

# **Consultancy for In-Country Waste Oil Audit for Fiji**

**Prepared for Secretariat of the Pacific Regional  
Environment Programme (SPREP)**

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## Executive Summary

This report covers the Fiji component of a project involving waste oil audits in Fiji and Vanuatu to establish volumes of hydraulic and lubricating oils imported annually into these countries and to confirm the volumes of waste oil produced, stored or otherwise disposed. The work was carried out by Contract Environmental Ltd under a contract to the Secretariat of the Pacific Regional Environment Programme (SPREP), with funding provided by the French Development Agency. Most of the information required for the audit was obtained in a country visit to Fiji which took place from 28 Oct to 3 Nov 2012 and was organised through the Fiji Department of Environment.

The quantity of lubricating oil imports into Fiji is about 5.2 million litres per year and it is estimated that approximately half that ends up as waste oil. In addition small amounts of the 430 million litres of diesel imported into Fiji ends up in the waste oil stream. Other waste oil components come from fuel oil purifier waste, diesel waste and small amounts of hydraulic oil, brake fluid and vegetable oil. It is therefore estimated that about 3 million litres of waste oil is produced per year.

There are only two companies recovering this waste oil. Fletcher Pacific Steel (FPS) is the main company and they currently recover about 875,000 litres/year. Eco Oil is the other company and they currently recover about 680,000 litres/year. The total waste oil recovered is therefore about 1.55 million litres per year. When this figure is compared with the estimated amount of waste oil generated, the recovery rate is therefore just over 50%.

Another company called East Wind were former collectors of waste oil but they made a commercial decision to withdraw from this business. They still, however, have about 100,000 litres of waste oil of unknown quality in storage. Other stockpiles of waste oil exist but they are all at user locations awaiting ongoing re-use in combustion processes.

The FPS waste oil collection and use systems were recently audited and found to be satisfactory. The systems set up for collection were commendable. The waste oil is used to fire a high temperature steel kiln and the on-site storage and reuse of the oil met almost all requirements apart from the requirement for regular emissions testing.

FPS also occasionally sells excess waste oil to Pacific Batteries and Eco Oil also sells waste oil to Pacific Batteries, as well as Vatukoula Gold Mine Ltd (VGML), Fiji Sugar Corporation and Damelco Pots. All these industries use the waste oil for combustion processes that operate at considerably lower temperatures than the FPS combustion process and this is a concern. Low temperature combustion of waste oil is more likely to cause harmful emissions than high temperature combustion.

If only about 50% of the waste oil produced is being collected, there is clearly potential for improved collection, although both FPS and Eco Oil vigorously pursue the collection of waste oil. In addition the options for increased reuse are not that promising and all the current re-users of waste oil are probably taking all the waste oil they need.

Discussions with the Department of Environment (DOE) confirmed that poor waste oil management practices are causing problems and a visit to some industries in Nausori during the audit provided a demonstration of these poor practices. The DOE is also hindered by a shortage of monitoring equipment and a lack of compliance inspectors.

The DOE has recently submitted a waste oil management cabinet paper targeted at the main importers of oil that promotes product stewardship and increased training of oil consumers. This is a good initiative but the lack of outlets for waste oil reuse will also need to be addressed.

Local government agencies such as the Suva City Council could also be used to supplement the compliance inspectorate of the DOE and in fact they already have such compliance powers and are backed up by a Public Health Act with stronger powers than the DOE's Environmental Management Act.

One matter that needs to be addressed is the non-compliance with the Waigani Convention. FPS, Eco Oil and East Wind have all imported waste oil into Fiji without observing the protocols of the Waigani Convention.

There is also at least one initiative by others outside Fiji to collect waste oil generated in Fiji and ship it outside the Pacific. That would, however, require use of the Basel Convention and Fiji is not party to the Basel Convention.

Based on this audit of waste oil in Fiji the following recommendations are offered:

- More vigorous efforts are needed to encourage greater re-use of waste oil in Fiji. The adoption of the proposed cabinet paper would provide considerable impetus for this to happen.
- There needs to be more effective means of enforcement to prevent mismanagement of waste oil causing pollution problems.
- A closer examination is needed of the current outlets for waste oil reuse apart from FPS. There is a concern about low temperature combustion of waste oil and there is also a parallel concern that there may not be sufficient satisfactory ways to reuse waste oil.
- It would be useful to carry out an audit of the Eco Oil waste oil management practices.
- Stricter compliance with the provisions of the Waigani Convention is needed in Fiji.
- There may be good justification for Fiji becoming a party to the Basel Convention, especially if shipments of waste oil from Fiji are being considered.
- Both Fletcher Pacific Steel and Vatukoula Gold Mine Ltd require their emissions to be checked and analysed regularly but this is not done for either company as there is no local emissions testing available. An overseas company could be brought in on a regular basis to check the emissions of both companies.

#### **Summary of Confidence Levels of Data Collected**

- The data for lubricating oil imports can be taken as having a **high level of confidence** because it is based on official Bureau of Statistics data. The categories above are not exclusive to lubricating oil, however, which reduces the level of certainty somewhat.
- The figure for total waste oil produced can be taken as having a **medium level of confidence**. Some figures are accurate but several estimates have been made.
- The overall figure for waste oil recovered can be taken as having a **medium-high level of confidence**. The figure for Fletcher Pacific Steel is accurate and is based on quantities supplied to their furnace. The figure for Eco-Oil is based on their recent estimate which is significantly higher than data reported to the DOE in Lautoka. A cross-check using

estimates from Eco-Oil data on quantities delivered to individual companies does correspond quite well, however, with the latest Eco-Oil monthly figure.

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# 1. Introduction

## 1.1 Purpose

This report covers the Fiji component of a project involving waste oil audits in Fiji and Vanuatu to establish volumes of hydraulic and lubricating oils imported annually into these countries and confirm the volumes of waste oil produced, stored or otherwise disposed. The work was carried out by Contract Environmental Ltd under a contract to the Secretariat of the Pacific Regional Environment Programme (SPREP), with funding provided by the French Development Agency.

## 1.2 Scope of Work

The scope of work and the tasks to be performed were listed in the Terms of Reference as follows (in slightly modified form as the original TOR covered both Vanuatu and Fiji):

*The scope of work covers the whole of Fiji and the purpose is to establish the quantities of hydraulic oils and lubricants imported into Fiji annually, to identify the users of these oils, and to provide estimates of the waste oils generated that are potentially available for re-use.*

### Tasks

- a) *Visit Fiji to determine the information required for the audit;*
- b) *Assess the volumes of hydraulic and lubricating oils imported into each country for internal use (over the last three years);*
- c) *Identify volumes of waste oils generated by the major users (over the last three years);*
- d) *Identify existing waste oil storage facilities and current stored oil volumes;*
- e) *Identify where possible, current waste oil disposal locations;*
- f) *Identify possible end-users in country or within the relevant distribution network for the waste oil;*
- g) *Provide sufficient information to complete the summary table provided; and*
- h) *Prepare an audit balance of new oils and waste oils.*

## 1.3 Report Content and Layout

Section 2 of this report provides details of the annual oil imports to Fiji, based on the data provided by the Bureau of Statistics and others.

