Used Oil Management Plan
Solomon Islands

May 2023

This document has been produced with the financial assistance of the AFD. The views expressed herein can in no way be taken to reflect the official opinion of the AFD.

Abbreviations

ADF	Advanced Disposal Fee
AFD	Agence française de développement
ARFD	Advanced Recovery Fee and Deposit Scheme
BFNZ	Blended Fuel Solutions NZ Ltd
BPS	Bluescope Pacific Steel
COP	Code of Practice
EU	European Union
GDP	Gross Domestic Product
GEFPAS	Global Environment Facility - Pacific Alliance for Sustainability
GPPOL	Guadalcanal Plains Palm Oil Co. Ltd
HCC	Honiara City Council
JICA	Japanese International Cooperation Agency
MECDM	Ministry of Environment, Climate Change, Disaster Management & Meteorology
MOFT	Ministry of Finance and Treasury
NFD	National Fisheries Development Corporation
NRH	National Referral Hospital
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyl
PE	Pacific Energy
PIC	Pacific Island Country
PICT	Pacific Island Countries & Territories
PPE	Personal Protective Equipment
SICED	Solomon Islands Customs and Excise Division
SINU	Solomon Islands National University
SPC	Sun Petroleum Corporation
SPREP	Secretariat for the Pacific Regional Environment Programme
SPO	South Pacific Oil
SWAP	Committing to Sustainable Waste Actions in the Pacific
TT	20’ ISO Tanktainer
ULO	Used Oil
UNEP	United Nations Environment Programme
USEPA	United States Environmental Protection Agency

Contents

1.0 AFD Programme to Develop a Used Oil Management Plan: Introduction

1.1 Project Background

Pacific Island Countries and Territories (PICTs) offer some of the richest areas of biodiversity on the planet. These areas, and their island communities, are under increasing pressure from development and growing human population, and the social and economic pressures associated with this growth.

Increased populations and urbanisation have led to increased product imports, production, and waste generation. Much of the waste generated through these imported products cannot economically be managed due to issues of small and isolated populations; economic volatility; geographical isolation from large economies; limited institutional, financial and human capacity; and inadequacy of infrastructure to capture and process waste materials.

Poor waste management poses risks to the economies of PICTs, as most rely heavily on clean environments for agricultural activities and a vibrant tourism industry, therefore polluted and degraded environments pose a significant threat to PICTs.

The overall work covered in this project is funded by the Agence française de développement (AFD), referred to hereafter as "Committing to Sustainable Waste Actions in the Pacific (SWAP)", and it aims to improve sanitation, environmental, social, and economic conditions in Pacific Island countries and territories through proper waste management. To achieve this, the overall work focuses on three streams of wastes: used oil, marine debris, disaster wastes and an overarching issue on sustainable financing mechanisms. The eight countries and territories that will benefit from this overall project are Fiji, French Polynesia, New Caledonia, Samoa, Solomon Islands, Tonga, Vanuatu, and Wallis and Futuna.

As part of this process, in December 2021, *Araspring Ltd* (New Zealand) in association with *Going Troppo Consulting* (Australia), *Pacific Reef Savers* (New Zealand) and *POPs Environmental Consultants Ltd* (New Zealand) were awarded a 9-month contract by SPREP/SWAP to develop used oil management plans for Samoa, Solomon Islands, Tonga and Vanuatu.

The project focuses exclusively on used oil and four countries have been chosen to benefit, namely Samoa, Solomon Islands, Tonga and Vanuatu. The main outcome of the project will be a National Used Oil Management Plan for each country. This report focuses on the Solomon Islands.

Special thanks must go to MECDM, Ms Debra Keresaka, Ms Wendy Beti and consultant Ms Gaylyn Puriana for their excellent work in the field, interviewing stakeholders and gathering feedback, which made to production of this report possible.

1.2 Used Oil Background.

Motor oils are used in internal combustion engines or associated mechanical parts. Their main function is lubrication of moving parts, but they also clean, inhibit corrosion and cool the engine by transferring heat. Motor oils are derived from petroleum-based and non-petroleum-synthesised chemical compounds. Similarly, hydraulic fluids are low compressibility oils that transfer power in hydraulic machinery. Common hydraulic fluids are also based on mineral oils.

Used oil is defined as any petroleum-based or synthetic oil or fluid that, through use and contamination, has become unsuitable for its original purpose due to the presence of impurities or loss of original properties. A significant proportion (40-60%) of lubricating oils (and hydraulic fluids) become a “used" waste product after a period of use.

1.3 Management of Used Oil.

Improper disposal of used oil can have major negative impacts on natural resources such as groundwater, the marine environment and soil, as well as on human populations. Poor management of used oil is a major environmental concern for Pacific Island nations including Solomon Islands. It is estimated that around 600,000 litres of used oil is generated annually in Solomon Islands[1].

There is some ad-hoc management of used oil by some industries and the community, but there is no co-ordinated national strategy to manage used oil.

1.4 Classification of Used Oil.

The United States Environmental Protection Agency (USEPA) and some other jurisdictions make a distinction between the terms “used oil” and “waste oil”, with waste oil being the broader term encompassing oil with a wider level of contamination. In this report, however, they are treated as interchangeable terms. This is the approach taken by the Basel Convention Guidance document[2] and also the SPREP Used Oil Export and Import Guidance Document[3].

[1] AFD/SPREP Feasibility Study 2022 Table 3 pp8.: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

[2] “Basel Convention Technical Guidelines on Used Oil Re-refining or Other Re-uses of Previously Used Oil” UNEP 1997

[3] “Waste Assessment Guide for the Export and Import of Used Lubricants and Used Oil” SPREP 2015

For this report, "used oil" uses the definition in the Basel Guidance Document:

> *Used Oil includes any semi-solid or liquid product consisting totally or partially of mineral oil or synthesised hydrocarbons (synthetic oils), oily residues from tanks, oil-water mixtures, and emulsions. These may be produced from industrial and non-industrial sources where they have been used for lubrication, hydraulic movement, heat transfer, electrical insulation or other purposes and whose original characteristics have changed during use, thereby rendering them unsuitable for further use for the purpose for which they were originally intended.*

1.5 Health & Environmental Impacts of Used oil.

Improper disposal of used oil can have major negative impacts on natural resources such as groundwater, the marine environment and soil, as well as on human populations.

Large volumes of used oil can potentially enter aquatic ecosystems in water runoff from urbanized areas. Typically, oil spilled on soil migrates downward by gravity into ground waters, and spreads laterally via capillary forces and soil heterogeneity. Once in the environment, oil hydrocarbons and associated metals may persist for years. Ingested oil may adversely impact the ability of animals to digest food and damage their intestinal tracts. Oil also reduces the insulating capacity of animal furs and the water repellency of bird feathers increasing morbidity and mortality due to exposure and eventual drowning.

There are also major community health considerations around the fate of used oil due to its toxicity. Used oils typically contain a range of compounds that may have adverse impacts when released into the environment. These compounds include polycyclic aromatic hydrocarbons (PAHs), heavy metals, additives and antioxidants, trace levels of chlorinated solvents, and polychlorinated biphenyls (PCBs). Exposure to these compounds can result in damage to the liver, kidneys, heart, lungs and nervous system. Poly-aromatic hydrocarbons are also potent carcinogens. Oil concentrations as low as one part per million (ppm) can contaminate drinking water.

1.6 The Programme to Develop a Used Oil Management Plan

The project initially produced an Inception Report and an Analysis Report which mainly assessed used oil arisings and current management. A Feasibility Report[4] has also been

[4] AFD/SPREP Feasibility Study 2022: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

carried out to examine the findings to date and presented the likely procedures, equipment, services, and capacity-building needs necessary to meet the stated government and stakeholder needs within a draft national Used Oil Management Plan.

From the outcomes of the Feasibility Study[5] the following recommendations are made for Used Oil Management in the Solomon Islands.

a) The first step is to set up a local enterprise to establish a collection service and storage depot, using the funding provided for the Honiara Used Oil Management Project. Once the used oil is collected and safely stored, with an ongoing collection system, then the focus can turn to recycling the stored used oil.
b) The pilot study is only for Honiara so once that is successfully underway, decisions will also need to be made regarding repeating such facilities and services elsewhere.
c) Public used oil collection points will also need to be established.
d) In the short term undertake a shipment or multiple shipments, according to need, to clear existing stockpiles of used oil, thereby mitigating risks to the local environment. The expected costs for a shipment to New Zealand would be USD7,800. The cost per litre rate is USD0.49. This may also end up being the long-term option.
e) Implement a pilot programme to address used oil management in remote communities using NuFuels units. The estimated cost for a ten-unit pilot, based on the costs in Section 4.1 Table 6 would be USD213,100.00.
f) Examine the feasibility of other local treatment options, including the PACPLAN Pyrolysis Unit and the Yuneng ZJC Series Unit.
g) Ensure the necessary training is carried out, including safe handling of used oil, based on the draft Used Oil Code of Practice (Annex 1).
h) Improve government staffing levels to cope with the need to manage used oil effectively.
i) Carry out an education programme to use the public collection points and discourage the unsatisfactory disposal of used oil, including current uses for marking sports fields, treating timber, controlling dusty roads, and replacing chainsaw bar oil.
j) Improve the collection of virgin oil import data.
k) Set up the ADF system to assist in funding future used oil management. Some user-pay charges could also be implemented, as well as searching for some ongoing donor funding.
l) In the long term, increased use of solar power and other sustainable energy practices, and the introduction of electric vehicles, will reduce the production

[5] AFD/SPREP Feasibility Study 2022: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

of used oil, and these should be encouraged. This would also be in keeping with the climate change goals of the Solomon Islands.

Following on from the recommendations of the Feasibility Study[6] a number of sequential steps need to be completed to ensure Solomon Islands manages used oil appropriately and in accordance with best practice into the future. These include:

- Finalisation of national used oil management policy, including a detailed cost benefit analysis of used oil generation rates and disposal options;
- Drafting of national used oil management legislation, regulations, standards and code of practice;
- Formation of a national Used Oil Management Steering Committee;
- Establishment of a Managing Agency;
- Formation of a user pays management system for used oil management;
- Implementation of collection of an Advanced Disposal Fee (ADF) on all imported lubricants; and
- Dispersal of ADF income to pay for national used oil collection, storage and management and local treatment or offshore disposal.

[6] AFD/SPREP Feasibility Study 2022: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

2.0 Purpose and Scope of the Used Oil Management Plan for the Solomon Islands

2.1 Purpose

This Used Oil Management Plan establishes and directs an appropriate management framework to improve national management of used oil and promote shared used oil management responsibility by all national stakeholders in the Solomon Islands.

2.2 Scope

The Plan improves national management of all used oil consistent with the classification of used oil as a hazardous waste under the Waigani and Basel Conventions[7,8].

The Plan also provides clear guidelines for the management of used oil in the Solomon Islands. This includes clearly stated "actions required".

[7]http://www.basel.int/default.aspx?tabid=4834
[8]https://www.sprep.org/convention-secretariat/waigani-convention

3.0 National Legislation

3.1 Overview

In 2020 Australian Aid produced two publications for SPREP, prepared with the financial support of the EU.

- **Stocktake of Existing and Pipeline Waste Legislation: Solomon Islands.** 16 March 2020 ISBN 978-982-04-0808-1.
- **Assessment of Legislative Framework Governing Waste Management in the Solomon Islands** November 2020 ISBN 978-982-04-0952-1[9].

Responsibilities for waste (including used oil) and environmental management exist within a range of legislation and regulations, but no single point of control exists to regulate planning and operation[5]. There does not seem to be any specific legislation dealing with water, land, noise or air pollution in a comprehensive manner in Solomon Islands. However various pieces of legislation deal with different aspects of pollution in an ad hoc manner. There are a range of Acts and Regulations that can be applied to the management of used oil and related wastes.

The primary legislation is the **Environment Act 1998.** Section III. Section 3(c) (ii) of the Act includes regulations to control the transport, collection, treatment, storage, and disposal of waste and to comply with and give effect to regional and international conventions and obligations relating to the environment.

Section IV is dedicated to the control of pollution. However, it lacks appropriate subsidiary legislation to make its provisions effective.

The **Environmental Health Act 1980 (version as at 1996)** identifies discharges which constitute a nuisance and/or an offence and prohibits the depositing of waste in water sources of urban districts.

The Environmental Health Act makes provisions for securing and maintaining environmental health in Solomon Islands. The Act sets up the administration and structure for community health in the country, and includes the administration of environmental health services by the Minister. Under sections 5-6, the Minister may delegate this to the Provincial Governments and the Honiara City Council, which are designated as Enforcement Authorities. The Enforcement Authority is given power to

[9] AFD/SPREP Solomon Islands Used Oil Management Plan Inception Report Section 3 pp7: https://library.sprep.org/content/contract-conduct-feasibility-study-and-develop-national-used-oil-management-plans-1

make its own by-laws under the Act to facilitate the efficient operation of environmental health services. The Enforcement Authorities are given power under section 15 to instigate their own prosecutions in their area.[10]

These delegated powers to enforce do not appear to be applied to or be working for the management of used oil.

The Honiara City Act 1999 assigns responsibility for waste collection and disposal to the Honiara City Council (HCC), with a focus mainly on municipal waste.

The Petroleum Act 1987 prohibits the discharge or escape of petroleum from any vessel into any inland or tidal waterway. While it is not specified in the Act, used oil could by extension be given the same status as petroleum and the regulations in the Act used to regulate used oil.

Subsidiary legislation made under this Act refers to a range of environmental matters. Specific obligations arise in case of damages. For example, contractors are obliged under the regulations to control and clean up any released petroleum or other materials and to repair, to the maximum feasible extent, any damage resulting from operations, with all costs to be borne by the contractor. [11]

Ports Act 1956. The Ports Act provides for the establishment of the Solomon Islands Port Authority, for the transfer to the Authority of certain port and harbour undertakings of the government, and for the functions of the authority. Section 49 prohibits persons from causing refuse, gas, petroleum oil, bilge water, ballast water or other offensive substance to be discharged into waters or land within the limits of a port without prior written permission of the Authority.

Levy of Rates and Dues (Ports of Honiara and Noro) Rules 2015 - LN 68 sets out fees for pollution cleaning and fuel discharge.[12]

Maritime Safety Administration Act 2009. This Act includes provisions for marine pollution prevention and response. Administration powers for this may be delegated to the Ports Authority, by notice in the Gazette. Under section 25, the Minister may also make regulations associated with the prevention or response to marine pollution and the dumping or incineration of wastes at sea by vessels[13]

[10] Solomon Islands Environmental Legislative Review SPREP 2018 ISBN 978-982-04-0873-9 Page 17
[11] Solomon Islands Environmental Legislative Review SPREP 2018 ISBN 978-982-04-0873-9 Page 17
[12] Solomon Islands Environmental Legislative Review SPREP 2018 ISBN 978-982-04-0873-9 Page 17
[13] Solomon Islands Environmental Legislative Review SPREP 2018 ISBN 978-982-04-0873-9 Page 18

The transboundary movement of used oil is governed by international conventions for the movement of hazardous waste. The relevant ones are the Basel Convention and the Waigani Convention and these conventions are referred to throughout this report and dealt with in detail in Annex 2.

3.2 Waste Types Covered Under the Environment Act

The Environment Act includes a broad definition of wastes as liquid, solid, gaseous or radioactive wastes, whether toxic or not, which are discharged into the environment. There is a lack of clear separation between hazardous waste materials and non-hazardous waste materials, and waste which can or cannot be recycled. Implementation and Enforcement powers that are available to authorities often rely on a requirement to identify wastes (including discharges of oil) as a form of nuisance, where in the Act nuisance has a specific legal meaning.

Waste is specifically included under the notion of pollution under Section 35 of the Environment Act[14], where pollution is defined as "*the direct or indirect alteration of the environment……. to its detriment or degradation*".

3.3 Waste Regulations

A range of enforcement regulations and actions are available under the Environment Act, including pollution abatement notices (s43).

There are also requirements for ministerial recording of information about licenses and enforcement actions undertaken, however such records are not available.

3.4 Waste Related Levies

Under Section 34 & 35 of the Environment Act, there are substantial penalties for premises that emit pollution, or cause or allow wastes to be in a position where they may impact on the environment or cause pollution. There appears to be very limited enforcement capabilities. There may be more scope under Section 36 to impose higher fees for licensed waste discharges from scheduled premises, and to impose higher penalties for breaches.[15]

[14] AusAid - Assessment of legislative Frameworks Governing Waste Management in the Solomon Islands ISBN 978-982-04-0952-1 Table 6 pp18

[15] AusAid - Assessment of legislative Frameworks Governing Waste Management in the Solomon Islands ISBN 978-982-04-0952-1 pp22

3.5 Used Oil Storage, Collection and Transportation Regulations

There is no legislation that applies specifically to the collection**,** transportation and storage of used oil. Section 5 of the **Petroleum Act 1987** prohibits the discharge or escape of petroleum from any vessel into any inland or tidal waterway.

Section 6 specifies requirements for packaging of petroleum. While it is not specified in the Act, used oil could by extension be given the same status as petroleum and the regulations in the Act used to regulate used oil.

4.0 Used Oil Management

4.1 Use Oil Management Goals

The National Used Oil Management Plan describes and directs an appropriate management framework to improve national management of used oil and promote shared used oil management responsibility by all national stakeholders. The Used Oil Management Plan has 6 goals:

- **Goal 1**: Minimisation of the unnecessary, untimely, and uncontrolled national generation of used oil.
- **Goal 2**: Minimisation of the adverse effects of used oil on the environment and people of Solomon Islands.
- **Goal 3**: Management of used oil in a manner that conforms and complies with all relevant national and international conventions and legal requirements.
- **Goal 4**: The costs associated with used oil management and disposal are met by those responsible for generating the used oil.
- **Goal 5**: Coordination of used oil management activities is maximized to ensure cost- effective environmental outcomes.
- **Goal 6**: The capacity of stakeholders to achieve effective used oil management and where possible re-use is increased.

4.2 Used Oil Management Actions

The Used Oil Management Plan will be achieved through 15 Strategic Actions that (a) strengthen institutional capacity; (b) promote public private partnerships; (c) promote sustainable best practices; (d) develop human capacity; and (e) improve documentation and dissemination of outcomes. These actions are presented in Table 1.

