Project Design Document

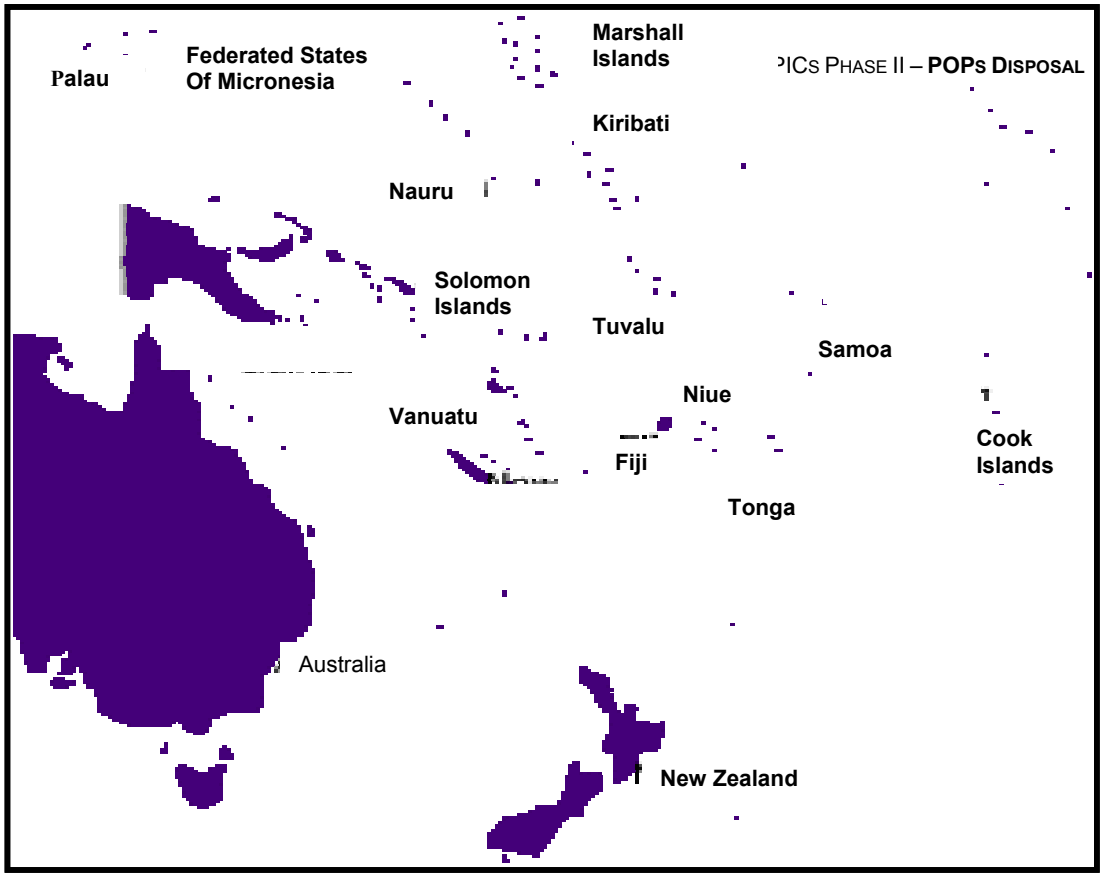
Persistent Organic Pollutants (POPs) in Pacific Island Countries, Phase II – scheduled POPs and intractable pesticide disposal

April 2003

POPs Disposal Project Design Document Contents

Acronyms, abbreviations and simple glossary

AMC	Australian Managing Contractor
ANZECC	Australian and New Zealand Environment and Conservation Council
AusAID	Australian Agency for International Development
DGC	Dangerous Goods Code
EA	Environment Australia, the Australian government department responsible for environment and heritage management, including permits under the Basel (or Waigani) Convention, and designation of environmentally significant projects
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999. Australian environmental legislation. Under Section 160 of this Act development assistance projects may require referral, or determination by the Minister of Environment
GEF	Global Environment Facility, a United Nations and World Bank fund to assist environmental management, with emphasis on regional solutions and innovative widely applicable appropriate methodologies
IFCS	Intergovernmental Forum on Chemical Safety
IMO	International Maritime Organisation
Intractable pesticides	Those pesticides that can not safely be disposed of in the Pacific.
JICA	Japan International Cooperation Agency
NZAID	New Zealand Agency for International Development
OH&S	Occupational Health and Safety
PACPOL	Program Targeting Ship-sourced Pollution in the Pacific
PCBs	Polychlorinated biphenyls, compounds with one or more chlorine atoms attached to a double benzene (biphenyl) group. Extremely stable organic compounds, PCBs were used as dielectric fluids for high voltage electrical equipment, in some heat transfer systems, hydraulic systems, pigments and carbonless copy paper. They are toxic and produce toxic dioxins when oxidised
PCC	Project Coordination Committee
PICs	Pacific Island Countries
PM	Project Manager
POPs	Persistent Organic Pollutants, mainly developed as herbicides and pesticides, which form toxic substances, commonly dioxins, when oxidised. Although 12 chemicals have been designated POPs under international agreements to ban their use, the term is used more widely to refer to the class of very stable hazardous chemicals.
SPREP	South Pacific Regional Environment Programme
SPREP PC	South Pacific Regional Environment Programme Project Coordinator (The Project Coordinator will be responsible for the initial fact-finding part of the project)
Scheduled POPs	The special group of Persistent Organic Pollutants that are designated under international agreements to ban their use. Also referred to as the 'dirty dozen'.
UNITAR	United Nations Institute for Training and Research
UNDP	United Nations Development Program
WASTE	Pacific Regional Waste Education and Awareness Project



Map: South Pacific

This project will include the following countries marked on the map: Fiji, Cook Islands, Federated States of Micronesia (FSM), Kiribati, Marshall Islands, Nauru, Niue, Palau, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

Scheduled POPs and Intractable Pesticide Disposal Executive Summary

I. Project setting

This disposal project is the second stage (Phase II) of an AusAID-funded project developed in conjunction with South Pacific Regional Environment Programme (SPREP) to manage persistent organic pollutants (POPs) in Pacific Island Countries (PICs). The Phase I project, which was implemented between April 1997 and April 2000, involved an inventory of hazardous chemicals, and a discussion of management options for obsolete chemicals and containers, in the PICs. Although many obsolete agricultural and other chemicals can be disposed of safely locally, others cannot.

Exposure to POPs can result in damage to human health and ecosystems. The human health effects include nervous system damage with impacts on learning, intelligence and liver damage. POPs chemicals are fat-soluble, so accumulate in breast tissue, disproportionately affecting women and breast-feeding infants.

Outputs 1.1 and 1.2 of Component 1, phase II are now almost complete. These outputs are defined in Section 3.1.4 below and a summary of the results of this work is presented in Section 2.3.

II. POPs disposal project design

The **overall goal** of the POPs in PICs project is reduce the threat posed by Persistent Organic Pollutants and related chemicals toward the environment and human health in PICs. This PDD relates only to phase II of the POPs in PICs project.

The purpose of the phase II project is to dispose of Polychlorinated biphenyls (PCBs), and PCB-contaminated solvent from transformers, small quantities of PCB-contaminated soil, stockpiled organochlorine pesticides including scheduled POPs and other intractable pesticides (mainly organochlorines and organophosphates), and unidentified pesticides considered likely to fall into those categories in participating PICs.

The four **project components** are:

1. In-country identification and confirmation of POPs for removal, in-country facilitation and overall quality assurance,
2. POPs collection, packaging and shipping to disposal facility,
3. POPs destruction,
4. Project and Contract Management.

III. Project implementation

III.i Contracting arrangements

The project will be managed through an Australian Managing Contractor (AMC) and in association with SPREP. SPREP has responsibility for the initial inventory and 'fact-finding' component of the project, most of which will have taken place prior to the appointment of the AMC. The AMC will manage the implementation of the project, subsequent to the inventory stage, including the clean up, shipping and disposal elements, with SPREP serving an in-country facilitation and external quality assurance role.

South Pacific Regional Environment Program (SPREP)
SPREP coordinated the inventory stage of the project from November 2001 to December 2002. SPREP recruited a project coordinator for the main fact-finding part of the work. A SPREP will also provide an in-country facilitation and quality assurance role through:

- providing advice, as requested by AusAID;
- participation of the selection of an appropriate AMC;
- confirming the suitability of the proposed disposal method;
- assisting liaison between Pacific island governments and the AMC;
- providing advice on the implementation of the Basel and Waigani Conventions in the Pacific;
- coordinating the consultation of Pacific stakeholders;
- quality assurance including periodic monitoring of the removal and shipping processes; and
- final confirmation that the work has been carried out satisfactorily.

A project technical report will be produced by SPREP, in consultation with the AMC, at the conclusion of the disposal exercise. This report will include advice on lessons learned from the project, and is anticipated to form the basis of a scientific publication on the project processes.

Australian Managing Contractor (AMC)
The AMC will undertake the role of project and contracts' manager for the project. The AMC should be a commercial organisation with extensive experience in international waste management activities and a proven track record in project and contract management, and will be responsible for the performance of the clean-up and disposal contractor. This role will include:

- The re-packaging (if necessary), loading and transport of the POPs will be managed by the AMC.
- Preliminary negotiations with PIC government agencies on components 2 and 3 will be assisted by SPREP.
- Initiate requests for approvals required under the Basel and the regional Waigani Conventions, with assistance from SPREP. These Conventions provide a framework for prior informed consent for the movement of hazardous waste into a country. The importing country requirements will include the provision of evidence of the need for the shipments (as outlined in this design document), detailed information on the packaging, shipping and documentation arrangements, including waste descriptions and quantities, financial guarantees, contractual arrangements, and evidence that the waste will ultimately be disposed in an environmentally acceptable manner. Special country arrangements will be needed for any countries that are not signatories to the Basel or Waigani Conventions by the time the POPs transfer commences.
- Preparation of a detailed Project Completion Report at the end of the project.

Clean-up
The clean-up Contractor may be part of the AMC's company or joint venture, or may be sub-contracted to the AMC. The clean-up will be carried out by a commercial operator with a proven track record in contaminated site clean up or management and in packing and shipping POPs or other scheduled substances. The contractor will provide a complete package, including the provision of equipment, staff, and all necessary documentation. The clean-up Contractor will arrange for the POPs to be removed from each PIC and shipped in accordance with international codes to the port facility, from where they will become the responsibility of the disposal contractor.

The clean-up Contractor will provide evidence that their work is done in accordance with recognised international quality standards such as the ISO 9000 and 14000 series. The Contractor will need to provide evidence of an appropriate (high) public liability insurance cover, applicable throughout the region.

Disposal
AusAID has selected B.C.D Technologies, Brisbane as the destruction facility for this project using base catalysed dechlorination, plasma arc and thermal desorption processes. B.C.D Technologies is the only

single-site installation in the Pacific region, including New Zealand with the required technology to destroy POPs in an environmentally safe manner. All bidders will need to utilise the services of this contractor. Incineration is not an acceptable method of disposal. The Disposal Contractor will be required to certify in writing that waste have been properly disposed of, in accordance with the agreed procedures. This certification will also be required under the Basel and Waigani Convention Permits.

The AMC will be responsible for the destruction of the POPs in accordance with international best practice. The disposal Contractor may be sub-contracted to the AMC, may be part of the AMC's company, a joint venture, or a partner.

III.ii Resources

The POPs disposal project is expected to take three to four years to implement. Three years six months work is scheduled, but the exact timing will depend on how long it takes to secure multi-country agreements and exchanges of letters relating to shipping waste.

Most of the project costs relate to the clean up and disposal (destruction) of the POPs. The AMC will manage these parts of the project. The SPREP inputs for the initial fact-finding part of the project will be provided by the SPREP PC.

Partner governments will not contribute directly to the funding of the project. Their inputs will be confined to providing in-country partner government representative support, facilitating the work of the AMC, and collaborating and cooperating to ensure that all permits and letters of agreement are finalised on time.

III.iii Coordination, feasibility and risk management

The project is technically feasible, and the technologies to be used are already operational, and have all been demonstrated to be effective. Its health and environmental benefits, while not able to be quantified, would in the longer term well outweigh the one-off cost of the project.

The assumptions outlined in the project logframe relate directly to potential risks to effective technical outcomes or to output delivery or efficiency. Any mishaps during shipping the POPs for disposal, or during their transport in the destination country, or at the point of disposal would present risks to SPREP's, Australia's and the AMCs' reputations, and to goodwill in the region. The assumptions and associated risks have been taken into account and built into the project design, particularly through the requirement for demonstrated quality performance and experience by potential contractors.

It is proposed that the Project Coordinating Committee (PCC) will meet on a annual basis, to ensure that project stakeholders are aware of any changes relating to the ratification of international Conventions and the implications of this for the project. During the initial phase, the SPREP PC will keep stakeholders informed of the exact quantities of PCBs involved, as laboratory tests are completed. The AMC, through reports to the PCC will provide information on the progress of agreements between participating PICs regarding import and export permits under the Basel and Waigani Conventions.

1. Project origin

1.1 Development context

This project is the second stage (Phase II) of an AusAID-funded project developed in conjunction with the South Pacific Regional Environment Programme (SPREP) to manage persistent organic pollutants (POPs) in Pacific Island Countries (PICs). The POPs disposal project will operate in the thirteen SPREP member countries included in Phase I of this project. The countries are Fiji, Cook Islands, Federated States of Micronesia (FSM), Kiribati, Marshall Islands, Nauru, Niue, Palau, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. These countries are small island states, and include high islands, a variety of low rock-based islands, and coral atoll-based islands. Most are densely populated countries, and totally lacking in the specialised resources needed for treatment and disposal of persistent hazardous chemicals.

In the Pacific, there is a widespread lack of awareness of the problems posed by POPs, and little understanding of the benefits of a POPs clean-up and removal project. This is mainly because of the hidden nature of the problem, a situation summarised well in a recent publication by the World Wildlife Fund (WWF 1999) on the issue of POPs.

POPs are synthetic organic chemicals, which are toxic, persistent, bio-accumulative, and pose a risk of causing adverse effects to human health and the environment. Twelve persistent chemicals are scheduled in current international negotiations to ban their use, but the term POPs is used commonly to refer to other similar chemicals. Exposure to POPs results in nervous system damage with impacts on learning and intelligence, liver damage, some cancers, and endocrine disruption or interference with hormone functions. Most POPs are soluble in fats, not in water, so women tend to accumulate them more readily in their body tissues than do men. Pregnancy and breast-feeding draw on maternal bodily fat reserves, so POPs are readily transmitted to infants. The effects of POPs on wildlife are similar to those observed in humans.

Recent studies have demonstrated a shift in POPs towards the earth's polar regions, as POPs tend to evaporate more in hot equatorial regions and condense and fall in precipitation near the poles. Whales, seals, penguins and the Canadian Inuit population show contamination from POPs produced in very distant regions, and many arctic/antarctic birds and small land and marine animals are dying from the direct or indirect effects of accumulated POPs.

Intractable pesticides, that cannot be safely disposed of in the Pacific, have high acute and chronic toxicities to humans and mammals in general, fish, birds, bees and other beneficial insects, and other species, cancers, birth defects, mutagenity, and reproductive disorders. Most are not very persistent in the environment, although some are at least moderately persistent.

The eradication of POPs and intractable pesticides is important for both local communities and for the world's health and environment. This project is aimed at eradicating POPs and intractable pesticides currently stockpiled in these thirteen PICs.

1.2 POPs in PICs Phase I

POPs in PICs Phase I was completed in early 2000, and produced an inventory of hazardous or toxic chemicals of concern throughout the region, an overview of disposal options, and reports for thirteen participating PICs. The results of the project were published by SPREP (see Burns, Graham, Munro and Wallis, 2000).

1.3 POPs Phase II – POPs disposal

The long-term objective of POPs in PICs is to upgrade regional capacity for management of chemicals, in order to eliminate the threat posed by POPs and related chemicals towards the environment and human health in PICs. The Phase I identified disposal options, the costs of various options for waste and obsolete chemicals, and for the remediation of contaminated sites. In many cases obsolete chemicals can be disposed of safely in PICs, using the manuals developed during Phase I, the methods outlined in that project report and in Burns, Graham, Munro and Wallis (2000), and following the training provided in the POPs Phase I project.

Some chemically stable (persistent) organic chemicals, predominantly polychlorinated biphenyls (PCBs) and organochlorine pesticides, cannot be disposed of safely through burial in landfills or by incineration, so cannot be managed within the Pacific Island Countries. They can be disposed of safely (ie in a manner which has no harmful effects on the environment or on human health) by physical-chemical processes which can break down the stable molecules, and permit recombination of the atoms as common non-hazardous substances such as salts, water, and carbon dioxide. The equipment needed for such processes generally involves sealed reaction chambers which operate under very high temperatures, and with controlled oxygen-free atmospheres. Such equipment requires steady high voltage power supplies and other infrastructure support.

No best practice disposal systems are available within the PICs. One suitable plant with a combination of processes is known to operate on a continuous basis in Queensland Australia. Others have operated intermittently in other Australian states, and other units are available in other developed countries including Japan, Canada and the mainland United States of America (USA).

Phase II of this project will therefore involve controlled removal of these intractable obsolete POPs from the PICs, shipping of the waste to a disposal plant (Narangba, Queensland) and disposing of them. Environmental management and other personnel in participating PICs will be involved in the inventory, packaging and removal stages of the project. This will increase the capacity of PICs to manage other forms of hazardous waste, including any undiscovered POPs that may remain in PICs.

