

**Consultancy for Contemporary Used Oil Audits in Selected
Pacific Island Countries**

**Report for the State of Yap
Federated States of Micronesia**

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

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Executive Summary

This report covers the State of Yap component of a project involving used oil audits in selected Pacific Island countries. The objective of the audits is to establish volumes of lubricating, hydraulic and transmission oils imported annually into each country and the volumes of used oil produced, stored or otherwise disposed. The work has been carried out by Contract Environmental Ltd under a contract to the Secretariat of the Pacific Regional Environment Programme (SPREP), with funding provided by the Global Environment Facility. Most of the information required for the audit has been obtained in a country visit undertaken by Martyn O’Cain from 1 June to 8 June 2014 and was organised through the local Environmental Protection Agency in Yap.

Used Oil Production

The total quantity of lubricating oils imported into Yap in 2013 was about 65,000 litres and it is estimated that approximately 50% of that will end up as used oil. In addition small amounts of the 4.4 million litres of diesel imported into Yap ends up in the used oil stream. Other used oil components come from diesel waste, small amounts of hydraulic and transmission oils, brake fluid and vegetable oil. It is therefore estimated that about 32,920 litres of used oil is produced per year. Certainty estimates for the estimated volumes are given at the end of s4.

Used Oil Collection and Disposal

There are no private used oil recovery companies in Yap. There is no formal used oil collection point in Yap. Oil is stored at the location where it was generated. Any disposal of used oil on Yap is not governed or managed by either the private sector or a government agency.

Based on the volumes of used oil that are being generated and the figures showing what is being stored and stockpiled there is confidence that used oil is not being disposed of unlawfully in significant quantities.

There are no oil reuse options available in Yap at this stage. The best management option is for the used oil to be collected and exported off shore.

National Instruments

There are no National instruments within Yap that regulate the management and enforcement of used oil.

Recommendations

Based on this audit of used oil in Yap State the following recommendations are offered:

- Establish a robust set of regulations for managing, monitoring and enforcing the handling, storage and disposal of used oil on Yap;
- Establish a specifically designed centralised collection point within Yap. This will include establishing an environmentally secure collection facility that is bunded, covered and monitored to ensure the entry and exit of used oil is correctly managed. The location should be well considered so that it complements any potential future reuse options that may be established;

- Establish a formal procedure for collecting, managing and disposing of used oil at the centralised collection point;
- Investigate a 'user pay' system for collecting used oil to help offset the costs for setting up and running the collection process. This may be coupled with leasing the collection and delivery of used oil to the private sector. A designated oil recovery company is motivated to ensure all used oil is managed correctly if the costs are realistic and provide value;
- Establish suitable time frames for exporting the collected oil to an offshore facility given that the estimated amount of used oil being generated each year is now available. This includes executing tender contracts within a timely manner;
- Independent scrutiny of tendering contracts for the export of the used oil. Consideration should be given to the reputation and professionalism of the appointed contractor. Such things as ensuring they have appropriate ships for carrying the oil; they have good history within the industry; they have guaranteed contracts with an approved treatment facility and that they will guarantee stewardship of the product once it has left Yap;
- Take up discussions with the State power company (YSPC) regarding the possibility of extending their reuse process to outside oil generators and what would be required to upgrade it. Given the small amount of oil that is being generated annually in Yap, the introduction of a small to medium sized centrifuge may be sufficient to assist YSPC with increasing the volume of treated oil that they can use. It is acknowledged that an oily water by-product will still need to be managed; and
- Consider re-use options on Yap. A possible re-use option would be to establish a waste to energy system at the existing power station. Briefly, this would involve establishing a suitably sized burner capable of being fuelled by used oil. Connect an electricity generating turbine that recovers the energy generated by the oil combustion. Connect the turbine to the main power grid which will supplement the existing power production. A feasibility study may be required to establish whether or not enough used oil is generated to warrant such a system.

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1. Introduction

1.1 Purpose

This report covers the State of Yap component of a project involving used oil audits in selected Pacific Island countries. The objective of the audits was to establish volumes of lubricating, hydraulic and transmission oils imported annually into each country and the volumes of used 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 Global Environment Facility. Most of the information required for the audit was obtained in a country visit undertaken by Martyn O’Cain from 1 June to 8 June 2014 and was organised through both the Office of Environment & Emergency Management of the Federated States of Micronesia and the Environmental Protection Agency of Yap State.

