

ENVIRONMENTALLY SUSTAINABLE PRACTICES AND ISO 14001

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SUMMARY

The global nature of the palm oil business has led some in the supply chain to seek proof of sustainability. Oil Palm agricultural practices must now reflect this sophistication in choice by being transparent, environmentally sensitive and possessing a documentary chain of evidence. Such a change requires the adoption of a system capable of managing the environment and new thinking by managers. In New Britain Palm Oil Ltd (NBPOL) the framework for this change is the International Standards Organisations (ISO) environmental management standard 14001.

NBPOL gained ISO 14001 (1996) accreditation in April 2004. This paper outlines how NBPOL implemented an Environmental Management System (EMS) and how environmental management has been made an integral part of the company's overall management system. In adopting an ISO 14001 EMS, NBPOL now has a system to monitor and manage environmental performance that permits objective auditing and provides a framework for continuous improvement. NBPOL is now using this framework to place environmentally sustainable practices under the same level of managerial control.

This paper outlines the details of setting up an ISO 14001 certified Environmental Management System and outlines the advantages for the use of such a system to enable NBPOL to grow sustainably

INTRODUCTION

When the world politicians, civil servants and experts met to discuss "Our Common Future" in 1987 they suggested that growth and environmental maintenance are not mutually exclusive. In what became known as the "Brundtland" report they defined sustainable development as "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs". A few years later the delegates to the Earth Summit in Rio de Janeiro (1992) refined this definition by linking economic growth (profit), environmental protection (planet) and social equity (people) in a blue print for sustainability in the 21st. century.

In New Britain Palm Oil Limited (NBPOL) these three elements (People, Planet and Profit) are applied to the business of growing oil palm. The way they are managed and controlled is at the core of the company's strategy for sustainable agricultural growth.

Drivers for Change

Once the oil palm is planted then palm oil production is the business of minimising field losses in order to maximise profits. Success in the plantation is based on establishing and imposing good agricultural practices and early handbooks focussed on the skills necessary to achieve a reduction in losses and an increase in yields (Bevan and Gray 1977; Pushparajah and Soon 1981; Turner and Gillbanks 1974; Vaderweyen 1952). Control of costs and increasing productivity drove most change with environmental benefits left to serendipity.

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The introduction of barn owls for rat control is often used to demonstrate an environmentally friendly approach to pest control (Lee and Ho 2000). It was however driven by the economic necessity to reduce fruit losses (Duckett 1981; Smal 1989) rather than sustainable development. Cost control still continues to influence the introduction of owls into the plantation system (Adidharma 2002; Fee, Cheong *et al.* 1994; Heru, Siburian *et al.* 2000; Wan 2000).

(Pushparajah 1997) stated that sustainable land management was built on five pillars: productivity, viability, stability, protection and acceptability and these same pillars have each driven change within the oil palm industry at different times. In more recent years stakeholder awareness of environmental issues within the oil palm supply chain has made “acceptability” a prime driver for change.

Public Awareness

As public awareness of environmental issues has grown, legislation has become stronger and in itself has driven change. Early attempts at land application of Palm Oil Mill Effluent were not regarded as pioneering sustainable technology but as practical disposal solutions to meet new water discharge regulations (Huan 1987; Palaniappan, Omar *et al.* 1983), and at least one author points out that the penalties imposed were an obstacle to sustainable development in the oil palm industry (Bakti 1990).

Corporate Awareness

A detectable shift in focus can also be seen with oil palm producers, planters and engineers. Most industry practices now reflect these changes and for the first time the fifth edition of the “The Oil Palm” (Corley and Tinker 2003) makes reference to such terms as environment and sustainability. A review of the literature of the oil palm industry’s approach to mill effluent over the last 30 years also shows this change in attitude (Lord, Tavaperry *et al.* 2003) with the effluent now viewed as a valuable resource commodity rather than a nuisance waste.

Customer Awareness

Sophistication in choice has eventually lead some consumers to seek proof of sustainability along the whole length of the supply chain (Ibrahim 2003) and this consumer acceptability has driven companies to actively engage in sustainable practices (Yee 2003). This growing awareness has prompted the oil palm industry to look at its own practices critically and has responded by setting up a transparent “Roundtable” to look at ways and means to improve performance and establish criteria for growing oil palms sustainably.

