2023 Yap State Chemical Profile

Yap State Environmental Protection Agency

FSM Department of Environment, Climate Change and Emergency Management
Waste Management and Pollution Control Unit
Federated States of Micronesia

Supported by the United Nations Environment Program

FSM Department of Environment, Climate Change and Emergency Management
the Federated States of Micronesia
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Acronyms & Abbreviations

CAS	Chemical Abstracts Service
CIF	Cost, Insurance, and Freight
COM	College of Micronesia
COO	Country of Origin
CPC	Percentage Per Cycle
DAF	Division of Agriculture and Forestry
DCT	Division of Customs and Tax
DDT	Dichlorodiphenyltrichloroethane
DECEM	Department of Environment, Climate Change and Emergency Management
DF&A	Department of Finance and Administration
DHS	Department of Health Services
DOE	Department of Education
DOJ	Department of Justice
DRD	Department of Resources and Development
DPWT	Department of Public Works and Transportation
DYCA	Department of Youth and Civic Affairs
EPA	Environmental Protection Agency
FSM	Federated States of Micronesia
FSMNG	Federated States of Micronesia National Government
HCB	Hexachlorobenzene
HCDCS	Harmonized and Commodity Description and Coding System
HS	Harmonized Commodities System
IMS	Island Mortuary Service
NCP	National Chemical Profile
OAG	Office of Attorney General
OCEA	Ocean Climate Energy Associates Inc.
OAS	Office of Administrative Services
OCO	Oceania Customs Organization
OPB	Office of Planning and Budget
PCBs	Polychlorinated Biphenyls
PIC	Pacific Island Countries
POP	Persistent Organic Pollutants
RAC	Refrigeration and Air-Conditioning
SCP	State Chemical Profile
SPC	Secretariat of the Pacific Community
USFS	United States Forest Service
Vital	FSM Petroleum Corporation
WCO	World Customs Organization
WMPCU	Waste Management and Pollution Control Unit
YCA	Yap Cooperative Association
YCHC	Yap Community Health Center
YSC	Yap State Code
YSG	Yap State Government

Authors' Note

The State Chemical Profile (SCP) is a desktop study that lists and summarizes relevant laws, policies, governmental institutions, and other mechanisms of the State of Yap that are relevant for managing and implementing chemical management in the Yap. The SCP is part of the FSM's National Chemical Profile (NCP) and includes data and information about the chemicals entering the State. Furthermore, data and information were collected to evaluate the management of chemicals and hazardous waste in the State. The SCP analyzed vital policy and legislative items: environmental, chemical control, customs and taxation, chemical management regulations and policies, and health. This report will inform discussion for further policy and legislative development in the FSM and the four States to support the implementation of proper chemical and hazardous waste management across the FSM.

Every effort was taken to ensure that the information written in this report is accurate. This report is provided for informational and educational purposes only. It is intended, but not promised or guaranteed, to be current and complete as of the date of its publication. This analysis should not be used as a legal document, and organizations should consult with lawyers to provide legal advice on implementing chemical and waste management in the FSM.

The contents of this report, including any errors or omissions, are solely the responsibility of the authors at OCEA, Inc. The authors invite corrections and additions.

Executive Summary

Understanding the critical nature of efficient chemical and hazardous waste management, the FSM has been fervently involved in global collaboration, aligning its strategies with international frameworks and treaties. Embracing global conventions and accords, like the Basel Convention, marks a noteworthy advancement for the FSM. Similarly, the nation's engagement in actualizing the Stockholm Convention is pivotal in curbing and eradicating persistent organic pollutants (POPs).

Between 1997 and 2006, the FSM actively participated in the Persistent Organic Pollutants in Pacific Island Countries (POPs in PICs) initiative, underscoring its resolve to combat chemical contamination and its steadfastness in confronting the ecological threats presented by POPs.

The FSM has initiated measures to tackle chemical handling and safety nationally via specific laws and programs. The Department of Environment, Climate Change and Emergency Management (DECEM) defines baseline standards and creates the legislative framework concerning chemical management. However, each State within the FSM is responsible for establishing legislation, regulations, and policies at the State level. Furthermore, each state is responsible for executing and implementing chemical and hazardous waste management initiatives within its jurisdiction.