An estimate of waste oil generation is set out in Section 3 and Section 4 contains an assessment of waste oil recovered and how it is recovered.

Section 5 assesses waste oil stockpiles and Section 6 examines the options for in-country use of waste oil.

Section 7 sets out the discussions that were held with Government Agencies.

Section 8 provides some overall discussions and recommendations.

Then there are three appendices as follows:

- The organisational details for the Fiji visit, the notes taken during each meeting, and the list of contacts are given in Appendix 1.
- Some concerns about oil pollution in Nausori are set out in Appendix 2.
- Details of waste oil collected from ships in 2012 are presented in Appendix 3.



## 2.0 Oil Imports

### 2.1 Bureau of Statistics Information

The following data in Table 1 have been obtained from the Bureau of Statistics for 2009, 2010 and 2011. The information for 2011 excluded December 2011 and the summed information for 2011 has been increased proportionately to show a yearly figure. No information is yet available for 2012.

**Table 1 - Oil Import Data, Fiji 2009-2011**

Type of Oil	2009 (litres)	2010 (litres)	2011 (litres)	Year Average (litres)
Lubricating Oil and Mineral Turpentine	5,861,901	4,825,808	5,075,597	5,254,436
Grease	205,519	187,512	150,216	181082
Other Lubricating Oils, Min Turps and Grease	275,099	443,433	188,114	302,215
Automotive Diesel	112,757,762	391,697,149	393,037,274	299,164,062
Industrial Diesel	172,192,600	130,447,009	94,034,776	132,224,795

### 2.2 Lubricating Oil

The category "Lubricating Oil and Mineral Turpentine" is not broken down further but it is likely that only a small percentage (say 3%) of the 5.25 million litres (average figure) is mineral turpentine and most of it would be engine oil.

There is another relevant category above, namely "Other Lubricating Oils, Mineral Turpentine and Grease" which probably contains lubricating oils for unusual (perhaps non-engine) uses. As a rough estimate, perhaps 50% of the quoted figure is lubricating oils.

It is therefore estimated that there are approximately  $5.25 \times 0.97 + 0.30 \times 0.5 = 5.2$  million litres of **lubricating oil imported per year**, based on the average figure for the 3 years. Typically about 50% of this figure would be consumed during engine operation and 50% would contribute to the total waste oil produced.

The main parties importing lubricating oil are Pacific Energy, Total and Carpenters Lubricants. Carpenters import the Mobil range of lubricants and there are also no doubt other smaller companies importing lubricating oil, although this was not assessed during the visit.

**Confidence levels:** the above data for lubricating oil imports can be taken as having a **high level** of confidence because it is based on official Bureau of Statistics data. The categories above are not exclusive to lubricating oil, however, which **reduces the level of certainty** for the above lubricating oil estimate.

## 2.3 Diesel

In addition, based on data from the Fiji Revenue and Customs Authority, about 300 million litres of automotive diesel is imported into Fiji and 130 million litres of industrial diesel. This latter figure has dropped substantially and this is probably because of the recent change to mainly fuel oil at the two largest power stations in Fiji.

The industrial diesel would be used mainly in the power stations as it is a cheaper lower grade diesel. The automotive diesel would produce negligible waste oil. The industrial diesel used at the power stations would produce a small amount of waste oil, for example if it is centrifuged before use, daily draw-downs from service tanks and leaks from machinery.

## 2.4 Fuel Oil / Power Stations

Fuel Oil imports into Fiji have recently commenced for the two largest power stations in Fiji (Kinoya and Vuda) due to a recent conversion of the Wartsila units from diesel to fuel oil. The visit to Kinoya Power Station (Appendix 1 – A2.2 below) has enabled estimates to be made as follows.

Based on the interview with the Telesource Kinoya Station Manager, Kinoya uses up to 80,000 litres/day and Vuda uses up to 30,000 litres/day, although this figure does vary from day to day so it is difficult to infer annual usage from these upper limit figures. A better indication of total annual use was obtained from the Fiji Electricity Authority (FEA) who advised that a total of 18,920,614 litres/year of fuel oil was used by the FEA. There are no known other users of fuel oil in Fiji apart from occasional ship refuelling so this is probably near the total imports figure. A discussion with Neptune Pacific Line, who run frequent shipping services to Fiji revealed that they and other shipping lines rarely refuel in Fiji unless they have to do so, although there is the capability for such refuelling. This is because refuelling in Fiji is expensive compared with New Zealand and Australia.

In addition Kinoya uses approximately 120,000 litres/day diesel and Vuda uses 20,000 litres/day diesel. These figures both apply only when the diesel generators are running, which is something they both try to avoid as they are more expensive than the fuel oil generators. If it is assumed that these diesel generators run for about 30% of the time, then the combined industrial diesel consumption would be about 15,000,000 litres/year for Kinoya and Vuda.

There are six other FEA diesel operated power stations on Viti Levu and the total capacity of Viti Levu is 130 MW excluding the hydro stations. (Kinoya is 48 MW and Vuda 20 MW). The FEA also have two diesel operated power stations on Vanua Levu (Labasa and Savu Savu) and a small one on Levuka. It is not known how much diesel is consumed by these power plants, as well as Kinoya and Vuda, but they no doubt contribute substantially to the figures given for "Industrial Diesel" in Table 1 above.

## 2.5 Waste Oil from Ships

The following quantities of waste oil are picked up from ships berthing in Fiji (Details in Appendix 3). These figures were provided by the Fiji Revenue and Customs Authority who collect Excise Tax on these waste oil pickups. The figures cover only 2012 and even then not all of 2012. Advice provided by the Fiji Revenue and Customs Authority, however, revealed that they were typical figures for recent years.

**Suva:** 17/1/12-17/10/12: 543,702 litres (59 pickups with max amount 37,000 litres from the Sun Princess).

**Lautoka:** Two pickups of 5740 litres and 1500 litres in Aug/Sep 2012.

The above figures were only until mid-October 2012 at which point 549,442 litres had been collected. If this figure is corrected to a yearly figure the total would be about 630,000 litres. This is waste from the ships' purifiers (or centrifuges) and it is typically about 50% water.

### 3.0 Waste Oil Production

An estimate can therefore be made of the quantities of waste oil produced, based on the information in Section 3.2 above.

#### ***Waste oil from lubricating oil:***

The total annual quantity of lubricating oil imported is approximately 5.2 million litres of lubricating oil, based on the average yearly figure. Typically about 50% of this figure would be burnt and 50% would contribute to the total waste oil produced. The estimate of waste oil from lubricating oil is therefore **2.6 million litres**.

#### ***Waste Oil from Fuel Oil from Power Stations***

The quantity of waste oil from fuel oil produced by the Fiji Electricity Authority (FEA) is confirmed by the FEA as 40,200 litres/year. This is from the Kinoya and Vuda Power Stations. This waste oil comes from the power station centrifuges that have been provided by Wartsila when the conversion was made from diesel to fuel oil for the Wartsila units. This waste oil has been through a treatment plant that separates the water from the oil. A comment was made by the waste oil collector Eco Oil, however, that sometimes this waste oil can contain quite a lot of water. It has therefore been decided to take 75% of this figure as waste oil, i.e. about **30,000 litres/year**.

