Good Practices for Solid Waste Management in the FSM

2015

FSM OEEM in collaboration with State EPAs/KIRMA and J-PRISM, Vol. 1

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J-PRISM'S presence in the FSM

The Secretariat of the Pacific Regional Environment Program (SPREP) and the Japan International Cooperation Agency (JICA) have been working together since 2000 providing technical and financial assistance to member countries in the area of Environment. The development of the Pacific Regional Solid Waste Management Strategy is one of the achieved products of the joint assistance of SPREP and JICA.

More importantly, JICA launched a regional project entitled, "The Japanese Technical Cooperation for Promotion of Regional Initiative on Solid Waste Management" (J-PRISM) in Pacific Island Countries in February 2011 after member countries requested for continued assistance with Japan. The overall goal of the project is to enhance sustainable management of solid waste in the Pacific region, with the purpose of strengthening human and institutional capacity base for sustainable solid waste management in the Pacific Region through the implementation of the Pacific Regional Solid Waste Management Strategy.

J-PRISM's objective is to develop and increase the capacity of member countries as a whole through the implementation of priority actions in order to address solid waste management issues.

As of April 2012, the total budget of J-PRISM was 940 million yen, which is approximately 11 million dollars.

There are eleven member countries which include Federated States of Micronesia, Republic of the Fiji Islands, Republic of Kiribati, Republic of Marshall Islands, Republic of Palau, Independent State of Papua New Guinea, Independent State of Samoa, Solomon Islands, Kingdom of Tonga, Tuvalu and Republic of Vanuatu.

Through the J-PRISM program, improvements in solid waste management areas have progressed especially in dumpsite management, collection and disposal, development of strategic plans, and solid waste awareness.

Good Practices in the FSM

DIRECTOR'S MESSAGE

This booklet serves as a testament of the states' efforts in promoting good waste management practices. It is one which will be part of a series of exchange of information for all levels of government and the general public.

The Office of Environment and Emergency Management continues to support and facilitate the states' efforts in the area of Waste Management. We also acknowledge the efforts of JICA's five year project called J-PRISM for its technical assistance rendered to the State EPAs/KIRMA and the national government.

Let us join hands in promoting waste management and finding innovative and sustainable ways to keep our environment healthy and vibrant.

Andrew R. Yatilman

STATE INFORMATION

STATE OF YAP

The island of Yap is one of the four FSM states. It is made up of four separate islands which include Yap Island proper (Marbaq),Tamil/Gagil, Maap and Rumung. The total land area is 102 kilometers square miles and has a population of 11,377. The climate is warm all year long in the 80 degrees Fahrenheit.

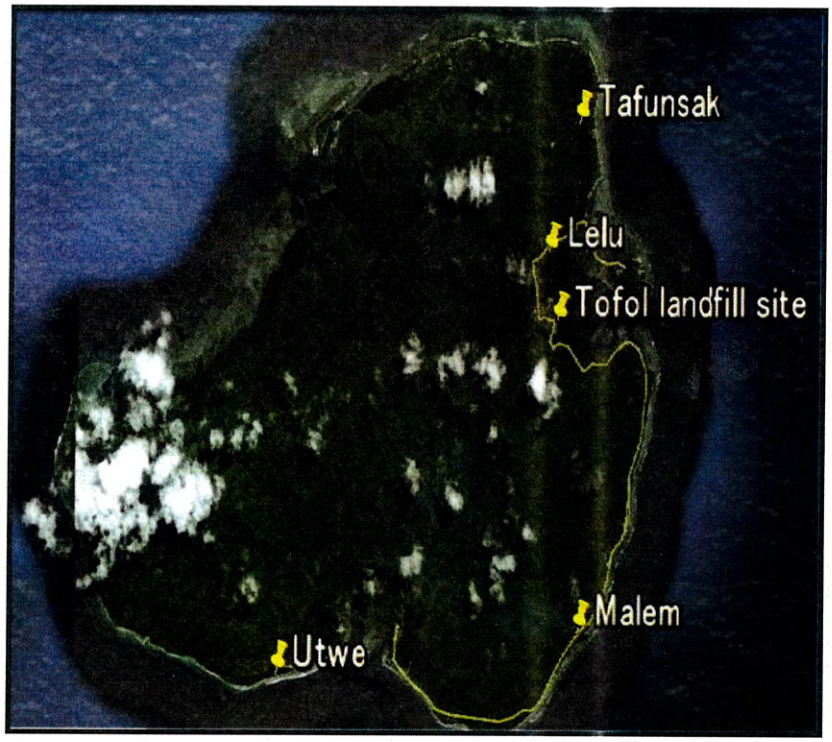
STATE OF CHUUK

Chuuk State consists of several island groups namely, Chuuk Atoll, Nomwisofo, Hall Islands, Namonuito Atoll (Magur Islands) (northwest), Pattiw (Western Islands), Eastern Islands (Upper Mortlock Islands) and the Mortlock Islands. The total land area is 127.2 km^2 (49.1 sq mi). Among the four FSM states, Chuuk is the most populated island. Currently, its population is 48, 655. The climate is warm all year round ranging in the 80 degrees.

STATE OF POHNPEI

Located near the easternmost area of the Caroline islands and midway between Hawaii and Japan, Pohnpei includes outer islands of Ngatik, Pakin, Ant, Mokil, Pingelap, Nukuoro, and Kapingamarangi. Its land area is 133.2 square miles (345 km^2). It often rains in Pohnpei but it is fairly warm all year round in the high 80's. The population of Pohnpei is 34, 685.

STATE OF KOSRAE



Kosrae is located about 370 miles north of the equator, between Guam and the Hawaii. The land area is 42 square miles (110 km^2) and the population is 6,616. Like the rest of the FSM states, Kosrae's climate is warm all year round in the 80's.

GOOD SOLID WASTE MANAGEMENT PRACTICES IN THE FSM

Introduction

The purpose of this booklet is to share good solid waste management practices exhibited by the four FSM states. The overall goal of the nation regarding Solid Waste Management is to develop, adopt, and maintain a system of integrated solid waste management that deals with the solid waste stream and minimizes the negative impacts on the health of the FSM's population and environment. In the following pages, a description of solid waste management good practices in each of the states will be provided for readers to get a glimpse of how solid waste issues are managed. The four areas that will be highlighted in this booklet will include: 1. Awareness Program 2. CDL System 3. Collection, and 4. Land fill Management.