Such shifts have led to a widening in the scope of oil palm practices, which has taken them beyond a purely agricultural skills base. Current “Best” practices, summarised in Table 1, reflect sensible agricultural measures and so many are not new. What is different is the addition of a social and political dimension, albeit at a local level. The term Environmentally Sustainable Practices is being used to define these local solutions and as the need arises, to place them within a management framework. For NBPOL this framework is the International Standards Organisations, ISO 14001, for environmental Management.

This paper outlines how NBPOL achieved ISO 14001 accreditation and how this management system has been incorporated into the company’s culture has been expanded to include environmentally sustainable practices.

ADOPTION OF A SYSTEMATIC FRAMEWORK

In 1998 NBPOL set about documenting its management practices, by assessing the way pesticides were used, stored and disposed of. NBPOL sought to minimise environmental contamination, increase sprayer productivity and incorporate Occupational Health and Safety measures into the workplace. This “planned approach” was the company’s first attempt to merged the principles of People, Planet and Profit and implement an environmentally sustainable practice. The approach worked increasing both productivity and profitability whilst at the same time bringing Occupational Health and Safety and environmental issues under the direct control of the plantation managers. This was to become the benchmark for future guidelines

As a result of discussion with one of its longstanding customers, NBPOL saw an opportunity to differentiate its products within the market place and strengthen its environmental management standards (Thompson 2003) and at the same time adopt the planned approach across its entire operation. NBPOL embarked on a path to publicly demonstrate sustainability through the adoption of an internationally recognised process, ISO 14001. The International Standard ISO 14001 had previously been recommended for adoption in the Malaysian Oil Palm industry as a model for sustainable development following evaluation of its economic benefits (Chan 1996; Chan 1997; Chan 2000; GLT and Chen 2003).

ISO 14000 series for environmental management

The International Standards organisation has been developing voluntary standards since 1947. Most standards are applied to particular products but the ISO 14000 “family” is one exception as it is concerned with the establishment of a process. A detailed account of the ISO14000 series and how to adopt them can be found in Chan (1996 and 1997) or for a general introduction to ISO visit their web site www.iso.ch.

ISO 14001 (the standard for Environmental Management Systems) can be applied to any organisation. Adopting such a standard provides order and consistency for an organization to address environmental issues and manage environmental performance. ISO 14001 provides a framework for continuous improvement through objective auditing. In addition, once an Environmental Management System (EMS) has been established it can be used to systematically monitor and control the performance of most processes. Therefore an accredited EMS can include environmentally sustainable practices and subject them to the same level of management control

Table 1 Examples of Environmentally Sustainable Practices

- 1 Formulate a corporate environmental policy
- 2 Develop an Environmental Management System (EMS)
- 3 Set performance standards for all aspects of the industry
- 4 Carry out environmental impact assessment to evaluate new developments for the ability to sustain future land use
- 5 Provide management plans on biodiversity and identify and conserve High Conservation Value Forest
- 6 Adopt zero burn techniques.
- 7 Maintain genetically diverse germplasm within breeding programs and then subsequently exploit genotype x environment interaction
- 8 Implement a precision agriculture program
- 9 Establish soil conservation and erosion control measures
- 10 Investigate methods to Increase fertiliser efficiency and minimize losses
- 11 Capture the nutrients from empty fruit bunches (EFB) and Palm Oil Mill Effluent (POME) through land application and compost
- 12 Adopt Integrated Pest Management practices (IPM) within the plantations
- 13 Trunk inject insecticides where possible when treating infestations.
- 14 Develop local weed control strategies by planning all herbicide applications
- 15 Reduce soil compaction within the plantation in particular adopt low-pressure tyres.
- 16 Conserve riparian reserves
- 17 Ensure high milling efficiency and product quality
- 18 Improve efficiency and reduce waste in milling and refining (aim for Zero discharge of effluent from palm oil mills)
- 19 Promote energy efficiency at all levels within the plantation and service departments
- 20 Improve transport efficiency both in field and between plantation and mills through the adoption of a transport policy
- 21 Identify sources of pollution and target their reduction
- 22 Manage water and waterways to prevent pollution.
- 23 Reduce emission to Air
- 24 Establish Occupational Safety & Health Management
- 25 ~~Improve social contribution to rural economy~~

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Modified in part from (Yee 2003); (Leng 2003) and (Weng, Jalani *et al.* 2003)

PRINCIPLES OF ISO 14001

The process of achieving ISO 14001 accreditation is not complex but it is complicated and demanding. The physical documentation process takes time and when this is combined with the introduction of corporate change it is necessary to adopt a pedestrian pace to allow the key principles to take root. There are 5 key principles in the process (Table 2) and it is through continuous monitoring of these that improvement to the business is effected. The adoption of these five principles must proceed systematically and to assist in their implementation a set of 10 additional elements are given to help in the interpretation (Table 2).

