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Capacity Building in Papua New Guinea for Community Maintenance During and After Mine Closure

Richard T. Jackson

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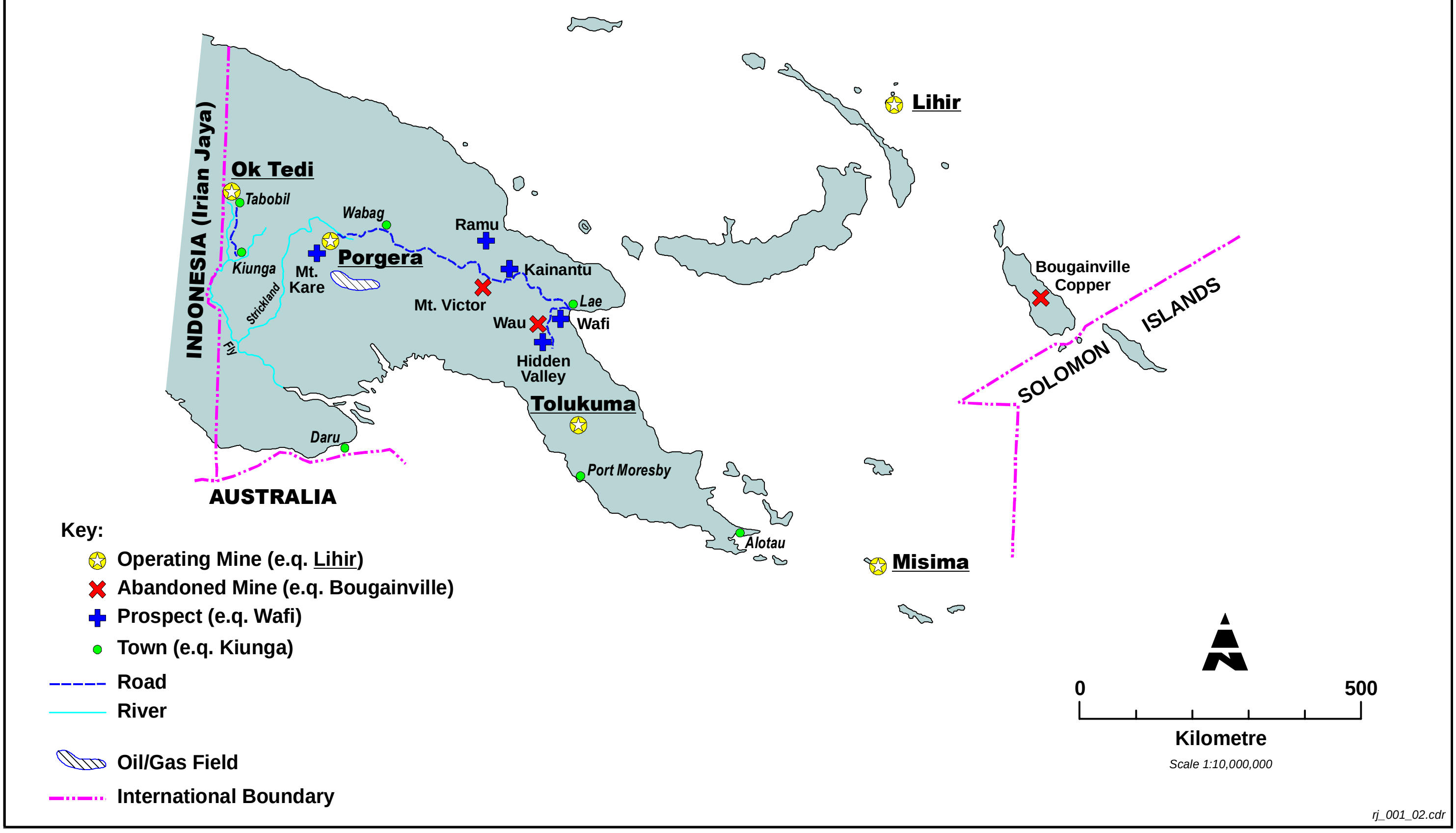
MINING PROJECTS IN PAPUA NEW GUINEA



1 Introduction

1.1 Mine Closure And Sustainability Policy In Papua New Guinea

Modern, generic legislation on mine closure in Papua New Guinea (PNG) is limited, largely, to post-closure mine safety. Since late 1998, an inter-departmental, national government committee has, however, been working on more general closure legislation and policy. A draft was produced early in 2000 and this has since been discussed with some stakeholders (companies, NGOs and government agencies). The Draft Policy is attached as Appendix A. Progress since late 2000 on this policy has been slow for a number of reasons largely associated with staffing issues.

This does not, however, mean that the thinking behind the Draft Policy – or the thinking that is more widely circulating in mining circles concerning closure and sustainability issues – is not evident in the preparations being made for closure plans at various project sites. Indeed, quite the opposite tends to be the case. This is for several reasons: first, because most of the government officers involved in drawing up the Draft Policy are also involved on a day-to-day basis with the supervision or co-ordination of individual projects. Secondly, because global company policies on closure and sustainability inform individual project plans in PNG; in one case (that of Misima – a member of the Placer Dome group), policies adopted by the project have, in fact, strongly influenced group policy. Thirdly, because one of the by-products of a recently agreed institutional strengthening package granted to the PNG Department of Mining (DoM) by the World Bank Group (WBG) has been a fairly efficient transmission of the WBG's own thinking on best practices in these areas to all involved in the PNG industry – with the exception of landowners in project areas. It is hoped that from the material that follows it will be clear that practice is actually much better than theory in PNG[1].

However, it is also clear that practice varies very considerably from one project to another. This is not entirely a consequence of the absence of a national overall policy. It is partly a result of circumstances being somewhat different at different projects and partly a result of the fact that different projects were planned at different times and have, therefore, incorporated, different standards regarding eventual closure. These standards cover such diverse fields as accounting practice, approaches to royalty distributions, rehabilitation planning and staging of workforce retrenchments. For example, it should be recalled that the Ok Tedi mine was being planned in the late 1970s, the practice of social and economic impact assessment was in its infancy and the concept of 'sustainability' was yet to be developed[2].

There is no doubt in the present writer's mind that local, varying circumstances will mean that large variations in closure strategies and post-closure planning will always occur. However, there is equally no doubt that PNG does need to finalise its policy-making on mine closure and post-closure issues so as to give guidelines to the industry. Unfortunately,

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[1] This is the exact opposite of the situation in some other countries – for example, the Philippines where the legislation is all encompassing but implementation is very weak, partly because of lack of funds to mining regulators and partly because, for a number of reasons, no significant new mines have be opened for a decade.

[2] Interestingly, 'sustainability' as is it is currently used was being pushed in the north Australian forestry industry much earlier – in the 1970s.

given the fact that preparations are already underway for parliamentary elections in 2002 (the National Parliament has a term of five years), it seems unlikely that any legislative progress on this matter can be expected before early in 2003.

1.2 The Place Of Mining In The PNG Economy

The mining industry has played a dominant role in many aspects of PNG's non-subsistence economy for over two decades. Exports of metals, metal concentrates and ores have contributed between one-third and two-thirds of the nation's exports in every year since Independence in 1975. In 2000, copper and gold exports accounted for over 45% of exports (with oil exports contributing a further 31%). Company taxes from mining projects have, since shortly after Independence, been paid, together with a variety of other taxes – but NOT income taxes of those engaged in the industry or royalties (2% of f.o.b. production value) – into the country's Mineral Resources Stabilisation Fund[3]. In 2000, the monies paid into the Fund were equivalent to 14.3% of total government revenues (or 18.7% of such revenue if external grants in aid are excluded) and over 62% of all company taxes raised. Whilst the industry is by no measure labour-intensive, it nevertheless does employ at least 60,000 persons (if small miners are included) and, whilst numbers of employed people in the country as a whole had, between 1992 and 1999, remained static – in a country where annual population growth rates 1990-2000 exceeded 3% - formal mining industry employment actually rose by 37%.

It has, however, been apparent for almost a decade that PNG's ability to attract ongoing exploration investment has declined sharply. This is explained partly by the post-UUSR collapse opening up of new exploration areas and partly by internal factors[4]. Warnings by experienced observers both within the Department of Mining and the industry largely went unheeded. There is now some evidence that political notice of the likely consequences of this situation is being taken. There is rather clearer evidence of multilateral lending agencies and, perhaps most significantly given its ongoing role as a major source of government revenues, of AusAID's concern. Spokespersons for these groups have frequently voiced their concerns at the implications for the economy as a whole of the sharp decline in exploration investment. A number of situation reports and position papers from such sources have circulated in government departments in recent months. All report what Department of Mining staff have been noting for at least the past five years: that there is a good chance that within the next decade mining outputs will decline by well over half. When, additionally, the Department of Petroleum and Energy noted in its Annual Report for 2000, that 'petroleum activities….was [sic] at an all time low' (Chamber of Mines and Petroleum, 2001), it becomes evident that it is by no means alarmist to state that, if one can call the

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[3] The MRSF was a device designed to regulate flows of funds from the industry into government coffers so as to avoid 'boom and bust' effects on national expenditure. For many years the MRSF satisfactorily fulfilled its role. However, from the mid-1980s onwards national politicians, seeking additional funds in straitened times, slowly eased the restraints originally placed upon them by the MRSF's founders. In 1999, a desperate government emptied the Fund overnight (taking out an accumulated K986m). In 2000 all funds paid into the fund (K430m) passed directly onto government. The Fund's regulatory flow function has now disappeared.

[4] These would include: the 1992-3 dispute over government's level of equity in the Porgera JV; increases in royalties (from 1.25% to 2% in 1996) and other additional taxes; perceived instability in both government and government policy; and difficulties in dealing with landowner issues. The relative importance of these factors (or whether they are in fact important at all) can be argued. What cannot be argued is the fact that mining exploration expenditure has fallen to very low levels.

mining/petroleum sector the backbone of the modern economy of PNG then all the signs of a critical case of osteoporosis are already evident.

1.3 Characteristics Of Existing Mining Projects In PNG

In this paper, only metal mines are considered – gas and oil fields are omitted. Additionally, one project (Ramu Nickel) not yet operating is briefly included. Mines are listed according to the year in which they commenced production.

1.3.1 Ok Tedi[5]

a) General

This large-scale mine started operations as a gold project in 1982/3 before transforming into a copper concentrate producer in 1986/7. It is located in the mountainous headwaters of the Ok Tedi, itself a tributary of the Fly, within 9km of PNG's border with the Indonesian Province of West Papua. The mine site itself is one of the world's wettest locations (over 10,000mm rainfall annually). The project is linked by a ridge top road, 137km in length, to the regional center of Kiunga whose own communication with the outside world is via the remaining 400km of the length of the Fly River to the Gulf of Papua. By the end of 2000, the project had produced over 7 million ounces of gold (most contained in copper concentrates), 11 million ounces of silver and 2.1m tones of copper and employed over 2,000 people (including contractors). Ok Tedi is regulated under its own Act, not the Mining Act. Changes in circumstances have required Supplementary Agreements, nine so far, to be enacted by Parliament. The latest prepares the ground for BHP to pull out of the project.

In 1980 Kiunga township had a population of fewer than 1,000 persons and the Star Mountains Census Unit (in which the project is located) one of fewer than 800. At the 2000 Census the figures were, respectively, 8,265 and over 10,000[6]. In 1980, the people of the mine site were entirely subsistence-oriented (their staple food being taro with a little sago) and the peoples lower down, towards Kiunga, were sago eaters a few of whom produced small amounts of rubber for cash. In 1980 there were six primary schools in area between Kiunga, the border, the Strickland River and the mine site. The only health services were those provided by the missions. What 'modern', commercial development there was, was largely restricted to riverine communities since the only road in the region was a track 25km in length between Kiunga and the Ok Mart River – then unbridged. Today the area has three High Schools, over 30 primary schools (where there were none in the Star Mountains there are now 13) and two hospitals.

However, the region's isolation continues. Its main physical link to the outside world remains the Fly River and the cost of most goods brought into the region is heavily, if indirectly, subsidized by OTML. Moreover, the provincial budget, regional business activity

[5] See Jackson (2000), Long-Term Economic Development Strategy for the Tabubil District for a fuller discussion.

[6] The latter figure relates to the Star Mountains Rural Local Level Government area that includes Census Units other than that of the Star Mountains; the total population of the Star Mts. LLG is 12,114.

and personal incomes are overwhelmingly dependent upon the mine's operations. The only economic activity partly unrelated to the mine is rubber growing – and even that is subsidized by the mine, which supports the central processing factory at Kiunga. In 1998 OTML paid just under K10m in royalties to the Province (Fly River Provincial Government - FRPG), K4m in royalties to mine landowners and K16.4m in rents and compensation payments to mine and downstream landowners. The project has spent (to the end of 1998) K317m on infrastructure (public roads, schools, health facilities, government offices and housing, wharves, power generation, community facilities and airstrips). Its township at Tabubil houses close to 6,000 persons and operations employed 1700 Papua New Guineans at the end of 1998 – one third of whom were from the areas immediately surrounding the mine (Kiunga and Telefomin). Whilst the focus of legal proceedings against OTML by downstream landowners has been that its activities have 'destroyed their way of life', the irony is that OTML's presence has provided much higher incomes, infinitely greater educational opportunities, better health care (resulting in doubled life expectancies) and vastly improved infrastructural provision for the great majority of people in the northern half of the Province.