1.0 Container Deposit Legislation (CDL) System

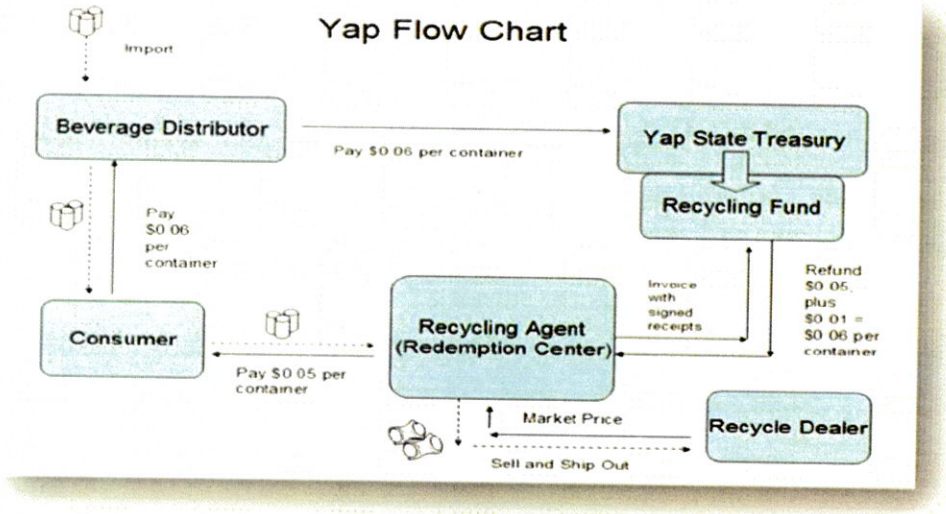
The Container Deposit Legislation (CDL) concept is based on the idea of requiring distributors and retailers to pay a minimum refundable deposit, such as 5-10 cents on certain beverage containers. It is a law that creates a privately funded collection infrastructure for beverage containers. The CDL system works like this:

- ✓ Deposit is paid by the Importer when he/she imports containers
- ✓ Deposit is paid by the Distributor when he/she delivers containers to the retailer
- ✓ Deposit is paid by the Retailer from Consumer at the point of purchase
- ✓ Deposit is refunded to Consumer when the container is returned
- ✓ Deposit is refunded to retailer when containers are returned to Distributor

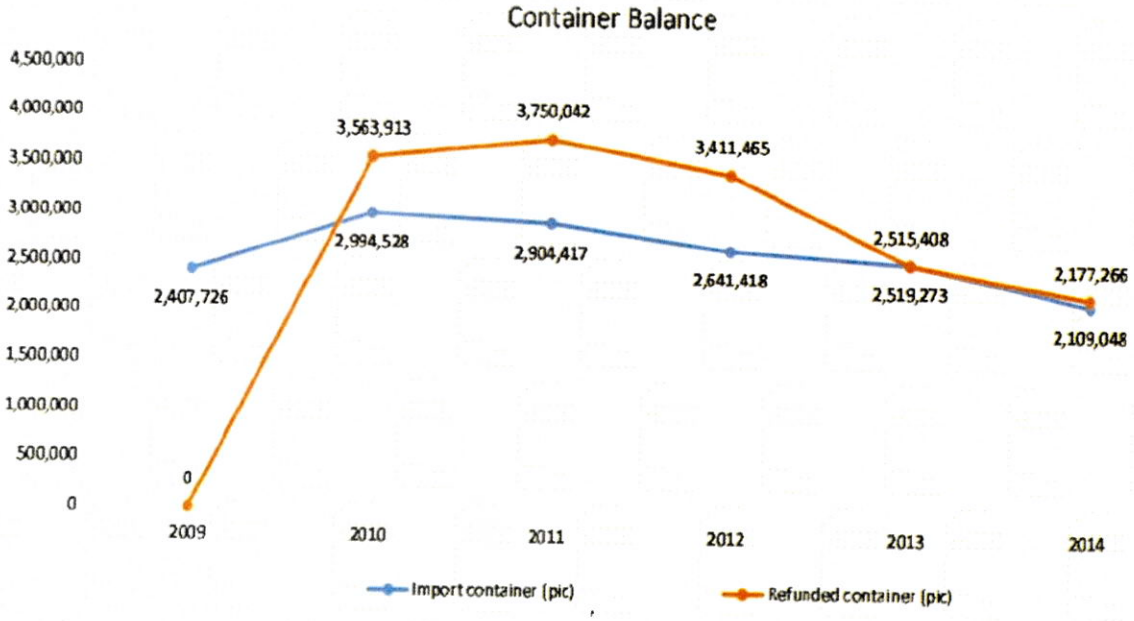
Some of the benefits of the CDL system include litter reduction and energy and resource conservation. In the FSM, Yap ,Pohnpei and Kosrae States have created CDL systems where State EPAs and/or Private Recycling Companies work together to promote good solid waste management practices.

1.1 YAP STATE CDL

In Yap, there is a 6 cent deposit fee per container of aluminum can, plastic PET beverage, plastic PET cooking oil, and glass beverage. See Yap Flow Chart below. Island Paradise Metal Co. is a local private company serving as the Recycling Operator for the State's Recycling Program. Customers who bring containers of a certain item will be refunded 5 cents per container. The one cent will go to the Recycling Company as the operation and shipping cost.



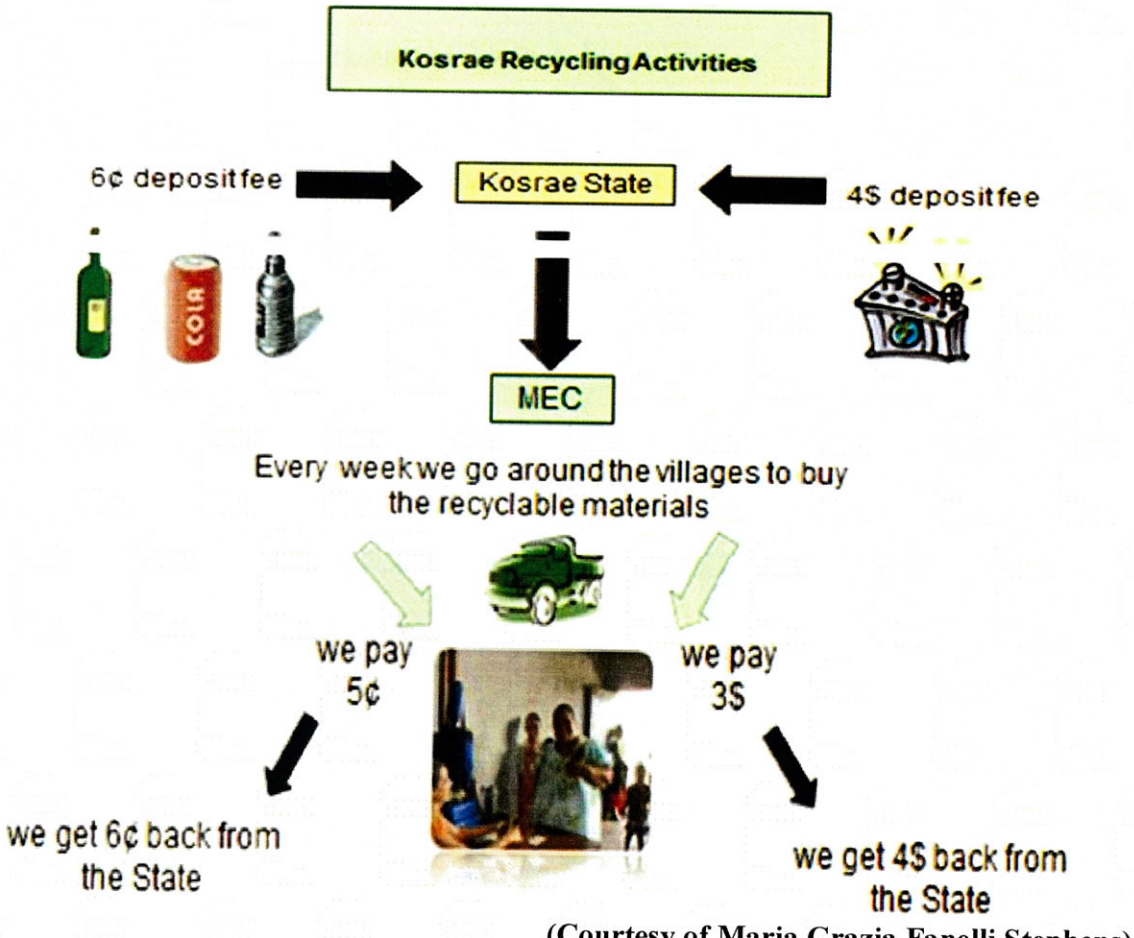
More than 14 million containers have been shipped out of Yap State which has contributed to the decrease in plastics and aluminum items, as well as lessening the waste load at the land fill. The chart below reflects the number of imported containers and refunded containers from 2009-2014. From November 2014 to March 2015, the Recycling Center collected the following: Aluminum-984,534; PET Plastic-189,906; Cooking Oil Containers-4,744; and Glass Bottles-16,579.