Principles		Elements	
1	Commitment and Policy	1	Give environmental management the priority it deserves
2	Planning	2	Establish and maintain good communication
		3	Determine the legislative requirements for each activity, product and service.
3	Implementation	4	Encourage environmental planning as a routine
		5	Provide sufficient resources
		6	Development commitment with clear assignment of accountability and responsibility
4	Measurement and evaluation	7	Encourage contractors and supplies to establish their own EMS
		8	Establish target performance levels
5	Review and improvement	9	Audit processes
		10	Evaluate regularly against targets

Modified from the AS/NZ ISO 14004:1996 standard

Commitment and Environmental Policy

ISO 14001 requires an organisation to make three major commitments

1. Compliance with all legislation
2. Reduction of pollution
3. Continuous improvement

The magnitude of these commitments often leads companies with extensive operations to opt for EMS by increment, focusing on one particular aspect of the operation at a time. However NBPOL wanted all of its operations to have a common point of origin and for accreditation to unify all aspects. It simultaneously adopted ISO 14001 principles within all 12 plantations, 5 mills, refinery, bulk terminal, cattle operation, seed business, transport fleet, construction workshops and welfare facilities. NBPOL's strategy was to make environmental management an integral part of the company's overall management system. To do so across such diverse operations would require a commitment to a systematic approach and the development of a flexible Environmental Management System.

Accreditation of an EMS can either be out sourced to consultants to write a prescriptive manual or it can be undertaken in-house. NBPOL viewed the establishment of an EMS as a serious change in

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business culture and one that should involved all of its operational managers (Thompson 2003). This latter option although more interactive and, in theory, more likely to generate ownership has the draw back of being slower and runs the risk of losing emphasis and direction. To prevent this NBPOL approached the project with a definite time scale, a two-year deadline, and from the onset proceeded to set objectives, targets and review milestones.

With over 29,000 ha and 6,500 employees, NBPOL recognised the need for a company representative to champion the process and to be accountable for all stages of its evolution. In addition it appointed an external consultant to interpret ISO 14001 requirements and to assist in steering the company through the necessary documentation.

Communication was vital through out all stages and to assist in this NBPOL set up a company newsletter that is now in its third year and carries not only ISO 14001 features but other company issues on a monthly basis. Staged awareness classes and workshops on environmental issues were also a prerequisite to ensure that management were made aware of the issues and process they were committing to.

A review of the company environmental policy is required but in NBPOL's experience this process was virtually continuous and the policy evolved as the EMS grew. Time and effort were required to ensure that the policy accurately reflected the company's commitments and NBPOL achieved this through open review with all managers.

Planning

Determining what legislation applies to which operation is fundamental to ISO 14001. The Papua New Guinea Environmental Planning Act (1978) requires any subsequent oil palm development to compile an environmental management plan for that site. A further requirement, set by the Department of Environment and Conservation, is for environmental monitoring for all land practices and potential pollutants for the proposed development. Papua New Guinea has recently combined all of its environmental legislation into one act (The Environmental Act 2000). This act details requirements on all aspects of pollution control on land, in water and in the air.

In addition to these legal aspects there are also 4 voluntary codes of practice, which affect oil palms plantations and mills. These cover specific topics such as landfill, milling, hydrocarbon use and post logging practices (particularly buffer zone establishment). As these are often cited within the Environment plan they become legally binding when that plan is enacted.

An equally important part of the implementation process is the determination of the resources required to achieve the required standard. An initial audit is therefore a prerequisite. Unless there is a history of regular and specific inspections then the reality may be far removed from expectations. A physical check is required to benchmark operations.

Standards and Benchmarking – the initial audit.

A representative sample of all the company's activities were physically inspected and results recorded. This allowed the company to determine the scale of the issues involved and to start defining resource requirements.