1.2 Scope of Work

A copy of the Terms of Reference for this work is given in Appendix 1. It lists the following tasks:

- a) *Establish and document national oil import/generation volumes and rates for the last 3 years ideally 2011, 2012 and 2013;*
- b) *Establish national used oil production rates for the last 3 years ideally 2011, 2012 and 2013;*
- c) *[Prepare an] Oil Audit Balance for the last 3 years ideally 2011, 2012 and 2013;*
- d) *Document and summarise existing national used oil management procedures; and*
- e) *Document and summarise existing national used oil management instruments.*

1.3 Report Content and Layout

Section 2 of this report provides details of the annual oil imports to Yap, based on the data obtained from the Customs Department and from companies that import directly into Yap (CSTI, FSM Petroleum Corp, YCA Ltd, and PBC Auto).

An estimate of used oil generation rates and volumes is set out in Section 3 and Section 4 contains the overall audit balance, including an assessment of uncertainties in the data.

Section 5 provides information on existing storage facilities for used oil and current stockpiles; current reuse or disposal methods; and an assessment of possible future alternatives. Information on the current shipping costs to the nearest main port is also covered here.

Section 6 sets out the details of the relevant national instruments for used oil management.

Section 7 provides some overall discussions and recommendations, and is followed by the following 2 appendices:

- A copy of the TOR is given in Appendix 1; and
- Appendix 2 provides detailed notes on all of the people and organisations contacted during the country visit.

2.0 Oil Imports

2.1 Information Provided by the Yap Customs Department

The following data in Table 1 have been obtained from the Customs Department for 2011, 2012 and 2013.

Table 1 - Oil Import Data for Yap State (2011-2013) as provided by Customs Department

Type of Oil	2011 (litres)	2012 (litres)	2013 (litres)	3-Year Average (litres)
Various Oil Types	29,545	67,756	43,220	46,840
Diesel	4,941,440	3,645,610	4,586,202	4,391,084

It is important to note that a small proportion of the oil figures provided by the customs department did not give a specific quantity. The volume has therefore been calculated using the import cost including freight (CIF) divided by an average cost per litre for the various imported oils. The freight and oil costs were provided by CTSI Logistics.

2.2 Additional Information on Imports

Table 2 shows the data that has been collected from individual importers of oils that include but are not limited to lubricating oil, hydraulic oil, transmission fluid and two-stroke oil.

Table 2 – Lubricating Oil Import Data for Yap (2013) as Provided by Importing Companies

Company	2013 (litres)
FSM Petroleum Corp.	25,723
YCA Ltd	5,492
CSTI Ltd	33,245
PBC Auto	500
Total	64,960

The 2013 Customs data is approximately 34% less than what the importing companies have indicated they brought in for 2013.

2.3 Cost and Price Information

The following price information for lubricating oil was obtained from CTSI Logistics Ltd.

Item	Wholesale Price
Lubricating oil, 208 litres	\$ 378 - \$499
Lubricating oil, 20 litres	\$46 - \$55
Lubricating oil, 1 litre	\$3.30

Note these costs include freight and customs duty of 4%

The Yap power company advised that their current costs for diesel fuel ranged between \$1.16 and \$1.33 per litre from January 2012 to June 2014.

3.0 Used Oil Production

The information collected on the production of used oil in Yap was obtained by visiting as many companies and operations that could potentially generate used oil. Individuals at each location were asked specifically how much used oil their operation generated over a set period of time. The information was provided verbally as very few operators kept detailed written records. The information was usually provided as drums per month which was then extrapolated to litres per year. The volumes of used oil identified at each locality are included in the contacts list attached as Appendix 2.2.

3.1 Used Oil Recovery by Vehicle and Machinery Servicing

Sixteen sites were visited that maintained or serviced vehicles either for their own use or for off site customers. The businesses and organisations that were visited included auto repair shops, construction companies, oil supply depots and air and sea port terminals.

The annual volume of oil generated by these businesses is calculated to be 9,445 L/yr

3.2 Used Oil Recovery from Ship and Boat Servicing

Two sites were visited that maintained, repaired or serviced engines associated with boats, both commercial and privately owned. The businesses that were visited included a small engine repair shop and the Hapilmohol 1, which is a cargo ship that only operates within the outer islands of Yap.

The annual volume of oil generated by these businesses is calculated to be 302 L/yr.

The boats located within the Yap area use small outboard engines (petrol). The Hapilmohol 1 uses diesel engines. None of the boats use heavy fuel oil.

Yap does not have the facilities nor the capability to accept used heavy fuel oil from visiting ships. Boats visiting Yap are mainly cargo ships providing necessary supplies to the Island.

3.3 Used Oil Recovery by Power Stations and Small Generators

Large power generators often use heavy fuel oil as their operating fuel. In Yap all the generators that were inspected used diesel as the fuel source. Therefore any used oil that is being generated at these sites is from the use of lubricating oil for running and maintaining the generators.

