

Mission Report

**Used Oil Stockpiles
Assessment
Mission
to
Pohnpei
Federated States of Micronesia**

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Used Oil Stockpiles Assessment Mission to Pohnpei, FSM, 2018

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List of Acronyms

ADF	Advance Disposal Fee
ARF	Advance Recycling Fee
B/L	Bill of Lading
EPA	Environmental Protection Authority
ESM	Environmentally Sound Management
EU	European Union
FCL	Full Container Load
FSMPC	FSM PetroCorp
GEFPAS	Global Environment Facility's Pacific Assistance Strategy
IMODG	International Maritime Organisation Dangerous Goods Code
MRF	Materials Recovery Facility
OEEM	Office of Environment and Emergency Management
PBF	Pacific Bulk Fuels
PDL	Pacific Direct Line
PIC	Pacific Island Country
PWMS	Pohnpei Waste Management Services
PUC	Pohnpei Utility Corporation
RFP	Request For Proposals
SPREP	Secretariat of the Pacific Regional Environment Programme
SAICM	Strategic Action on International Chemical Management
SWM	Solid Waste Management
TA	Technical Assistance
TEU	Twenty-foot Equivalent Unit (standard shipping container)
TT	ISO Tanktainer (20,000 litre tank in a TEU frame)

Executive Summary

This report covers the visit to Pohnpei of February 23rd to March 4th 2018, as part of the consultancy engaged by SPREP under the Global Environment Facility's Pacific Assistance Strategy: Integrated Management of Solid and Hazardous Wastes and Persistent Organic Pollutants (GEFPAS uPOPS) project to update the situation in Pohnpei, FSM regarding their used oil stockpile. The main purpose of the mission was to develop a practical proposal to remove the stockpile overseas for processing. A secondary aim was to update information on used oil generation rates in Pohnpei. Much of the estimates for the current used oil stockpile use information from the 2014 SPREP Audit for Pohnpei, updated where possible.

Pohnpei was chosen for a site visit once it was identified through a desktop study as one of two priority locations requiring assistance to remove a critical used oil stockpile. The Pohnpei oil stockpile is primarily in two locations: the Pohnpei Utilities Corporation (PUC) power plant site, and at the landfill, with a third stockpile at the FSM PetroCorp (FSMPC) Tank Farm at Pohnpei port.

Existing Stockpiles

The PUC site has approximately 122,000 litres of used oil in two open sumps, under disused generators sets in an unused area of the power house; approximately 53,000 litres in two large storage tanks outside the power plant, and approximately 260,000 litres in 1,300 oil drums, mostly under cover.

The landfill, managed by Pohnpei Waste Management Services (PWMS) under contract to the State Government, has approximately 400,000 litres of used oil in approximately 2,000 drums. Many of these drums have been there a long time and some will have leaked their entire contents. Many are overgrown, and some are visibly sinking into the landfill (see photos in the report). The landfill has kept data on incoming oil volumes since 2016 (with some months' of data not available). The FSMPC stockpile is in two large storage tanks, one of approximately 75,000 litres and one of 26,000 litres, giving a total of around 102,000 litres of used oil.

The overall increase in used oil stockpiles since the 2014 audit is estimated at 126,000 litres. It must be recognised that there may be a significant level of variation between estimate and actual amount. The table below provides an overview:

Location	2014 QTY	2018 QTY
Landfill	245,000	400,000
PUC	473,800	435,000
FSMPC	7,800	102,000
Penda Ocean	73,000	N/A
Other	11,000	N/A
Totals	810,600	937,000

Used Oil Stockpiles in Pohnpei, litres

The 'Penda Ocean' stockpile noted in 2014 is actually fuel recovered from a ship called 'Penda Seven' that went on the reef, and is reported by the current owner of the stockpile, Ace Hardware, as being Intermediate Fuel Oil (IFO) used for ship fuel, and is being used; thus it has been removed from the 2018 estimates. Ace Hardware do have some used oil from construction operations that is in drums which can go to the landfill stockpile. Small generators such as automotive workshops take their used oil to the landfill stockpile in drums, and so their stockpiles will be constantly

changing, and should be included in the landfill numbers. Thus these two quantities are included in the landfill estimate for 2018.

Removal of Stockpiles

There are no local use options that will make any impact on these stockpiles, although many small local producers - such as oil from car engines - do find local uses for the used oil (see below). This large Pohnpei used oil stockpile must be exported to an overseas facility where it can be processed for burning or re-refining. This is most likely to take place in New Zealand or Fiji. Another part of this project is looking at where that market might lie.

The most economic method of removal is highly likely to involve the use of T14 ISO Tanktainers (TT) as these are coming into Pohnpei containing liquid fuels. Shipping lines serving Pohnpei are potentially able to easily direct TT towards Fiji and/or New Zealand. A New Zealand company, Pacific Bulk Fuels (PBF) has TT that are used to import fuel into Pohnpei, and PBF has said that these TT can be backfilled with used oil, but a cleaning charge does apply after emptying at the receiving end, in addition to freight costs. A TT will hold approximately 21,000 litres at the fill rate that is expected, the TTs typically having a nominal maximum capacity of 25,000 litres.

Removal of 937,000 litres of used oil would require perhaps 44 TT. If removal took place over one year, that will require 3 to 4 TT per month to be imported, filled and exported. The PUC power plant uses much more than this to import diesel per month, and so there may well be a way to bring in diesel in TT and take it straight to the power plant, so as to avoid filling a road tanker at the port with diesel for the power plant.

Removing used oil from the PUC power plant is fairly straight forward. Oil can be pumped from the sumps in the generator house, into a TT. The drums in the used oil stockpile would then be emptied into the sumps for subsequent removal. For the FSMPC stockpile, again, direct pumping into the TT is easy.