Moreover, over the years it has slowly had to take over many of the functions that should be the responsibility of government, notably the construction of public works. Despite having, for most of the past twenty years, the highest per capita revenues of any province in the country, the FRPG has been one of the least effective and has been suspended on several occasions for financial mismanagement.

The project's national impact has been significant – indeed, at times critical. In the late 1980s, prior to the opening of the Porgera and Misima projects but at the start of the Bougainville crisis, it was the only major source of national exports and government revenue. Even today its role remains significant. In 1998 it purchased goods worth K132.6m from PNG suppliers, paid K52.2m in taxes (including employees' income taxes) and K18.2m in dividends to government.

b) Major Problems

Ok Tedi's operations have been marred by two major problems. Most attention has been focused upon its downstream impact on the river system and adjacent riverine lands. The project has no tailings retention facility. During construction the selected site, at Ok Ma, suffered a series of landslips even before tailing dam construction had properly commenced. To exacerbate matters, from 1986 onwards, the project dealt with much higher volumes of throughput materials than had originally been envisaged or planned for. The consequence has been greatly increased sedimentation, originally in the lower portion of the Ok Tedi (from the point where the river leaves the mountains) but now increasingly in the middle Fly area. It is expected that a 'slug' of sediment will continue to move down the Fly over the next forty to fifty years; whilst dredging efforts have been relatively successful in abstracting – in the lower Ok Tedi reaches – much of the sediment that has been added by operations since 1998, material added before that date remains in the system. Given that the Fly at Kiunga is a mere 50m above sea level but 400km from the sea, this additional sedimentation has both created flooding and raised regional water levels causing major changes both to riverine vegetation and off-river drainage patterns.

The second, less-remarked upon but in the present writer's opinion equally problematic, issue has been the fact that the project to date has hardly been a financial success. Capital cost over-runs (of US$500m or more) and lower than expected returns on gold production between 1982 and 1986 almost closed the project in 1986/7. Indeed it was only due to PNG Government's strong insistence that the copper stage be proceeded with that the private partners eventually agreed not to withdraw. Only in 1990 did the project start to pay dividends – and then only to preference shareholders. Ordinary dividends were paid for the first time in 1997. Quite the reverse of the original project concept (which foresaw the gold phase paying off all the project's debts so as to enable the 'marginal' copper phase to proceed), the project has only recently become profitable overall. Indeed, the final years of mining are expected to generate between K50m and K100m annually in profits[7]. It therefore appears that the project will be much more profitable in its final years than in its early ones. It will continue, however, to have negative environmental impacts.

C) Funds Sources And Distribution

When Ok Tedi started production, royalties payable by mining companies nation-wide were set at 1.25% of f.o.b. production values and were to be divided 95% to the relevant provincial government and 5% to landowners. As a direct consequence of negotiations for the Porgera project the latter proportions were modified – but differently so in different projects. At Ok Tedi, the change was to 70% to FRPG and 30% to landowners. The overall royalty level was raised from 1.25% to 2% as of 1st July 1996. The thirty percent landowner share is split as follows: 25% is divided equally between four villages who are considered owners of the land inside the Special Mining Lease (the land taken for the mine itself) while the remaining 5% is split equally between two villages who are considered owners of land inside two Leases for Mining Purposes (the land on which Tabubil town is built and the land hosting the project's hydro-power scheme). Note that local government is not a recipient of royalty payments.

In 1991 (again as a direct outcome of Porgeran landowner efforts on their own behalf), the PNG Government agreed to allow all mine landowners and all provinces hosting projects to each take up 2.5% free equity in mining projects in their areas. In Ok Tedi's case in 1997 a further 10% of equity was reserved for the future benefit of people of the Western Province – this tranche being paid for out of future dividends. The dividends paid to landowners (from their 2.5% holding – that has only actually paid dividends since 1997) have in practice been divided into two halves: one paid in cash to landowners, the other paid into a future generations trust.

The PNG Government pays to the provinces that host major projects monies (termed Special Support Grants) equal to 1% of project f.o.b. receipts. In the Ok Tedi case one-fifth of this sum is now[8] paid directly to the Star Mountains LLG. Until 1998, it could fairly be said that local level government services in the mine area were non-existent – all such services were provided by OTML. Note that these SSG payments only occur as long as the

[7] Taken from Jackson (2000) – this assumes that the kina will be valued at US$0.40.

[8] Previously all funds went direct to FRPG on the understanding, specified legally in a 1991 Memorandum of Agreement, that the FRPG would spend 20% of them on public projects in the Star Mountains LLG area. Few of these funds arrived. This prompted the change, in 1998, to PNG Government remitting 20% of SSG funds directly to the LLG.

mining project operates. It is as yet too early to judge whether the changes in funding arrangements will occasion any change in this situation.

4) Closure Status

At the present time, closure for the Ok Tedi project is planned for 2009. Despite widespread calls – mainly from outside PNG itself - for the project to be shut down before then, it seems most unlikely that the PNG Government would allow this to occur and it is also clear that the overwhelming bulk of landowners impacted by the project want the project to continue[9]. OTML produced a draft Closure Plan in April 2000 for consideration by the PNG Government. This, amongst other things, proposed the establishment of a Foundation Trust for post-closure development with particular focus on agriculture. Negotiations on this document are continuing but agreement on its main features – and on the establishment of an offshoreTrust Account – has already been reached.

However, most attention during 2000 and 2001 – of both OTML staff and those officers in the PNG DoM with responsibilities for the Ok Tedi project – has been focused on the planned withdrawal from it of the project's major shareholder and manager, BHP-Billiton. As of October 2001, it was the hope of BHP-Billiton to withdraw entirely from the project by January 2002. In order for it to do so, it was keen to negotiate indemnity from any future liabilities. To this end it negotiated with communities along the length of the Ok Tedi-Fly river system agreements for the continuation of mining. These became part of an Act of the PNG National Parliament that created, by its passage in late 2001, the conditions for its withdrawal. Additionally, BHP-Billiton proposed that its 52% shareholding be placed under the control of an offshore trust part of whose incomes will be used for ongoing development projects in the Western Province and the remainder used for post-closure activities. It has been estimated that prior to planned closure in 2009 this fund should have an income in excess of one billion kina.

1.3.2 Misima[10]

a) General

The Misima gold project is located on a small island of the same name 220km southeast of mainland of PNG. Although remote, Misima was one of the first sites of 'modern' gold mining since, in the 1880s, Australian miners operated a number of underground workings there. The Misima mine is an open-cut operation developed on top of these workings. The project commenced operations in July 1989. Mining ceased in May 2001 having yielded 3.2m ounces of gold and over 16m ounces silver. Currently, it is processing low-grade ore stockpiles. Late in 2000 it employed 780 persons. During 2001 approximately half that workforce were retrenched.

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[9] Motives differ substantially however. Landowners at the mine site and at Kiunga generally and simply want the mine to go on for as long as possible given the bleakness of non-mine scenarios. Landowners in the Middle and South Fly – who receive few employment benefits and no royalties – generally would like the mine to close, but not before they have received what they consider to be just compensation. To obtain that, they recognize that the mine will have to keep on operating.

[10] See Jackson (2001), Long-Term Economic Development Strategy for Misima, for a fuller discussion.

Misima people have long been exposed to outside influences and when the project began it was able to draw on many local skilled and educated people who had migrated to other parts of the country. One unusual feature of the project, among all major PNG mining projects, was that the overwhelming bulk of its workforce was local: 82% in 2000. This tied into two other distinguishing features. Firstly, like Porgera (where, however, the outsider proportion of the workforce was much higher), non-local workers operate on a fly-in/fly-out (FIFO) roster. This aspect of the project was strongly opposed by PNG politicians and caused several months delay in the project start-up. However, FIFO was strongly supported by local people who were concerned that external influences could upset their way of life. Secondly, not only did the mine not construct any associated township – local workers lived in their villages and were bussed in on a daily basis – but the project involved the construction of very little additional physical infrastructure.

This was partly because the project was adjudged by its proponents (Placer Dome) to be marginal financially and not able to bear charges arising out of large, up-front infrastructural expenses. Even after the fears of marginality were somewhat allayed, - the project's cumulative net cash flow turned positive in 1995 - Misima Mines Ltd (MML) has held to the position that it will not become involved in unsustainable infrastructural (or other) development. However, MML did involve itself in a number of unique (to PNG) initiatives aimed at post-closure sustainability.

b) Major problems

Environmental issues have not been a focus of concern from any group – even anti-mining NGOs have been muted in their comments. The deep-sea tailings disposal (DSTD) scheme operated for over a decade appears to have worked well[11]. Similarly, the project has had none of the cost over-runs that bedeviled Ok Tedi and has performed much better, financially, than originally expected, even if modestly. Moreover, the project has had only minor problems associated with social matters (which is not to say that everyone on Misima is delighted with its work)[12]. There is one major challenge however: given that so many of the project's workers were recruited locally, what is happening now that closure is in sight? How will the community re-adjust again, this time to mine closure? As at the time of writing the workforce had been reduced by almost 50% from its level at the end of 2000. No monitoring of the results of this is being undertaken – although such monitoring may shortly be commenced. However, it is reported that the lump sum plus housing scheme redundancy packages being offered (K7000 for lower level workers plus house building assistance) are being over-subscribed (Himata, 2001, personal communication). Additionally, MML has to some degree assisted the Misima Mineworkers Union to set up a joint venture with an international personnel recruitment agency with the aim of placing retrenched workers elsewhere in the PNG mining industry. Ironically, by the end of 2001, this body's biggest successes to date have been in supplying MML with short-term contract workers – from the pool of those just retrenched.

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[11] Which might account for the vigour with which anti-mining groups are now (mid-2001) attacking DSTD and gathering, where they can, examples of its failures. They have not so far had much of a harvest from the Misima scheme. However, the pipeline has broken on two occasions.

[12] Community Aid Abroad commissioned Dr. Julia Byford to review the social consequences of the project in 2000. Although the resulting study cannot be said to exhibit a very positive attitude towards MML, it is on occasions complimentary to the project and its criticisms are very muted (and, in this writer's view, rarely substantiated).

Adjustment may be made more problematic by the fact that, whilst mining has been proceeding, government services supporting cash-cropping on Misima have been receding. Copra must now be marketed at Alotau and cocoa at Lae. Although private sea transport facilities are reasonably good, their cost greatly reduces incentives to produce these traditional cash crops.

Perhaps the most significant problem both during and after mining operations has been the application of national rules on benefits from mining projects to a small, cohesive island community. These are discussed in the next sub-section – they have tended to divide the community.

c) Funds sources and distribution

From the start of the project, national guidelines on royalty payments were varied on Misima. Instead of the Milne Bay provincial Government (MBPG) receiving 95% they received 70%. Moreover, of the thirty percent going to landowners, two-thirds was paid into a Future Generations Trust Fund. Simultaneously, however, the remaining ten percent was divided between SML landowners and 'pit area landowners'.

This latter category is not legally recognized anywhere in the national mining rules and laws even if its identification is not without sense. Effectively, under the national rules all landowners within an SML share equally (according to their proportional landholdings) in royalties. Obviously, however, the SML does not coincide exactly with the area mined or otherwise damaged. Thus, two landowners each with, for example, 100ha of land inside the SML will be paid exactly the same royalty even if one landholder has all his land mined whilst the other's land remains completely untouched by mining operations. The former will receive more compensation (since compensation rates differentiate between unused land, used land and lost land) than the latter. However, over time royalties have grown to be far bigger than compensation: in 1990 compensation was 45% the size of royalties, by 1999 this had reduced to 31%. Consequently, the differential between those who had lost their land and those who had only temporarily had restrictions put upon their use of it had narrowed. This issue has arisen in other mining areas of PNG but only at Misima were 'pit area landholders' (holders of lost land) recognized. Their recognition was, however, not strictly legal and it was withdrawn from 1997 onwards. The withdrawal created one source of division locally.

It was not the only source of divisiveness. The major land-owning villages (Narian and Gaibobo) not only received the most royalties and compensation but the most work and associated small business contracts – as was their right under national rules. The twenty percent of royalties going into the FGTF is also theirs. Thus not only during, but after, operations these two communities have received and will receive much greater compensation than everyone else on Misima – particularly when one recalls that general infrastructural benefits are much more limited than at most other projects.

In 1997 the MBPG agreed to reduce its share of royalties to one-half; the FGTF share remained at 20% and the remaining 30% has been divided, in cash payments, between SML landholders (pit area landowners have disappeared as a category).

In fact, most of the royalties supposed to go to landowners (of any description) were not received until MML took over responsibility for their distribution late in 1996. This was first due to what appears to have been gross financial mismanagement by the originally recognized landowners' association (few of whose leaders were in fact SML landowners) and, later, because a series of court cases then resulted in all payments into the FGTF being paid into a trust fund administered by the courts[13]. These cases appear to have been finally resolved in February 2001 when the court provisionally recognized one landowner group (Emel Ltd) as the rightful representative of the landowners. The condition was that Emel provide the court with a copy of its proposal for a trust management (the Kalopu Trust). The present writer views this Kalopu Trust as easily the best such trust document yet drawn up in connection with mining projects in PNG. Most importantly, the landowners themselves drew it up. As at the time of writing (February 2002), the court's final decision has not yet been made.