#### ***Waste Oil from Ships***

About 630,000 litres/year of waste oil is picked up from ships and it is typically about 50% water. The actual waste oil quantity would therefore be **315,000 litres/year**.

#### ***Waste Oil from Diesel and other Sources***

Diesel and other products (e.g. solvents, mineral turpentine, grease, hydraulic oil, cooking oil etc) also contribute minor amounts to the waste oil stream at say 0.01% of the lubricating oil figure, i.e. **26,000 litres/year**.

The above figures are presented in Table 2 below:

**Table 2 - Waste Oil Production in Fiji**

Source of Waste Oil	Estimated Quantities (million litres/year)
Lubricating Oil	2.6
Fuel Oil from Power Stations	0.03
Waste Oil from Ships	0.315
Waste Oil from Diesel and Other Sources	0.026
TOTAL	2.971

**Total**

The total of the above figures is 2.971 million litres. This figure can be rounded to **3.0 million litres**, given the accuracy of the estimating.

**Confidence levels:** the above figure for total waste oil produced can be taken as having a **medium level** of confidence. Some figures are accurate but several estimates have been made.

## 4.0 Waste Oil Recovery

### 4.1 Fletcher Pacific Steel (Fiji) (FPS)

FPS is the main user of waste oil in Fiji and was largely the only collector for a long period. They use the waste oil to fire their steel furnace. Their plant was audited as part of this project and the audit is described in a separate report made as a result of this visit.

They are required to make waste transport returns to the Fiji Department of Environment (DOE) and the return quantities were as follows:

	<u>Waste Oil Burnt in Furnace</u>
• September 2009 to March 2010	- 744,700 litres
• April 2010 to September 2010	- 675,730 litres
• October 2010 to March 2011	- 427,170 litres
• April 2011 to September 2011	- 447,550 litres

These quantities are based on waste oil actually burnt in the FPS furnace, rather than the total collected, but the difference would be the water that is removed, so the error is small. There is another small error in that Fletchers pick up around 1000 oil filters per year and feed them into the furnace, thus recovering about 500 additional litres of waste lubricating oil.

Based on the above figures the reported yearly oil quantity in the 09/10 year was 1,420,430 litres and in the 10/11 year was 874,720 litres. There has therefore been a dramatic drop-off in volume picked up by FPS which is no doubt due, in large part, to the recent success of their competitor Eco Oil in collecting waste oil. It is proposed to take the rounded-up 10/11 figure in order to complete the estimate of waste oil collected. The FPS figure will therefore be taken as **875,000 litres/year**.

FPS has been collecting quantities surplus to their needs in the past. They have been on-selling some (mainly to Pacific Batteries for their lead production) and also simply burning it as a service, thus acting as a waste disposal company.

### 4.2 Eco-Oil

Eco Oil (Appendix 1 – A2.4 below) has been collecting waste oil in Fiji for approximately four years, and has steadily been increasing the volumes of oil they collect. Recently the increase has been very significant and in the last six to seven months the quantity collected has gone up to 60,000 litres per month, based on reports from the company, which is a substantial increase on waste oil quantities reported in the six monthly reports to the DOE.

The DOE in Lautoka provided access to the Eco Oil waste transport return, and this indicated that for the six monthly periods from January 2010 to June 2012 they had transported 80 tonne, 100 tonne, 90 tonne, 100 tonne, 100 tonne and 120 tonne.

Eco Oil supply several users as follows:

- **Vatukoula Gold Mine (VGML)** - this is the main user of oil purchased from Eco Oil and they use the waste oil to fire their roaster. Their usage is variable, from 500 - 2000 litres/day, depending on what is happening in the mine, although usually nearer the lower end. For the purpose of this audit an average figure of 1000 litres/day has been taken. This equates to about **330,000 litres per year**, assuming a 10% plant downtime for maintenance.
- **Fiji Sugar Corporation (FSC)** - the state-owned FSC runs four sugar mills at Lautoka, Ba (Rawarai), Raki Raki (Penang) and Labasa. They have all purchased waste oil from time to time but their use is irregular. The waste oil is used for steam-raising and the steam is used for sugar processing and electricity generation. The plants normally use bagasse or sugar cane waste but this is not practical if the bagasse is too wet. At present Lautoka is the only plant taking waste oil and Eco Oil reported that in the last six months they have taken 300,000 litres. In the next six months they may, however, take very little, but other sugar mills may decide to take some. For the purposes of this audit, a figure of **175,000 litres per year** has been chosen.
- **Pacific Batteries** - this company buys waste oil (for lead production) from both Eco-Oil and Fletchers (although more recently Eco Oil) and the best usage estimate obtained by the auditors was about 10,000 litres per month on average, which equates to **120,000 litres per year**.
- **Damelco Pots** - this company buys waste oil on an irregular basis from Eco Oil for aluminium forming, when they have a need, and then they may buy and use approximately 600 litres/day. If this happens 25% of the time, then the annual usage is about **55,000 litres per year**.

The total used by the four companies supplied by Eco-Oil is therefore about **680,000 litres per year** (57,000 litres/month), which equates well with the 60,000 litres/month estimate of Eco-Oil. This figure could be verified more closely with interviews with the companies concerned, although the Vatukoula Gold Mine was interviewed and was unable to give any accurate figure for waste oil usage. This is very likely the pattern, in that the usage of waste oil with all these companies may be quite irregular and difficult to predict.

### 4.3 East Wind

East Wind (see Appendix 1 – A2.5) picked up waste oil for several years in Fiji but they are not in the waste oil collection business at present.

### 4.4 Total Waste Oil Recovered

The total waste oil recovered is therefore:

Fletcher Pacific Steel: 875,000 litres/year

Eco-Oil: 680,000 litres/year

**Total: 1,555,000 litres/year**

**Confidence levels:** the above data for waste oil recovered can be taken as having a **medium-high level** of confidence. The figure for FPS is accurate and based on quantities supplied to their furnace. The figure for Eco-Oil is based on their recent estimate that is significantly higher than data reported to the DOE in Lautoka. A cross-check using estimates from Eco-Oil data on quantities delivered to individual companies does correspond, however, with the latest Eco-Oil monthly figure.

Based on the figure in Section 3.3 above of **3.0 million litres** for the waste oil produced, Fiji is therefore recovering 51.83% of its waste oil. This could be rounded to **52% recovery (or even 50% recovery)**, given the accuracy of the estimating.



## 5.0 Waste Oil Stockpiles

East Wind has a stockpile of waste oil they have collected but they have not been able to find a user for this waste oil. This stockpile amounts to **100,000 litres** and is stored in their depot at Lami. It is surprising that this waste oil has not been taken by Fletchers or Eco Oil and this may happen in the future. East Wind has reported that they would be prepared to give the waste oil away for free.

There are also stockpiles at the main users of waste oil in Fiji, including Fletchers and Vatukoula Gold. These are stockpiles for regular use, however and they are continually being drawn down and replenished.

Eco Oil has no storage capacity for oil, which is a deliberate policy as they do not want the liability for storage. The trucks they own have a capacity of 8000 litres and 6200 litres, and they also have one standby truck of 11,000 litres. Presumably, these trucks provide some low-level standby storage.