3.3.1 Small Generators

The power supply on Yap is considered stable and reliable therefore the use of private generators is not common. No industry or private company was identified as using generators on a full time basis or operating off the main power grid. Information from three sites (Manta Ray Bay Hotel, Yap Telecommunications and Yap Hospital) confirmed that the use of generators was limited and they were primarily maintained for emergency use only.

The annual volume of oil generated by these operations is calculated to be approximately 350 L/yr. Please note that this quantity also includes a small percentage of vehicle maintenance oil which is also collected from these sites.

3.3.2 Yap State Power Company

The Yap State Power Company (YSPC) is located in Rull, approximately 10 minutes' drive from the main commercial area in Colonia.

The manager of the power company, Mr Francis Falan, believes they generate very little used oil as they already utilise a basic reuse system. Mr Falan explained that they collect the used oil from the maintenance of their generators which is estimated to be about 17,600 litres per year. Oil is skimmed off the surface of collected used oil and reused to run the generator(s). The remaining water is then heated, converted to steam and released. It was further explained that an oil-based 'sludge' is generated from the water when it is converted to steam. The sludge is captured and stored on site in 208 litre drums.

The annual volume of the oil-based sludge generated by YSPC is estimated to be 2,500 L/yr.

3.5 Used Oil Recovered from Outer Islands

The 2008 FSM Statistical Yearbook indicated that in 2000 the communities on the Outer Islands made up 34% of the population.

No formal information was available regarding oil use or generation on the outer islands of Yap. It is accepted that there would be a small percentage of the total volume of used oil being generated on the smaller islands, however anecdotal evidence gathered from the main centres throughout the Micronesia Islands indicates that used oil is often re-used for such things as pest control, suppressing odour from 'natural' toilets and fuel for lanterns. Within Yap, the Hapilmohol 1 stated that they give the used oil they generate to locals living on the outer islands for uses described above.

3.6 Survey Allowance

It would be unrealistic to assume that this audit is without inaccuracies and incomplete data. It is accepted that there are businesses and companies that generate used oil but were not visited as

part of this audit. Such operations would also include individual vehicle owners that carry out their own maintenance and repair. It is unknown how many of these operations there are. Therefore a 10% allowance has been applied to the total volume of used oil that has been determined from visiting individual sites.

4.0 Oil Audit Balance

4.1 Theoretical Used Oil Production Rates

An estimate can be made of the quantities of used oil produced based on the information provided in the previous section.

Waste oil from lubricating oil:

The total annual quantity of lubricating oil imported is approximately 64,960 litres, based on the 2013 figure provided by the importing companies. Typically about 50%¹ of this figure would be burnt and 50% would contribute to the total used oil produced. The estimate of used oil from lubricating oil is therefore **32,480 litres**.

Waste Oil from Fuel Oil used by Power Stations

The generators operating in Yap use standard diesel to produce the country's power supply. No used oil is generated from the ignition process however it is generated from the lubricating oil that is required to run and maintain the engines. It is also noted above that YSPC have a basic treatment and reuse process. An oil-based sludge is collected as a by-product of this process which is included in the lubricating oil volume given above.

Waste Oil from Ships

FSM is not a member of the International Convention for the Prevention of Pollution from Ships (MARPOL) therefore it is not expected to accept used oil from visiting ships. It is our understanding that none of the Federated States of Micronesia accepts used oil from visiting ships. On-site observations confirmed that each of the states do not have the facilities at the docking ports to accept, handle or dispose of such a product in the quantities that would be generated.

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 used oil stream at say 0.01%¹ of the figures that are available from the Customs Department, i.e. **440 litres/year**.

The above figures are summarised in Table 3 below:

Table 3 – Theoretical Used Oil Production in Yap

Source of Used Oil	Estimated Quantities (litres/year)
Lubricating Oil	32,480
Waste from Diesel and Other Sources	440
TOTAL	32,920

¹ These figures have previously been accepted by SPREP based on earlier used oil audits

4.2 Actual Used Oil Production Rates

The used oil being collected on Yap by auto repair shops, heavy plant and machinery operators, generator operators and boat maintenance operations is generally being mixed without any record of what waste stream it is being generated from. No operators were able to indicate the quantities of used oil generated from the different oil products. Therefore for the purpose of this report used lubricating oil, hydraulic oil, transmission oils, grease, and diesel 'slops' are considered as the total used oil generated.