Table 1. National used oil management goals and actions

Used Oil Management Goals	Used Oil Management Actions	Responsible Entity
G1: Minimisation of the unnecessary, untimely, and uncontrolled national generation of used oil	MA1: Minimum national quality standards for managing imported lubricants are promoted and enforced. MA2: A comprehensive review of lub oil imports is undertaken to identify all border import points, and to ensure all lubricant imports are captured & recorded, correctly categorized and the volumes accurately recorded in the national customs database.	MECDM MECDM MOFT
G2: Minimisation of the adverse effects of used oil on the environment and people.	MA3: Appropriate standards and safeguards (ie., a new Code of Practice) for the handling, collection, transportation, storage, and disposal of used oil is established and implemented	MECDM Steering Group

Used Oil Management Goals	Used Oil Management Actions	Responsible Entity
G3: Management of used oil conforms and complies with all relevant national and international conventions and legal requirements	MA4: All national obligations required under relevant International Conventions are met for the management of used oil. The Environment Act 1998 is updated to enact the required legislation for specifically managing used oil.	MECDM S.I. Parliament
	MA5: Management of used oil complies with all relevant laws and the new Code of Practice. The Environment Act 1998 is updated to enact the required legislation. Regulations to achieve compliance and empowerment of enforcement officers are embodied in the legislation. A National Steering Committee is established to establish and implement the National Use Oil Management Programme. The Committee comprises representatives of Government, industry and the community.	MECDM S.I. Parliament
G4: The costs associated with used oil treatment/final disposal are met by those responsible for generating the used oil	MA6: Used oil management is sustainably funded utilizing a publicly supported instrument based on the polluter pays principal. The Environment Act 1998 is updated to provide enabling legislation for the implementation of a funding scheme. The funding scheme is set up by the Steering Committee and implemented by the Managing Agency	MECDM Steering Group Managing Agency
	MA7: A comprehensive audit of national used oil generation rates completed to establish an accurate database so that a cost benefit analysis of national used oil management can be achieved.	MECDM MOFT
G5: Duplication of effort is minimized and coordination of used oil management activities are maximized to ensure effective implementation of the Policy	MA 8: The National Steering Committee write the Code of Practice for managing used oil based on the draft in this plan. MA9: A national contractor is appointed by the Managing Agency to manage all used oil including collections transport, treatment and re-use where possible and disposal where appropriate. The appointment is by a competitive tendering process	MECDM Managing Agency Private Sector
G6: The capacity of stakeholders to achieve effective used oil management is increased	MA10: Used oil management concerns are appropriately addressed by the Steering Committee The committee provides the lead to Government on any further updating of waste management legislation and regulations. The committee oversees the implementation and operation of the used oil management programme by the Managing Agency and national contractor.	MECDM Stakeholders Community
	MA11: Opportunities are created to develop industry and community understanding, skills and general capacity to manage used oil	MECDM SINU
	MA12: An independent Auditor is appointed by MECDM to monitor all activities of the national contractor on an annual basis and report back to the National Used Oil Steering Committee.	MECDM SPREP
	MA13: The activities of the Managing Agency and service delivery of used oil management activities by the National Contractor will be clearly separated	MECDM

Used Oil Management Goals	Used Oil Management Actions	Responsible Entity
		Managing Agency
	MA14: A national register of oil and lubricant importation data and used oil generation maintained and reported annually.	MOFT MECDM
	MA15: Local industrial consumers of used oil are identified and encouraged to join a new programme to collect and treat used oil for use as a supplementary fuel to reduce the reliance on consumption of diesel and reliance on export as a disposal option.	MECDM Managing Agency Key Industries.

4.3 Used Oil Management Roles and Responsibilities.

4.3.1. Solomon Islands Government

The Solomon Islands Government is responsible for regulating and enforcing the national management of used oil. They will be assisted by the private sector.

The Solomon Islands Government will:

- Take the lead in final cost benefit analysis of national used oil management
- Take the lead in reporting national lubricating oil import data and used oil data.
- Take the lead to implement national used oil management legislation, regulations and standards
- Take the lead in the development of national occupational health and safety guidelines for used oil management.
- Take the lead in the development of national environmental guidelines to be published in a Code of Practice for the safe handling, collection, transportation, and storage of used oil.
- Take the lead in enforcement of relevant workplace health and safety legislation.
- Take the lead in regulation and enforcement of the rules governing used oil management activities.

4.3.2. National Steering Committee

The National Steering Committee will develop a used oil management programme which covers the following:

- Rules;
- Operating manuals and a Code of practice;
- Standards; and

- Regulations to regulate all activities associated with used oil management and provide the government with specialist advice and programme oversight on the national management of used oil.

4.3.3. Used Oil Managing Agency

The Used Oil Managing Agency will:

- Manage the collection, storage and disposal of used oil under contract to the Solomon Islands Government and will appoint a National Contractor by competitive tender to operate the used oil service.

4.3.4. National Petroleum Industry

The National Petroleum Industry and the Tertiary Sector will take the lead in provision of used oil management training, and will apply all relevant regulated work-based used oil management standards.

5.0 Critical Plan Activities

5.1 Summary of Actions

A range of steps need to be completed to ensure Solomon Islands manages used oil appropriately into the future. These are summarised in Table 2.

Table 2. Summary of actions required to achieve best practice used oil management in the Solomon Islands.

Action	MA (Table 1)	Responsibility	Timeframe	Outcome
Review and revision of the Solomon Islands National Waste Management and Pollution Control Strategy 2017 – 2026 with a focus on Used Oil.	MA1 MA2	Government and Stakeholders	2023	Agreed and endorsed national used oil management policy
Complete national used oil cost benefit analysis	MA2 MA7	MECDM JICA, SPREP	2023	True cost of national used oil management documented
Establishment of National Used Oil Management Steering Committee	MA5 MA10	MECDM	2023	Expert used oil management body to develop a used oil management programme and provide specialist advice to Government
Under the Update of the Environment Act 1998, empower the Steering Committee to develop a used oil management programme which covers the following : • Rules • Operating manuals • Code of practice • Standards • Regulations to regulate all activities associated with used oil management	MA3 MA4 MA5 MA8 MA10	MECDM	2023	All activities associated with used oil management are standardised. The resources, manpower and mechanisms required for enforcement are established.
Establishment of a user-pays management system enforced under the Environment Act 1998	MA6 MA8	MECDM	2023-2024	Special Fund model, where the government collects the ADF and pays it back out to a contracted System Operator (Managing Agency)
Collection of agreed Advanced Disposal Fee (ADF) on all imported lubricants	MA6	MECDM MOFT Customs	2024 onwards	Collection of an Advanced Disposal Fee (ADF) on all imported lubricant products

Action	MA (Table 1)	Responsibility	Timeframe	Outcome
				enforced under Government regulations
Local industrial consumers of used oil are identified and encourage to join a new programme to collect and treat used oil for use as a supplementary fuel,.	MA15	Managing Agency National Steering Committee	2024 onwards	Reducing the reliance on export as a disposal option
A contractor is appointed to manage the used oil collection transport, storage and disposal programme	MA9 MA13	Managing Agency National Steering Committee	2024 onwards	National management of the collection, storage, local treatment and re-use, and export of the used oil.
Public education and training programme	MA11	MECDM SINU Training Modules. Petroleum industry	2024 onwards	National awareness of and willingness to manage used oil. Certificated education Training for operators.
Monitoring and Evaluation	MA12 MA14	MECDM MOFT National Steering Committee	2024 onwards	Annual programme evaluation and reporting

5.2 Regulatory Framework

5.2.1. Policy

The Solomon Islands National Waste Management and Pollution Control Strategy 2017 – 2026 is a recent policy framework document that can be used a guide to establish an appropriate management framework that improves national management of used oil and promotes shared used oil management responsibility by all stakeholders.

The strategy identifies major wastes and pollution streams which include: solid wastes, liquid wastes, hazardous and chemical wastes, health-care wastes and e-wastes to be addressed under the strategy[16]. The strategy is consistent with the country's obligation to the Stockholm Convention and can cover all used oil consistent with the classification of hazardous waste under the Waigani and Basel Conventions. This includes any semi-solid or liquid product consisting totally or partially of mineral oil or synthesised hydrocarbons (synthetic oils), oily residues from tanks, oil-water mixtures and emulsions.

[16] Solomon Islands State of Environment Report 2019 Theme 7 pp 117

Action Required: The National Used Oil Management Policy needs to be reviewed, and revised as necessary to establish a national policy for used oil, and the revised policy endorsed by Government and Stakeholders (MA1, MA2).

5.2.2. Legislation

Effective management of used oil in Solomon Islands will be achieved by updating the Environment Act 1998. Under Section 5 of the Act, the Environment and Conservation Division of the MECDM, its Director and Environmental Inspectors are responsible for enforcing provisions of the Act. The Public Finance Management Act has provision for a special fund to be in place, retained for the purpose for which it was established and not re-paid to the consolidated fund.

In 2021 a series of documents were prepared for SPREP and the Solomon Islands Government providing guidance on the establishment of an Advanced Recovery Fee and Deposit (ARFD) Scheme for recyclables. These ARFD documents can also be used as guidance for establishing the framework to legislate and implement an ADF programme for used oil. [17] [18]

Action Required: Under the Environment Act 1998, in relation to used oil management, the Government of Solomon Islands via the Ministry of Environment Climate Change, Disaster Management & Meteorology is required to establish, control and regulate all activities associated with used oil management by preparing, adopting, and enforcing relevant:

- **Rules**
- **Operating manuals**
- **Codes of practice**
- **Standards**
- **Regulations**

(MA3, MA4, MA5, MA8, MA10).

5.2.3. Regulations

The Environment Act 1998 includes a broad definition of wastes as liquid, solid, gaseous or radioactive wastes, whether toxic or not, which are discharged into the environment. There is a lack of clear separation between hazardous waste materials and non-hazardous waste materials, and waste which can or cannot be recycled. Implementation and Enforcement powers that are available to authorities often rely on

[17] Advance Recovery Fee and Deposit Scheme for Solomon Islands – Legislative Guidance Notes – October 2021
[18] Advance Recovery Fee and Deposit Scheme for Solomon Islands – Implementation Plan – November 2021

a requirement to identify wastes (including discharges of oil) as a form of nuisance (where in the Act nuisance has a specific legal meaning).

The update of the Environment Act 1998 must establish Regulations that provide a framework for actively managing used oil. When enacted and enforced, these regulations:

- Will empower enforcement officers to ensure compliance with all aspects of the Used Oil management regulations and Code of Practice.
- Identify a product stewardship arrangement for used oil that promotes the sharing of responsibility by importers, retailers, consumers, and users of oil
- Provide an arrangement for managing used oil that is financially sustainable
- Ensure that management of used oil complies with relevant international conventions and national legal requirements
- Ensure that users of oil contribute to the costs associated with exporting or otherwise managing used oil in an environmentally sustainable manner
- Ensure management of the export of used oil in an environmentally sound manner.

Action Required: Under the Environment Act 1998, the Government of Solomon Islands is required to designate used oil as a hazardous material and to pass legislation that implements Regulations for national management of used oil (MA3, MA4, MA5, MA8, MA10).

5.2.4. Regulatory Compliance

Action Required: Under the Environment Act 1998, in relation to used oil management, the Government of Solomon Islands via the Ministry of Environment Climate Change, Disaster Management & Meteorology is required to provide the legal framework to enforce national used oil management regulations (MA3, MA4).

5.3 Sustainable Financing

5.3.1. Cost Benefit Analysis

Background, but incomplete information has been collected on used oil generation rates in Solomon Islands from various reports, dating back to 2013.[19]. These studies identified that an average of 1,250,000 Lts of lubricants are imported into Solomon Islands annually. Based on this data, it is estimated that imported lubricants will generate up to

[19] AFD/SPREP Feasibility Study 2022 Section 2.1 Table 2: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

600,000Lts of used oil annually that needs to be sustainably managed[20]. These numbers are not substantiated by firm data.

Used oil is currently used for a range of purposes in Solomon Islands, with some industrial plants accepting used oil for use as a boiler fuel, usually blended with diesel.[21] It is estimated that these plants use up to 422,500 litres per year. These plants may be considered legitimate re-users; however the environmental performance of these plants would be improved by pre-treatment of the used oil before blending with diesel. There are also many environmentally unacceptable uses such as sports field marking[22]. About 45,000 litres of Used oil is also stored at SPO in Honiara

Accurate information on total volumes of annual new lube oil imports and total annual used oil generation rates is critical for establishing an ADF to finance national used oil management. The costs associated with national used oil management that will need to be met by the ADF include collection, transport storage, and disposal, and will require an estimated ADF of about **5 Solomon Islands Dollars per litre** on all lubricant imports to be collected if export of used oil is the preferred management option[23]. This ADF levy amount is based on export to New Zealand and will need to be adjusted depending on actual costs. For example, if Sun Petroleum Corporation become involved and are able to collect, transport and treat the used oil for free, then the ADF levy amount will be substantially reduced.

Action Required: Collection of accurate data on national new lube oil imports and used oil generation data and calculation of Advanced Disposal Fee (ADF) based on this information and preferred used oil disposal (export) option (MA6).

5.3.2. Sustainable Funding and Cost Recovery

Under the Environment Act 1998, in relation to used oil management, the Head of State (acting on the advice of Cabinet) may make Regulations which impose special levies on particular goods which have adverse effects on the environment, or for the purpose of raising revenues for the effective management of waste.

[20] AFD/SPREP Feasibility Study 2022 Section 2.2 Table 3: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

[21] AFD/SPREP Feasibility Study 2022 Section 4.4 Table 7: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

[22] AFD / SPREP Analysis Report Section 2.4 page 7: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

[23] Haynes and Rasch (2022). *Samoa Feasibility Study*. SPREP 53pp: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-samoa-solomon

As discussed in Section 5.3.1, ARFD documents can also be used as guidance for establishing the framework to legislate and implement an ADF programme for used oil. [24] [25]

Action Required: Collection of an Advanced Disposal Fee (ADF) on all imported lubricant products enforced under Government regulations (MA6).

5.3.3. Collection of an Advances Recycling Fee to Fund On-going Used Oil Management

Collection of an Advanced Recycling Fee to fund used oil management will require collection by the Customs Department of an advanced deposit fee (ADF) on all lubricant imports. The implementation of the AFD requires a multi-agency approach. The agencies who will implement the AFD in the Solomon Islands are Customs, Crown Law Office, the Treasury Division of the Ministry of Finance and the MECDM.

The costs associated with national used oil management that will need to be met by the ADF include collection, transport, storage, and disposal, and will require an estimated ADF of about 5 Solomon Islands Dollars per litre on all lubricant imports to be collected if export of used oil is the preferred management option[26]. This ADF levy amount is based on export to New Zealand and will need to be adjusted depending on actual costs. For example, if SPC become involved and are able to collect, transport, export and treat the used oil for free, then the ADF levy amount (currently estimated at 5 Solomon Dollars per litre in Section 5.3.1) will be substantially reduced.

Action Required: Commencement of routine collection of an Advanced Disposal Fee (ADF) on all imported lubricant products (MA6).

5.4 Used Oil management Roles and Responsibilities

5.4.1. Used Oil Management Steering Committee

A key element to the successful future management of used oil in the Solomon Islands is the establishment of a National Steering Committee. The aim of the Steering Committee is to ensure successful delivery of the used oil management programme in the Solomon Islands including maximising the benefits from the projects and ensuring an approved methodology is followed. The Steering Committee will include representatives from the following institutions:

- SPREP/JICA

[24] Advance Recovery Fee and Deposit Scheme for Solomon Islands – Legislative Guidance Notes
[25] Advance Recovery Fee and Deposit Scheme for Solomon Islands – Implementation Plan
[26] Haynes and Rasch (2022). *Samoa Feasibility Study*. SPREP 53pp: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-samoa-solomon

- Chamber of Commerce and Industry
- MECDM
- Ministry of Finance & Treasury
- Solomon Power
- Lube Oil importers
- Timber and Fisheries industries.

Action Required: MECDM to establish a National Used Oil Management Steering Committee (MA6, MA8, MA10).

5.4.2. Managing Agency (System Operator) Appointment

The Managing Agency will be established by the Steering Committee will oversee the daily operation of the used oil programme. The programme will be funded by the Advanced Recycling Fee. The Managing Agency should be a non-profit government entity responsible for managing and administering the national used oil management programme. The Managing Agency should:

- be a not-for-profit entity;
- manage the funds received from the Advanced Disposal Fee in accordance with the requirements of the Department of Finance ensuring sufficient funds are allocated to pay used oil collectors and recyclers;
- enter into a contract agreement with an approved national used oil collector/transporter and local and/or offshore recyclers;
- Manage the competitive tender process to appoint the national used oil collector/transporter;
- Appoint an independent contractor to conduct audits of used oil collectors and recyclers to ensure compliance with all facets of the used oil programme;
- carry out regular inspections of all facets of the used oil management programme;
- design and implement used oil awareness and education campaigns directed to the community; and
- minimize and where possible eliminate bad disposal practices and ensure that as far as is possible that all used oil is recycled or reused or exported.

Action Required: The MECDM and the National Steering Committee establish a body as the national used oil Managing Agency (System Operator) (MA10, MA12).

5.5 National Used Oil Education and Awareness Programme

The National Steering Committee will establish and promote a national public awareness campaign and community and industry training programmes run by the Managing Agency and delivered by SINU and the Petroleum Industry, on best practice used oil management to:

- provide accurate information concerning the relative risks posed by used oil to Solomon Island's natural environments and to promote government initiatives to deal with the used oil issue;
- provide accurate information on best practices that individuals and businesses can adopt to better manage used oil at a local scale; and
- provide training on the safe handling, storage and management of used oil.

The awareness programme would be conducted in two phases.

Phase 1: General Awareness

This phase will focus on general awareness raising of the used oil issue among key stakeholders such as importers, consumers, garage owners, service stations and local villages. This phase will promote the government's effort to improve the waste oil stewardship programme and inform people what they can do to assist with used oil recovery. The mobilization of this phase would be commenced two months prior to implementation of the stewardship programme and to complement Phase 2 awareness.

Phase 2: Implementation Messages

Communication activities will focus on community advertising to inform people about oil collection points and other facilities and to encourage behavioural change. This stage would be mobilized one month prior to implementation of stewardship program and continue over the life of the program.

Action Required: Development and communication of ongoing public and industry used oil management awareness and training campaigns (MA11).

5.6 Industry Training

Personnel carrying out works that generate, transport, store, and dispose of used oil in the Solomon Islands must undergo a basic site-specific induction and training which includes an outline of the waste management requirements (and other environmental issues) on-site. Applicable training suited to the different roles and responsibilities is to be undertaken in accordance with appropriate national standards. Certificated training modules will be set up and delivered by SINU.

Action Required: A register of businesses that generate, transport, store, and dispose of used oil in the Solomon Islands is established and audited annually. SINU and the Petroleum Industry in partnership with the National Steering Committee sets up and delivers certificated training modules (MA11, MA14, MA15).

6.0 Implementation of a National Used Oil Management Programme

6.1 Elements of the Programme

A national used oil management programme will be managed and coordinated by the National Managing Agency in accordance with the national legislative framework and will require the following (simplified) interconnected elements:

- Importers bring oil products into the country and are charged a small levy which is passed on to a Used Oil Managing Agency. The used oil levy covers the costs associated with national used oil management, and may also be used to encourage consumers to return used oil through some kind of reward mechanism.
- Lube Oil is imported and sold by retailers to consumers who eventually produce used oil.
- Used oil is returned by small consumers to a licensed site for a possible partial refund.
- Larger businesses that generate Used Oil set up contractual arrangements for take-back of used oil with their retailers. The retailers set up back-load services with their delivery systems and set up storage depots for used oil.
- All used oil returns are documented.
- Recovered used oil is stored for local treatment and re-use, or for export for disposal.
- Unclaimed funds and the balance of the import levy are used to support used oil collection, storage, local treatment for re-use, and for export costs, the administration of the Managing Agency and to support used oil awareness campaigns.