1.4 Australian potential to contribute

AusAID's strategy for assistance to the Pacific region places a high emphasis on support for national environmental management, and support to regional organisations. As in the POPs Phase I project, AusAID support can be an effective means of achieving the objectives of this POPs disposal project.

Australia will also provide a suitable plant for the safe disposal and destruction of POPs. The disposal plant in Queensland is the closest location to the Pacific region where safe, best international practice destruction of PCBs and intractable pesticides, can be undertaken.

2. Project setting

2.1 Problem analysis and strategies chosen

POPs are defined by the international chemical community as chemical substances which are persistent, accumulate through natural food-chains (bioaccumulate) and pose a risk of causing adverse effects to human health and the environment. The term POPs is used broadly to include all hazardous or potentially hazardous chemicals including pesticides, polychlorinated bi-phenyls (PCBs), industrial chemicals, medical waste, laboratory chemicals, oil, bitumen, timber treatment chemicals and fertilisers. The Stockholm Convention identifies twelve of the most difficult to destroy POPs for the purpose of international regulation. For the purposes of this project, POPs refers to those chemicals that are difficult to dispose of through incineration or burial as they produce other persistent hazardous chemicals as by-products. Examples are PCBs and organochlorine pesticides and organophosphates that are unsafe to bury in any waste disposal facility that is not managed for this purpose.

As discussed in detail in POPs Phase I, and in Burns, Graham, Munro and Wallis (2000) solid waste disposal presents problems in PICs, where few managed landfill sites exist, where there are no completely adequate solid waste management facilities, and where for atoll countries in particular their landform and groundwater configurations present great difficulties for the construction of managed waste disposal landfill sites. This POPs Phase II project will increase the ability of PICs to identify, package and manage the disposal of waste and obsolete chemicals in PICs. However considerably more work will remain to establish facilities to comprehensively manage and dispose of such waste locally. This project will remove from those PICs the particularly hazardous, intractable waste, which cannot be safely managed locally.

2.2 Related projects

2.2.1 Other projects and programs

POPs in PICs complements other international and regional chemical related activities in which SPREP is either involved or is encouraging regional participation. These include:

- The Rotterdam or 'Prior Informed Consent' Convention;
- The Inter-governmental Forum on Chemical Safety (IFCS);
- The New Zealand Agency for International Development (NZAID) funded Development of Hazardous Waste Management Strategies, or HazWaste project;
- The United Nations Institute for Training and Research (UNITAR) developed National Chemical Profiles which assess the capacity of countries to safely and efficiently manage chemicals;
- The Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities;
- The Global Environment Fund (GEF) Regionally-Based Assessment of Persistent Toxic Substances project which will be assessing the available information on current discharges and stockpiles of toxic substances, and possible methods for dealing with existing problems;
- PACPOL which targets ship-sourced PACific POLlution;
- The Basel and Waigani Conventions;
- Pacific Regional Waste Education and Awareness Project (WASTE); and
- The regional activities for the Stockholm Convention on control of POPs, and particularly the preparation of National Implementation Plans (NIPs). The GEF is making available funding

worldwide, to parties to the Stockholm Convention, to assist with the preparation of NIPs, and a number of PICs are taking advantage of this funding.

2.2.2 Basel and Waigani Conventions

The Basel Convention is an internationally recognised convention which provides for controls on the import/export and international movement of hazardous materials. The Waigani Convention is the regional equivalent of the Basel Convention. Australia is a party to both the conventions and in 1996 amended the *Hazardous Wastes (Regulation of Import and Exports) Act* to fulfil its obligations under these conventions.

Under the Conventions, waste may be imported into Australia only from countries which are also parties to either of the Conventions. Article 11 of both Conventions allows for bilateral, multilateral or regional agreements, which may include non-Party countries, but this is typically difficult, time consuming, and cannot be relied upon as a long-term solution. The Waigani Convention is therefore critical to the success of this project. The project will be much more efficient if all countries involved in the project are parties to the Waigani Convention. At present all are except Marshall Islands, Nauru, Niue, Palau, and Vanuatu, and Nauru is a party to the Basel Convention. Every effort is now being made to ensure these countries become parties to the Waigani Convention before the time comes for applications to be made to move the waste.

Procedures need to be prepared for the Waigani Convention implementation in each country. The SPREP specialist advising on the convention is expected to hold a regional workshop on the Waigani Convention in February 2003 for all parties to the Waigani Convention. The workshop will provide an opportunity to assist countries to set the procedures in place and unify these procedures throughout the region. This POPs project can be used at this workshop as a practical and imminent example of how the Waigani Convention should be administered in the region.

2.2.3 Other donor proposals

The Phase I report lists a number of different waste stockpiles and contaminated sites that require clean up and disposal actions. The total cost of this work was estimated at over AUD$10million. This project will deal with about 30% of the hazardous waste identified in POPs Phase I.

A number of initiatives are currently being pursued by SPREP and other agencies to address these issues, including the following:

- Funding has been obtained from United Nations Environment Program (UNEP) Chemicals (from the Canada POPs fund) to carry out additional work on the non-POPs pesticide stockpiles not already covered by the POPs in PICs work. This money is being used to extend the program to specific issues in FSM and Fiji, and to provide on-the-job training to a Pacific Island consultant.
- Medical waste management systems are being upgraded in FSM, Kiribati, Marshall Islands and Vanuatu through a joint programme between Japan and World Health Organisation (WHO). SPREP is providing technical input to this work through the SPREP/Japan International Cooperation Agency (JICA) solid waste programme, and the subject is also covered in the annual SPREP/JICA/WHO waste management training course. The medical waste incinerator in Tuvalu was refurbished as part of an AusAID bilateral waste management program, and a new facility is planned for Samoa as part of a broader health services program funded by the World Bank. SPREP will continue to promote and support countries in the region as the need arise.
- A pilot program for waste oil management is under development in Micronesia as part of the GEF/UNDP/SPREP International Waters program. SPREP is also providing technical advice and support to several countries in the region who are attempting to address this issue directly, either through the oil suppliers or oil recycling companies.

- A funding proposal for a pilot program on laboratory waste was recently submitted to New Zealand Agency for International Development (NZAID). This is a joint proposal between SPREP and several New Zealand contractors, and is initially targeted at two countries, Cook Islands and Fiji. The proposal includes an intensive training programme in chemical management, chemical disposal exercises, and a packaging/export operation for those waste that need to be disposed overseas.
- Discussions are continuing with possible partners for the development of a funding proposal to the World Bank and GEF to support a demonstration project using an *in situ* biological treatment process for the clean-up of pesticide contaminated sites. This is a proven process for non-organochlorine pesticides but the application needs to be demonstrated in the Pacific islands environment. Both the World Bank and GEF have previously indicated interest in support for low-cost, in-country treatment methods.

SPREP, in conjunction with United Nations Environment Program (UNEP) and the United Nations Development Program (UNDP), is working to assist countries in accessing GEF funding for the development of National Implementation Plans (NIPS) under the Stockholm Convention. The NIPS will provide a framework for the effective management of hazardous chemicals and hazardous waste within each country. Some of the funds may also be used for investigations of contaminated sites, and clean-up activities. Fiji, FSM, Niue, Papua New Guinea and Samoa have already accessed this money and applications are currently being prepared and/or processed for Kiribati, Nauru, Palau, Tonga and Vanuatu. It is anticipated that by mid-2003, a total of around US$4million will have been committed to the region for this work. SPREP is also assisting the remaining independent PICs (Cook Islands, Marshall Islands, Solomon Islands and Tuvalu) who have also expressed their intention to access the GEF funds, but will first need to accede to the Stockholm Convention.

2.3 Materials of concern for POPs Phase II

This POPs phase II project will remove all scheduled POPs and stockpiled intractable pesticides from the participating PICs. The only scheduled POPs found in the phase I and phase II inventory stage of this POPs project were PCBs, from electrical transformers, and pesticides.

This project will remove from participating PICs, PCBs and PCB-contaminated wash-liquid from transformers, small quantities of PCB-contaminated soil, stockpiled organochlorine pesticides including scheduled POPs and other intractable pesticides (mainly organochlorines and organophosphates), and small amounts of unidentified pesticides considered likely to fall into these categories.

None of these materials can be safely disposed of in the Pacific.

2.3.1 PCBs

PCBs are characterised by having one or more chlorine atoms attached to a double benzene (biphenyl) group. As one of the most stable organic compounds known, PCBs have had a variety of uses, the most common being as dielectric fluids for high voltage electrical equipment, where their electrical properties and extremely stable nature made them very suitable. PCBs were also used in some heat transfer systems, hydraulic systems and in some pigments and carbonless copy paper.

PCBs are toxic and are highly persistent in the environment. In 1976, the United States restricted the manufacturing of PCBs under the Toxic Substances Control Act. Most developed countries subsequently adopted similar legislation. Substances containing less than 50 parts per million (ppm) of PCBs were deemed not to pose a significant risk and may still be used. To be considered PCB free, the material must have less than 2 ppm PCB.

PCBs have been sold under a number of common trade names, including the following:

Arochlor	Chlorinol	Fenclor	Non-flammable liquid
ArochlorB	Chlorphen	Hyvol	Pheboclor
ALC	Clophen	Inclor	Pydraul
Apirloio	Clorinol	Inerteen	Pyralene
Asbestol	Diaclor	Keneclor	Pyranol
ASK	DK	Kenneclor	Pyroclor
Askarel	Dykanol	Magvar	Saf-T-Kuhl
Adkarel	EEC-18	MCS 1489	Santotherm
Capacitor 21	Elemex	No-Flamol	Santovac 1
Chlorextol	Eucarel	Nepolin	Santovac 2

Arochlor was one of the few 100% PCB oils marketed. Oil used in transformers was typically mixed with other organic solvents, particularly chlorinated benzenes. As a result most transformers do not contain pure PCB oil. In addition many transformers contain low levels of PCBs due to cross contamination.

2.3.2 Intractable pesticides

Pesticides can be defined as a wide family of chemicals manufactured and used for killing unwanted pests including insects, plants, and fungi. They are frequently used in an agricultural context, and often in conjunction with new high yield varieties of crops. They are manufactured to target specific pests, but frequently have unwanted impacts on other life forms, including humans and other mammals, birds, fish and desirable insects such as bees.

This project will consider only those pesticides that cannot safely be disposed of in the Pacific. All of the intractable pesticides must be disposed through base catalysation or plasma arc technology to ensure there can be no hazardous by-products. Incineration, even at very high temperatures, produces some toxic by-products.

Intractable pesticides, for the purpose of this project, are those pesticides that cannot be safely disposed of in the Pacific.

- ***Scheduled POPs pesticides***

  The POPs group of pesticides are persistent, in that they take a long time (often decades or longer) to break down. They can also be transported long distances in the atmosphere or in groundwater, and can accumulate and concentrate through the food chain. These pesticides include the POPs pesticides scheduled in the Stockholm Convention, namely aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene. Some of these pesticides have been found in Pacific Island Countires, mainly DDT and small amounts of chlordane and dieldrin.

- ***Other intractable pesticides***

  Other intractable pesticides are generally held in insecure stores throughout the Pacific, and are contained in drums, bottles, plastic containers and cardboard boxes that are frequently leaking. In many cases the pesticides are evaporating and are undoubtedly causing health and environmental problems. There is also a very real risk of fire occurring with these stores, which would produce severely toxic fumes over large areas. In some cases the stores are in built-up areas, such as the large amounts of pesticides stored in the botanical gardens in Pohnpei, FSM.

The main adverse effects of these pesticides include high acute and chronic toxicities to humans and mammals in general, fish, birds, bees and other beneficial insects, and other species; they can cause nausea, cancers, birth defects, mutagenaity, and reproductive disorders. Some are not very persistent in the environment, although some are moderately persistent. All can be classified as hazardous to very hazardous and none of the PICs that are included in the project have capacity to effectively manage and dispose of their usually insecure stockpiles of pesticides.

2.3.3 Other hazardous waste

At the completion of POPs Phase I there remained some debate over whether to include other hazardous waste in the project to remove PCBs from PICs. Obviously available budget is a limiting factor, but an alternative approach would have been to deal with all waste but in fewer PICs, and anticipate a further project phase to deal with the PICs not included in the Phase II project.

The main reason for concentrating on PCBs and intractable pesticides was that the other types of waste require different disposal methods, thus involving the use of different disposal facilities - most likely incineration - in different locations/countries.

Given the balance of national interests, relative costs, and efficiencies in collection and removal, it was concluded that this POPs Phase II project would remove and dispose of PCBs and stockpiled intractable pesticides from thirteen PICs.

2.4 Safe disposal of waste

The POPs, intractable pesticides and unidentifiable assumed POPs pesticides in this project must be disposed of using base catalysation or plasma arc technology. Incineration is not acceptable.

B.C.D Technologies is the only single-site installation in the Pacific region, including New Zealand, with the required technology to destroy POPs in an environmentally safe manner. The AMC will need to utitlise the services of this contractor.

The land route to be taken from the port will be the standard hazardous goods transport route that has been identified by the Queensland State Government.

2.5 Other issues in problem analysis

2.5.1 International transport of hazardous waste

A permit is required under the Australian *Hazardous Waste (Regulation of Exports and Imports) Act 1989,* to import hazardous waste into Australia. When applying for an import permit, an applicant must have a written contract or chain of contracts demonstrating ownership and continuous control over the movement of the waste, starting with the waste owner and ending with the disposal facility. An applicant must also have appropriate insurance and provide evidence of financial viability, with a financial guarantee needed if assets are not sufficient to allow the return of the material to the country of export. The application must be accompanied by one original copy of the Environment Australia Application Form and associated fee, two copies of the Australia Transfrontier Movement of Wastes - Import/Transit Form and two copies of the Australia Transfrontier Movement of Wastes - Import/Transit Movement/Tracking Form. Under the Hazardous Waste Act, up to 60 days is allowed to process the import application, although this period can be extended.

Transport of hazardous materials through international waters must comply with Australian and New Zealand Environment and Conservation Council (ANZECC) strategies to reduce impacts from shipping operations, and the management of scheduled waste, the Australian Maritime Safety Authority's Marine Order Part 41 – Carriage of Dangerous Goods and with the International Dangerous Goods Code (DGC), administered by the International Maritime Organization (IMO). The DGC also has a permit system, which requires the appropriate labelling, packaging and tracking of hazardous materials. Under the DGC, all shipments of hazardous material must include a dangerous goods declaration with the main transport document (e.g. the consignment note). Each transport 'unit' must include:

- the proper shipping name as determined by section 13.8 of the United Nations Orange Book,
- the class, or when assigned, the division of goods. Class 1 articles should be followed by the compatibility group letter,
- the UN number preceded by the letter 'UN', and where assigned, the packing group, and
- the total quantity of dangerous goods.

The UN Orange Book also recommends that those responsible for supervising the packaging of hazardous goods provide a 'container packing certificate'. This should certify that:

- the container is clean and fit for purpose,
- incompatible packages have not been stored together,
- packages have been inspected for signs of damage,
- all goods have been properly loaded, adequately braced and the load evenly distributed,
- for goods bearing a Class 1 code, the container must be structurally serviceable in accordance with the Orange Book, and
- the container and all packages are properly labelled.

For this project, the packaging of waste must comply with the recommendations in the UN Orange Book. It will also be necessary to provide an Emergency Response Plan to AusAID, the Australian Maritime Safety Authority and the Queensland Department of Emergency Services, which contains sufficient information to safely address and mitigate an accidental spill or leak of hazardous material during transport. The IMO has developed 'Emergency Procedures for Ships Carrying Dangerous Goods' which would provide an appropriate guide. This should be augmented by health and safety data specific to the material being transported.

Once the waste enters Australia, a commercial hazardous waste transport company that is registered with the Queensland Environmental Protection Agency (EPA) must undertake transport from port to treatment facility.

The AMC will be required to include a provision for storage at EPA approved facilities in Brisbane as a contingency measure where shipping schedules necessitate short-term storage. However, it is the aim of this project to minimise storage time in Australia. The option of leaving waste in the Pacific until BCD Technologies has the capacity to treat the waste must be considered.

The AMC must liase with the Queensland EPA regarding checks and monitoring of transport and any required storage facilities.

2.5.2 Environmental significance

Under Australian Commonwealth legislation, any AusAID project which AusAID or the Minister for the Environment and Heritage considers environmentally significant must meet the requirements of Subdivision A, Division 4, Part 11, Chapter 4 of the Environment Protection and Biodiversity Conservation (EPBC) Act (1999). Section 160 of Subdivision A requires AusAID to obtain and consider advice from the Minister for the Environment and Heritage before entering into a contract or agreement for the implementation of the project anywhere in the world. In providing advice, the Minister may impose conditions on the project for the purpose of protecting the environment. Documentation that will be provided to Environment Australia under the EPBC Referral process is available in draft form to the successful bidder.

Implementation of the project would require issuance of Waigani, Basel, or Special permits under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989*. An action authorised by a Waigani, Basel, or Special permit, is listed under Regulation 6.01 as a possible trigger for referral. AusAID believes the proposed POPs II project to be environmentally significant and therefore referable to the Minister for the Environment and Heritage.

2.5.3 Possible buried POPs and pesticides

The identification and treatment of buried POPs and pesticides is outside the scope of this project. The treatment of possible buried POPs and pesticides are expected to be included in National Implementation Plans for the Stockholm Convention. If project personnel are alerted to the location where chemicals may be buried, they should notify that country's personnel that are responsible for the Stockholm Convention National Implementation Plan and relevant personnel in SPREP.