Yap has taken proactive steps by passing laws and formulating various resource management strategies to meet its obligations regarding the stewardship, safeguarding, and preservation of the environment and its natural resources. Yap has developed regulations that address the handling and removal of chemical and hazardous waste only for development projects. It has established an Act related to POPs and maintains a registry of prohibited chemicals. It also has legislation that requires proper labeling of all chemicals and hazardous materials.

However, Yap is burdened by several challenges:

- A comprehensive list of chemicals that enter the State;
- Having appropriate legislation, regulations, and policies that address the importation, handling, and disposal of chemical and hazardous waste;
- Identifying the major importers of chemicals and hazardous materials into the FSM;
- Knowing which agencies are responsible for managing the proper disposal and management of chemicals and hazardous waste.

The "Strengthening Institutional Capacity of Chemical Management in the FSM" project is designed to assist Yap in creating an extensive State Chemical Profile. This involves pinpointing the varieties and quantities of chemicals arriving in the State, understanding their usage and management, identifying the sectors engaged in chemical importation, and evaluating the existing laws and enforcement.

The analysis will require data collection from various sources, documentation of existing chemical storage sites, and stakeholder engagement to discuss policy recommendations and legislative reforms on chemical management. The consultant will carry out the following

activities:

- Collecting import statistics from the State Customs office for Chapters 28-40 of the 2018 Harmonized Commodities System (HS) to assess chemical imports, their sources, and their intended use.
- Provide import statistics for the island state, including data on the types and amounts of chemicals imported, their sources, and their intended use.
- Capture photographs of chemical storage sites across the island state to assess compliance with storage and handling requirements and identify potential risks or hazards.
- Inspect the domestic market to assess the availability and use of chemicals and identify any potential risks or hazards associated with their use.
- Facilitate stakeholder engagement workshops to collect feedback and provide policy recommendations on chemical management. The workshop will bring together key stakeholders, including government agencies, industry representatives, and civil society groups, to discuss the situational analysis findings and identify policy improvement opportunities.

The analysis aims to identify the current status of the legal, institutional, administrative, and technical infrastructure for chemicals management in the Yap, FSM. The result of such analysis will help implement environmental and chemical management priorities and inform necessary legislative reforms to improve chemical management at the state and national levels in the FSM.

1. The Profile of the State of Yap

The project entitled "*Strengthening Institutional Capacity for Chemical Management in the FSM"* requires each FSM state to complete a situational analysis of its chemical use and management, including identifying the types and amounts of chemicals used in various sectors and industries and assessing the current regulatory framework and enforcement mechanisms for chemical management. FSM and its four states have imported chemicals in multiple sectors, including education, agriculture, health, and pest control. These chemicals and associated waste could pose severe environmental and local health risks without adequate management.