For more information, contact Yap State EPA at tel. # (691) 350-2317

1.2 KOSRAE STATE CDL

Micronesia Eco is Kosrae's Recycling Center. There is a 6 cent deposit fee for aluminum and PET bottles, and a 4 dollars deposit fee for batteries. *See Flow Chart below on Kosrae Recycling Activities.* Cans, Plastic bottles, Glass bottles, and Car Batteries are collected and most of them are either reused or shipped out in containers to Korea and Hong Kong under the Basel Convention rules. Experimentation with PET Bottles in building construction and implementation of the use of crushed bottles for the insulation of a roof and mosaic decoration has been conducted. Additionally, Micronesia Eco conducts workshops at elementary schools on teachings kids how to "Recycle, Refuse, Reduce, and Reuse."



(Courtesy of Maria Grazia Fanelli Stephens)

For more information, contact KIRMA at tel #: (691) 370-2076

2.0: Awareness Program

Awareness Programs on Solid Waste Management issues are more visible on some islands than others. However, each island's Awareness Program is unique and has benefitted communities in some ways. In Yap State, efforts to improve waste management can be seen through an established 3R wire bin system, public posters, and the launch of the green promo bag. Yap State EPA is collaborating with stores to implement the use of the green bag instead of the plastic bags, as part of their ban on plastic bags campaign.

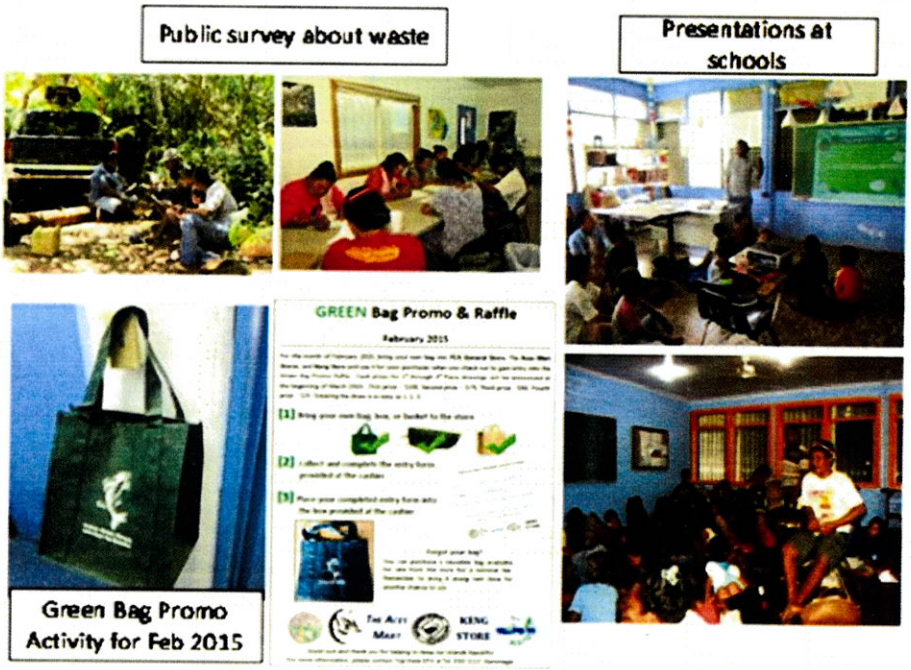
2.1 Yap State Awareness Program

In 2012	During the month of November: Awareness activity plan (1) was developed ✓ School workshops conducted ✓ Posters and Stickers were distributed
In 2013	During the month of May: Baseline survey regarding general SWM was conducted and collected with 120 respondents
In 2014	During the month of May: Awareness activity plan (2) was developed ✓ New poster was developed ✓ Green Bag campaign commenced ✓ Student trip to landfill site to begin in 2015