For the landfill stockpile, a TT filling hardstand, with a bund wall to contain spills, is required, along with a place to empty drums into the TT. This can be simply and cheaply achieved by placing the drums onto a steel scaffold tower, with a large drainage pan, which drains down into the TT parked on the hardstand below. This could be easily built amongst the drum stockpile, and the drums lifted up using the PWMS excavator already on site. This method minimises the manhandling of the drums and the distance over which they need to be moved, as the piles are very unstable, and with gravity filling the TT, the need for power supplies and pumps is removed, and with it, another source of potential failure and delay.

The funding to build the hardstand and tower is already allocated to Pohnpei under the GEFPAS project, and if the local stakeholder committee should agree, then the obvious solution is to pay PWMS an agreed amount to build the concrete hardstand and tower. Details are supplied in the report, with schematics, and this approach was discussed with relevant local stakeholders.

A Request for Proposals can be advertised, by SPREP, for the removal of the used oil using ISO TTs. A simple payment schedule can be based on a specific amount per TT exported, on submission of a Bill of Lading to SPREP. Any successful bidder must show competency with import and/or export of TTs and also an existing relationship with an approved receiver overseas, and a shipping company, as part of a successful bid criteria. These aspects are covered below. A list of the key local stakeholders and their contact details is provided in an appendix.

1. Introduction

This report covers the visit of the consultancy engaged by SPREP under the Global Environment Facility's Pacific Assistance Strategy: Integrated Management of Solid and Hazardous Wastes and Persistent Organic Pollutants (GEFPAS uPOPS) project to update the situation in Pohnpei, FSM regarding their State used oil stockpile. The mission was conducted by Alice Leney between February 23rd and March 4th 2018. The mission was one of three conducted as part of the consultancy, two to countries with stockpiles of used oil identified as a priority for action, FSM and Marshall Islands, and one to the Blue Scope steel company in Fiji in an effort to find a market for the exported used oil.

1.1 Aim of the Mission

The overall aim of this mission was to determine if there were ongoing used oil use or treatment processes that would reduce the used oil stockpile, or develop a work plan and budget for the export of the stockpile. The stockpile quantity estimate was also updated.

1.2 Mission Outcomes

The mission had the following outcomes:

- Update of the stockpile status from 810,000 litres to 960,000 litres;
- No significant local use found that would reduce the ongoing stockpile;
- Determination that bulk export of the stockpile was the only feasible option;
- Recommendations as to a system to use T14 ISO Tanktainer bulk fuel containers to export the used oil stockpile to a destination to be determined (likely Fiji or New Zealand) ideally for burning as fuel;
- A general costed plan to collect and export the used oil;
- Recommendations as to local construction works at Pohnpei landfill that would be the collection point for locally produced used oil, other than that produced by the FSM PetroCorp or the Pohnpei Utilities Corporation powerhouse;
- Description of a sustainable system that could be put in place, based on the experience gained with exporting this stockpile, which would levy an Advance Disposal Fee on each litre of oil imported into Pohnpei in the future.

The details supporting these outcome proposals are found below.

2. Assessment of Stockpiles

The 2014 used oil audit identified four large stockpiles of used oil, plus a large number of workshops that held small quantities as a result of daily operations. As these small stockpiles change rapidly in quantity, and as any used oil from the public should be taken to the landfill and added to this stockpile, only the four large stockpiles were investigated.

All numbers are rounded, as the exact numbers of drums, the volume of bulk storage and contents, or the fill rate of individual containers cannot be verified; however, every effort was made to give a reasonable estimate. A 'drum' is taken as 55 US gallons, or 200 litres. All 'gallons' are US gallons at 3.79 litres each gallon.

2.1 Landfill Stockpile

The landfill stockpile was visited on Saturday February 24th and again on several other occasions during the mission. The landfill manager, Mr. Pius Yaropiy of Pohnpei Waste Management Services (PWMS) was consulted, and he provided a guided tour of the stockpile, which is split over two areas separated by an internal road. It appears that in 2014, only the easterly stockpile was in existence. This older stockpile is now covered with creepers, and trees have grown up around the drums, as can be seen in figures 3 & 4 comparing the same view as in 2014 with today. The 2014 estimate was 245,000 litres, being around 1,175 drums. This estimate inevitably had a significant margin of error, as will the 2018 estimate.

The landfill has been keeping records since January 2016 on the incoming used oil. Records for every month since then are incomplete, but for the 13 months that do have figures, 47,000 litres are recorded as incoming (quantities are recorded in gallons). Extrapolating those figures for the 43 months since the 2014 audit gives figures of around 150,000 extra litres, or about 720 extra drums. That would bring the estimated total on site to around 1,900 drums, or around 400,000 litres. Monthly incomings are of the order of 3,600 litres; at that level, annual incomings would be around 43,000 litres, or just over 200 drums. The drums could not be counted accurately as many are covered in creepers and some piles are very unstable and it would be dangerous to walk around and over drums to get a better estimate. Some drums have sunk into the landfill as it is soft. Much leakage is evident; some drums were observed to have rusted out into large holes (figures 1 & 2). Given the inaccessible nature of the stockpile, and the danger in moving around it, a significant number of drums can be expected to have leaked out over the last ten years.



Figures 1 & 2: drums completely rusted out in landfill stockpile



Fig 3: Landfill stockpile in 2014; note position of radio tower on left.