Damelco also has a 10,000 litre tank for oil storage and this is for regular use.

## 6.0 In-Country Use Options

### 6.1 Fletcher Pacific Steel

FPS is the major current user of waste oil in Fiji and currently uses approximately 875,000 litres/year (Section 4.1 above). Their waste oil operations are described in a separate report on an audit carried out during the visit to prepare this report. The waste oil is used to fire the kiln that melts steel billets to produce reinforcing rod. Fletchers performed well with the audit, with the only major concern being that regular checks on air emissions quality were not carried out. (In-country facilities were not available for these checks.)

This figure of 875,000 litres/year is probably near the maximum use as they use no other fuel for firing their kiln and are presumably meeting the market demand for the reinforcing steel they are producing. If they increased their production then they could use more waste oil.

### 6.2 Vatukoula Gold Mine Ltd

The Vatukoula Gold Mine is estimated to use currently about 330,000 litres/year. Their demand for waste oil varies considerably and will depend to a large extent on whether they are processing a sulphur rich gold ore in their roaster, as then they need less waste oil as the sulphur acts as a fuel. Again they are probably using all the waste oil they need as Eco Oil will supply to them everything they can take.

A visit was made to the Vatukoula Gold Mine and a meeting summary is given in Appendix 1 – A2.6 below. This company is a suitable user of waste oil although there are two possible concerns from an environmental point of view:

- The operating temperature of the roaster was not determined although the question was asked of the company. Typical gold roaster temperatures are about 650°C, however, which may not be high enough to effectively destroy emissions from waste oil burning.
- There is no stack emission testing carried out although there will be emissions of sulphur oxides and also other possibly harmful emissions from the waste oil burning.

### 6.3 Fiji Sugar Corporation

The state-owned FSC sugar mills at Lautoka, Ba (Rawarai), Raki Raki (Penang) and Labasa have all purchased waste oil from time to time but their use is irregular. For the purposes of this audit, a figure of **175,000 litres per year** has been chosen (Section 4.2 above).

The mills generally use bagasse as a fuel, which is the fibrous matter that remains after the sugar cane is crushed to extract the juice. The bagasse naturally has a high moisture content, however, and if it is also wetted due to rains (especially heavy rains) it is difficult to use as a fuel. This is when waste oil is purchased and used. There are problems with this practice, however, as the oil tends to damage low-temperature refractories.

One environmental problem is that the waste oil is burnt at a low temperature (around 350°C) and may produce will almost certainly produce undesirable emission products.

## **6.4 Other Users**

Other (irregular) users of waste oil are Pacific Batteries who use the oil for lead production, and Damelco Pots who use the oil for aluminium forming to produce aluminium pots. Together these plants have the potential to use 175,000 litres/year (Section 4.2 above) although this potential may not be available every year. There were no other potential users of waste oil identified and this was confirmed by Eco Oil who has been searching for such potential users.

One possibility was the cement company operated by Fiji Industries but they currently produce cement by grinding up imported clinker and they do not therefore have a use for waste oil. A new Chinese cement works has been proposed as a possibility for Fiji and that may provide an opportunity to use large amounts of waste oil for supplementary fuel for firing the cement kiln.

## **7.0 Discussions With Government Agencies**

### **7.1 Department of Environment**

The DOE officers who liaised with the auditors were very helpful. As part of the audit, an officer Laisani Lewanavanua took one of the auditors to Nausori to see the effects of mis-managed waste oil and the results are presented in Appendix 2.

The relevant legislation is the Environmental Management Act of 2005 and the Environmental Management and Waste Disposal and Recycling Regulations 2007, effective January 2008.

DOE have recently prepared a paper on waste oil for submission to cabinet. This cabinet paper concerns a product stewardship programme, where the major oil companies will be required to pay a levy to cover the cost of waste oil management. It also includes a training programme for waste oil management. It is considered that this initiative will considerably assist with effective waste oil management in Fiji.

The DOE has three divisions - the East, which is based in Suva, and also includes the outer islands, the West, which is based in Lautoka, and the northern division, which covers Vanua Levu.

The DOE discussed the various contractors picking up waste oil, and this information is covered elsewhere. They pointed out that much waste oil is being disposed into storm-water, and this was later demonstrated by the visit to Nausori.

It was suggested that the major oil companies could play their part by training garages in the effective management of waste oil.

Lack of staff for proper compliant enforcement was a problem, although an increase in staff numbers was being planned.

There was also a shortage of equipment for monitoring.

It was also confirmed that waste oil was commonly used for marking out school sports grounds.

The Department of Environment has issued permits to several parties to collect waste oil although only two are currently operating, i.e. FPS and Eco Oil.

### **7.2 Department of Labour**

The relevant legislation is the Occupational Health and Safety Act 1996 and all relevant regulations.

The Department of Labour confirmed that they do not have the equipment to monitor air emissions. They have only workplace air detectors for hydrogen sulphide, carbon monoxide, LEL and oxygen.

They have attempted to use these at FPS on a stack emission port, but only succeeded in damaging their equipment.

They do carry out regular OSH workplace hygiene inspections, which include assessments of hazardous substance risks. Their hazardous substance checklist was provided, which includes an assessment of hazardous waste disposal methods.

## **7.3 Suva City Council**

### **3.8.3 Suva City Council:**

The main focus of the Suva City Council (SCC) is public health, and their sanitation section is responsible, among other things, for ensuring that garages, etc, manage their waste oil properly. They have an inspectorate to enforce compliance.

The Suva City Council mainly relies on the DOE, but also has health inspectors. These inspectors are, however, more interested in garbage than industrial waste.

They administer the Public Health Act (PHA), and the DOE administers the Environmental Management Act (EMA). The PHA is more powerful and has more stringent penalties than the EMA.

Urban and rural councils all operate under the PHA, and all have powers of enforcement. Routine inspections are carried out and complaints are acted upon.

The EMA requires businesses to have waste-discharge permits.

The Suva City Council requires businesses to obtain business licenses, and before these are issued compliance with the PHA is checked.

Several complaints about waste oil have been received by SCC over the years, such as buses leaking oil. Those responsible for oil spills can be prosecuted under the PHA for littering.

The SCC was aware of Fletchers as waste oil recycling agents, and they attended a workshop at Fletchers several years ago.

The other councils in the Suva area are the Lami Town Council, the Nasinu Town Council and the Nausori Town Council. SCC works closely with these town councils and there is the potential they could work together to manage waste oil issues. The town councils also issue business licenses.

## **7.4 Department of Customs**

The auditors also visited the Department of Customs, where they were advised that the Department of Customs was the focal point for Waigani Convention. Fiji is not signatory to the Basel Convention, and this matter was also discussed. The auditors discussed the benefits that might accrue to Fiji if they were party to the Basel Convention.

Customs confirmed that a levy of two cents per litre is imposed on waste oils unloaded from marine vessels at Suva and Lautoka. The issue of vessels importing waste oil from other countries was discussed. Most cargo vessel port calls are on a regular rotation so waste oil off-loads should be consistent. Customs does not audit the volumes to identify unusually large off-loads which could indicate an import from another country.

