

USED OILS AUDIT SURVEY

An audit survey of used oils in Samoa

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April 16th 2012

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1.0 Abstract

- 1.1 Total importation of lubricating oils into the country is approx 660,841 litres per annum (averaged over 3 years) and includes hydraulic oils
- 1.2 Major end users of lubrication oils are in :
 - Power generation – Electric Power Corporation
 - Shipping – Samoa Shipping Corporation
 - Transportation – Bus and Haulage Operators
 - Construction Industry – Machinery and Equipment
 - Auto Garages – Vehicles servicing
- 1.3 Other end users of lubrication oils are :
 - Local commercial Fishing
 - Manufacturing Industry – Machinery and Equipment
 - Transport – company fleets, taxi operators
 - Other – DIY customers
- 1.4 Used oils removed from motor engines during an oil change, are frequently discarded into the environment, resulting in pollution of both aquatic and terrestrial ecosystems. Very little is known in Samoa about used oils generation, utilisation, and disposal. These factors were investigated using in-depth interviews across the end users as identified in 1.2 and 1.3 above and are discussed further in Section 5.0 Findings.
- 1.5 There is nil to insignificant volumes in re-export of lubrication oils
- 1.6 Uses of used oil included coating roofing, timber, fencing posts, marking play grounds, as a rust preventative, weed killer and dust suppressant. It's disposal also involved burning and pouring in the environment.
- 1.7 Lack of policy and information for proper handling of used oils contributed to the poor management of used oil exhibited
- 1.8 No structured collection and storage system exists in Samoa for used oils

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2.0 Introduction

It is an established fact that used oils has the potential to impact health and the environment.

This specific study is concentrated on establishing the volume of used oil generated and the uses and disposal from the generators in many service and industrial activities such as auto repair, machinery lubrication, hydraulic repair, power generation and transportation

It is important that used oil be properly disposed to prevent potential pollution of the environment, surface water and groundwater. Used oil can contain cancer-causing agents, metal contaminants, and organic compounds that filter into the groundwater supply when used oil is dumped, spilled or sprayed, and can result in serious hazards to human health

Used oil is defined here as any oil that has been used and as a result of such use is contaminated by physical or chemical impurities. Animal and vegetable oils are excluded from the definition of used oil

Waste oil is defined here as normal used oil that has been mixed or contaminated with other waste eg oily rags, general rubbish, other fuels slops etc

Oil changing operations are normally performed at auto garages, however, there is a significant number of individuals (DIYs) that change their vehicle oil and indiscriminately dump it

It has been proven in numerous studies over the years that used oil has the potential to do harm, this study also seeks to estimate the threat of this very common hazardous substance to Samoa

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3.0 Terms of Reference

- 3.1 Establish total annual volumes of lubricating oils and hydraulics oils imported into Samoa over the period 2009, 2010, 2011
- 3.2 Determine subsequent used oils generated from usage activities and their current means of collection and storage
- 3.3 Identify existing practices of used oil disposal and in particular by the major used oil generators
- 3.4 Identify opportunities for effective used oil collection and storage available in country
- 3.5 Identify practical opportunities, both locally and off shore for the effective disposal of used oils
- 3.6 Establish an audit balance of imported oils with used oils for Samoa

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4.0 Methodology

4.1 Total importation of lubricating oil volumes are recorded by the Samoa Customs & Revenue Department.
Customs & Revenue records include:

4.1.1 Names of importers

4.1.2 Country of origin for the imported lubrication oils

4.1.3 Grade of lubrication oil

4.1.4 Quantity in volume (litres) or weight (kgs) as applicable

4.1.5 Re-export of lubrication oils through duty draw-back process

4.2 A descriptive cross sectional questionnaire using quantitative methods was used to answer the questions that guided the survey and together with observations were utilised to obtain data [[copy of questionnaire format in Attachments](#)]

4.3 Face-to-face interviews took place at the various work places, which allowed direct observation of practices in regards to used oils collection and storage.

Users were asked for documentations to confirm if they have management plans in place to deal with used oils

Three interviewers were used for the study, 2 in Upolu and 1 in Savaii

4.4 Survey was conducted in both Upolu and Savaii.

The study population was comprised of and concentrated on the major users of each category :

4.4.1 EPC power stations at Tanugamanono and Salelologa

4.4.2 Samoa Shipping Corporation

4.4.3 Auto Garages (3 out of 5) – Asco Motors, Hyundai Motors, HJ Keil

4.4.4 Service Stations (11 out of 15) – Maluafou, Vaiala, Apia Park, Vailoa, Nofolii, Savaii (3 sites), Lepea, Vailele, Faleula

4.4.5 Transport and Haulage Operators (8 out of 14) – Ott, Silva, Bluebird, Ah Liki, Lucky, Ulia, Betham Bros, PPS

4.4.6 Construction companies (5 out of 8) – Ott, Silva, Ulia, Bluebird, Lucky, Ah Liki

4.5 Interview and site visit to Tafaigata Dump was included to establish if used oils were being dumped and if so to what extent

5.0 Findings

5.1 Total annual imported volumes of lubrication and hydraulic oils in litres are tabulated below.

Customs records do not clearly separate hydraulic oils from other engine oils.