Fig 4: Photo of same site today; note background features of Sokehs Is. skyline

Mr Yaropiy stated that much of the oil came from ships - mostly fishing boats and associated vessels - changing their oil in Pohnpei. He said that ships' engineers told him that it was easier from an official point of view to change oil in Pohnpei as there were few constraints, and so maintenance was scheduled for Pohnpei. The FSM is not a party to the International Maritime Organisation (IMO) and thus not a party to the MARPOL convention. A typical oil change from a ship was around 15 drums (3,000 litres) according to Mr. Yaropiy. Since August 2017, PWMS have been charging \$US1/gallon (\$US55/drum) to ships bringing in used oil, and this has slowed the flow of oil into the dumpsite. This impression was borne out by inspection of the incoming data which indicated recent monthly inflows (October 2017 to date) to be much lower. The situation is complicated to a degree in that people do come to get used oil from the dump for use such as: timber treatment to protect against termites; use down 'long-drop bush toilets to kill flies and smells; use in outer islands for flaming torches used in night fishing. However, these uses would very rarely exceed a single drum per month, which would at best decrease the stockpile by around 50 drums since 2014.

The claim that the oil in drums came frequently from ships was borne out by the predominance of Shell Oil Company branded drums with Korean language labelling being prominent amongst the new drums that could easily be inspected. Even these newer piles were frequently observed to be dangerous, with piles leaning precipitately, and drums sinking into the landfill (figs 5 & 6).



Fig 5: drums sinking into landfill



Fig 6: unstable piles of drums

PWMS operates a crude used oil separation process to drain off water and solids. This attempts to ensure that the oil in the drums is reasonably free of water, rags, sludge etc. A simple tank is used with a drain half way up, and the oil that comes in from local sources is usually put through this system and decanted into drums. The water and solids are drained off and dried. The sludge is dried and landfilled in the same manner as oil spill clean up mops. This would be considered acceptable practise under the Basel Technical Guideline for Used Oil¹ (section 34, p. 7)

¹<http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/AdoptedTechnicalGuidelines/tabid/2376/Default.aspx>

2.2 Pohnpei Utilities Corporation Stockpile

Pohnpei Utilities Corporation (PUC) power plant was visited on February 26th. Two senior staff were consulted, and a reasonably accurate count of the drums of used oil was conducted.

The sumps - reported as holding 122,500 litres in 2014 - under the old gensets, were still full²; these old gensets no longer operate. There were 45 drums in the powerhouse waiting removal to the stockpile. 100 drums were outside of the shed holding most of the stockpiled drums. In addition, two large tanks were alongside the stockpile shed. These were tanks photographed in 2014 but in a different location in the power plant. The estimated volume of the tanks is 19,000 and 34,000 litres. An estimate of the stockpile in the shed was made by counting drums in each row, being 1,155 in the shed. Total estimated number of drums at PUC is about 1,300 drums, being around 260,000 litres. The combined estimated total of the above is 435,000 litres.

The 2014 estimate was 473,800. The number of drums is similar, but some drums are clearly new. Only two large storage tanks are now reported as full, the difference between the storage in tanks reported in 2014 being approximately 30,000 litres. The power plant production of used oil was reported as 19,200 litres per year³, which would have added 69,000 litres over the intervening period if so. The difference indicates the significant margin of error inherent in these estimates: the staff noted the stockpile of drums as 300, but the count was 1,300. There has been no known use of large quantities of oil from the stockpile in the intervening period.

2.3 FSM PetroCorp Stockpile

The FSM PetroCorp (FSMPC) Key Accounts Manager was met at the company's head office. He reported that FSMPC has 20,000 gallons used oil in one large tank, and 7,000 gallons in a partially filled tank, both at the tank farm at the port area. This is approximately 102,000 litres. The 2014 figure for FSMPC was 7,800 litres. This would be an increase of approximately 26,300 litres per year for the intervening period, more than the PUC power plant production. The source of this oil was requested but no response was supplied. The stockpile was not sighted.

2.4 Penda Seven Stockpile

This stockpile comes from a ship, the Penda Seven⁴ used during the runway extension construction of several years ago, which ran aground on the reef in 2012. Oil was recovered from the ship, and stored in drums in the Ace Hardware construction yard at the port, Dekehtik, Nett. The 2014 figure reported was 45,000 litres in drums (216 drums), plus 28,000 litres in a tank. The Ace Hardware manager, Mr. Richard Adams, explained that the oil was not lube oil but Intermediate Fuel Oil (IFO) an blend of gasoil and heavy fuel oil, with less gasoil than marine diesel oil. This IFO was removed under a contract, and is held in a large tank, and ownership is of some dispute. Ace Hardware does not consider this to be used oil. It does appear that it is slowly being used as fuel.

² To within about 500mm of the top.

³ Four engines, two drums per engine per month (500 hr oil change schedule).

⁴ Called the Penda Ocean in the 2014 audit report

Some 120 drums were sighted and counted in the yard, some in very poor condition. Some drums are leaking badly and they have been banded by coral sand, which does appear to be doing a reasonable job in containing the oil. The estimate of what those 120 drums might contain is 25,000 litres, although some of those drums have definitely leaked over the last four years. These drums were photographed in the 2014 audit report. Exactly what these drums contain is not clear, possibly a mixture of IFO, water and used oil. Mr. Adams was under the impression that not much of this was actual used lube oil⁵, and agreed that any used lube oil from their operations would best be transferred to the dumpsite collection system for transferring to any bulk carrier ISO Tanktainer system that may be coming into place. Mr. Adams is concerned about the situation and supports the instigation of a used oil collection and removal system, and expressed genuine concern about other aspects of waste management in Pohnpei.

As a result of the discussion with Mr. Adams, and given the uncertainties in stockpile estimates, the Penda Seven stockpile will be removed from the general calculations of the overall stockpile in Pohnpei.

2.5 Other Stockpiles

The 2014 audit identified some number of small workshop stockpiles, typically of about one drum, but under ten drums. This comprised a reported total of 11,000 litres in thirty one locations, giving an average of one to two drums per site. None of these were visited on the mission. These small stockpiles will have to be taken to the landfill site for transfer to any export containment. Given that there is clear local demand for small quantities of used oil, whatever might be held in a typical workshop this month will be quite different six months later, and is thus largely irrelevant to this exercise of developing a system to export the used oil stocks.