3R wire bins

Posters and Stickers

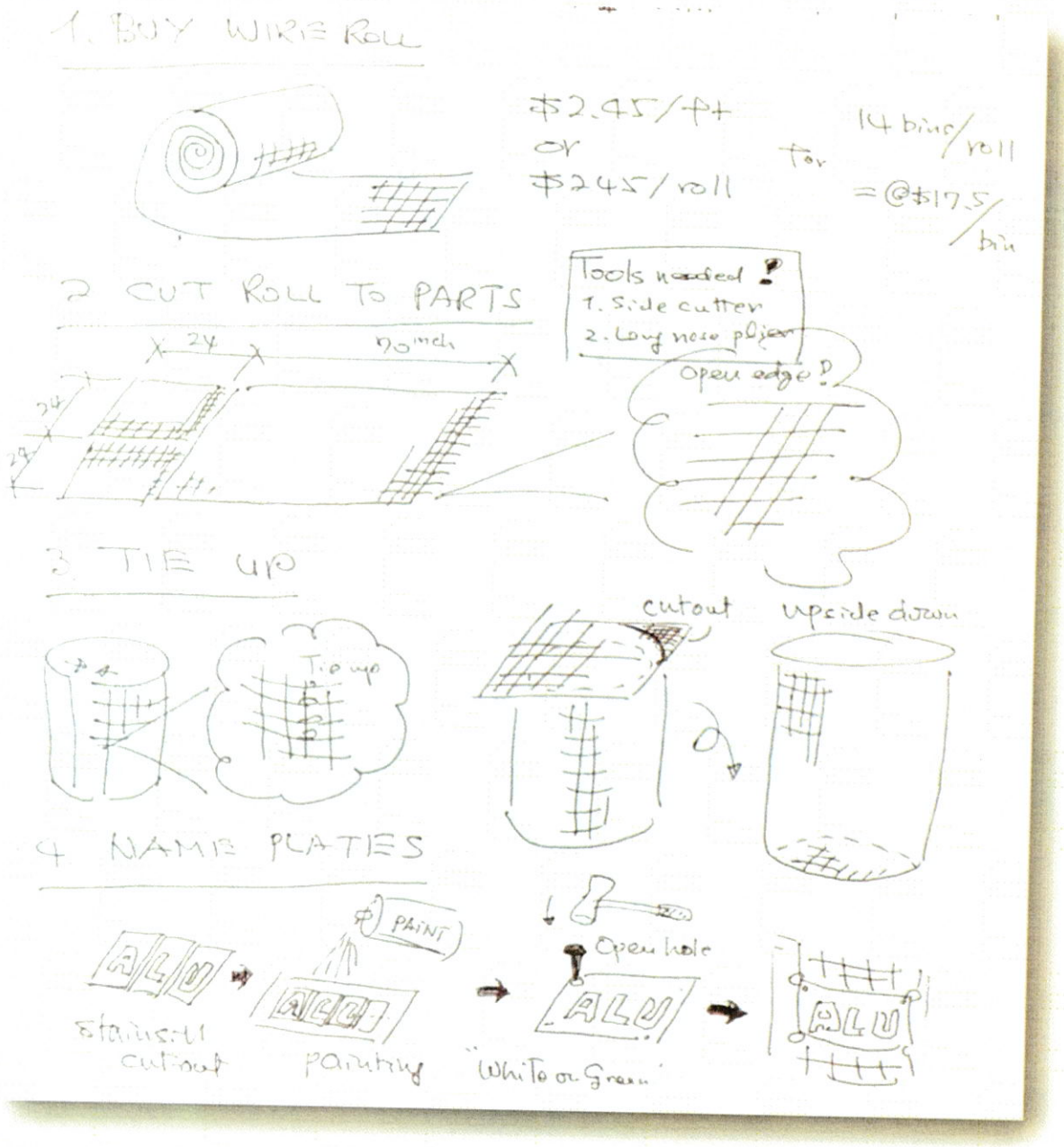
The green promo bag campaign addresses the need to ban plastic bags and promote the 3R concept of Reduce, Reuse, and Recycle. Did you know that plastic bags are made from oil? One mile worth of oil used in your car is equivalent to the production of fourteen plastic bags.



Green Bag Promo campaign

The wire bin: How do you make one?

1. Buy a roll of wire
2. Cut the wire roll into several parts by 24 inches by height and 70 inches by width
3. Tie ends together



Steps by former Yap JICA volunteer Tetsuro Azuma

For more information, contact Yap State EPA at tel. #: (691) 350-2317

2.2 CHUUK STATE AWARENESS PROGRAM

In Chuuk State, the Environment Protection Agency (EPA) collaboratively works with the Chuuk Women's Council (CWC), and the communities to promote cleanliness. An island wide clean up day and community clean ups are some examples of promoting waste management.

Community residents include the youth.

Also, the Chuuk Women Council is conducting a **Litterbug Project** which includes Litterbug clubs in schools, brochures on protecting the environment, and a recycling campaign that addresses waste segregation.

For more information, contact Chuuk State EPA at tel.# (691) 330-4158

2.3 POHNPEI STATE ENVIRONMENTAL CLUB

As part of Pohnpei State EPA's long term goal to minimize the environmental risks at the community and school levels, an ENVIRONMENTAL CLUB was created to enhance awareness in the school system. Through this club, EPA, in collaboration with other environmental agencies, provided an awareness platform to a select group of students. The main objective of the Club is to train students to take action on solving environmental issues. The target group are seventh graders from Kolonia and Elementary Schools. Students meet every day after school from February to June on annual basis. A sample of topics and activities covered is provided below:

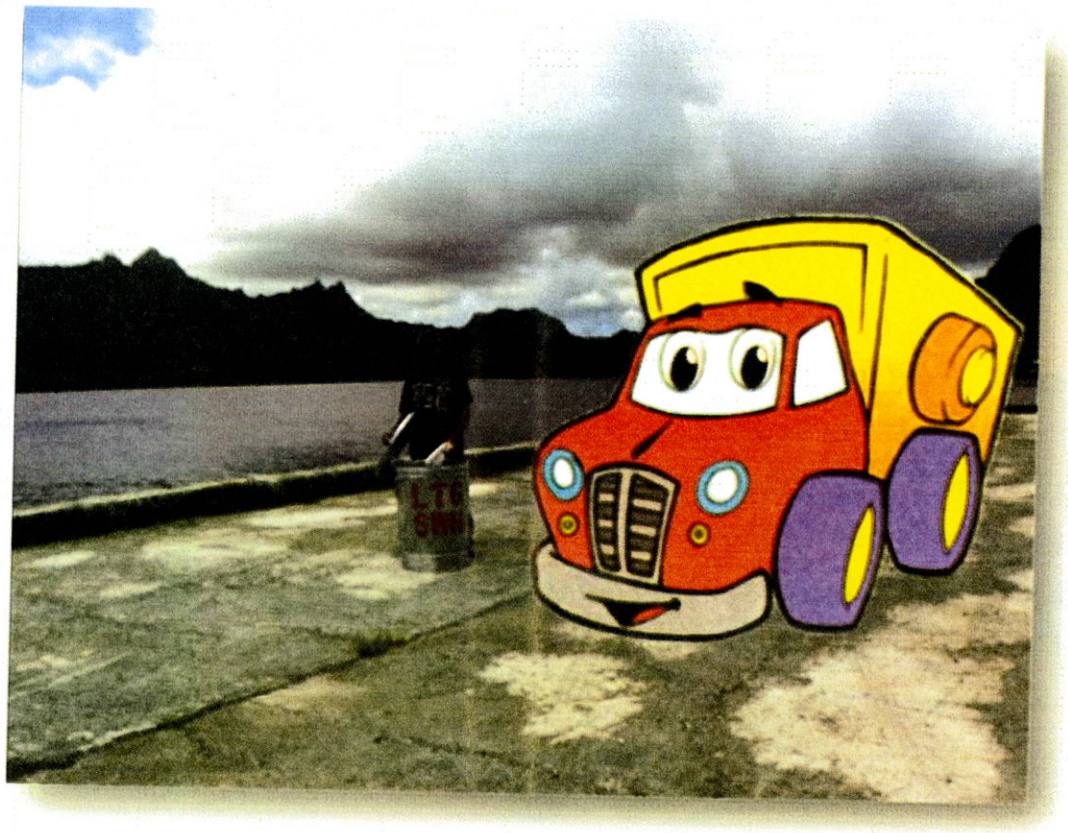
Round	Date	Subject	Venue	Cooperation Agency
	1/30	Orientation	OES	
2	2/6	Garbage We Make	OES	
3	2/13	Reuse Items	OES	PWMS
4	2/20	Conclusion of Waste Issues	OES	
5	2/27	Dumpsite Tour	Dekehtik Dumpsite	PWMS, EPA
6	3/5	Water in Pohnpei	EPA	EPA
7	3/12	Make Waste Oil Candle	OES	
8	3/21	Composting	COM National Camp.	Agriculture Dep.
9	3/26	Marine Protected Area	Lenger & Sapwuafik Is.	CSP
10	4/9	School Action Plan	OES	
11	4/30	Climate Change	OES	
12	5/2	Forest and Agroforestry	OES	NRCS
13	5/8	Food Mileage	OES	IFCP
14	5/14	Renewable Energy	COM Kolonia Camp.	Instructional Div.
15	5/16	Action Plan Follow up	OES	
16	5/21	Action Plan Follow up	OES	
17	5/26-30	Conduct Action Plan	OES	
18	5/28	Climate Change	OES	
			Kolonia Town	
			Black Coral	

