine Closure

- Typical Mine Closure Issues:
  - Physical removal of buildings/infrastructure
    - Decommissioning
    - Deconstruction/Scraping
    - Asset Disposal
  - Environmental rehabilitation
    - Pits/Dumps (ARD, alternative end-land use)
  - Socio-economic
    - Workforce post-closure employment opportunities
- “Government” problems:
  - Education, Law & Order
  - Provision & Maintenance of Infrastructure
    - Electricity, Telecommunications, Road Maintenance, Water Supply
  - Public health & hygiene
2nd Phase Revegetation

Cooktown Waste Rock Dump
(Reveg. started ~1996, top bench finished 1999)
Stakeholder Engagement

- Local Community
  - Regular mine-site tours and inspection of progressive rehabilitation of waste rock dumps
- Our Workforce
- Regulators (DoM, DEC)
  - Quarterly review meetings
  - Six-monthly reports
- Sustainability Plan Advisory Committee (SPAC)
  - Landowners Representatives
  - Local Community Groups
  - NGOs, Church Organisations, etc
- Misima Mines Closure Committee (MMCC)
  - Landowners Representatives
  - Regulatory Authorities (DEC, DoM)
  - Government Representatives (Provincial, LLG)
Audit involved area-by-area review of:
- Evidence/presence of obsolete structures
  - Buildings, pipelines, tanks, etc
- Presence of safety hazards
  - Decaying buildings, culverts, adits, etc
- Evidence chemical spillage/waste disposal
- Prior structures removed according to plan

Note: ecological success (and other requirements) of the overall closure plan not assessed by this audit
Closure Needs Change Over Time

- **1989 – Contract of Sale**
  - “remove the processing plant … except for concrete foundations”

- **2003 – Closure Plan**
  - No legislative framework, requirements
  - Company volunteered;
    - Remove foundations were possible, or break-up concrete and cover with sufficient topsoil to enable cash cropping or subsistence gardening

- Example of how the closure plan needs to go beyond ‘legal’ requirements
• Typical Mine Closure Issues:
  • Bio-physical Environment
• “Government” problems:
  • Education, Law & Order
  • Public Infrastructure
  • Public health & hygiene

• Sustainability
  • Environmental Awareness
  • Social Responsibility
  • Economic Viability

Mine Closure Planning

Triple Bottom Line
Partnerships

• a new way to manage social issues:
  “Managing the impact of natural resource projects on local communities, maintaining a company’s social license to operate and improving the contribution a project makes to long-term regional development, present a complex set of issues that may be best solved through a collaborative effort between business and wider society”

Natural Resources Cluster – Business Partners for Development.
Water Supplies
Filariasis Eradication Program

- Caused by thread-like, parasitic filarial worms
- Enlargement of the leg, arm or genitals
- Disabilities cause considerable economic impact, psychological and social stigmata
Filariasis Eradication Program

- Company/Government Program
- Developed & expanded program via partnerships:
  - Provincial Dept of Health, WHO, Church Missions, Private Companies, James Cook Uni, (Steamships/Toba Motors/Amrad)
- Potential for add-on programmes
  - malaria control
  - vaccinations
  - AIDS/HIV
• Tax Credit Scheme (TCS)
  • TCS expenses deemed tax paid
    • 0.75% of gross sales (2% before 2000)
  • Gov. approved infrastructure projects

• Future Generations Trust Fund
  • 20% of mining royalties

• Business Development
  • Samarai Murua Agriculture Rehabilitation Training (SMART) Centre
    • cash cropping (improved varieties, harvesting and processing)
• Future Generations Trust Fund
  • 20% of mining royalties

- Dept of Finance
- Dept of Mining
- Dept of Trade & Industry
- Landowners
- Placer Niugini Ltd
- Commercial Accounting Company

Term Deposits

- Community Projects and Infrastructure Maintenance
Cash Crops - Cocoa
Vanilla and Spices
Louisiade Women’s Association

- Women Support Initiatives
  - Guest House
  - Drum Ovens
  - Sewing Machines
  - Management Training
Social Issues

• Community
  • Foreign Workers
    • Fly-in, Fly-out minimised social conflict
    • Workers Confined to Camp (request by community)
      • 15 years enforcement lead to minimal social tension
  • Improvement of Facilities
    • Trade Stores, Water Supplies, Hospital, Schools, etc
• Family
  • Greater access to cash
    • Improved standard of living
    • Ability to adopt western benefits to the traditional culture
• Individual
  • Education, Training
Conclusion (“lessons learnt”)

- Programmes & initiatives built upon existing entities
  - institutional partnerships crucial
  - assist government & community to help themselves
  - avoid ‘dependency’ on the company

- Stakeholder Engagement
  - Who wants what done !
    - “Win-Win” situation
    - What is included in the ‘scope’ of the closure plan
    - Benefits continue after mine closure