Some items discovered during this "Benchmarking audit" required immediate action but for the majority there was a need to plan their improvement on a priority basis over a longer time scale due to the costs involved. ISO 14001 actively promotes priority scheduling of remedial work by the creation of specific improvement plans. One concept that has proven difficult to comprehend is that ISO 14001 allows an organisation to enter into the process of establishing an EMS at any level, even if there is a lot wrong. In NBPOL there was an initial temptation to try and correct everything on a "today basis" even though provision is made within the system to allocate resources so that corrective action can be undertaken in a timely manner and not unduly affect bottom line.

Implementation

Once the shock of the benchmarking audit is over, the systematic examination of all activities within the company must begin. An Aspects and Impacts register, which is pivotal to a successful EMS must be developed. Within the register each activity is scrutinised to determine all processes and practices associated with its operation and then each of these aspects is further examined to establish the likely environmental impacts. The Aspects within the register need to be ranked in order to assess any potential threat they may pose. A numerical score is allocated according to their inherent risk (Severity Score). This can then be amended to assess the damage potential if such a risk occurred (Risk Score). This is unlike the concept of risk and hazards in Occupational Health and Safety assessments, where the hazard is the potential to cause harm and the risk is the likelihood of it occurring.

Aspects and impacts

NBPOL's approach was to divide the company into teams representing each of the various company operations. After training each team generated, evaluated and scored their associated environmental Aspects and Impacts. Once identified, the Aspects together with each of their impacts can then be evaluated and scored by the same team. Actual examples of Aspects and Impacts taken from NBPOL's Register are shown in Table 3.

Sequential Code	Activity	Aspect	Impact
ER 001	Air conditioner maintenance	Refrigerant gas evacuation	Greenhouse effect
ER 002	Composting of EFB	Runoff containing tannins, nutrients	Water quality
ER 003	Petroleum hydrocarbons	Back up generator - 'collapse' of fuel tank	Water contamination
ER 004	Upkeep / New development	Earthworks - roads, drains and terraces	Water quality
ER 005	POME treatment	Inadequate oil recovery	Water quality
ER 006	New development	Settlement in housing compound	Social change
ER 007	Chemicals storage and use	Demineralisation plant- resin regeneration	Water quality
ER 008	Fertiliser storage and use	Leaching by rain	Water Quality
ER 009	Feedlot effluent treatment	Run-off of sediment into the ocean	Water quality
ER 010	New development	Land Ownership disputes	Social disruption
ER 011	Petroleum hydrocarbons	Back up generator - 'collapse' of fuel tank	Soil contamination
ER 012	Boiler operation & steam use	Particulate matter emissions	Air quality
ER 013	Illegal gardening in reserves	Habitat destruction, soil erosion	Water quality
ER 014	Liquid waste disposal	Maintenance of septic systems and, abattoir pits	Water quality
ER 015	Nursery	Nutrient leaching from fertiliser	Water quality
ER 016	POME treatment	Inadequate treatment, overflow	Water quality
ER 017	Chemicals storage and use	Storage - spills, leaks	Water quality

Initially 691 Aspects were identified but these were reduced to 135 through a process of combining similar aspects from different areas and common sense. The numerical score required to rank these 135 Aspects was obtained through the answers to 7 questions (Table 4). Each question had 5 possible

answers and these attracted a score of between 1-5. At the conclusion each aspect could have a possible score ranging from a minimum of 7 to a maximum of 35.

This combined score is referred to as the Severity Score and outlines the inherent risk to the environment for a specific aspect. A final question (Table 4, number 8 and attracting a score of between 1 to 7) was applied to each aspect and allowed the final Risk Score to be calculated. The risk score is a value representing the likelihood of a threat occurring and the potential cost to the environment. It was achieved by multiplying the Severity score by the frequency (question 8). The minimum Risk score is 7, while the maximum is 245.

Table 4 Questions used to determine Severity and Risk scores		
1	Area	How large is the area affected by the impact
2	Duration	How long did the impact occur before it was controlled?
3	Magnitude	How much damage could be caused by the impact?
4	Legal	Will the impact result in non-compliance with company or legal requirements
5	Efficiency	Will the impact result in higher costs, loss in cost effectiveness or compensation claims?
6	Corporate	How will the impact affect the company's global standing?
7	Remediation	What is the estimated cost to repair the damage to the environment
8	Frequency	How often is the failure likely to occur?