During Summer Camp, students demonstrated what they have learned during the school year through performances. Above is a group photo of students and their trainers.

For more information, contact Pohnpei State EPA at tel. # (691) 320-2927.

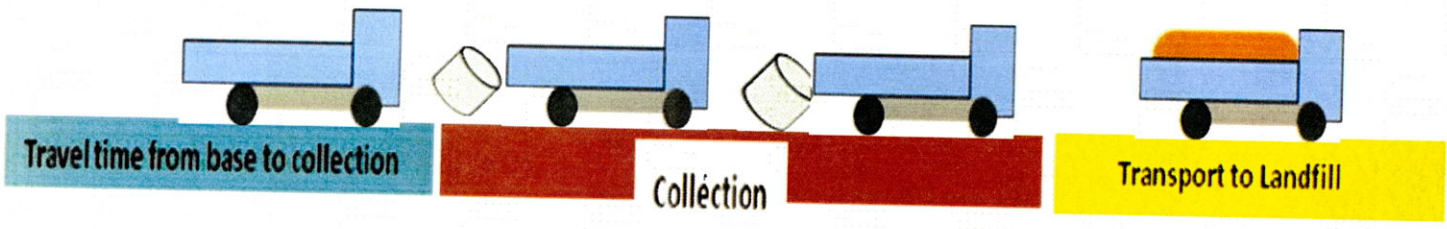
2.4 KOSRAE STATE's SPIFFY

Through a project aimed to improve solid waste management in Kosrae, KIRMA in collaboration with MEC and JICA developed an educational booklet on the promotion of the 4R's. The central figure depicted in the educational booklet is "SPIFFY", the talking Garbage Truck. SPIFFY means CLEAN. SPIFFY's mission in life as described in the booklet is to pick up trash in order to keep the island clean and beautiful. The booklet has been used in the school system as a guide for Kosrae science teachers. In addition to the booklet and trainings on waste management, a compost kit was developed and distributed freely. Additionally, clean up efforts at various places in Kosrae State have been conducted with occasional field trip visits to the Tofol landfill.



"Spiffy the garbage truck"

For more information, contact Kosrae Island Resource Management Authority at tel.# (691) 370-2076.



3.0 COLLECTION

Each state is equipped with garbage trucks that have been donated from the Japanese Government. Some states have their own version of garbage trucks in the form of flatbeds or pick-up trucks. Among the four FSM states, Chuuk State is the only state that provides free collection services to its residents.

3.1 CHUUK STATE HORN COLLECTION AND BIN SYSTEM

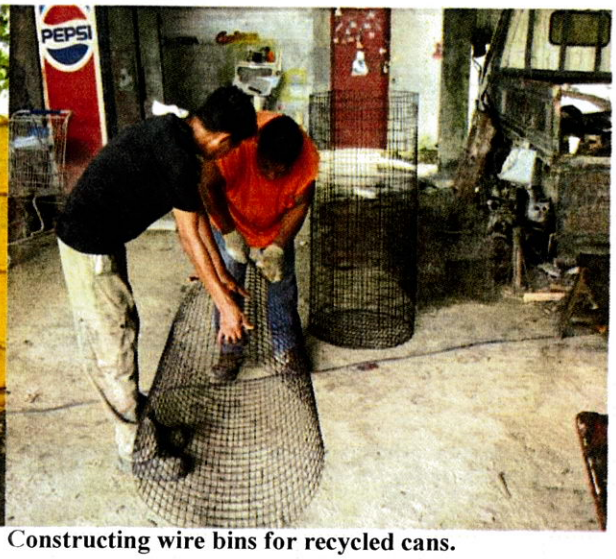
HORN COLLECTION:

Through collaborative efforts between Chuuk State EPA, Department of Transportation and Public Works, and the Chuuk Women Council, the "Sia Nimeti Chuuk" project was created to address waste issues in Chuuk. Under the project, the "Horn Collection" method was developed to aid in the collection of waste throughout the communities. The "Horn Collection is a garbage collection method in which a garbage truck driver honks the horn during collection to signal community residents to bring their garbage loads to the garbage truck for disposal. Collection services began in Mwan Village and now has extended to six other villages. In addition to the Horn Collection, several locally made rubbish bins have been designated throughout the commercial center for public disposal. The bins are locally made of durable metallic hardware welded together. A bin costs about $800.00. Collection from bin locations is done on a daily basis.

"Do not Litter" sign or else a $500 fine.

Public Bin ---bigger than the size of an adult (*see designs on pages 21 and 22)*

Recovering trash from the public bin.