1.1 Geography Context

1.1.1 Location & Terrain

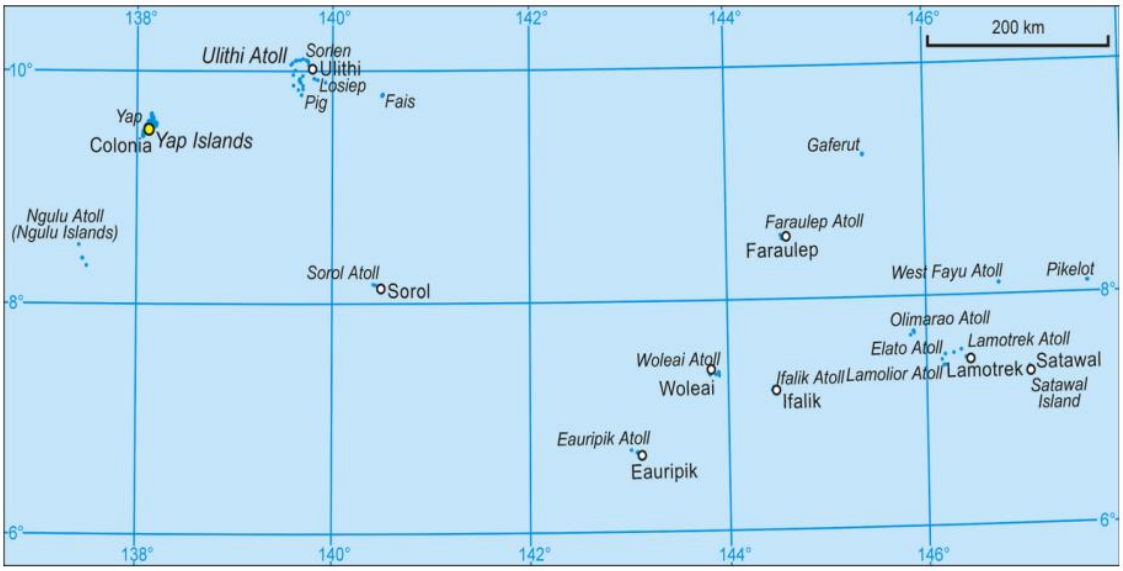


Image 1*: Map of Yap State (image source: Wikimedia Commons)*

Yap State is the westernmost state in the FSM, lying midway between Guam and Palau, with a population of approximately 11,000. Yap, also known as Wa'ab, comprises four relatively large main islands (Gagil, Rumung, Tomil, and Yap) that are geologically volcanic and connected by a coral reef. Each island is characterized by a gentle topography with an elevation of 175 m (574 ft) above sea level and substantial swampy lowlands. The state's landmass is 102.9 km^2 (39.7 sq mi). Yap state comprises outlying coral islands and atolls, nineteen (19) inhabited with a total land area of about 45 square miles. [1]

Yap has a deep cultural tradition and is perhaps best known for its "stone money," which consists of enormous stone disks. In ancient times, the stone was quarried in Palau's Rock Islands at significant risk due to the dangerous sea voyage. The stone money can measure up to two meters in diameter and weigh up to four tons, making it the world's largest currency.

[1] Government of the Federated States of Micronesia (2016). Yap Joint State Action Plan for Disaster Risk Management and Climate Change. SPC's Suva Regional Office, Fiji.

Yap has an estimated 26.8 sq. miles of forested areas. General forest types on the main island of Yap include upland forests that cover 12.1 sq. miles, swamp forests that cover around 62 acres, and mangrove forests.[2] Mangrove forests make up about 13% of Yap's vegetation and provide multiple benefits for the environment such as fisheries habitat, coastline protection, and carbon sequestration. The island is surrounded by an extensive barrier reef that stretches a mile offshore and encircles much of the island, creating a fringing coral reef system about 19 miles long and up to 7 miles wide.

1.1.2 Climate Overview

Table 1: *Overview of climate trends in Yap State*

Climate feature	Climate trends
Air Temperature	In Yap, annual mean air temperatures have increased at a rate of +0.3°F (0.17°C) per decade since 1951. Annual maximum air temperatures have increased at a rate of +0.22°F (0.12°C) per decade since 1951, showing a further increase at a rate of +0.32°F (0.18˚C) per decade during the dry seasons.
Rainfall	Yap is affected by the West Pacific Monsoon climatic pattern which regularly brings in storms and typhoons with additional rain during the wet season. Average annual rainfall in Yap is of 122 inches (3098 mm) and it shows a small declining trend of -0.03 inches (0.87mm) per decade since 1950. The number of consecutive dry days[3] in Yap has decreased (-0.37) since 1952, suggesting that the area is potentially getting wetter. In a typical El Niño, dryness and drought are common.
Sea Level	Coastal flooding is recurrent particularly during storms and typhoons.
Storm patterns	The Micronesia Region is the most active tropical cyclone basin in the world, with tropical storms and typhoons that can occur annually and affect especially Chuuk and Yap State. Between 2013 and 2019, Yap state was hit by 5 typhoons. In Yap, the outer low-lying islands are particularly affected by typhoons. In 2013, Typhoon Hagupit caused extensive damages to Ngulu, Eauripik, Woleai, Ifalik. Most recently, in 2019, Wutip contaminated water and damaged crops in Satawal, Lamotrek, Elato, Faraulep and Piig.

Sources: *Pacific Climate change data portal, Data portal, NOAA National Centers for Environmental Information (NCEI), Australian Bureau of Meteorology and CSIRO-2014*

1.2 Demographic structure

1.2.1 Economy

Yap's average annual income from wages is $11,804, slightly higher than the national average of $11,386.[4] Although a substantial amount of the State's population is employed in the public and private sector, most people are still dependent on natural resources for food with approximately 95% of households engaging in at least one subsistence activity such as fishing or agriculture.

[2] Government of the Federated States of Micronesia. (2020). FSM Forest Action Plan 2020-2030.