3. Project Design

3.1 Project description

3.1.1 Project goal

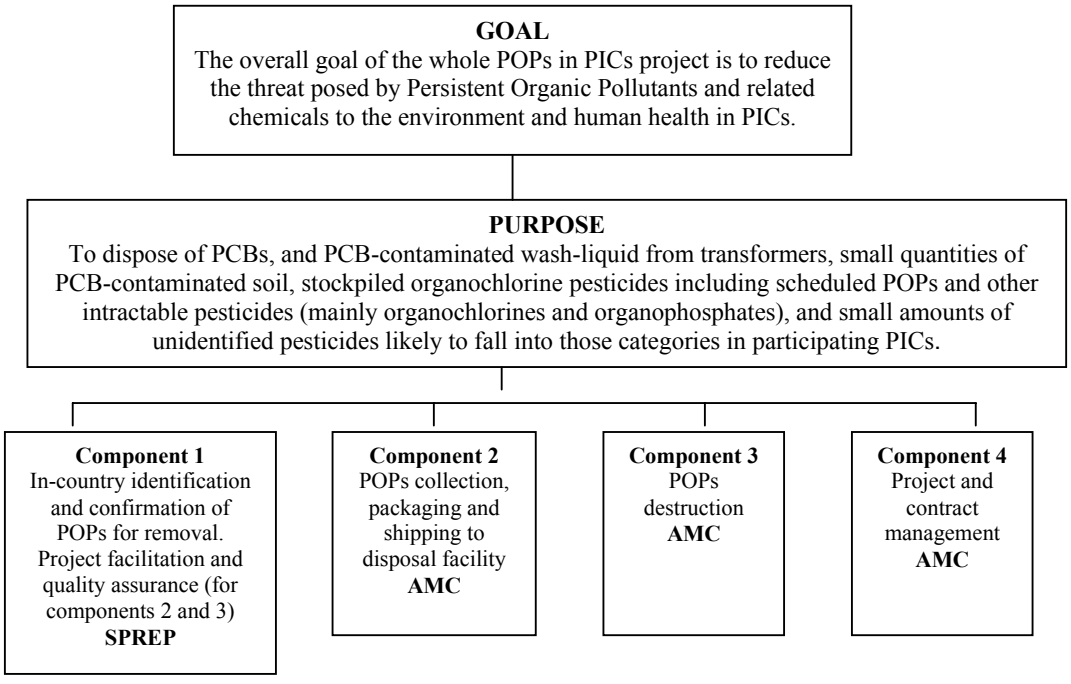
The overall goal of the whole POPs in PICs project is to reduce the threat posed by Persistent Organic Pollutants and related chemicals to the environment and human health in PICs.

3.1.2 Project purpose

The purpose of the project is to dispose of Polychlorinated biphenyls (PCBs), and PCB-contaminated solvent from transformers, small quantities of PCB-contaminated soil, stockpiled organochlorine pesticides including scheduled POPs and other intractable pesticides (mainly organochlorines and organophosphates), and unidentified pesticides likely to fall into those categories in participating PICs.

3.1.3 Project components

Project activities have been organised within four components. The AMC will be responsible for overall project management, while SPREP will deliver the outputs in component I, which include in-country facilitation and overall quality assurance. An AMC will be appointed to manage components 2, 3 and 4 of the work.



The four components are:

1. In-country identification and confirmation of POPs for removal. Project facilitation and external quality assurance for components 2 and 3 [SPREP],
2. POPs collection, packaging and shipping to disposal facility [AMC],
3. POPs destruction [AMC],
4. Project and contract management [AMC].

No component objectives are specified, as the project objective is to be achieved through the specific outputs.

3.1.4 Detailed description of project components

Component 1: In-country identification and confirmation of POPs for removal

Output 1.1
The SPREP Project Coordinator (PC) will have worked with senior government personnel in each of the thirteen PICs to confirm and obtain written agreement within each PIC for the disposal operation to proceed.

PIC visits by the SPREP PC commenced from the start of Phase II. The approach will involve an initial formal presentation to senior representatives from all relevant government agencies and power authorities, followed by specific meetings with the key decision makers, who will have been identified during the formal presentation. A lead agency will be identified within each PIC and the SPREP PC will later assist with the drafting of all necessary correspondence, to obtain the relevant approvals.

Indicative Activities to achieve this output are likely to include:

- SPREP to recruit and appoint (or contract) a SPREP PC, a specialist adviser with good negotiating skills.
- SPREP Management to review six-monthly reports prepared by the SPREP Project Coordinator and submit these to AusAID.
- SPREP Project Coordinator to prepare Six-monthly Progress Reports for AusAID then AMC.
- Partner government representative country notification.
- Visits to each participating PIC to identify stakeholders.
- Presentations and discussions to obtain verbal agreement.
- Identification and confirmation of partner government representative agency and responsible partner government representative.
- Written requests to each PIC to confirm agreement.

Output 1.2
Field testing will have been carried out by the SPREP PC and partner government representative or electricity agency personnel, for all transformers in each PIC and samples will have been collected and submitted for laboratory testing.

Indicative Activities to achieve this output include:

- Identify and confirm a suitable analytical laboratory for oil and soil analysis.
- Cross-check and confirm existing inventory information (from Phase I, transformers and pesticides).
- Inspect all out of use transformers, record existing identification information, assign identification and label if necessary, classify and label as potentially PCB or not.
- Carry out field tests on transformers, as required, and record results. Collect laboratory samples and estimate oil volumes on all units testing positive.
- Collect soil samples from areas of suspected contamination

- Arrange for samples to be shipped to the analytical laboratory from each PIC.
- Prepare field inventory report for each PIC (able to be updated when laboratory results are available).
- Capacity of PIC staff to identify and manage POPs improved

Output 1.3
The SPREP PC will have confirmed final quantities and locations of PCBs, transformers and pesticides for disposal. Indicative Activities to achieve this output include:

- Enter laboratory results into inventory data.
- Calculate disposal quantities for each PIC, to update inventories and provide advice to AMC.
- Prepare regional report, including final disposal quantities and cost estimates.
- Skills transfer to local staff in the identification and handling of hazardous waste.

Output 1.4
All PCB and intractable pesticide disposal and site clean-up plans will have been agreed between SPREP and each relevant participating PIC. Indicative Activities to achieve this output include:

- Preparation of draft plans for each PIC listing all transformers and pesticides to be removed, site clean-up requirements, proposed staging posts and any in-country assistance likely to be required during the clean-up operation.
- Submission of these plans to each participating PIC government for agreement.

Output 1.5
SPREP monitoring and audit of the processes of POPs collection and transfer. Indicative Activities to achieve this output include:

- Attendance and monitoring of contractor activities in each PIC.
- Preparation of audit reports for each PIC.
- Reviews of contractor six-monthly reports.
- Preparation of six-monthly progress reports.

Output 1.6
SPREP audit of the process of POPs destruction. Indicative Activities to achieve this output include:

- Attendance and monitoring of selected disposal operations.
- Preparation of audit report.

Output 1.7
Preparation of a project technical report, to be provided to the AMC, including clear descriptions of the activities carried out and any lessons learned. [This report might provide models for similar clean-up activities in less-developed countries or remote and isolated locations. It is anticipated that the lessons to be learned from this project will be both positive and negative, and that the results of the project may lend themselves to publication in a scientific journal]. Indicative Activities to achieve this output include:

- Project completion report prepared for AMC.

Component 2: POPs collection, packaging and shipping to disposal facility

Output 2.1
The AMC will have applied to Environment Australia to obtain permits to import waste under the Waigani or Basel Conventions, and will have applied to the export and transit countries to obtain permits to export / transit waste under the Waigani or Basel Conventions from / through those countries. (Countries not party to either the Waigani or Basel Conventions will need special Permitting arrangements). Indicative Activities to achieve this output include:

- Confirm most likely shipping route and pick-up sequence (this determines what in-transit country approvals are required).
- Confirm signatory status for each PIC and prepare a checklist showing permit and approval requirements.
- Prepare model letters and agreements for signature by participating PIC's, as required.
- PIC visits by AMC, facilitated by SPREP, to assess logistical requirements and initiate permit applications by Partner government representatives.
- Regular follow-ups with each PIC to monitor progress on permit process.

Output 2.2
All Waigani or Basel Export, Transit and Import or Special Permits obtained, with agreements within and between all participating PIC's and Australia. Indicative Activities to achieve this output include:

- Partner government representatives forward copies of permits to AMC and SPREP.
- Contribute to a SPREP-run workshop on the implementation of the Waigani Convention.

Output 2.3
All PCBs, intractable pesticides and associated contaminated materials packaged by Clean-up contractor and prepared for shipping, within each PIC. Indicative Activities to achieve this output include:

- Deliver clean-up and packaging equipment to each PIC.
- Identify and recruit local labour, as required.
- Train local labour in safe handling procedures.
- Set-up packaging site(s).
- Transport pesticides and transformers to packaging site(s) as required.
- Carry out packaging operations to comply with IMO DGC.
- Partner government representative and SPREP to oversee operations as required for audit purposes, and to ensure that tracking procedures are followed.

Output 2.4
Shipping agreements finalised between the AMC and a shipping company or companies. Indicative Activities to achieve this output include:

- Identify shipping options.
- Confirm shipping restrictions or route advice to be provided by Environment Australia etc.
- Decide on most appropriate option.
- Sign shipping contract(s).

Output 2.5
All POPs containers, with PCBs, contaminated transformers, contaminated soils and other identified intractable pesticides, collected from each PIC. Indicative Activities to achieve this output include:

- The AMC will advise the SPREP and national partner government representatives of the proposed collection program.
- A SPREP representative will attend and observe the pick-up in selected PICs.
- The AMC will advise the SPREP of each pick-up.

Output 2.6
All POPs containers delivered to, and off-loaded at port of final disposal. Indicative Activities to achieve this output include:

- Ship movements in accordance with agreed schedule and route.

Component 3: POPs destruction

Output 3.1
The AMC will have obtained any permits or approvals required at a State level for POPs import and disposal. (NB This output is a pre-requisite for the import permits covered under Output 2.2) Permits or

approvals to import and dispose of hazardous waste may be required under state regulations in Queensland. It is anticipated that the AMC will be aware of any such legislation/regulation, and will be in frequent contact with the relevant regulatory authority. Indicative Activities to achieve this output include:

- The AMC will be required to provide copies of existing permits.
- The AMC will need to apply to State or similar government for other permits as required.
- The AMC will have to provide evidence to AusAID and SPREP that all necessary permits have been obtained.

Output 3.2
All POPs containers will have been transported to the disposal facility or (if necessary) other agreed interim storage facility in receiving country. Indicative Activities to achieve this output include:

- AMC to provide evidence to AusAID and SPREP that transport will be in accordance with local regulations.

Output 3.3
All POPs and associated contaminated materials will have been disposed of successfully. Indicative Activities to achieve this output include:

- AMC to provide evidence to AusAID and SPREP that transport will be in accordance with local regulations.
- AMC to provide evidence to AusAID and SPREP of disposal of all chemicals and associated materials included in shipping manifest.
- AMC to provide evidence to AusAID and SPREP that shipping containers are either free of contamination, or have been destroyed.

Component 4: Project and contract management

Output 4.1
Effective project management will have operated throughout all of the Component 2 and 3 project activities. This will have included regular project reporting (six-monthly reports and Annual Plan to AusAID), and facilitation of the PCC.

It is proposed that the PCC will meet on an annual basis, to ensure that project stakeholders are aware of any changes relating to the ratification of international Conventions (Basel and Waigani) and the implications of this for the project. Stakeholders will also be kept aware of updated information on exact quantities of PCBs involved, as laboratory tests are completed, and on the progress of agreements between participating PICs regarding import and export permits under the Basel (or Waigani) Convention. Indicative Activities to achieve this output include:

- AMC to submit six-monthly and exception reports to AusAID
- AMC to convene annual meetings of PCC.
- AMC to prepare Project Annual Plan (including a work plan).
- SPREP to assist AMC in preparation of a Project Completion Report.

Output 4.2
Effective contract management and liaison with stakeholders including participating PIC governments (through SPREP where appropriate), AusAID, and (as appropriate) Environment Australia. This will be undertaken with the guidance of the project's Communication Strategy[1]. Indicative Activities to achieve this output include:

- Liaison with Australian stakeholders
- Effective contract management
- Review of six-monthly reports.

[1] The drafting of the POPs phase II Communication Strategy has been separately contracted to allow communication issues to be identified prior to the project referral to Environment Australia and to allow closer involvement in communication issues by AusAID.

- Effective communication

Output 4.3
Management of public and civil liability issues.

The AMC will be required to have proven experience in the management of hazardous waste, will be fully aware of local and international insurance and liability issues, and must hold appropriate insurance cover. Indicative Activities to achieve this output include:

- AMC to provide evidence adequate current insurance cover is held.
- AMC to provide an Emergency Response Plan.

Output 4.4
Preparation of a project completion report including technical reporting, with clear descriptions of the activities carried out and any lessons learned.

This should be a scientific/technical report which might provide models for similar clean-up activities in less-developed countries or remote and isolated locations. Technical input to the report should be provided by SPREP. It is anticipated that the lessons to be learned from this project will be both positive and negative, and that the results of the project may lend themselves to publication in a scientific journal.

3.2 Quantity and Location of Waste for removal in POPs phase II

Table 1: Details of PCBs to be collected

Country	Location	No of Transformers	Wt of Oil (kg)	PCB Conc (mg/kg)	No of Flushes	Total Waste Wt (incl Flushes) (kg)
Cook Islands		Nil				
Fiji		Nil				
FSM						
Chuuk	Weno Power	3	600	1170	4	3000
	Station		600	518	4	3000
			600	321	3	2400
Kosrae	Kosrae Power	2	325	399	3	1300
	Station		260	443	3	1040
Yap	Yap Power	4	420	1410	4	2100
	Station		420	2090	4	2100
			420	1240	4	2100
			420	92	2	1260
Kiribati	Nil					
Marshall Islands	Majuro Power	1	720	350	3	2880
	Station					
Nauru	Port Harbour	1	196	1050	4	980
Niue		Nil				
Samoa	Vaitele EPC	2	106	130	3	424
	Depot (Upolu)		239	219	3	956
	Asau Timber Plant	1	120	289	3	480
	(Sava'ii)					
Solomon Islands (2)			1200	460	3	4800
Palau	Kesebelau, Airai,	5	206	117	3	824
	Babeldaob		220	34	2	660
			182	25	2	546
			190	28	2	570
			215	75	2	645
Tonga	Popua Power	1	1345	98	2	4035
	Station					
Tuvalu	Tuvalu Power	1	324	92	2	972
	Station					
Vanuatu (2)			1500	460	3	6000
TOTALS			**10828**			**43072**

Notes:

1. Access to all locations is by fair to good all-weather roads.
2. Solomon Islands, Vanuatu and Marshall Islands inventories are still to be validated in the phase II, component 1 work. The quantities shown are maximum estimates based on the phase I work and the pattern from the phase II work.

3. All quantities should be confirmed on site by the AMC. This is because where transformer nameplates are missing or transformers are partially full, quantities have been estimates.
4. The Transformer Management Regime will be as follows:
   Less than or equal to 100g/m^3 PCBs: two flushes of solvent
   Less than or equal to 500g/m^3 and greater than 100g/m^3 PCBs: three flushes of solvent
   Less than or equal to 2500g/m^3 and greater than 500g/m^3 PCBs: four flushes of solvent
   The type of solvent and standing time should be nominated by the tender. For all transformers that are flushed as above, the PCB concentration will be less than 2g/m^3 and the transformer can be regarded as PCB-free and landfilled locally.
5. These five locations where transformers known to contain PCBs have leaked. These location are: FSM, Chuuk (Weno power station); FSM, Yap (Yap power station); Samoa, Upolu (Vaitele depot); Samoa, Sava'ii (Asau timber plant); Palau, Airai Babeldaob (Kesebelau transformer storage area). Tenders should allow for 5 cubic meters of soil to removed from each location.

Table 2. Details of Intractable Pesticides to be collected

Country	Location	Wt of POPs Pesticides (kg)	Wt of non-POPs Intractable Pesticides (kg)	Wt of Unknown Pesticides (kg)
Cook Islands	Aitutaki		1520	
	Atiu		322	
	Mangaia		380	250
	Totokoitu, Rarotonga	100	1371	
Fiji	Agchem Ltd, Suva		6800	
	Dreketi	200	2639	
	Koronivia		470	224
	Lakena		9404	
	Legalega		255	1
	Lomaivuna		4629	
	Navua		202	
	Rentokil Ltd, Suva	14	20	32
	Seaqaqa		113	5
	Sigatoka		17	2
	Wainigata		44	
FSM				
Chuuk		0	0	0
Kosrae	Agriculture Store		50	
Pohnpei	Botannical Gardens	60	710	1960
Yap	Ag Research Stn		317	119
Kiribati	Kanton Island		461	
	Tarawa Ag Store		200	400
Marshall Islands	Arno Farm		44	14
Nauru		0	0	0
Niue	Works Dept Store		1606	271
Samoa	Vaitele Wholesale			
	Store		268	
	Salelologa Retail			
	Store		72	
Solomon Islands (2)		5760	8898	2640
Palau		0	0	0
Tonga	Vaini Research Farm	20	115	106
Tuvalu		0	0	0
Vanuatu (2)		1080	144	110
TOTALS		**7234**	**41071**	**6134**

Notes:

1. Access to all locations is by fair to good all-weather roads, except for Kanton Island (refer to note 5 for more information).
2. Solomon Islands, Vanuatu and Marshall Islands inventories are still to be validated in the phase II work. The quantities shown are estimates based on the phase I work and the pattern from the phase II work.
3. All quantities should be confirmed on site by the AMC. This is because:

   a. More pesticides may be found that require disposal.
   b. Where labels are missing or containers are partially full, quantities have been estimated.
   c. Pesticides that were already in secure storage were not unpacked and examined in detail, eg. Aitutaki, Cook Islands and Phonpei, FSM.
4. The 200 kg of POPs waste held at Dreketi, Fiji, is suspected dioxin contaminated waste that arose when the chlorinated pesticide trichlorfon was burnt. The presence of dioxin still needs to be confirmed.
5. The pesticide waste on the remote Kanton Island in Kiribati will need to be packaged by the contractor, but local arrangements for transport to Tarawa will be made by the Kiribati government.
6. Detailed inventories for all countries are given in Annex 5.
7. Under the Waigani and Basel Conventions, and under Australia's *Hazardous Waste (Regulation of Exports and Imports) Act 1989*, it is not possible to import unknown hazardous wastes. It is also not possible to import hazardous waste without establishing that they are able to be safely and appropriately treated and disposed of in the receiving country. Therefore, all items identified in the 'Wt of Unknown Pesticides' column of the above table will need to be fully identified prior to export.