Table 4 – Actual Waste Oil Collection in Yap

Source of Used Oil	Actual Quantities (litres/year)
Vehicle and machinery servicing	9,445
Ship and boat servicing	302
Small generators	283
YSPC Power Station	2,500
Sub Total	12,530
Survey Allowance (10%)	1,253
TOTAL	13,783

4.3 Used Oil Balance

There is a 59% difference between the theoretical oil production rates and the actual oil production rates as determined from interviewing individual businesses. However, for most of the discrepancy it may simply be due to the basic oil treatment and reuse process being implemented by YSPC. The power plant actually generates 17,600 litres of used oil per year, however only 2,500 litres per year is collected as sludge and stored. About 15,100 litres is reused. If the 15,100 litres is added to the actual used oil production figure the total volume being generated on Yap is approximately 28,900 litres per year. The difference after applying this methodology between the theoretical oil production and the actual oil production volumes is only about 12%.

The remaining 12% discrepancy may be due to any of the following:

- The theoretical assumption that 50% of the oil would be burnt during a normal life cycle may be under estimated;
- The contribution of diesel slops to the waste stream may be too low;
- The 10% margin of error is not high enough;
- An under estimate by the individuals that were interviewed regarding the actual amount they expect to generate each year; and
- A combination of some or all of the above.

4.4 Certainty Assessment

The confidence levels for each component of the audit balance are summarised below:

- The data for lubricating oil imports can be taken as having a **medium to high level of confidence**. The audit has used the data provided by the import companies for 2013 rather than the Customs data. The reason being that there seems to be an element of subjectivity when describing the type of oil that is being imported under the Customs data system. There is significant scope for data to be missed or categorised incorrectly. In addition some of the data needed to be estimated using the imported cost figures. The importing companies provided the data directly from their yearly accounts; and
- The figure for total used oil produced can be taken as having a **medium level of confidence**. The data is reliant on the accuracy of the people that were interviewed at each of the locations and that at least 90% of the used oil generators were visited.

5.0 Current Storage and Disposal Practices

5.1 Existing Storage Facilities and Current Stockpiles

5.1.1 Specific Used Oil Storage Facilities

There is no specialised oil recovery company based in Yap nor is there a designated area where used oil can be safely left and stored by individuals or companies. Currently in Yap used oil is mostly being stored at the site where it is being generated. Used oil is being stored in drums, plastic pails and the original quart bottles.

The closest Yap has to a formal collection facility is 8 steel-encased containers with a capacity of 945 litres each, however they remain empty and in storage. The containers were purchased specifically for collecting used oil but the local Environmental Protection Agency are unsure where to store these containers and how to facilitate the collection of used oil. These containers, once full, will have to be in a location accessible by a fork lift or a vehicle-mounted hoist.

5.1.2 Current Stockpiles

Twenty two individual sites were visited as part of the used oil audit. At each location the volume of used oil that was being stockpiled on the site was recorded and photographed. The total volume of used oil recorded at the time of the audit was 59,771 L. This figure is likely to be slightly underestimated as it is accepted that not every container holding used oil was inspected by the project representatives. Similar to the error margin described for the used oil generation an increase of 10% would be considered realistic.

Therefore the total volume of used oil stockpiled on Yap is 65,750 L.

The volumes stockpiled at each location are included in the contacts list attached as Appendix 2.2.

Very few of the sites that were visited had well-managed storage facilities that included bunds and weather protection. The drums and containers were poorly managed and exposed the local environment to significant risk from the uncontrolled release of used oil.

5.2 Current Reuse or Disposal Methods

Currently there are no reuse options on Yap capable of utilising the Islands' used oil. Two sites that were visited reused some of the oil they were generating for their own purposes but did not have the capacity to increase the amounts to take outside volumes.

The first was YSPC. The power plant uses a basic treatment system to collect used oil that can then be utilised in their generator. The system then converts the associated water to steam however an

oily sludge is collected as a by-product to this process. There is 27,000 L of the sludge material currently stockpiled at the power station site.

The second is at the GPPC construction yard site. GPPC have an asphalt batching plant that they can operate on used oil mixed with some diesel. This is a potential reuse option however, GPPC have indicated that they do not have enough pavement contracts requiring asphalt to use their own current used oil stocks, without having to look for alternative sources. Currently GPPC have a used oil stockpile of 14,500 L. At the time of investigation GPPC was confident of winning a government roading contract that would allow them to use their existing used oil stocks. Fortunately the oil being stored at the site was weather protected and bunded.

No other light industry that was visited used burners or generators that were capable of utilising used oil. All the generators that were visited used diesel to fuel the operation.

It was encouraging however to observe that the new power station did manage used oil generated from the maintenance of the existing generators albeit on a small self-sustaining scale.

The only available option for the disposal of the majority of used oil from Yap, at the time the audit was undertaken, is to have it taken offshore and disposed of at a facility that has the capability to treat the product to a standard where it can be reused for light and/or heavy industry purposes elsewhere.