[3] Consecutive Dry Days: Maximum number of consecutive days in a year with rainfall less than 1mm (0.039 inches)

[4] Government of the Federated States of Micronesia. (2018) Yap Biodiversity Strategy and Action Plan 2018.

1.2.2 Education

Several nationwide reports revealed that student enrollment generally followed population distribution, while other reports consider household income as a determining factor as well.[5] Population-wise, Yap ranks third among the four states in student enrollment. Percentage-wise, Yap accounts for the highest proportion of students who attend private schools (14%), which is higher than the national average (7.3%). The state also has a higher proportion of youth that attended elementary/secondary schools (52%) and tertiary/vocational schools (9%). However, a relative percentage of youth (38.6%) were found to not attend school for reasons such as engaging in subsistence work. Gross enrollment rates over fiscal years 2018-2022 have also seen a gradual decline, which can be attributed to a few things, such as out-migration and inaccurate statistics that are received from some schools.[6]

1.3 Political Structure

1.3.1 Government Structure

Yap State has a constitutional government. Unlike the FSM Constitution, Yap's Constitution recognizes a fourth governing body composed of traditional leaders, "a Council of Pilung and Council of Tamol, which shall perform functions which concern tradition and custom."

1.3.2 Legislative

The Yap State Legislature is a unicameral body of ten members elected to four-year terms from the election districts described in Article XI of the Yap Constitution. The Legislature's power extends to all rightful subjects of legislation that are not inconsistent with the Yap Constitution. Unique among the four States, the Yap Constitution enshrines a specific legislative role for its body of traditional leaders concerning custom and tradition. Each bill passed by the Legislature will be presented to the Council of Pilung and the Council of Tamol for consideration.

1.3.3 Executive

Yap's Executive Branch is led by the governor and lieutenant governor, elected jointly by garnering at least 45% of the votes. Each joint ticket must include one person who is a resident of Yap Islands Proper and one who is a resident of the Outer Islands.

1.3.4 Judicial

The judicial branch in Yap State consists of the State Court and other courts as may be created by law. Yap's Constitution contains a judicial guidance clause providing that court decisions must be consistent with the State Constitution, state traditions and customs, and the social and geographical configuration of the State.

[5] FSM Household and Income Expenditure Survey 2014.

[6] FSM National Department of Education (NDOE) Education Indicator Report 2022.

1.3.5 Municipal

The Yap Constitution recognizes the right of citizens to organize and operate local governments. Pursuant to implementing legislation, the 28 extant municipalities of Yap State are identified, and it is noted that their respective geographical boundaries are "according to custom."

In Yap's executive branch, there are five (5) departments and three (3) offices. Table 2 lists the governor's cabinet, which is composed of the heads of state departments.

***Table 2**: Executive Departments/Offices of the State of Yap*

Department	Website
Yap State Government (YSG)	Home | Yap State Government
Office of Administrative Services (OAS)	N/A
Office of the Attorney General (OAG)	N/A
Office of Planning and Budget (OPB)	N/A
Department of Resources and Development (DRD)	N/A
Department of Education (DOE)	Home | Pearson (ydoeconference.wixsite.com)
Department of Health Services (DHS)	N/A
Department of Public Works and Transportation (DPWT)	N/A
Department of Youth and Civic Affairs (DYCA)	N/A

1.4 Stakeholder Meetings on Data Collection and Coordination

1.4.1 Stakeholders and Informants at National and State Level

DECEM - Division of Environment

The Waste Management and Pollution Control Unit (WMPCU), operated under DECEM, provides centralized policy guidance for FSM chemical and hazardous waste management. With a constrained team of only two personnel, WMPCU primarily acts as a bridge, offering standardized approaches to Yap State EPA. The Division is crucial in determining resource allocation, coordination with the State, providing technical advice and fostering dialogue between state agencies and international stakeholders.

Despite its limited capacity, the WMPCU holds significant responsibilities, from representing FSM in international forums to monitoring and guiding the state-level implementation of chemical policies. The focus often leans towards forging external partnerships, leveraging additional technical expertise funding, and ensuring that state agencies have the right tools, frameworks, and knowledge. Through its coordination, the Division aims to provide harmonized chemical management practices across the FSM states.