Beneficial Impacts also needed to be captured. Activities such as recycling empty fruit bunches, composting or re-establishing Buffer zones around riparian strips, needed to be documented and scored. NBPOL has yet to do this but intends using the following 6 questions (Appendix 1). A score of 1-5 for the first 5 questions are added together then multiplied by the sixth questions (score 1-5) to determine the "Beneficial Impact Score" which ranges from a minimum of 5 to a maximum 125.

Management Guidelines

Once a list of Aspects and Impacts had been obtained and ranked, it was necessary to place these in context. NBPOL had previously developed guidance notes for use in its mills and plantations but these had become outdated and did not accurately reflect current practices. The opportunity arose to use one process to not only capture and review new ideas and practices but to also document Occupational Health and Safety, environmental controls and sustainable practices for each activity. This was a large task and had NBPOL not sought and obtained ownership of the process from its operational managers at an early stage this part of the project would have floundered and the project sunk.

In their final form the resulting documents were called Management Guidelines and 20 were written (listed in Table 5). Each activity within the guidelines was broken down into tasks and for each task there is a definition, a standard to achieve and the normal practice to follow. The guidelines cover all the company's activities from new developments to replants and mill reception to refinery.

These guidelines required the inclusion of the salient Aspects and Impacts and the attendant scores and rankings to be added before they made the transition from an agricultural (or engineering) practice to an environmental one. The Aspect's Severity Scores and Risk Score were used to determine the degree of concern by linking them to the definitions of environmental harm (General, Material or Serious) found in the new Environmental Act (2000).

Table 5 List of New Britain Palm Oil Management Guidelines

MG 01	Plantation Management Guidelines - New Development Practices
MG 02	Plantation Management Guidelines - Nursery Practices
MG 03	Plantation Management Guidelines - Pesticides Practices
MG 04	Plantation Management Guidelines – Upkeep Practices
MG 05	Plantation Management Guidelines - Harvesting Practices
MG 06	Milling Management Guidelines – CPO Milling Practices
MG 07	Milling Management Guidelines – PKO Milling Practices
MG 08	Refinery Management Guidelines – Palm Oil Refining Practices
MG 09	Bulk Handling Management Guidelines – Bulk Terminal Practices
MG 10	Central Stores Management Guidelines – Materials Handling
MG 11	Transport Management Guidelines – Mosa Transport Practices
MG 12	Services Management Guidelines – Construction Practices
MG 13	Services Management Guidelines – Hydrocarbon Use Practices
MG 14	Services Management Guidelines – Compound Practices
MG 15	Services Management Notes - Waste Disposal Practices
MG 16	Research Management Guidelines – Composting Practices
MG 17	Research Management Guidelines - Tissue Culturing Practices
MG 18	Research Management Guidelines - Seed Production Practices
MG 19	Research Management Guidelines - Bunch Analysis Practice
MG 20	Cattle Management Guidelines – Cattle & Abattoir Practices

A risk score below 100 signified general environmental harm.

A risk score above 100 or a severity score above 20 signified material environmental harm

A risk score over 100 plus a severity score over 20 signified serious environmental harm.

Where the guideline was inadequate to manage a high scoring impact, attempts were made to design out the problem. Where this could not be done its aspect was reviewed and practice changed.

Environmental Improvement Plans and Emergency Response Procedures

A further two items were required to turn the Management Guidelines into ISO 14001 documents. These were Environmental Improvement Plans and Emergency Response Procedures.

Each guideline contains specific Aspect improvement plans but these were required to be incorporated into a single, central, document to become part of the Company’s Improvement Plan. NBPOL set targets and objectives for improving each Aspect and Impact included in the guidelines and in many cases this required a monitoring program to assess the sustainability of the practice or the gathering of new data. The process is of course ongoing and reflects the ISO 14001 commitment to continuous improvement.

For all Aspects with a Severity Score of above 20 it was necessary to provide an Emergency Response Plan in order to be able to minimise the acute environmental effects resulting from an emergency (such as a road traffic accident involving a crude palm oil tanker). The Emergency Response Plan sets out procedures and responsibilities in advance of the incident so that reaction time is reduced and any environmental impact is minimised.