2.6 Stockpile Total Estimates

Total stockpile quantity is clearly not exact; variability is clearly seen above, and the time difference between the 2014 audit and today's estimates helps to bring that variability into perspective. The variability is significant: for example, in 2014 FSMPC noted only 7,800 litres, but four years later says they have over 100,000 litres⁶. Overall, it can be expected that the stockpile is perhaps at least 120,000 litres larger than 2014.

Location	2014 QTY	2018 QTY
Landfill	245,000	400,000
PUC	473,800	435,000
FSMPC	7,800	102,000
Penda Ocean	73,000	N/A
Other	11,000	N/A
Totals	810,600	937,000

Table 1: Estimated Used Oil Stockpile in Pohnpei, FSM, in litres

⁵ It does look very black and thick, but it would still be useful as fuel oil burnt by any used oil processor.

⁶ If there was confusion over litres and gallons then if it was 7,800 gallons that would be nearly 30,000 litres.

3. Annual Used Oil Generation Estimates

Given the changes since 2014 seen above, some estimate can be made of used oil generation in Pohnpei. The small quantities of used oil noted in 2014 from workshops is assumed to have gone to the landfill stockpile in the 2018 estimate. The 2014 annual generation estimate was 67,000 litres.

PUC: the power plant reports using two drums of oil, per engine, per month, with four engines. That would be 19,200 litres per year if none is burnt. This is equivalent to about one Tanktainer (TT) of oil per year. The actual stockpile figure is apparently less than that of 2014, which goes to show how much variation we have in estimates. PUC does not take used oil from other producers, they say. If half the oil is burnt by the generator sets, then the oil produced annually would be around 10,000 litres, one half a TT.

FSMPC: the stockpile at FSMPC has changed from 7,800 litres in 2014 to 102,000 litres in 2018. This would equate to around 25,000 litres per year, but requests to identify the source of this oil have not produced an answer. This is roughly one TT per year. Some may be diesel slops from spills, if so, generation rates could be very erratic.

Landfill: this has increased by an estimated 150,000 litres since 2014. This estimate is derived from a record of incoming oil, provided as monthly figures, for 13 months: January - September 2016 and October 2017 - January 2018, which was around 47,000 litres. These numbers were extrapolated out for the 43 months from the 2014 audit to get the current estimate. Some drums have been taken out for use by local residents, but less than one per month, so a maximum perhaps of 9,000 litres has left the site. Some has also certainly leaked out of rotten drums. The landfill manager notes that when a ship brings oil in it is typically around 15 drums (3,000 litres, 825 gallons) and the records sighted indicate that this is a reasonable estimate as six of the 10 months of 2016 show reasonable multiples of these numbers, with two months showing much less (around 200 gallons, or four drums). The 2017-8 numbers of only four months show only one month with a potential ship oil input, and this is consistent with the PWMS introduction of a US\$1/gallon charge for dumping oil from ships⁷. If the lower monthly numbers are taken as typical Pohnpei-only used oil input, the amount is more along the lines of 200 gallons/month, or around 800 litres. This would translate to around 10,000 litres per year, (50 drums) or one half a TT. Realistically, one TT per year (20,000 litres) might be collected by the landfill, being around 100 drums per year if no ship oil is taken, and assuming all local workshops and small used oil generators take their oil to the landfill collection point. With ship oil included, the amount would be more like at least two TT per year. The 2014 audit estimated 11,000 litres in small workshop stockpiles, and these figures do indicate some level of consistency.

These numbers point to an annual collection potential of three to four TT per year, possibly five if oil continues to come into the landfill from fishing boats in quantity, although this may appear to be falling off. These numbers broadly match the 2014 estimate of 67,000 litres, which would be three and a half TT.

⁷ Casual inspection of drums clearly indicates many more recent drums have come from overseas suppliers from Asia.

4. Current Used Oil Uses in Pohnpei

The 2014 audit reported that used oil was being burnt by the scrap metal processor in a generator. The scrap metal operator has now left Pohnpei and is no longer operational. The PUC reported that they used some used oil in a centrifuge, but this is not operational now, and has not been used for some time. FSMPC is reported to have a centrifuge, but it is not operational. The hospital is in the process of installing a new incinerator under the PacWaste project⁸. The only significant large user of used oil in the past has been *SS Thorfinn*, which last visited in 2006. The *Steam Ship Thorfinn* (a dive ship based in Chuuk lagoon) had taken used oil from Pohnpei in the past to use as boiler fuel. The last time it came to Pohnpei, the ship hit the reef whilst leaving, and was subsequently involved in litigation at State level, and has not returned as a result. *SS Thorfinn* is reported have loaded significant quantities by truck tanker from the PUC stockpile. *SS Thorfinn* is also reported to have taken oil from the landfill stockpile in the past, but again, not since 2006⁹.

Several other uses are reported for used oil in Pohnpei, and used oil is removed from the dump stockpile for these purposes, but at less than a drum a month¹⁰. These uses are common, widespread, and include:

- Painting on to timber to improve termite resistance;
- Painting around houses foundations on the ground to discourage insects entering the house;
- Putting down 'long-drop' water-less rural toilet pits to cut down on smell and flies;
- Burning in torches for use in night-time fishing, more so on outer islands, saving torch batteries;

Many car owners do not change their oil, and simply top up the oil. With most cars being reasonably old, oil consumption is probably fairly high.

⁸ The hospital was not visited on the advice of the local focal point due to some sensitive issues around the PacWaste incinerator not yet being installed.

⁹ Pers. Comm. Pius Yariopy, PWMS landfill manager.

