

# SPREP

South Pacific Regional  
Environment Programme



# PROE

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## **Samoa POPs Project Country Plan** **(Prepared by SPREP, January 2003)**

### **1. Introduction**

The Australian Agency for International Development (AusAID) several years ago identified the mismanagement of hazardous chemicals in the Pacific Island Countries as a serious environmental concern, and hence the Persistent Organic Pollutants in Pacific Island Countries (POPs in PICs) project was developed as an AusAID funded initiative, to be carried out by SPREP. POPs are a group of twelve particularly hazardous chemicals that have been singled out by the recent Stockholm Convention for urgent action to eliminate them from the world. They include polychlorinated biphenyls (PCBs), which are mainly found in transformers, and several pesticides that are very persistent and toxic to the environment.

Phase I of the project involved predominantly an assessment of stockpiles of waste and obsolete chemicals and identification of contaminated sites, for 13 Pacific Island Countries. Other Phase I activities included education and awareness programmes in each country and a review of relevant legislation.

Samoa was a participant in Phase I of this work. A comprehensive report of this Phase I work was prepared and circulated, and significant quantities of hazardous wastes were identified in the countries visited, including estimated figures of 130 tonnes of PCB liquids and 60 tonnes of pesticides (although only about 3 tonnes of POPs pesticides). Many other hazardous wastes were also identified as well. In addition, quite a large number of contaminated sites were discovered, including six locations of buried pesticides. On the basis of this report, it was decided to proceed to the Phase II of the project, which involved the preparation of a more detailed inventory, and then collecting, transporting and disposing of the wastes, to a suitable Australian facility.

The first part (Component 1) of the Phase II work is now nearly complete, and has involved visits to each of the countries involved in the project, including Samoa, for detailed inventories to be carried out, including testing of all stockpiled transformers.

Other work was also carried out during these visits, including improving the temporary storage arrangements where necessary, and obtaining written agreement from each country for the project to proceed.

The most significant conclusion found from this next stage of the work is that the estimated amount of PCB contaminated oils was far too high. Instead of the expected 130 tonnes, only 12.5 tonnes were found. This presented an opportunity to include additional wastes in the project, and it was decided to collect and dispose of all the pesticides, rather than only the POPs pesticides (as well as all the PCB transformer oils that were confirmed positive). A total of 50,265 kg of pesticides will now be dealt with, including 1825 kg of POPs pesticides and 6542 kg of unknowns, some of which may be POPs pesticides.

A full inventory of all pesticides and PCB contaminated oils was prepared in November 2002 as the basis for bid invitations to appoint an Australian Management Contractor (AMC) to carry out the rest of the Phase II work. As a result, the Australian company GHD Pty Ltd was appointed as AMC. GHD is expected to start work shortly and it is important that all countries agree to a confirmed plan for implementing the rest of the Phase II work. The wastes will all go to the BCDT / SRL Plasma plant in Narangba, north of Brisbane.

AusAID have engaged the Australian legal firm of Blake Dawson Waldron ("**BDW**") and instructed them to provide advice in relation to aspects of the POPs Project. As part of this process BDW has asked SPREP to obtain from participating countries some information as presented in Section 4 below.

## **2. Country Inventory**

(It is possible that more wastes may be found in the categories below, prior to the time of pickup. If so, these could be added to the inventory, subject to negotiation with AusAID and the AMC.)

Samoa has **PCB Contaminated Oils** in three stockpiled transformers. At the Vaitele Depot of EPC, there were 179 transformers to test. Of these, 96 were empty, 28 tested positive with Dexsil Chlor-N-Oil 50 test kits, and two of these were later confirmed as positive by Hill Laboratories in New Zealand. At the Salelologa Power Station, 47 transformers were stored, 3 were too new to test, 8 tested positive with the test kits, and none were finally confirmed as positive. At the Tui Vaai Timber Products Company in Asau, there were 7 transformers and one tested positive. It was later confirmed as positive. It should be noted that the Dexsil kits test for all chlorine and not just chlorine in PCBs, so they are susceptible to "false positive" results.

Samoa therefore has the following **PCB Contaminated Oils** to be collected.