Measurement and Evaluation

Once collated and documented all work practices were required to be verified on a regular basis for their appropriateness under field conditions. It is a requirement of ISO 14001 to correlate what is documented with actual on site occurrence. These are referred to as internal audits. For most of the company these audits are the routine interface of the ISO 14001 process. These audits provide the ground-truthing, a to-do-list of action points and the mechanism for feedback that links the entire process.

Internal and pre-audits

There is an inbuilt fear of audits in the hearts of many. For these people audits (internal or otherwise) take on the same significance as body cavity searches. Resistance at this point was probably at its strongest and required tact and diplomacy to entice co-operation.

NBPOL uses audits to initiate, monitor and appraise progress. The audit team was composed of the senior departmental manager, the environmental officer and, in the case of plantation, the assistant manager in charge of the audited division. The physical presence of the management chain throughout the audit ensures ownership. Use was made of checklists and basic pencil and paper techniques-to ensure that a copy of the audit report is left on site at the conclusion of the audit

Non Conformances

Within NBPOL, action points generated during audits are termed non-conformances. They are issued for any deviation from the expected standard or practice. A Non Conformance citation clearly states what is wrong, what needs doing to fix it, who is responsible and when it should be completed by. Non Conformance Citations have been well received at NBPOL as:

1. The managers like it as it leaves them in no doubt what needs doing and by whom
2. The external auditors like it because it clearly assigns resources, responsibility and time frames
3. Environmental teams like it because it effortlessly provides for continuous improvement

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Continuous improvement

ISO 14001 demands commitment to continuous improvement but rather frustratingly doesn't say how to achieve it. After the first benchmarking audit there were a list of items which required attention and the sensible approach was to place all these items into the improvement plan and tackle them one by one until the list is exhausted. But to maintain the momentum of this improvement plan and to demonstrate that the process is continuous the action points from the subsequent audit visits needed to be captured. NBPOL uses the non-conformance citations to form part of this plan.

NBPOL's environmental improvement plan is in 3 parts.

1. Monthly improvements as a result of cited non-conformance records
2. Environmental objectives arising from periodic management guideline reviews.
3. Specific issues, which are raised centrally or from ISO accredited audits.

Monthly improvements as a result of cited non-conformance records are compiled and placed on a calendar for tracking purposes. The Environmental Objectives and Improvement targets are found in

each of the 20 management Guidelines and NBPOL reviews these annually. Specific issues are normally raised centrally by the environment team and cover items that are widespread such as bunding of Hydrocarbon bulk fuel tanks and water use permits or local issues of high importance like medical waste disposal.

Infringements or deviations found by ISO 14001 auditors result in the issue of Corrective Action Requests (further differentiated into minor and major actions based on the degree of potential threat). These together form the final part of the continuous improvement program.

Once accreditation was achieved the ISO auditor returned after 6 months and then subsequently at 9-month intervals. This ensures that the organisation is audited through various “seasons”. Any corrective action issued during the previous visit must be shown to be completed or be work in progress. The auditors also evaluate the actual EMS process. This is another layer to ISO 14001 concerning the documentation required to conform to the standard. It outlines the aims, responsibilities, methods, consequences arising, records required and references for each stage in the Environmental Management System. In a sense this is the master template for controlling an ISO 14001 management system and as such it comprises 17 guidelines (Table 6).

Table 6 Environmental Management System documentation Guidelines	
Subject for Documentation	
EMS 01	Identification of environmental aspects and evaluation of impact significance
EMS 02	Legal requirements
EMS 03	Environmental objectives and targets
EMS 04	Environmental improvement programs
EMS 05	Responsibility and resources
EMS 06	Training and awareness
EMS 07	Communication
EMS 08	Document control
EMS 09	Operational process control
EMS 10	Purchasing
EMS 11	Emergency preparedness and response
EMS 12	Monitoring and measurement
EMS 13	Monitoring equipment calibration
EMS 14	Legal compliance
EMS 15	Non conformance control
EMS 16	Records control
EMS 17	Internal audit

Review and Improvement

Periodic reviews are required and NBPOL, by again using the internal audits and the non-conformances that arise from these, is able to continuously monitor and provide frequent feedback to each of the management groups. For example within the plantations each plantation group is audited monthly although individual divisions within a group may only be visited quarterly. A copy of the audit summary is left on site and is cross-linked to any non-conformances. Issues unresolved or of a major nature are dealt with at Senior Manager monthly meetings in just the same way as crop, labour,

upkeep and Occupational Health and Safety issues. Environmental management is fully integrated with all other management concerns and subject to the same level of scrutiny as minimising losses and maximising profits.