3.3 Responsibilities

As noted above, in Phase II SPREP and the AMC will be responsible for the achievement of outputs under the four components. These are specified in the project summaries above, AusAID and the PICs partner governments will also have roles in the project. The responsibilities for particular aspects of the project are summarised in Table 3.

Table 3: Responsibility for POPs Phase II outputs

Contractor (AMC)	SPREP	AusAID	Partner Governments
Arrange Waigani/ Basel/Special permits, arrange for final disposal of POPs Obtain any necessary permits for destination Organise POPs packaging, collections at nominated locations, arrange vessel charter or back-loading Destruction of POPs in environmentally acceptable way Project management: six-monthly and exception reports, annual plans, project completion report, organise PCC meetings	Identification and confirmation of locations, types and quantities of POPs to be collected for disposal Facilitate in-country approvals and clean-up and packing activities Monitoring the removal and disposal through site inspections, working with partner government representatives Final technical report, as part of project completion report Communication with Pacific stakeholders Seeking other donor funds to appropriately manage waste identified in phase I.	Oversight of AMC and SPREP contracts Monitoring project progress from the Australian Embassy in Samoa, other Pacific Embassies and Canberra Facilitation of permits, shipping route etc through liaison with Environment Australia Management of public communication process in Australia. (Either through a separate contract or in-house)	Commitment to participate in project – by facilitating access for SPREP and the AMC Commitment to sign a simple Basel Article 11/Waigani agreement for this project [whether or not signatory to the convention(s)] Partner government representative personnel to participate in field sampling for laboratory testing, and in POPs removal and clean-up monitoring Selected Partner government representative to participate in PCCs

3.3.1 Roles of SPREP and the AMC

SPREP

SPREP recruited a coordinator to undertake the main fact-finding part of the work. The SPREP Project Coordinator (PC) will report to the Coordinator of its Pollution Prevention Program. Most of the in-country negotiation and project monitoring will be carried out by the SPREP. The actual re-packaging (if necessary), loading and transport of the POPs will be handled by the AMC. The PC will also provide an in-country facilitation and quality assurance role through:

- providing advice, as requested by AusAID;
- participation of the selection of an appropriate AMC;
- confirming the suitability of the proposed disposal method;
- assisting liaison between Pacific island governments and the AMC;
- providing advice on the implementation of the Basel and Waigani Conventions in the Pacific;
- coordinating the consultation of Pacific stakeholders;

- quality assurance including periodic monitoring of the removal and shipping processes; and
- final confirmation that the work has been carried out satisfactorily.

The SPREP PC will work with partner government representatives to reinforce POPs I training on the identification, safe handling and management of POPs, will undertake screening testing of all units not yet tested for PCBs, take samples of 'positive' transformer oils and intractable pesticides for laboratory analysis, and advise on the relocation of 'positive' transformers and pesticide stocks to suitable staging points.

A SPREP representative will also visit countries on a spot-check basis during the clean-up activities and with national partner government representatives will monitor (and if necessary with AusAID approval direct an improvement in) the performance of the Clean-up activity. SPREP will provide an oversight of the disposal operations, to ensure that the work is being done in accordance with the procedures specified by the AMC in their original proposal. SPREP will also act as media liaison person in the region, and will distribute prepared press releases cleared and supplied by AusAID on the disposal operations.

A project technical report will be produced by SPREP, in consultation with the AMC, at the conclusion of the disposal exercise. This report will include advice on lessons learned from the project, and is expected to form the basis of a scientific publication on the project processes.

AMC

The AMC will undertake the role of project and contracts' manager for the project. The AMC should be a commercial organisation with extensive experience in international waste management activities and a proven track record in project and contract management, and will be responsible for the performance of the clean-up and disposal contractor. This role will include:

- The re-packaging (if necessary), loading and transport of the POPs will be managed by the AMC.
- Preliminary negotiations with PIC government agencies on components 2 and 3 will be assisted by SPREP.
- Initiate requests for approvals required under the Basel and the regional Waigani Conventions, with assistance from SPREP. These Conventions provide a framework for prior informed consent for the movement of hazardous waste into a country. The importing country requirements will include the provision of evidence of the need for the shipments (as outlined in this design document), detailed information on the packaging, shipping and documentation arrangements, including waste descriptions and quantities, financial guarantees, contractual arrangements, and evidence that the waste will ultimately be disposed in an environmentally acceptable manner. Special country arrangements will be needed for any countries that are not signatories to the Basel or Waigani Conventions by the time the POPs transfer commences.
- Preparation of a detailed Project Completion Report at the end of the project.

Special country arrangements will be needed for any countries that are not signatories to the Basel or Waigani Conventions by the time that the POPs transfer commences. These arrangements can be initiated by the importing country after being contacted by the AMC, although the process might vary from country to country, depending on how the Conventions are implemented through national legislation. The AMC will arrange for the POPs to be removed from each PIC and be shipped in accordance with international codes to the port facility. (Import and Special Permits issued by Environment Australia, will a time limit of 12 months. This will require careful monitoring by the AMC).

The AMC will provide evidence that their work is done in accordance with recognised international quality standards such as the ISO 9000 and 14000 series. The AMC will also need to provide evidence of an appropriate (high) public liability insurance cover, applicable throughout the region, as the AMC will carry the liability.

Clean-up
The clean-up Contractor will arrange for the POPs to be removed from each PIC and shipped in accordance with international codes to the port facility, from where they will become the responsibility of the disposal contractor. The clean-up Contractor may be sub-contracted to the AMC, may be part of the AMC's company or a joint venture.

The clean-up should be carried out by a commercial operator with a proven track record in contaminated site clean up or management and in packing and shipping POPs or other scheduled substances. The contractor will offer a complete package, including the provision of equipment, staff, and all necessary documentation. The clean-up Contractor will provide evidence that their work is done in accordance with recognised international quality standards such as the ISO 9000 and 14000 series. The Contractor will need to provide evidence of an appropriate (high) public liability insurance cover, applicable throughout the region.

Remediation of contaminated sites by the clean-up Contractor will involve removal of the contaminated soil and raking or minor reshaping of the surface to remove uneven ground hazards or erosion triggers. The contaminated soil will be disposed of with other POPs material. This work will be undertaken with assistance from local partner government representatives or contract labourers.

Disposal
AusAID has selected B.C.D Technologies, Brisbane as the destruction facility for this project using Base Catalysed Dechlorination. B.C.D Technologies is the only single site installation in the Pacific region, including New Zealand, with the required technology to destroy POPs in an environmentally safe manner. The AMC will need to use the services of this contractor. Incineration is not an acceptable method of disposal. The Disposal Contractor will be required to certify in writing that waste have been properly disposed of, in accordance with agreed procedures. This certification is also be required under the Basel and Waigani Convention Permits.

The AMC will be responsible for the destruction of the POPs in accordance with international best practice. The disposal Contractor may be sub-contracted to the AMC, may be part of the AMC's company or a joint venture.

3.4 Major design issues

3.4.1 Public Consultation

As part of the preparation of this PDD, a Communication Strategy was developed to identify key stakeholders, and to ensure effective consultation and communication with those stakeholders. A specialist Communications Consultant has been commissioned to assist AusAID in the implementation of the Communication Strategy throughout the course of the project. Liaison will be required between the Communications team and the AMC throughout the course of the project.

Because this project is considered environmentally significant, it will be referred to Environment Australia under the EPBC Act. A public consultation process will also be undertaken as part of the EPBC Act referral process, and amendments will be made to the project design based on the outcomes of public consultation.

3.2.2 Expectation of complete elimination of PCBs and stockpiled intractable pesticides

It is unrealistic to expect to completely eliminate all PCBs from the PICs, despite the fact that no new equipment imported into these PICs will contain PCB. There are two reasons for this. One is that in some PICs old transformers have been disposed of by dumping 'in the bush'. Some of these have been found, but it is not possible to guarantee that they have all been found. The other is that some in-use transformers are contaminated with PCBs. These will be removed from service where possible and the oil replaced, but this may not be possible in all instances for practical reasons such as access.

The total number of transformers in the above categories will be very small. For example when this exercise was done in the Marshall Islands in 1995, there was only one large transformer not able to be treated. This is now the sole unit requiring disposal in this PIC.

In the case of intractable pesticides, extensive efforts were made in Phase I to identify all current holdings. Most of these pesticides are no longer used in PICs, so the risk of new stockpiles being created is reduced. There is however always a risk of additional small quantities of old materials being discovered in unexpected locations. Through this project, PICs will have experience at managing this problem and in safely disposing of any POPs waste identified after the project's completion.

3.2.2 PCB and pesticide contaminated sites

PCB-contaminated sites identified in the work to date should be dealt with to just a basic level of site remediation at the same time as the PCB disposal. This is an efficiency issue in that the same equipment, documentation, shipping and disposal procedures will be used.

It is intended that pesticide contaminated sites will be dealt with under a separate programme, which utilises in-situ treatment methods. These methods are only effective at moderate to low concentrations associated with environmental contamination. A funding proposal for this work is being prepared for submission to the World Bank. The buried concentrated pesticide sites identified in the region will need to be dealt with by other means.

3.2.3 PCB and pesticide testing and PCB quantities

Stockpiled transformers either have been or will be tested by the time the AMC commences work, and the quantities and concentrations will be accurately known. Some further testing may be necessary if further transformers are discovered, or if more transformers are brought out of service.

The pesticide quantity information given in the Phase I report is based on label information combined with visual assessment of the stockpiles. The Phase II, Component 1 work has added more information and updated the Phase I work. Since the Phase I work, many of the pesticide stockpiles have deteriorated significantly, and some urgent remediation has been necessary. In addition, significant amounts of the volatile pesticides have evaporated, exposing neighbouring residences and personnel to health risks on a long-term basis.

As present there is expected to be over six tonnes of unknown pesticides. Limited sampling and analysis may be required to confirm the composition of some of the unknown pesticides, although there are many unknowns in small containers and detailed sampling and analysis will be far too costly and time consuming. It would be more appropriate to use field-testing equipment to broadly characterise and assess the hazards presented by these unknowns.

3.2.4 Method of disposal of PCBs from Transformers

The concentration of PCB Contaminated Transformers, to date, has ranged up to 2090 mg/kg, with an average figure of 463 mg/kg[2]. These concentration results have a significant impact on the overall cost of the project. If these figures had averaged in the "thousands" or higher, it would have been necessary to collect the transformer carcasses as well as the PCB oils. The total weight of oil plus carcasses typically measures 4.5 times the weight of oil only.

Because of the low concentration of PCBs in Contaminated Transformers, flushing the transformers and treating the flushing solvent is an acceptable option. The problem with draining oil out of a PCB transformer is that about 10% of the oil is left in the transformer carcass. This can be removed by successive flushings with solvents, but the contaminated solvents then have to be removed and destroyed as PCB contaminated material as well. There is a tradeoff between transporting and destroying large amounts of solvents and just

[2] These test kits indicate only that PCBs might be present at greater than 50 mg/kg (ppm).

transporting and destroying / decontaminating the contaminated oil plus the carcass. At the relatively low concentrations found so far, however, only two, three or four flushes of solvent would be needed, and in this case the removal of the carcass as well as the oil is not justified. The total weight of oil and solvent requiring disposal would therefore be more than 40,000 kg.

It is proposed that the regime for managing the transformers would be:

Less than or equal to 100 g/m^3 PCBs:	Two flushes with solvent
Less than or equal to 500 g/m^3 and greater than 100 g/m^3 PCBs:	Three flushes with solvent
Less than or equal to 2500 g/m^3 and greater than 500 g/m^3 PCBs:	Four flushes with solvent
Greater than 2500 g/m^3:	Remove the whole transformer plus PCB contaminated oil.

This approach will leave a large safety margin, given the 90% reduction with each flush. All transformers will then be well below the 2 mg/m^3 level which is internationally considered to be "PCB-free". The transformers can then be left drained, and plugged securely. They can then be disposed of safely to landfill within the countries concerned.

Only stockpiled transformers have been tested. It is impractical to test "in service" transformers, as this would necessitate shutting off power supplies, and there is strong resistance to even short power outages in the countries visited. The "in-service" transformers are expected to be PCB free, as they would be relatively new. These "in service" transformers will, however, be subject to ongoing testing included in the "National Implementation Plans" being prepared as part of the Stockholm Convention obligations. The Stockholm Convention allows for a phase-out by 2025, of all "in-service" transformers containing PCBs.

3.2.5 Participating Countries, and Papua New Guinea as an exception

Papua New Guinea (PNG) has not been included in Phase II, though it is expected that a future project could use the same methodology to work with PNG to remove POPs.

4. Implementation

4.1 Contracting arrangements

AusAID will undertake the POPs disposal project through an Australian Managing Contractor (AMC) and in association with SPREP. SPREP will have responsibility for the initial 'fact-finding' component of the project, much of which will have taken place prior to the appointment of an AMC. The AMC will manage the overall project, with SPREP serving an in-country facilitation and external quality assurance role. SPREP has recruited a suitably qualified and experienced specialist as SPREP Project Coordinator (PC), for their part of the work.

A significant proportion of the costs for this project will be paid to the clean-up and disposal Contractor(s). The AMC will be responsible for sub-contracting these operators if necessary. Alternatively the AMC may be a company able to undertake the final packaging, collection and transfer of the POPs.

The AMC may use any suitable company to undertake the shipping component of the project. However, if the AMC would like assistance from AusAID in selecting the shipping contractor, AusAID can recommend HK Shipping.

4.2 Resources

Annex 3 provides information on the implementation of the project.

AMC
The AMC will manage any disposal and clean-up sub-contracts. A large percentage of the project costs relate to disposal (destruction) of the POPs.

SPREP
SPREP will undertake in-country negotiations and preliminary preparation, and will provide quality control throughout the project. No other personnel costs will be incurred, except local travel for in-country partner government representatives or labourers.

Partner Governments
Partner governments will not contribute directly to the funding of this project. Their inputs will be confined to providing in-country government support, facilitating the work of the AMC, and collaborating and cooperating to ensure that all permits and letters of agreement are finalised on time.

It will not be possible to complete the resource schedules until the following activities are undertaken:

- in-country negotiations and public consultation are completed and cooperation of all stakeholders is assured;
- an AMC identified;
- a collection schedule and shipping route determined; and
- the exact cost of clean-up and disposal calculated.

4.3 Suggested timing

4.3.1 Work program and timing

The anticipated period for project implementation is three to four years, of which one year has been spent to date on the Component 1 work. The critical point issue is the time required to obtain between-country approvals for shipping of PCBs under the Basel and Waigani Conventions, or special permits. This will be facilitated by SPREP and the AMC, but it is likely to take up to six months. Until those agreements are in place, no removal or shipping of POPs can commence. (Import and Special Permits issued by Environment Australia have a time limit of 12 months. This will require careful monitoring by the AMC).

The work plan and implementation schedule presented in Annex 3 is as detailed as possible at this stage.

5. Monitoring and management strategies

5.1 Project monitoring

Monitoring and reporting on the overall project activities will be a key role for the AMC.

The key monitoring role for SPREP will be in ensuring quality control by field-checking (and if necessary modifying the methodology) at all stages of the packaging, removal, shipping and disposal chain.

AusAID and Environment Australia will also provide monitoring assistance and quality assurance through oversight of the project, and by ensuring that conditions or recommendations for the shipping and disposal activities are adhered to rigidly.

The project logframe (Annex 2) with the addition of the key indicative activities listed in Section 3 of this design document, will act as the basis for project monitoring. Most project outputs are 'deliverable' or 'achievable' outcomes so provide a clear basis for contractor payments based on results.

5.2 Performance indicators and benefits

5.2.1 Key result areas

This project will contribute to AusAID's key result areas in, environment, health, governance, poverty and gender.

The performance indicators listed in the 'verifiable indicators' and 'means of verification' columns of the project logframe include external environmental controls, and acknowledge the requirement for stringent environmental selection criteria.

POPs have a serious long-term negative impact on human health. Removal of POPs from PICs will reduce significantly the likelihood of local communities being affected by them.

By encouraging the cooperative region-wide involvement, which will be necessary to prepare import/export agreements and meet the requirements of a Waigani, Basel or Special Permit, the project will contribute to broader governance objectives.