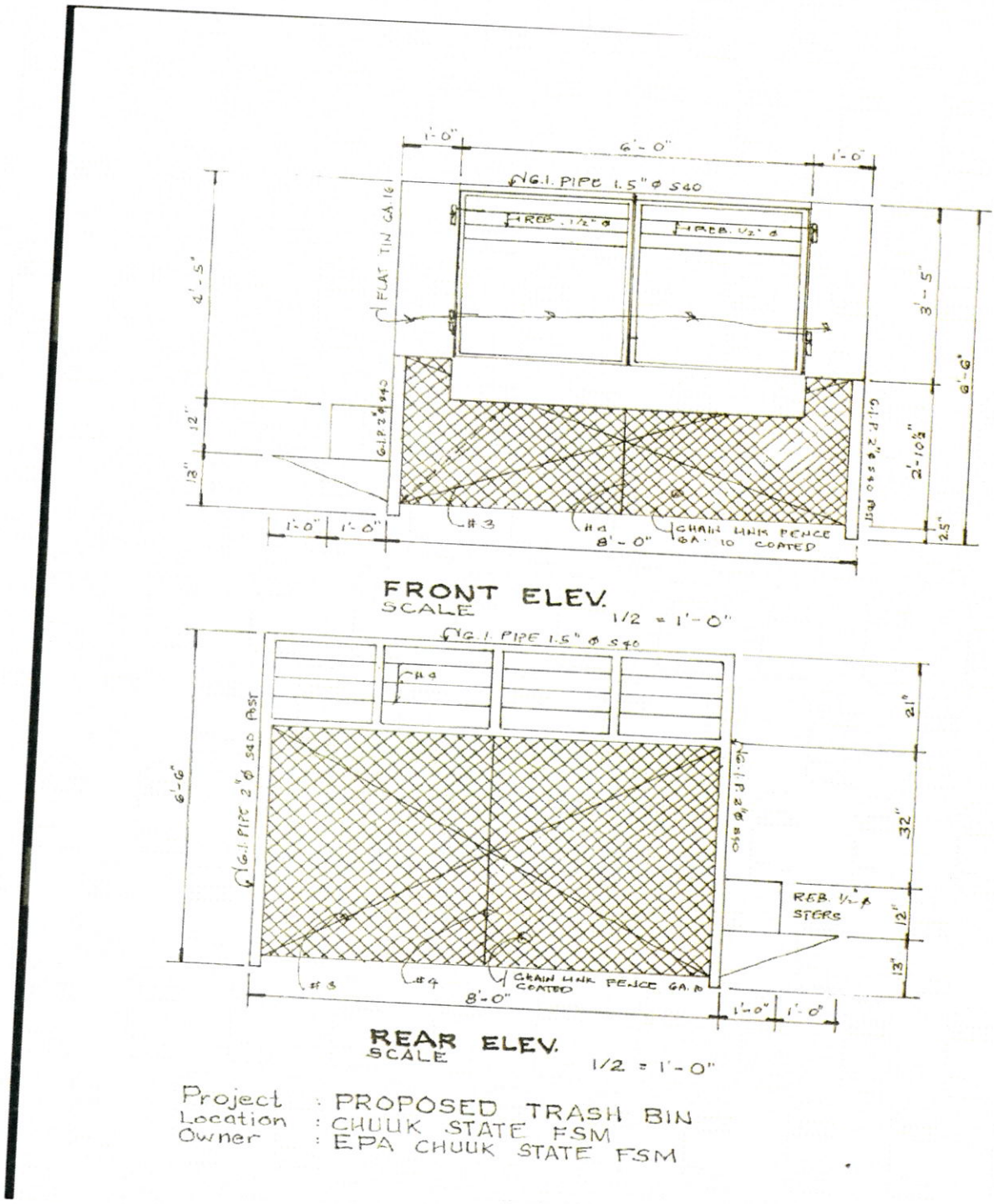


Constructing wire bins for recycled cans.

For more information, contact Chuuk State EPA at tel #: (691) 330-4158

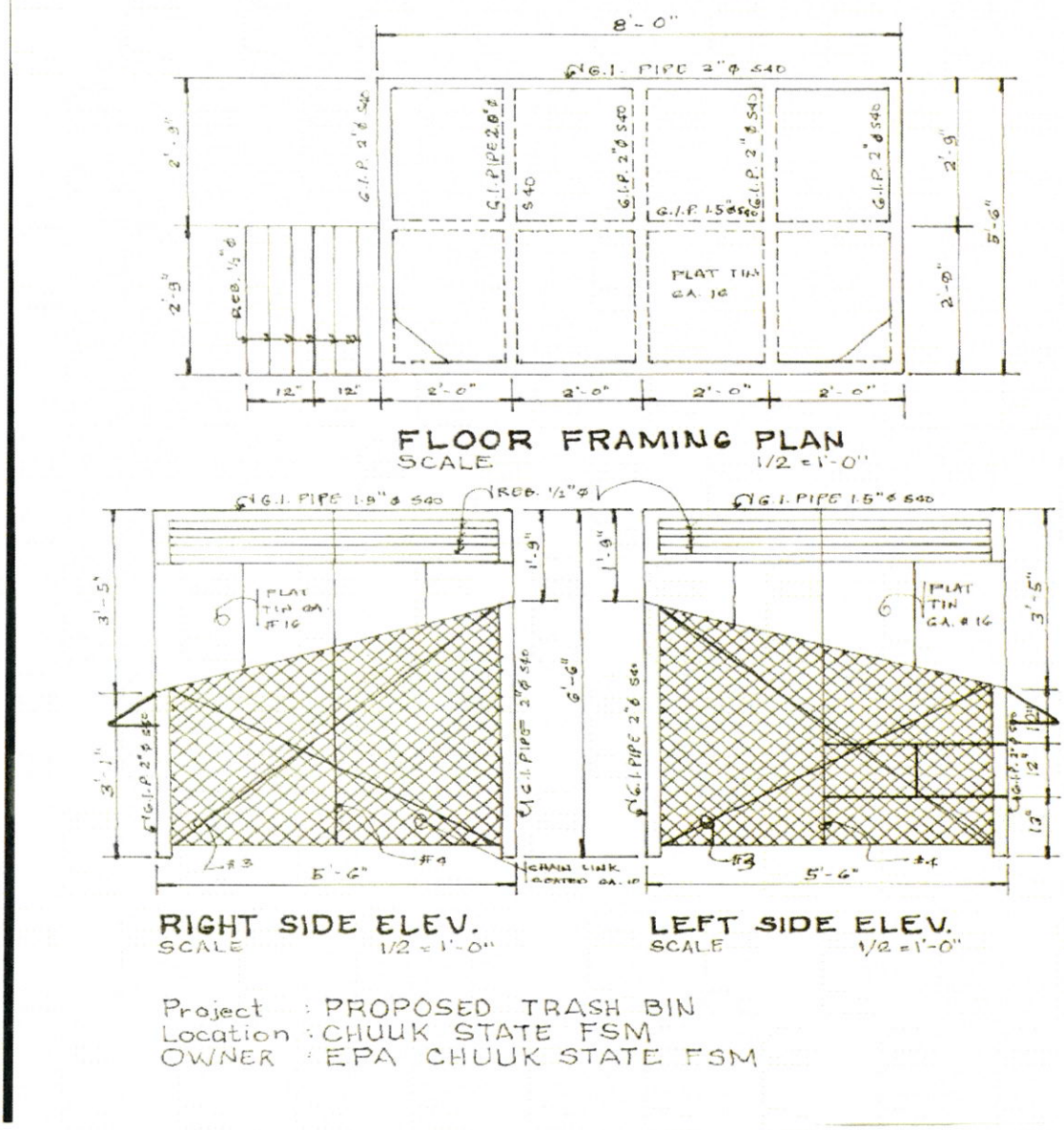
Chuuk's Disposal bins are made of durable metals that are welded into shape. Each bin is designed specifically to stand tall and erect on the ground with four legs. The base of the bin which stands on the four legs is a flat surface where piles of trash are disposed. The base is covered with walls and an open door. The legs are covered with screen wires to keep the public from dumping trash underneath.