The court actions have not entirely been unfruitful since they have meant that the funds – worth close to K17m - accumulated over the years of legal argument remain intact and have only been released once mining proper has ceased. It should also be noted (and this is expanded upon in later sections of this report) that in the interim landowners of the SML had developed their own ideas for the use of these trust funds in an exemplary fashion.

It should be noted that MBPG has received a smaller proportion of royalties (and, because the Misima Project is much smaller than Ok Tedi or Porgera or Lihir, much lower levels of SSGs from national government) than other provinces hosting projects. Nevertheless, although it does not escape criticisms from Misima people, its performance in service provision and infrastructure support on Misima has been very much better than that of either the Western or Enga Provinces. Similarly, although local level government is not a recipient of mining funds directly, that on Misima has performed creditably (in comparison with not only that at Ok Tedi but with many others around the country).

d) Closure status

MML in co-ordination with MBPG, local government and villagers started planning for closure and post-closure sustainability in 1996. In some ways, between then and 1999 these stakeholders offered the rest of the world an example of 'best practice' in this area. The hesitancy of the present writer implied in his use of 'in some ways' is justified because in the end the process embarked upon did not come to full fruition. MML hired a PNG-based agency, Harmony Ink, to introduce planning concepts at the village level. Harmony Ink was remarkably successful in this task and by 1999 most communities on Misima, and particularly those close to the project, had developed village plans that were distinguished by

[13] Two sets of funds were the subjects of the court case: those paid into the FGTF and a similar amount consisting partly of landowner shares in Orogen plus cash paid to landowners at the time of Orogen's establishment (in 1996) in lieu of their taking up options for further shareholdings in the MML project. In early 2002, Orogen (51% of whose shares were owned by the PNG Government) announced that it would merge with the privately owned Oil Search, the original oil/gas explorer in PNG. This merger resulted, at least in the short-term, of Orogen shares rising in value by around 30%.

being both understandable to, and budgetable by, bureaucratic planners whilst truly expressing villagers' wishes. Unfortunately, for internal reasons Harmony Ink broke up just as these village plans were about to integrated into a long-term strategy for Misima.

Mainly as a consequence of this MML only produced its Closure Plan in June 2001. Moreover, that Plan did not fully reflect the earlier work on village level planning even if the legacy of that work remains in the communities. Despite this, co-ordinated planning by MML, MBPG and local level government is ongoing and is relatively well developed. Indeed, the national-level agency, the Department of National Planning and Monitoring has recently (February 2002) hired the MBPG Provincial Planner as a consultant to show them how the planning system, originating from MML's efforts, he and an AusAID-funded consultant have developed can be applied nationwide. A second focus of MML's sustainability planning is on renovation of older cash crops, cocoa and copra, and the possible introduction of new ones, notably nutmeg, vanilla and mace. This is promising at present but not yet fully established. A third area of focus, near to completion, originated from MML's initiation of a filariasis eradication program in association with the WHO. The incidence of this debilitating disease has been reduced from over 70% to less than 15%. But perhaps more significantly, the program now runs at a very low cost largely thanks to the establishment of a network of ordinary people who act as drug dispensers. This network is now being used for other health programs such as the distribution of mosquito nets.

1.3.3 Porgera[14]

a) General

The Porgera gold mine is located in Enga Province at the western-most limit of the Highlands Highway to Lae. Early in 2001 its production topped 10m ounces of gold and 1.8m ounces of silver. It employs directly just under 2,000 people of whom half are Porgerans. In the first four years from its start in August 1990 it produced 5m ounces of gold and was, financially, the most successful mining project in modern PNG. Since then grades have fallen and costs have gradually risen so that profit margins are now small.

The project to the end of 2000 had paid out K78.7m in royalties, K8.8m in compensation, spent K38.8m on Tax Credit projects (see below), K15.8m on the Infrastructure Development Program and K4m on community projects. It has issued K113.6m-worth of contracts to Porgeran business and K352m-worth of contracts to other PNG businesses. It has paid taxes to national government of almost K700m[15].

A major feature of this project has been the impressive organisation and relative unity of landowners and their representative bodies. These dominated the 1989 Development Forum, at which they, the Enga Provincial Government (EPG) and national government negotiated benefits and responsibilities. Note that the PJV itself was not a party to these negotiations directly. The landowners have continued to at least hold their own (and to usually do better than that) in negotiations with other stakeholders. This extends across a

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[14] For further details see Jackson and Banks (forthcoming)

[15] As elsewhere these figures can be misleading since they are in current values whereas the kina has depreciated against the US$, for example, from greater than parity in 1993 to US$0.28 as of October, 2001.

network of organisations: landowners have a dominant role not only in their own Landowners' Association but in the local level government and in the Porgera Development Authority, set up to co-ordinate development activity in the area.

As at Ok Tedi, the project has no tailing retention facility. It has also experienced increasing problems with waste storage and disposal and currently uses both stable dumps and 'erodible' dumps that slowly feed waste into the river system.

The project operates a FIFO system for its non-local employees. In contrast to the Misima people, those at Porgera have always opposed this claiming that as a result they 'lose millions of kina' in both cash and infrastructural benefits each year. After resisting these claims for many years, the Porgera Joint Venture (Placer Dome, Goldfields and the parastatal Orogen Minerals – the PJV) agreed in 1997 to assist in the funding of a township at Paiam whilst continuing to minimize FIFO operations.

In 1980 the Porgera area had an enumerated population of 5,011 persons. By 1990 this had grown to 10,403 and by 2000 to 22,347. Whereas there was very little migration to Misima of outsiders and whereas migration to Ok Tedi of all but OTML workers and their families was largely restricted to people from the thinly populated neighbouring areas, Porgera has attracted migrants from all across the PNG highlands area. There are now as many 'Porgerans' employed by the PJV as there were adult males in 1980.

b) Major problems

The major – and long-lived – problem at Porgera is that associated with downstream sedimentation. This is divisible into two separate issues: the burying of downstream alluvial gold deposits rendering them inaccessible to local miners and the possible impacts further down the Strickland River of physical and chemical changes in water quality. The first threatens the unity of landowners (since the Landowners' Association is composed of SML claimants rather than of Lower Porgerans). Whilst the second has involved a number of what seem to the present writer to be rather wild claims ('over 130 deaths', 'genocide'), the first is based on a real loss. The question is rather the extent of that loss and court proceedings are continuing on the matter.

c) Funds sources and distribution

Until July 1995, the EPG took 77% of royalties (it appears that a slip of the minute taker's pen wrote 23% instead of 20% for the landowners' share). From the start (and to the present) the Porgera Development Authority took 5% - the first time an organ of local level government received royalties – and a 'Children's Trust' took (and still does) ten percent. Until 1995 the balance, eight percent, went to the SML landowners. After that time their share increase to 15% but other Porgera landowners were granted 12% and 'Young Adults' took eight percent. The EPG forewent 27% reducing its share to 50%. This arrangement helped overcome divisions apparent in projects mentioned so far – it gave funds to local authorities (who will be the main source of service provision after closure) and to landowners in the impact area who were not themselves landowners in the SML. It also earmarked a higher proportion of funds for future generations.

The Tax Credit Scheme, now utilized by all major mining projects in PNG, arose as a result of one PJV manager's (Vic Botts) concern that EPG royalties and SSG payments did not seem to be generating visible improvements in Enga Province. He persuaded PNG Government to allow mining companies to spend up to 0.75% of their taxable income on infrastructure projects in their wider impact areas. This proportion was raised to 2% but reduced back to its original level at the end of 2000. In many ways the TCS was successful since, although by no means infallible, the mining companies tended to be very much more successful in building schools, footbridges, feeder roads, police housing and the like than the provincial Departments of Public Works had been. Another measure of its success was that the TCS idea was extended to all mining projects in the country. However, the TCS raised the issue of increased community dependence upon mining companies – what would happen when mining ceased and these functions reverted to public authorities?

The importance of this question was only exacerbated in Porgera's case by the agreements arrived at in 1993 when the PNG Government unexpectedly increased its stake in the project. Originally the PJV had committed K4m to a program of community project expenditure. The new, 1993 agreement (named the Infrastructure Development Program) greatly increased PJV spending in this sector – and, unlike the original TCS, these funds were largely spent in and around Porgera itself. However welcome such expenditure was by Engans (and it was widely welcomed), it emphasized the potential problem of post-closure maintenance funding.

As in many other areas it was the tenacity of the Porgera landowners that won, not just for them but also for all PNG mine landowners (or at least those where mines held an SML), the right to own shares in 'their' project. Unlike most other groups the Porgera landowners actually paid for their shares. Moreover, they also won for themselves an additional K11m from their right of first refusal to another tranche of equity when the then Prime Minister (Mr. Skate) needed to raise security for government loans by selling part of the additional PJV shares onto the parastatal Orogen Minerals. Part of these funds has been invested in real estate (including the building housing Placer Dome's PNG operational staff).

d) Closure status

The Porgera project is scheduled to complete mining in 2005 or 2006 and then to continue milling low-grade ores for a further five to six years. Thus all payments (royalties, taxes, TCS, dividends) will be sharply reduced in 2005/6 and finish in 2011. The PJV introduced a 'Sustainability Policy' in early 1998, preferring to emphasize ongoing issues over the more simple (and bleak) 'closure policy'. However, a closure planning unit and a proposal for a closure plan is now (February 2002) in process of formation also.

The PJV is fortunate that its efforts at sustainability have strong, but not total, support from landowner leaders who have themselves been contemplating the post-mining future of their area for certainly as long, if not longer, than PJV itself. As with Ok Tedi and Misima, a long-term economic development strategy, funded by the PNG Government under MOAs arrived at in 1989, is now, somewhat belatedly, being undertaken. In contrast to the other projects, in this case landowners have already developed a number of long-term strategies.

These include a proposal to take over, after closure, the PJV's electricity generating station at the Hides gas field along with its transmission lines, extending them to link up with the national grid and selling power to other areas[16]. They also include the concept of making Porgera into a regional service center – providing a new road link to Tari in the Southern Highlands can be built.

The PJV's aims for closure are not necessarily identical or, at times, congruent, with those of landowners. However, in this case landowners and company have both commenced work on long-term development well in advance of closure.

1.3.4 Lihir

Lihir gold mine commenced operations in 1997 and is expected to have a mine-life of thirty-five years. By the end of 2000 it had produced 2m ounces of gold and, in that year, on a production of approximately K600m (about US$200m) made a gross, pre-tax operating profit of US$37m. The operation currently produces approximately 20mt of waste and 35mt of tailing annually. These, as at Misima, are deposited offshore in a DSTD scheme. The project employs approximately 1,900 workers of whom 42% are from Lihir.

Lihir was placed on European world maps long before most parts of Australia. The Dutch landed there after a trans-Pacific crossing in the early 17th century naming it Gerhard De Nijs (later Denys Island). This was followed by several other European landfalls at irregular intervals. However, when steamships took over from sail and when Germany took over New Guinea in the 1880s the visits stopped. The Germans paid no attention to the island. Thus, Lihirians had a very long period of European contact with few positive outcomes for them. By the 1970s, many of its inhabitants were members of an offshoot of the (President) Johnson cargo cult – a mark of their frustration over the lack of modern development. However, rather like Misimans, many Lihirians had used education to gain experience elsewhere in the country – one, for example, was Deputy Head of the country's central Bank. With the examples of the preceding projects before them, educated Lihirians greatly assisted their fellow islanders to obtain a very good deal from the mining company (a Rio Tinto offshoot). This included:

- 20% of royalties to landowners and 30% to the Nimamar local government; as will be noted, the latter is by far the largest share of royalties obtained by any local level government in a project area;
- a relocation scheme involving close to 250 households that included houses (minimum value K50,000), reticulated water and electricity, garbage collection, septic tanks, village planning costs and house building assistance;
- two villages at the center of the project to receive K500,000 lump sum payment annually (CPI adjusted) plus K2,000 per family per year for the inconvenience of relocation plus K35,000-worth of community projects per year;
- one village (of the preceding two) to receive K300,000 for a Trust Fund;

[16] Note that this strategy is not realistic for Ok Tedi (where local demand is barely 4% of OTML's generating capacity and where no other demand of any size exists) or for island Misima.

- trust funds for three other villages and one for the whole island (including three neighbouring islands);
- K320,000 per year for community development projects. This is now distributed to each ward in Lihir (that is, the main Niolam Island, Malie, Masahet and Mahur Islands) according to population. Thus, unlike Misima, the problem of island landowners outside the SML not receiving many benefits is also addressed;
- 6.8% of the shares of the project company. The bulk of these are to be paid for out of future dividends but cash for them was provided by means of a low interest EC loan. Technically, the landowners have an outstanding debt in excess of K80m.

These, and other benefits, were bundled up in one Integrated Development Package. The IBP is currently being reviewed and landowners have proposed (for negotiating purposes) increases in benefits that are approximately five times existing levels.