<b>Location</b>	<b>No of</b>	<b>Wt of Oil</b>	<b>PCB Conc</b>	<b>No of</b>	<b>Total Waste Wt</b>
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	<b>Transformers</b>	<b>(kg)</b>	<b>(mg/kg)</b>	<b>Flushes</b>	<b>(incl Flushes) (kg)</b>
Vaitele EPC	2	106	130	3	424
Depot (Upolu)		239	219	3	956
Asau Timber Plant (Sava'ii)	1	120	289	3	480
		<b>465</b>			<b>1860</b>

Samoa has the following **Pesticides** to be collected:

<b>Location</b>	<b>Chemical</b>	<b>Active Agent</b>	<b>Quantity</b>	<b>Comments</b>
			<b>Kg</b>	
<b>Vaitele Wholesale Store</b>	Afugan 30 EC	Pyrazophos+xylene	24	Liquid
	Ethrel 48	Chlorethephon	24	Liquid
	Perfekthion	Dimethoate	20	
	Milcurb	Dimethirimol	21	Liquid
	Pig wormer	Thiophanate	20	
	(Tridex unlabelled)	Trichlorfon	15	Liquid
	Saprol	Triforine+ Dimethylformamide	10	Liquid
	Karmex	Diuron	17.5	
	Basagran	Bentazone	5	Liquid
	Lannate	Methomyl	4	Liquid*
	Flea Proof Mist	Methoprene	2	
	Thiodan 35	Endosulfan	0.8	Liquid
	Sevin?	Carbaryl	0.125	
N.B. The above is all old stock in secure storage at the Wholesale Store				
<b>Vaitele Annex</b>	Not readable	Atrazine	20	Liquid
	No label	Unknown	20	Liquid
	Lepidex	Trichlorfon	15	Liquid
	Dibrom EC	Naled	15	Liquid
	Baqua Shock	Unknown	5	Liquid
	Banana Dip	Carbendazim + pyrethrum	3	Liquid
	Fusilade	Unknown	2	Liquid
	No label	Unknown	1	Liquid
	Foschek	K phosphonate		Empty containers
	Gramoxone	Paraquat		Empty containers
	Cusol	Cu Amm sulfate		Empty containers
	Tridex	Trichlorfon	1	Empty container
N.B. The above is currently stored adjacent to the main store in an old shed				
<b>Salelologa</b>	Manzate	Mancozeb	12	
<b>Agricultural Store</b>	Punch	Flusilazol	0.25	Liquid
	Perfekthion	Dimethoate	11	Liquid

	Actril	2,4-D	5	Liquid
	Bravo 50	Chlorothalonil	4	Liquid
	Escort	Metsulfuron	3	
N.B. The above is old stock in the Agriculture Retail Store				

<b>DSLE</b>	Lindane 1%	Lindane	0.05	
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### **3. Other Project Work**

#### **PCB Soil Analyses**

At both the Vaitele and Salelologa sites, there were numerous transformers that had spilled quite a lot of oil, so composite soil samples were collected from both locations and sent for analysis.

*At the Vaitele site, a low but positive result was obtained, of 0.3 mg/kg dry weight.*

*At the Salelologa site, the result was negative (<0.2 mg/kg dry weight).*

#### **Nu'u Agricultural Research Farm**

A visit was made to the Nu'u Agricultural Research Farm at Nu'u, run by the Ministry of Agriculture, Forests, Fisheries, and Meteorology (MAFFM). At this site it is estimated that about 2.5 tonnes of pesticides have been buried, in at least three locations. The main burial inspected is quite a large location, at the back of the facility. Eye-witness accounts of the burial indicated that about 3-4 large trailer loads were brought to the location and dumped here in a large unlined pit, and then covered up. No records were kept of the burial, but a senior and long-standing staff member recalled the following were buried here:

Dieldrin (10 x 1 gallon containers?)  
Dicidex (trichlorfon)  
Mocap  
Perfekthion  
2,4,5-T and 2,4-D  
Rovral  
Chlordane (in 20 litre containers)  
Lindane (in 10 litre containers)  
DDT (in 10 litre containers)  
Endrin (possibly)

This pit was reported to have been about 7 m x 4 m x 3m deep, and some of the pesticides had been apparently burnt before they were placed in the pit, posing a concern that dioxins might be present. No large drums were placed in the hole.

The other two burial locations at Nu'u were close to the main offices and stores. One was adjacent to the store where the current (in use) pesticide stockpile is kept. This was also reported to have been quite a large pit of similar dimensions to the pit described above, although not as deep (maybe 2m). No burnt materials went into this pit. The third reported burial location was just for one (5 litre?) container of a strong smelling pesticide.

### **Tui Vaai Timber Products Company**

A visit was made to the Tui Vaai Timber Products Company in Asau, Savaii. One of the purposes of the visit was to test the stockpiled transformers on the site, for PCBs. However there were other problems at this site, namely potential asbestos contamination and CCA contamination.

The oil plant for processing and treating timber has a large amount of lagging and cladding that may have been asbestos. Seven samples were taken from various locations and sent back to New Zealand (Dowdall and Associates) for analysis. Five of these samples were ruled out visually by the laboratory, and two were examined for asbestos. One was positive for white asbestos (chrysotile), and this was a pipe insulaion above pump mountings. This section of insulation has since been removed and buried in a marked location.