¹⁰ Pers. Comm. Pius Yariopy, PWMS landfill manager

5. Customs Data on Imports

The FSM Customs service main headquarters at Palakir was approached with a request to supply data on oil imports into Pohnpei state from 2013 to 2017 inclusive. The following tariff lines were requested for information on quantity:

27071000	Oils and products of the distillation of high temperature coal tar; benzol (benzene)
27074000	Oils and products of the distillation of high temperature coal tar; naphthalene
27076000	Oils and other products of the distillation of high temperature coal tar; phenols
27079900	Oils and other products of the distillation of high temperature coal tar;
27090000	Oils; petroleum oils and oils obtained from bituminous minerals, crude
27101130	Diesel
27101190	Other petroleum oils and oils from bituminous minerals, not crude or waste oils;
27101900	Oils; petroleum oils and oils obtained from bituminous minerals, not crude;
27109100	Waste Oils; of petroleum or obtained from bituminous minerals, not crude;
27109900	Other

A meeting was held with the Customs Analyst Ms. Lorena Rea Seady and the Customs Advisor Mr. Rensly Sigrah¹¹ to request the information. Some concern was expressed regarding commercial confidentiality, but it was noted by the consultant that only import quantity and not importer data was requested. No data has been supplied; Mr. Sigrah did indicate a marked reluctance to allow Ms. Seady to fill the request.

¹¹ Previously Governor of Kosrae and a representative of the Private Sector.

6. Scenario for Stockpile Export

A plan was developed given the information available, and given the logistics of the situation in Pohnpei. This requires managed export of the stockpile. There are three stockpiles of used oil that can be expected to require ongoing management after any one-off removal. This scenario aims to do two things:

- Remove the existing stockpile of used oil in Pohnpei;
- Leave in place a system that can be ongoing to deal with future used oil exports.

The key parameters of any stockpile export are:

- 1) How will the oil be physically handled?
- 2) Who will operate the logistics of moving the oil containers around Pohnpei?
- 3) Who will pay the costs of the export?
- 4) How will any one-off removal contribute to a long-term sustainable system of used oil export?

6.1 *How Will the Used Oil be Handled?*

There are four possible options: 200 litre oil drums; 1,000 litre Intermediate Bulk Carriers (IBC); 23,000 litre rubber bladders that fill a standard Twenty Foot Equivalent (TEU) shipping container; or 24,000 - 26,000 litre ISO Tanktainers (TT).

The simplest to handle and most cost effective method for the up to 1 million litres involved in this export would be via fifty ISO TT's. Only 18 IBC can be put into a TEU, and they would have to be purchased and imported to Pohnpei as there is no regular source of used IBC on island; this can be expected to cost over \$300 per IBC just to buy and land them in Pohnpei. Drums would be problematic for shipping, unless new drums were used. Rubber bladders require specially prepared TEU units, and have the potential to be difficult to handle unless crews are experienced with these systems¹². Any leakage of used oil during transport would likely result in the shipping company refusing to take further shipments in that manner. There may also be restrictions on using a variable composition product in a bladder. The most practical and secure method is the Tanktainer (TT).

Use of a T14 ISO TT (the type suitable for hazardous chemicals and acids) would be the simplest to handle and fill. However, these would need to be sourced and imported to Pohnpei in order to fill and export them. The TTs are similar to conventional shipping containers in that they are owned by the shipping line and leased as part of the shipping cost. The shipping line Pacific Direct Line (PDL) does bring in T14 ISO TTs containing fuel into Pohnpei, sourced from a related company, Pacific Bulk Fuels. These TT units have a capacity of 24 - 26,000 litres, and the typical fill rate is 85-90% full. This would give a range of 20,400 to 23,400 litres per TT, depending on size and fill rate. It will be assumed for the purposes of calculation that a TT will carry 21,000 litres of used oil.

¹² Shipping containers must also be lined with plywood before the bladder is inserted.

6.2 Stockpile Removal Logistics

There are three key players involved in the stockpiles: PUC, PWMS, and FSMPC. Of the three, only FSMPC has any experience at importing and exporting Tanktainers (TT), which are currently used to import jet fuel. FSMPC also has trucks capable of moving a Tanktainer, which neither PUC or PWMS has. Thus, FSMPC has the capacity to import, handle and export any TT of used oil. However, other businesses on Pohnpei also handle TT and have trucks to move them. One is the Ace Hardware company, which has extensive construction, wholesale and retail operations across all four FSM states. A contractor would be engaged to operate the system.

PBF have TT that come into Pohnpei with fuels. PBF will allow their TT to be backfilled with used oil, but there will be an extra charge for cleaning after delivery¹³. The markets identified by PBF are in New Zealand and Fiji. In Fiji, the oil would go to BlueScope Steel to be used as fuel for steel manufacturing, in New Zealand a disposal charge would be made to take the oil. BlueScope are expected to take the oil for free, although there is a government tax of \$FJ0.02/lit on used oil imported into Fiji..

The logistics would operate as follows:

A TT is imported into Pohnpei. This may or may not have fuel inside. If it does have fuel, this will decrease costs. For example, a TT full of diesel can be taken direct from the port to PUC by FSMPC, and the diesel pumped out into the PUC fuel tanks. The fuel tanks at PUC powerhouse are owned by FSMPC, and PUC in effect buys fuel from those tanks. PUC then pumps used oil into the TT, a facility they already have. The pumping is done from the sumps in the powerhouse. Drums can be emptied into the sump, and then the oil pumped into the TT. The logistics here involve PUC moving drums of used oil from their stockpile to the powerhouse for transfer into the TT. In the long-run, used oil would only go into drums and then into the sumps for transfer, and no stockpile outside would be required under this scenario.