A draft Code of Practice for the Management of Used Oil in Pacific Countries has been prepared and is included in this report in Annex 1. This draft code sets out in detail the requirements for managing used oil at all stages, including collection, transport, storage and disposal.

Action required: National used oil management programme established and operated by the Managing Agency (MA10).

6.2 Types of Used Oil Collected

Types of oils collected under the national used oil management programme are defined as any petroleum-based or synthetic oil or fluid that, through contamination, has

become unsuitable for its original purpose due to the presence of impurities or loss of original properties. This covers all used oil consistent with the classification of hazardous waste under the Waigani[27] and Basel Conventions[28].

The programme will target primarily lube oil from internal combustion engines.

6.3 Used Oil Collection

A Typical used oil collection system would include establishing small volume (<1000Lt) temporary storage sites. 1,000 litre Intermediate Bulk Containers (IBCs) in "as new" condition can provide storage to a satisfactory standard. Ideally the containers would be stored undercover and placed in a bunded area to contain any spillages. Collection locations would be sited at service stations, car workshops, haulers/bus companies, construction companies and other industrial locations such as provincial forestry depots.

Any government or non-government organisation, agency or business or private individual that generates used oil would be serviced under this plan. Used oil will be required to be stored in appropriate containers - tanks that are appropriately labelled and in accordance with the recommendations of relevant Safety Data Sheets. Used oil storage containers are to be located within bunded waste management areas in accordance with the guidance in the Code of Practice.

Action required: Routine collection of used oil from used oil generators is continued or commenced. The SPREP Honiara Used Oil Collection and Storage Project is used as a model for setting up Used Oil storage depots.

6.4 Used Oil Transportation

Used oil collection from temporary storage locations would be carried out by competent licensed carriers with the appropriate equipment. The licensed carriers would collect used oil by road tanker or in smaller suitable containers such as steel drums. Interim temporary storage of collected used oil prior to export shall include bulk storage (in Tanktainers) or in 200 litre steel drums contained in a concrete, sheltered and bunded area. Transportation of bulk used oil from collection points to bulk storage must be controlled to ensure best environmental standards and compliance with the Code of Practice are met. This will include:

[27] Convention to ban the importation into Forum Island countries of hazardous and radioactive wastes and to control the transboundary movement and management of hazardous wastes within the south Pacific region (1995).
[28] Basel Convention on the control of transboundary movements of hazardous wastes and their disposal and Annexes and Amendments (1998)

- All vehicles and drivers used in the collection of used oil must comply with all Transport Authority registration and licensing requirements
- Transportation of used oil in suitable, covered containers
- Appropriate labeling of transport containers
- Tracking of transported oil
- Access to suitable accidental spill containment equipment and personal protective equipment.

Action required: Regular collection and transport of collected oil to bulk storage facilities commenced by a contractor appointed by the Used Oil Managing Agency. Location of the sites for urban and provincial storage depots based on need are identified and established by the Managing Agency.

6.5 Used Oil Storage

The collection and storage of used oil would be supported by appropriate legislation established by the update to the Environment Act 1998, so that there is a legal requirement for used oil to be collected and stored in an environmentally sound manner. All collected used oil shall be stored in compliance with the regulatory provisions concerning the transport of dangerous goods and hazardous wastes including relevant regional and international conventions such as Waigani and Basel Convention.

The Honiara Used Oil Management Project[29] which will be implemented by MECDM contains the specification and costing for a used oil management facility in Honiara. This can be used as a model for storage facilities in other population centres and provinces. The estimated cost to establish the Honiara Storage facility was US$198,282.95 in June 2022.
This cost can be expected to rise by about 10% in 2023-2024 to US$ 220,00.00

Action required: Regular bulk storage of used oil is established and commenced by the Managing Agency.

[29] Pilot Project Proposal – SWAP – Honiara Used Oil Management Pilot Project June 2022

6.6 Used Oil Treatment for Re-use or Export

6.6.1 Long-term Bulk Storage for Export

The costs of collection, storage, local treatment and where required the overseas shipment of used oil for recycling/disposal will be covered by the ADF placed on the Lube oil when it is imported into the country. The National Steering Committee will set up storage depots, initially according to need. The two areas identified in the Analysis Report where there is immediate need are Honiara and Noro. The SPREP Honiara Used Oil Collection and Storage Project can be used as a model for setting up Used Oil storage depots in other centres, and the costs are stated in Section 6.5

Longer term bulk storage of used oil may be necessary irrespective of the ultimate mechanism used to dispose of collected used oil. Bulk used oil is currently stored at the SPO depot in Honiara, this includes SPO used oil and used oil returned to SPO from SPO customers. This stockpile is about 50,000 litres, awaiting export for disposal. [30] This depot is existing and has the necessary capacity and equipment necessary to manage bulk oil storage. Goldridge Mining are also reported to have a stockpile of about 5,000 litres. Compared to other Pacific Islands countries this level of known stockpiling is low.

6.6.2 Used Oil Export

When overseas export of waste is being considered or undertaken, it should be noted that shipping services and shipping routes vary from country to country. Different companies service different countries and usually there is no one company that can provide a common service to all destinations.

There are currently three companies providing services to the Solomon Islands, Sofrana ANL, NPDL and Swires. New Zealand is a common destination and for this reason many PICs have traditionally sent their used oil to NZ for recycling.

Swires operate the Moana Taka Programme which offers countries, under certain specified conditions, free shipping for wastes, but this only assists countries that are on the Swires routes. In addition, Swires impose conditions that may restrict shipments to one per country, and also they do not cover insurance.

As a Waigani or Basel transboundary permit is required for shipments, the objective is to find the most direct route to the disposal location, so that less transit permits are

[30] UMOP Solomon Islands Analysis Report Section 6.1 Table 6.

required. There are currently a number of recyclers that offer recycling/disposal services for used oil, including:

- Cleanaway Brisbane Australia
- Waste Management New Zealand Auckland & Tauranga NZ
- Salters Cartage Ltd Auckland NZ
- Waste Petroleum Combustion Ltd Auckland NZ
- Bluescope Pacific Steel Ltd Suva Fiji.

Section 6.0 Table 6 in the Analysis Report lists information from stakeholders regarding their stockpiles of used oil, indicating the totals are around 45,000 – 50,000 litres. The intention is that these stockpiles will also have to be exported for recycling in the longer term. [31]

In summary there are a number of options for export of used oil. Shipping costs will vary as shipping companies change their routes and rates in response to commercial imperatives. The costs of the various options must be determined just prior to shipment according to prevailing rates and available shipping route at the time.

The requirements for permits for the transboundary shipment of used oil are set out in Annex 2.

6.6.3 Used Oil Treatment and Re-use in the Solomon Islands

6.6.3.1 Local Recycling v Offshore Disposal.

Section 2.3 of the Inception Report identified a key issue with in-country recycling of used oil. In-country processing is only viable if there is an end user who can take the refined product. Most diesel and other internal combustion engine manufacturers will not warrant their engines unless the correct fuels are used, and this means that refined used oil is generally limited to use for heating, such as in furnaces and steam boilers, unless specifically design for the combustion of processed used oils.

Therefore, although offshore disposal/recycling may not be regarded by some as best practice, the reality is that shipping to a facility that can recycle and re-use the end product may be most cost effective and sustainable option.

[31] Extract from UMOP Solomon Islands Analysis report Section 6.4.1.

6.6.3.2 Industrial Users

Section 6.3.1 of the Analysis Report identified local industrial organizations who operate heating plants which use diesel or a combination of diesel and untreated or partly treated used oil to fuel their boilers. Those sites listed below are:

- Solomon Islands Brewing Co., located in Honiara, brewing beer.
- Soltuna Canning plant, located in Noro, processing tuna fish.
- Islands Own Ltd, located in Honiara, processing coconuts
- Guadalcanal Plains Palm Oil Ltd (GPPOL), located at Tetere North Guadalcanal, processing palm oil

The National Fisheries Development Corporation (NFD) purchased two used oil incinerators in 2020. These units are installed but have not been used as a permit to operate has not been issued by the government. NFD are giving their used oil to Soltuna.

As indicated in Section 4.4, Table 7 in the Feasibility Study[32], there is possible capacity for local industry to consume at least 422,500 litres of locally processed used oil per year, based on supplementing up to 50%. of diesel with locally processed used oil. Over time as the users become more familiar with the benefits of locally processed used oil, there is scope based on current diesel usage to increase local processed used oil usage to about 850,000 litres per year.

It must be noted that GPPOL's consumption is about 50% of these figures and could have a very significant impact. Also, these figures do not include the National Referral Hospital (NRH) which would have a significant impact on yearly consumption. By blending treated used oil with diesel, NRH has the potential to use up to 300,000 litres per year of used oil.

Incentives may be proposed to encourage companies to change their fuel arrangements, the cost of locally processed used oil being the most obvious incentive. Other incentives may include subsidizing the cost of new burners, tankage and where necessary subsidizing the costs of any air emission control equipment. Incentives can be supported by new legislation imposing improved air emission controls which will improve combustion performance as well as improving environmental outcomes.

[32] AFD/SPREP Feasibility Study 2022: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

6.6.3.3 Local Recycling Plant.

Product from a suitably sized used oil recycling plant may be able to complement diesel as a fuel source, and at a more competitive price than diesel.

Mobile and static used oil recycling plants are available from multiple manufacturers, many of whom are located in China.

A typical unit is the ZJC series manufactured by the Chongqing Yuneng Oil-Filter Manufacturing Co., Ltd. https://www.yunengoilpurifier.com/zjc-series-hydraulic-oil-filtration-machine.html

A range of sizes are available from 30 litres per minute up to 200 litres per minute. Technology used is vacuum chamber for dehydration and degassing, plus high precision 3 stage filter used to filter impurities and solid particulates through coarse filter, protecting filter, and fine filter.
The parameters of a suitably sized unit, model ZJC3KY-GR, are:

Parameters	Model ZJC3KY-GR	Before Purification	After Purification
Flow Capacity	3,000L/H – 50L/M		
Viscosity		Up to 320 mm^2/Sec	
Water content		Up to 3,000ppm	Less than 50ppm
Filter Capacity			Less than 3 micron
Heating Power	30KW		
Total Power	33.5KW 3Phase.		

The quoted price is US$ 9,800 ex-factory (April 2023).

This type of plant can be skid mounted and would be transportable in a 20’ shipping container. Ancillary equipment such as portable bunding, operators PPE, and maintenance equipment/spare parts could be accommodated in the shipping container. This would allow recycling operations to be undertaken in key provincial hubs that are serviced by inter-island freight shipping services. Initial hubs would be Honiara and Noro.

The environmental benefit for industrial users blending treated oil with diesel is an improvement in the stack emissions from their heating plants. The removal of contaminants by the treatment plant allows a better quality product to be blended with diesel, resulting in a better calorific value and improved performance of the burners.

6.6.3.4 NuFuels Plant for Remote Communities.

Detailed description of the NuFuels technology and activities in the Solomon Islands are included in Annex 3. Costing estimates to establish NuFuels units is the Solomon Islands are presented in Table 3, Annex 3.

Nufuels Ltd, a New Zealand company, has developed a community scale system which enables small remote communities to reduce pollution in their environment and use the energy recovered from the waste. The technology developers have initially focused on reduction of plastic pollution; however it has been demonstrated that the systems can also process used oil and other feedstocks.

The process used is pyrolysis – the cracking of hydrocarbons in the absence of oxygen. It is NOT incineration. The feedstock can be used oil, plastics, biomass, tyres, used oil plastic packaging and a mixture of those wastes. While the current projects have been focused on processing plastics, a 'cook' can use a mix of used oil and plastics, or can process used oil on its own.

The chamber is heated up and the hydrocarbons are cracked turning them into vapour. The vapour is then cooled, with a final gas having a similar profile to LPG (without being liquified) being produced, along with a condensed waxy liquid fuel. With just used oil, the liquid fuel produced is a diesel-petrol like mix. If mixed with plastics, a more waxy liquid fuel is produced. The liquid fuel is usable in simple burners and can be stored. The gas is currently used real time. A 'cook' using about 10kg of plastic delivers 4-5 hours of usable cooking gas energy. Mixed with used oil, it would produce more. Approximately 35 litres of used oil can be processed in a cook, and provides significantly more energy for end use.

Nufuels has also developed a 'rocket oven' as part of the package, to use the waxy liquid fuel, along with used oil if available.

Nufuels is also refining an input burner design for the explicit purpose of using used oil to heat the pyrolysis retort. Efficient burner design will ensure emissions are similar to that for diesel. Recent development work now enables production of up to 80% gas with the remainder a liquid fuel, or via a Nufuel's prototype output burner design, to use 100% vapour for direct heat, at up to 800 degrees Celsius. With simple adaptations to small petrol generators the gas can be used to produce electricity in a small-scale environment. This gives more flexibility to communities around what kind of energy they want. As these improvements are developed, they will be provided back to the communities who have systems.

The units are easily transportable, including by small boat, and for easy use and for the most part require simple engineering skill to make. The projects have been well received by local communities and the technology offers a simple option for rural and small communities in the Solomon Islands and elsewhere in the Pacific.

The cost comparisons between New Zealand and Solomon Islands manufacture are based on NuFuels research and development in New Zealand and their activities in the Solomon Islands as detailed in Annex 3.

6.6.3.5 . Pyrolysis of Used Oil.

A Vanuatu company Ocean Environmental Services (OES), based in Port Vila, Vanuatu, is planning to establish a local processing facility based on pyrolysis technology. OES is a subsidiary of Ocean Logistics Ltd. The following information has been provided by OES.[33]

They are currently at the investigation stage and are planning to have a used oil pyrolysis processing plant operating and in production in early 2024. They are considering purchasing a standard unit supplied by Beston Group (www.bestongroup.net). Probably they would choose the BLJ-6 model with a capacity of 4-6 T/d.

They consider that they could sell the product at a price that is very competitive with diesel on the local market. Their goal will be to produce a useable fuel oil for use in some older tugboat vessels and within their group of companies and for container handling equipment. They have also identified several other possible customers in the local market that use boiler furnaces in their processes.

Considering the relatively low capital cost of the plant and the fact that the selling price of the product will compete very favorably with locally available diesel, initial indications are that the project is financially viable and attractive. Subject to its viability in Vanuatu, a similar processing plant could be a viable option for Solomon Islands.

[33] Email communications with Andrew Bohn, CEO Ocean Logistics Ltd, April 2023

7.0 Monitoring and Reporting

7.1 Monitoring

The monitoring and evaluation of the National Used Oil Management Programme as implemented by the Managing Agency and Contractor(s) employed by them, will be controlled by MECDM and MOFT.

MECDM will use inspectors appointed and empowered by legislative updates to the Environment Act 1998 to monitor all aspects of the Used Oil Management Programme, compliance with the regulations to monitor and carry out regular inspections of used oil generators and collectors, and to ensure that the Managing Agency and its contractors follow the Used Oil Regulations and the Draft Code of Practice (Annex 1). The monitoring will ensure that any breaches of the Regulations are identified, appropriate remedial actions taken, improvements are achieved, and where necessary offences are prosecuted.

7.2 Reporting

The Managing Agency will prepare an annual evaluation report to the responsible Minister (MECDM) each year, which will include the following information:

- The annual amount of levy paid into the Fund;
- The annual quantity of imported oil on which levy is paid;
- The annual number of litres of used oil collected;
- The quantity of used oil in current storage;
- The quantity of used oil treated and re-used locally including details of local users;
- The annual quantity of used oil exported;
- Details and outcomes of awareness campaigns;
- An audited account of how the money in the Fund has been spent;
- A programme occupational health and safety report; and
- Such other matters about which the Steering Committee may from time to time request feedback.

8.0 Stakeholders' Meeting

A Stakeholders' Meeting was held on 16 March 23 to discuss the draft Used Oil Management Plan. The minutes of this meeting are contained in Annex 4.

Findings from this meeting have been used as the basis to complete this Final Used Oil Management Plan.

Annexes

- Annex 1: Draft Used Oil Code of Practice for Pacific Countries (2022)
- Annex 2: Transboundary Shipment of Used Oil
- Annex 3: Nufuels Technology
- Annex 4: Minutes of the Draft Management Plan Workshop with Key Stakeholders.

Annex 1 - Draft Used Oil Code of Practice for Pacific Countries (2022)

Please note:

- This Code is largely based on the New Zealand Document – "Management and Handling of Used Oil HSNOCOP 63" November 2013, NZ Environmental Protection Authority.

- References to the GHS7 are to the UN Globally Harmonised System Rev 7. This is an international system for classifying hazardous substances and all references are to the flammable liquids classification. The following categories apply:

Table 1: GHS7 Flammable Liquids Categories

Category	Criteria
1	Flash point < 23°C and initial boiling point ≤ 35°C
2	Flash point < 23°C and initial boiling point > 35°C
3	Flash point ≥ 23°C and ≤ 60°C
4	Flash point > 60°C and ≤ 93°C

1.0 Definition of Used Oil

In this document, the term 'used oil' is used. However, this is intended to be synonymous with the term 'waste oil' in the context of the contents of the document.

While it is appreciated that, in general, 'used oil' can be derived from many different sources and mixtures of different waste streams, have many different compositions and mean different things to different people, used oil is taken to have the following definition:

> *Any oil that has been refined from crude oil, or any synthetic hydrocarbon oil, that has been used, and as a result of such use, has become unsuitable for its original purpose due to the presence of impurities or contaminants or the loss of original properties.*

Used oil is oil from industrial and non-industrial sources and can be derived from any one of the substances in List A, or be a mixture of these substances. These substances have a flash point (closed cup) above 60^0C.

List A

- Engine oil – typically includes crankcase oils from gasoline, diesel and LPG engines
- Brake fluid
- Gear oils
- Transmission fluids
- Hydraulic oils and fluids
- Compressor oils
- Refrigeration oils

- Industrial process oils
- Electrical insulating oil except oil likely to contain PCBs
- Neat metalworking fluids and oils (excluding chlorinated products) – these must not be diluted with water or any product from List B
- Heat transfer oils
- Machining oils
- Ship's slops, bilge water, tank cleanings produced by vessels during normal shipboard operations
- Bottom clean-out waste from virgin fuel storage tanks, virgin fuel oil spill clean-ups, or other oil
- Wastes that have not been used, providing the flash point of the material is greater than 60^0C

Used oil should not include any of the products in List B or a mixture of products in Lists A and B

List B

- Petroleum distillates used as solvents, such as turpentine, kerosene, parts washing solvents
- Petrol and/or diesel (including biofuels) – including mixtures from refuelling errors
- Antifreeze, radiator flushing, or other inhibitor packages (e.g. stabilising coolant additives (SCAs))
- Oils derived from animal or vegetable fats and oils – including those used as a lubricant
- Paint and paint brush washings
- Chlorinated oil or solvents
- Any virgin or used oil which may contain PCBs (> 5 mg/kg)
- Soluble cutting fluids

Please note:

- Many, although not all, of the products in List B will have a flash point (closed cup) below 60^0C. Regardless of flash point, however, List B products must not be mixed with List A products and then disposed of as used oil.
- If used oil becomes contaminated with products from List B, the resulting product will usually become unsuitable for collection for re-use as a fuel.
- Small amounts of **some** List B products such as vegetable oils may not greatly change the actual properties of the List A products.
- However, mixing of List A and List B products is strongly discouraged as there is no guarantee that the resulting mixture would be suitable for used oil collection.