The trash bins were first constructed in 2011 by Jason Poll's Construction Company. The company was sought out by Chuuk EPA to assist in the management and collection of waste throughout the commercial center. See bin design layout on pages 22 and 23.



(Courtesy of Chuuk EPA Director Ishmael)

Chuuk State Bin Design: Floor Framing Plan



(Courtesy of Chuuk EPA Director Ishmael)

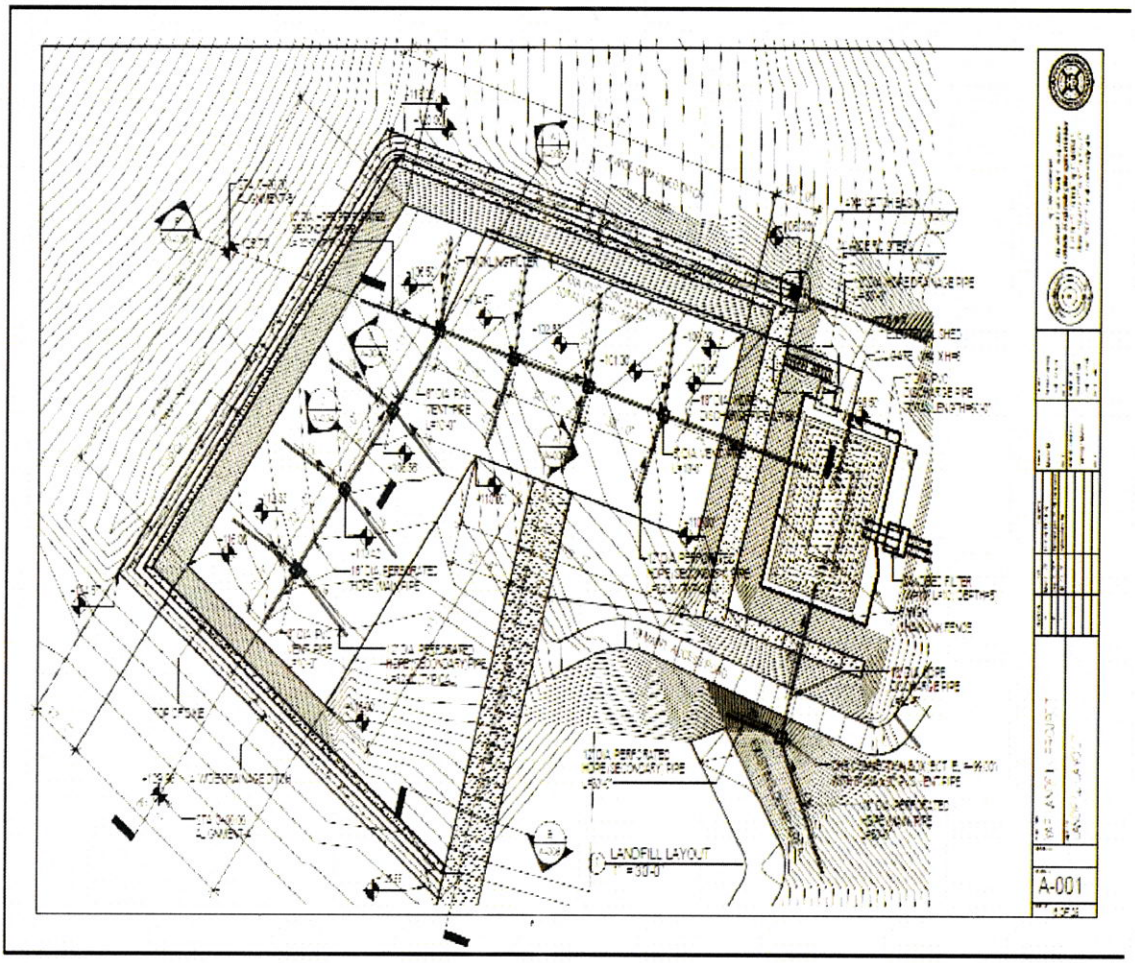
4.0 LANDFILL ACTIVITIES

4.1 YAP STATE'S LANDFILL

Yap State recently constructed a new landfill using the Japanese sanitary landfill technique called the Fukuoka Method. The design was prepared by Yap State Department of Public Works engineers and constructed by a private company called Surangel and Sons.

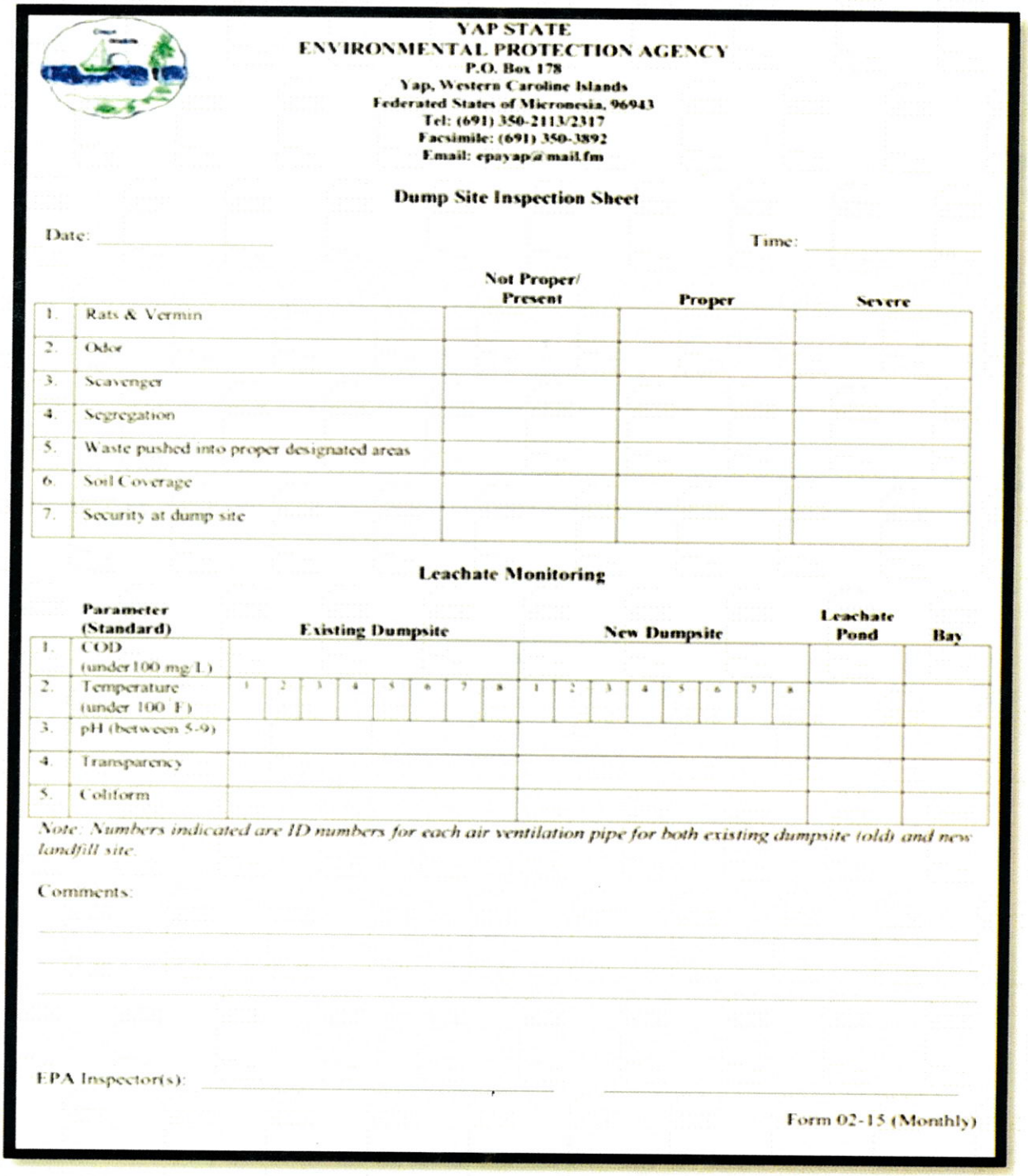
BASIC FACTS ABOUT THE NEW YAP STATE LANDFILL