If the TT is empty, then it can be taken to either to PUC for filling, or the landfill, as required. At the landfill, PWMS will have constructed a bunded hardstand area of concrete with a low wall (1 ft or so) to contain any spills (see Figure 7 below).

PWMS would ideally install a drum crusher on site to handle the empty drums, so these can be moved to the scrap metal pile after emptying. The steel tower and the concrete hardstand works can all be built by PWMS on-site using readily available materials. Funding is available under GEFPAS for these works.

For the FSMPC stockpile (currently about 100,000 litres) the facilities exist at the location to pump out the holding tanks into a TT. For other producers of used oil on Pohnpei, all their oil should be directed to the landfill for holding before filling the TT using the landfill used oil transfer system.

The contractor will be responsible to truck any TT around Pohnpei, and will be responsible for export of any TT of used oil, including suitable IMODG requirements and Basel or Waigani permits that may be required, working alongside the National Office of Environment and Emergency Management (OEEM) as the national Focal

¹³ Pers. Comm Giles Giles Jephcott, General Manager, Pacific Direct Line 28/2/18

Point for these conventions. A Waigani Permit will be required for export to Fiji, and a Basel permit where used oil is exported to New Zealand.

6.3 Landfill Collection Point Construction

The landfill needs a simple method to empty around 1,900 drums currently on site. The drum stockpile is potentially dangerous to move around for the workers who will have to handle the drums, and so the more that can be done with machinery, the better. PWMS has an excavator that can be used to pick drums off the stockpile, keeping manual handling to a minimum. The following is proposed as a viable and simple solution, which will leave in place a simple ongoing system to empty drums.

A bunded concrete hardstand should be constructed in the stockpile area. This should be approximately 10m x 4m with a 150 - 200mm bund wall. This will be large enough to place a T14 ISO Tanktainer onto the hardstand, and leave room at the far end. At that far end, a steel scaffold tower can be built that has a platform and simple cradle upon which an oil drum can be placed. Under the drum a large funnel arrangement can be built using sheet metal to catch oil coming out of the drum. A large flexible hosepipe can lead from the catchment output into the Tanktainer; use of a hose means that positioning of the Tanktainer on the hardstand is not critical. The funnel should have a capacity of around 220 litres (60 gallons) so as to accept all oil from a single drum to avoid spillage, and should be larger than the area of a drum so any leaks from old drums are caught. A schematic of the arrangement is provided below at figure 7.

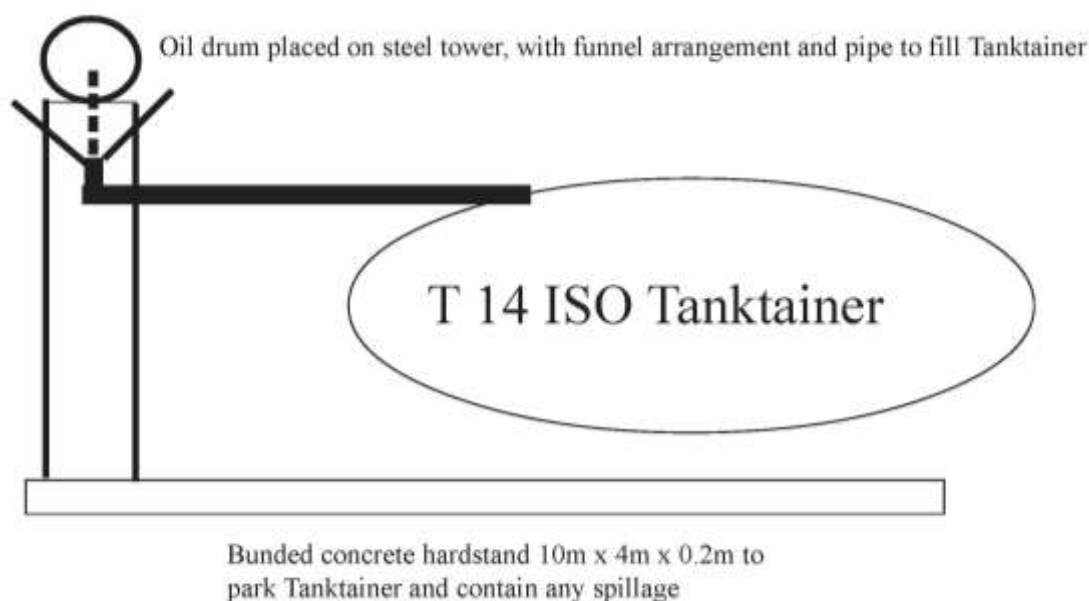


Figure 7: Schematic of simple oil drum emptying system for PWMS

With a Tanktainer in place on the hardstand, a drum can be picked off the stockpile using the excavator, and taken directly to the emptying tower. The drum can either be opened conventionally, or in the case of very badly corroded examples, simply punctured, and allowed to drain into the funnel. Oil from leaking drums will be caught by the large funnel arrangement. Empty drums can be taken down by the excavator, and crushed using a drum crusher device, or simply run over by the excavator, and placed into the scrap pile.

Building the bunded hardstand next to the existing used oil stockpile minimises the distance the excavator needs to move any drums and the potential to contaminate other areas during the process. Some drums have been in the landfill over ten years, and moving them may result in significant leakages. Using gravity to fill the Tanktainer avoids problems with pumps and installing a power supply on the landfill site. One Tanktainer will require about 100 drums to fill it. If the Tanktainer was filled over a five and a half day working-week period, this would require about half an hour each to lift, and empty, each drum. It can be expected that a TT must be filled in the interval between the shipping line regular voyages so as to avoid rental costs for the TT.