Within the scope of this document, used oil must either not have any flammable liquid classification (Flashpoint > 93^0C) or have a Flammable Liquids Category 4 Class under the UN GHS7 Classification System (Flashpoint >60^0C or ≤93^0C).

2.0 The Used Oil Collection System

The used oil management system can be divided up as follows:

- small volume generators
- public collection points
- industrial/commercial generators
- collectors and transporters
- storage and processing
- end users (e.g. industrial boilers)
- exporters

The effective collection and transport of used oils from the point of generation to end-use locations is essential if used oil is to be utilised or disposed of in an environmentally acceptable and safe way.

The following sections of this code address each of the components of the used oil collection system and provide advice to the relevant parties on their roles and responsibilities with regard to used oil.

The aim is to:

- prevent contamination of used oil with inappropriate materials;
- encourage small volume oil generators to deliver their used oils to local collection centers;
- encourage retail outlets which sell lubricating oils to arrange for used oil collection facilities to be available to their customers and the general public;
- encourage the provision of publicly available collection facilities in rural areas that are inadequately served by retail outlets selling lubricating oils;
- provide safe and efficient collection and transportation procedures for used oil;
- set out the operational and testing procedures and equipment to be used by any party aggregating used oil in a transfer or tank farm facility;
- provide guidance and information on what is and what is not an appropriate use for used oil; and
- ensure the safe handling of used oil by those who collect, transport, store, process, use or dispose of used oil.

3.0 Small Volume Generators

Many people buy small amounts of lubricating oil to use at home. Collectively this ends up generating significant volumes of used oil. This section of the code aims to provide information to these "small volume generators" on how to handle and what to do with their used oil.

3.1. Definition of a small volume generator

Small volume generators are those oil users who have no on-site used oil storage, and typically accumulate volumes of less than 60 litres of used oil at any one time. The large numbers of private motorists who change their own oil fall into this category.

3.2. What are your responsibilities?

People who maintain their own vehicle(s) and who change the engine and/or other oil(s) should comply with the following procedures:

- Place a drip pan directly under the vehicle's oil pan plug to collect as much as possible of the used oil and to prevent spills, before draining oil from the sump.
- If you are changing your oil filter, loosen the old filter (use a filter wrench if necessary), then spin it off and drain as much oil as possible into the drip pan. Place the filter upside down in a container. Drain for 24 hours. Add the used oil to what you already have in your collection container. If you can, take the old filter to a local scrap metal dealer or public collection point. If you don't have any other alternative, wrap the filter in newspaper and dispose of it through your domestic waste collection.
- Pour the used oil into a clean, empty container with a tight lid (e.g. the plastic container the clean oil was supplied in)**. DO NOT MIX IT WITH ANY OTHER SUBSTANCE.**
- Take the used oil to your nearest used oil public collection site.

3.3. Where do you take your used oil?

Public collection sites fall into two types: those where the public can leave the used oil in its container at a drop-off bin and those where the used oil is poured into a bulk tank.

Drop-off bins are available at a number of locations including:

- oil retail/reseller sites such as;
- auto accessory stores; and
- DIY stores.

Bulk tanks are available at some landfills and other properly designated sites.

3.4. Inappropriate methods of disposal of used oil

The following methods of disposing of used oil are inappropriate due to the actual or potential adverse environmental impacts:

- unauthorised disposal on the ground, or into watercourses, sewers or drainage systems;
- burial;

- using used oil for dust control, weed abatement, vegetation control, timber preservation by painting, staining or dipping, pest control or as a carrier fluid for agrichemicals (pesticides or herbicides);
- use as a marker, e.g. on playing fields;
- placing used oil in rubbish bins to be collected as part of household waste (except for disposal of well drained used oil filters and oily rags);
- open-air burning;
- combustion in, for example, kerosene burners, or as a fuel; or
- any other practices, in which the used oil may cause contamination of the ground and ground water, migrate to watercourses, contaminate air or have negative impacts on humans, plants, animals or other organisms.

4.0 Public Collection Sites

For the collection of used oil from small volume generators to be effective, there needs to be an appropriate number of public collection points available. This section aims to encourage retailers of virgin oil to the public to recover the used oil, and local authorities to take a more proactive role in used oil collection. It also provides a guide on what is required to comply as a used oil public collection site.

4.1. Definition of a public collection site

Any site or facility that accepts/aggregates and stores used oil collected from small volume generators is a public collection site. Public collection sites fall into two types: those where the public can leave the used oil in its container at a drop-off bin and those where the used oil is poured into a bulk tank.

4.2. What Are Your Responsibilities?

All retailers of oil are strongly encouraged to promote the recovery and/or reuse of their oil. This can be enhanced by posting a sign at the point of sale either advising the consumer that the outlet accepts used oil, or that you have made arrangements for another outlet to accept used oil on your behalf.

Oil retail/reseller sites

All sellers of oil in packages of 20 litres or less are therefore encouraged to:

- have a suitable facility available to take back used oil at the point of sale at no charge to the consumer, or
- arrange for a third party within a 10 km radius in an urban area, and at an appropriate location in a rural area, to accept oil on their behalf.

Sellers should also prominently display a sign advising customers of recommended recovery arrangements for the site.

If the aggregate quantity collected exceeds 1000 litres, the sites must comply with the requirements of Appendices 3 (Site requirements) and 5 (Spill management).

Local authorities

Where a public collection site utilises bulk tanks, such as at landfills, those facilities must comply with the provisions of section 5 below and the appendices of this code.

4.3. Classification of Public Collection Sites

Used oil public collection points are classified as either controlled collection or as general collection sites based on the ability to prove that the used oil on site is not contaminated by other products.

Controlled collection sites

A used oil public collection point can be classified as a controlled collection site when the site can demonstrate, by appropriate in-house procedures for handling used oil that it is protected from receiving unwanted or contaminated oils (see Appendix 1). In particular, it is protected from receiving flammable liquids.

General collection sites

Used oil public collection points that cannot show they are protected from receiving unwanted or contaminated oils will be classified as general collection sites. The site requirements specified in Appendix 1 are to be applied.

5.0 Industrial and Commercial Used Oil Generators

Industrial and commercial operators must store or dispose of their used oil in a manner that is not detrimental to human health and the environment. Industrial and commercial generators may have complicated operations and must take care to segregate used oils generated from different processes to avoid contamination of the separate oil streams. This includes:

- not contaminating segregated oil with any other oily fluid that may appear to be the same substance, and
- not contaminating oils with flammable liquids.

5.1. Definition of an industrial or commercial used oil generator

Industrial and commercial generators are defined as those parties who in the course of their commercial operations generate or accumulate used oil. In all cases the site storage of used oil is unlikely to exceed 5000 litres.

Typical sites include:

- automotive vehicle repair workshops
- industrial manufacturing operations
- other commercial operators, for example sites generating used gear oil and sites generating used hydraulic oil.

These are essentially sites that are not public collection sites.

Industrial and commercial generators of used oil are classified as either a controlled collection site or as a general collection site.

Controlled collection sites are sites where the used oil has not been contaminated by other hazardous substances. This means being able to demonstrate by in house procedures that the used oil comes from closed systems where cross-contamination with other substances has not occurred during typical industrial processes, for example contamination with refrigerants or solvents.

General collection sites are sites where it cannot be demonstrated that the site is protected from receiving contaminated oils or unwanted substances. The site requirements specified in Appendix 1 must be applied.

5.2. What Are Your Responsibilities?

As a generator of used oil you must collect and store used oil in dedicated facilities which are designed, labelled and operated to minimise contamination and spillage. The used oil must be prevented from becoming contaminated with other substances such as petrol, diesel, solvents, agricultural chemicals, water, or engine coolants. If contamination with other substances does occur, the contaminated substance must be immediately treated as a hazardous waste that requires competent management.

You must provide separate dedicated facilities for each of the main types of used oil:

- automotive engine lubrication and circulating oils, including engine oil, transmission fluids, final drive and drive-line fluids, brake fluids and power steering fluids, hydraulic oils, turbine oils, heat transfer oils, compressor oils, industrial gear oils;
- used metal working/cutting oils, including neat cutting, grinding, machine, rolling, quenching and coating oils, and undiluted soluble metal-working fluids (but excluding chlorinated products); and
- electrical insulating oils. If these contain polychlorinated biphenyls (PCBs) or other chlorinated organics they must not be mixed with any other oil. If you suspect that the oil might contain more than 5 ppm PCBs, you should contact the EPA for advice on handling and disposal.

You must ensure that your staff have been trained to be aware of the procedures for the storage and handling of used oil, and of the need to keep used oil separate from other substances, especially flammable liquids.

5.3. Site Requirements

The site requirements, including management procedures which must be followed, are specified in Appendix 1.

The requirements for storage tanks are specified in Appendix 2.

Procedures for spills are specified in Appendix 3.

6.0 Collection and Transportation

This section sets out the operational, testing, equipment and recording procedures to be used for the transportation of used oil in bulk.

6.1. Definition of a Transporter

Used oil transporters are those parties who commercially collect used oil from more than one used oil generator or collection point and transport it to a used oil transfer facility or tank farm facility (as defined in Section 7.1). This does not include domestic users of oil who transport small quantities (e.g. less than 60 litres) of used oil from the point of generation to a collection site.

6.2. Your Responsibilities

Used oil must be collected in a manner that is not detrimental to human health and the environment. When collecting and transporting used oil you must ensure that the used oil has a flash point greater than 60^0C. To do this you must either:

- conduct a flash point test or vapour test at each collection point, or
- conduct a pre-collection audit of the site you are collecting oil from.

It should be noted that portable flash point testing equipment is available but may not be considered practical in some Pacific contexts. Transporters can, however, easily carry LEL gas detectors, which are often combined with detectors for other gases (e.g. oxygen, carbon monoxide, hydrogen sulphide.) An audible alarm is usually set at 10% of the detector calibration gas and conversions are available to calculate LELs for other gases. LEL detectors should be calibrated regularly and records should be kept of the calibrations.

The LEL is the “Lower Explosive Limit” and at the LEL is defined as the lowest concentration (by percentage) of a flammable gas or vapour in air that is capable of causing a fire in presence of an ignition source.

The site inspection should cover the following areas:

- storage equipment
- site management procedures
- general site tidiness
- potential hazards
- source of used oils
- whether the site is a controlled collection site
- collection of List A substances only
- where there is any doubt, a flash point test or vapour test must be undertaken

If the site meets the criteria for collecting used oil, you and the site operator can agree on an appropriate collection service schedule for the site.

If you are a used oil transporter you must ensure that the vehicle transporting the used oil meets the criteria for the type of sites that the used oil is being transported from (see Section

6.3). The types of vehicles that are required for a general collection site and a controlled collection site differ.

You should keep records for each site detailing the date and volume of used oil collected. This can be an invoice/receipt for each site. If invoices are not provided, the site operator must subsequently have access to your collection records if required, for use as evidence of appropriate used oil management.

If oil is accidentally discharged during collection and/or transportation, you must take immediate action to protect human health and the environment; for example, contain the spill by bunding the discharge area, notify local authorities and clean up the spill. Spills must be reported to the site operator and to the appropriate agency, such as a local council, as soon as possible.

Sites should keep records of each spill in excess of 5 litres. These records should be retained for at least 3 years.

6.3. Requirements for Drivers and Vehicles

The following requirements are to be observed:

- All tank wagons used in the collection of used oil must comply with relevant national regulations for the transport of hazardous substances. If used oil is collected in bulk from general sites where there is a possibility of contamination with Flammable Liquids of GHS7 categories 1, 2, or 3, then the used oil must be transported in a tank wagon suitable for the transport of petrol.
- If you collect and transport used oil in bulk from controlled sites where the oil can be guaranteed to have a flash point (closed cup) above 60^0C (that is, it has a GHS7 Flammable Liquid Category 4) then a tank wagon suitable for diesel will be sufficient. If the flashpoint is above 93^0C then a tank wagon suitable for non-flammable substances will be sufficient.
- All tank wagons must carry a road tanker spill kit for cleaning up any minor spillage. For further information on spill kits, spill preventions, response and clean-up procedures for transporters see Appendix 3.
- Any spillage of used oil at a customer site must be cleaned up. This may be by using the vehicle's spill kit. If the spill is greater than can be handled by the spill kit, the driver must wait at the site until a clean-up crew has arrived and responsibility for the clean-up is handed over to them.
- All hoses must be plugged or capped when not in use. All suction pipes are to be stored in an enclosed leak-proof container or locker complete with a drain point so that it can be drained of product if necessary.
- All tank wagons should work on a no-product-to-ground policy.
- All drivers must undergo training for tank wagon work, and this must be documented.
- All drivers must have the current drivers licence for the vehicle they are driving. If the substances being transported, including any local requirements for licensing drivers for transporting dangerous goods, then these requirements must also be observed. Special training is necessary.
- Additional precautions are required if the used oil being transported has a flash point less than 60^0C. This includes applying hazardous atmosphere zones for substances with

GHS7 flammable liquid categories 1 and 2. These zones are areas around the tankers where sources of ignition must be excluded.

- Vehicles with product that could be contaminated with GHS7 flammable liquid categories 1, 2 or 3, are to be labelled with UN Number "1993", Shipping name "Waste Flammable Liquid NOS", and Common Name "Used Oil, Hazchem 3[Y]". This information must also be stated on the accompanying transport documents.

6.4. Vacuum Tankers

Prior to using a vacuum tanker, even in controlled sites, the driver should check to ensure that GHS7 Categories 1, 2 and 3 flammable liquids have not inadvertently been disposed of in the tank which is being collected from. Vacuum tankers can only collect these liquids if the vehicle is designed and constructed for them, or otherwise there is a risk of fire or explosion.

6.5. Static Electricity

Static electricity is a problem when pumping petroleum substances. The following precautions must be taken whenever used oils are pumped.

- Always earth road vehicles before loading or unloading. Before pumping commences and the tank is being unloaded or loaded, attach a loading or unloading hose that is electrically continuous to the tank. You can also use a separate static strap that can be attached to the tank. The tank must be earthed.
- Avoid splash loading when top loading into empty vehicles. Ensure that the fill pipe reaches as close as possible to the bottom of the tank or use bottom filling.
- Avoid pumping water or air with petroleum substances.
- Maintain a slow loading rate until the fill pipe on the receiving vessel is covered by at least 100 mm.

6.6. Records

When you collect and deliver used oil you should maintain records of this transaction for a minimum of three years. Each tank wagon load of used oil must undergo flashpoint testing or vapour testing (See Section 6.2 above) before it is delivered to a used oil transfer facility. This will ensure contaminants are not present in the load. Records of this testing should be retained for three years.

Acceptance

As a used oil transporter, you must keep a record of each used oil batch accepted for transport. Records for each batch must include:

- the name, address and ID number (if applicable) of the transporter and whoever provided the used oil for transport;
- the date of acceptance of the used oil;
- a description of the used oil being transported;
- the quantity of used oil accepted; and
- the signature of a representative of whoever provided the used oil for transport. The signature must be dated on receipt of the used oil.

Delivery

As a used oil transporter, you must keep a record of each shipment of used oil that is delivered to another used oil transporter, user or transfer facility. Records of each delivery must include:

- the name and address of the receiving facility or transporter;
- the ID number (if applicable) of the receiving facility;
- the date of delivery;
- the quantity of used oil delivered;
- the signature of a representative of the receiving facility or transporter. This must be dated on receipt of the used oil; and
- the results of the flashpoint test or vapour test of each tank wagon loads of used oil.

6.7 Delivering Used Oil

Used oil transported from a collection point must only be unloaded at a site that meets the criteria for a used oil transfer facility/tank farm facility (see Section 7).

6.8 Transportable Containers

Where IBCs (Intermediate bulk containers) are used for the collection and transportation of used oil, these must comply with chapter 6.5 of the UN Model Regulations on the Transport of Dangerous Goods.

IBCs are required to be inspected at 2.5 yearly and 5 yearly intervals. These inspections are required to be in accordance with the UN Model Regulations.

A compliant IBC needs to be marked and needs to display the date of the latest inspection.

Where portable tanks are used for the collection and transportation of used oil, these must comply with chapter 6.7 of the UN Model Regulations. Furthermore the attachment of the portable tank to the deck of the vehicle must be able to resist the forces experienced when being transported.

7.0 Storage and Processing

This section concerns owners and operators of used oil bulk storage facilities together with those who have operations for processing, refining or disposing of used oil. It does not apply to people who carry out incidental processing operations on used oil during the normal course of transportation (see Section 6). It includes the use of used oil as a fuel in any operation.

7.1. Used Oil Facilities

Bulk storage facilities

A used oil tank bulk storage facility is defined *as any facility at a site that receives and aggregates used oil from used oil transporters (as defined in Section 6.1) for subsequent additional transportation, processing, re-refining or use and which is not a used oil generator.*

A bulk storage facility typically consists of a tank farm and may include the incidental processing of used oil through, for example, stripping water.

Typically, bulk storage facilities are likely to receive used oil from used oil transporters in large volumes i.e. received in bulk by tank wagon.

Processing and use plants

Used oil processing or use plants are *any facilities which either receive and aggregate used oil from used oil transporters (as defined in Section 6) and which also process, re-refine or use the used oil.*

These are facilities that engage in physical operations designed to make used oil more amenable for the production of fuel oils, lubricants or other used oil-derived products. Processing includes, but is not limited to, any mechanical or chemical treatment, as well as blending used oil with virgin petroleum products (excluding those with flammable liquids classifications GHS7 Categories 1, 2 and 3).

Bulk storage facilities are subject to more rigorously controlled practices than for either virgin oil stored at commercial operations or used oil stored at public and industrial / commercial collection points. The reasons for this are:

- storage of greater volumes
- the likelihood that such sites will sometimes receive used oil contaminated with flammable liquids.

7.2. What Are Your Responsibilities?

Owners and operators of used oil bulk storage facilities and used oil processing, refining or burning sites must hold current consents to operate such facilities, and maintain and operate them in accordance with these consents. Used oil bulk storage facilities must also minimise contaminated waste which will require disposal to landfills, for example, by shredding, washing and recycling plastic oil containers.

Each site must comply with all relevant requirements of the relevant legislation.

7.3. Storage Facilities

Tanks

Tanks must comply with the following:

- Stationary tanks must be compliant with Appendix 2 (New Tanks) or Appendix 5 (Existing Tanks) of this code.
- A means to prevent unauthorised access is to be provided; this can include padlocking inlet and outlet valves when not in use.
- Above ground stationary tanks of 1,000L or more must have a secondary containment system. A secondary containment system is a system in which the used oil is contained if it escapes from the container or containers in which it is held. The used oil must be able to be recovered from the secondary containment system. A common form of secondary containment is a compound with bund walls. The secondary containment system must have a capacity of at least 110% of the largest tank at the site.
- The bund floor must be impervious.
- Below ground stationary tanks must have a secondary containment system of at least the capacity of the tank.
- Each tank is to have some method to determine the volume of used oil in it.
- All tank maintenance is to be recorded and the records kept for five years.
- At each site the operator is to have a sufficient storage capacity on site certified for flammable liquid storage to allow for discharge from the largest capacity of a vehicle that may be received, in the event of a load being contaminated with a low flash point substance.
- The vehicle discharge area must be bunded. The bund must equal or exceed the volume of the largest compartment of any vehicle to be discharged.
- Operating requirements are specified in Appendix 1 to this code.