It is worth noting that up until about 2 – 3 years ago, a vessel based in Chuuk State would visit Yap and collect stockpiled used oil. The vessel is known as the 'Thor Finn' and runs on steam engines. Captain Lance Higgs uses waste oil to run the boiler. The Thor Finn no longer visits Yap.

5.3 Assessment of Possible Future Alternatives.

Future alternatives are limited.

The local asphalt batching plant does utilise some used oil however the contractor running the plant does not have enough work to be a viable reuse option for the Island's used oil supply. In addition, from the explanation provided by staff at the site, the fuel is mixed with diesel, therefore it is not a viable option to use the burner to remove used oil from the current waste stream, when it is not being used for asphalt production.

The local hospital was approached to determine how they destroy their medical waste and if it is by incinerator, what type of fuel they use. The hospital indicated that they use a diesel fuelled burner and have never considered introducing used oil as fuel option.

The local power plant currently uses a simple form of cleaning the used oil collected from their generators and reusing the treated oil to maintain the running of the generator. This process could be further explored to establish if better treatment and improved oil quality could increase the amount they can use to run the generator.

Alternatively a designated burner could be considered that is specific to treated used oil. Extending this scenario further would be to couple the oil burner with a heat recovery unit that could generate

energy, thus providing a waste to energy option. Such a facility would be best suited at the power plant as they already have the infrastructure to deliver the energy that would be generated.

It is acknowledged however that an upgrade or introduction of new technology would require significant upfront capital which would most likely be outside the means of the State or Federal government without an offshore partner. A feasibility study may be required to establish whether or not enough used oil is generated to warrant such a system. It is also acknowledged that these systems are reasonably 'high tech' and carry significant risk if not managed or used correctly. Assistance in training and maintaining such equipment would have to accompany any reuse initiatives.

5.4 Administration of Used Oil Exports

The Federated States of Micronesia and therefore the State of Yap is a party to both the Basel Convention and Waigani Convention. As such, Yap may export used oil to other countries that are parties to Basel and/or the Waigani Conventions.

5.5 Current Shipping Costs

Mr Willy Banua of CSTI Logistics estimated the cost to ship a 20 ft container from Yap to the Philippine's at \$2,500. The estimate excludes:

- Bladder/drum costs
- Basel Convention consent costs
- Insurances
- Wharf costs
- Custom costs

6.0 Relevant National Instruments

6.1 Relevant National Legislation and Regulations

The local Environmental Protection Agency contacts explained that Yap does not currently have any specific state legislation to control the use, collection, management or disposal of used oil.

Some legislative framework pertaining to the management and control of chemicals generally has been in place since the Trust Territory days but it has not been sufficiently updated or been given resource support that would allow for a robust regulatory process. It was noted however that an Australian volunteer, trained in law, was at the time of the investigation working in the Yap EPA office. One of the tasks was to review and recommend environmental regulations that will help better manage various potential pollutants, including used oil. The outcome of the review and recommendations may be available by the time this document is circulated.

6.2 Relevant National or State Programmes and Policies

The Yap EPA staff were unable to provide any information on relevant National or State programmes.

7.0 Discussion and Recommendations

7.1 Used Oil Generation

The quantity of lubricating oil imports into Yap was about 66,000 litres for 2013 and it is estimated that approximately half that would end up as used oil. In addition small amounts of the 4.5 million litres of diesel and other oil-based products imported into Yap would end up in the used oil stream.

All the oil generated is collected from the maintenance of vehicles, boats or generators. Yap does not have the facilities to collect and purify used fuel oil from visiting ships.

There are no established companies in Yap that recover used oil from the businesses and companies that generate the used oil as part of their day-to-day operations. Used oil that is generated is currently being stored on the premises where it is being generated or given to 'locals' for pesticide control, lantern fuel or for the lubrication of concrete block moulds, to name but a few examples.

The amount being generated is estimated at just under 13,000 L/year while at the time the investigation was undertaken about 66,000 L of used oil is currently stored on Yap. 27,000 litres is stored at YSPC as oil sludge while 14,500 L is being stockpiled at GPPC ready to be used for running the asphalt batching plant. The balance of about 24,500 L is stockpiled at multiple locations.

There is approximately 5 years of accumulated used oil stockpiled on Yap.

7.2 Used Oil Collection

As discussed in Section 5.1.1 there is no established oil recovery company operating in Yap nor is there any formal centrally located collection facility for used oil. Currently used oil is collected in drums or other various containers and stored on the premises where it originated. The manner in which the oil is being stored is not environmentally protective with many of the storage containers exposed to the elements.

The closest officials have come to creating a formal collection facility is the purchase of eight 945 litre containers for storing used oil. The containers are currently empty and stored in a warehouse.