Various shipments of hazardous substances were discussed and it was noted that in some cases proper documentation was not being prepared. The Department of Custom agreed to advise on quantities of waste oil being picked up from Suva and Lautoka ports. This information was later supplied (see Appendix 3).

## 8.0 Discussion and Recommendations

The quantity of lubricating oil imports into Fiji is about 5.2 million litres per year and it is estimated that approximately half that would end up as waste oil. In addition small amounts of the 430 million litres of diesel imported into Fiji would end up in the waste oil stream.

The other main component of the waste oil stream arises from purifying fuel oil (removing the water). This generates a waste that is about 50% water and 50% oil. About 94% of the waste in this category is collected from ships visiting Fiji and the rest comes from the two power stations that use fuel oil. The actual waste oil in this waste stream would be about 345,000 litres. Small amounts of other types of oil also end up in the waste stream, such as hydraulic oil, brake fluid and vegetable oil used for cooking. It is therefore estimated that about 3 million litres of waste oil is produced per year.

There are only two companies recovering this waste oil. Fletcher Pacific Steel (FPS) is the main one and they currently recover about 875,000 litres/year, although they used to recover substantially more (about 1.42 million litres/year). Most of this drop in waste oil recovered by FPS can be accounted for by the vigorous entry of a recent waste oil collector into the market, namely Eco Oil. As well as picking up a substantial amount (probably about 38%) of the waste oil formerly collected by FPS, including all the FEA waste oil, they have tapped into some new sources of waste oil. Eco Oil's entry into the market has been aided by the fact that they pay for the waste oil they collect and FPS has a policy of not paying for the waste oil they collect.

It is estimated that Eco Oil now collects approximately 680,000 litres/year. It should be emphasised that Eco Oil was not audited as part of this project as this was not included in the project brief.

The total waste oil recovered is therefore about 1.55 million litres per year. When this figure is compared with the estimated amount of waste oil generated, the recovery rate is therefore just over 50%.

Another company called East Wind were former collectors of waste oil but they made a commercial decision to withdraw from this business. They still, however, have about 100,000 litres of waste oil of unknown quality in storage and they want to get rid of this waste oil at no charge. Other stockpiles of waste oil exist but they are all at user locations awaiting ongoing re-use in combustion processes.

The FPS waste oil collection and use systems were recently audited and found to be satisfactory. The systems set up for collection were commendable. The waste oil is used to fire a high temperature steel kiln and the storage and reuse of the oil met all requirements with the exception of a lack of suitable testing of the stack emissions. There are some mitigating circumstances, however, as the technology for carrying out this testing is not available in Fiji. Also there were no visible signs of problems, although there may still be harmful emissions that are not visible.

FPS also occasionally sells excess waste oil to Pacific Batteries and Eco Oil also sells waste oil to Pacific Batteries, as well as Vatukoula Gold Mine Ltd (VGML), Fiji Sugar Corporation and Damelco Pots. All these industries use the waste oil for combustion processes that operate at considerably

lower temperatures than the FPS combustion process and this is a concern. Low temperature combustion of waste oil is more likely to cause harmful emissions than high temperature combustion.

VGML take a large percentage of the waste oil collected by Eco Oil and there is potential for their emissions to be harmful. As with FPS, their discharge consent requires them to regularly measure the quality of their emissions but they are also handicapped by a lack of local technology for measuring these emissions.

If only about 50% of the waste oil produced is being collected, there is clearly potential for improved collection, although both FPS and Eco Oil vigorously pursue the collection of waste oil. In addition the options for increased reuse are not that promising and all the current re-users of waste oil are probably taking all the waste oil they need. A new cement kiln that may be constructed would provide an excellent high temperature combustion opportunity for using waste oil. Possibly the sugar industry could use more waste oil, although the low operating temperature may present pollution problems and the issue of refractory damage would need to be overcome.

Discussions with the Department of Environment (DOE) confirmed that poor waste oil management practices are causing problems and a visit to some industries in Nausori during the audit provided a demonstration of these poor practices. The DOE is also hindered by a shortage of monitoring equipment and a lack of compliance inspectors.

The DOE has recently submitted a waste oil management cabinet paper targeted at the main importers of oil that promotes product stewardship and increased training of oil consumers. This is a good initiative but the lack of outlets for waste oil reuse will also need to be addressed. If the initiative is successful then other uses for waste oil need to be considered such as power generation (which has already been considered by FPC). Alternatively the excess waste oil could be shipped to suitable parties overseas.

Local government agencies such as the Suva City Council could also be used to supplement the compliance inspectorate of the DOE and in fact they already have such compliance powers and are backed up by a Public Health Act with stronger powers than the DOE's Environmental Management Act.

One matter that needs to be addressed is the non-compliance with the Waigani Convention. FPS, Eco Oil and East Wind have all imported waste oil into Fiji without observing the protocols of the Waigani Convention. The Department of Customs is the focal point of the Waigani Convention although it was not confirmed whether they were aware of these illegal waste oil imports.

There is also at least one initiative by others outside Fiji to collect waste oil generated in Fiji and ship it outside the Pacific. That would, however, require use of the Basel Convention and Fiji is not party to the Basel Convention.

The following table provides a summary of the key information that was requested in the Terms of Reference:



**Table 3: Summary of Key Information on Waste Oil for Fiji**

<b>ANNUAL OIL IMPORT VOLUME (LITRES/YEAR)</b>	<b>ANNUAL WASTE OIL VOLUME ESTIMATE (LITRES/YEAR)</b>	<b>CURRENT STOCKPILE OF WASTE OIL ESTIMATE (LITRES)</b>	<b>ORGANISED COLLECTION BY?</b>
5.2 million litres/year	3 million litres/year	100,000 litres	Fletcher Pacific Steel and Eco Oil
<b>DIRECT CONTAINER SHIPPING ROUTE TO FIJI?</b>	<b>SHIPPING COSTS (APPROX. FOR A 20FT CONTAINER)</b>	<b>CURRENT REGULATORY DRIVERS?</b>	<b>PARTY TO BASEL/WAIGANI?</b>
Yes	US\$2000	Cabinet Paper Prepared	No/Yes

Based on this audit of waste oil in Fiji the following recommendations are offered:

- More vigorous efforts are needed to encourage greater re-use of waste oil in Fiji. The adoption of the proposed cabinet paper would provide considerable impetus for this to happen.
- There needs to be more effective means of enforcement to prevent mismanagement of waste oil causing pollution problems.
- A closer examination is needed of the current outlets for waste oil apart from FPS. There is a concern about low temperature combustion of waste oil and there is also a parallel concern that there may not be sufficient satisfactory ways to reuse waste oil.
- It would be useful to carry out an audit of the Eco Oil waste oil management practices.
- Stricter compliance with the provisions of the Waigani Convention is needed in Fiji.
- There may be good justification for Fiji becoming a party to the Basel Convention, especially if shipments of waste oil from Fiji are being considered.
- Both Fletcher Pacific Steel and Vatukoula Gold Mine Ltd require their emissions to be checked and analysed regularly but this is not done for either company as there is no local emissions testing available. An overseas company could be brought in on a regular basis to check the emissions of both companies at the same time to save costs.