The project sets aside K15, 000 monthly for future costs of closure. No closure plan is as yet in place. However (and despite the fact that the Nimamar LLG has, since the start of the project received K10m in royalties), the Lihir Management Company is assisting the LLG to develop a long-term Lihir District Plan. It is hoped that, unlike previously mentioned projects, planning throughout the life of the mine will mean that a specific closure plan is not actually required. This is considered, at least by the present writer, to be an essential step since, given the very high level of benefits obtained by local interests and given the small size and relative remoteness of Lihir, it seems unlikely that alternative means of maintaining local incomes after closure will be available on the island itself.

1.3.5 Other projects

Tolukuma: This small gold mine started production in February 1997 and was originally expected to have a life of six years. An initial open cut operation has been succeeded by a second phase of underground mining. It employs 80 workers and deals with around 320t or ore per day. The ore deposit was originally estimated to contain marginally in excess of 1mt grading an average of 24.4gpt (with a cut-off of 4gpt). Royalties are divided: 20% to Central Provincial Government and 80% to landowners. The latter is split 16% to each of three clans, 8% to the Yulai Landowners Association and 24% to the Yulai Trust Fund (a 'future generations' fund). A one per cent SSG from the PNG Government goes directly to the Goilala District in which the project is located. The mine is in remote mountainous country and very little associated infrastructure has been built. The site is entirely serviced by helicopter. However, a small police post and a school built by the project developers will be maintained by the CPG after closure.

Ramu Nickel Project: This project has been granted all necessary permissions and has completed all necessary work with landowners. However, finance has yet to be arranged for it and, given developments elsewhere in the world nickel industry, there is some doubt that it will proceed although the project proponent, Highlands Pacific, remains optimistic. Agreements were signed in 1998 and thus, although not yet implemented, are interesting since they represent the latest example of the evolving series of benefit sharing arrangements in PNG. The project involves strip mining of nickel/cobalt ores and continuous rehabilitation some 120km inland; slurrying the ores along a pipeline to a process plant on the coast at Basamuk; and tailing disposal in a DSTD scheme. The latter has come under concentrated attack from anti-mining NGOs. Because of the project's extended geography, a large number of landowners are involved as at Ok Tedi – but, unlike Ok Tedi, their interests have been negotiated prior to project start up. The royalty sharing agreement is especially interesting since the Madang Provincial Government (MPG) has agreed to take only 31% of royalties (particularly low for such a large project) with the balance divided between four landowner groups: the Kurumbukari mine site landowners (30%), the inland pipeline landowners (11%), the coastal pipeline landowners (11%) and the Basamuk plant site landowners (11%). In each of the four landowner cases, one percent of royalties is to be placed in separate trust funds for future generations. Any funds accumulated thus can only be used fifteen years after the first royalty payments have been made. Landowners collectively will share 5 percent free equity in the project. None of this is particularly novel. What is, however, is the proposed (and agreed to) Independent Professional Management Unit (which is charged with the drawing up of a Social and Economic Development Plan for the impact areas) and the Ramu Nickel Foundation. The former will draw its members from MPG, members of National Parliament for the area, chairs of landowner association, presidents of relevant local level governments and representatives of company and the national Departments of Mining and Finance. The project proponent (Ramu Nickel Ltd – RNL) will fund the IPMU for the first two years of its existence providing start up capital of K500, 000. In Phase II of the Plan PNG Government will contribute K3m, MPG K1.4m and RNL K2m. In a complementary fashion, the 1% SSG from PNG Government will be allocated as follows:

Table 1: SSG allocation, Ramu Nickel Project

Recipient	Year			
	1 - 5	6 - 10	11 – 15	>15
Ramu Nickel Foundation	80%	40%	20%	0%
Local level governments	0%	0%	10%	10%
MPG	20%	60%	70%	90%

Others: No other working or fully negotiated projects exist – which, given the closure status of Misima, Porgera and Ok Tedi, is a major reason why both the PNG Government and international agencies are currently expressing concerns for the future. One small project (Kainantu Gold) and two medium sized projects (Mt. Kare and Hidden Valley) appear to be close to negotiation. The former, operated by Highlands Pacific is likely to try and negotiate a deal incorporating elements of both the Tolukuma (it is likely to be somewhat larger than Tolukuma) and Ramu Nickel agreements. Both Kainantu and Mt. Kare projects have been mooted for over a decade but have been delayed by complex landownership issues. Several other possible projects exist – PNG's natural prospectivity remains very high. However, none appears close to the bankable feasibility stage and, given existing levels of exploration expenditure, none are likely to advance rapidly in the near future.

2 Key Closure Issues

2.1 Safety

The PNG mining industry has had a good operational safety record and safety is regarded as a top priority by almost every operating mine. The 1995 explosions at the Dyno Wesfarmers plant at Porgera, which killed 11 persons, have been the worst accident in the past two decades. Post-closure safety issues are rather more difficult to assess since relatively little research has been carried out on the topic. Such matters tend to overlap with post-closure environmental issues.

The prospects for research are potentially quite good. One small mine (Mt. Victor in the Eastern Highlands Province), one medium sized mine (at Wau in Morobe Province) and one very large project (Bougainville Copper) have closed in the past fifteen years. At the first, Mt. Victor, considerable attention was paid to closure planning from the viewpoints of safety and environment. Safety matters were also dealt with in some detail at Wau. However, at the Bougainville mine continuing violence in the mine area has meant that unplanned and very rapid, enforced closure has been followed by over ten years of ignorance as to what conditions are like. Once access is again possible, a study of these conditions will be especially useful from the viewpoint of post-closure safety and environmental effects.

A potential problem foreseen by PNG's Mining Inspectorate may arise out of invasions of abandoned open pits by small scale miners even whilst project milling operations continue – as is likely to be the case at Porgera[17]. The flooding of most pits at Misima means that it is unlikely to be an issue there. Unfortunately, it is likely to be a very much bigger issue at Porgera. Tolukuma, being an underground operation, may have different and more difficult to manage safety problems at closure.

2.2 Environment

'Wolf!' has been cried so frequently and raucously in PNG mining areas by various NGOs in recent years that one is tempted to ignore such cries altogether. That however would be a mistake. Environmental impacts downstream of the Ok Tedi mine have foreclosed some possible post-closure alternative economic and social options for river use – or have at least postponed such uses for several years or decades. OTML has itself publicly announced that sediments added to the Ok Tedi/Fly system by its activities will take several decades to move down to the Gulf of Papua. It is quite possible that environmental monitoring following eventual closure of Ok Tedi will need to continue until the middle of the 21st century. Although not quite as dramatic, one of the problems created by the Porgera project's adoption of erodible dumps for waste will be that these dumps will be contributing waste to the Lagaip/Strickland system for many decades to come. At both projects the continued integrity of 'stable' waste dumps will also require long term monitoring. Whilst the Lihir project has been setting aside K15,000 a month since the start of operations for closure

[17] At Porgera the tailings outlet has been surrounded, since the start of the project, by small miners. Before a gravity separation unit was installed at the mill, returns to small miners at this source are said to be have particularly high. Small miners in 2001 immediately invaded the new waste dumps at Anawe. Earlier waste dumps, being more inaccessible, have not been so invaded as yet but undoubtedly will be once mining (and security over the waste dumps) ceases.

activities (including post-closure monitoring) earlier projects did not do so until recently. With profit margins narrowing at Porgera and Ok Tedi making its first real profits in twenty years only recently, the question of environmental bonds is a live issue.

A problem already encountered on a small scale after the closure of the Mt. Victor project could be repeated at a much larger scale in future. That is, good rehabilitation work carried out by operating companies of on-site environments could be undone by small-scale miners invading and re-mining abandoned pits and, worse, stabilized and rehabilitated waste dumps. In these circumstances, the extent and onus of liability becomes unclear – which is why, in their response to the Draft Mine Closure Policy the mining companies pressed for Government to 'sign off on mine closure'.

A third issue that requires clarification – especially amongst landowners – is that 'rehabilitation' does not mean (and usually cannot mean) restoring used or mined land to its pre-use status. Misima ML has been experimenting with some success for some years on creating harvestable timber on abandoned pit slopes and involving in the land's owners in all rehabilitation work. This, however, has also brought home to MML staff the difficulty one or two landowning families will face after closure: they will be very short of arable land[18]. It is at this scale that the overall national rationale for the mining industry – efficiently exploiting part of the nation's non-renewable resources so as to generate finances for the creation of sustainable resources – takes on its sharpest focus. It is clear that whatever the success (or failure) of this rationale at the national or provincial level, several hundred people at all large projects will, after closure, realize fully that they will have lost the bulk, or at least some, of their subsistence assets. Hence the importance of local financial strategies dealt with later.

2.3 Workforce

When the Bougainville Copper mine closed it was a blessing for other mining operations, particularly Porgera that was just commencing operations at the time, since they were able to readily recruit CRA's displaced personnel. Conversely, the fact that PJV was hiring meant that for the great majority of non-Bougainvillean (and many Bougainvillean) workers at Panguna readily obtained employment elsewhere. There is a group of several hundred skilled mining trades people who have spent the last twenty or thirty years in the industry within PNG. On current indications, transfers similar to that which occurred when BCL closed will not occur as Misima, Porgera and Ok Tedi wind down since present levels of exploration expenditure suggest that no new major mines will be opening up to take on displaced workers. Although all projects are different and thus what happens at one may not be applicable to all, it would seem obvious that a careful study of what is currently occurring at Misima, which has already cut its workforce in half between the beginning of 2001 and the present (February 2002), should be undertaken.

A particularly interesting initiative taken by the Misima Mineworkers Union has to establish a joint venture with Placements Ltd (an Australia-based recruitment agency), Oiatau, in an attempt to find employment for Misima workers. Its rate of success is not yet clear. It is a

[18] Most will not – at least not as a result of mining, since the mined areas were not previously used for arable purposes. The problem on Misima is that the island, largely composed of very steep slopes, is not over-endowed with land suited to cultivation and natural population growth alone is threatening a potential land shortage issue.

little early to judge but as of February 2002 only four or five skilled Misiman workers had found work in mining or oil/gas projects elsewhere in PNG.

Misima is worth further study from another workforce viewpoint. Mining has been completed but milling operations are planned for a further three years. The bulk of workers at Misima, and therefore the bulk of those laid off recently, are Misimans. The PJV also plans to cease mining in 2005/6 but continue milling – with similar proportional reductions in workforce – until 2011. Partly because of the FIFO issue, PJV has steadily increased its proportion of local workers so that they now form just over half the total workforce. However, Porgerans are better represented in the mining-associated departments of PJV than in others. Thus when lay-offs commence, several hundred Porgerans will be affected. Are there any special problems to be dealt with when a mine that is running down has recently unemployed workers as its neighbours?

A very strong feature of all mining projects since the late-1970s has been the mutual agreement between Government, companies and landowners that preference should be given in mining employment to local people. This creates a number of challenges. During operations when hiring is occurring it begs the question: who is local and therefore eligible for priority employment? It appears that no project to date has actually drawn up a list of persons resident before a specified date in the areas designated for employment priority[19]. Some have established committees of landowners who advise the company who is and who is not a 'Porgeran' or a 'Lihirian'. All have committees established by the PNG Government to oversee hiring procedures and the award of contracts (for which locals also have preference). Whatever the grey areas involved in such preferences, most stakeholders seem to believe that they are right and proper. It is of note that with the passage of time, the proportion of local persons employed at various projects has steadily increased: BCL had around 27% Bougainvilleans at the time of closure, OTML has hovered at around 33% local 'preferred area' employees, Misima, outstandingly, attained 82%, Porgera has now reached 51% and Lihir even at an early stage, when the effects of its training programs for locals have not yet occurred, is at 42%. Thus, even if new mines were to open up, the 'local preference' might exclude the possibility of large-scale transfers of workers from a closing mine.

Even more significantly from a national viewpoint, the mining industry now has several thousand highly skilled PNG workers. While many of these have skills applicable in activities other than mining, many others' skills are likely to be wasted without new mines opening up. As noted earlier, employment levels in PNG since 1990 have barely risen – the mining industry is one of the few exceptions. Mining revenues have not been successfully used to create sustainable human skills at the national level, it would seem. It would be doubly unfortunate if, therefore, in the one known area where mining has created skills – the industry itself – employment were to fall off.

Post-closure planning will need to know with considerable precision the likely size and nature of population that will remain once closure is effected. On these numbers will depend planning for specific aspects of infrastructure – such as schools and health services, if not roads. It seems very likely that, given the isolation of most mine project sites and the

[19] The Kainantu Gold project is doing so although it is not yet agreed precisely what employment priorities will be.

lack of obvious alternative ways of earning a cash income there, most workers will leave at closure and take their families with them, greatly reducing population and demand for services.

However, aside from company workers, most projects also attract persons with their own businesses, large or small, or who work for non-company businesses or who live in hope (occasionally fulfilled for some) that will gain some sort of employment. At Porgera it seems likely that some of the 10,000 or more in-migrants will return to the rest of the Highlands from whence they originally came. However, many will stay – especially if the financial provisions for the maintenance of reasonable levels of both landowners' private incomes and of public, local incomes turn out to have been successful. This will be even more strongly the case at Tabubil (Ok Tedi) for the simple reason that most of the 5,000 plus non-OTML migrants there have come from outlying parts of the Star Mountains, Telefomin and Oksapmin. In these 'supply' areas there has been little or no socio-economic development in the past two decades – there are no roads, schools or working health centers. Thus even if prospects at Tabubil decline sharply, as they will, they will remain very much stronger and more attractive for most people than those in their home areas.