Poverty alleviation is a key focus of all AusAID development interventions. The links between poverty and human health, and environmental health and human health are well established. Improvements in environmental quality in countries where populations rely on natural resources, and in human health, will have an indirect impact on reducing poverty.

The removal of POPs from PICs will benefit women and infants proportionally more than men, as women and infants unknowingly suffer the impacts of POPs in their bodies more than men.

5.2.2 Measurement of performance

Key performance indicators have been identified in the logical framework. As noted in Section 5.1 all outputs are achievements or results, and the performance of the AMC and SPREP will be directly measurable against these outputs.

Monitoring has been discussed above, and is a key element of the project design. The AMC and SPREP will report regularly to AusAID.

5.2.3 Reporting requirements for the project

The AMC and SPREP will both report to AusAID on a six-monthly basis. These reports will also be provided to the PCC meetings and will follow the AusGuide format. It is expected that these six-monthly reports will follow a set format, and will be minor reports unless there are exceptions to the proposed project plans to report. All major problems or unanticipated risks would also be identified as well as the status of permit and approval processes, so that SPREP or AusAID can take action in response. The six-monthly reports will each contain a quality reporting section, as quality assurance is a major role of SPREP. Alternate six-monthly reports will be an Annual Report, and will have as an attachment an Annual Plan for the next year of the project.

In addition to six-monthly reports, the AMC will provide exception reports to AusAID. Exception reports will be provided when the project's implementation schedule or budget become unreasonable as a result of exceptional circumstances. Exception reports should especially be provided in circumstances where the AMC believes that AusAID's interests may be compromised. The format and length of such reports should be brief and appropriate to the seriousness of the exception.

5.2.4 Project coordination

The AMC will be the overall coordinator for the project.

A Project Coordination Committee (PCC) will be established to advise on the project, and if necessary to recommend on revisions to the design and implementation. The PCC should meet on an annual basis, and should receive the annual plan from the AMC (or SPREP in Component 1) at least two weeks before its meetings.

Suggested membership of the PCC is AusAID, Environment Australia, a SPREP representative, two representatives of the participating governments, and a principal of the AMC.

The inclusion of a representative of Environment Australia at PCC meetings to assist with technical advice, is important because of the complex technical expertise involved with the issue of permits under the Basel and Waigani Conventions, or special permits. Environment Australia will also be involved in advice regarding acceptable shipping routes, or on conditions that would ensure the project has no significant environmental impact. Involving Environment Australia in project decision-making, at the technical and not managerial level, is desirable.

5.3 Risks and risk management

5.3.1 Key assumptions and risks

The assumptions in the project logframe relate directly to potential risks to effective technical outcomes or to output delivery or efficiency. Any mishaps during shipping the POPs for disposal, during their transport in the destination country, or at the point of disposal would present risks to SPREP's, Australia's and the contractors' reputations, and to goodwill in the region. All these assumptions and associated risks have been taken into account in the project design, particularly through the requirement for demonstrated quality performance and experience by potential contractors.

These risks, and their likely impact on the project are set out in the risk management matrix (Table 3). Actions to mitigate the impacts of the risks are also indicated, along with responsibility for taking these actions.

Table 3. Project Risk Management Matrix

Risk	Likelihood	Impact	Action in response	Responsibility
Not all PIC governments agree to participate	Moderate	Low	POPs waste will not be collected from PICs not willing to cooperate	SPREP PC
Belief that because of ownership of the PCBs and transformers, some agencies may expect payment for the waste. (Note this is a common problem with stockpile disposal work.)	Moderate	Moderate	As the PCBs identified so far are in old out of service transformers and the PCB concentrations are low, this is unlikely to be an issue. If any transformers are to be reused, they can be left filled with new oil.	SPREP
No commitment to assistance by PIC partner government representatives in any PIC	Moderate	Very low	Support has been good so far, from all participating governments. Project can proceed without local partner government representative inputs	SPREP
Domestic public opposition to project	Moderate	Moderate	Effective implementation of Communications Strategy, attendance at established regular community meetings and engagement of community in the process of assisting to define third party monitoring of treatment emissions for the project.	AusAID with assistance of Communicat'n Team
Laboratory tests not completed satisfactorily	Very low	High	A quality, accredited laboratory has been selected	SPREP
Governments (especially Australia) do not agree to the shipping and disposal operation	Low	Very high	Invitation to EA to participate in all project planning discussions, participate in PCC, to address ongoing issues	AusAID and SPREP
No availability of local paid labour	Very low	Moderate	Seek partner government assistance to seek labour	SPREP
Suitable shipping companies and/or charter vessel cannot be identified	Very Low	Very high	All countries are serviced by regular commercial shipping routes	AMC with assistance of SPREP
Problems due to natural hazards (eg cyclones), labour disputes, etc	High	Moderate	Such events likely to be localised, so could reschedule collections	AMC
Disposal facility does not have permits in place	Very low	High	The selected disposal facility has all necessary operating permits	AMC and SPREP
Import permits will not be granted	Very low	Very high	Involve EA and ensure activities comply with appropriate standards (eg. IMO packaging regulations).	AMC with input from SPREP
Disposal plant does not operate satisfactorily	Very low	Moderate	The selected plant has been audited and does operate satisfactorily.	AMC
AMC does not have effective project/contract management systems in place	Low	High	Such systems would be a contractual requirement, penalties would be imposed by AusAID if these systems were not appropriate.	AMC and AusAID
No insurance cover available for this type of operation	Very low	High	This will be a contractual requirement that would be demonstrated clearly before the AMC was appointed.	AMC
Disposal operation not completed successfully	Very low	High	Criteria for selection will ensure existing capacity. Batches re-	AMC

Risk	Likelihood	Impact	Action in response	Responsibility
			admitted to chamber	
Ship with POPs ready for disposal refused entry to a port (labour dispute)	Low	Moderate	Sensitive public consultation prior to transportation in-Australia. Agreement with PICs.	AusAID – AMC
Ship with POPs ready for disposal looses cargo (ship sinks, hits reef)	Very low	High	POPs packaged to meet IMO packaging requirements, cargo rescue plan.	AMC

5.4 Feasibility and sustainability

5.4.1 Technical feasibility

The methods and technologies proposed are all tried, and all have been demonstrated to be appropriate. This is a technical project, and several aspects of the design relate to ensuring technical appropriateness and ensuring the quality of those processes.

5.4.2 Sustainability/ In-country capacity building

Although in-country partner government representative agency personnel may be involved in managing PCB-contaminated transformers in the future, it will not be necessary to undertake training of electricity supply and power station personnel in the identification, safe handling and management of PCBs. That training was completed in Phase I, at least to the point where national partner government representatives will know that they may need to seek assistance from SPREP in these instances. In addition a manual on the safe handling, management, substitution and disposal of hazardous chemicals, including PCBs, was produced and distributed as part of Phase I training, and will be available for future reference.

Having people in each PIC trained to remove intractable POPs will not be essential for sustainability. A much smaller-scale removal process could be repeated by SPREP or another agency in the future if more transformers with PCBs or additional stores of intractable pesticides are located. However, Phase I has ensured that appropriate interim actions can be taken to manage any new stockpiles of hazardous chemicals and deal with local disposal issues where appropriate.

5.4.3 Governance

Although the broader POPs in PICs project has a strong capacity building and institutional development component, Phase II will have only minor impact on governance or institutional strengthening. The project will require a high level of cooperation from the governments of all participating PICs, and will engage them in a high level of interaction to ensure the effective transport of POPs waste through the region and to another country for disposal. Because of the high cost of chartering a ship, it is likely that existing commercial shipping services will be used, and these ships will pass through several ports. Complex (port entry and waste export) permits or intergovernmental letters of agreement will be necessary for the project to succeed, and its success will depend on cooperation between the participating PICs. SPREP will assist the AMC to obtain these permits, letters of agreement or exemption letters.

Early stages of the work are directed at obtaining any necessary in-country approvals for the operation. It will also be important to ensure that approvals are obtained from all relevant government agencies, including customs, environment, internal and external affairs as necessary.

5.4.4 Financial and economic feasibility

The methods proposed in the project are tried, and are cost-effective. There is little choice for implementation, as there are very few facilities able to dispose of POPs. So clean-up and disposal costs are virtually fixed. As the methodology is sound, there is little financial risk in the project. The potential for accidental spillage is covered by the necessity for the AMC to hold adequate and appropriate insurance.

The long-term benefits of the project in environment and health outweigh the short-term one-off cost.

5.4.5 Impact on poverty

This will be achieved indirectly through improvements in human health, environmental health and the natural living resources on which stakeholder communities depend.

5.4.6 Impact on environment

This project is based on environmental intervention to reverse the impact of manufactured chemicals to improve environmental and human health.

POPs and intractable pesticides are synthetic chemicals, which do not degrade readily and have other hazardous impacts. Exposure to POPs results in nervous system damage with impacts on learning and intelligence, liver damage, some cancers, and endocrine disruption or interference with hormone functions. The effects of POPs on wildlife are similar to those observed in humans. Recent studies have demonstrated a shift in POPs towards the earth's polar regions, as POPs tend to evaporate more in hot equatorial regions and condense and fall in precipitation near the poles. Whales, seals, penguins and the Canadian Inuit population show contamination from POPs produced in very distant regions, and many arctic/antarctic birds and small land and marine animals are dying from the direct or indirect effects of accumulated POPs.

The environmental consequences of not taking action to remove POPs are high. Disposal is only possible outside the Pacific Islands region, and the project is designed to maximise environmental benefits and minimise risks.

5.4.7 Social impact and gender implications

Conscious or unconscious exposure to POPs has severe human health impacts. Most people in the Pacific region are unaware that they are exposed to these chemicals, but the impact exists. Pacific Island governments are not fully aware of the impacts of these chemicals, nor were they aware of their existence in their countries until the POPs inventory was completed in POPs in PICs Phase I.

Most POPs are soluble in fats, not in water. Women's bodies have more fat storages than men's, so women tend to accumulate POPs more readily and in proportionally greater amounts in their body tissues than do men. Pregnancy and breast-feeding draw on maternal bodily fat reserves, so POPs are readily transmitted to infants, where their impacts on developing nervous systems may be profound.

For both local communities and for the world's health and environment the eradication of POPs is important. This project is aimed at eradicating POPs currently stockpiled in thirteen PICs. Eradication of the stockpiled non-POPs pesticides is important for the health and environment of local communities, and in several local Pacific Island communities, the health effects of these stockpiled pesticides (e.g. Chuuk, FSM and Fiji) has already been severe.

Annex 1: Bibliography

ANZECC 1992 *(Draft) strategy for management of scheduled waste*. Australian and New Zealand Environment and Conservation Council.

ANZECC 1996 *Maritime accidents and pollution strategy*. Australian and New Zealand Environment and Conservation Council.

Burns, T., Graham, B., Munro, A., and Wallis, I. 2000 *Management of Persistent Organic Pollutants in Pacific Island Countries. Waste and Obsolete Chemicals and Chemical Contaminated Sites*. SPREP, Apia.

United Nations Environment Programme 1999 *Guidelines for the Identification of PCBs and Materials Containing PCBs*. UNEP, Nairobi.

United Nations Institute for Training and Research, n.d. *Preparing a National Profile to Assess the National Infrastructure for Management of Chemicals – A Guidance Document*. UNITAR, Geneva.

World Wildlife Fund 1999 Persistent organic pollutants: hand-me-down poisons that threaten wildlife and people. *WWF Issues Brief,* January 1999, Washington

Annex 2: POPs in PICs – POPs Disposal Project Logframe

Code	Narrative Summary	Verifiable Indicators	Means of Verification	Assumptions
Project Goal	**To reduce the threat posed by Persistent Organic Pollutants (POPs) and related chemicals toward the environment and human health in PICs**			
Project Purpose	**To dispose of Polychlorinated biphenyls (PCBs), and PCB-contaminated solvent from transformers, small quantities of PCB-contaminated soil, stockpiled organochlorine pesticides including scheduled POPs and other intractable pesticides (mainly organochlorines and organophosphates), and unidentified pesticides considered likely to fall into those categories in participating PICs.**	**PIC monitoring reports, audit report on destruction operation, and project technical report** **Detailed description of government roles and extent of participation given in project technical report**	**Acceptance of clean-up plans by partner government representative and acceptance of project reports by AusAID**	**Cooperation and formal agreements obtained from all participating governments**
Component 1	**In-country identification and confirmation of POPs for removal**			
Outputs				
1.1	**SPREP PC has confirmed and obtained written agreement within each PIC for the disposal operation to proceed**	**Formal agreement between SPREP and each PIC**	**Copies of signed letters or Memoranda of agreement received by SPREP**	**All PIC governments agree to participate**
1.2	**SPREP PC has completed field testing of all transformers in each PIC and collected and submitted samples for laboratory testing**	**Detailed field inventories for each PIC in standard format (including ID, quantities, field test results)**	**Acceptance of PIC reports by Partner government representative and SPREP**	**Assistance by Partner government representatives in each PIC**
1.3	**SPREP PC has confirmed final quantities and locations of PCBs, transformers and pesticides for disposal**	**Final regional report including laboratory test results, updated inventories and**	**Acceptance of inventory results by SPREP and AusAID**	**Laboratory tests completed satisfactorily**

Code	Narrative Summary	Verifiable Indicators	Means of Verification	Assumptions
		calculation of final disposal quantities.		
1.4	**PCB/pesticide disposal and site clean-up plans agreed between SPREP and each PIC**	**All PCB/pesticide disposal and site clean-up plans complete**	**Written acceptance of plans by Partner government representative**	**Assistance by Partner government representatives in each PIC**
1.5	**SPREP has monitored and audited the process of POPs clean-up and shipping**	**Monitoring/audit reports which demonstrates that all safety requirements were met during handling transfer and disposal of POPs, immediately following the conclusion of each in-country operation**	**Report sign-off by SPREP and Partner government representative nominees Acceptance of reports by AusAID**	**Cooperation by partner government representative**
1.6	**Final audit by SPREP of POPs destruction**	**SPREP audit report on the destruction of each shipping load of POPs**	**Acceptance of report(s) by AusAID**	**Disposal operation completed successfully**
1.7	**Preparation of technical inputs to project completion report including clear descriptions of the activities carried out and any lessons learned**	**Final technical report as input into Project completion report**	**Acceptance of report by AusAID**	**POPs removal and disposal operation completed successfully, or technical advice can be provided for similar future operations**
Component 2	**POPs collection, packaging and shipping to disposal facility**			
Outputs				
2.1	**The AMC will have made contact with Environment Australia to initiate the permitting processes required under the Basel and Waigani Conventions, and will have also facilitated the completion of country-to-country agreements that may be required for in-transit activities.**	**Checklist prepared by AMC of all required agreements Letters of agreement or permit applications submitted by each PIC to Australia, and other governments as required**	**Completeness of checklist confirmed by AusAID, in consultation with Environment Australia All required agreements, as per checklist**	**Assistance by Partner government representatives in each PIC**
2.2	**Basel, Waigani or Special Permits obtained, with agreements within and between all participating PICs and**	**Permits issued by Australia, and other governments as required**	**Signed permits, cross-checked against checklist**	**Governments (especially Australia) agree to the shipping and disposal**

Code	Narrative Summary	Verifiable Indicators	Means of Verification	Assumptions
	Australia			**operation**
2.3	**All PCBs, intractable pesticides and associated contaminated materials packaged by AMC and prepared for shipping, within each PIC**	**Audit reports for each PIC by SPREP to confirm operations completed**	**Sign-off of Audit reports by Partner government representative**	**Assistance by Partner government representatives in each PIC. Also, availability of local paid labour**
2.4	**Shipping agreements finalised between the AMC and shipping company or companies**	**Signed agreements**	**Six-monthly reports by AMC**	**A suitable shipping company and/or charter vessel is identified**
2.5	**All POPs containers collected from each PIC**	**Containers removed**	**Six-monthly reports by AMC**	**No problems due to natural hazards (eg cyclones), labour disputes, etc**
2.6	**All POPs containers delivered to, and off-loaded at port of final destination**	**Containers off-loaded at destination port**	**Six-monthly reports by AMC**	**No problems due to natural hazards (eg cyclones), labour disputes, etc**
Component 3	**POPs destruction**			
Outputs				
3.1	**AMC will have obtained any permits or approvals required at a State level for POPs import and disposal (NB This output is a pre-requisite for the import permits covered under Output 2.2)**	**Permits obtained (or written confirmation that permits are not required)**	**Signed permits**	**Disposal facility already has permits in place. Import permits will be granted provided activities comply with appropriate standards (eg. IMO packaging regulations)**
3.2	**All POPs containers transported to disposal facility or other agreed storage facility in receiving country**	**Delivery and acceptance receipts**	**Six-monthly reports by AMC**	**No problems due to natural hazards (eg cyclones), labour disputes, etc**
3.3	**All POPs and associated contaminated materials successfully disposed**	**Treatment processes carried out in accordance with agreed**	**Six-monthly and exception reports by AMC and**	**Plant operates satisfactorily**

Code	Narrative Summary	Verifiable Indicators	Means of Verification	Assumptions
		protocols	SPREP	