In addition to the filling system, a separation tank is needed at the landfill. PWMS does have an existing system that is handling small amounts of oil brought in to the landfill in gallon containers. However, it would be much better to have a larger settling tank that could handle drums of oil coming in from local workshops. A significant risk to the exporter is that too much water is in the used oil exported, causing the receiver to stop taking the shipments. The most likely source of excess water is from oil coming from local workshops where open tanks collect water. Pohnpei has exceptionally high rainfall and an open container can quickly double its volume of oil through rain entry. Another source of oily water may be ships sending in oily bilge water, if the engine oil being changed is dumped into the bilge before pumping into drums. A schematic of a suitable tank is provided at Figure 8. The capacity of such a tank should be at least 500 litres or 1m³ - 1,000 litres or 250 gallons - so as to ensure plenty of room to separate out full drums of mixed oily wastes.

The residual water and sludge can be drawn off for drying and landfilling, consistent with Basel Technical guidelines cited previously.

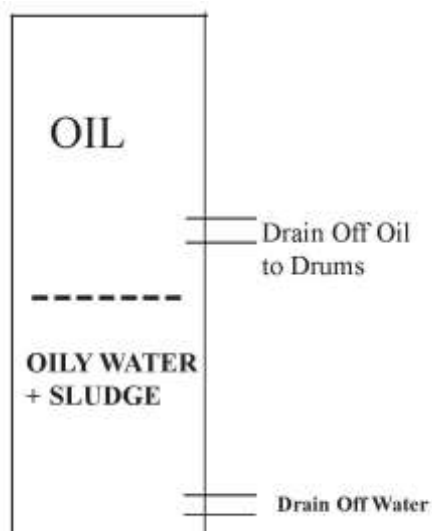


Figure 8: Schematic of simple oily water separation tank for Pohnpei Landfill



Figure 9: Existing tank at landfill

6.4 Estimated Costs of Export

There are some significant costs involved:

- Import of each T14 ISO TT;
- Trucking a TT to and from wharf to the oil filling site;

- Export of TT, and Basel (or Waigani) Convention documentation preparation costs.
- Construction of the landfill hardstand and oil draining tower.

It is assumed for this exercise that the value of the used oil export is only sufficient to pay for the trucking and handling and TT cleaning at the importing end, and the used oil has no value to the exporter.

Enquiries were made of two shipping agents in Pohnpei, and one shipping line currently handling TT in and out of Pohnpei, with destinations to Fiji and India. These were: FSM Shipping Corporation, and SeaLand, respectively. Neither FSM shipping Corp nor SeaLand were prepared to provide prices at this time without an actual shipment, it seems. Consultation with a source in regional shipping, known to the consultant, indicates a cost of around \$4,500 to ship a TT from Pohnpei to Fiji. TT are more expensive than TEU as TTs are expensive to lease.

FSMPC operates a side lifter for moving containers, and Ace Hardware has a tractor and trailer unit that can also move containers as long as they stay on the trailer, for \$100 per day. The cost of a crane to lift a container on and off the trailer (outside the port) is \$150/hr. A cost of \$500 for moving a TT from the wharf to the PUC powerhouse and back again is probably a reasonable estimate.

Shipping routes

There is a route to Fiji and New Zealand via Busan, Korea, using Kyowa Line, or Pacific Direct Line (PDL). PDL bring T14 TTs into Pohnpei with fuel inside, but not enough to fill the requirements for perhaps 50 in a year, as might be needed to clear the existing stockpile.

6.5 Who will pay?

Landfill Collection Point

The construction of the landfill oil drum transfer system, and the separation tank can be financed by the GEFPAS funding available under Activity 4: Collection, Storage and Disposal, consistent with the MOU between SPREP and the FSM regarding implementing the used oil project activities. US\$23,000 is available under Activity 4, and it is understood that the four FSM states have agreed to allocate all this money to Pohnpei State activities¹⁴ as Pohnpei State is acknowledged to have the most critical problem with used oil at this time. If a contract can be drawn up with PWMS to build the collection point, then this will make things very simple and much cheaper as they have the labour and equipment to do this and can build this whilst still operating the site¹⁵.

Agreement regarding this will be required by Pohnpei EPA and the State Used Oil Steering Committee, established under the GEFPAS project.

Import and Export of Tanktainers and Trucking on Pohnpei

A single contractor should be chosen to import, move and export TT's required for the used oil stockpile removal. A contract should be put out for a Request for

¹⁴ Pers. Comm. Patti Pedrus, OEEM.

¹⁵ Pers. Comm. Pius Yaropiy, PWMS landfill manager.

Proposals, but with important criteria for choosing the contractor, detailed below. The contractor must be experienced in handling containers, bulk fuels and import / export.

The UNEP GEFPAS project has a significant sum allocated for used oil removal for a priority country(s), and a portion of this money could be allocated to the contract. The contract should require that the contractor is paid a certain amount based on each TT exported.

6.6 Contracting and Tender

It is essential that any bidder for an RFP to fill TT and export used oil must have a demonstrated ability in this field, such that the following must be requirements for any bid to be accepted:

- Proven experience in import of fuels and / or lubricating oils;
- A reference from a shipping line serving Pohnpei that explicitly states that the company is prepared to work with the bidder in providing and exporting T14 ISO Tanktainers containing used oil;
- Preferably an existing capacity to move shipping containers around Pohnpei Island;

Any Proposal should be structured such that the contractor bids for a price to export each TT of used oil, of a minimum of 20,000 litres, from Pohnpei. Payment is made upon presentation of a copy of the Bill of Lading for each export.

By making payments based on each TT exported, the uncertainties involved in determining the actual stockpile, which are clearly significant, can be overcome to some extent, and avoid entering into a contract to export a quantity of used oil that is not found to exist. The contractor also has an incentive to avoid exporting oily water as the receiver may decline to accept further shipments as a result.