Currently there is an estimated 67,000 L stockpiled on premises around Yap. This poses a potential significant environmental risk to Yap. There are no existing viable reuse options available due to the absence of suitable industries on Yap. There are two examples where used oil is being reused, however these options would not be considered sustainable or reliable. The only option available to businesses and industries that accumulate used oil is to continue storing it at the originating premises or giving it away to locals for various uses. There is no formalised or centralised collection system.

7.3 Used Oil Management

The volumes of used oil that are being generated and those that have been identified in stockpiles do indicate that businesses on Yap that produce used oil are generally collecting and storing it. The only evidence of used oil being disposed of in an uncontrolled manner are the second hand stories regarding locals requesting it from businesses for treating timber to protect against termites, using it as a lubricant when making concrete blocks, lantern fuel and so on.

The main issue to surface from the investigation undertaken on Yap is the lack of environmental management being implemented by businesses generating and storing used oil. This is a natural consequence of Yap not having a centralised and well managed collection point established on the Island. Figures 1 and 2 show examples of how some local businesses are storing used oil drums.

Figures 1 and 2 – stored used oil drums in Yap



Establishing a centralised collection point will require due consideration particularly regarding the location. Four possible sites were identified however each one had a number of advantages and disadvantages associated with it.

Power Plant (YSPC)

The power plant is an obvious location for establishing a used oil collection point. The advantages for this location are:

- There appeared to be enough space to construct such a facility;
- They are used to handling and managing large quantities of used oil;
- They may be able to include some of the additional used oil within their basic treatment and reuse system; and
- If a more sophisticated reuse system e.g. waste to energy, was to be established on the island, it would most likely be at the power plant therefore having an established centralised collect point would be most beneficial.

The disadvantages are:

- There is no large capacity storage tank at this location. All the used oil would be required to be stored in drums or similar small capacity containers. While this would not rule the site out entirely as such a collection system could be managed, it will increase the storage area required if there is no reuse option available; and
- The location of the power plant is not suited if the used oil that is collected is to be exported off the Island rather than reused. The oil would most likely have to be transported down to the port and exported in the original drums. This may not be the most cost effective or practicable method.

Port Area

The advantages for this area are:

- There appeared to be available space to establish a centralised collection point however this would require discussion with the port operators;
- It is adjacent to the docking facilities which would help with the handling of the product if it was to be exported off the Island; and
- It is located within a central area and can be easily accessed.

The disadvantages are:

- There is no large capacity storage tank at this location. All the used oil would be required to be stored in drums or similar small capacity containers. While this would not rule the site out entirely as such a collection system could be managed, it will increase the storage area that will be required; and
- Having a drop off and collection point may raise some port security concerns however this should be manageable.

FSM Petroleum Corporation (FSM PC) tank farm

The advantages for this area are:

- It has easy site access;
- There are a number of large storage tanks already located at the site, however some of them need repair or upgrading before they would be suitable for use;
- There is an established pipe network from the tank farm to the port. This would be useful if the product is to be exported off the Island. However, it is unknown if any of the existing pipes are suitable or would be permitted to be used for transferring used oil; and
- Staff at the site are already trained to deal with hazardous substances.

The disadvantages are:

- FSM PC is a privately owned company and therefore may not wish to be included in any used oil management initiatives;
- Any tank that is released by FSM PC may require extensive work carried out on it to ensure it meets all necessary standards;
- If the existing pipes from the port to the tank farm are not suitable for transferring used oil then additional pipes may need to be installed. If this is required then the site may not be a viable option; and
- FSM PC may have site access, security and liability concerns.

The local landfill

The local landfill is also a possible storage site as it has the space to accommodate such a facility. However it has similar obstacles as the power plant as it does not have an existing large capacity storage tank on site and it is some distance from the port.

The Yap EPA office does not have substantial authority to monitor and enforce suitable used oil management requirements under its current regulations however this is currently being addressed. Compliance and enforcement of any introduced regulations will most likely be hampered by limited resources both human and financial.

With regard to the management of used oil at a state level, the findings of this report do suggest that the collection of used oil and exporting it off shore is the most appropriate way to manage the product in the foreseeable future.

The most urgent aspect associated with the short and long term management of used oil on Yap is to establish a formal, well designed centralised collection point. Coupled with establishing a collection point is the requirement to raise the awareness of the producers of used oil to the potential adverse effects that the product can have on the environment if it is not properly managed. This can be delivered via various media outlets and through EPA visits.