Component 4	Project and contracts management			
Outputs				
4.1	Effective project management will have operated throughout all of the Component 2 and 3 activities, including regular project reporting (six-monthly and exception reports and Annual Plan to AusAID), facilitation of PCC	Effective and on-going seamless project process	AusAID monitoring reports	AMC remains under contract to AusAID throughout the project
4.2	Effective contract management, and liaison with stakeholders including participating governments, AusAID, Environment Australia	Contract and other agreements in accordance with project work programme and timeframes	Six-monthly and exception reports	Suitable organisation can be identified for engagement AMC
4.3	Management of public and civil liability issues	Responsibilities clearly spelt out in all contract documents, along with documented evidence of adequate liability cover	Evidence of contractor liability cover	Insurance cover available for this type of operation
4.4	Project completion report prepared, including coordination of technical inputs from SPREP	Project completion report	Acceptance of PCR by AusAID	All operations completed successfully

Annex 3: Indicative Work plan and Implementation Schedule

	Description	2001/4	2002/1	2002/2	2002/3	2002/4	2003/1	2003/2	2003/3	2003/4	2004/1	2004/2	2004/3	2004/4	2005/1	2005/2	2005/3	2005/4	
	Component 1, complete regional inventory and																		
	other preliminary work																		
1.1	Confirm and obtain written agreement for disposal to proceed		M																
1.2	Field testing, Laboratory analysis																		
1.3	Regional report, including final disposal quantities																		
1.4	Disposal and site clean up plans																		
1.5	Monitoring and audit of POPs collection																		
1.6	Monitoring and audit of POPs destruction																		
1.7	Project technical report for AMC							M											
	Component 2, Basel, clean-up, shipping																		
2.1	Confirm signatory requirements, shipping route & pickup sequence								M										
2.2	Basel/Waigani permits and agreements between PICs and Australia																		
2.3	PCBs and contaminated materials packed and prepared for shipping											M							
2.4	Shipping agreements finalised										M								
2.5	POPs containers collected from each PIC															M			
2.6	POPs containers delivered and off loaded at disposal port																M		
	Component 3, Disposal																		
3.1	State permits and approvals obtained for POPs import and disposal														M				
3.2	POPs containers transported from disposal port to disposal facility																	M	
3.3	POPs and associated contaminated materials disposed																		M
	Component 4, Management																		
4.1	Project reporting, facilitation of PCC, Annual Plan			x			X		X		X		X		X		X		
4.2	Contract management and liaison with stakeholders						X				X				X				
4.3	Management of public and civil liability issues																		
4.4	Project completion report (technical report from SPREP)																		x

Annex 4: Australian legislation requirements associated with POPs disposal

- *Environmental Protection and Biodiversity Conservation Act 1999*
  - Regulation 6.01 (b): requires advice from the Environment Minister if the action is authorised by a Basel permit and it is likely to have a significant impact on the environment.
  - Regulation 6.01 (e): requires advice from the Environment Minister if the action is authorised by a permit or authority (however described) under the *Great Barrier Reef Marine Park Act 1975* or the *Great Barrier Reef Marine Park Regulations 1983* and it is likely to have a significant impact on the environment.
  - EA's determination of national environmental significance, if the project is partly carried out in Australia.
- If POPs to be destroyed in Australia, import permits under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* will be required.
- If POPs to be destroyed in Australia, could trigger assessment processes of one or more States.

Annex 5: Extension of the scope of work to include other intractable pesticides

1. Background

1.1 POPs in PICs Phase I

The small island nations of the Pacific Region have very limited capabilities to manage and dispose of chemicals and hazardous waste. AusAID has recognised this problem as one of very high priority and hence the Persistent Organic Pollutants in Pacific Island Countries (POPs in PICs) project was developed. The long-term objective of this project is to upgrade regional capacity to eliminate the threat posed by hazardous waste towards the environment and human health.

The Phase 1 work concluded that the primary activity for the following phases of the project should be the disposal of the stockpiles of obsolete and unwanted chemicals, contaminated site remediation, and other targeted waste management activities. These activities were listed in the Phase 1 Report as:

1. Chemical waste disposal
2. Contaminated site assessment
3. Interim site improvement
4. Contaminated site remediation
5. Laboratory waste management program
6. Medical waste management program

1.2 Phase II project rationale

The total cost of all these projects required as a result of the phase I study was estimated to have an upper limit of about $A13.5 million. All the work was urgent, but clearly the total cost was beyond the scope of any one waste management aid project to fund. AusAID indicated that they were prepared to fund Phase 2 of the project to the value of around $A4,000,000, and SPREP agreed to endeavour to try to find other donors to undertake the remainder of the work.

Phase II of the AusAID POPs in PICs project was therefore designed to deal with just PCBs and POPs pesticides, and some associated site assessment and cleanup work, although it was acknowledged that this would still leave a large amount of urgent hazardous waste work still to be done.

2. Preliminary results of phase II, component 1

2.1 Methodology of component 1

The phase II, component 1 work involves visits to 13 countries[3] to confirm and safely store the inventory of POPs pesticides and PCBs identified in phase I.

2.2 Preliminary results on PCB contamination from phase II, component 1

The eight countries surveyed so far have produced the following confirmed (by laboratory analysis) quantities of PCB contaminated oils, compared with quantities predicted by the PDD on the basis of the Phase 1 work. (The order shown is the order in which the countries have been visited in the Phase 2, Component 1 work).

[3] Originally this was 12 as Fiji was excluded on the basis that it had no PCBs or POPs pesticides. A UNEP grant of $US35,000 has since been obtained which enables Fiji to be included.

Annex 5 Table 1. PCB Oil predicted and actual results

Country	Predicted PCB Oils (kg) (Maximum)	Actual PCB Oils (kg)
Niue	1000	0
Tonga	8000	1345
Samoa	10000	465
Tuvalu	8000	324
Kiribati	5500	0
Cook Islands	4000	0
Palau	18000	1013
FSM	55000	4065
TOTAL	**109,500**	**7,212**

Notes to the table:

1. The difference in results between phase I and phase II was anticipated and is explained by the different methodologies for PCB testing. The phase II test process is more thorough than phase I which aimed to identify maximum amounts.
2. Phase II results also indicate that the concentration of PCBs in contaminated transformers is less than anticipated by phase I. Attachment 2 provides details of the rationale for the lower concentrations of PCBs and the preferred treatment methodology.
3. There are five more countries to visit, Nauru, Fiji, Vanuatu, Solomon Islands and Marshall Islands.
4. It is already understood from the Phase 1 work that Fiji has no PCBs, although this will be checked at the time of the next visit.
5. It is known from the Phase 1 work that the Marshal Islands has 800 kg of PCB contaminated oils, as the US Environmental Planning Agency has already removed all the PCB oils from the Marshal Islands except from one large transformer containing 800 kg of oil, which was in service at the time and could not be removed. The US EPA analysed the oil in the laboratory, and confirmed that it was PCB positive.
6. This leaves Nauru, Vanuatu and Solomon Islands. The total maximum predicted quantity in these three countries was given in the PDD as 20,800 kg. Until these countries are visited, there is no way to know for certain how much PCB contaminated oil they have but a reasonable estimate of the total PCB oil can be made by a pro rata calculation based on the "predicted" versus "actual" figures arrived at to date. This gives a total of 1370 kg in these three countries. The overall total PCB contaminated oil is likely to be around 9400 kg of PCB oil (40,000kg of solvent), compared with the prediction based on phase I work of 131,100 kg.

2.3 Preliminary Results on POPs pesticide stockpiles from phase II, Component 1

The quantity of POPs pesticides looks increasing, based on the fact that the some of the Solomon Islands DDT destined for reuse may not have been reused. In addition, there may be other stockpiles of DDT in the Solomon Islands which were not identified in the Phase 1 work. A total of 7000 kg of POPs pesticides have therefore been allowed for in the calculations below.

3. Cost Implications of the preliminary results from phase II, component 1

The much reduced quantities of PCBs will considerably reduce the costs of the remaining part of phase II (collection, transport and disposal). Estimates of the cost based on original quantities, from phase I, is A$3,250,817. The revised estimate, based on less PCB-contaminated transformers and lower concentrations of contamination is less than A$2million.

4. Expansion of the project to include stockpiled intractable pesticides

4.1 Pesticide background

Intractable pesticides are typically in deteriorating stockpiles located in insecure storage sheds. Most of these materials have been stored for at least 10 years. They are old stocks that will never be used, and the quantities are not increasing. Most can be linked to old agricultural projects that have been abandoned a long time ago, leaving unused stockpiles of pesticides.

The 24 main pesticides that have been identified, together with brief descriptions of their main concerns, are presented in Appendix 1. There are many other pesticides present in smaller quantities, and also there are over 6000 kg of unknowns, likely to be hazardous. This large quantity of unknowns is a serious concern and it is also possible that these unknowns may include quantities of POPs pesticides.

The adverse effects from the pesticides, listed in Attachment 1, include high acute and chronic toxicities to humans and mammals in general, fish, birds, bees and other beneficial insects, and other species, cancers, birth defects, mutagenaity, and reproductive disorders. Most have at least one main concern and many have several main concerns. Most are not very persistent in the environment, although some are moderately persistent.

All the pesticides can be classified as hazardous to very hazardous, and none of the Pacific Island countries that are included in the project has the capacity to manage and dispose of the insecure stockpiles of pesticides. In view of the lack of disposal capabilities for these pesticides in Pacific Island countries, the 46,000 kg of pesticides, that are stored in association with POPs chemicals, can be regarded as “intractable”.

Even if the stockpiles are secure, fire is a major risk. Most pesticides when burnt, produce toxic fumes and many are flammable. One large stockpile in Pohnpei, FSM, for example, in the middle of a built up area, would result in a major evacuation if a fire occurred.

Inclusion of these intractable pesticides will not jeopardize a sustainable outcome to the project. The stockpiles of pesticides are old and are not increasing.

It must be acknowledged that this project has generated strong expectations in all the participating countries over a long period. It will be very difficult to send a collection team to each country and then remove only the small amount of the stockpiled pesticide waste.

4.1.2 Rationale to include intractable pesticides

Stockpiled intractable pesticides and stockpiled unknown pesticides are included in this project because:
The intractable pesticides cannot be disposed of safely in the Pacific.
The intractable pesticides are mostly co-located with POPs pesticides.

4.1.3 Cost implications of inclusion of intractable pesticides

If the 46,000 kg of intractable non-POPs pesticides were dealt with in addition to the PCBs and POPs pesticides, then disposal could still be managed most appropriately at the Queensland facility, at an indicative cost of $13/tonne for the non-POPs pesticides.

5. Conclusions

1. The POPs in PICs Project was designed to deal effectively with the worst of the hazardous waste problems in the Pacific Island countries that are part of the project, by permanently removing the PCBs and POPs pesticides.

2. Much fewer PCBs than expected, have been confirmed as stockpiled in the countries, based on the detailed Phase 2, Component 1 work completed to date (8 of 13 countries).

3. This provides the opportunity to deal with the next most urgent issue in these countries, namely the intractable pesticides, including unknown pesticides which can be disposed of safely by base catalysiation or plasma arc technologies.

4. It is estimated that the intractable pesticides could be included within the original project budget.

Annex 5: Attachment 1 - Main non-POPs Pesticides Identified

Asulox (*Carbamate*)

Total Quantity: 115 kg

Countries Identified: Niue

Main Concerns: Very mobile and degradation products may be toxic and persistent; may be human carcinogen;

Butoxone (2,4-DB) (*Phenoxyherbicide*)

Total Quantity: 200 kg

Countries Identified: Samoa

Main Concerns: May be carcinogenic and mutagenic; reproductive effects; moderately toxic to fish; moderately persistent (breaks down to 2,4-D which is also a powerful herbicide).

Captan (*Sulfenimide*)

Total Quantity: 330 kg

Countries Identified: FSM, Niue

Main Concerns: Toxic to fish

Carbaryl (*Carbamate*)

Total Quantity: 4630 kg

Countries Identified: Fiji, FSM, Kiribati

Main Concerns: toxic and bioaccumulative to fish and aquatic invertebrates; extremely toxic to bees; may be mutagenic; moderately toxic to humans; "prudent to consider as human carcinogen" (UK Govt); endocrine disrupter effects; moderately persistent.

Carbofuran (*Carbamate*)

Total Quantity: 750 kg

Countries Identified: Cook Islands

Main Concerns: Highly toxic to humans by inhalation and ingestion, and moderately toxic by dermal absorption; may be potent carcinogen though production of N-nitrosocarbamates under acidic conditions in the stomach of some animals possibly including humans; extremely toxic to birds – in 1989, the US EPA estimated that 1 to 2 million birds were killed in the USA each year by carbofuran alone, and the US Fish and Wildlife Service said "there are no known circumstances under which carbofuran can be used without killing birds"; it is highly toxic to fish; and may be teratogenic to some aquatic species.

Diazinon (*Organophosphate*)

Total Quantity: 210 kg

Countries Identified: Cook Islands, Kiribati

Main Concerns: Highly toxic to birds, mammals, bees and other beneficial insects; very highly toxic to freshwater fish and invertebrates; one of the leading causes of acute insecticide poisoning for humans and wildlife.

Dimethoate (*Organophosphate*)

Total Quantity: 50 kg

Countries Identified: FSM

Main Concerns: Moderate human toxicity increased by impurities which can be present; some reproductive effects are of concern; highly toxic to fish, birds and bees; very mobile; US EPA has deregistered this pesticide.

Ethoprophos (or Mocap) (*Organophosphate*)

Total Quantity: 320 kg

Countries Identified: Solomon Islands

Main Concerns: very highly toxic to humans and contact with the skin, inhalation of dust or spray, or swallowing may be fatal, or result in permanent brain damage; moderately persistent in soils.

Fenamiphos (*Organophosphate*)

Total Quantity: 650 kg

Countries Identified: Cook Islands

Main Concerns: Extremely toxic to humans and mammals in general, and contact with skin, inhalation of dust or spray, or swallowing may be fatal; very highly toxic to birds; very highly toxic to fish; moderately persistent in soil and breakdown products may be very persistent; may bioconcentrate in aquatic organisms.

Fenitrothion (*Organophosphate*)

Total Quantity: 725 kg

Countries Identified: Solomon Islands

Main Concerns: Moderate to high human toxicity and contaminants also be highly toxic to humans; moderately toxic to fish; highly toxic to birds and can also affect bird reproduction; highly toxic to aquatic invertebrates, highly toxic to bees;

Hyvar (or Bromacil) (*Organobromine*)

Total Quantity: 105 kg

Countries Identified: Cook Islands

Main Concerns: Moderate human toxicity through skin or swallowing; moderately toxic to fish; endocrine disruptor which affects reproductive processes.

Isopropcarb (*Carbamate*)

Total Quantity: 3000 kg

Countries Identified: Fiji

Main Concerns: Moderately toxic to humans, birds and fish.

Karmex (Diuron) (*Organochlorine*)

Total Quantity: 860 kg

Countries Identified: Cook Islands, FSM, Niue

Main Concerns: Moderate to highly toxic to fish; affects blood and blood-forming tissues; sometimes has a dioxin related impurity (TCA).

Karathane (Dinocap) (*Dinotrofungicide*)

Total Quantity: 110 kg

Countries Identified: Cook Islands, FSM

Main Concerns: Highly toxic to humans; has been conclusively linked birth defects in rabbits and US EPA has deregistered this pesticide.

Kelthane (or Dicofol) (*Organophosphate*)

Total Quantity: 170 kg

Countries Identified: Niue

Main Concerns: Contains DDT analog impurities; reproductive impairment in fish and birds; highly toxic to aquatic organisms; moderate human toxicity; some evidence of animal cancers.

Malathion (*Organophosphate*)

Total Quantity: 220 kg

Countries Identified: Cook Islands, FSM, Kiribati

Main Concerns: May have reproductive effects; clear evidence of mutagenic effects and these mutagenic effects may arise from impurities; some evidence points to birth defects; moderately toxic to birds; moderate to highly toxic to fish; highly toxic to bees;

Mancozeb (*Carbamate*)

Total Quantity: 3180 kg

Countries Identified: Cook Islands, Fiji, Niue, Vanuatu

Main Concerns: Moderate to highly toxic to fish, toxic fumes when burnt; some evidence of cancer, and mutagenic effects in animals.

Methyl Bromide

Total Quantity: 60 kg

Countries Identified: Niue, Vanuatu

Main Concerns: Very toxic gas, injury to brain and nerves, lungs, and throat and permanent damage may result; serious ozone depleting substance and covered by Montreal Protocol

Orthene (*Organophosphate*)

Total Quantity: 410 kg

Countries Identified: Fiji

Main Concerns: Weakly mutagenic; highly toxic to bees, moderately toxic to birds, including reproductive effects.

Propanil (*Acetanilide*)

Total Quantity: 5400 kg

Countries Identified: Fiji

Main Concerns: moderately toxic to humans and birds; very toxic to a wide range of aquatic species.

Thiobencarb (*Carbamate*)

Total Quantity: 800 kg

Countries Identified: Solomon Islands

Main Concerns: Moderately toxic to fish; highly toxic to aquatic invertebrates; acutely toxic to marine estuarine fish and mollusks; moderately toxic to mammals; moderately persistent and can accumulate in some aquatic organisms.

Trichlorfon (*Organophosphate*)

Total Quantity: 4320 kg

Countries Identified: Fiji

Main Concerns: Moderately toxic to humans; may have reproductive effects; may produce birth defects; may be carcinogenic; highly toxic to birds, many aquatic species, and beneficial insects; mobile and persistent (breaks down to another insecticide dichlorvos).

Vydate (Oxymal) (*Carbamate*)

Total Quantity: 980 kg

Countries Identified: Cook Islands

Main Concerns: Very toxic to humans and fish; highly soluble and relatively stable in acidic waters and soils.