# Appendix 1 – Organisational Details and Meeting Summaries

## A1. Organisational Details

The visit to Fiji took place from 28 Oct to 3 Nov 2012. The consultants were Boyne Drummond and John O'Grady. They were based in Suva but John O'Grady also took a trip around the island of Viti Levu.

The primary agency for liaison was the Fiji Department of Environment, and the following personnel were involved:

Lote Rusaqoli, Acting Principal Environment Officer

Laisani Lewanavanua, Senior Environmental Officer

Rahul Dutt, Senior Environmental Officer

These officers were very helpful and provided considerable support during the visit.

Numerous other people were visited and considerable assistance was willingly provided. Full contact details are given in Section A3 below.

## A2. Meeting Summaries

### A2.1 Oil Companies (Including Subsequent Correspondence)

#### **Pacific Energy**

Pacific Energy reports to DOE on their main terminal at Reservoir Rd Suva and 2 depots at Nausori and Juhi Nadi. Waste disposal returns are made 6 monthly. The permit for waste liquid disposal at Reservoir Rd is 8,000 litres per day.

Waste oil from the Nausori and Nadi depots is transported to Reservoir Rd, and then collected by FPS.

According to the waste oil returns, waste oil generated by Pacific Energy is approximately 32,000 litres per year including waste oil from Savusavu. This waste oil is collected by Fletcher Pacific Steel, although petroleum slops are sometimes blended back into the bulk tanks at the recommended ratio after conducting fuel tests.

#### **Mobil / Carpenters**

Mobil does not import any lubricating oil directly and it is all done through Carpenters. Import figures have been obtained from Carpenters (contact is Daven Gounder) for Mobil products as follows:

- Engine Oil – 4 kilobarrels or 636,000 litres

- Hydraulic Oil – 2 kilobarrels or 318,000 litres
- Brake Fluid, Coolants etc – 1 kilobarrel or 159,000 litres

Carpenters advise that the majority of their major customers use Fletcher Pacific Steel to dispose of their waste oil.

**Total**

Total supplied the following information:

Import quantities in metric tonnes are as follows:

Metric tonnes lubricants and greases				
2012	2011	2010	2009	2008
1,840	1,534	1,739	2,052	480

Note - 2008 figure is for October to December only (change-over from JD Edwards to SAP, pre October figures not available).

Waste oil (slops) removal from our sites is to Fletcher Pacific Steel. Labasa, Taveuni and Levuka Depots collect their waste oil and ship to Suva for pick up by Fletcher from the Total Suva Terminal. Fletcher picks up directly out of the Total Vuda Terminal. On average Fletcher picks up approximately 50T per year from each of our main Terminals (Suva and Vuda).

Fletcher also picks up from Total service stations but these volumes are not currently recorded.

**A2.2 Telesource (Fiji) Ltd**

Telesource (Fiji) Ltd operates the Kinoya (Suva) and Vuda (Lautoka) Power Plants under contract to the Fiji Energy Authority (FEA). Telesource, which has its headquarters in Chicago, has a lease contract with FEA for 20 years, from 2003, to operate these power stations.

The Kinoya Power Station is 48 megawatts capacity, and the Vuda Power Station is 28 megawatts, although it has recently been downgraded to 20 megawatts. FEA also operate two further thermal power stations in the centre of Fiji, three in western Fiji and one in the interior. It also operates two power stations in Vanua Levu, at Labasa and Savu Savu. There is also a small power station on the island of Levuka.

Power generation in the rest of Fiji, on Taveuni and the many smaller islands, is covered by the Rural Electrification Programme using small generators, and there is also quite a strong move into solar power.

There are also three hydro power stations – two in Viti Levu, and one on Vanua Levu, at Savu Savu.

The maximum demand on Viti Levu is approximately 130 megawatts.

The Wartsila generators at Kinoya have recently been converted from diesel to heavy fuel oil, and a similar conversion is taking place at Vuda. The Caterpillar generators continue to use diesel. The heavy fuel oil goes through newly installed purifiers, and the waste from the purifiers passes through an oil-water separation treatment plant. Eco Oil won the contract to collect this waste oil.

The volume of waste oil produced at Kinoya is approximately 30,000 litres per year. The oil-water treatment plant was not working at the time of the visit. It uses a system of caustic injection, flocculation and cyclone-separation.

The tank farm was inspected. It holds one storage tank holding about 100,000 litres of fuel oil and several smaller tanks (see Photo 1). Every week a tanker-trailer unit delivers enough fuel oil to keep this tank full, and current usage is approximately 80,000 litres a day. Also in the tank farm is a 15,000 litre sludge tank, a 15,000 litre buffer tank used for settling and storage, a 10,000 litre oily water tank and a 2000 litre day tank for separated oil ready to be pumped to the generators.

In addition, the four Caterpillar units use approximately 120,000 litres a day in total when they are running, although the preference is not to use the Caterpillar units. Diesel Storage is shown in Photo 2.



**Photo 1 - Kinoya Tank Farm**



**Photo 2 - Diesel Storage**

Vuda Power Station also has two converted Wartsila units and two other diesel-operated units, and uses approximately 30,000 litres of heavy fuel oil per day, in addition to its diesel consumption.

### **A2.3 FEA Headquarters - Suva**

The contracts for supply of fuel, transformer and lubrication oils are with Total and Carpenters Lubricants. FEA has conducted trials to blend waste oil in with their fuel oils, but results were unsatisfactory.

FEA reported the following information subsequent to the visit:

Total quantities used in all their power stations:

Diesel	64,190,456 litres
Fuel Oil	18,920,614 litres
Lube Oil	267,764 litres

Total amount of waste oil generated for collection - 40,200 litres

This waste oil is collected by Eco Oil throughout Fiji and FEA do not know what Eco Oil does with the waste oil.

#### A2.4 Eco Oil

Eco Oil has been collecting waste oil in Fiji for approximately four years, and has steadily been increasing the volumes of oil they collect. In the last six to seven months, this has gone up substantially to 60,000 litres per month. They have no storage capacity for oil, which is a deliberate policy as they do not want the liability for storage. They have a yard in Ba for parking their two trucks.

The auditors were not invited to Eco Oil's site and so were not able to audit and verify the quality of Eco Oil's operation. Furthermore an audit of Eco Oil's operation was not part of the project brief. It should be noted, however, that Eco Oil is approved by the Fiji Department of Environment as a waste oil collector.

Eco Oil's trucks have a capacity of 8000 litres and 6200 litres, and they also have one standby truck of 11,000 litres. Presumably, these trucks provide some standby storage.

They employ six to eight people, and can call on ten extra personnel, as needed. They have two drivers per truck.

They have a policy of leaving 1000 litre IBCs, and also 200 litre drums for their clients to fill up with waste oil. They also have a policy of ensuring that their customers maintain a clean site and they will do the clean-ups, if necessary.

They do all the pickups from FEA, and they advised that the oil from the Kinoya Power Station sometimes has a high percentage of water. They pick up significant amounts of engine oil but rarely pick up transformer oil or hydraulic oil because of the low heat capacity of these oils. They are able to drain off some water from the waste oil, after it has been separated from oil, from their trucks. In the rainy season there is less oil from the power stations because FEA has more capability to run their hydro stations.