Location: Rull & Dalipebinaw, west of Colonia
Age: 6-7 months
Leachate pond: 60 ft (=18m) x 40 ft (=12m) x 6 ft (=2m) depth
Dimension: 320 ft (=31m) Long x 80 ft (=24m) Wide
Completion: June, 2014 and opened to public on February 26, 2015



4.2 YAP STATE DUMPSITE INSPECTION SHEET

Another way to monitor landfill/dumpsite performance is by using an inspection sheet to make sure everything is intact. Yap State EPA has taken the initiative to devise a checklist to monitor daily operations of the landfill.



YAP STATE
ENVIRONMENTAL PROTECTION AGENCY
P.O. Box 178
Yap, Western Caroline Islands
Federated States of Micronesia, 96943
Tel: (691) 350-2113/2317
Facsimile: (691) 350-3892
Email: epayap@mail.fm

Dump Site Inspection Sheet

Date: _____ Time: _____

		Not Proper/ Present	Proper	Severe
1.	Rats & Vermin			
2.	Odor			
3.	Scavenger			
4.	Segregation			
5.	Waste pushed into proper designated areas			
6.	Soil Coverage			
7.	Security at dump site			

Leachate Monitoring

	Parameter (Standard)	Existing Dumpsite								New Dumpsite								Leachate Pond	Bay
1.	COD (under 100 mg/L)																		
2.	Temperature (under 100 F)	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8		
3.	pH (between 5-9)																		
4.	Transparency																		
5.	Coliform																		

Note: Numbers indicated are ID numbers for each air ventilation pipe for both existing dumpsite (old) and new landfill site.

Comments:

_____

_____

_____

EPA Inspector(s): _____ _____

Form 02-15 (Monthly)

4.3 POHNPEI'S REHABILITATED DUMPSITE

2013

2014

2015 Rehabilitated dumpsite's make over

2015 - Leachate Treatment Filter

Type of Landfill/dumpsite: Open dumping transitioning to Fukuoka style

Location: Dekehtik, Nett, Pohnpei

Age: over 20 years (late 1970's)

Size: 9.18 acres (3.72 hectares)

Pohnpei's Rehabilitated Dumpsite has progressed since 2013 when it was rehabilitated to a semi-aerobic status. A leachate treatment filter has been installed and the development of a second cell is in progress.

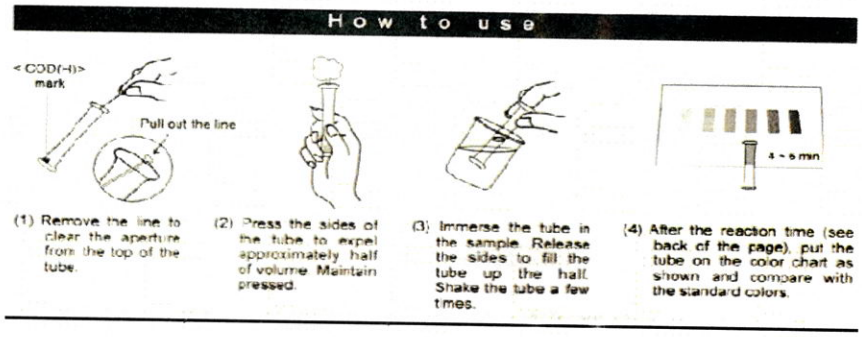
4.4 KOSRAE STATE'S LEACHATE MONITORING SYSTEM

Kosrae state is the first among the FSM states to construct and own a sanitary landfill with Fukuoka Method applications. In the early 2000, Kosrae State Government received funding from the Japanese Government to construct a landfill.

In a sanitary landfill, waste decomposes quickly and becomes stable which reduces the impact on the land. Leachate Collection and Gas Venting pipes are placed in the landfill to increase the aerobic area in the waste layer, in order to assist with the quick discharge of the leachate which will prevent saturation and anaerobic conditions.

At the Tofol landfill site, leachate is monitored periodically to confirm if the landfill is performing as designed. Water quality is monitored using parameters such as Chemical Oxygen Demand (COD) and (pH). COD is a measure of organic and inorganic matter in the water, expressed in mg/L. It is the amount of dissolved oxygen required for full chemical oxidation of contaminants. COD tests measure the physical, chemical, and biological characteristics of the waste water.

The basic steps for measuring COD and pH include the following:



- Strip of Universal paper is dipped in water sample
- Reaction takes place
- Color changes
- Read pH after universal paper is taken out of water sample and laid against color table at one or two seconds intervals
- COD is read after universal paper is taken out of water sample at 5 minutes interval.

For more information, contact Kosrae Island Resource Management Authority at tel #: (691) 370-2076

WAY FORWARD

As we echo our Micronesia anthem with these verses, " We will all work together with heart, voice, and hands; Till we have made these islands another promise land, " we are reminded that in order to promote a healthy population and encourage economic growth throughout the FSM, it is necessary to adopt cost effective and self sustaining Solid Waste Management systems to protect our environment. This can be achieved through on-going collaboration and a willingness to find ways to manage waste. It is our hope that waste will be managed not just now, but in the years to come.