7.4. Transfer Operations

During loading and unloading of used oil at a used oil facility, a staff member must be in attendance at all times.

Records

All sites that hold, process, refine or dispose of used oil are to keep records of incoming oil by date, volume, source and flash point. Records of oil going off site should indicate date, volume, and destination. Owners and operators of sites that hold, process, refine or dispose of used oil must keep documentation that acts as an audit trail, Sites must also keep disposal records for any hazardous by-products generated in the process. This includes sludges and ash, and spent fuller's earth containing oil.

All records should be retained for at least three years.

Spill/ Emergency Management Procedures

Employers and staff must be properly prepared to manage an emergency involving hazardous substances, including having emergency response procedures and equipment. These include:

- At least two fire extinguishers if at least 500L of used oil is held when the used oil is of GHS7 Flammable Liquid Category 4, although it is good practice to have fire extinguishers available regardless of the hazard classification of the used oil.
- A spill kit that is appropriate for cleaning up used oil. This should contain personal protective equipment (PPE) that may include overalls, boots, gloves, eye protection. It should also contain spill handling equipment, containment equipment, absorbent materials and information on what to do when a spill occurs.
- Signage that notifies employees, emergency services and other people of the presence of hazardous substances. Refer to Appendix 1 for details of signage.
- A secondary containment system that meets the requirements set out in section 7.3.
- An evacuation plan.
- An emergency response plan if your site holds greater than1000L of used oil. If your site holds less than 1,000 litres of used oil it is still good practice to have an emergency response plan.
- Where applicable, emergency response procedures for low flash point substances and/or substances at elevated temperatures.
- Emergency response plans must be site specific and cover all reasonably likely occurrences and the responses for your site and shall include a description of what you will do to:
    - call emergency services;
    - warn people at the workplace and in nearby areas that an emergency has occurred;
    - advise people how they can protect themselves and how they can help other people involved in the emergency; and
    - manage the emergency so that damage is minimised.
- The plan must also:
    - Name the people with specific responsibilities (such as fire wardens, first aiders) and include the contact information for them and emergency services;
    - Include how to get information about the hazardous properties of the substances involved in the emergency;
    - State the location and purpose of emergency equipment and materials that may be needed;
    - Set out the actions to take for each potential emergency and the order in which to take them; and
    - Be available to all people that are listed in the plan as having responsibilities and also to emergency services.
- Emergency response plans must be tested at least annually; records of tests must be kept for at least two years. You must update your plan if there are changes to the hazardous substances present at your workplace, or if there are changes to staff that have specific emergency responsibilities. You must test altered plans as soon as possible, and in any event no later than 3 months after the change.
- After any emergency, you should review your plan and identify steps to prevent future incidents.

8.0 Use or Disposal of Used Oil

8.1. Air Quality

Open burning of used oil is environmentally unacceptable, due to a wide range of potential emissions, including dioxins.

Combustion of used oil for purposes of generating useful heat, steam, power or electricity must also be done with due regard to air emissions.

If you collect and transport used oil to people who intend to utilise the used oil as a fuel, you should ensure the user intends to use it in an environmentally acceptable manner.

Combustion processes must meet ambient air concentration requirements for fine particulate (PM10), sulphur dioxide, nitrogen dioxide, ozone and carbon monoxide.

Complying with the fuel specifications in 8.2 below does not ensure that the combustion process will ensure compliance with these requirements.

8.2. Reprocessed Oil Specifications

Used oil reprocessed for use as a fuel oil must be converted into a distinct marketable substance. It must meet the following fuel specifications:

Maximum levels
Lead 100 ppm maximum
Arsenic 5 ppm maximum
Cadmium 2 ppm maximum
Chromium 10 ppm maximum
Total halogen content 1,000 ppm maximum (no PCBs allowed)
Flash point 60°C minimum

Each batch of reprocessed oil must be tested to ensure this specification is complied with. Such testing would normally be undertaken by the provider of the used oil and the records should be retained for at least 5 years. This includes situations whereby used oil is collected and used directly as fuel oil.

For practical purposes smaller batches e.g. batches less than 10,000 litres, may be consolidated for testing so long as the sample is representative.

8.3. Disposal of Used Oil

Used oil that is to be disposed of (as opposed to being used for burning or being re-used) will usually involve a commercial transaction, with the ownership of the used oil generally passing to the collector.

In this case, the responsibility for environmentally acceptable disposal practices passes to the collector.

The used oil must be disposed of by:

- Exporting it as a waste – all requirements of the Basel Convention or Waigani Convention (whichever is relevant), must be followed.
- Treating it so that it is no longer hazardous.

The latter point does not include depositing it in a sewage facility or spreading on land surfaces (including roads) but does include combustion in a managed incineration facility.

8.4. Disposal of Packaging

Unless the package is to be reused or recycled, the package must be rendered incapable of containing any substance and disposed of:

- in a manner consistent with disposal of the used oil itself; or
- through a public or commercial waste collection service.

Appendix 1: Site Requirements

Management procedures

- The operator must provide written material to staff about the appropriate procedures for handling used oil and oil filters. Safety datasheets must be available.
- The used oil collection and transportation agent must comply with the guidelines in Section.
- Collection facilities are sited to prevent used oils from entering sewerage and storm water systems, drainage channels and the natural environment.
- Storage facilities should be inspected visually on at least a weekly basis to ensure that a standard of cleanliness and that environmental management is maintained, and that regular collections are carried out.
- Stationary container facilities should be audited annually, with records retained on site until the next audit. These audits will generally be by internal staff (i.e., conducted by storage facility staff).
- The site must have a management plan in the event that the storage tanks and other receptacles become contaminated with other hazardous materials, such as flammable solvents. This may entail calling a transporter able to handle GHS7 Categories 1, 2, and 3 flammable liquids and arrange for collection of it.
- The site must have health and safety procedures that are appropriate to the handling that is taking place.
- In the event that a spillage occurs, records should be kept for all spills in excess of 0.5L. These records should be retained for at least 3 years.

Additional management procedures for controlled collection sites

- Controlled collection sites must be able to show they are protected from receiving unwanted or contaminated oils by having the following management procedures in place on site and by ensuring that staff are aware of them. Only used oils from List A are acceptable.
- A legible and visible sign must be prominently mounted which advises persons wanting to dispose of used oil to avoid contaminating it and either:
  - lists the products that are not accepted (antifreeze, paints, solvents, petrol, diesel etc.), and says where unacceptable products should be disposed of, or
  - specifies the used oils that the storage tank is limited to receive.
- Signs that meet this requirement include:

USED LUBRICATING OIL
(76 pt black print yellow highlight)
LUBRICATING OIL
TRANSMISSION AND HYDRAULIC FLUIDS ONLY
(46 pt green highlight)

PROHIBITED SUBSTANCES
(Black 76 pt yellow highlight)
PETROL, DIESEL, COOLANTS, PAINT SOLVENTS, PARTS WASHING FLUIDS and KEROSENE are forbidden
(Black 46 pt, red highlight)

- For public collection sites where used oil is poured into a tank, the operator must visually inspect the used oil and reject any that he or she suspects may contain something unacceptable. This is unnecessary for public collection systems where the used oil is retained in sealed leak proof containers such that each batch of used oil is separated from other material.
- For sites generating used oil, the operator must have a documented process for accepting the used oil and this process must be made aware to the staff involved.

Segregation of incompatible substances

Used oil must not be in contact with any substance or material with which it is incompatible. Incompatible substances, including those held in packages, must be held separately. Used oil must be separated from:

- Explosive substances
- Flammable gases
- Flammable solids
- Oxidising substances

Public collection facilities

The collection agent at a public collection site must provide a safe, leak proof facility for the collection of customer's contaminated containers/receptacles. The agent must ensure that contaminated receptacles are recycled. If recycling is not available, containers must be disposed of in a safe and appropriate manner, e.g. at a suitable landfill.

All public collection sites must:

- be monitored at all times they are available to the public, and
- be inaccessible to the public when not monitored e.g. at night, and
- be weather tight, and
- be located away from sources of ignition, gutters, storm water drains, waterways and environmentally sensitive areas, and
- be advised to local fire and pollution response authorities in order to minimise the risk of spills, fires, contamination and over-filling.

If the used oil has a GHS7 Category 4 Flammable Liquids classification, the used oil containers/receptacles must be stored:

- outside, or in a detached building;

- in a room with walls and ceiling constructed with 60/60/60 fire resistance rating provided not more than 450 litres are situated in the store; or
- in a room with walls and ceiling constructed with 120/120/120 fire resistance rating provided not more than 2000 litres are situated in the store.

Rooms in the third and fourth bullet points may have a door opening into the building provided that:

- The door of the room has a fire resistance rating of -/60/60 in the case of bullet point three and - 120/120/120 in the case of bullet point four;
- The door is fitted to be self-closing in the event of a fire near the doorway, and
- There are no combustible materials within 3 metres of the doorway;
- No portion of the structure within 3 metres of the doorway is constructed of combustible materials; and
- The door is kept closed except when goods are placed in, or removed from, the room.

This code of practice is not applicable to used oils which have a flashpoint 60^0C degrees Celsius or lower. These oils may require additional precautions.

Removal of used oil

Removal of used oil from public collection sites as well as industrial and commercial generator sites should only be done through a commercial collection agent who complies with procedures as set out in Section 6.

Fire extinguishers

Fire extinguishers must have a capability of 30B4 (the rating should be marked on the fire extinguisher) and must be positioned within 30 meters of the used oil.

Emergency response plan

Employers and staff must be properly prepared to manage an emergency involving the used oil. The site must have a single emergency response plan for all of the hazardous substances held in it. This plan must describe all of the reasonably likely emergencies that may arise and for each of these must:

- Describe the actions to be taken to
  - Warn people at the place, and in surrounding areas that may be adversely affected by the emergency, that an emergency has occurred;
  - Advise those people about the actions they should take to protect themselves, and
  - Help or treat any person injured in the emergency;
  - Manage the emergency so that its adverse effects are first restricted to the area initially affected, then as soon as practicable reduced in severity, then if reasonable possible eliminated;
  - If any of the substances remain, re-establish the conditions imposed on it when it was approved; and
- Identify every person with responsibility for undertaking any of the actions described above and give information on:
  - How to contact the person;
  - Any skills the person is required to have;

  - Any actions that person is expected to take; and
- Specify
  - How to obtain information about the hazardous properties of and means of controlling the substance or substances that may be involved;
  - Actions to be taken to contact any emergency service provider;
  - The purpose and location of each item of equipment or material; to be used to manage the emergency;
  - How to decide which actions to take; and
  - The sequence in which actions should be taken.

All equipment, materials and responsible people specified in the plan, must be:

- present at the location;
- available to reach the location within the times specified; or
- in the case of trained persons, be available within a specified time frame.

The emergency response plan must be available to every person responsible for executing the plan or part of it and to every emergency service provider.

The emergency response plan must be tested:

- at least every twelve months; and
- within 3 months of a change to the plan, persons or procedures.

The test must demonstrate that every procedure and action is workable and effective. The results of the test must be documented and held for at least 12 months.

Furthermore the site must demonstrate that it has a spill-response and clean-up plan, which includes:

- up-to-date procedures for contacting clean-up contractors;
- procedures for notifying the relevant municipal authorities;
- staff awareness; and
- having a spill kit available (see Appendix 3).

Secondary containment systems

Secondary containment systems are required when the quantity of used oil is equal to or greater than 1,000 litres. It is also recommended that secondary containment systems are installed when the quantities are below 1,000 litres. The capacity of the secondary system is dependent on the capacity of the containers in which the substances are held whether they are held above or below ground, and whether the used oil has a flammable classification or not.

Table 2: Minimum secondary containment capacity for used oil that is flammable i.e. Category 4

Container Size	Quantity – Total Aggregate Capacity	
Categories	**Less than 5,000 litres**	**Greater than or equal to 5,000 litres**
≤ 60 litres	At least 50% aggregate capacity	2,500 L or 25% aggregate capacity whichever is the greater
> 60 and up to 450 litres	At least 100% aggregate capacity	5,000 L or 50% aggregate capacity whichever is the greater
> 450 litres	At least 110% of the capacity of the largest container	

Table 3: Minimum secondary containment capacity for used oil that is not flammable.

Container Size	Quantity – Total Aggregate Capacity	
Categories	**Less than 20,000 litres**	**Greater than or equal to 20,000 litres**
≤ 60 litres	At least 25% aggregate capacity	5,000 L or 5% aggregate capacity whichever is the greater
> 60 and up to 450 litres	At least 25% aggregate capacity or 110% of the largest container whichever is greater	5,000 L or 5% aggregate capacity whichever is the greater
> 450 litres	At least 110% of the capacity of the largest container	

Common forms of secondary containment systems include:

- a compound with bund walls or a depression in the ground;
- a tank with a double skin and where the interstitial space is monitored; and
- for small volume collection, leak proof containers held within a larger receptacle.

In order to avoid the secondary containment system collecting rainwater during periods of rain, a shelter or roof can be placed over the tank and secondary containment system.

Signage requirements

- Signage is required when the quantity of used oil is equal to or greater than 1,000 litres.
- Signs must advise people of the hazardous properties of the substances that are present at a site and must have precautionary statements that tell people what to do to avoid unintended consequences.
- Signage needs to be in English, clear, easily understood, and able to be read from a distance of 10 metres.
- If the used oil is located in a building, signs must be positioned at every vehicular and pedestrian access to the building and at each entrance to any room or compartment inside the building which the used oil is located in.

These requirements are complied with by signs which show the following:

- The hazardous substances present, with the use of signal words such as HAZCHEM, or WARNING.
- The hazardous properties of the substances and the type of hazard of each substance present. If substances have multiple classifications these all need to be considered when displaying signs.
- Precautionary statements that prevent unintended ignition or combustion.
- Emergency actions to be taken in the event of an emergency.

This can be provided in pictorial form, for example by pictograms (as in the example below). The sign below is suitable for used oils with a flash point above 60oC. (Separate consideration is required if the flash point is 60^0C or below.)

<table>
<tr><td colspan="2">HAZCHEM 3Z</td></tr>
<tr><td colspan="2">USED OIL</td></tr>
<tr><td> 
Combustible Liquid</td><td rowspan="2">In case of emergency dial 111
Fire, Police or Ambulance
Keep away from ignition sources – no smoking, no naked flames
Ecotoxic to aquatic life – contain spills, protect waterways.
24Hr company contact Dial xx xxxxx
Regional council pollution hotline Dial xx xxxxxx</td></tr>
<tr><td> 
Ecotoxic to Aquatic Life</td></tr>
</table>

Personal Protective Equipment

A person who handles the used oil in a place of work must use protective clothing or protective equipment that is designed, constructed, and operated to ensure that the person does not come into contact with the used oil and is not exposed to a concentration of the used oil that is greater than the workplace exposure standard for the used oil, or any component of it.

Practical application of these requirements for the handling of used oil includes the use of gloves and safety goggles and a mask. Additional personal protective equipment may be necessary for other reasons for example, the use of safety boots/shoes to minimise physical injuries.

Equipment to handle the used oil

A person in charge of the used oil must ensure that equipment used to handle it—

a) retains the used oil, without leakage at all temperatures and pressure for which the equipment is intended to be used; and

b) dispenses or applies the used oil, without leakage, at a rate and in a manner that the equipment is designed for.

+

Appendix 2: Tanks for Used Oil

This appendix specifies the minimum standard for used oil stationary container systems at small volume industrial/ commercial and public collection sites that is, for tanks less than 5000 litres capacity.

Design and Construction

All new above ground tanks with a capacity of 250 litres or greater and all new below ground tanks must comply with a recognised international code of practice which should be stated on the tank, and can be manufactured from steel or fibreglass reinforced plastic. Steel tanks can have integral secondary containment to avoid the need for external secondary containment.

For used oil at controlled sites and which does not have a flammable hazard classification, that is, the flash point is greater than 93^0C, thermoplastic tanks and rotationally moulded polyethylene tanks are also acceptable. Again they must comply with a recognised international code of practice which is stated on the tank.

Information to be supplied with tanks

Tanks installed on site should be supplied with sufficient information to readily support their compliance.

Existing tanks

Tanks installed prior to the date of this code must comply with the provisions of Appendix 5 of this code.

Design considerations for tanks

In addition to the requirements of the recognised international code of practice, the following must also be adhered to:

Openings

All openings should be located in the top of the tank above the safe fill level. Where it is necessary to install an opening below the safe fill level, e.g. for use as a water drain or sediment removal, this opening must have a secure closure which is only open under the supervision of a trained person. A secure closure is one which is locked and which requires a key to open or one which requires tools to open.

Fill point

Where the used oil is tipped into the tanks from containers, the fill point is to be of sufficient size to allow easy draining of the oil containers. A mesh is to be provided in the fill point to stop the ingress of solid particles or matter.

Discharge

The discharge point must be suitable for the collection truck to pump out the used oil. If permanently fitted, the pipe on the suction discharge should terminate as close to the bottom of the tank as practicable to enable the collection of as much sludge as possible. If sludge stays in the bottom of the tank it will become hard and reduce the workable volume of the tank. Sludge is not easily removed.

Colour
The external surface of the finished tank may be any colour.

Safe fill level
The tank is to be marked, or have an indicator, showing the safe fill level.

Security
Unless unauthorised access to the tank is prohibited e.g. the tank is located in a lockable building:

- All openings for the tank must be able to be locked, and.
- Tanks are to be kept locked at all times, unless they are being loaded or unloaded.

Siting of used oil tanks

- Tanks are to be sited to minimise the possibility of leakage through malicious or accidental damage.
- The tank's location must be where there is some degree of supervision by the site operator, who has responsibility for what is emptied into the tank.
- The tanks should be sited so that oil can be safely loaded and unloaded from the tank.
- Tanks must be mounted on an impermeable surface such as concrete or asphalt. They must not be placed on soil.
- If the tanks are located near vehicular traffic, consideration should be given to the movement of vehicles. Where impact that is resulting in damage to the tank is likely to occur, protection should be installed e.g. barriers or bollards.
- Tank wagons must be able to manoeuvre safely around the site.
- Potential hazards, such as recycling and rubbish bins, should not be placed within 2 metres of a used oil tank sited outdoors.
- On sites equipped with drainage interceptors, tanks must be located within the interceptor's catchment area. On sites not equipped with interceptors, the tank should be located at least eight metres from any storm water, sump or other drain.

Tanks containing used oil may be located inside buildings:

- at controlled sites;
- when the used oil does not have a flammable hazard classification, that is, the flash point is in excess of 93 deg C5; and
- when fabricated from steel; or
- when fabricated from fibreglass reinforced plastic or plastic with a capacity no greater than 1000 litres.

When tanks are located inside, they should be located so that a used oil collection truck can park within five metres.