Eco Oil collect waste oil from ships berthing at Lautoka, and also occasionally Suva. The oil from ships is collected for free, but Eco Oil pays for all other waste oil. They consider that this encourages everyone to value the oil, and also to keep their sites clean.

Eco Oil is considering building a plant to remove the water from their waste oil, but they do not see any urgency to undertake this step.

They provide other oil services, such as tank cleaning and cleaning up oil spills.

They have imported oil from Kiribati in a 20-foot container (80 drums) but they did not follow Waigani protocols and were not aware of the need to follow these protocols.

They also take oil from water companies, hotels, resorts (including those on outer islands), yachts, vehicle servicing companies and cooking oil from food outlets, including McDonalds. They get waste oil from the outer islands and they are hoping to increase this source of waste oil. All the resorts have generators and the villages on the outer islands have generators too. Yachts are a good source of small quantities of waste hydrocarbon in the form of bilge slops as they burn diesel for generators. Bilge slops are often caused by engine oil leaks into the bilge.

Eco Oil claims to be the sole supplier to Vatukoula Gold Mines, Damelco Pots, Pacific Batteries and the sugar mills. They advised that Damelco has a 10,000 litre tank. Eco Oil provides numerous other services to Vatukoula Gold, besides supplying them with waste oil. They took over the contract with the gold mine from East Wind.

Eco Oil stressed the importance of education in making sure that their clients keep their sites clean and free from oil spills. They photograph all sites to ensure they are clean, and they have a signing-off process in place.

Eco Oil does not collect oil filters.

There is an Indian buyer of waste oil, who has been contacting Eco Oil regularly to buy waste oil. His name is Mr Sumit of Jhoola Company of Calcutta. The waste oil may first be going to Singapore for processing, and he has already taken a shipment of waste oil from Vanuatu.

The DOE in Lautoka provided access to the Eco Oil waste transport return, and this indicated that for the six monthly periods from January 2010 to June 2012 they had transported 80 tonne, 100 tonne, 90 tonne, 100 tonne, 100 tonne and 120 tonne. Their sources were quoted as ASCO, Fiji Water, Lautoka Port, FEA and various garages. The destinations were quoted as Vatukoula Gold and Pacific Batteries.

## **A2.5 East Wind**

East Wind picked up waste oil for several years in Fiji but they are not in the waste oil business at present. East Wind were reported to be collecting about 700,000 litres per year when they were operating.

Previously Eastwind collected waste oil from FEA, the garages and bus companies. They were supplying the sugar mills approximately 500,000 litres per year. Their policy was not to pay for waste oil and to sell it for an average price of about 15 cents per litre.

In about 2002 Eastwind arranged 2 shipments each of 16,000 litres in drums from Kiribati to Fiji and the oil went to FSC Sugar Mills. The shipments were completed without transboundary notifications and they were not aware of the Waigani Convention.

East Wind's main business now is drum reconditioning and tank fabricating as well as providing support to the petroleum industry. They also undertake tank cleaning. They have a contract with Mobil to service their petrol stations.

It was confirmed that they have about 100,000 litres in stock at their yard at Lami. They cannot collect any more as their storage is full. Up to 2011 they were supplying FSC Ba mill, who were buying about 500,000 litres per year.

They use a waste oil interceptor on their Lami site and the water produced is disposed to ground.

East Wind was recently visited by an agent wanting to buy oil for India. The offer was US\$280 per tonne, provided Eastwind pays the freight to Singapore. MD believes that shipping in 200 litre drums it is not possible to cover the costs for US\$280/T. The companies involved are Synergy Oil in Singapore and Jhoola Refinery in India.

The auditors commented that it would currently not be possible to legally ship waste to Singapore or India because Fiji is not a signatory to the Basel Convention. Both the Export and Import Countries must be ratified parties to the Basel Convention in order for the transboundary movements to be arranged. In this case India is a party but Fiji is not, so the Basel Convention cannot be used. Similarly India is not a party to the Waigani Convention.

East Wind owns a drum reconditioning plant located at Lautoka. It is not operating because they have issues with the discharges of drum washing liquids. East Wind would like to buy an incinerator to burn waste oil and industrial waste and use the steam in the drum plant.

East Wind commented that one problem associated with providing collection drums/tanks to waste oil generators is that under the new EMA regulations, the provider of the collection vessel is responsible for any pollution caused by and around the collection vessel. This is a disincentive for collection companies.

## **A2.6 Vatukoula Gold Mine Ltd (VGML)**

VGML took over from Emperor Gold Mine as operators of the mine in 2006. VGML said that when they took over the plant from Emperor Gold Mine, Emperor had left a significant mess for them to clean up.

Upon taking over the plant, VGML put out a tender for waste oil supply. East Wind won the first tender but supplied unsatisfactory quality oil. Eco Oil then started up their business and were taken on as the waste-oil supplier. They supplied better quality oil and also maintained the waste-oil system overall, in addition to carrying out clean-ups, including cleaning the bunded areas and separator pits. Eco Oil provides a good service now, although initially their oil handling required improvement. Eco Oil, once they understood the VGML concerns, responded well to these concerns about waste oil handling and there are now no issues. Eco Oil also maintains the separator pits.

The waste oil is used on site to operate the high-temperature roaster that is used to bake the gold ore and extract the gold. The on-site waste-oil storage capacity consists of two tanks at 4400 litres,



and one tank at 5200 litres, giving a total storage capacity of 14,000 litres (see Photo 3). The waste-oil tanks are bunded and the company has an emergency-response plan in place for managing spills.

Eco Oil visits the site every three to four days. Occasionally, waste oil is rejected because of obviously high water content or impurities. This check is a visual one only. It is not known what Eco Oil does with the rejected waste oil.

The person spoken to at VGML did not know the operating temperature of the roaster, or the quantities of waste oil used per month, and advised that they would find out and let the auditor know. This never happened and subsequent follow ups were not successful either. The roaster runs on a daily cycle, where it is brought up to operating temperature (thought to be about 650°C based on typical gold roaster temperatures), but is kept hot at a lower temperature on a 24-hour basis 365 days a year, except for short scheduled maintenance periods.

The plant produces heavy grease and tar, and VGML currently has no way of disposing of this waste. The plant also produces waste grease, which Eco Oil is able to take, for payment. They also take some hazardous wastes. VGML does not know what Eco Oil does with this waste and it is not known what happens to it.

They have a discharge permit for the discharge to air from the roaster which requires them to advise the DOE annually what the discharge levels are. They have never been able to meet this condition, however, because of there is no-one available locally to measure the discharge. Ambient monitoring at several locations was carried out around the site in 2004 by Emperor and only low levels of sulphur oxides and particulates were found. The mine is attempting to procure the services of an overseas air-monitoring company, but is finding such services to be very expensive.

It was not possible to go into the site to look at the waste-oil storage and roaster as gate passes needed to be arranged at least two days beforehand and the auditor was not made aware of this requirement prior to the visit. The auditor was, however, permitted to inspect the waste-oil tanks, roaster and stack from a distance. (Photos 3, 4, and 5 below).