Department of Finance & Administration, Division of Customs & Tax

The FSMNG Department of Finance and Administration (DFA), specifically the Division of Customs and Tax (DCT), plays a crucial role in chemical management. DCT controls and monitors chemical imports, ensuring compliance with documentation and restrictions on certain substances. They set and collect tariffs on imported chemicals, thereby regulating the influx of certain substances by promoting safer alternatives or discouraging harmful ones. In collaboration

with DECEM, Yap State DHS and EPA, DCT supports national and state regulations on chemical imports, storage, and usage.

Data collection is another critical aspect of their responsibilities, offering insights on chemical types and quantities imported, which aids in environmental, public health, and economic planning. The Division's role also extends to implementing international chemical-related agreements, raising public awareness of chemical safety, and potentially issuing licenses for specific chemical imports.

Yap Attorney General's Office

The Yap Attorney General's Office plays a pivotal role in drafting, reviewing, and updating chemical-related laws and regulations in addition to ensuring that the legalities surrounding the import, use, disposal, and transport of chemicals are clear and comprehensive. They are responsible for representing the government's interest in chemical-relates disputes or challenges and work with FSM Department of Justice (DOJ) to ensure that any international chemical-related agreements to which FSM is a party are effectively integrated or utilized to update state law.

Yap State EPA

Yap State EPA is a regulatory agency created through the Environmental Quality Protection Act in 1987. The role of EPA can be found under Yap State Code (YSC) Title 18, which is to protect human health and the environment. Four programs can be identified under EPA: (1) pollution control, (2) pesticides and hazardous chemicals, (3) public education and awareness, and (4) water quality. The agency has the power to promulgate, enforce or repeal regulations, as well as administer a permit system to control and prohibit pollution of air, land, and water.[7] Relevant existing regulations include:

- Environmental Impact Assessment Regulation
- Oil Spill Reporting Regulation
- Persistent Organic Pollutants Regulation
- Solid Waste Management Regulation
- Hazardous Substances Regulation

A permit shall be required for reasons including:

- Discharge by any person of any pollutant in the air, land, water
- Conduct by any person of any activity, including but not limited to, the operation, construction, expansion, or alteration of any installation, which results or may result in the discharge of any pollutant in the air, land, or water.

Yap State Department of Health Services

The DHS has a role in chemical management as it imports and receives a relative number of pharmaceuticals and medical supplies annually. The DHS or other departments and/or agencies,

[7] 18 YSC § 1507

such as the EPA, carry out disposal procedures for expired supplies containing varying concentrations of chemicals or other hazardous substances.

Yap State Department of Public Works & Transportation

The DPWT has a role to play in chemical management. The Department provides waste services and oversees the island's public landfill site and leachate pond. Public waste generated at public institutions such as schools and government offices is collected by a private company that is contracted by DPWT. [8] Any improper waste management services can put increased strain on the environment, and disposal of chemical wastes left over from agriculture and commercial products poses additional problems.

***Table 3**: Yap State Departments/Agency responsible for chemicals, biohazards, and other hazardous materials*

Department	Mandate
EPA	The agency has the power and duty to control and prohibit pollution of air, land, and water in accordance with Title 18, Chapter 15 of Yap State Code and is authorized to: • Adopt, approve, amend, revise, promulgate, and repeal regulations, in the manner, which is or may be provided by law, to affect the purposes of this chapter, and enforce such regulations which shall have the force and effect of law. • Adopt and provide for the continuing administration of a Yap State-wide program for the prevention, control, and abatement of pollution of the air, land, and water of Yap State, and from time-to-time review and modify such programs as necessary. • Establish criteria for classifying air, land, and water in accordance with their present and future uses. • Adopt and implement plans for the certifications of importers and applicators of restricted use pesticides, for the issuance of experimental use permits for pesticides and a plan to meet special local needs, and such other measures as may be necessary to carry out the purposes of this chapter. • Establish and provide for the continuing administration of a permit system whereby a permit shall be required for the burning of any office, warehouse, store, barn, shed, cookhouse, boat, canoe, lumber, copra or any other building or shelter, crop, shrub, grass, timber or other property, or for the discharge by any person of any pollutant in the air, land, or water, or for the conduct by any person of any activity, including but not limited to, the operation, construction, expansion, or alteration of any installation, which results or may result in the discharge of any pollutant in the air, land, or water, provide for issuance, modification, suspension, revocation, and termination of such permits, and for the posting of an appropriate bond.
DPWT	The Department of Public Works and Transportation is composed of the Divisions of Contracts and Engineering Management, and Transportation.