Unknowns

Total Quantity: 6000 kg

Countries Identified: Most Countries

Main Concerns: Numerous, especially the fact that they are unknown.

Annex 5: Attachment 2. PCB contaminated transformers: testing and treatment

1. Number of PCB contaminated transformers: test methodology phase I

The estimate in the PDD, based on Phase I results, was much higher than the actual quantity and concentration of PCBs in transformer oil. The PDD estimate was based on field tests of a limited number of transformers. These field tests measure chlorine in the sample and not PCBs and as noted in the PDD it is not until a sample is analysed in a certified laboratory that the actual presence (and concentration) of PCBs can be verified. The presence of non-PCB chlorine will give a "false positive" and can arise from many sources, such as sea spray, perspiration, and non-PCB additives in the oil that contain chlorine.

A total of 142 transformers has so far tested positive from the test kits, but only 19 (or 13.3%) have in fact been established to contain PCBs. If all 142 had been established as positive, the total weight of PCB contaminated oil would be around 71,000 kg, which is much closer to the original predicted maximum.

2. Concentration of PCBs in transformer oil: methodology for disposal of PCB contaminants

The concentration of the PCBs in transformer oil affects the range of disposal options available. This matter was not addressed in the Phase 1 work, as no laboratory analyses were undertaken. Actual concentrations measured in the 19 transformers that have tested positive have ranged up to 2090 mg/kg, with an average figure of 463 mg/kg.

These concentration results have a significant impact on the overall scope and cost of the project. If these figures had averaged in the "thousands" or higher, it would have been necessary to collect the transformer carcasses as well as the PCB oils, increasing the total weight of a factor of 4.5 times.

The problem draining oil out of a PCB transformer is that about 10% of the oil is left in the carcass. This can be removed by successive flushings with solvents, but the contaminated solvents then have to be removed and destroyed as PCB contaminated material as well. At the relatively low concentrations identified between 2 and 4 flushes of solvent would be needed, and the removal of the carcass as well as the oil is not justified. The total weight of oil plus solvent for treatment would therefore increase to about ***40,000 kg***, depending on how many flushes are needed in each case.

A suggested regime for flushing is as follows:

Less than or equal to 100 g/m^3 PCBs: *Two flushes with solvent*
Less than or equal to 500 g/m^3 PCBs and greater than 100 g/m^3: *Three flushes with solvent*
Less than or equal to 2500 g/m^3 PCBs and greater than 500 g/m^3: *Four flushes with solvent*
Greater than 2500 g/m^3: *Remove the whole transformer plus PCB contaminated oil.*

If it is assumed that each flush will remove 90% of the PCBs, then in each case above, the concentration of PCBs will be reduced less than 2 g/m^3, including a safety margin. The concentration level of 2 g/m^3 is generally taken as being PCB free.

Annex 6: Inventory of pesticides by country

Samoa Pesticides Inventory

Location	Pesticide	Active Agent	Quantity	Comments
			kg	
Vaitele Wholesale	Butoxone	2,4-DB	200	
Store	Perfekthion	dimethoate	20	
	Milcurb	dimethirimol	10	Liquid, 10x1litre
	Thiophanate		20	Pig wormer
	Sevin	carbaryl	0.1	
	Endosulphan	thiodan	6	Liquid
	Saprol	triforine	10	Liquid, 10x1litre
	Lannate	methomyl	2	Liquid
N.B. The above is old stock in secure storage at the Wholesale Store				
Salelologa Retail	Actril	2,4-D	5	Liquid
Store	Dipel	bacillus thuringensis	18	Liquid, 36x0.5kg
	Karmex	diuron	2.5	
	Escort	metsulfuron	3	
	Attack	permaphos methyl	2	Liquid
	Butoxone	2,4-DB	7.5	Liquid
	Vydate	oxymal	19	Liquid, 5x1USGal
	Perfekthion	dimethoate	11	Liquid, 11x1kg
	Bravo 50	chlorothalonil	4	Liquid, 4x1kg
N.B. The above is old stock in the Agriculture Retail Store				

Tonga Pesticides Inventory (all located at Vaini Research Farm)

Pesticide	Active Agent	Quantity	Comments
		kg	
Dieldrin	dieldrin	20	Liquid, no label, but staff confirm dieldrin
Mocap (Ethoprophos)	ethoprophos	30	Liquid, in two partly empty 20 l drums
Amini ICI Hormone Weedkiller	probably 2,4-D	5	Liquid, in a 20 l container
Captafan	probably captan	20	In 4 x 5kg bags
Ronilan	vinclozolan	10	
Mesurol	methiocarb	10	
Karmex	diuron	10	
Calirus	benodanil	10	
Basamid Soil Fumigant	dazomet	4	
Captan Fungicide	captan	3	
Amidthin Fungicide		0.2	
Furadan 10G (Carbofuran)	carbofuran	3	
Manzeb	mancozeb	0.1	
Endosulphan Insecticide	endosulphan	1	
Alar Inhalt	daminozide	1	
Malathion	malathion	2	Liquid
Nemacur 400 (Fenamiphos)	fenamiphos	5	Liquid
Roundup	glyphosate	1	Liquid
Contaminated Packaging		30	6 bags
Unknown white powder		15	
Unknown light brown powder		3	
Unknown Fungicide		5	
Unknown brown powder		0.2	
Unknown green powder		4	
Unknown clear liquid		10	
Unknown liquid in blue container		8	
Unknown dark brown liquid		5	
Unknown black liquid		3	
Unknown clear liquid		1	
Unknown thick black liquid		1	
Unknown brown powder		10	
Unknown powder		2	Markings indicate pesticide
Unknown white powder		3	
Unknown liquid		0.5	
Unknown brown liquid		5	
N.B. 1. All the above are being held in secure storage at the Dept of Agriculture Research Farm, Vaini.			
2. All the above were repackaged in good packaging in March 2002.			

Solomon Islands Pesticides Inventory

Location	Pesticide	Active Agent	Quantity	Comments
			kg	
Metapona Plains	Stam F-34	propanil	5400	Liquid, 27 drums, good condition
near Honiara	Mocap	ethoprophos	320	16 sacks in poor condition
Storage Shed on	Rice Saturn	thiobencarb	200	Liquid, 1 drum, poor condition
Rice Farm	Saturn D	thiobencarb	600	Liquid, 3 drums, poor condition
	Unknown Liquids		1600	8 Drums, poor condition
Ranadi, Honiara	DDT	DDT	2000	10 boxes, poor condition
Min of Health and	DDT	DDT	800	Liquid, 4 drums, fair condition
Med Services (MHMS)				
Munda MHMS Store	Fenitrothion	fenitrothion	300	3 sacks, poor condition
	Fenitrothion	fenitrothion	400	2 drums, poor condition
Geology Lab, Honiara				
	Paraquat	paraquat	20	Liquid, good condition
Fisheries Store, Honiara	Unknown liquid		600	3 drums, poor condition
Ranadi MHMS Hardware	DDT	DDT	2000	Corroded containers
Shed				
Gizo MHMS	Fenitrothion	fenitrothion	25	1 sack, good condition
N. B. The above quantities are based on 1998 information plus 20%, as more pesticides are expected to be found.				
These quantities will be confirmed in the next few weeks.				

Vanuatu Pesticides Inventory

Location	Pesticide	Active Agent	Quantity	Comments
			kg	
Luganville	Methyl bromide	methyl bromide	33	3 cylinders, good condition
Quarantine Store				
Espiritu Santo	Lindane	Lindane	5	1 bag, good condition
Chapius, Store 1	Aliette	fosetyl	20	1 sack, poor condition
	Dithane M45	mancozeb	29	42 pkts, poor condition
	Dithane M45	mancozeb	10	1 bag, poor condition
	Difolatan	difolatan	4	9 pkts, good condition
	Unknown solids		88	7 sacks, labelled poison
Espiritu Santo	Dicidex	trichlorfon	4	Liquid, 4 bottles, poor condition
Chapius - Old Store	Orthene	acephate	0.2	Liquid, 1 bottle, good condition
	Agral LN	agral	3	Liquid, 3 bottles, good condition
	Dimethoate	dimethoate	8	Liquid, 2 bottles, good condition
	Ambush	permethrin	4	Liquid, 4 bottles, poor condition
	Unknown		4	Liquid, 1 bottle, poor condition
Luganville Hospital	DDT	DDT	900	18 sacks, poor condition
N. B. The above quantities are based on 1998 information plus 20%, as more pesticides are expected to be found. These quantities will be confirmed in the next few weeks.				

Nuie Pesticides Inventory (All located at the Works Depot Store)

Pesticide	Active Agent	Quantity	Comments
		kg	
Gramoxone	paraquat	7	Liquid
Sting Herbicide		0.2	Liquid
Yates Heals and Seals	captafol	0.2	
Shell Pruning Paste	captafol	0.3	
Asuntol	coumaphos	0.2	Liquid
Manzeb	mancozeb	3	80% WP
Cosan		20	
Dithane	mancozeb	100	5x20kg bags
Fetrilon		210	Plant Nutrient (Contam) 7x30kg bags
Gesatop		2	
Dursban concentrate		0.5	Liquid
Gesaprim 80		4	
Actellic	pirimphos methyl	10	
Actellic Oil	pirimphos methyl	5	
Kelthane	dicofal	170	Powder (some mixed with gravel/soil)
Manzate	mancozeb	220	Powder
Methyl bromide	methyl bromide	30	Full cylinder in reasonable condition
Bravo 500F	chlorothalonil	35	Liquid
Asulox Weedkiller	asulam	115	Liquid, contains 20 litres Asulox
Water contamated with Asulox	asulam	50	
Karmex Ouron Weedkiller	diuron	35	
Dithane Z-78 Fungicide	zineb	265	Powder
Captan	captan	70	Powder
Copper oxychloride	copper oxychloride	30	
Carbaryl 80W	carbaryl	20	
Bromacil	bromacil	17.5	
Diazinon	diazinon	1	
Rovral	iprodione	1	
Dacthal W75		2	
Dithane	mancozeb	53	
Karmex	diuron	14	
Carbaryl 80W	carbaryl	5	
Karmex + Unknown Powder	diuron	60	
Mixed Herbicides/Fungicides		50	
Lime sulphur (polysulphide)		16	Contaminated with unknown pesticide
Contaminated Soil		50	Unknown Green Pesticide
Contaminated Clothing		20	2 Sacks
Unknown Powder		0.3	Fine White Powder
Unknown Crystals		0.2	Black Colour
Unknown solid		0.05	1 jar if Black solid lumps
Unknown Powder		1	White Powder gone solid
Unknown solid		0.2	Lumps of white solid
Unknown solid		0.5	White Flakey Solid

Nuie Pesticides Inventory (continued)			
Pesticide	**Active Agent**	**Quantity**	**Comments**
		kg	
Unknown solid		2	White Lumpy Solid
Unknown solid		1	Crystalline Solid
Unknown Brown sludgey material		0.6	
Unknown white crystals		0.1	
Unknown white lumpy powder		0.1	
Unknown solid		0.2	White lumpy crystalline solid
Unknown solid		0.2	Blueish white crystalline solid
Unknown Liquid		0.3	Clear colour
Unknown Liquid		0.5	Clear Liquid with white ppt at bottom
Unknown Liquid		0.4	Clear syrupy liquid
Unknown Liquid		10	Brownish Colour
Unknown Liquid		0.2	Strong Organic Smell
Unknown Oil		2	
Unknown Organic Liquid		0.5	Probably Kerosene
Unknown Liquid		0.5	Strong smelling organic liquid
Unknown Liquid		2	
Unknown Powder		0.5	Beige Colour
Unknown Yates Liquid		0.5	Control of Brown rot and Black rot
Unknown Clear Liquid		0.05	Unknown bottle marked poison
Unknown Liquid		10	Clear & Watery Liquid
Unknown Liquid		20	Marked Poison, clear and syrupy
Unknown Crystals		2	Blue colour
Unknown green powder		6	
Unknown poison		1	brown sticky liquid
Unknown white lumpy solid		2	
Unknown liquid		36	Black syrupy liquid
Unknown brown powder		30	
Unknown powder		30	
Unknown powder		10	
Unknown Grey Powder		14	
N.B. 1. All the above are being held in secure storage at the Dept of Public Works Depot, Alofi.			
2. All the above were repackaged in good packaging in February 2002.			

Marshall Islands Pesticides Inventory (All located at Arno Farm)

Pesticide	Active Agent	Quantity	Comments
		kg	
Dinocap	dinocap	3	Good packaging
Sevin	carbaryl	7.5	Good packaging
Warfarin	warfarin	4	Good packaging
Metaldehyde	metaldehyde	4	Good packaging
Kelthane	dicofol	2	Good packaging
Brestan	triphenyl acetate	1	Good packaging
Mixed known powders	various	15.5	Good packaging
Mixed known liquids	various	7	Good packaging
Unknown		14	Liquid, 27 bots, Good pkg
N.B. 1. The above is 1998 information and will be confirmed in the next few weeks.			
2. In 1998, these pesticides were being held in secure storage at the			
Dept of Agriculture Arno Farm			

Kiribati Pesticides Inventory

Location	Pesticide	Active Agent	Quantity	Comments
			kg	
Tawara Agricultural				
Store	Unknown Liquids		400	
	Methyl bromide	methyl bromide	70	10x10kg full or party full cylinders
N.B. This material is kept in secure storage in the Tarawa Argicultural Store				
Quarantine Station	Ag 500	diazinon	150	Liquid, packaging in poor condition
Kanton Island	Sevin	carbaryl	236	Powder, packaging in poor condition
	Malathion		75	Liquid, packaging in very poor condition
N.B. This material is kept in an insecure store on Kanton Island. Kanton is a remote island with no regular				
transport. Transport of packaging crew to the island and crew and packaged pesticides from the island will				
be arranged by the Kiribati Government				

Federated States of Micronesia (FSM) Pesticides Inventory

Location	Pesticide	Active Agent	Quantity	Comments
			kg	
Kosrae Agriculture	Sevin 80S	carbaryl	50	
Store, Tofol				
N.B. The above pesticide is kept in an insecure store in Kosrae.				
Pohnpei Botannical	DDT	DDT	40	2x30l sealed pails - assume 20 kg in each pail
Gardens	Chlordane	chlordane	20	1x30l sealed pail - assume 20 kg in pail
	Terrachlor	terrachlor	20	1x30l sealed pail - assume 20 kg in pail
	Chlorpyriphos	chlorpiriphos	20	1x30l sealed pail - assume 20 kg in pail
	Treflan	trifluralin	20	1x30l sealed pail - assume 20 kg in pail
	Dibrom		20	1x30l sealed pail - assume 20 kg in pail
	2,4-D	2,4-D	20	1x30l sealed pail - assume 20 kg in pail
	Ortholide	ortholide	20	1x30l sealed pail - assume 20 kg in pail
	Benlate	benomyl	20	1x30l sealed pail - assume 20 kg in pail
	Strychnine	strychnine	20	1x30l sealed pail - assume 20 kg in pail
	Carbamate	carbamate	20	1x30l sealed pail - assume 20 kg in pail
	Dimethoate	dimethoate	20	1x30l sealed pail - assume 20 kg in pail
	Diazinon	diazinon	20	1x30l sealed pail - assume 20 kg in pail
	Captan	captan	20	1x30l sealed pail - assume 20 kg in pail
	Bravo	chlorothalonil	20	1x30l sealed pail - assume 20 kg in pail
	Dithane	mancozeb	40	2x30l sealed pail - assume 20 kg in pail
	Sevin	carbaryl	40	2x30l sealed pails - assume 20 kg in each pail
	Malathion	malathion	60	3x30l sealed pails - assume 20 kg in each pail
	Di-syston	disulfoton	60	3x30l pails - assume 20 kg in each pail
	Karmex	diuron	120	6x20l containers
	Manzate	mancozeb	100	5x20l containers
	Kelthane	dicofol	10	2x5l jars
	Unknown mixed		1600	10x200l drums unknown powdered and liquid pesticides
	Unknown liquids		55	11x5l jars unknown liquid pesticides
	Unknown Powder		100	5x30l pails - assume 20 kg in each pail
	Floor Sweepings		80	4x30l pails - assume 20 kg in each pail
	Rinse Water		125	5x30l pails - assume 25 kg in each pail
N.B. 1. The above are all kept in a locked store in a bad location, in the middle of the popular Botannical Gardens.				
2. The quantities above are approximate only, as all materials had been repacked in bulk containers as				
above, securely several years ago. They were therefore not unpacked in the Phase 2 exercise, but quantities				
were estimated based on labels on the new containers. This label information was not detailed.				
Yap Agricultural	Kelthane 35 Miticide	dicofol	2	
Research Station	Thiodan 50WP		2	
	Dithane M4D	mancozeb	1	
	Dithane M45	mancozeb	6	

Federated States of Micronesia (FSM) continued

Location	Pesticide	Active Agent	Quantity	Comments
			kg	
	Orthiolide 50 wettable	ortholide	13	
	Karathane WD	dinocap	22	
	Benlate	benomil	4	
	Sevin 50W	carbaryl	14	
	Manzate 20D	mancozeb	6	
	Unknown Powder		114	
	Unknown Powder		5	
	OLW Terracide WP		4	
	Golden Marin Fly bate	methomyl	0.5	
	Dipel worm killer	bacillus thuringiensis	0.5	
	Captan WP	captan	2	
				The Yap pesticides shown above from Kelthane 35 to
				Captan WP have been repacked in 4 sealed 200l drums
	Lannate L	methomyl	16	Liquid
	Ortho Bibromo 8		4	Liquid
	Cygon	dimethoate	8	Liquid
	Methyl bromide	methyl bromide	12	120 ampoules each 100g
	Furadan 3G	Carbofuran	200	50x4kg packs
N.B. The above are all kept in an insecure store at the back of the Yap Agricultural Research Station. Access to				
the research station is good, but the pesticides shed is at present accessible only by a long walking track.				
The old road to the shed may be accessible by four wheel drive, but is currently not used.				