An example is that a total container load of 80 x 205 drums would be of engine, hydraulic and transmission oils, but the entry was classified as engine oils, hence, Hydraulic oils quantities are understated and is included in the total quantities

Note : Customs records show quantities in litres for some imports, kilograms for some and both units for some imports, thus it is difficult to arrive at definitive figures, except to convert imports in kgs to litres

	2011	2010	2009
Lube Oils - litres	593,849	562,562	469,439
Lube Oils - kgs	666,321	710,634	786,653

5.2 During site interviews, it was obvious that some of the quantities being put forward were on the high side, not accurate enough nor supported by documentations due to limited access and absence of an authorised person to release purchase and sale records

Only PPS Ltd provided documentation and records to support their numbers

Best estimates based on interview notes and observations had to be made to arrive at realistic quantities that correlate closely with Customs records which I considered to be more accurate based on the data kindly provided by the Comptroller and her staff

Major Importers of lubrication and hydraulic oils in litres per annum on average are

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Goldstar	125,397
Ott Transport	185,369
Samsparcs	234,437
Petroleum Products Supplies Ltd	70,637

5.3 Other Importers account for approximately 7 % and are :

- Westend - retail
- Coral Oil - retail
- Bluebird Hardware – retail and own use
- H J Keil – retail

5.4 Major Supply points for the lubrication oils are (based on 2011):

- Singapore – 28 %
- USA – 31 %
- Australia – 28 %
- New Zealand – 4 %

5.5 Major users of lubrications oils and their approximate quantities in litres per annum are again hampered by inadequate documentations being made available and reliant on approximates provided by workshop mechanics and supervisors :

Electric Power Corporation (EPC)	41, 615 litres
Samoa Shipping Corporation	47,000
Transport – Bus & Haulage Operators	149,165
Construction Industry	228,010
Auto Garages & Service Stations	165,151

5.6 Service stations in the country do not carry out oil changes at their premises, but are engaged only in retailing them through regular top-ups of customers vehicles at the time of refuelling or through direct sale of lubricant packages for customers to do their own oil changes at home (DIY)

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- 5.7 EPC Tanugamanono best estimates for **used oil generated per annum is 16,646 litres** and are collected at the plant in used oil drums. At the time of site visit, there were 34 x 200 litre drums stored on the ground covered by a tarpaulin
- 5.8 EPC Salelologa best estimates for **used oil generated per annum is 6,564 litres** and are collected in drums. At time of visit, there were 8 x 200 litre drums stored
- 5.9 Local commercial fishing boats (with diesel engines) rely on a haulage operator, Silva Transport, to collect their used oils from the Fisheries wharf at no fee, albeit the quantities are small, and Silva Transport stores these in large drums at their depot in conjunction with their own generated used oils.
- 5.10 Petroleum Products Supplies Ltd [PPS], as the Fuels Distributor and Terminal Operator has storage tank capacity of 185,000 litres for it's own used oil and fuel slops generated from terminal activities. Fuel slops are from water/separator facilities, tank cleaning and interface disposals during tanker unloading. Fuel slops are settled out, then tested in the Laboratory to determine blending ratios with either Unleaded petrol or Diesel. There is no used/waste oils collection in place.
- 5.11 EPC has tankage of 185,000 litres at it's Tanugamanono plant site that could be made available for a used oil collection and storage program in the near future when EPC commissions the new power station facility at Fiaga in 2012/3

The new Fiaga power station facility has a 50,000 litre capacity tank designated for used and waste oils storage located in a concrete bunded tank farm. What plans they have for disposal is not known at this stage

- 5.12 There were no standard containers used for collection and storage of the drained oil at all the oil-changing facilities.

The containers used included basins, tins, plastic jerrycans, half cut drums, plastic pails to plastic bottles.