Tanks for the collection of used oil situated outside must be separated from buildings and site boundaries by the following separation distances. These separation distances are only applicable where there is no possibility of contamination with Category 1, 2 or 3 substances:

Table 4: Separation Distances

Tank capacity	Separation distance
Up to 600 litres	0 metres
600 L to 1,000L	1.5 metres
1,000 L to 2,500L	2 metres
2,500L to 5,000L	3 metres
5,000L to 25,000L	4 metres
25,000L to 50,000L	5 metres
50,000L to 100,000L	6 metres
100,000L to 250,000L	7 metres

Separation distance between tanks

Tanks up to 5,000 litres capacity used for the collection of used oil must be separated from each other by 0.5 m. Tanks greater than 5,000 litres capacity or where there is possibility of contamination with Category 1, 2 or 3 liquids require greater separation distances..

Secondary containment systems

If tanks are above-ground and have a capacity of at least 1000L, a secondary containment system is required. Details are provided in Appendix 1.

Markings

All tanks used for the collection of used oil should have signs which specify the oils which are accepted and the oils which are not accepted. This sign may be mounted on the tank or in a prominent place nearby. A suitable sign is specified in Appendix 1.

Appendix 3: Spill Prevention, Response and Clean-up Procedures

Spill kit: suggested contents list

Suitable for vehicles and also sites storing up to 5,000 litres.
(This may be varied to suit local conditions if required).

Table 5: Spill kit contents

Contents	Quantity
Hydrocarbon absorbent pads	10
Bag of particulate (Oil Dry or similar)	1
Absorbent socks	1 x 1.5 m - 1 x 3 m
Hydrocarbon pillows	2
PVC drain cover	1
Folding trenching tool	1
Pair PVC gauntlets	1
A pot of Vetta Paste, Plug 'N' Dike, Pig Repair putty, or similar	1
Polythene disposal bags	2
Contents list	1

Spill prevention

Key precautions are as follows:

Table 6: Precautions

Do	To prevent
Park away from traffic flows, and/or use safety cones if necessary	Tank wagon being hit by other traffic
Protect tank with barriers or bollards if there is nearby vehicle movement	Tank being hit by traffic
Dip tank wagon and site tank before collection	Tank wagon overflow
Regular inspection of hoses, pumps and other equipment	Equipment failure

If spills do occur

Any spillage or similar escape, or contamination of other products by the used oil shall, where possible, be rectified before the collector leaves the site.

- For each action, put on appropriate personal protection equipment.
- Isolate the source of spillage and close vehicle valves.

- If it is safe, contain and control the spill.
- Stop all operations in the immediate areas of concern and remove or shut down any ignition sources.
- Close the interceptor valve if there is one on site, and close and/or block any drains leading off the site.
- Report spillage to site operator.
- Start the clean-up. Request assistance if necessary.
- Ensure that any materials used in the clean-up are disposed of appropriately.
- If the spillage occurs on unsealed ground, the soil must be removed and disposed of to an appropriately approved facility – either landfill, transfer station, or hazardous waste treatment facility.
- If there is a risk of oil entering a sewer, storm water drain or natural waterway, the relevant local authority should be notified immediately.

Notice of any such incident shall be given to the appropriate agency as soon as possible by way of a report detailing the cause and severity of the incident and the remedial measures taken. Your emergency management procedures must include the possibility of a spill of used oil occurring.

Appendix 4: Tank Wagon Operating Requirements.

Prior Use

Before a tank wagon is used to carry a hazardous substance of any hazard classification that differs from a hazardous substance previously carried:

- the tank wagon must be completely emptied of the previously carried substance; or
- the mixture of the hazardous substance with any residue of the previously carried substance remaining in the tank must not create a substance of a different hazardous property, nature, or degree.

Filling tank wagons

A person in charge of a tank wagon must ensure that a tank compartment is not filled to a level beyond the maximum filling level.

The person in charge of transferring a liquid hazardous substance to or from any tank wagon must—

- attend the tank wagon from the time the transfer of the hazardous substance commences and until it is completed; and
- ensure that, from the time the transfer of the hazardous substance commences and until it is completed, the tank wagon does not move; and before the tank wagon is moved, ensure that all tank openings are securely closed when the transfer of hazardous substance is complete.

Supervision of tank wagons

The person in charge of a tank wagon that contains a liquid hazardous substance of any hazard classification (or residue vapour from the hazardous substance) may leave that tank wagon unattended—

- in suitably managed transit depot that takes into account the hazardous nature of the tank contents; or
- on a road or elsewhere for up to 5 minutes if the tank wagon is—
  - at least 30 m away from all areas of high intensity land use other than roads;
  - and at least 8 m away from all areas of low intensity land use other than roads.

Firefighting capability

A tank wagon that carries a Flammable liquid equal or below Flashpoint 93^0C must have—

- at least 1 fire extinguisher in the tank wagon cab; and
- on each tank at least 1 fire extinguisher.

Fire extinguishers must be installed and located on a tank wagon in a way that the person in charge of the tank wagon is able to extract any extinguisher from its location and hold it ready for use within 10 seconds.

Authorised persons

A person in charge of a road tank wagon with a tank capacity of not less than 2,000 litres must, at any time a hazardous substance (or residue of a hazardous substance) of any hazard

classification is contained in the tank, ensure that no person is in or on the tank wagon except the persons—

- necessary for the operation of the tank wagon; and
- who carry out maintenance, inspection, training, or management duties

Appendix 5: Existing Tanks

Existing tanks may be constructed in accordance with the following parameters:

Materials

The materials for used oil tanks shall be fit for purpose. All materials used in the construction of used oil tanks must be able to retain product for the life of the tank without leakage or deterioration from either the product contained or external conditions. To minimise the hazard from static electricity, the mixing of conductive and nonconductive materials shall be avoided in the construction of containers.

Plastic Tanks

Tanks constructed from plastic materials (including fibreglass reinforced plastic tanks) shall be capable of withstanding exposure to ultraviolet radiation in the environment within the temperature range -18°C to +55°C.

Containers made from plastics shall contain anti-static inhibitors.

When a container is moulded of polyethylene it should be tested for stress cracking in accordance with Appendix G of AS/NZS 2906:1999, and it shall not crack. **Note:** This requirement may be waived if the manufacturer can provide evidence that the polyethylene is crack-resistant.

Tanks with a capacity of less than or equal to 1000 litres,

The maximum size for fibreglass or plastic igloos shall be 1,000 litres.

Capacity

The container will have an overflow capacity, to the lowest opening, not less than 105 percent of the safe fill level.

Colour

The external surface of the finished tank may be any colour.

Safe fill level

The tank is to be marked, or have an indicator, showing the safe fill level.

Tank fixing

The tank is to have suitable points for fixing to the ground. These are to be clearly identified by the manufacturer. The mountings and the tank need to be able to withstand a side force equivalent to the weight of the container and the used oil contained in the tank. The average specific gravity of lubricating oil is to be taken as 0.9. The purpose of this side force requirement is to allow for wind and earthquake forces, not for impact resistance.

Tanks compliant with this specification and which are constructed from a form of plastic material have a have a finite life of 10 years from the date of manufacture. Where the date of

manufacture is not known, the tank must be removed from service within 5 years from the date of this code.

IBCs

IBCs (intermediate bulk containers) are designed as transportable containers. They are not designed for, or approved as, stationary tanks. Information on IBCs is included in section 6.8 of this code.

Annex 2 – Transboundary Shipment of Used Oil

1.0 Classification of Used Oil for collection, transport and marine shipment

1.1 Classification of Used Oil

Used oil that has not been treated or processed is classified as waste. Waste oils and oils unfit for their original purpose are categorised as wastes to be controlled by Annex 1 of the Basel Convention[1] as Y8 or Y9 wastes. Authorities in concerned countries should control the transboundary shipments of used oil from their country to ensure that environmentally sound management of the used oil is achieved, there is compliance with national and international laws and regulations, and that where possible local management solutions are prioritized and implemented (Section 2).

1.2 Used oil mixing

Used oil can be collected from a range of different sources. At some collection points there is the possibility that different types of used oil and other similar liquids may be mixed, this may result in the used oil being classified as hazardous and not suitable for collection. Section 1 of the New Zealand Code of Practice "Management and Handling of Used Oil HSNOCOP 63" lists those oils which can be mixed [List A], and those substances which cannot be mixed [List B] with List A oils.

1.3 Used oil flash point testing

The New Zealand Code of Practice further states that used oil being collected cannot have any flammable liquid classification under the New Zealand HSNO Act or have a 3.1 D classification (ie a flashpoint between 60° C and 93° C). Used oil collectors must conduct a flash point test or vapour test at each collection point to determine that the used oil to be collected has a flash point higher than 93° C. Used oil that does not pass these tests must be segregated and managed as hazardous waste. It should not be mixed with or diluted with other used oil.

2.0 Transboundary protocols – The Basel and Waigani Conventions

An overview of the Basel and Waigani Conventions and the status of the Parties is detailed on the Basel Convention[2] and SPREP websites[3]. The two Conventions aim to reduce hazardous waste generation and promote environmentally sound management of hazardous wastes, wherever the place of disposal. This is addressed through a number of general provisions

[1] https://www.basel.int/Portals/4/Basel%20Convention/docs/text/BaselConventionText-e.pdf
[2] http://www.basel.int/default.aspx?tabid=4834
[3] https://www.sprep.org/convention-secretariat/waigani-convention

requiring States to observe the fundamental principles of environmentally sound waste management (Basel Convention Article 4). Hazardous wastes may not be exported to a State not party to the Basel Convention, or to a party having banned the import of hazardous wastes (Basel Convention Article 4). Parties may, however, enter into bilateral or multilateral agreements on hazardous waste management with other parties or with non-parties, provided that such agreements are "no less environmentally sound" than the Basel Convention (Basel Convention Article 11). In all cases where transboundary movement is not, in principle, prohibited, it may take place only if it represents an environmentally sound solution, if the principles of environmentally sound management and non-discrimination are observed and if it is carried out in accordance with the Convention's regulatory system.

The regulatory system is the cornerstone of the Basel and Waigani Conventions and is based on the concept of prior informed consent, it requires that, before an export may take place, the authorities of the State of export notify the authorities of the prospective States of import and transit, providing them with detailed information on the intended movement. The movement may only proceed if and when all States concerned have given their written consent (Basel Convention Articles 6 and 7). In the event of a transboundary movement of hazardous wastes having been carried out illegally, i.e. in contravention of the provisions of articles 6 and 7, or cannot be completed as foreseen, the Convention attributes responsibility to one or more of the States involved, and imposes the duty to ensure safe disposal, either by re-import into the State of generation or otherwise (Basel Convention Articles 8 and 9).

2.1 The Basil Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous and their Disposal (the Basel Convention) is the broadest and most significant international treaty on hazardous and other wastes. Its objectives are to regulate international trade in hazardous waste and other wastes, to minimise their generation and transboundary movement, and to ensure their environmentally sound disposal. The Basel Convention was adopted in March 1989 and entered into force in May 1992.

2.2 The Waigani Convention

The Waigani Convention is modelled on the Basel Convention and constitutes the Pacific regional implementation of the international hazardous waste control regime. There are however some differences between the two conventions: the Waigani Convention also covers radioactive wastes; and its territorial coverage includes each Party's Exclusive Economic Zone (200 nautical miles) (rather than extending only to the outer boundary of each Party's territorial sea (12 nautical miles) as under the Basel Convention). **The Waigani Convention bans the importation of Hazardous and Radioactive Wastes into Forum Island Countries, and controls the Transboundary Movement and Management of Hazardous Wastes within the Pacific Region**. The Waigani Convention entered into force in 2001.

Table 1. Conventions ratified or acceded by country

County	Basel	Waigani
Samoa	Yes	Yes
Solomon Islands	Yes	Yes
Tonga	Yes	Yes
Vanuatu	Yes	Yes

2.3 Role of Competent Authorities

All shipments of hazardous waste under the auspices of the Basel or Waigani Convention must have the prior written approval of the countries of export, import and any transit countries. The approvals are managed by the Competent Authorities of the concerned countries. A list of the competent authorities for member countries can be found on the SPREP website[4]. Each Competent Authority shall be responsible for the implementation of notification procedures for transboundary movement of hazardous wastes in accordance with the text of the convention.

Table 2. Competent Authorities

County	Basel	Waigani
Samoa	MNRE	MNRE
Solomon Islands	tba	MECDM
Tonga	MIEDECC	MIEDECC
Vanuatu	DEPC	DEPC

3.0 Transboundary shipment permits

3.1 Notification & Movement Pages

Applications for approval to make used oil shipments under either the Basel or Waigani Convention use a common format based on the Basel documentation format for applications for approval to make shipments. Instructions for completing the notification and movement pages for an application can be found on the Basel Convention website *"Revised notification and movement documents for the control of transboundary movement of hazardous wastes and instructions for completing these documents"*[5]. The validity of an approval is 12 months.

3.2 Contract & transfer of ownership and responsibility

The existence of a valid contract between the exporter and the disposer is required. The point at which the responsibility and ownership of the waste transfers from the exporter to the disposer must be clearly stated in the contract. If an authorized transboundary movement of waste cannot be completed in accordance with the terms of the contract or the convention, the waste is to be returned to the exporter. Alternatively, the importer may, with the agreement of the concerned Parties, arrange for another suitable disposal facility in the import country to manage the environmentally sound management of the shipment.

[4] https://www.sprep.org/sites/default/files/30-SPREP-Meeting/Waigani%20Convention/WC_5.2_Att.1-List_Competent_Authorities_and_Focal_Points.pdf

[5] http://www.basel.int/Portals/4/Basel%20Convention/docs/techmatters/forms-notif-mov/vCOP8.pdf

3.3 Insurance requirements

The Basel and Waigani Conventions require that for any transboundary movement of hazardous wastes there shall be an adequate public liability insurance, bond or other guarantee as may be required by the exporting, importing and any transit Parties. The insurance cover must be appropriate for the type of waste and the amount being shipped, and must be sufficient to cover any incident including personal injury or damage to property, and the cost of remedying all contamination, spillage or pollution caused by a sudden, accidental event. Refer to the guidelines for importing hazardous waste into New Zealand for further details on insurance requirements for transboundary shipments[6].

3.4 Shipping pre-requisites

The Conventions require that the Competent Authority of the export country shall not allow a transboundary movement until it has received written consent for the shipment from the import country and all other concerned transit countries. The shipping company may also impose other controls on the waste substances it may accept for shipment and the packing of the waste, for example most shippers will not accept waste oil in flexi-tanks.

3.5 Environmentally Sound Disposal

Competent Authorities are required to ensure that transboundary shipments are destined for facilities that provide for environmentally sound management of the waste. Parties are required to ensure the availability of treatment and disposal facilities for the environmentally sound management of hazardous wastes, which shall be located, to the extent practicable, within areas under its jurisdiction, taking into account social, technological, and economic considerations. However, where Parties are for geographic, social or economic reasons, unable to dispose of hazardous waste safely within those areas, co-operation should take place between Parties to facilitate the availability of adequate treatment and disposal facilities and to improve and achieve the environmentally sound management of hazardous wastes.

4.0 Packing and documentation for marine shipment

4.1 ISO-Tanks

An ISO Tank is a tank container which is built according to the ISO standards (International Organisation for Standardisation). ISO tanks are designed to transport and store liquids, both hazardous and non-hazardous. They offer a safe and cost-efficient method for transporting used oil. ISO tanks offer the advantage to maximize the volume that can be transported (23,000 litres) in a 20' container footprint. A disadvantage is that if the unit is on hire for an extended term, it must be re-positioned empty for subsequent shipments, therefore shipping cost is potentially doubled.

[6] https://www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Guidance/2e44f5838c/Importing-hazardous-waste-into-New-Zealand.

4.2 Drums and IBCs

Figure 1. UN rating Stamp

Figure 2. Plastic Intermediate Bulk Container (IBC)

Drums used for shipping waste oil must be UN rated and carry the UN stamp (Figure 1). Closed head drums used for liquids are designated UN 1A1. Open head drums used for solids are designated UN 1A2. Drums are usually steel and must be in "as new" condition. Plastic drums may be acceptable provided that they have not been stored outdoors and subject to UV rays from sunlight which may cause deterioration of the plastic.
Wood pallets used for packing drums must carry the ISPM15 stamp[7]. ISPM 15 was developed to address the global spread of timber pests by regulating the movement of timber packing and dunnage used in international trade. ISPM 15 describes phytosanitary measures that have been used and are designed to reduce the risk of the introduction and/or spread of quarantine pests associated with timber packaging material.

Intermediate Bulk containers (IBCs; Figure 2) used for transporting used oil must be in "as new" condition and carry a registration plate that indicates it is certified for transporting dangerous goods. The base of the IBC should be metal, wood bases are generally not suitable. The bottom valve of the IBC must be lockable in the closed position and be fitted with a blanking cap.

4.3 Packing the shipping container

Where 20' general purpose shipping containers are used for the marine transport of used oil, the shipping container must have a valid CSC plate. This is the safety approval plate that contains the main details of the container. The details shown on a CSC plate are as prescribed by the Convention for Safe Containers (1972). Drums should be strapped and/or wrapped to secure them on pallets. Where IBCs are stacked two high the bottom frame of the upper IBC should be secured to the top of the lower IBC using strong cable ties, to prevent movement during shipment. The contents of the shipping container should be strapped or braced with timber to prevent movement during shipment. In particular, the front row of the cargo must be strapped

[7] https://www.mpi.govt.nz/export/timber-wood-products/using-wood-packaging-for-exports/requirements/country-ispm-15-requirements/

or braced to ensure the cargo does not shift during shipment and put pressure on the doors of the container.

4.4 Labelling and placarding

Used oils should be classified under the Environmentally Hazardous Substance class as:

- UN Number: 3082;
- Dangerous Goods Class: Class 9 (Miscellaneous dangerous substances and articles);
- Proper Shipping Name: Environmentally Hazardous Substance, Liquid, N.O.S. (Used Oil);
- Hazchem Code: 3Z (The HAZCHEM Emergency Action Code specifically designed to inform emergency services / fire brigades of actions required).

4.5 Basel/Waigani Movement document procedures

Movement pages must be completed and sent to the Competent Authorities of all concerned countries before a shipment can commence. Instructions for completing the movement page for a shipment can be found in the text for the Waigani Convention Annex VI A[8].

4.6 Shipping documents

The following documents are required for transboundary shipments:

- Container packing lists;
- Dangerous goods declaration;
- Valid notification and completed movement document;
- Transit port approvals; and
- Bills of Lading.

[8] https://www.informea.org/en/treaties/waigani-convention/text

Annex 3 – Nufuels Technology

1.0 Overview

Nufuels Ltd is a wholly owned subsidiary of Blended Fuel Solutions NZ Ltd is a New Zealand owned company. BFSNZ specialises in making fuels fit-for-purpose, and this usually involves blending with other fuels including fossil fuels if this is required. Both are based in Otaki, New Zealand and share an operational site in Foxton.

Nufuels' main focus to date has been the conversion of plastic wastes to a usable fuel using a technology and engineering that can be manufactured locally in Pacific Island countries and transported to small communities. Gaseous and liquid fuels are produced in ratios that can be varied.