The old CCA (copper, chromium, arsenic) plant had an outdoor CCA storage and pressure injection system, which had subjected the surrounding ground to extensive contamination, as evidenced by the large areas of green staining. A composite sample was taken of soil from this stained area and analysed for CCA. The results were as follows:

***Total recoverable arsenic: 122000 mg/kg dry weight***

***Total recoverable copper: 106000 mg/kg dry weight***

***Total recoverable chromium: 20,500 mg/kg dry weight***

***Chromium VI: 28.8 mg/kg dry weight.***

These levels were extremely high and confirmed the extensive contamination that had taken place. It was somewhat reassuring that the chromium VI level was only 28.8 mg/kg, but as chromium VI is quite mobile, much of this may have been removed by years of exposure to rain.

### **Bluebird Hardware and Lumber**

This site was reported in the 1998 POPs Project (Stage 1) work as having a 10,000 litre storage tank full of CCA treatment chemicals, together with extensive site contamination. A large amount of work had been carried out on the site since then and the location of the former contamination had been covered by compacted fill. The old storage tank and the long pressure treatment vessel had been taken to a nearby vacant area, where the tank was inside this area and the long pressure vessel was lying on the side of the road outside. No one knew what had happened to the 10,000 litres of CCA liquid.

### **“Non-Pesticide” Chemicals**

Stockpiles of “non-pesticide” chemicals were identified in several locations, including the main hospital in Apia, the central schools store, and some other schools. Some of these chemicals (especially at the central schools store) could be used elsewhere (possibly at NUS?) and may still be used by the school.

## **4. Domestic Laws on Collection, Packaging, Transportation and Export of Hazardous Waste**

AusAID have engaged the Australian legal firm of Blake Dawson Waldron ("BDW") and instructed them to provide advice in relation to aspects of the POPs Project. As part of this process BDW has asked SPREP to obtain from Samoa (as well as all other participating countries) the following information:

- a) What are the legal responsibilities in Samoa for persons involved in collection, packaging, transportation and disposal of hazardous wastes and who are those responsibilities allocated to by the laws in Samoa.
- b) Who is the owner of the hazardous wastes in Samoa.
- c) Does Samoa have domestic legislation which allocates responsibility for POPs waste during collection, packaging and export? If so, how is this responsibility allocated? Please consider that liability and responsibility may arise from:
  - requirements to comply with clean-up notices or Government directions relating to the waste;
  - requirements to meet safety, environmental and other standards in relation to the waste; and
  - requirements to compensate others for damage to property, human health or the environment.
- d) Does Samoa have a domestic policy in relation to providing or withholding consent under the prior informed consent provisions of the Waigani Convention (Article 6) for:

- Samoa
  - any other Pacific Island Countries planning to 'transit' wastes through Samoa.
- e) Has Samoa developed a national hazardous waste management strategy in accordance with Article 4(4)(e) of the Waigani Convention? If so, how is the strategy relevant to:
- the collection, packaging, transportation and exportation of POP waste; and
  - responsibility for and ownership of the POP waste at each of the steps in (i).

Should you have any enquiries, please contact the following relevant Blake Dawson Waldron staff, Tony Hill on (02) 9258 6185 or Joanna Perrens on (02) 9258 6401 in Sydney, Australia.

## **5. Discussion**

Two transformers filled with PCB contaminated oils are located in the Electric Power Corporation (EPC) Main Depot at Vaitele near Apia. These transformers are in a pile of old transformers at the rear of the Depot, and have both been leaking. They need to be removed from the pile and placed in a safe covered area until the AMC packaging crew arrives. The ground underneath them needs to be fenced and signposted.

The other transformer is located at Asau on the Western end of Savaii, in the yard of the Tui Vaai Timber Products Company. This transformer is a small one and about two thirds of the total initial volume of oil has leaked out, presumably contaminating the ground underneath (although it could have been moved to its present site after the leak had occurred). This transformer and surrounding ground has now been fenced off to protect it until the AMC packaging crew arrives.

The pesticides in the Vaitele Wholesale Store (163.4 kg) are kept locked in a secure, clean room with controlled access. This store is in Vaitele near Apia. The annex to this Store also holds various pesticides (82 kg) and this store is in a bad condition and leaking.

The pesticides in the Salelologa Retail Store (35.3 kg) have not been secured and are just sitting as old stock on the shelves of the store. The Salelologa Retail Store is in Savaii, on the road from Salelologa.

It will probably be necessary to take about 5 cubic meters each (10 cubic meters in total) of potentially PCB contaminated soil from the Vaitele Depot and the Asau timber yard where the transformer is stored. About 50 x 200 litre drums will therefore be needed for the soil.