The following table provides a summary of the key information collected in the survey:

Table 5: Summary of Key Information on Waste Oil for Yap

AVERAGE ANNUAL OIL IMPORT VOLUME (LITRES/YEAR)	ANNUAL WASTE VOLUME ESTIMATE (LITRES/YEAR)	CURRENT STOCKPILE OF WASTE OIL ESTIMATE	ORGANISED COLLECTION BY?
54,300 litres/year	13,800 litres/year	65,750 litres	Nil
DIRECT CONTAINER SHIPPING ROUTE TO PHILIPPINES?	SHIPPING COSTS (APPROX. FOR A 20FT CONTAINER)	CURRENT REGULATORY DRIVERS?	PARTY TO BASEL/WAIGANI?
Yes	US\$2,500 (excludes wharf fees, insurance etc)	Limited	Yes/Yes

7.4 Recommendations

Based on this audit of used oil in Yap State the following recommendations are offered:

Short to medium term

- Establish a robust set of regulations for managing, monitoring and enforcing the handling, storage and disposal of used oil on Yap;
- Establish a specifically designed centralised collection point within Yap. This will include establishing an environmentally secure collection facility that is bunded, covered and monitored to ensure the entry and exit of used oil is correctly managed. The location should be well considered so that it complements any potential future reuse options that may be established;
- Establish a formal procedure for collecting, managing and disposing of used oil at the centralised collection point;
- Investigate a 'user pay' system for collecting used oil to help off set the costs for setting up and running the collection process. This may be coupled with leasing the collection and delivery of used oil to the private sector. A designated oil recovery company is motivated to ensure all used oil is managed correctly if the costs are realistic and provide value;
- Establish suitable time frames for exporting the collected oil to an offshore facility given that the estimated amount of used oil being generated each year is now available. This includes executing tender contracts within a timely manner;
- Independent scrutiny of tendering contracts for the export of the used oil. Consideration should be given to the reputation and professionalism of the appointed contractor. Such things as ensuring they have appropriate ships for carrying the oil; they have good history within the industry; they have guaranteed contracts with an approved treatment facility and that they will guarantee stewardship of the product once it has left Yap; and

- Take up discussions with YSPC regarding the possibility of extending their reuse process to outside oil generators and what would be required to upgrade it. Given the small amount of oil that is being generated annually in Yap, the introduction of a small to medium sized centrifuge may be sufficient to assist YSPC with increasing the volume of treated oil that they can use.

Long term

- Consider re-use options on Yap. A possible re-use option would be to establish a waste to energy system at the existing power station. Briefly, this would involve establishing a suitably sized burner capable of being fuelled by used oil. Connect an electricity generating turbine that recovers the energy generated by the oil combustion. Connect the turbine to the main power grid which will supplement the existing power production. A feasibility study may be required to establish whether or not enough used oil is generated to warrant such a system.

It is acknowledged that the implementation of some of these recommendations will require significant financial capital that is unlikely to be readily available. Funding from an outside agency would more than likely be required. It is also acknowledged that these systems are reasonably 'high tech' and carry significant risk if not managed or used correctly. Assistance in training and maintaining such equipment would have to accompany any reuse initiatives.

Appendix 1: Copy of the Terms of Reference

Summary

Completion of contemporary used oil audits in Cook Islands, FSM, Kiribati, Marshall Islands, Nauru, Niue, Palau, PNG, Solomon Islands, Tonga, and Tuvalu

Objective

Completion of contemporary used oil audits in Cook Islands, FSM, Kiribati, Marshall Islands, Nauru, Niue, Palau, PNG, Solomon Islands, Tonga, and Tuvalu to establish volumes of lubricating, hydraulic and transmissions oils imported into each country and the volume of used oil produced, and stored or otherwise disposed of.

Location of Work

- Sub-region A: PNG
- Sub-region B: FSM, Marshall Islands and Palau
- Sub-region C: Kiribati, Nauru, Solomon Islands and Tuvalu
- Sub-region D: Tonga, Cook Islands, and Niue

Tasks

For each nominated sub-region (A, B, C & D), the Consultant will visit each country and spend as much time as is necessary to collect the information required to:

- a. Establish and document national oil import/generation volumes and rates for the last 3 years ideally 2011, 2012 and 2013:
 - i. Document by major suppliers, the annual volume of lubricating, hydraulic and transmission oils imported into each country for internal use;
 - ii. Document quantities of each oil distributed to outlying islands from main port(s) of entry;
 - iii. Obtain retail and wholesale purchase costs for: a 205litre and 20litre drum; and 5 litre, 4 litre and a 1 litre containers of lubricating oils; and
 - iv. Identify prices for fuels in particular the cost of diesel fuel purchased by power generators.
- b. Establish national used oil production rates for the last 3 years ideally 2011, 2012 and 2013:
 - i. Document used oil volumes recovered from outlying islands;
 - ii. Visit large and small vehicle service centres to establish actual recovery rates;
 - iii. Visit bus, haulage and construction companies to establish actual recovery rates;