Due to the nature of the system and the complexities of storing gas, the gaseous fuel cannot be stored (for example, like a 9kg cylinder is) so must be used as it is produced, although techniques have been devised to store it in containers under a small water pressure that can deliver the gas to cooking elements or a small generator, by providing a buffering effect. The storage time of the gas can be a few hours depending on maximum production and use rates, which means the gas does not have to be used immediately.

The liquid fuel produced from processing plastic is a waxy fuel in the New Zealand winter conditions that applied during a recent inspection on 7 Sep 22, but it becomes thinner in warmer Pacific Island conditions. The fuel from plastic can be used in a rocket burner, designed by Nufuels which can then be inserted into a stove and/or hot water heater. Nufuels has shown through trials that with the introduction of a reflux column and more control it can produce petrol and further gasify 95% of the plastic into petroleum gas. Processing the Used Oil will also produce up to 905% gas, or can produce larger ratios of petrol/diesel like fuels.

The process involves pyrolysis, or heating the plastic in the absence of air, apart from the small amount of air that is trapped in the sealed vessel at the start of the "cook". The process does NOT involve incineration or burning. The sealed vessel is surrounded by a firebox that can be heated using wood or other combustible materials like Used Oil or the wax fuel.

The pyrolysis process operates at around 300-400C and causes the thermal decomposition of the plastics into shorter carbon chain products (liquid and gas) and a small amount of ash remains. Chlorinated plastics such as PVC must be excluded, and sea water salts must be washed off, to avoid the production of dioxins and furans. If PET plastics are processed, then a ratio of PET to polypropylene/polyethylene (PP/PE) must be observed to avoid the production of condensed tarry solids such as benzoic acid that can cause blockages in the pipework.

A Solomon Islands project based on Nufuels technology that was funded by MFAT is described below in Section B. There is also a current UNDP project underway in the Solomon Islands.

2.0 History of the Nufuels Plastic Waste to Energy Programme in the Solomon Islands.

2.1 History of Project Concept

The New Zealand Government Ministry of Foreign Affairs and Trade (MFAT) funded a pilot project delivered by three partners – the Solomon Islands Association of Rural Vocational Training Centres, Nufuels NZ Ltd (the developer of the system) and Caritas Aotearoa who work in the Solomon Islands which took place during 2018-2020. The project was set up to create an incentive/ value for local people to collect plastic waste by being able to easily process the plastics into usable energy in a way that saves them money.

This allows local people to substitute the energy they recover from the plastics for the purchase of gas, or diesel or burner fuel. This energy can be used in homes or cooking huts, to use as heat for small businesses (e.g. drying of foods for markets) or boiling clean water. The gas produced can be used in small petrol generators (e.g. to run lights or electric tools).

As much as possible the build was local with the idea that a small business in partnership with Nufuels in NZ could be created.

Alongside the actual build and costed into the systems is:

- project co-ordination – locals would work along with NZ project members, to identify how the energy could be used. The NZ co-ordinator would work with each community to monitor operator safety and look for wider applications;
- training; and
- a minimum of a year-long commitment from NZ to really get the full benefits from the system. This support in the first year is very important.

2.2 How it Works: The Retort and Condenser

The process used is pyrolysis – the cracking of hydrocarbons in the absence of oxygen. Plastic waste is put into a closed chamber surrounded by a firebox which can be fueled by wood. The process can accept biomass, tyres, used lube oil and plastics coated in aluminium.

A formula of PE and PP plastics to a ratio of PET allows PET bottles to be processed.

The chamber is heated up and the hydrocarbons are cracked turning it into gas. It is not incineration. Depending on the system design, the gases can be flared off directly for heat with a small amount going through a condenser and becoming liquid fuel. If more liquid fuel is wanted rather than mainly gas, then more liquid fuels can be produced.

2.3 Products

Gas with a similar profile to LPG but not liquefied just “PG” petroleum gas is produced, together with a liquid fuel and a very small amount of solid fuel. The current two systems in the Solomon Islands produce about **20%** gas in real time and **80%** waxy liquid fuel which can be used in

burners. The waxy liquid fuel while usable in burners is not easy to use in the oven that has been developed.

Recent development work back in NZ now removes most of the wax and produces a more 'runny' liquid fuel which makes it easier to use in the oven and 'rocket' burner that have also been designed by Nufuels for the community.

The further development work since late 2019 has also resulted in the ability to produce **80% gas** with the remainder a liquid fuel. This gives more flexibility to communities around what kind of energy they want. A flare burner has also been produced which can use the gas to temperatures of up to 800 degrees. As these improvements are developed they will be provided back to the communities who have systems.

At present the gas would be used virtually real time alongside a cook but there is potential to design a simple storage system (under minimum pressure).

With simple adaptations to small petrol generators the gas can be used to produce electricity.

2.4 Unit Design

The unit is designed:

- to be easily transportable, including by small boats. The NZ government who part funded the project for the two systems at Henderson and Munda, was particularly interested that the systems around Munda and places like Gizo could be used to keep the lagoon water clean;
- for easy use by women as well as men; and
- so simple tools can be used for repairs.

2.5 Rocket Burner and Oven

The rocket burner and oven were developed by Nufuels to provide options for using the energy for households' end use, or small businesses. This simple burner was developed from adapted disused LPG bottles to take either the waxy liquid fuel or a dripped fuel into the burner. These items can be built locally.

2.6 Environmental and Health Impacts and Benefits

2.6.1 Waste Diversion

The current adopted design delivers the following waste diversion results[1]:

- One system can deliver between 2 cooks per day, each taking about 120 minutes (followed by a cool down period);
- Each cook will process 5-6 kgs of soft plastics and about 2-3 kgs of plastic bottles, or up to 21 kgs per day. Measurement by volume can be undertaken but is less useful as compression will vary;
- On average each person from a low-income household in Honiara produces about 0.1 kgs of plastic per day, or 36.5 kgs of plastic waste per year. Honiara City Council

Waste Characterisation Study 2011 and National Waste and Pollution Control Strategy 2017-2026; and

- One system will remove the following waste quantities annually from the environment under low, medium and high use scenarios:

Table 1: Waste Diversion	
Use Scenarios	Annual Waste Diverted (kg)
Low (I daily cook)	1827
Medium (2 cooks)	4382
High (3 cooks)	7665

One system will divert the household waste of the following number of households:

Table 2: Household Waste Diversion		
Use scenarios	Number of households with full plastic waste diversion (Average Household size [1])	Number of low-income households with full plastic waste diversion[1]
Low	11	9
Medium	23	18
High	35	26

These metrics are calculated using Honiara City waste data which identified approximately 0.86kg of waste per capita per day overall. Low-income households generate about 0.81kg. Of this about 12% is plastics. Per capita and household waste produced is likely to be lower in provincial communities. These smaller communities will also have commercial and some small-scale industrial waste plastics which these systems can also process. A key issue will be processing waste plastic washed in on ocean currents.

Note: the current design may be adapted in the future to perhaps take up to 10-12 kgs per cook.

2.6.2 Waste Management

Plastics do not have to be clean or sorted but if retrieved from the sea or beaches a simple wash down in the rain to remove salts is required. .

- The systems can be used for people to revisit into old dump sites and clean up plastics – e.g. at Ranadi tip or illegal dump sites.

2.6.3 Emissions and Climate

The energy produced is still from fossil fuels so there will continue to be impacts.

- The benefit lies in the fuel substitution which avoids greenhouse gas emissions associated with oil extraction, transportation to the Solomon Islands etc. A net 20% reduction is estimated;
- The technology can be used for other sources, e.g. used oil and biomass such as copra waste; and

- Discharge of toxic gases and particulates are avoided from burning of plastics as a disposal method.

2.6.4 Nature of Emissions

- There are emissions from the wood fuel charging the retort, similar to any wood fire. The emissions from the fuel produced have a similar profile to LPG or natural gas, and diesel/ kerosene like fuels. These have been independently tested in New Zealand against New Zealand discharge to air standards. That data can be provided;
- The combusted gases burn cleanly with no particulates at temperatures rising up to 500-800 degrees Celsius; and
- There are health benefits from avoided exposure to the burning of plastics.

2.7 Social and Economic Benefits

A simple calculation of the value of the energy as a substitution fuel is shown below. The tables are based on a 20% gas production rate: with recent improvements up to 95% gas production rate can be achieved. It shows the benefit from imported fuel substitution – through measurement of recovered energy (liquid and solid) generated per annum, and the net of energy used to power on-going batch pyrolysis.

The table below shows the conversion of the annual energy produced relative to standard purchasing units for four energy types (LPG, diesel, kerosene and wood) across the three cook scenarios. In effect this illustrates the level of substitution for commercial fuels that is achievable from one system.

Table 3 - Annual Energy Produced by One System Calculated as Substitute Energy Type – Usual Unit of Purchase

Substitution for Commercial Fuels for One Year				
	LPG No. of 9kg gas bottles	**Diesel Litres**	**Kerosene Litres**	**Wood No. of 6kg bundles**
Cook Scenarios				
Low (1 cook per day)	141	1,352	1,339	623
Medium (2 cooks)	338	3,244	3,214	1,496
High (3 cooks)	591	5,678	5,625	2,618

The substitution value for wood is shown as an example and for information. However, the focus in the pilot is on substitution of liquid fuels and gas.

The table below shows the potential income arising from fuel substitution from one system, under the more conservative processing scenarios. Whether this is realized as avoided energy costs or as revenue from fuel sales will depend on decisions by communities as to how they want to use the fuel and disperse the benefit.

Table 4: Financial Value of Annual Energy Produced buy One System Expressed as Energy Type (Usual Unit of Purchase) - SD$ (2019)				
	LPG No. of 9kg gas bottles	Diesel Litres	Kerosene Litres	Wood No. of 6kg bundles
Cook Scenarios				
Low (1 cook per day)	$21,095	$11,439	$10,995	$93,572
Medium (2 cooks)	$50,627	$27,452	$26,388	$224,573
High (3 cooks)	$88,598	$48,042	$46,179	$393,002

Benefits are potentially greater in rural locations due to the higher cost of fuel.
This has the potential to be used as a proxy for calculating direct financial return on investment. (NB It does not include any multiplier effect from the energy use – e.g. use in small business development.)

It also indicates a significant financial incentive for people to be involved in collecting and processing waste – which would also avoid the need for a collect and transport system.

2.8 Usefulness in Outer Islands

The central idea of this concept and programme is that small local and remote communities are self-sufficient in converting their plastic, used oil, tyres (if any), and biomass to usable energy locally. (Nufuels is passionate about the idea of dispersed waste recycling and resource recovery systems which avoid collection and transportation costs and complexities).

The units can be used locally with the benefits going back to the local communities. For example, the heat from a system could be used to melt tin cans and even create new objects from them, or to process food, or reduce the energy costs of the local Rural Training Centre, or produce electricity on a small scale.

The idea is to avoid the need to collect and transport the waste over any distance. The systems themselves can be transported on the back of a truck or by small boat to other communities so that any local village-based waste can be processed. They can also be transported to areas where there is significant marine pollution.

The model we were working to before Covid 19 was to get local businesses (e.g. tourism businesses at Munda) to help with the transportation of the system between communities, but there are other ways of making this happen.

The key thing for each remote community or grouping of communities is to have a waste stream size that makes processing on a regular basis worthwhile. Other waste streams can also be included. Very small communities who produce little plastic or other waste may not benefit to the same degree from systems of the size designed here. However, building smaller systems – as small as a large cooking pot, may be useful.

3.0 UNDP Small Projects Fund Initiative 2021-2022 Solomon Islands

3.1 Project Description

The project provides:

- the build of three community scale systems in a Nufuels partnership with the Design and Technology Centre, Henderson. Nufuels supplies some materials not obtainable in Honiara and works with the Centre to develop other waste minimisation and recycling initiatives.
- three systems being deployed to:
  - St Martin's Rural Training Centre (RTC) Honiara, Guadalcanal
  - Kaotave RTC, Guadalcanal
  - Divit RTC, Visale, Guadalcanal
- 6-9 months of training and community liaison to embed the systems in community management and optimise the energy returns and benefits for each community.
- working with St Martin's and Kaotave trade skills teachers and students to have them build the simple rocket burners and ovens/ water heating system which can use the waxy crude created by the cooks.

3.2 The Concept

- create a simple technology which can recover usable energy from the waste plastic using a process called pyrolysis (see background sheet);
- design the technology so it can be used by women as well as men and is easily moved;
- provide communities with this technology to extract the energy from the plastic;
- help combat poverty by households/ organisations substituting this recovered energy for purchased fuels;
- help create local jobs building the systems and using the recovered energy – e.g. food drying for sale; and
- help reduce green-house gas emissions by using this recovered energy (20% reduction over standard fuels due to fuel substitution.

3.3 How the Project is Organised and Funded

The project is funded by the UNDP Small Projects Fund and delivered via a partnership between Nufuels Ltd (technology developers and project management) and the Solomon Island Association of Vocational and Rural Training Centres (SIAVRTC – financial administration and liaison with key stakeholders):

- build of systems in Honiara undertaken by the Design and Technology Centre, Henderson, Honiara (delivery partner with Nufuels Ltd);
- three days intensive training for each community delivered by Lindsay Teobasi, previous coordinator in 2018 pilot project; and

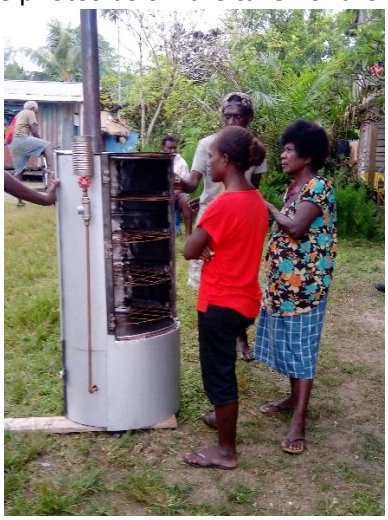
- on-going community engagement, monitoring and training via contracted community coordinators based in Honiara and Munda working with three communities and two other communities with existing systems.

3.4 Progress to Date

The project started in July 2021 and since then:

- there have been some delays due to Honiara riots and subsequent impacts of Covid 19;
- the build of systems completed and systems tested and commissioned by early April 2022; and
- training and roll-out to RTCs are completed, co-ordination and liaison on-going.

The photos below are taken of the Solomon Islands work.



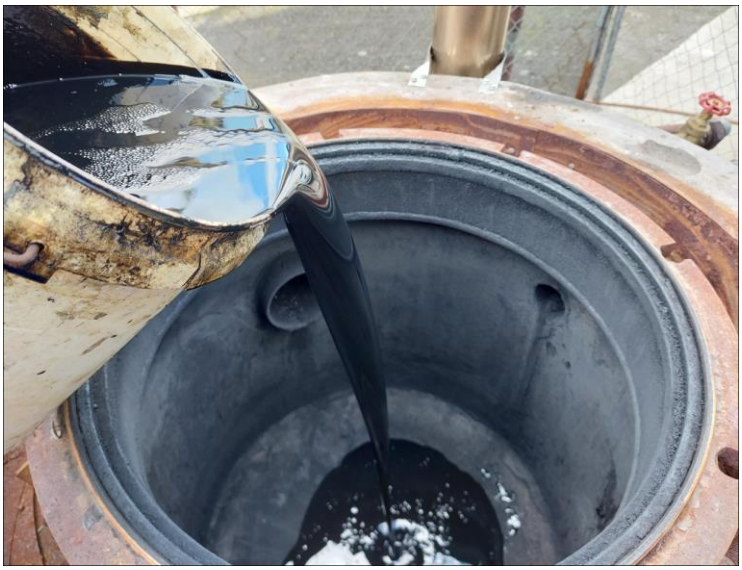
Pyrolysis Retort on right built in Honiara; Rocket Oven on left.

4.0 Visit to Nufuels in New Zealand on 7 Sep 22

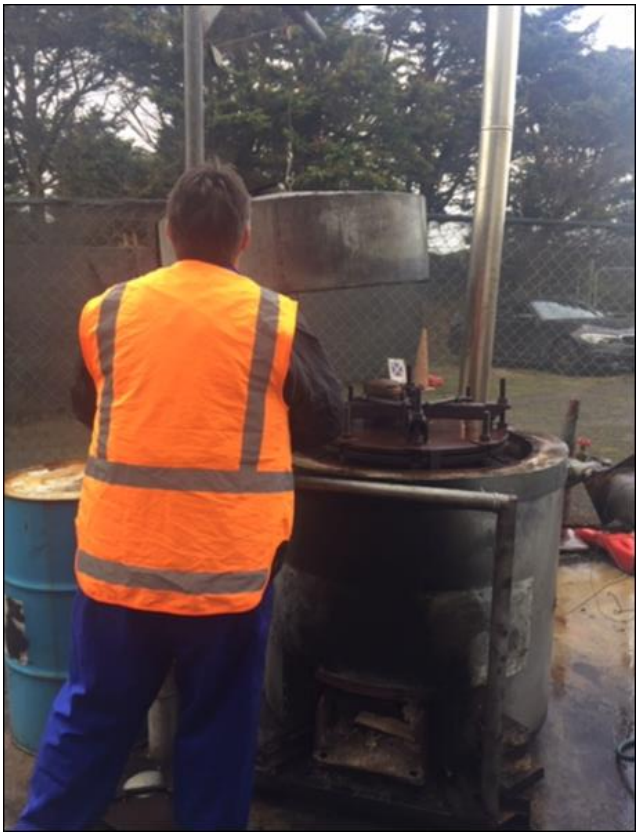
4.1 Visit Description

The visit on 7 Sep 22 to the Nufuels operational site at Foxton (by John O'Grady and others) was to assess the technology for processing Used Lube Oil (ULO). A "cook" of used oil was carried out over a two-hour period as demonstrated by the following photos. A small amount of a gaseous product was also produced that was burnt on a cooking ring. As with the plastic, the incorporation of a reflux column and more control in trials has shown Nufuels can gasify the ULO into usable petroleum gas which can be used for heat (flame) and used for spark ignition generators.

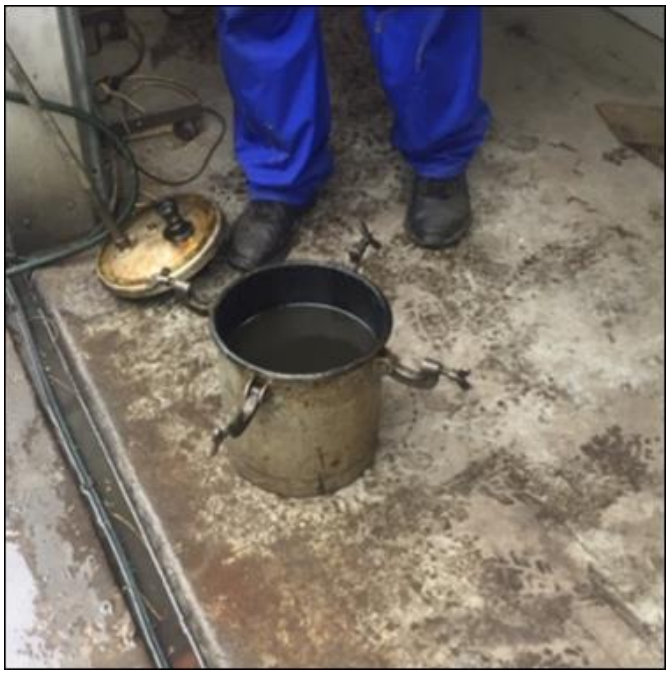
The photos below were taken from the visit on 7 Sep 22.