**Photo 3 - VGML Waste Oil Storage**



**Photo 4 - VGML Stack**



**Photo 5 - VGML Plant/ Roaster**

### **A3. List of Contacts**

#### *Department of Environment*

Lote Rusaqoli, Acting Principal Environment Officer  
Laisani Lewanavanua, Senior Environmental Officer  
Rahul Dutt, Senior Environmental Officer  
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Ph: +679-3311699

#### *Ministry of Labour, IR and Employment*

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#### *Suva City Council*

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196 Victoria Pde, Civic Admin Bldg, PO Box 176, Suva  
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#### *Fiji Revenue and Customs Authority*

Nacani Drew, Manager International Relations  
Tevita Tupou, National Manager Customs, Risk and Compliance  
Josevata Qalubau, Senior Customs Officer and Environment Enforcement Officer  
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#### *Pacific Energy*

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*Fletcher Pacific Steel (Fiji)*

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Mukhtar Khan, Production Manager  
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*Eco Oil*

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*East Wind*

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## Appendix 2 - Nausori Light Industry

Laisani Lewanavanua from DOE took John O’Grady to visit several waste oil generators in Nausori. Some unfortunate examples of water pollution were noted, with streams and storm-water channels badly contaminated with waste oil, which would have flowed into the nearby river (Photos 6 and 7). Several vehicle workshops were visited, which had a poor standard of cleanliness, with oil all over the floor and in the yard, and discharges to stormwater (Photo 8). There were numerous examples of open burning of waste oil containers and oil filters (Photo 9).



**Photos 6 and 7 - Examples of Stormwater Contamination**



**Photo 8 - Poor Oil Housekeeping**



**Photo 9 - Open Burning**

Discussions were held with a diesel servicing company, who strongly complained about the lack of waste-management services by the Nausori Town Council, although they appeared to be making no effort to manage their waste oil. They had a small tank which they said Fletchers had supplied to them, and they maintained they called Fletchers once per month, when it was nearly full, for Fletchers to collect. In later discussions with Fletchers, however, Fletchers advised that they had

never had any dealings with this company, and when shown a picture of the tank, Fletchers said it was definitely not one of their tanks.

The manager of this company also advised that they occasionally gave waste oil to schools for marking their playgrounds and sports fields (the auditors later discovered this was quite common in Fiji). They also occasionally supplied timber companies, which apparently painted the waste oil on timber as a preservative.

This company, and other companies, advised that they used sawdust to mop up spills, and when asked how they disposed of the sawdust, advised that they burnt it.

The Environment Department has the power to issue spot fines, and Laisani Lewanavanua advised that the DOE regularly issued such fines, although they were only approximately \$40 and failed to act as much of a deterrent.

The diesel servicing company also had a wheelie bin full of oil filters, and they advised that a waste-management company called Waste Care collected these filters at the rate of \$150 for three containers, and then took them to the landfill.

Laisani Lewanavanua also took the auditor to several locations along the river where industrial waste had been dumped, including waste oil and oil filters (Photo 10). Apparently, the lack of suitable industrial refuse-disposal facilities encourages such illegal dumping. Waste-management contractors charges are costly to collect such waste and dispose to the landfill. Individual companies can also dispose of waste at the landfill, but they need a waste-disposal permit, which costs \$3000 for three years, plus \$26 per visit to the landfill, plus the cost to hire a truck. Clearly, there is a need for a transfer station in Suva that accepts such waste for a reasonable charge. The DOE is aware of this matter and various options are currently being considered.



**Photo 10 - Waste Dumping by River**



### Appendix 3 - Waste Oil from Ships

SLUDGE REPORT 2012 - SUVA PORT		
DATE	VESSEL NAME	DISCHARGE LITRES
17/01/2012	SOUTHERN PEARL	4,000
20/01/2012	DANNY ROSE	10,000
8/02/2012	SOUTHERN PEARL	4,000
10/02/2012		30,000
22/02/2012	DANNY ROSE	10,000
25/02/2012	PACIFIC PEARL	20,000
25/02/2012	SEABOURN ODYSSEY	6,000
29/02/2012	SOUTHERN PEARL	6,000
7/03/2012	MT HERACLES	5,610
13/03/2012	PACIFIC JEWEL	20,000
15/03/2012	REAGATTA	6,000
21/03/2012	JIN TSAI FU # 168	1,500
23/03/2012	SUN PRINCESS	37,000
27/03/2012	SOUTHERN PEARL	6,000
2/04/2012	DANNY ROSE	10,000
10/04/2012	FV SHOJIN MARU 38	6,000
17/04/2012	VOLENDAM	15,000
18/04/2012	SOUTHERN PEARL	6,000
30/04/2012	HELIOS	4,500
7/05/2012	DANNY ROSE	12,000
9/05/2012	SOUTHERN PEARL	6,000
13/05/2012	DAWN PRINCESS	6,000
13/05/2012	DAWN PRINCESS	6,000
15/05/2012	LATALANTE	12,000
29/05/2012	YING JEN # 366	2,000
31/05/2012	SOUTHERN PEARL	8,000
3/06/2012	BORAL GAS	5,000
7/06/2012	PACIFIC DAWN	12,000
13/06/2012	OSLO BULK 4	11,000
14/06/2012	MICRONESIAN PRIDE	6,000
14/06/2012	MICRONESIAN PRIDE	3,000
15/06/2012	PACIFIC JEWEL	12,000
18/06/2012	STENA PARIS	6,000
25/06/2012	SOUTHERN PEARL	6,000
25/06/2012	PACIFIC GAS	4,092
19/07/2012	MICRONESIAN PRIDE	6,000
19/07/2012	SOUTHERN REEF	6,000

26/07/2012	DANNY ROSE	10,000
28/07/2012	RHL AURORA	8,000
4/08/2012	SOUTHERN PEARL	10,000
7/08/2012	SOUTHERN REEF	8,000
9/08/2012	STENA PARIS	5,000
15/08/2012	MV SOUTHERN PEARL	6,000
15/08/2012	JIN TSAI FU # 888	1,000
22/08/2012	MICRONESIAN PRIDE	11,000
31/08/2012	DANNY ROSE	12,000
3/09/2012	SOUTHERN PEARL	6,000
5/09/2012	SUN PRINCESS	30,000
10/09/2012	PACIFIC PEARL	18,000
14/09/2012	MCP KOPENHAGEN	12,000
25/09/2012	SOUTHERN LILY 2	6,000
25/09/2012	SOUTHERN PEARL	6,000
27/09/2012	REEF SAMOA	5,000
27/09/2012	SOUTHERN CROSS	6,000
3/10/2012	DANNY ROSE	10,000
9/10/2012	PACIFIC GAS	10,000
13/10/2012	CARNIVAL SPIRIT	12,000
16/10/2012	SOUTHERN PEARL	7,000
17/10/2012	DAWN PRINCESS	16,000
<b>TOTAL</b>		<b>543,702</b>

In addition two collections were made at **Lautoka** as below:

DATE	VESSEL	ROTATION	DESCRIPTION	QUANTITY
21.08.2012	SARA THERESA	12/311	Waste Oil (Sludge)	5740ltrs
17.09.2012	CMA CGM MATTISE	12/347	Waste Oil (Sludge)	1500ltrs