Also as noted earlier, Department of Mining staff feel that the ongoing redundancy exercise being carried out at Misima is proceeding with considerable success so far. In view of even larger exercises likely to occur in the foreseeable future at other projects it is difficult not to draw the conclusion that this process at Misima requires very careful monitoring and the lessons learned there need wide dissemination even if such lessons will not necessarily always be applicable in other situations.

2.4 Infrastructure

A clear theme that emerged from the 'Mine Closure' workshop hosted by the World Bank Group in March, 2000 was the universally reported difficulty local authorities have in taking on the responsibilities for social services and infrastructure which they inherit when mines close or are privatized. This is as applicable in PNG as in any other area. In this respect, the nature of the benefits negotiated before and enjoyed during mining's operations phase has an important significance at closure.

We may distinguish between several types of infrastructure at the three major projects that have closure in sight (Ok Tedi, Misima and Porgera):

2.4.1 Physical infrastructure

a. for mine use only, e.g. milling plants, stores – all projects have these. In most cases such facilities are of little use post-closure. However there are facilities that local communities would certainly like to retain – even if their post-closure maintenance costs or their usefulness might be doubtful. These include housing and electricity supplies. At Tabubil there are over 600 family residences; town facilities represent a capital outlay over the years of well over K100m (probably equal to K300m in current kina values). OTML faces a major problem of what to do with this housing stock at closure. The problem is very much reduced at Misima and Porgera. At the former the single status accommodation camp (plus 16 family houses[20]) and central messing and recreational facilities have some potential as a post-mine resort center. At Porgera, resettlement has already resulted in over 500 landowner households receiving new houses. Camp facilities (a mixture of individual houses and small dormitories) may become a useful offshoot of Paiam town; the camp at Suyan has already been incorporated into a new 'urban' Porgera LLG.

b. OTML currently has the capacity to generate over 100MW of power – post-closure demand is unlikely to exceed 2MW. While the small 2.8MW diesel generator at the port of Kiunga may be useful (even if paying for fuel may prove difficult) almost all other facilities will not. In one case at Ok Tedi, that of the 50MW hydro scheme, mothballing appears inevitable. At Misima, plant facilities are unlikely to be of any value to the community. However, MML is looking at a sustainable, new mini-hydro scheme at the present. The landowners at Porgera – as mentioned earlier – are hoping to take over the whole of the 80MW at Hides gas field and sell power to the national grid.

c. primarily for mine use but of general use also, e.g. roads. Post closure maintenance costs will tend to be high. The minimum post-closure maintenance costs for the Tabubil-Kiunga highway will be K1.5m (Jackson, 2000) per annum excluding the cost of clearing any major landslip. The equivalent cost of maintaining the 70km long circum-Niolam road is K0.25m (Brew, 2001, personal communication). The Misima roads might be maintainable at a cost of K100, 000 annually. The maintenance of the access road into Porgera from Wabag currently costs K2.4m per annum – it might be maintainable post-closure for half that cost. Note that without a road any other form of development after closure at either Porgera or Tabubil is difficult to imagine. Note further that at present the total incomes of each of the Star Mts. LLG and the Porgera Development Authority are less than the maintenance costs just estimated. At Lihir and Misima cheap, efficient sea transport has this vital function.

d. built for joint public/mine use, e.g. hospital facilities. At Ok Tedi the public and mine facilities are combined. The hospital costs at present K3m annually to operate. At Porgera the mine has its own facility on site whilst a public hospital was built at Paiam township. Despite valiant efforts by a Filipino doctor at the latter, its facilities are basic. However, running costs are about one-third of those of its equivalent at Ok Tedi. On Misima, MML strongly (if silently) opposed the building of a hospital at Bwagaoia. Its personnel originally had a clinic inside the processing area of the project. Today, MML closely so-operates with the hospital's senior staff. The public facility is a fine hospital that cost K6m to build (out of non-project funds). Unfortunately, many of its facilities (some of which are unique in PNG) cannot be used because of staff shortages and chronic underfunding of maintenance – even while the mine is operating. In the year 2000, the doctor-in-charge estimated that a minimum of K240, 000 was needed that year for basic maintenance (i.e. additional to wages and drugs) when the budget allocated was K42, 000 (Jackson, 2001).

[20] Five of which have already (February 2002) been sold off to local Misimans and transported to other sites.

e. built by the mine for public use, e.g. schools. At Ok Tedi schools will pose a very serious problem at closure. It is doubtful if the post-closure population will warrant the retention of the existing High School and, certainly, some present primary schools will be redundant. This is because the bulk of the High School students and many of those at primary level are dependants on non-local mine employees. This is not a problem at either Porgera or Misima, which operate FIFO systems.

f. built by other parties so that they can participate in mine benefits, e.g. banks and private stores, offices and houses. Decisions regarding these post-closure will be a matter for private owners. However, if closure means the withdrawal of banking services, as seems likely, then this will greatly impede the development of any possible alternative form of cash economy.

g. built by the project for government e.g. police stations, government offices. At all projects, mining companies have constructed or assisted with such construction. The status of local level government at Tabubil may be judged by the fact that until 2000 (when OTML built a fine set of offices for it) the Star Mts LLG had no building; its president operated out of a converted shipping container and its secretary's office was a converted broom cupboard. At Porgera and Misima, local level government has continued to be active (and, at Porgera, strengthened) throughout project life and offices at closure will remain a useful asset.

2.4.2 'Non-physical'[21] infrastructure

a. Social organisations e.g. women's groups, sports federations, religious groups. These are currently best developed at Ok Tedi – but equally are most likely to collapse there after closure given their dominance by OTML workers from other parts of PNG. The Misima project has limited inputs into social group formation (with one major exception) and it seems likely that the social organizational heirlooms of mining will be stronger at Porgera. The one exception at Misima has been the village planning exercise that could continue to have benefits through the local government system for many years to come.

b. communications facilities – in some ways the most valuable heirlooms inherited by remote communities although it is doubtful if the communities themselves would agree with this view. The telephonic systems put in place for company use automatically give access at all sites to the most up-to-date of communications facilities, most notably access to the Internet. Any post-closure programs, whether purely commercial or social, could benefit greatly from their maintenance. At Misima in particular where economic potential for both tourism and specialist spice production exist, Internet communications may be a key development tool.

c. air transport – although Porgeran landowners were loudest in their demands for this facility, it will prove more useful at Misima (an island) and Tabubil (whose road link

[21] Most such 'non-physical infrastructure' has, of course a physical expression – which often outlasts the disappearance of the purpose it served – for example sports fields, golf courses.

to the outside world in the form of Kiunga is especially fragile). However, it is difficult to see who will be able or want to fly in and out of Tabubil after mine closure given the mine area's lack of future commercial possibilities. By contrast the improved (by OTML) strip at Kiunga will be vital.

d. Of the four major projects considered earlier (Ok Tedi, Misima, Porgera and Lihir), we can rank them in terms of mine-provided infrastructure. However, we should also consider the status of and financial provision for local level government at each project since these are the authorities who will effectively take over such infrastructure after closure. These considerations are combined in Table 2:

Table 2: Infrastructure and local level government provision

	Strength of and provision for local level government			
Extent of infrastructure	STRONG → WEAK			
EXTENSIVE ↓	Lihir	nil	nil	Ok Tedi
	nil	Porgera	nil	nil
MINIMAL	nil	nil	Misima	nil

At closure the most easily managed case would be where infrastructure passed on from operations was minimal and where local level government was both strong and well provided for. The most difficult case would be that (occupied by Ok Tedi) where local government is both weak and not well provided for financially and where infrastructure is extensive. However, if infrastructure is minimal then presumably the local population will consider that they have not gained very much from mining operations; from their viewpoint the more extensive the infrastructure, the more they benefit. Thus the ideal compromise would appear to fall in the two highlighted boxes in Table 2 where takeover is possible, thanks to a well-organised and reasonably well funded local authority, of substantial infrastructure. Porgera would nearest approach this situation in PNG. Misima is intermediate between Ok Tedi and Porgera: its local government is reasonably competent but is poorly funded and the infrastructure to be inherited from the mine is limited.

2.5 Economies

In general and oversimplified terms it is very easy to identify the economic and financial implications of closure for varied stakeholder interests: those that benefited most during operations will be hardest hit. This will become truer, the less recipients of funds during operations have invested such funds in sustainable investments. Interestingly, in theory, sustainable financial benefits are much easier to conceive of in connection with every PNG mining project than sustainable, local business development – given all areas' remote locations. Even at this stage it has been suggested (Jackson, 2000; Jackson, 2001; and Jackson and Banks, forthcoming) that at Ok Tedi, Misima and Porgera it is not too late for landowners in mining project areas to develop investment plans that would maintain their existing levels of income for an indefinite period into the future.

2.5.1 National level

Excluding any receipts from dividend payments the PNG Government appears to have received kina payments from each of Ok Tedi and Porgera over the life of each mine up to the end of 1999 of around US$500m. Misima to the end of 2000 had provided tax and duties revenues of US$130m[22]. Since, by the end of 1999, total mine production values had been US$3.7bn in Porgera's case and US$5.7bn in Ok Tedi's, then these mean that the national government had been easily the biggest PNG beneficiary from both ventures. It may be unnecessarily pessimistic to do so but it would seem that it is difficult to avoid the conclusion that little sustainable, long-term development has been created by these funds. The Mineral Resources Stabilisation Fund has been drained and the national economy remains in serious difficulties. Given this situation, one might also conclude that the national government is hardly in a position to complain about the manner in which lower levels of government or landowners have used their (smaller) shares of mining revenues. However, whilst national government can always live in hope of new mines replenishing its coffers (even if at the moment for the first time in twenty years those hopes are rather dim), for most of the mining provinces and – even more so – for the landowner communities in remote areas, mining revenues are a once-and-only opportunity of building up a basis for long-term development.

2.5.2 Provincial levels

Excluding Special Support Grants from national government, provincial governments involved with Ok Tedi, Porgera and Misima (FRPG, EPG and MBPG) have received respectively and approximately US$100m, $150m and $15m from project revenues up to the end of 1999. However, in terms of relative performance and efficiency in use of these (and other funds) Milne Bay PG has clearly outshone the other two – both EPG and FRPG have had to be suspended of several occasions for alleged mismanagement by the national government. In EPG's case, it was their apparently non-beneficial use of funds that pushed PJV into proposing the Tax Credit Scheme[23]. In Western Province, performance has, if anything been worse with there being virtually no visible sign to the casual observer of how, if at all, this US$100m (which is equivalent to US$1000 per head of population) might have been put to public use. Again, it may be exaggeration but it is difficult to avoid the conclusion that provincial governments have done very little to create the basis for longer term development from mining revenues. Moreover, their alternative options are very much more restricted than those even of a cash-strapped national government.

2.5.3 Local Level Governments

When Independence was achieved by PNG in 1975 many of the country's leading politicians felt that power was too much concentrated in Port Moresby. Separatist tendencies at that time in Bougainville and, to a slightly lesser degree, in Papua helped the

[22] Note that these figures have been converted into US$ from kina at annual conversion rates; they are in real US$. Note also that the 5% tax that the PNG government levies on all royalties, other than that proportion of royalties paid into trust funds, has not been included here.
[23] It must be added, however, that although suspensions continue EPG's performance has improved since 1996.

new PNG Government of the time in its decision to establish a provincial government system. As just noted this has not met with as much success as was hoped for at the time. In several parts of the country local government was reasonably strong at the time of Independence assisted to be so by the authority of Australian Patrol and District Officers. Not unnaturally, PNG politicians on the whole wished to reduce the authority of the kiaps as they were known and, in doing so and in creating the new provincial governments, they also enfeebled local level government. Twenty years later the National Parliament reconstructed the system of governance by tying provincial governments much more closely into the national system (national parliamentarians became members of provincial governments ex officio) and also by placing much more responsibility on the long neglected District and Local Level Governments (whose heads also became ex officio members of the higher level organisations).

The timing of these changes in attitudes is important for it helps explain the importance attached to local authorities in the various mining arrangements. When Ok Tedi was negotiated, no local authorities were involved at the negotiating table. Local governments did (and still do) not participate directly in mining benefits from the Ok Tedi project. In Misima's case local leaders were partially involved in discussions but they were not local authority representatives. In the Misima case too, Local Level Government is not a direct beneficiary of project revenues. Fortunately, however, in the Misima case Local Government Councils (the forerunners of LLGs) had been in place so long that they had survived the period of post-Independence neglect whereas at Ok Tedi there had been no such tradition – mining exploration had preceded administrative organisation there. In Porgera's case, the landowners were, rather reluctantly, allowed to participate and, to the surprise of all but themselves, succeeded in outwitting almost all other parties to the discussions. A quasi-LLG, the Porgera Development Authority, was granted a 5% share of all royalties. All other projects have been negotiated since the provincial and local government reforms of 1995/6. And in all cases LLGs have been taken note of in such negotiations. At Lihir the Nimamar LLG receives 30% of royalties.