It may well be that a single contractor can cover both Pohnpei and the RMI, and so the country that works best with the contractor will gain most by exporting the most oil. It is unlikely that the funds currently thought to be available will be sufficient to clear out stockpiles in both locations.

7. Work Plan

The basic work plan is fairly straightforward as the main effort will be conducted by the contractor, and the filling by PUC, FSMPC and PWMS so as to get rid of their oil stockpiles.

Table 2: Budget and responsibilities for tasks

Task	Budget USD	Timeline	Responsible
Draw up design and approve collection point construction for landfill	N/A	May 2018	EPA/OEEM/PWMS
Draft Request for Proposals for Used oil exports	N/A	May 2018	SPREP/UNEP
Build landfill collection point	\$23,000	–June-Aug 2018	PWMS
Publish RFP for export in FSM and regionally	N/A	May 2018	SPREP
Negotiate contract and sign		Aug 2018	SPREP/UNEP
Contractor commences import/ export of TT for used oil filing and removal	\$130,000	Sep 2018 - Sep 2019	Contractor

Table 3: Timeline for activities

Task	2 nd Qtr 2018	3 rd Qtr 2018	4 th Qtr 2018	1 st Qtr 2019	2 nd Qtr 2019
Draw up design and approve collection point construction for landfill					
Draft RFP for Used oil exports					
Build landfill collection point					
Publish RFP for export in FSM and regionally					
Negotiate contract and sign					
Contractor commences import/ export of TT for used oil filing and removal					

8. Sustainable System for Used Oil Recovery

In the long term, a sustainable oil recovery system can be built to service Pohnpei, based on this model. The operation of this stockpile removal project should provide solid information as to what the real costs are of this operation, per TT filled and exported. Once a cost per TT can be determined (including a level of profit for any contractor), this can then be converted into a cost per litre of oil imported, and levied as part of an Advance Disposal Fee (ADF) system for Pohnpei.

8.1 Advance Disposal Fee Scenario

The obvious arrangement, if the scenario above proves practical and occurs as envisaged, is that FSMPC - or a similarly experienced local business - would be the 'System Operator' who would have the right to make a claim against the fund holding the ADF. This legislation would be fairly simple, and a model legislation has already been prepared by SPREP under the AFD project in 2013. The 'System Operator' would have a contract with the Pohnpei State Government to remove used oil and be able to claim against the fund. The claims against the used oil ADF fund should be sufficient to ensure that the System Operator can make a profit from collecting and exporting used oil.

Given that a significant quantity of oil imported is not collected (the 2014 audit found that only about 30% of the imported quantity appeared in the used oil stream) this would allow a ADF rate to be selected that would reflect this low return, so keeping down the cost of the ADF itself.

If the cost per TT of used oil exported was US\$10,000, and the TT holds 20,000 litres, then this would require a ADF of 50¢/litre (US\$2/gallon). But if only 30% of the oil imported can be expected to be recovered, the ADF could be one third of this, at around 17¢/litre or 65¢/gallon. At a local retail price of around US\$4/litre (US\$16/US gallon), that would be a 4.25% price increase to cover the import levy.

If imports are 500,000 litres per year, and a 17¢ /litre ADF is levied, that would generate US\$85,000. If annual export requirement was 8 TT/year, then that would be around US\$10,000 for each shipment, likely more than enough.

8.2 Legislative Framework

To support the above proposal of an ADF system, State legislation would be required. The only current legislation relevant to used oil is the Solid Waste Regulations, but these do not allow any ADF system to be imposed as such. New legislation would need to be passed to deal with this.

The key parameters of any new legislation would be that the State could impose a levy per litre (gallon) on new oil coming into the State. This money would be held in a fund at the State Treasury. A 'System Operator' would be designated who had a contract with the State, under which they could claim a certain amount of money for each Tanktainer of used oil they exported. The legislation could be simple, with the detail of arrangements being in the contract between the System Operator and the State. EPA can mandate under the existing Solid Waste Regulations (Section (e) Part 8) that used oil from workshops and the public must go to the collection point at the PWMS landfill, so that small generators of used oil are covered by the system. The funds levied per gallon would be taken at import in the same manner as the existing beverage container refund system, as current in Pohnpei.

9. Key Stakeholders

Pohnpei State does have a Used Oil Steering Committee of the key stakeholders on the issue in Pohnpei State. The committee was created through Executive Directive 03-16 in October 2016. The Committee includes representatives of the following:

- FSM PetroCorp;
- Department of Transportation and Infrastructure;
- Pohnpei Utilities Corporation;
- Environmental Protection Authority;
- Conservation Society of Pohnpei;
- Pohnpei waste Management Services;
- Social Affairs (Chair, Ms. Lululeen Santos);
- Department of Education;
- Private Sector

A list of the key stakeholder contact details is provided at Appendix I.

Appendix I: Contact Details for Key Stakeholders

FSM PetroCorp (Vital)

Key Accounts Manager: Trevayne Esiel

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cell: +691 922 1006

CEO: Jared Morris

Email: jared.morris@fsmnpc.com

Pohnpei Utilities Corporation

General Manager: Dackson Solomon

Tel: +691 320 2374

Email:

Pohnpei Waste Management Services

Landfill Manager: Pius Yariopy

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Pohnpei Environmental Protection Authority

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Alfred David

Environmental Specialist One

Pollution Control Unit

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Pohnpei Ace Hardware

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Store Manager: Richard Adams

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Tel: +691 320 2723

P.O. Box 67 Pohnpei FM 96941

Pacific Direct Line (New Zealand)

General Manager: Giles Jephcott

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FSM National Government

Office of Environment and Emergency Management

SPREP Focal Point

Patti Pedrus

Sustainable Development Planner

Department of Environment, Climate Change, & Emergency Management

National Government

Federated States of Micronesia 96941

Email: pattiwarm@gmail.com