- iv. Visit the port authority, operators of fishing/private vessel and international vessels, shipping agents and shipping companies to establish actual recovery rates;
- v. Visit electricity generators using diesel powered generators to establish recovery rates; and
- vi. Document volumes of used oil generated by any other major users.
- c. Oil Audit Balance for the last 3 years ideally 2011, 2012 and 2013:
 - i. Prepare an audit balance of new oils and used oils.
- d. Document and summarise existing national used oil management procedures:
 - i. Identify existing storage facilities and stored oil volumes;
 - ii. Identify where possible, current used oil disposal locations;
 - iii. Provide photographic records of existing collection and storage facilities;
 - iv. Identify possible end users in country or within the relevant distribution network for the used oil, either using the used oil as a diesel extender, a supplementary furnace fuel etc;
 - v. Review the paperwork pertaining to the transportation of any used oil from each country; and
 - vi. Document shipping costs of containerised or tank-tainers of used oil to the nearest main port with adjacent used oil recycling facilities (e.g. Australia, Fiji, India, Japan, New Zealand, Philippines, Singapore). Shipping costs shall include documentation costs, port handling costs and any insurance costs.
- e. Document and summarise existing national used oil management instruments:
 - i. Document used oil provisions in national legislations by identifying relevant national waste management legislation, regulations and policies that manage used oil, and provide an overview of any national used oil management regulatory considerations.

Project Deliverables

Provide comprehensive draft audit reports (individual reports for each country) including the methodology used and associated confidence levels for the reported data for each country by the 29th August 2014 and final reports by the 30th September 2014 or other date subsequently agreed with SPREP.

Timeframes

All final reports completed and submitted to SPREP within twenty six (26) weeks from the date of contract signature.

Appendix 2: Organisational Details and List of Contacts

A2.1 Organisational Details

The visit to Yap took place from 1 June to 8 June 2014. The consultant was Martyn O’Cain.

The primary agency for liaison was the Yap Environmental Protection Authority, and the following personnel were involved:

Christina Fillim, Office Manager

Jeremy Wayan, 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. Particular mention goes to Francis Falan at YSPC for providing additional information. Full contact details are given below.

A2.2. List of Contacts

Company	Date	Location	Type	Category	Contact	ULO Generated (litre/year)	Stockpiled (litres)
Hapilmohol 1	3/06/2014	Weloy	Boat Repair	Boat	Rophino	227	670
Yap Fishing Authority	3/06/2014	Weloy	Boat Repair	Boat	Rodriquize	75	400
Manta Ray Bay Hotel	3/06/2014	Weloy	Hotel	Generator	Tuelo Perez	30	22
Yap Hospital	2/06/2014		Hospital	Generator		53	0
Yap State Power Company	2/06/2014	Rull	Power Station	Generator	Francis Falan	2,500	27,000
Yap Telecommunication Corp	3/06/2014	Weloy	Service Provider	Generator	Phillip	200	0
7 D Rentals	3/06/2014	Weloy	Engine Repair	Vehicle	Sammy	620	19
Centreline Construction	3/06/2014	Rull	Construction	Vehicle	Filemar	200	0
Damech Tyre Shop	3/06/2014	Weloy	Engine Repair	Vehicle	James Gilmau	230	26
Family Auto Shop	3/06/2014	Rull	Engine Repair	Vehicle	Sen	45	275
Fisheries Maritime Institute	3/06/2014	Tomil	Engine Repair	Vehicle	Alex Raiukler	75	0
GPPC	2/06/2014	Rull	Construction	Vehicle	Rock	1,250	14,500
ITM Auto Shop	3/06/2014	Weloy	Engine Repair	Vehicle	Maranda	26	200
P & D Auto Shop	4/06/2014	Tomil	Engine Repair	Vehicle	Chris	270	10
Pacific Sunshine Ltd	3/06/2014	Tomil	Engine Repair	Vehicle	Chen	1,660	19
PBC Auto Shop	2/06/2014	Weloy	Engine Repair	Vehicle	Mark Ruuemaui	500	4,800
PMA (aircraft hangar)	2/06/2014	Rull	Engine Repair	Vehicle	Ames	400	2,100

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Public Transport system	2/06/2014	Rull	Engine Repair	Vehicle	Eric Santos	1,700	4,400
Target Workshop	3/06/2014	Rull	Engine Repair	Vehicle	John	19	0
WAAB Transportation Co	3/06/2014	Weloy	Engine Repair	Vehicle	John Gilsowuth	400	4,200
Yap Public Works	2/06/2014	Rull	Construction	Vehicle	Fanapluw	1,250	730
YCA Shop	2/06/2014	Weloy	Engine Repair	Vehicle	Henry Giltamag	800	400