

Recycling oil for profit in Western Samoa



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Aegis Oil

photo: SPREP

The problem

Pacific island environments are threatened. Development and growing reliance on imports is increasing the waste produced on our islands. More industry and mechanisation means more engines, and this means more waste from those engines and machinery.

Waste oil is particularly difficult to dispose of. If it remains on land, it can directly harm animals and plants. It can also introduce toxic chemicals into the soil, which can indirectly harm plants and animals in the food chain.

Land is another problem. As most Pacific island communities only have limited land areas suitable for dumping, waste oil from growing industrial activities can quickly fill these dump sites. This can lead to oil dumping in places that can harm us, our environment and the natural resources that we rely on for food and drinking water.

Dealing with the problem

Recycling this oil is one way of dealing with this problem. Western Samoa produces about 20,000 litres of waste oil annually from transmissions, hydraulics, sumps and brakes. This can all be processed in a relatively simple plant now running in Western Samoa.

Waste oil is picked up from government departments and workshops such as the national electricity authority and public works; and private businesses, such as mechanical workshops and engineering firms. Private individuals can also leave their waste at the plant.

The plant can use many types of oil - sump, hydraulic and transmission. These can be mixed together and processed.

Waste oil is delivered to the factory (right) or collected in drums supplied by Aegis Oil.

photo: SPREP



Recycled oil is sold from the factory (left), or from retail outlets.

photo: SPREP

The process

Diagram 1 shows the process, which relies on heating, cooling and filtration to separate impurities from the waste oil to produce a base oil.

The steps in the process are:

1. Remove Water

The first job is to remove any water that may be in the oil. Water is a constant problem - if it is not removed, it causes problems in the processing by building up excessive steam pressure in the various heating processes. This is done by a simple *water trap*, with the remaining water boiling off as steam in the *dehydrator*.

2. Remove liquid impurities

Next, we take out all the liquid impurities in the waste, such as paint thinners, diesel, petrol and kerosene. This "crude" oil is heated to 200°C in the *dehydrator* and impurities are condensed as a distillate.

These collected fuels are recycled into the plant's diesel tank to provide heat for the plant processes. This saves on some of our fuel costs for the plant.

3. Neutralise any noxious fumes

Fumes, mainly containing sulphur, are produced from the distillation process. These are removed in the *scrubber tank* and the simple *scrubber towers*. Gases from the dehydrator are piped to the base of the first scrubber tower, which is filled with waste PVC piping, and water trickled from the top of the tower.

Tony shows the condenser system. The scrubber towers behind him are filled with scrap PVC piping, and filter out any noxious gases.

photo: SPREP

As the gases and water mix in the tower, sulphur and other noxious compounds are dissolved in the water, which is continually recycled through the towers, with excess fumes going back into the plant's *condenser*.

The result from the towers is a harmless exhaust gas.

4. Remove solid impurities

The processed waste oil is then heated to 300°C and treated with sulphuric acid in a *acid treat tank*, and then pumped to an *acid settle tank*. This cleans the oil of metal filings, dirt and other heavy impurities, which fall to bottom of the tank and form a *sludge*. The sludge is neutralised using slaked lime from a nearby industrial gas company.

This tar-like sludge is then used by the Public Works Department in its road building programme. The sludge can also be used in concrete work.

5. First filter

The partly-cleaned oil is again heated in the *bleacher vessel*, and mixed with imported diatomaceous earth. This oil is then reheated and kept at temperature for 3 hours, and then pumped to a *clay settle tank*.

6. Heavy filter

It is then cooled to 140°C, and fed by gravity through a *filter press*. The result is a clean *base oil*.