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- 5.13 Total registered cars and small vehicles according to LTA is around 16,000 (could be more with numerous unregistered vehicles in rural areas) and 250 buses, and under normal servicing, these vehicles would carry out an oil change twice a year on average of 3.5 litres/vehicle/change and 8 litres/bus/change

Best estimates from auto garages and DIY customers based on site interviews and conservative estimates of **generated used oil is 112,000 litres per annum**

- 5.14 Transport and Haulage Operators and the Construction Industry best estimates from site interviews **generated 113,153 litres of used oil on a conservative ratio of 30% of usage**

- 5.15 There was no dumping of used oil at the Tafaigata public dump for some years now. MNRE managed dump facility prohibits used and waste oils from being dumped except for vegetable cooking oils

- 5.16 Aegis Oil, a local company based at Vaitele, has the plant equipment necessary to carry out used oil recycling by means of the Acid/Clay re-refining process, which is not highly sophisticated and appropriate to Samoa. When this plant was operational, it was collecting used oils from Samoa and American Samoa and **processing approx 4,000 litres in 16 hours of operation.**

The company stopped recycling in 1998 due to several factors with the main ones being exorbitant shipping costs from PagoPago and local used oil generators refusing to supply and demanding higher fees

- 5.17 Nearly all the sites visited showed very poor management and a lack of awareness of used oils in collection and storage [refer photos]

6 Conclusions

- 6.1 Based on averaged quantity of lubrication oils imported and from site visits and interviews, the quantity of generated used oils and their disposal, an audit balance on annual averaged basis is summarised as follows :

There was no segregation at all of the different types of oils including hydraulic oils when drained and are being collected in same containers, hence “used oils generated” quantity is all inclusive

	Imported	Usage	Used oils generated	Used oils in storage	Used oils disposed
Engine oils and Hydraulic oils	660,841	630,941	248,363	8,400	248,363

- 6.2 A substantial volume of used oils, according to responses, was given out for free to schools and farmers
- 6.3 Used oils disposal means are varied and difficult to quantify as records do not exist, however, the current practices of disposal means ascertained from site visits and interviews include the following :
- 6.3.1 Ground marking of sports fields – schools and villages collect from generated sources at EPC, transport operators, auto-garages
 - 6.3.2 Preservative use in timber (applied as a coating) to fencing posts, farm buildings etc
 - 6.3.3 Dust suppression (limited usage) on dusty gravel roads and during road construction

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- 6.3.4 Rust preventative (applied as a coating) to machinery and equipment exposed to the weather and to roofing and steel in building frames
- 6.3.5 Inclusion with other general rubbish
- 6.3.6 Pouring directly into storm water drains or waterways or into ground
- 6.3.7 Weed killer
- 6.3.8 Burning off with other rubbish

It is not possible to quantify in terms of litres and % on the various disposal means being practiced. It will require more time and effort to follow the trail of used oils from generators and all the way to disposal to be able to establish quantities.

- 6.4 Collection of used oils generated are in containers of all sorts with large oil drums being predominant. Unfortunately these storage points are not in a contained environment to prevent ground contamination which is evident on site nor secured from spillage as a result of leaky drums or overflows from rain water access into open drums
- 6.5 Collection of used oils is strictly a practice carried out by a small number of individual companies for their own peace of mind, but they have no plans of effecting appropriate disposal means
- 6.6 Appropriate documentations in respect of used oil generation and disposal do not exist to enable traceability and quantification of volumes
- 6.7 DIY customers pose a real threat to the environment through indiscriminate disposal of their used oils, and in majority situations, these are simply dumped into the ground or drainage
- 6.8 Potential future storage of used oils is available at EPC and PPS locations should there be a formalised collection and storage program put in place

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7 Recommendations

7.1 Major used oil generator, EPC, be encouraged and supported to construct simple and basic storage facilities at Tanugamanono and Salelologa to ensure environment is not contaminated. Basic facilities to comprise of :

7.1.1 Concrete bunded area for storage of used oil drums
Open shelter over storage area to prevent rain from filling up bunding as well as into oil drums

7.1.2 Bunded area to be connected into a Triple Interceptor Trap that will allow normal drainage of runoffs and capture any oils mixed with runoff [[refer attached drawing](#)]

7.1.3 A future small storage tank of 10,000 litre capacity in same bunded area to replace drums as they are susceptible to leaking

7.2 Technical expertise to assist EPC in implementation of above is available through PPS

It is noted that EPC new power station facility at Fiaga will have proper storage facilities, however, it is not clear at this stage as to what means of disposal will be employed

7.3 Two main storage point facilities for used oils be established with PPS at the main Sogi Fuel Terminal to cover Upolu, and at Salelologa to cover Savaii

7.4 The advantages of establishing used oils storages at Sogi and Salelologa are :

7.4.1 Land space is available for tankage to be installed

7.4.2 API Separator facilities are already in place

7.4.3 PPS is an approved hazardous products handler

7.4.4 Facilities are owned by Government of Samoa

7.4.5 PPS is in a better position to effect transfer of used

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oils from Savaii to Upolu through it's regular fuel transfer operations between the islands

- 7.5 Intermediate storage points be established at key central locations through installation of small IBC units of 1000 litres capacity to enable consumers to dump their used oils.