As closure has approached there has also been a growing feeling amongst company closure planners and national Department of Mining officers that LLGs will play a crucial role in closure and sustainability planning. It will be LLGs and other local authorities (such as Districts) that will have to take on the burden of service provision after closure. OTML, for example, initiated and funded planning workshops for provincial and district officers and has built accommodation premises for the Star Mts. LLG. At Porgera, the Porgera LLG and Porgera Development Authority are playing a major role in the development of Paiam township. At Misima for several years most of MML's work on village planning was undertaken in close co-operation with the Samarai-Murua District office (which is located on Misima) and the Louisiade LLG.

However, as yet no steps have been taken to re-arrange the distribution of mine-generated funds. Mines started before the local government reforms still pay royalties to the parties nominated as recipients before those reforms took place. Consequently, different projects have quite different sets of recipients for such funds. A major problem is that mines established early on cannot readily redirect funds – those currently receiving them would strongly object. But mining companies would be even more loath to have additional imposts placed on them to make financial provisions of the type needed. It has been proposed

(Jackson 2001) that all projects established before 1995 need to hold 'Mine Closure Forums' to develop plans (and means of funding those plans) for closure. Such forums would supplement the 'Development Forums' that, since the first such Forum that drew up responsibilities for the Porgera Project in 1988/9, have become a standard feature of the mine development process in PNG. The concept is that it is necessary to allocate responsibilities for closure and post-closure planning (and implicit in such a suggestion is the idea that it will also be necessary to re-arrange the distribution of benefits during the final years of mining to facilitate the transition to post-closure futures).

Mining companies' attitudes towards the future role of local authorities is also varied. At Lihir, as noted earlier, not only is the Nimamar LLG the recipient of 30% of royalties but the LMC is working with it to develop a long-term Lihir Plan. At Misima, MML has been working for five years on a similar approach although it has tended to focus its co-operation with District, rather than LLG, authorities. Although at Porgera the PJV has worked closely with the PDA, the Porgera Landowners Association and the Porgera LLG, no overall planning has yet taken place. At Ok Tedi, to date, OTML has tended to dominate the development of any plans for the region while local authorities have largely stood on the sidelines; clearly, the wish of BHP-Billiton to extricate itself from the project has helped in creating this situation. Thus the capabilities of local authorities are seen as being very varied.

It is in this respect that the absence of any formally adopted closure (and post-closure) policy is rather damaging. There is every indication at present that individual projects will all end up with quite different closure processes particularly as far as the hand-over to local authorities of responsibilities is concerned.

2.6 Community Capacity

2.6.1 The Nature Of The 'Communities'

The capacity of mine area communities to survive mine closure varies very considerably. But so does the nature of those communities. The combination of a FIFO strategy and maximum local recruitment and intensive training at Misima has meant that there was no great influx of non-Misiman population to that project. Consequently, there will equally be no great exodus of population at closure – even if pre-mine Misimans drawn back to their home island by the project may once again move to other parts of PNG. At Porgera, the Porgeran peoples' kinship systems (that trace relations and affiliations through both the mothers' and the fathers' lines) helped encourage massive in-migration especially from nearby Highland communities. These migrants (epo atene) now predominate in the Porgeran 'community' and, because they have largely arrived with the assent of kin who are true Porgeran landowners, are disseminated everywhere throughout the Porgera valley. At Ok Tedi, a slightly different pattern has emerged. There too migrants were drawn in and some were welcomed by the Wopkaimin landowners eager to increase their numerical strength. However, most true landowners remain settled in individual villages whilst most migrants have squatted or have rented land from landowners in distinct settlements around the project.

There has also emerged an electoral problem in mining communities. Effectively, non-locals are not represented in the political decision-making structures of local government.

For example, the Star Mts. LLG basically consists of one councillor for each traditional, landowner community plus a single representative for Tabubil town – notwithstanding the fact that Tabubil has many more residents than all the villages combined. Although voters in national elections, Tabubil residents have very little say in local issues – which is one reason why the Star Mts. LLG has long been ineffectual. At Misima with the dominance of locals in employment this has not been an issue. At Porgera a situation similar to that at Ok Tedi has emerged: the 'true' landowners dominate local politics with FIFO workers (voluntarily) and epo atene (less willingly) excluded from the local political process. These variations in the nature of what constitutes the 'local community' will impact on closure and post-closure planning and planning options as well as on 'community capabilities'.

At all three projects (Misima, Ok Tedi and Porgera) mining has inadvertently created community divisions. To be specific, the application of national rules over the distribution of benefits from mining has meant that some individuals have done very well out of projects whereas others have gained very little. On Misima, where all people speak the same language, SML landowners, 'pit area' landowners and other Misimans all have distinct identities now – based on the monetary and other benefits they have received and will continue to receive from the project. Almost all the arguments that have resulted in court actions lasting almost as long as the project itself on Misima have arisen from jostling between these parties. At Ok Tedi, whilst landowners in SML villages and in villages controlling Leases for Mining Purposes have done well from the project and whilst some downstream communities, by taking legal actions, have also done well in recent years, communities along the road linking Tabubil to Kiunga show relatively little positive improvement. OTML has tried to rectify some of these disparities but has not been very successful. One result is that, together with the consequences of downstream sedimentation, OTML community affairs staff have now to deal with dozens of 'communities' all with quite different characteristics, problems and complaints. This may also help explain why OTML cannot easily incorporate 'the community' into its own efforts for regional development.

The situation is least problematic (which is not to say that it is problem-free) at Porgera. The potential for equally fissile communities has always existed at Porgera – after all the same national distributive mechanisms apply there and communities are also varied. In one respect, traditional kinship systems have helped here: the fact that one can trace one's affiliations in many directions at once gives a degree of unity (but no less tendency to factionalism) that many other societies lack. But principally the relative unity of the Porgeran community can be traced to one fact: the community leaders who negotiated with the project in the mid-1980s during exploration, who negotiated the Development Forum deals and the various issues that have arisen during operations are still in place and showing few signs of being any less eager to continue negotiating future deals. Porgeran leaders have for over fifteen years tightly controlled their own landowners' association, the PDA and the Porgera LLG whilst holding key positions with both the PJV and the government. While government liaison officers have come and gone and while PJV managers have done their tours of duty, the faces on the landowners' side have always been the same. They have astutely minimized risks of division by, for example, ensuring that when the original royalty sharing agreement was re-negotiated in 1995/6 landowners other than those in the SML received, from July 1995 onwards, 12% of royalties. Whilst originally they fought very strongly against, and beat off, what they saw as EPG's early attempts to grab the greatest benefits for Wabag (the provincial capital), they have, in recent years, co-operated on many occasions with Wabag to both parties' benefit.

The major threat to landowner unity at Porgera arises out of the sedimentation of downstream alluvial gold deposits. This threw up its own leaders separate from those who had controlled Porgera for many years. One leader was elected national MP for Porgera in the 1997 elections – defeating, in the process one of the most prominent of Porgera landowner leaders. However, with new elections looming in 2002 and the unity of landowners having been maintained since 1997 this threat may be receding.

2.6.2 Community Savings For The Future

Only partial information is available regarding savings and investments made either by individuals or landowner bodies in PNG's mining areas. Mawuli and Sanida (2000) give some information in their recent paper Landowners' Mineral Rent-Quest and Use in PNG[24]. This appears to show that out of an average household expenditure of K13, 200 in the twelve months preceding their survey, Ok Tedi landowners made money investments of K200, had savings of K984 and had spent K40 on compensation and K1860 on brideprice. The first two figures may be regarded as 'modern' investments; the last two may be regarded as 'traditional' investments. Respectively they amount to 9% and 14.4% of total expenditure or just under one-quarter of total expenditure. A further K1700 on average had been expended on vehicles – which might be regarded as investment income, but is probably better classified as (very) short-term 'indulgence' expenditure in most cases. Since the paper does not present overall expenditure figures for Porgera and Misima landowners interviewed, it is difficult to give comparable figures for these two projects. However, it was reported that at Misima in twelve months preceding the survey, the average expenditure on investments was K483, savings K947, compensation K38 and brideprice K42. In this case the annual average expenditure of K2916 on boats might be more justifiably classified as investment than consumption (it is much more difficult to crash a boat). At Porgera, investments were on average K160 per household, savings K2500, compensation payments K2100 and brideprice K780. Thus total annual savings and investments appear to have been: Ok Tedi K3084, Misima K1510 (excluding boats) and Porgera K5540. The equivalent value for Lihir reported by Mawuli and Sanida was K3740. Only in the Ok Tedi case was the present writer able to calculate what these figures mean in percentage terms – and then only as a percentage of expenditure rather than of income. The study's own authors concluded that:

> less than one percent of the total incomes is invested in agricultural pursuits and approximately 6% is invested in non-agricultural enterprises which are mostly related to the mine.
>
> (<u>op.cit.</u> p.72)

This conclusion could be questioned: investment in brideprice could be seen as agricultural investment in view of the key role of women in agriculture. Additionally, whilst investment

[24] The paper does not quite do justice to the information collected since tables on different projects are not readily comparable; the present writer found difficulty in abstracting the information presented here and apologises to Mawuli and Sanida if he has misinterpreted it.

in mine-related activities may not be particularly safe (in view of impending closure), the 6% quoted excludes savings cited by the authors.

Mawuli and Sanida correctly open their paper with the remark that:

> It is widely believed that the landowners are simply living off their resource rents.
>
> (op.cit. p.v)

Certainly the switch to bought rather than self-produced foodstuffs clearly indicated by their study poses problems for future food security. At Ok Tedi and Porgera present populations are sixteen and six times respectively greater than before mining started and there is no way their inhospitable environments and poor soils could support such populations in subsistence now. At Misima where conditions are much better, internal population growth since the start of mining also threatens food security for the future.

Nevertheless, it is worth pointing out that even if one ignores 'traditional' forms of investment that are especially significant at Ok Tedi and Porgera, the rate of 'modern' savings and investment by landowners covered in Mawuli and Sanida's survey (even if they are worryingly low) puts that of provincial and national governments to shame. The latter are not even managing to live off resource rents, let alone save funds.

Mine closure will severely reduce private household incomes. According to Jackson (2000), household incomes amongst Ok Tedi SML landowners will fall by 30% post-closure (and by more unless investment strategies are now put in place); those of LMP landowners will fall by 40% and those of the Ningerum people to the south of the mine will fall by 55% (local public incomes will fall by 90%). Providing prudent investment of accumulated funds occurs, Jackson (2001) believes that on Misima the two central landowner communities' average incomes will fall by 35%, whilst those on the rest of the island will fall by 75% (local public incomes will also fall by 90%). In neither case – but especially that of Ok Tedi – was Jackson sanguine over any possible alternate form of cash-earning activity emerging.

Note that SML landowner incomes are forecast, given certain assumptions, to fall by much less than those of other members of local communities. This is because SML and LMP landowners have obligatory trust funds where moneys are put aside for post-closure activities whereas others' cash benefits are largely in the form of wages. The post-closure use of such trust funds will largely determine their beneficiaries' future incomes and opportunities.

The 'trust fund' situation is clearest at Misima. This is because for several years, all funds have been frozen by court action. It would appear that by the end of mine activity in three years approximately K19m will be available in cash for continuing investment for SML landowners from the funds paid into the Future Generations Trust Fund over the years plus landowners' shares in Orogen Minerals. The landowners have already established their own investment fund, the Kalopu Trust, which places the trust funds beyond the decision-making reach of any individual or group of landowners and which has laid down clear guidelines for expenditures from the funds. With prudent investment, this should maintain landowner incomes at a level well above the average for PNG as a whole for the foreseeable future.

The 'future income' figures for Ok Tedi landowners previously estimated were based on assumptions that have not yet been realized; moreover, the present writer doubts that they will be realized – hence actual incomes may be well below those that could be possible. Most investment by landowners to date has been by individuals or business groups. There has been little studied investment by landowners as a group. It is difficult to see how investment in local business ventures could be considered 'prudent' in view of the project's uncertain future and the lack of any viable alternative business opportunities in the region. Lack of co-ordinated investment by landowners and of local investment opportunities is certainly one reason why there is apparent acceptance of BHP-Billiton's proposal that its own Trust Fund (to be established when it withdraws from the project) should be based offshore.

Porgera landowners have exhibited the greatest acumen in their group investment policies. They have invested in real estate outside the Enga Province (largely in Port Moresby) whilst negotiating for other stakeholders to invest in the development of Paiam town. By the time of mine closure the various trust funds associated with the project should have accumulated well in excess of K30m for ongoing investments. The strategies adopted by individual Porgerans is poorly known but a similarly dual approach has certainly been taken by particular individuals – they have married more wives whilst buying residential properties in both Port Moresby and Australia.

3 Challenges And Responsibilities For Stakeholders In Closure

3.1 National Government

National government has generally done a good job in getting mines underway. In particular, the Department of Mining (and its predecessors) deserves praise for its role in dealing with the majority of mining crises – the only one it might be criticized for is its failure to push along the Bougainville review. Government as a whole, however, has tended to react slowly to changing circumstances in mine development with the result that there has been a steady evolution of policies on participation in mine decision-making and benefits. However, it is difficult to avoid the conclusion that its own policies have always been one or more steps behind evolving landowner demands and that many of its solutions have been both ad hoc and detrimental, in the long-term, to the well being of the industry. Thus, quite aside from the fact that different social conditions at mine sites have resulted in variations in conditions and in participation in benefits, landowner demands and the exigencies of particular circumstances have driven policy along in what has been, at best, only a semi-controlled fashion. It is a matter of urgency that the draft policies on mine closure be finalized, agreed to and legislated upon. It is also a matter of equal urgency that national government devote at least some of the major resources it marshaled for negotiating mine openings to the planning of impending mine closures. However, since over the next two years the whole area of mining sustainability policy is to be addressed by World Bank Group consultants, no further comment in this area will be made here.