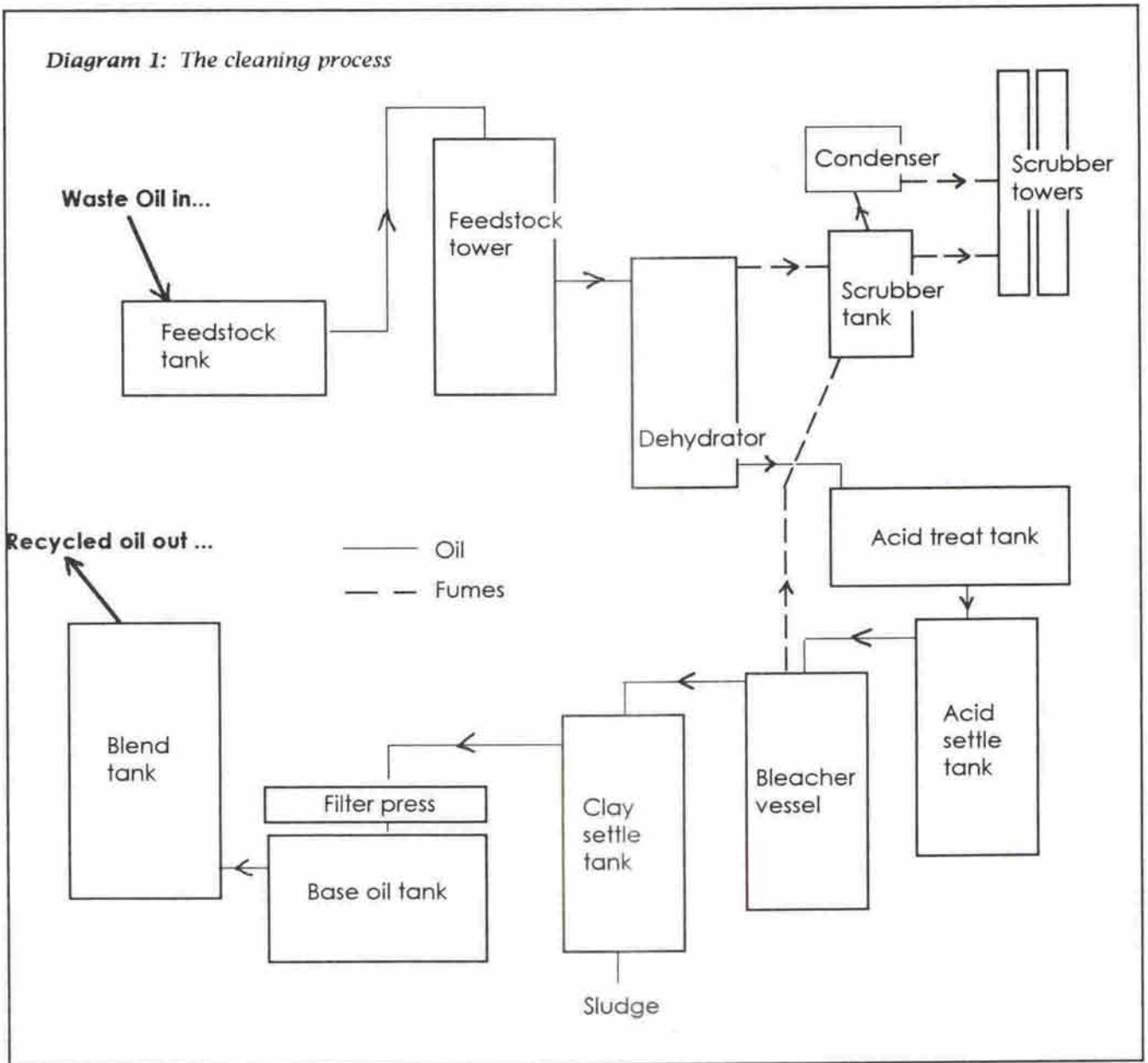


The sludge from clay settle tank (left) is used in a local road-building programme. The filter press (right) produces the base oil.

photo: SPREP



Diagram 1: The cleaning process



7. Testing

All oils are tested in a *on-site laboratory* for viscosity and density, and decisions are made about blending the oils produced and the additives needed to produce high quality oil products.

8. Blending

Chemicals are added to this base oil to produce various oil products such as *engine oil*, *transmission oils*, and *hydraulic oil*. These are then packaged for sale from the factory and at local retail outlets.



The quality of the base oil is checked at the factory.

photo: SPREP

A profitable enterprise

The table below shows the cost of producing 20 litres of standard motor engine lubricant.



Production Costs:

Item	WST ¹ /batch ²	WST/drum ³
Labour	20.00	
Electricity	25.00	
Clay	420.00	
Diesel	89.00	
Sulphuric Acid	298.00	
Total Cost of Base Oil	852.00	2.84
Additives ⁴		21.93
Container and label		5.15
Labour		0.30
Delivery		1.00
Total Cost		WST 31.22 (US \$12.49)

Note: ¹ Western Samoan tala
² one "batch" produces 6,000 litres of base oil
³ one drum holds 20 litres
⁴ to produce SAE 30 motor oil

Aegis Oil Samoa produces a range of oil-based products by blending recycled base oil with chemical additives.

photo: SPREP

The unique recycled plant

The plant itself is a good example of recycling waste materials. Some parts of the tanks were built from discarded pipes at a hydro-electric power plant, while those containing heat and pressure were once steam boilers from a tuna cannery and the national hospital. A heavy roller in the scrubber tank is a former front wheel from a road compactor.

Maintenance

As we built the plant, we know how it works and can troubleshoot any problems that may arise ourselves.

The future

Marketing is a major problem. People must be educated to see the value in saving all waste oil and recycling it so it is a local, reuseable product.

If we look at importing from other Pacific island countries, it must be in safe containers, and should not contravene any international convention, such as the Basel Convention, or any proposed regional treaties.

Our small islands can no longer afford to keep importing materials and buying in goods that generate waste, the type of waste that we cannot get rid of cleanly.

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