[8] Yap State Solid Waste Management Strategy 2018-2027 (Action Plan:2018-2022). Retrieved from: General Profile | FAOLEX Database | Food and Agriculture Organization of the United Nations

	Its main duties are stated in Title 3, Chapter 1 of the Yap State Code. The Department's duties consist of the operation and maintenance of public works, and providing for the engineering, construction, maintenance and operation of public improvements and facilities. Program for solid waste management (2 divisions) – intended to go under division of transportation.
DHS	Title 1, Chapter 3 of the Yap State Code states that the main duties of the Department are to provide for the protection and promotion of public health and administer medical and dental facilities of the State.

2. Insights on Chemical Consumption and Imports in Yap

2.1. Data Collection

Compiling import data through customs is essential for grasping the dynamics of a nation's trade and goods and services. In the FSM, import management and regulation are the responsibilities of the Office of Customs & Tax (OCT), operating under the auspices of the Department of Finance& Administration (DF&A). The International Convention on the Harmonized and Commodity Description and Coding System (HCDCS), or more commonly, the Harmonized System (HS), came into existence in 1983. Designed by the World Customs Organization (WCO), the HS serves as a global standard for categorizing traded goods, simplifying the classification of items across international borders. It's essentially a universal code for goods, allowing for the standardization of customs operations and trade practices among countries. The HS's fundamental purpose is to bring consistency and efficiency to how nations monitor and quantify goods movements, including value, weight, and origin. This systemization enhances the fluidity of trade, enriches statistical evaluations of global commerce, and underpins strategic economic planning and policy development.

Meanwhile, the Oceania Customs Organization (OCO) is a pivotal intergovernmental body in the Pacific, instituted to foster collaboration and fortify capabilities among the regions' customs authorities. The organization is committed to streamlining trade, optimizing revenue generation, and bolstering border protection within its member states. Within this framework, the HS is instrumental to the OCO's operations. Through the integration of the HS, OCO affiliates, including the FSM, align their customs categorizations with global benchmarks. This alignment through standardized HS codes ensures uniformity in Pacific customs protocols, facilitating seamless trade interactions between member nations. Using these harmonized codes enables effortless exchange and comparison of customs information among the OCO nations, aiding in examining regional commerce and shaping pertinent policies. Furthermore, the OCO extends technical support and educational services to member states to assure the effective execution of the HS, thereby enhancing customs governance and data-gathering processes.

2.2. Data Assessment & Methodology

Within the framework of the ongoing consultancy that focuses on aggregating customs data from Chapters 28-40 using the HS 2017[9] Code, the subsequent paragraphs will detail the methodology employed in compiling, refining, storing, and producing analysis of chemical imports in the State of Yap. The Office of Customs & Tax in the FSM filters and compiles the relevant import data based on the specific HS chapters and year (HS 2017) required for analysis.

Import data collected in Yap contributes to the FSM's chemical profile. The information collected by the Yap Customs offices encompasses specifics of the goods imported, their categorization, and description according to the HS code, in addition to their quantity, the cost, insurance, and freight (CIF) values, the year of import, the state, and the country of origin. These particular data criteria are employed to extract pertinent statistics across the 13 chapters that focus on chemicals and products related to chemicals.

[9] For HS 2017 Chapters see: https://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2017-edition/hs-nomenclature-2017-edition.aspx

The data collected is methodically arranged and categorized based on the relevant HS chapters, specifically chapters 28 to 40. This process guarantees the data's readiness for further analysis. Once organized and compiled, the customs import data undergoes an exhaustive analysis, considering factors such as total CIF, Country of Origin (COO), and Annual Percentage per Chapter (CPC). The aim is to discern trends, quantities, and values specific to certain commodity groups, pinpoint potential trading trends, and evaluate the primary sources of major chemical imports.

The initial data was compiled from customs statistics for 2019-2021, and the results of the chemical survey conducted in Yap underwent a "cleaning" process before being uploaded to the national database. The data analysis outcomes have been consolidated into detailed data tables and reports featuring visuals, all housed and maintained within the newly developed National Chemical database system. The report will serve as a valuable resource for the government and concerned parties, enabling them to make well-informed decisions and formulate effective policies regarding chemical trade (including tariffs, incentives, and stockpiling strategies). Additionally, these comprehensive data insights assist in fulfilling reporting requirements stipulated by international and regional Conventions and Agreements, such as the Basel and Stockholm Conventions.