Table 7 Environmentally Sustainable Practices and New Britain Palm Oil's Response	
Industry Recognised Sustainable Practice	Response
Formulate a corporate environmental policy	Since 1999
Develop an Environmental Management System (EMS)	Since 2002
Set performance standards for all aspects of the industry	Since 2004
Carry out environmental impact assessment to evaluate new developments for the ability to sustain future land use	Since 1978
Provide management plans on biodiversity and identify and conserve High Conservation Value Forest	Yet to be done
Adopt zero burn techniques.	Since 1968
Maintain genetically diverse germplasm within breeding programs and then subsequently exploit genotype x environment interaction	Since 1968
Implement a precision agriculture program	Since 2002
Establish soil conservation and erosion control measures	Since 1970's
Investigate methods to Increase fertiliser efficiency and minimize losses	Since 1998
Capture the nutrients from empty fruit bunches (EFB) and Palm Oil Mill Effluent (POME) through compost	Since 1999
Adopt Integrated Pest Management practices (IPM) within the plantations	Since 1980
Trunk inject insecticide where possible when treating infestations.	Since 1996
Develop local weed control strategies by planning all herbicide applications	Since 1996
Reduce soil compaction within the plantation in particular adopt low-pressure tyres.	Since 1999
Conserve riparian reserves	Since 1978
Ensure high milling efficiency and product quality	Since 1980
Improve efficiency and reduce waste in milling and refining (aim for Zero discharge of effluent from palm oil mills)	Since 2001 One mill
Promote energy efficiency at all levels within the plantation and service departments	Yet to be done
Improve transport efficiency both in field and between plantation and mills through the adoption of a transport policy	Since 1997 But no policy
Identify sources of pollution and target their reduction	Since 2002
Manage water and waterways to prevent pollution.	Since 1978
Reduce emission to Air	Since 2000
Establish Occupational Safety & Health Management	Not complete
Improve social contribution to rural economy	Since 1968

ENVIRONMENTALLY SUSTAINABLE PRACTICES

The management guidelines outline current practices on how NBPOL produces palm oil. People, Planet and Profit are not separated and are included in this “planned approach”. Sustainability is integral to NBPOL’s thinking and as such has been embedded in management philosophy. Sustainability is achieved through the application of a variety of localised solutions. A company’s sustainability performance can be measured and monitored and it is capable of undergoing continuous improvement. Sustainability can therefore be managed and an ISO 14001 EMS can be used as the framework and discipline for such control.

As the auditing process at NBPOL matures, attention has focussed away from the negative aspects (pollution and absence of documentation) onto the positive and beneficial impacts of NBPOL practices. Comparison of some of the accepted Industry Environmentally Sustainable Practices (Table 7) with NBPOL’s response shows a high degree of commitment and implementation. Although some responses date back to the formation of the company the majority of responses however date from the mid 1990’s and since 2001 the adoption of an EMS has provided a additional impetus. The following list of published NBPOL solutions to sustainability illustrate this: harvesting and mechanised collection systems (Graham and Soupa 2000; Shedden and Hoare 2003); plantation development (Graham and Mamando 2003); zero effluent discharge (Lord, Hoare *et al.* 2002); composting EFB for nursery use (Lord, Tavaperry *et al.* 2003); integration of cattle (Mann, Hoare *et al.* 2002); pesticides and integrated pest management (Page and Lord 2004); milling improvements (Wheller 2003) and management strategies (Thompson 2003).

There are still a number of areas in which NBPOL has not made any significant improvements (balancing energy inputs and outputs and evaluating High Conservation Value Forests) and these are targeted for action.

BENEFITS OF ISO 14001

Environmental considerations are an integral part of the company’s overall management system and as such NBPOL should gain from the 12 benefits listed by ISO for the adoption of an internationally recognised environmental management system (Table 8).