3.2 Provincial Government

The challenges of closure for Provincial Governments are in some ways even more acute than they are for the National Government of PNG. In the case of Western and Enga Provinces, provincial budgets have become very heavily dependent upon mine revenues (more than half of their revenues are directly a result of their hosting mine projects). Ironically, the province that has received a much smaller proportional share of funds generated by a much smaller project than either Ok Tedi or Porgera – the Milne Bay Provincial Government – has performed very much better than they. It has slowly developed a number of other economic projects despite a chronic shortage of funds. Even at this stage it is not too late for the FRPG and EPG to start to emulate the performance of the MBPG since mining funds continue to flow. However, given the many years of failure in adequate supervision of development and of proper use of funds, especially in Western Province, it would appear unduly optimistic to expect any major turn around in the near future.

3.3 Local Government

Under the 1995/6 provincial government reforms, much more responsibility was given to Districts (as budgetary planners) and Local Level Governments (as development priority setters). Nation-wide there have been loud complaints, however, that the devolution of authority has not been accompanied by any similar devolution of funding. The exclusion of local authorities in pre-1995 agreements on royalty and other mine revenue sharing arrangements (with the partial exception of Porgera) has meant that during mine operations most have played very marginal roles in planning and service provision. Yet, after closure the overwhelming bulk of work in these areas will fall on them. Clearly, if this assumption is correct some form of transition from low profile to total responsibility is necessary. Cash continues to flow from mining project – but not in their direction – and in most cases there is no provision for post-closure funding for local authorities' operations. This can, and should, be corrected prior to closure as could the upgrading of the skills of personnel working for such local authorities. It is also evident that local authorities should be the key personnel to receive full and clear information concerning both company and government plans for closure. This is not simply a lesson learnt from PNG experience – it is one reported from worldwide experience. Only faltering steps have been made in this general direction to date. Fortunately, in more recent project, notably Lihir and Ramu this key role has been to a greater or lesser extent been recognized from the start of the projects.

3.4 Companies

It is the present writer's opinion that companies have, in general, shown more awareness of closure issues and done more as a result of that awareness than any other single stakeholder in PNG. However, that is hardly a compliment. The ultimately partially unsuccessful approach taken by MML was the most ambitious adopted by any company trying to realign a project for successful closure. Nevertheless, it has had success in both the areas of planning and community health. That adopted by OTML – complicated by the circumstances of BHP-Billiton's withdrawal manoeuvres – has been distinctly more a 'top-down' approach to date. At Porgera, closure plans are only now beginning to be formed and a key element there will be whether or not the landowners and the PJV, the two dominant forces involved, will be able to adopt a co-operative approach. Should they do so they could achieve better results than either of the preceding two projects – or at least match Misima's achievements.

Should Ramu ever proceed then it, along with the Lihir project, already has the basis for a more successful approach to long-term planning. Local authorities are involved, in both cases, in both revenue sharing and in planning from the start. In these cases the initiatives taken by mining companies and their consultants could mean that closure issues can be considered throughout the operations phase rather than being seen as a separate process – as is the case at earlier projects.

3.5 Communities

Two major problems face mining communities as a result of closure: first, everyone's income will fall but, second, in relative terms landowners for whom trust funds have been set aside will continue to have respectable incomes whilst others in the same communities will have very small incomes. This cannot help being divisive and undermine community unity. This problem has been created by national rules and it will require national policies on closure to take it into account if it is to be addressed.

3.6 Non-Government Organisations

Two forms must be distinguished here: traditional and modern NGOs. In PNG the distinction is rather clear. The former are missions, for the most part, which, in many areas now hosting mining operations, were previously the dominant and often the only service providers. Mining closure will almost certainly bring these NGOs back to the forefront of activity, especially if various levels of government fail to properly prepare themselves for closure.

'Modern' NGOs are those most people think of when 'NGOs' are mentioned. Such bodies are not especially well-established in PNG and most that are have specialized in attacking mining companies on a variety of grounds and supporting legal cases against mining projects. Whilst this has been a valuable service for some landowners, it has been unusual for such NGOs to establish a lasting presence in mining areas. More commonly, they have been present during crises and absented themselves once the crisis has subsided. NGOs specializing in rural development are conspicuous by their absence in PNG but could play a very major role in post-closure adjustment. The work of Conservation International, currently undertaking a review of marine resource use in Milne Bay – partly as a result of MML's presence there - is an exception to the usual pattern. MML management reported to the author that several attempts by them to try and get such organizations as OxfamCAA (the Australian branch of Oxfam) involved in development projects on Misima had been rebuffed on the grounds that OxfamCAA preferred to see its role as an 'ombudsman' to the industry.

3.7 Multilateral Lending Agencies

AusAID, possibly in a sign of its frustration with some of its past dealings with government and with the lack of NGOs it can work with, recently introduced its 'Incentive Program' whereby private and profit-based organisations may apply for funds for community social and economic development. Misima Mines has applied on several occasions for funds under this scheme (although to date it has not been successful). Other companies have been following MML's lead. There is no doubt at all that MLAs could – if they wished - have a major impact on the closure process in PNG if only because of the impending influx of mining consultants associated with the WBG's current mining strengthening program. Approaches taken at Ok Tedi (its provincial officers' training programs) and Lihir (local area planning) as well as MML's earlier attempts at villager empowerment, are all areas in which MLAs could be of considerable assistance in future.

4 Increasing Stakeholder Capacity

4.1 Lessons Learned

Despite what may appear to be a pessimistic tone evident throughout this paper two major points need to be made here: a) there is very little evidence that mine closure is being approached in any better way anywhere else in the world and b) approaches to mine closure have evolved in a positive direction in PNG over time. The conditions for future closures appear to have been put in place – as far as existing thinking about what makes for good closure practice is concerned – at Ramu and Lihir. The problem appears to be one of somehow re-framing the conditions under which earlier mines operate in order to bring them 'up-to-date'. However, some of the problems of doing that are very difficult to address. For example, even if it is now apparent that trust funds for local authorities should have been much more prominent as recipients of mine-generated monies, it is difficult to see how existing recipients will be persuaded to give up some of their income to make up for this oversight. It is equally difficult to see how mining investment might be encouraged if a further levy were placed on mining companies for this purpose. Nevertheless this, and other issues, needs to be addressed.

A second lesson learned is that despite public pronouncements to the contrary there is some evidence that landowners in mining project areas have shown a greater proclivity to save and invest (if not always wisely) mine generated funds than either provincial or national levels of government. In at least one case – Porgera – landowners have consistently shown, for fifteen years, an ability to bargain hard without forgetting their own long-term aims for their area in a way that is both consistent and realistic. When given the chance by MML, Misima villagers also showed themselves more than capable of realistic future planning. Thus, it is by no means romanticized idealism to suggest that the most promising areas for future advances will be in the project host communities themselves. Their efforts have by no measure been perfect but they have been far more productive than those of others. Moreover, they have far more interest in a satisfactory outcome than any other party.

4.2 Priorities For Resource Inputs

The following key areas for resource inputs are proposed:

a. completion of the National Mine Closure Strategy process;

b. establishment of 'Mine Closure Forums' at Misima, Ok Tedi and Porgera that will address

c. distribution of benefits during the closing years of mine operations and

d. development of co-ordinated closure and sustainability strategies.

Appendix A

Papua New Guinea's Draft Mine Closure Policy

This draft was completed in mid-2000 and was discussed with most stakeholders at the end of that year. However, it has still to be finalized.

Independent State Of Papua New Guinea Mine Closure Policy And Guidelines

Draft

Part (I): Preamble And Guiding Principle

The Independent State of Papua New Guinea supports the development of the country's mineral resources to provide sustainable benefits to the State and its people. Guided by the fourth goal of the National Constitution which states,

> *We declare our fourth goal to be for PNG natural resources and environment to be conserved and used for the collective benefit of us all and be replenished for the benefit of future generations.*

In order to achieve these, the following principles will apply to developments in the minerals industry.

Part (II): Principles For Mine Closure Planning

i)Appropriate planning will have to be undertaken to ensure that as many benefits as possible from mining are sustained beyond the life of the mine;
ii)Appropriate planning is also required to ensure that any negative environmental or social impacts from mining activities are minimized during the mine life and eliminated, where possible, after mining operation ceases;
iii)The mine developer shall be required to inform the State at the pre-feasibility stage on how the company would be planning to work with stakeholders to achieve (i) and (ii) above during and after mining.
iv)Each mining project in PNG will develop and implement a site-specific mine closure plan.
Integrated mine planning, incorporating exploration, development, operations and closure, will be practiced;
v)Integrated mine planning shall address:
Conversion of the resource into long-term sustainable capital;
Undertaking this while minimizing short and long-term negative impacts on the environment and social fabric of the people living in and around the mine affected areas.

These principles are best achieved through this Mine Closure Policy which will apply to all current and future mining operations in PNG.

Therefore, whilst this Policy has been developed primarily for mining projects that will commence after its implementation, the existing mining operations, all of which are in process of developing mine closure plans, are encouraged to adopt the Policy and its Guidelines wherever feasible. Exploration projects are addressed by the Environmental Code of Practice for the Mining Industry in PNG and are therefore not covered by this Policy. Mines closed prior to the implementation date are also not covered by this Policy.

The Policy covers all mining operations in PNG, whether on land or under the sea. Any sub-sea mining projects should also incorporate the provisions of the UN Convention on the Law of the Sea (UNCLOS).

Part (III): Key Policy Elements

Some of these policy elements are that:

i)Mine closure planning will be an integral component of mine planning in PNG;
ii)Appropriate funding arrangements will be established by the State and mine developer to ensure that mine closure does not become a liability to the country;
iii)Mine closure planning will involve all levels of government, landholders and communities likely to be affected by mining operations and its subsequent closure;
iv)Mine closure plans will be consistent with Medium Term Development Strategy guidelines at the National level and complement Provincial, District and Local Government planning;
v)Proper provision through the proposed mine closure funding mechanism shall be made for the orderly retrenchment of the workforce from closing mines and retention of their skills for the benefit of the country;
vi)Proper provision shall be made to have all assets valued prior to transfer to relevant stakeholders;
vii)Proper provision shall be made for the transfer of infrastructure and facilities to relevant stakeholders;
viii)Adequate provisions shall be made to ensure that any non-transferable assets and equipment shall be properly tendered and sold domestically or internationally.

Part (IV): Guidelines For Their Application

1. Administrative aspects

1.1 The Mine Closure Policy will apply to all projects licensed or permitted by the State and will cover both existing and proposed new mining projects. Existing projects have differing requirements for the inclusion of closure planning (e.g. some environmental plans include requirements for closure plans, while the Ok Tedi Agreement Act and Supplemental Agreements provide for the preparation of a 'reclamation plan' ten years prior to scheduled mine closure). In these cases, the operating companies or developers are encouraged to submit their closure plans earlier than required under their existing agreements.

1.2 The mine closure process should commence at the pre-feasibility stage through proper consultation between the Stakeholders. In addition, the guidelines for preparing the Environmental Plan or application for environmental permit should include a section on mine closure. Regular review of mine closure plans will be necessary as agreed from time to time among the organisation responsible for Mining, organisation responsible for Environment and the mine operator.

1.3 Unless specifically covered by legislation, the ownership of assets after mine closure must also be covered in the Mine Closure Plan.

1.4 The Organisation responsible for Mining is the primary agency for regulating, monitoring and administering all aspects relating to mine closure. However, the Organisation responsible for the Environment will complement the Organisation for Mining and assist in the technical review of Mine Closure Plans and funding arrangements. In particular, the Organisation responsible for Environment will have responsibility for certifying and monitoring the environmental aspects of the completion criteria, while the Organisation responsible for Mining will be responsible for certifying the occupational health and safety aspects. The Chief Inspector of Mines will be responsible for inspection of the site during and on completion of decommissioning to ensure that all aspects of the Mining Safety Act are complied with.

1.5 Other departments will be involved in mine closure planning and review through an Inter-Departmental Standing Committee and will be consulted throughout the process.

1.6 Provincial and Local Level Governments must be involved in the mine closure process from the start to the end of a mining project. In particular they should be included in the consultation process. This is to ensure that sustainable development is achieved at post-closure period.

1.7 All stages of the mine closure process will be subject to audit with the aim of ensuring that they are both appropriate and comprehensive. This will be managed by the State in conjunction with the mine operator. The mine operator may initiate an independent audit of mine closure planning at any time. The report of this audit must be made available to the State. The State requires an audit at the mid-point of the planned mine life and annually for the final three years of mining or processing activities. An audit will also be required to validate achievement of the agreed completion criteria.

1.8 Upon achievement of the agreed completion criteria to the satisfaction of the respective Organisations responsible for Mining and the Environment, the former will issue a Completion Certificate; this will be the mechanism for formal relinquishment of the operating leases.