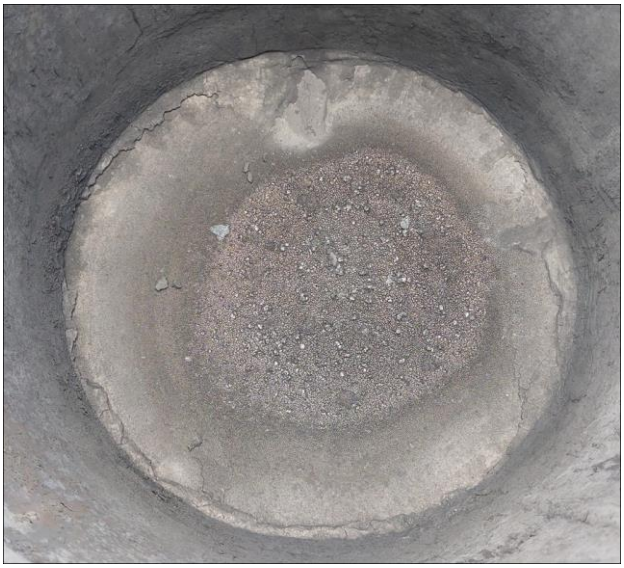
Used Oil Poured into the Pyrolysis Unit



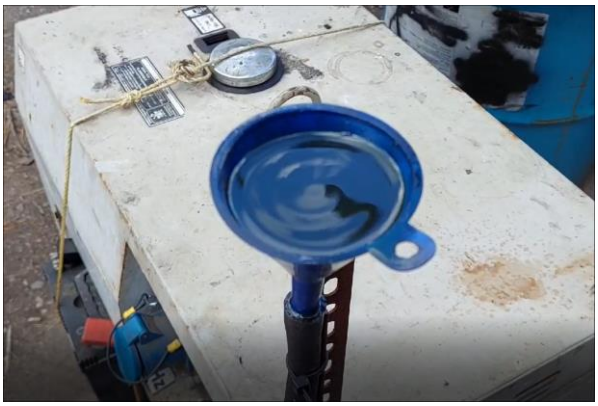
Lid Placed on Pyrolysis Unit



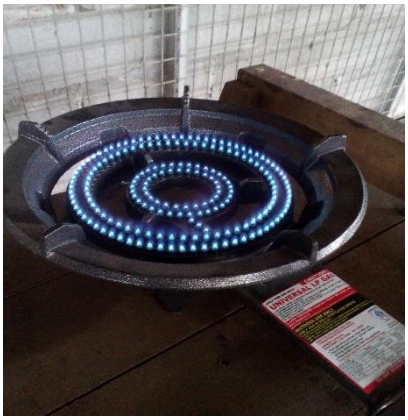
Liquid Fuel (diesel type distillate) Product from the Cook



Residual Ash after Cook (approx. handful)



Liquid Fuel Product Operating Generator



Gas hob burning gas produced

Nufuels also demonstracted straight ULO being used as an input energy to the pyrolysis process, and also input into a water heater.

4.2 Matters Demonstrated in Visit

The visit thus proved that:

- Used oil can be converted by the pyrolysis process into a usable fuel. The fuel (unfiltered) looked like diesel – darker than diesel but perhaps a little lighter in viscosity.
- The diesel ran a small generator for quite a while with no obvious problems. It could run other diesel engines like tractors and excavators with older style injection systems.
- A useful gas was also produced that can be stored under low water pressure for a few hours and used to cook meals or heat water, or gas generator.
- A small amount of ash was produced that could be landfilled.
- The scale of demonstration was quite small – about 8 litres of used oil. This was simply transferring the same kgs of plastics as a starting point for ULO as a relative comparison.

The Nufuels team advised, however, that they will be upping the volumes in stages to 35 litres per cook batch as at 4/2/23.

- There is potential to increase the overall retort capacity with R & D with a goal of increments of 50, 100, 150, to 200 litres capacity for a similarly simple system.
- Nufuels also has expertise in ULO collection, storage, processing and safe efficient combustion of ULO for heat for larger volumes.

4.3 Conclusions from Visit

a) Based on the findings above, the Nufuels process can readily convert used oil into two very usable fuels – one liquid and one gas.
b) The process can also be set up locally without too much difficulty, and the liquid and gas products can also be easily used locally, allowing for significant cost savings although some fuel is needed to fire the pyrolysis unit. ULO can be used as an input energy to run the initial process.
c) More investigation is needed to establish the fuel use and the costs of local set-up, and also the training needed, for the conversion of used oil. Costs of a system, building, training and roll out will be very similar to the cost of a system for plastics processing and data can be provided.
d) More information is also needed on the feasibility of scaling up the process so that much larger quantities of used oil can be converted using the pyrolysis process.

Annex 4 – Minutes of the Draft Management Plan Workshop with Key Stakeholders

2021/064
AP_6/15 – Technical assistance to conduct a feasibility study and develop a National Used Oil Management Plan for Samoa, Solomon Islands, Tonga, and Vanuatu.
Memo:
Subject: Minutes & Notes from the draft Management Plan Workshop held Thursday 16th March 2023 at 9.30am (S.I.T.)

Present at MECDM offices in Honiara:

Name	Organisation	Contact details
Wendy Beti	ECD/MECDM	WBeti@mecdm.gov.sb
Karl Kuper	MECDM	KKuper@mecdm.gov.sb
Emanuel K	Customs	
Pauline Faye	AFD	
Julie Pillet	SWAP/SPREP	juliep@sprep.org
Anthony Taoluli	SPREP	anthonyt@sprep.org
Belinda Manakera	Nat Fisheries Development	bmanakera@nfd.com.sb
John Sa'ohu	National Regional Hospital	JSaohu@nrh.gov.sb
Lindsay Teobasi	Design & Technology Centre	Lindsay.Teobasi@gmail.com
Mathew Walekoro	MNPDC	MWalekoro@mnpdc.gov.sb
Joseph Maeke	MNPDC	JMaeke@mnpdc.gov.sb
Gaby Galokale	Solomon Power	Gaby.Galokale@solomonpower.com.sb
Christian Siota	Solomon Power	Christian.Siota@solomonpower.com.sb
Ishmael Iro	Solbrew	
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Diana Vasula	SIMA	
Ashley Vasula	SIPA	avasula@sipa.com.sb
Methoda Ifuimae	MOH	MIfuimae@moh.gov.sb
Bobby Patterson	MOH	BPatterson@moh.gov.sb
Andrew Nixon	HCC	andrewnixon030@gmail.com
Henry Tobani	Independent Environment	
Silas Kitotu	GRML	
David Natogga	MMNRE	DNatogga@mmere.gov.sb
Joshua Kera	SIWA	jkera@solomonwater.com.sb

Present by Zoom in New Zealand & Australia:

Name	Organisation	Contact details
John O'Grady	Araspring (Project team leader)	jogrady@actrix.co.nz
David Haynes	Araspring (Project team consultant)	goingtroppo@y7mail.com
Boyne Drummond	Araspring (Project team consultant)	boyne@popservices.co.nz
Leigh Ramsay	NuFuels	leigh@bfsnz.net

Present by Zoom in Solomon Islands:

Name	Organisation	Contact details
Gaylyn Puairana	Araspring (Project team consultant)	gayepuai13@gmail.com
Isiah Alepio Soltuna		jalepio@soltuna.com.sb
Toswell Kaua	Energy Division MNERE	TKaua@mmere.gov.sb

Session 1:

The Workshop Facilitator Boyne Drummond opened the workshop with a welcome in Te Reo and English.

Mr Karl Kuper, Deputy Secretary Corporate, MECDM, welcomed participants to the workshop. Mr Kuper expressed his appreciation to the stakeholders for the attendance and he thanked the French Development Agency AFD for their funding which makes the project possible. He also thanked SPREP for their support.

Mr Kuper noted the Honiara used oil project aimed at collecting used oil in co-operation with SOE's and the private sectors. Mr Kuper concluded by thanking those present, and noting that the government look forward to solutions for managing used oil being identified by this project.

Session 2:

a). Wendy Beti – MECDM. Linking the National Programme with the SWAP Project.
Wendy spoke to a powerpoint presentation which covered the following:

- Overview of National Programs & Priorities – Environment Act 1998.
- Overview of National Programs & Priorities – National Waste & Pollution Control Strategy 2017 – 2027.
- Overview of National Programs & Priorities – Role in Emergency Response & Role in Maritime.
- Policy & Legislations related to Waste Management & Pollution Control.
- Linkages between National Program & SWAP Projects – Including Used Oil.
- Linkages between National Program & SWAP Projects – improving sanitation.
- Environmental, social & economic conditions in PICTs through proper waste management.

b). John O'Grady – Facilitator. Outline of the draft Used Oil Management Plan
John spoke to a powerpoint presentation which covered the following:

- What is used oil
- Why is used oil a problem, including some photos of polluted sites
- Some current issues including acceptable uses and environmentally unacceptable uses
- Reviewing the objectives of the SWAP programme
- How much used oil is assessed to be in the Solomon Islands
- Best practices for used oil collection, suitable types of containers, drop-off points
- Best practices for used oil transportation
- Best practice for used oil bulk storage
- Local collection containers – strong double skinned plastic tanks
- Public Drop-off centres, typical layouts
- Best practice disposal options for Solomon Islands

- Local industry disposal options
- Best practice for waste oil exports
- Best practice financing and an Advanced Disposal Fee levied on imports
- A model flow diagram for sustainable funding
- Disposal of used oil in storage (stockpile)

Session 3:

a) Boyne Drummond – Facilitator. Outline of the draft Used Oil Management Plan
Boyne spoke to a powerpoint presentation which covered the following:
Introduction to the draft Used Oil Management Plan

- Outline of the SWAP Program and AFD funding.
- Management Plan Purpose
- Role of the Solomon Islands Government
- Regulatory Framework
- Legislation Required
- Establishment of Implementing Agencies
- Role of the National key stakeholders

b) Boyne noted the number of actions that need to be completed to ensure Solomon Islands manages used oil appropriately into the future. These are set out in the **Feasibility Study**[1] and are summarized within the following 9 recommendations:

- **One**. Implement the necessary legislation to give effect to the Used Oil Management Plan and Strengthen the capacity of MOFT to collect accurate lub oil import data from all importation points.
- **Two**. Establishment of the National Used Oil Management Steering Committee and Duplication of the Honiara Pilot in other provincial centres:
- **Three**. Identify suitable locations and establish Used Oil collection Points.
- **Four.** Best practice Sustainable finance - collection of an Advanced Disposal Fee (ADF) on all imported lubricant products. Best practice Sustainable Finance Model (estimated cost in SB Dollar) for offshore disposal options – Australia, India, New Zealand
- **Five.** Undertake a one off export shipment of used oil to alleviate any stockpile issues.
- **Six.** Implement a pilot programme of the Nufuels technology in remote provinces.
- **Seven**. Examine local treatment options:
- **Eight.** Recommendations for Training.
- **Nine.** Improved Staffing levels.

c) Boyne then outlined the Goals of the **Draft Management Plan** and **Critical Actions** required to achieve these Goals. He noted that a review and revision of the Solomon Islands National Waste and Pollution Control Strategy 2017 – 2026 will be required.

The following points were noted as Critical Action Activities:

- Establish the Legislative framework to establish and implement the used oil management plan. Appropriate rules, standards and safeguards are established for handling, collection, transportation, storage, and disposal of used oil.

[1] AFD/SPREP Feasibility Study 2022: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

- A National Used Oil Management Steering Committee is established.
- Used Oil Management Agency is established.
- Collection of an advanced recycling fee (ADF) to fund used oil management is set up.
- Key Stakeholders are identified and encouraged to join the programme.
- Local Options for treatment and disposal of Used Oil are Established. Options were discussed in the Feasibility Study[2].
- A Contractor is appointed by the Used Oil Managing Agency to undertake collection, transport, and storage of used oil.
- A Public Education programme is developed and implemented.
- Activities of the Managing Agency and the national contractor are audited annually.

Session 4 – Questions & Answers:

Q 1. From Solomon Power, Comment on the takeback programme that they operate with South Pacific Oil. Answer, from Boyne, yes, the consultants agree that the takeback programme that Solomon Power has with SPO appears to work well. Where a lub oil retailer can sell the new oil and take back the used oil this is a good model programme. Generally it can work across all sizes of retailer business, provided they have suitable facilities to store the takeback used oil.

Q2. From Leigh, Nufuels. Leigh made a comment about the value of used oil. Used oil should be seen as a valuable resource that can be beneficially reused for other purposes such as a fuel. It should not be seen as a useless waste to be discarded and dumped. There can be risks with badly managed stockpiles of used oil, but equally there can be risks with exporting used oil. Exporting gives away a valuable resource which should be used in country wherever possible. Boyne also commented that as a party to the Basel Convention, Solomon Island is obliged to manage its own waste in country unless it is not possible to do so.

Q3. Henry expressed concern about who to reach out to small operators in the Honiara area. Answer from Boyne. The answer lies in setting up workable legislation and regulations, which are then implemented by trained compliance officers who work in the community to ensure compliance with the regulations. They also educate the community on proper used oil management practices. John added that a very important point is to make the collection easy, by setting up readily accessible drop-off points for the public to use.

Q4. From Lindsay Teobasi. Seeking further information about slide 18, local treatment options. Boyne Explained the capabilities of the Chinese Yenung filter plant that is detailed in the Feasibility Study[3]. He spoke about the use of this type of plant for filtering transformer oil, and its possible application in Solomon Islands. Boyne also noted that the PacPlan pyrolysis unit being proposed by SPREP will be included in the final Management Plan.

Q5. From Tony Talouli, SPREP. Tony asked about the 50,000 litres currently stored at SPO. Boyne confirmed that this is the stockpile referred to in the Feasibility Study. He also

[2] AFD/SPREP Feasibility Study 2022: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

[3] AFD/SPREP Feasibility Study 2022: https://library.sprep.org/content/contract-conduct-feasibility-study-develop-national-used-oil-management-plan-solomon

commented that he has been in contact with SPO as a separate exercise from this project to offer SPO a plan to export their stockpile to NZ from recycling. Tony asked for clarification of the Slide 11 spreadsheet. Boyne explained the costs of the options. Tony noted that this provides a starting point for the Steering Committee when considering the Advance Disposal Fee.

Q6. From Diana Vasula- SIMA. Commented that SIMA have recently established a fee structure for accepting wastes from vessels entering Solomon Island ports. Boyne commented that these wastes are covered by the Marpol Convention. Boyne also noted the used oil from marine vessels (ships slops) can have high water content and be very difficult to treat.

Q7. Ashley from SIPA commented that SIPA has a pollution levy which is paid by all vessels entering S.I ports. This levy provides a fund for dealing with oil spills and marine pollution.

Q8. Ashley commented that Solomon ports are not taking quarantine waste from international vessels. There is no organisation to deal with used oil in country. Operations charge environmental fees on international vessels. Booms are available for dealing with oil spills. Ports have a bio security waste incinerator which is powered by electricity and diesel. Not using the incinerators due to high cost of fuel and the electricity and also technical reasons.. Not being used for technical reasons. Also mentioned that the used oil incinerators at Noro are not being used. *[Matters for the steering committee to address BHD]*

Session 5:

John O'Grady updated progress on the project and the timeline to completion.
The Solomon Islands Used Oil Management Plan (UMOP) is well advanced, and the final draft will be ready in April 2023.

Vanuatu draft UMOP is in progress and will be completed before John's trip to Dubai in late April for the Sun Petrochem audit. The draft UMOP when ready will be circulated to key stakeholders prior to the UMOP stakeholders' workshop, which is scheduled for late May.

The Tonga UMOP has been delayed due to recent natural disasters. John aims to have the draft UMOP ready for circulation to key stakeholders prior to the trip to Dubai in late April for the Sun Petrochem audit. The UMOP stakeholders' workshop is schedule for mid June when John is in Tonga for a SPREP asbestos project.

The Samoa draft UMOP is completed and ready for circulation to key stakeholders prior to the UMOP stakeholders workshop, which is scheduled for early May.

Final reports are on target to be completed before the project completion date which is 30 June 2023.

Julie commented on the Sun Petrochem audit and stated that SPREP is concerned to ensure that Sun Petrochem is a safe and environmentally sound option for managing used/waste oil from Pacific Island countries. Feedback from the audit can be added into the UMOP's for each country.

Session 6: Any other Questions.

Q 10. Edward from Solbrew asked about the costs on the proposed ADF for funding the programme. Boyne explained the ADF and the way it is intended to work. He noted the similarity to proposed schemes for funding the collection and recycling of plastic bottles which is another example of a user pays scheme. The programme has to be funded and the logical way is to levy a cost on the sales of new oil which when it reaches the end of its working life becomes used oil.

Q 10. Thomas from private sector. Concern about the increase of price on new luboil. Boyne replied that the ADF could be spread over all fuels, including petrol and diesel. This would significantly reduce the impact of the cost of new luboil. This is why a multi - agency approach is required when the steering committee looks at the options for the ADF. The ADF is a critical element of the programme and it has to be set up at the front end. John added, the fees that advanced or recycling fee was calculated if organizations like ADF are serving

Q.11 From SPO 50,000 litres stockpile. Used oil is commonly reused in daily life in Solomon Islands. Sawdust control which only appears once. There are lots of unsealed tar roads. Used oil can use in the unsealed tar roads in country instead of exporting the used oil. Is there any technology or best practices to use used oil on tarsealed roads? Boyne commented that he is not aware of any where that used oil can use as bitumen.

Q. 12. Comment. There being no more questions at this time, Boyne raised the issue of possible legacy problems that may arise with fuel oil escaping from rusting tanks in WWII sunken warships in Ironbottom sound. He mentioned the issues that have been experienced with similar wrecks at Chuuk Atoll. Some very approximate quantities were estimated in Section 7.6 of the Analysis Report.

At this time the workshop was completed. On behalf of the MECDM, Wendy Kereseka spoke and thanked all participants for attending the workshop, both those online and those who attended the MECDM offices. Debra also thanked SPREP for their participation and support for the project, and again all the stakeholders for their contribution to the workshop and the project and encouraged stakeholders to provide more feedback for the draft management plan during the next week or so.

Mr Tony Taoluli From SPREP thanked Wendy and Debra and the Solomon Islands government for organizing and hosting the workshop. He also thanked John and Boyne for Facilitating the workshop. He noted that this project is the forerunner leading to a system change in the way that Solomon Islands manages its used oil, and the work undertaken in this project will provide a model for other improvements in the way that Solomon Islands manages its waste and its environment. He further noted the advantages that putting in place policies and fees to cover the costs of the programme and the need for the management system to cover the full life cycle of the used oil. Tony also thanked the AFD for their assistance and support to make this project possible.

Ms Julie Pillet thanked the stakeholders for their participation in the workshop and noted that she was happy with the progress of the project so far. She thanked all those involved in the workshop.

John thanked the stakeholders for their participation in the workshop, and noted that from the consultants' point of view, it has been a great project to be part of.

The workshop then concluded with a prayer and lunch.