Cook Islands Pesticide Inventory

Location	Pesticide	Active Agent	Quantity	Comments
			kg	
Totokoitu,	Dieldrite	dieldrin HEOD	100	Liquid, good packaging
Rarotonga				
	Foresite	oxadiazon	2	Liquid, good packaging
	Sinbar	tarbacil	1	Good packaging
	Di-Trapex-New		2	Liquid, good packaging
	Counter 10-4 (very toxic)	terbufos	4	Good packaging
	Benlate	benomyl	7	Poor packaging
	Nemacur	fenamiphos	1	Liquid, good packaging
	Aliette	fosetyl-aluminium	4	Poor packaging
	Basudin	diazinon	2	Good packaging
	Delsene		20	Liquid, good packaging
	Frontier	dimethanamid	2	Liquid, good packaging
	2,4-D Amine	2,4-D	5	Liquid, good packaging
	Stomp	pendimathalin	1	Liquid, good packaging
	Vydate	oxyamyl	947	Liquid, good packaging
	Monitor	methamidophos	2	Liquid, good packaging
	Brassicol 75	quintozine	1	Poor packaging
	Planavin 75	4-methylsulphonyl	1	Good packaging
	Dacthal	dimethyl	5	Good packaging
	Calirus	benodanil	1	Good packaging
	Copac E		0.2	Liquid, good packaging
	Actazine	frazine	4	Liquid, good packaging
	Enide 50W	diphenamid	11	Good packaging
	Rovral	Iprodione	1	Good packaging
	Bayleton	triadimepon	0.5	Good packaging
	Rubigan	fenarimol	0.2	Liquid, good packaging
	Kerb	propyzamide	0.5	Good packaging
	Kepone		1	Good packaging
	Septan	carbaryl	0.5	
	Allicep	chlorbufam	2	Poor packaging
	Actazine		6	Good packaging
	Devrinol	napropamide	3	Good packaging
	Ramrod	propchlor	0.5	Liquid, good packaging
	Totril	ioxynil	5	Liquid, good packaging
	Gesatop	simazine	3	Good packaging
	Temik	2-methyl-2-methithio-propional	1	Good packaging
	TOK-E-2		1	Good packaging
	Ambush	Permethrin	0.3	Good packaging
	Tokuthion	propthiophos	0.3	Poor packaging
	Lindane	lindane	11	Good packaging

Cook Islands Pesticide Inventory (continued)

Location	Pesticide	Active Agent	Quantity	Comments
			kg	
	Miral	10% isozofos	0.5	Good packaging
	Multicrop	chlorflurenol	3	Liquid, good packaging
	Krenite	fosamine	4	Liquid, good packaging
	Tribunil	methabenzthiazuron	2	Good packaging
	Simazine	simazine	5	Liquid, good packaging
	Lorsban	chlorpyrifos	2	Liquid, good packaging
N.B. All above are kept at the Agricultural Research Station at Totokoito,				
Rarotonga, in good secure storage.				
Aitutaki	Carbofuran	carbofuran	750	Packed in a container
	Larvicide		100	Packed in a container
	Nemacur	fenamiphos	650	Packed in a container
N.B All the above are kept locked in a container adjacent to the Aitutaki Agriculture				
Store, except for the lead arsenate, which is on the floor of the Store.				
Mangaia	Malathion	malathion	80	Poor packaging
	Karmex	diuron	150	Poor packaging
	Mancozeb 80	dithane	40	Poor packaging
	Diazinon 20P	diazinon	10	Poor packaging
	Diazinon 50P	diazinon	100	Poor packaging
	Unknown		250	Poor packaging
N.B. All the above are kept locked in an old stone building, but are lying on the				
floor in an untidy fashion.				
Atiu	Hyvar	bromacil	105	Good packaging
	Karmex	diuron	90	Good packaging
	Ridomil 25WP	ridomil	36	Good packaging
	Karathane	dinocap	91	Good packaging
N.B. All the above are kept locked in the Agriculture Store.				

Fiji Pesticides Inventory

Location	Pesticide	Active Agent	Quantity	Comments
			Kg	
AgChem Ltd[i]	Technical grade Isopropcarb	Isopropcarb	4800	24 Drums
Suva	50 WP ETRO	Isopropcarb	2000	Packed in cardboard boxes
N.B. The above are stored securely and tidily at the rear of AgChem's Premises in Lomi, a covered and bunded location.				
Lomaivuna	Maneb	maneb	4500	180 bags x 55lb
(Near Suva)	Dithane	maneb	75	3 bags x 55lb
	Fumazon	fumazon	54	Liquid: 3 x 4 gallons(in Paraquat containers)
N.B. The above are stored in a locked secure shed, but in an untidy manner.				
Lakena	Sevin	carbaryl	2705	Some in boxes and others in their 1.5kg packets
(Nausori)	Orthene	acephate	270	36 boxes x 100 packets x 75g
	Dicidex	trichlorfon	889	Liquid: 2222 x 1 litre containers, average 40% full
	ETRO	isopropcarb	12	From deduction, labels missing
	Chinese Insecticide	carbamate	1.5	1 x 1.5kg packet
	Propal	propanil	88	Liquid, Poor labels on the containers
	Gesaprim 80	atrazine	6	
	Riceclean 1	propanil	5176	Liquid: 190 boxes x 6 x 1gallon
	Malathion	Malathion	176	Liquid: 44 x 4litre containers
	Propal	dimethoate	9	Liquid: 6 containers x 1.5kg
N.B. The above are stored in a locked and tidy concrete shed. Some of the volatiles are evaporating.				
Seaqaqa	Sevin	carbaryl	3	
Vanua Levu	Ethone		3	In a Gramoxone container
	BHC	lindane	1	Liquid
	Gesaprim 80	atrazine	1	Liquid
	Rogor	dimethoate	3	Liquid
	Dithane	maneb	1	
	2-4-5-T	2,4,5-T	1	Liquid

Fiji Pesticides Inventory (continued)				
Location	**Pesticide**	**Active Agent**	**Quantity**	**Comments**
			Kg	
	Karmex	diuron	2	
	Benlate	benomyl	1	
	Saturn EC-50	thiobencarb	0.5	Liquid
	Zineb	mancozeb	2	
	Maneb	carbaryl	50	Identity based on deduction
	Lasso	atrazine	44	Liquid
	Unknown Liquid Chemicals		4	Liquid: 4 x 1litre bottles, not labelled
	Unknown Insecticide		0.5	Liquid
N.B. The above are stored in a locked and tidy shed.				
Dreketi	Sevin	carbaryl	396	66 boxes x 4tins x 1.5kg
Vanua Levu	Dicidex	trichlorfon	638	Liquid: I litre containers, some spilled on the floor
	Sevin	carbaryl	6	
	Malathion	malathion	16	Liquid: 4x5l containers (some part full)
*	Malathion	malathion	35	Liquid: 7containers x 5 litres
	Empty Dicidex Containers etc	dicidex	600	60 plastic bags of largely empty containers (from Korokadi)
	Dicidex liquid	dicidex	230	Liquid: 17 buckets x 18 litres x 0.75 full (from Korokadi)
	Dicidex sludge	dicidex	700	14 x 70l containers each 50kg (from Korokadi)
	Dioxin contam waste?		200	4 x 70l containers each 50kg (from Korokadi)
	Carbaryl	carbaryl	18	(from Korokadi)
N.B. The above are stored in a locked and tidy shed. All the waste formerly at Korokadi has now been brought to Dreketi as a result of a cleanup at Korokadi.				
Wainigata	Malathion	malathion	2	Liquid: 2 x 1 litre tins
(near Savosavo)	Diazinon	diazinon	4	Liquid: 2 x 2 litre tins
Vanua Levu	Rogor	dimethoate	4	Liquid
	Mancozeb	mancozeb	2	Liquid: 1 packet
	Lannate	methomyl	3	Liquid
	Benlate	benomyl	2	
	Ridomil MZ	methaxyl & mancozeb	2.5	
	Dithane M-45	mancozeb	1	

Fiji Pesticides Inventory (continued)				
Location	**Pesticide**	**Active Agent**	**Quantity**	**Comments**
			Kg	
	Carbaryl 80 W	carbaryl	9.2	17 1 lb packets + 1 x 1.5 packet
	Orthene	acephate	0.7	
N.B. The above are stored in a locked and tidy shed.				
Koronivia	Rice spray 70	chlorophenoxyacetic acid	20.5	Liquid
Shed 27	Oftanol GR5		8	Experimental pesticide
Nausori	HOE 084498 Staub		4.25	
	Mocarb		2	
	Padan 4G		3	
	Methomex	methomyl	5	Liquid
	Miral 5G		0.5	
	Monitor	methamidiphos	1	Liquid
	Paracol	paraquat & diuron	0.25	
	Aflix	endosulfan & dimethoate	1	Liquid
	JF9199/A		1	Liquid
	Lannate	methomyl	1	Liquid
	Monitor GS		3	Liquid, experimental pesticide
	Snip 05	carbamate	2.25	
	Hopcin 20 ULV		5	Liquid
	Kelthane EC	dicofol	0.5	Liquid
	Cymbush 3ED		1.2	Liquid, experimental pesticide
	ETRO 50WP	isopropcarb	1	
	Supracide		0.2	
	Afugan		1	Liquid
	Hostathion 40EC		0.5	Liquid
	Malathion	malathion	10	Liquid
	Furadan 10G	carbofuran	7	
	Maneb	maneb	25	
	Counter 150G			
	Unknown		61	Various unlabelled solids
	Tefluthrin		0.015	Labelled Very Toxic
	Asulox 40	Asulam	4	Liquid
	Basagran		5	Liquid
	Chlorpiriphos	chlorpiriphos	1	Liquid
	Ditronn EC			Liquid
	Fenom P425 EC		1	Liquid
	Tamaron SL 500		1	Liquid
	Mitre 20		1	Liquid
	Propanil 360 EC	propanil	1	Liquid

Fiji Pesticides Inventory (continued)				
Location	**Pesticide**	**Active Agent**	**Quantity**	**Comments**
			Kg	
	Monocrotofos 60LC		2	Liquid
	ETRO 20 WP	isopropcarb	1	Liquid
	Chinese Unknown liquid		6	Liquid
	Ficam W		1.2	
	Chinese Pesticide	carbamate		
	Decig 25 Ec	deltamethrin	0.2	Liquid
	Marshal 25 EC	carbosulfan	1	Liquid
	DD Soil fumigant		4	Liquid
	Saturn EC50	thiobencarb	4	Liquid
	Gesaprim	atrazine	5	Liquid
	Taiwanese MIPC		1	
	Thimiet 10-G	phorate	14	
	Ficam 20		0.5	
	Lorsban		0.1	
	Endosulfan		0.1	
	Fenitrothin		0.1	
	Actellia		0.1	
N.B. The above are stored in cramped conditions in a secure but untidy shed.				
Koronivia	Cosan (Wettable Sulfur)		3.2	
Weed Research	Aquagon		10	Liquid
Nausori	Alicep	chlorbufam & chloridazon	4	
	Round up		5	
	Stacker WP		2	
	Saturn-D-GR	thiobencarb	60	
	Chinese Pesticide		48	
	Blue Bell (Lanes)		20	Liquid
	Clarosan		7.5	
	Cobex Dinitramine		1.5	Liquid in poor container
	Shelleston P		1.3	Liquid
	Carbaryl 80WP	carbaryl	2	
	Dicambone 75-D		5	Liquid
	ARD/13/33	asulam & atrazine	5	Liquid
	Experimental Herbicide		4	Liquid
	ICI Caneclean		5	
	Tribunil		0.8	
	Girraween		1.5	
	Dual 720 EC		20	Liquid
	Amitrol		5	Liquid
	Weedazol		30	Liquid
	Frenock		10	Liquid
	Icipon		2.5	
	Caragard		30	

Fiji Pesticides Inventory (continued)				
Location	**Pesticide**	**Active Agent**	**Quantity**	**Comments**
			Kg	
	Planavin 75		2.5	
	Linuron 50		2	
	Hyvarx		0.5	
	Venture Tridex		1	Liquid
	Linurex 50WP		0.5	
	Frontier Herbicide		1	Liquid
	Mixture	atrazine & amethryne	4	
	Propal	propanil	4	Liquid
	Ally Herbicide		0.2	
	Saturn EC	thiobencarb	0.5	Liquid
	Pillarxone	paraquat	1	Liquid
	Atrazine 40%		0.8	Liquid
	Mixture	paraquat & diuron	0.6	Liquid
	Bennol	dicamba	0.5	Liquid
	Igran 500 FW		0.5	Liquid
	Ametryne 20%		0.2	Liquid
	Propazol 50	propazine	0.5	
	Paraquat 20%	paraquat	0.5	Liquid
	BASF Citrowet Sticker/Herb		2	Liquid
	Triflurane		1	Liquid
	Classic 250F	chlorinuon ethyl	2	
	Gesapex 500		1	Liquid
	Velpar K4	diuron	1.5	
	Unknown		5.8	Various solids with no labels
	Unknown		157	Various liquids with no labels
N.B. The above are stored in a secure but very untidy shed.				
Rentokil[ii]	Smoke Bombs		0.45	
	Mouse Powder	DDT	11	
	Actellic Smoke Generator		0.1	
	Chlordane	chlordane	3	Liquid
	Wood Borer		2	Liquid
	EDB	ethylene dibromide	20	Liquid
	Unknown FOG solution		25	Liquid
	Unknown		5	Liquid, probably an organophosphate
N.B. The above are stored in a secure shed at the rear of the Rentokil premises.				

Fiji Pesticides Inventory (continued)				
Location	**Pesticide**	**Active Agent**	**Quantity**	**Comments**
			Kg	
Navua	Dicidex	trichlorfon	11	Liquid, 19 x 1 litre containers, 8 empty
	Carbaryl	carbaryl	46.5	
	Riceclean #1	propanil	144	Liquid
N.B. The above are stored in a secure shed, and the volatile pesticides are evaporating.				
Legalega	Cycocel 750		1	Liquid
	Bayleton 125 EC		1	Liquid
	Aliette	fosetyl	3	In 1kg containers but partly used
	Phymone		4	Liquid
	Brestan 60		1	
	Manzate	maneb	1.5	
	Carbaryl 80 WP	carbaryl	6.5	
	Rogor CDP	dimethoate	3	Liquid
	Endosulfan		4	Liquid
	Nitofol		10.8	Liquid
	Lepidex	trichlorfon	5	Liquid
	Riceclean 70	propanil	5	Liquid
	Orthene	acephate	4	In a Gramoxone box
	Stam F-34	propanil	4	Liquid
	Propal	propanil	4	Liquid
	Actril DS	2,4-D	2	
	Mancozeb 80 WP	mancozeb	7	
	Foresite		1	
	ETRO 50WP		2	
	Saturn EC 50	thiobencarb	3	Liquid
	Riceclean #1	propanil	13	Liquid
	Icipon		1.5	
	Dicidex	trichlorfon	5.5	Liquid
	Sutan +		10	Liquid
	Rice spray		15	Liquid
	Tridex		5	Liquid
	Thiram 80		20	
	Embutor	2,4-DB	4.5	Liquid
	Pyrienei 48 EC		1	Liquid
	Senior		1	
	Ronilan		0.5	Liquid
	Baristin FL		1	Liquid
	Primextra 500 FW		20	Liquid
	Primextra 2		20	Liquid
	Kilval	vamidothion	1	Liquid
	Impact (Sopra)		1	Liquid
	Cobex		1	Liquid
	Lasso	atrazine	2	Liquid

Fiji Pesticides Inventory (continued)				
Location	**Pesticide**	**Active Agent**	**Quantity**	**Comments**
			Kg	
	Dimilin WP 25		0.3	
	Unknown		0.5	White powder
	MCPA		44.5	Liquid
	Manzeb	mancozeb	1.2	
	Milcarb		3	Liquid
	Diuron 90 WG	diuron	0.2	Liquid
	Cymbush 3ED		0.75	Liquid
	Septene 80		3	
	Karmex	diuron	0.5	
	Velpar K4	hexazinome & diuron	6	
N.B. The above are stored in a secure shed.				
Sigatoka				
Research	FR304/5		2	
Storeroom	Furadan 5G	carbofuran	1.5	
	Tordon		1.5	
	Vegiben 2E		1	Liquid
	Unknown			Liquid
	ETRO 50 WP	isopropcarb	4	
	ETRO 20 WP	isopropcarb	3	Liquid
Fruit &	Pymethrin	pymethrin	1	
Vegetable	Unknown		2	Liquid, 2 containers
	Benlate	benomyl	1	
	Basagran		1	Liquid
N.B. The above are stored in secure sheds.				

[i] These locations are commercial properties. The pesticides at these locations are in amounts that are too small to be managed in a commercial disposal operation and subsequently could result in a long-term community problem. Both companies have volunteered to give in-kind support to the project's operation in Fiji.

[ii] These locations are commercial properties. The pesticides at these locations are in amounts that are too small to be managed in a commercial disposal operation and subsequently could result in a long-term community problem. Both companies have volunteered to give in-kind support to the project's operation in Fiji.