1.9 The Organisation responsible for Mining in conjunction with other Departments and Agencies, will establish Guidelines for the implementation of this Policy.

1.10 The State should put in place taxation measures that will encourage progressive rehabilitation of mine sites and orderly mine closure.

2. Financial Aspects

2.1 To guarantee that there is ample funding available to effect the various mine closure processes, this Policy proposes the establishment of certain funding mechanisms. It is proposed that the developer will be required to put in place a mandatory Mine Closure Bond and, in addition, may establish a Mine Closure Trust Fund at its discretion.

2.2 The current taxation regime applicable to the mining taxpayers will invariably lead to un-recouped mine closure expenditure for the developer, if things were to remain as they are. The Policy proposes that the current Taxation Review being undertaken by the PNG Internal Revenue will address this deficiency by way of tax concessions or specifically tax deductibility of the expenditure to be incurred. This will ensure the participation by the State, as a shareholder in the mine closure process, in addition to easing the financial burden of the developer.

2. (a) Mine Closure Bond

2(a).1 The MCB must be in place prior to the commencement of construction of the mine and will be based on an Initial Mine Closure Plan, submitted with the Feasibility Study and include estimated cost for closure and financial provisions. The quantum of the bond is variable, and is based on the estimated cost of closing the mining and incorporates premature closure. This bond will include the costs of technical and physical rehabilitation and would be separate from the Environmental Bond proposed under the Environment Bill.

2(a).2 The review and audit by the State of the Mine Closure Plan as developed and updated periodically by the developer will include a review of the adequacy of the MCB.

2(a).3 The operator may with the agreement of the State write down the value of the MCB as expenditure relating to mine closure processes are incurred (e.g. rehabilitation, decommissioning of facilities etc.) or contributions accumulate in a Mine Closure Trust Fund.

2(a).4 It is important to note that the MCB is meant to cover only the technical and environmental aspects of mine closure. A different mechanism is established to cover the social implications of closure.

2 (b): Mine Closure Trust Fund

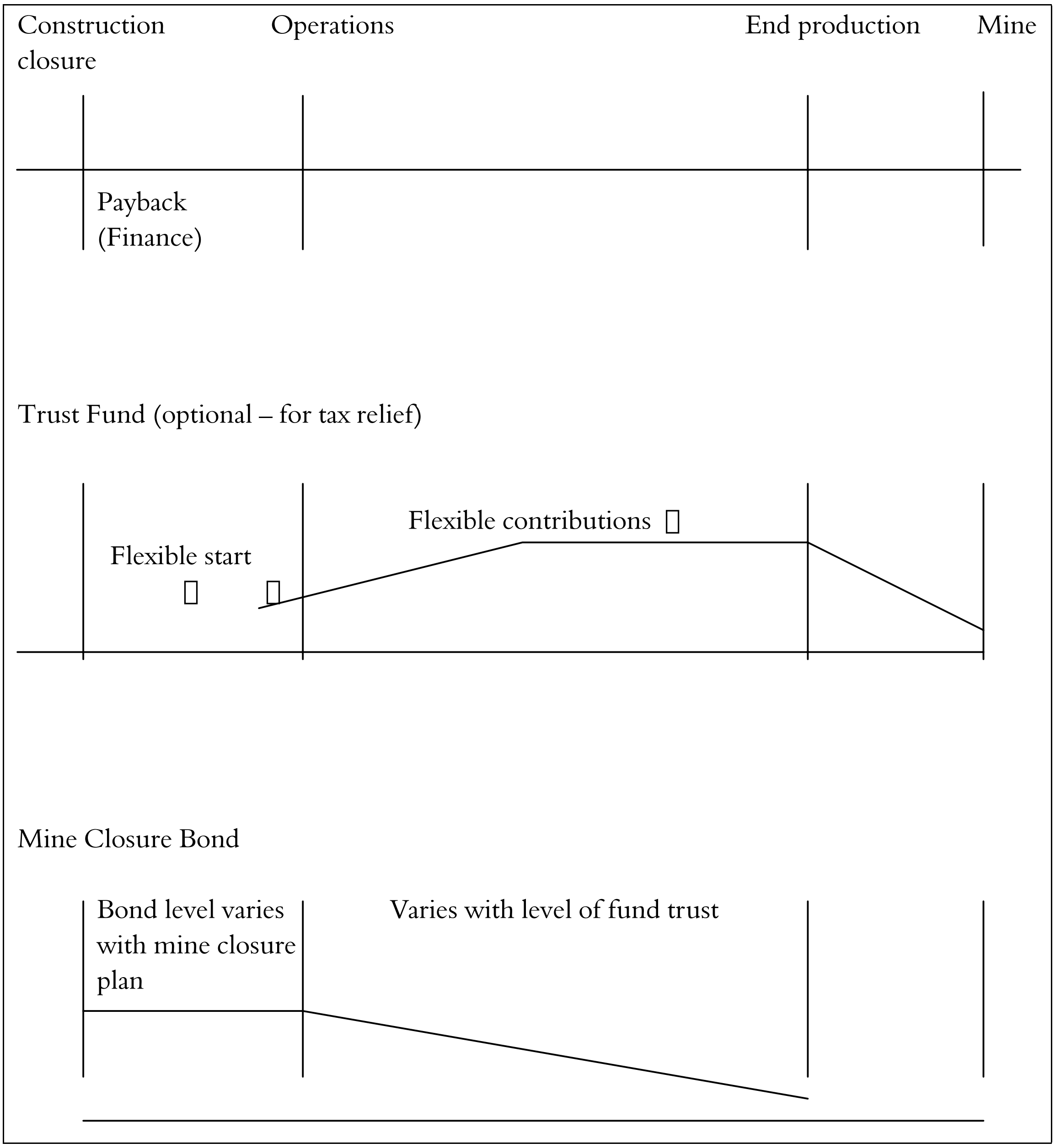
2(b).1 Establishment of a Mine Closure Trust Fund is optional, at the election of the operating entity. The MCTF covers all costs of mine closure, decommissioning, rehabilitation and monitoring after the completion of commercial production at the mine. Rehabilitation costs incurred during commercial production would be written off as a direct operating cost for tax purposes.

2(b).2 The MCTF should be quarantined from 'normal' company assets to avoid being seized by a liquidator in the event of bankruptcy. Contributions to the MCTF would be at the discretion of the operator but at a predetermined time before cessation of commercial production, the cumulative contributions would be equal to the maximum value of the MCB as determined at that time. However, where the write-down of the MCB or draw-down of the MCTF are allowed before the above-mentioned time, the combined value of both should not fall below the initial value of the MCB. Any draw-down of MCTF will be deemed as assessable income and be subject to tax. Interest would accumulate in the fund and be applied to the cost of mine closure.

In summary, the aspects of each component are outlined in the following table:

Mine Closure Bond	Mine Closure Trust Fund
MCB established at start of construction Level determined by initial mine closure plan – Feasibility Study Bond level reviewed with rolling closure plan Bond may be reduced with contributions to Trust Fund Technical and environmental costs for mine closure only MCB covers premature closure	Optional to developer Applicable post-commercial production Flexible with contributions and draw-downs Contributions are operating expense Draw-downs are taxable income Maximum value equal to maximum value of bond Trust is a liability and must be quarantined from liquidators Managed by developer with regular reports to the State Interest accumulates for rehabilitation post-production State must be a trustee to the Fund

2(b).3 The relationship between the two funding mechanisms is shown diagrammatically in the following figure:



MCTF: to provide tax relief mechanism and to guarantee funding
MCB: to provide insurance guarantee to government

3. Environment/Technical aspects

3.1 The Mine Closure Policy applies to all new mining projects (medium and large) as well as existing projects. It specifically does not cover closed projects, small-scale mining and exploration projects which are covered by the Environmental Code of Practice for the Mining Industry in PNG.

3.2 Environmental Plans developed for mining projects under the Environmental Planning Act should include a Rehabilitation Plan and estimated total rehabilitation costs. An Initial Mine Closure Plan must include all necessary aspects of decommissioning, rehabilitation, social and sustainable development. As projects develop and more information becomes available, the Initial Plan will grow and evolve and may become a separate document, clearly identified as a Mine Closure Plan. The level of detail in the Mine Closure Plan increases as the project approaches the decommissioning and closure phases.

3.3 Mine Closure Plans should include discussion and, where appropriate, proposals on the following areas:

- Progressive rehabilitation
- Post-mining land use
- Completion criteria
- Environmental and social indicators
- Monitoring and evaluation program
- Premature closure, and
- Temporary closure

3.3 The Mine Closure Plan should clearly address uncertainties in the closure process and propose a program of work to reduce those uncertainties wherever feasible.

3.5 Each Mine Closure Plan will be updated periodically according to a period agreed with the State. Triggers for updating a Mine Closure Plan will include the periodic review of mining plans or when material changes occur to mining plans.

3.6 The following table presents an initial outline of a Mine Closure Plan.

A. Background and area of impact
Summary and background regarding the details of the original environmental assessment, environmental plan and environmental audits. Identification of the area of impact of mine closure (not just the mine site but all waste disposal areas, infrastructure, transport routes, loading and storage facilities etc.)
B. Stakeholder identification, participation and perceptions
Identification of the communities affected by mine operations and its subsequent closure, including 1st line (directly affected), 2nd line (indirectly affected) and 3rd line (international interest groups). Identification of stakeholder expectations; and making the stakeholders part of the decision-making process; how are the concerns and aspirations of the key stakeholders being reflected in the mine closure plan.
C. Regulatory and contractual arrangements
Regulatory requirements and contractual agreements relating to mine closure, including land tenure, National, Provincial and LLG regulation and foreseeable regulatory developments.

D. Environmental aspects
Identification of the environmental protection and remediation needs and estimation of the costs and timetable of physically closing the mine, with especial attention to hazardous plant, materials and wastes. These should cover physical stability, chemical stability and land use and should cover mining operations, waste dumps, tailings, plant and infrastructure. Time needed for physical mine closure; the proposed timetable for ramping down commercial exploitation of the ore body and ramping up expenditure for mine closure; the final land form and post-mining land use of the site, and plans to ameliorate impacts already in evidence at the mine site and downstream environments, including hydrology, physical, biological and chemical landscape, ecology, flora and fauna.
E. Social aspects
The social aspects of mine closure and estimates of the costs and the time period within which these can be adequately addressed includes: Food security and managing the transition back to a subsistence traditional agricultural economic system, if needed; Sustainability of existing social services, taking into account the sustainability and level of government institutional involvement, commitment and participation in the social services provided; Involvement, participation and representation of local communities in community activities and services; The extent and level pf partnerships that have been developed with regard to social and community development initiatives
The findings of work on social sustainability and on the capacity of local authorities to administer the communities and properly use funds that are available after mine production ceases; Sustainability of alternative cash economic systems; Location of possible income-generating opportunities for affected communities and possible implications regarding migration; and The broader implications of mine closure on the national economy – this information shall be provided by the State.
F. Compensation
The environmental and social costs of amelioration and compensation, both of existing and predicted impacts, and include some leeway for unexpected impacts; financial responsibility for amelioration and compensation of social and environmental damage; compensation amounts, recipients and delivery mechanisms; relationship of compensation to incomes needed for communities to survive. The Plan should also include a specific policy approach on retrenchment benefits for employees of the mining operation.
G. End point or completion criteria
Targeted outcomes relating to a) social – including LLG capacity building, local community capacity building, community and social development, economic sustainability, conflict-free and harmonious communities and b) physical including landform stability, soil stability, water quality, soil formation, end land use, vegetation establishment etc.

H. Post-mine closure and conflict resolution
How the mine closure process will be monitored and how post-closure sustainability will be monitored, liability and indemnity regarding past, present and future harm. Sources of possible post-mine closure conflicts and mechanisms for resolving them.

4. Social aspects

4.1 The social aspects of mine closure will be referred to in the Mine Closure Plan, but the details will be included in a specific Social-Economic Development Plan (SEDP) prepared for each mining operation. The SEDP should embody the principles and practices of sustainability and aim at providing, from benefit streams during the mining operations phase, adequate finance for the provision and maintenance of community services after mine closure.

4.2 During the development of the Initial Mine Closure Plan, the State will convene a forum, comprising representatives of the National, Provincial, District and Local Level Governments, landowners directly affected by the mining project, and the project developer. Appropriate NGOs should also be invited and represented at the forum. This forum will assist in the development of the SEDP with particular emphasis on:

1. minimizing long-term social disruption as a result of the mining operation
2. maximizing long-term social benefits from the project
3. retrenchment policy for the project
4. end land use implications
5. medium-term development strategy
6. capacity building of Provincial and Local Level Governments
7. identification and establishment of benefit streams for stakeholders including funds for future generations
8. monitoring and evaluation of implementation of the SEDP
9. mechanisms for reporting to all stakeholders in the project, and
10. a timetable for review of the SEDP

4.3 For existing mines, the forum should be held as soon as practicable after the promulgation of this Policy in order to assist in the developing of the MCP.

4.4 The SEDP should be either part of or have strong links to the Local Level, District and Provincial Government' five-year rolling plans. It may be appropriate under the SEDP to consider establishing a co-ordinating authority such as a Foundation, to implement such a Plan. If such a Foundation is established, it should complement rather than replace the existing system of government in the area of the mining project.

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