For this program to work, it will need to be driven by Government through ministry of MNRE and will require an awareness and educational program right across the country

Other major used oils generators such as Transport Companies and Auto Garages should also be provided with IBC tanks for collection

- 7.6 Collection and transfer of used oils from these intermediate storage points to the main storage centres of Sogi and Salelologa can be contracted out to PPS the approved hazardous products handler or any other approved contractor.

An appropriate fee for the handling and storage of used oils to be approved by Government and could be done through the form of a levy on the imported price of all lubricating oils. To arrive at a fee, consideration must be given as to the appropriate disposal means, as this forms the second part of the overall project

- 7.7 Disposal of used oils in Samoa on a practical and economical means is through Recycling/Reprocessing, utilising plant equipment that is already on the island.**

By products from the recycling/reprocessing process will be disposed off as follows :

- 7.7.1 Blending with diesel fuel – depending on final viscosity, density and flashpoint, ratio could be as high as 20 %, and this blending is best carried out at the Fuel Terminal where larger quantities of diesel fuel are stored and blending operations can be done under strict control

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7.7.2 Tar sludges – mixed in with road making asphalt and bitumen of the construction companies

7.8 Aegis Oil be appointed by Government (MNRE) under Licence to be the Recycler company that will process ALL used oils from the Collection program.

However, for this to work effectively, the following conditions shall be satisfied to ensure an efficient continuous operation :

7.8.1 Existing premises will allow installation of adequate tankages for storage/settlement of collected used oil and for the reprocessed oil and by-products [utilise storage tanks at EPC following commissioning of new power facilities at Fiaga]

7.8.2 Become an approved hazardous products handler

7.8.3 Have a small road tanker equipped for picking up used oil from intermediate collection points, as well as for transferring the by-products to Fuels terminal and Road making companies

7.8.4 Oil and water separator be installed around tank farm

Government and Aegis Oil to agree on a fee for recycling or alternatively Aegis Oil can negotiate for sale of by-products to recover it's costs.

Existing equipment is capable of recycling 4000 litres used oil in 16 hours operation

7.9 Alternative disposal means is to ship offshore for recycling and based on shipping schedules into/out of Samoa, the only viable destination is New Zealand.

Preliminary costs in NZ\$ currency for this Option based on a shipment of 4 x 22,000 litre tank tainer provided by Reef Shipping and Salters are as follows :

7.9.1 Documentations - \$2520 (per shipment)

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- 7.9.2 Tank tainer hire - \$128/day
- 7.9.3 Tank cleanout - \$1400
- 7.9.4 Shipping insurance - \$8000 (per shipment)
- 7.9.5 Cartage at NZ end - \$1680
- 7.9.6 Disposal of oil at Salters - \$0.10/litre
- 7.9.7 Costs is approx NZ\$0.30 excluding local handling charges and freight Akl/Apia/Akl

Shipping to Fiji is not a viable option due to freight costs, and in the absence of direct shipping between Apia and Suva/Lautoka, containers would have to be shipped via Auckland, and the same issues of documentations and insurance for hazardous cargo will apply.

- 7.10 Burning off through proper Incinerator or Heater is another practical disposal of used oil that could be applicable to Samoa
- 7.11 Legislation needs to be enacted to ensure all used oils are dumped in proper collection storage receptacles provided and to licence appropriate used oil recycling
- 7.12 All current practices of used oil disposal are of a very high potential to be harmful to the health of the general population and to the fragile environment waterways

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List of key contributors :

Comptroller	Customs and Excise, Matautu
Generation Manager	EPC Tanugamanono
Station Manager	EPC Salelologa
Managing Director	Silva Transport, Vaitele
Terminal Manager	Petroleum Products Supplies Ltd, Sogi
Managing Director	Sams pares, Matafele
Managing Director	Apia Lua Company (construction and service station), Savaii
Manager	Asco Motors, Savalalo
Manager	Hyundai Service Centre, Vaitele
Manager	HJ Keil, Taufusi
Manager	Gold Star, Sogi
Office Manager	Lucky Construction, Vaitele
Manager	Bluebird Transport, Palisi
Transport Manager	Betham Brothers Enterprises, Matautu
Manager	Ott Transport
Manager	Ah Liki Construction Co, Vaitele-tai
Operations Manager	Samoa Shipping Corporation
Supervisors	Service Stations network

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ATTACHMENTS