In many of the cases (Table 8) the benefits are not tangible. However the individual solutions adopted by NBPOL are all measurable and returns show promise. For example herbicide usage in NBPOL plantations has decreased 45% since 1998 despite increases in total hectareage and utilising EFB composting methods for nurseries has not only reduced the residency time of seedling and produced uniform growth but has also cut nursery costs by 42% (Lord, Tavaperry *et al.* 2003). Advances in techniques used for establishment of new developments and on replants show reductions in erosion rates of between 50 and 80% and changes in labour organisation have increased harvester productivity to levels above 2.3 tonnes of FFB per man-day (Shedden and Hoare 2003)

CONCLUSION

NBPOL recognises that its activities impact on the environment it operates in but it is committed to minimising these impacts through continuous improvement of performance. Having embraced the principles of sustainable development, NBPOL is ensuring that future generations will continue to benefit from the company’s actions. NBPOL defines sustainable development as encompassing responsible resource stewardship, effective pollution prevention and the capacity to produce efficiently, and has implemented an Environmental Management System, which will provide the framework to realise these goals. By achieving the ISO 14001, 1996 standard for Environmental Management Systems, NBPOL believes that not only is it demonstrating to stakeholders that it is

conducting all operations in a manner consistent with this international standard but is also operating in a sustainable manner.

By conducting its operations in a transparent manner it can be seen that NBPOL not only complies with all Papua New Guinean legislation and industry voluntary codes of practise but goes beyond compliance. It sees ISO 14001, as assisting the company to prevent pollution, reduce waste, allocate adequate resources and ensure that land management practices are consistent with the long-term productivity. NBPOL regards sustainable development as a balance between making economic progress, protecting the environment and being socially responsible. By implementing the principles of ISO 14001 NBPOL is adopting a planned approach to achieve this balance, believing this to be the safest, most efficient and environmentally responsible way of operating sustainably.

Table 8 Benefits of an ISO 14000 EMS and how they complement thinking on sustainable development

Benefits of an ISO 14001 Environmental Management System -ISO handbook (1996)	Sustainability Pillars Pushparajah (1997)	Sustainability Indicators Pushparajah (1997)	NBPOL Triple bottom line
Maintaining good public relations	Acceptability	Social	People
Enhancing corporate image	Acceptability	Social	People
Facilitating the attainments of permits and authorisations	Acceptability	Social	People
Reducing incidents that result in liability	Stability	Crops and market	People Profit
Assuring stakeholders of commitment to demonstrable environmental management	Viability	Economic	Profit
Satisfying investor criteria and improving access to capital	Stability	Crops and market	Profit
Meeting vendor certification criteria	Viability	Economic	Profit
Obtaining insurance at reasonable cost	Protection	Environment	Profit
Improving cost control	Productivity	Agronomic	Profit
Conserving input material and energy	Productivity	Agronomic	Profit Planet
Demonstrating due diligence	Protection	Environment	Planet
Improving industry/ government relations	Protection	Environment	People Planet Profit

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APPENDICES

Appendix 1 Determining Beneficial Impact of Aspects

Beneficial impacts – scale, categories and word descriptors

1	Regulatory (beyond legal compliance and/or code of practice)	
	Extreme	achieves highest international standard
	High	well above code requirements
	Moderate	meets industry code consistently
	Low	meets licence compliance
	Negligible	no improvement
2	Environment improvement consequence	
	Extreme	alternative used – no impact
	High	alternative used – low impact that is reversible
	Moderate	impact reduced or low risk
	Low	further deterioration/impact prevented
	Negligible	no improvement
3	Corporate image	
	Extreme	recognised as a global leader
	High	high performance in industry
	Moderate	well regarded in country
	Low	well regarded by local community
	Negligible	no change
4	Personnel	
	Extreme	sustainable community benefit or national benefit
	High	long lasting (>5 years) community benefit or national benefit
	Moderate	medium term (<5 years) community benefit
	Low	short-lived community benefit
	Negligible	no significant benefit
5	Production/economic improvement	
	Extreme	major cost reduction or benefit to national economy (>K10m)
	High	significant reduction or regional benefit (K2.5-10m)
	Moderate	one-off cost reduction or widespread local benefit (K0.5-2.5m)
	Low	small cost reduction or only a few locals benefit (K0.05-0.5m)
	Negligible	no change
6	Frequency	
	Extreme	continuous implementation/achievement at this level
	High	regular
	Moderate	occasional
	Low	a one-off occurrence
	Negligible	unlikely

Charles Ross (Pers Comm)

Note k = Kina the currency of PNG

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