It has been suggested that the best way to remove the PCB contaminated oils from the transformers would be to flush the transformers with a suitable solvent such as kerosene. An estimate of the number of flushes required is given in the PCB Table above, and if this method is used, this would mean a total of 1860 kg (or about 2200 litres) of contaminated oil and solvent would need to be transported. This would require 11 x 200 litre drums. The alternative to solvent flushing is to take the complete transformer (contaminated oil plus carcasses), but then the oil will need to be drained out of the carcass and transported separately.

There is about 281 kg of various pesticides to be transported. Allowing for packaging, absorbent and the possible need for segregation, these pesticides would probably require about 5 x 200 litre drums.

The total number of drums needed is therefore 66 drums (approximately). A total of 80 drums will fit inside a 20 ft container, so only one 20 ft container will be required.

A staging location will be needed for the container, possibly on an area of land controlled by the DSLE, as it is understood that they will be the focal point agency in Samoa for the project. The filled drums will then be transported there from Vaitele, Saleloga and Asau, and all packed securely into the container according to international shipping requirements.

The local transport of the drums needs to be on safe covered trucks with good containment. About 30 drums will come from Savaii, and the sea transport on the ferry will need to be discussed with Samoa Shipping Corporation. Once the container is securely packed and all the paperwork is completed, the container will be transported to the Port for shipment.

It is also important that consent procedures are in place to process the application from GHD to the Government of Samoa to export the waste. Samoa has ratified the Waigani Convention, and needs to be ready to handle effectively, the export application, including any appropriate public consultation processes. SPREP plans to hold a workshop soon to assist countries with this consent process.

The impact on the public in Samoa should be minimal, provided everything is organized and implemented according to a well-designed management plan. The local transport routes and movement times will be part of the plan, and the only risk of public exposure will be if some incident occurs during this local transport, which leads to a spill. The basis of the management plan should be communicated to the public effectively via TV, radio, and printed media, but not in an alarmist fashion, as the risk to the public is very low.

More investigations are needed into the environmental impacts of the CCA contaminated site at Asau and the buried pesticides at Nu'u. This is now being carried out in conjunction with the preparation of the National Implementation Plan (NIP) for the Stockholm Convention.



The matter of stockpiled chemicals needs to be dealt with effectively in Samoa. They need to be inventoried and possible reuse options explored. Some simple disposal may also be undertaken, such as neutralizing acids with alkalis. It may also be useful to find a central storage location for all such chemicals.

## **6. Conclusions**

1. Samoa has three PCB contaminated transformers containing in total about 465 kg of contaminated oil (about 550 litres). If solvent flushing is used to remove all the contaminated oil, this will mean there will be about 1860 kg (about 2200 litres) of contaminated oil and solvent to be removed.
2. About 10 cubic meters of contaminated soil will also need to be removed from under the transformers that have tested positive.
3. About 312 kg of pesticides of various types will need to be picked up, mainly from Vaitele and Salelologa.
4. A total of about 66 drums will be required if the transformers are flushed. If not, the number of drums will be smaller and the transformer carcasses will also be shipped. Either way, all the wastes should be able to be managed in one container.
5. There are at least two contaminated sites in Samoa that need further investigation, namely the CCA contaminated site at Asau and the buried pesticides (in at least three locations) site at the Nu'u Agricultural Research Farm.
6. There are several stockpiles of unwanted "non-pesticide" chemicals in Samoa.

## **7. Actions**

1. The transformers containing PCB contaminated oils need to be isolated and secured, and preferably placed under cover, until they can be removed.
2. The potentially contaminated soils associated with these transformers need to be fenced off, signposted and kept secure until they can be removed.
3. The pesticides for collection need to be isolated and secured. This especially applies to the Salelologa pesticides, which are currently on shelves in a retail store. The pesticides in the Vaitele Annex should be relocated and the Annex needs to be cleaned up. It needs to be confirmed with the owners that these pesticides are definitely to be removed as part of the project.

4. A local management plan will need to be prepared for all local operations, including the determination of the location of the container while the collection operations are going on. This plan will need to address such issues as local transportation arrangements, local contact focal point, and the best way of carrying out consultation with the Samoan public on the local implementation of the project. This plan needs to be developed in conjunction with the AMC.
5. Local systems need to be put in place to ensure effective processing of the application from the AMC to export hazardous waste from Samoa to Australia. This application will be lodged under the Waigani Convention. A SPREP workshop is planned for April to assist countries with these procedures, and a Samoan representative should attend this workshop. (Financial assistance will be provided.)
6. The Asau (CCA) and Nu'u (pesticides) contaminated sites should be investigated further and possibly remediated, if investigations establish that remediation is appropriate.
7. An effective system is needed for the management of waste chemicals in Samoa, probably involving a central store, detailed inventory, reuse where possible, and disposal where possible. A short management plan should be prepared.