2.2.1. Top-Down Analysis of Chemical Imports

The top-down approach to assessing chemical imports provided a comprehensive overview of the national and, in other instances, the regional chemical import landscape. Starting with a macro perspective, this method identifies overarching patterns and trends, pinpoints high-import volume or high-risk substances, gauges existing policies' impact, and sets regulatory and action planning priorities. The derived insights from this approach will inform national chemical management policies and action plans for the FSM National Government (FSMNG) and state levels, ensuring they are effectively aligned with national public health, environmental, and economic objectives and goals set forth under international conventions and agreements the FSM is a Party to.

2.2.2. Bottom-Up Analysis of Chemical Imports

This approach focused on gathering granular data on chemicals directly from the source, i.e., laboratories throughout FSM. By distributing a chemical inventory survey, specific data about chemical names, quantities, storage methods, usage patterns, and more can be collected. A chemical inventory survey was distributed to all known laboratories through the FSM to collect the following data:

- **CAS Number:**[10] Unique identifiers for chemical substances.
- **Chemical Name:** The standardized name of the chemical.
- **Location - Building:** Specific building where the chemical is stored or used.

[10] A CAS Number is a unique numeric identifier designating only one substance. It provides a standard line between the various nomenclature used to describe substances. It serves as an international resource for chemical substance identifiers used by scientists, industry, and regulatory bodies. See: https://www.cas.org/support/documentation/chemical-substances/faqs

- **Location - Room Name or Number:** Specific room or area within the building.
- **Physical State:** Solid, liquid, gas, etc.
- **Description of Hazards:** Specific risks associated with the chemical.
- **Disposal Method:** Recommended ways to discard the chemical safely.
- **Safety Precautions:** Guidelines for safe handling, transport, storage, etc.
- **Amount:** Quantity of the chemical in possession.
- **Units:** Measurement units (from the approved list) for the quantity.

A meticulous chemical inventory survey, employing a bottom-up approach, was utilized to capture specific details necessary for the actual use and importation of chemicals into Yap. The survey, combined with a top-down analysis of imports, yielded a holistic view of the chemical situation in Yap. Furthermore, it traced the journey from place of import to the island, its utilization on the island, and eventual disposal. This dual approach informs policy decisions and safety protocols. It furnishes data on a state and national scale, shedding light on the patterns of chemical usage in Yap and the laboratories.

In-depth inventory processes determine whether laboratories comply with established safety standards, appropriate storage methods, and usage protocols. Additionally, conducting a statewide chemical inventory has added the benefit of urging stakeholders involved in chemical management to evaluate and address specific laboratory needs. These needs may encompass safe equipment, enhanced storage systems, or training programs for laboratory staff.

The data amassed through this method can pinpoint knowledge gaps concerning certain chemicals or reveal inconsistencies in the quantities reported when juxtaposed with the top-down import analysis. Given the absence of established systems for chemical monitoring, reporting, and licensing in Yap, especially for more hazardous substances, it's expected that there might be notable variances between the findings and the two methodologies that were utilized during the analysis.

2.3. Chemical Import Statistics

The chemical import statistics, analyzed for the baseline years of 2019 – 2021, were sourced directly from the DCT division system called PC Trade, which currently uses the 2017 version of the HS codes. Through a rapid analysis, the datasets covering the 13 chapters of interest for Yap State had a significant lack of data for the "Quantity" and "Unit" columns.

An area of concern was the compiled chemical import statistics for the baseline years, which involved the magnitude, measured in the CIF, of chemical imports declared under tariff codes with the description containing "Others". Using such tariff codes provided no helpful information on the description of the items brought into the country. It was surmised that importers may not be as informed and incentive to declare their imports accurately, given that the HS codes and tariff number descriptors are esoteric and time-consuming to search for. To minimize the time costs, importers may tend to settle on the tariff codes labeled "Others" rather than search for the closest match of the imported chemical goods. On the customs side, there is a

clear lack of technical capacity and discipline in capturing precise monetary values or exact descriptions of imports.

Large importing companies tend to be better organized when declaring their imports against appropriate tariff numbers and descriptors. This could be due to companies working with suppliers that are well-informed about the products they export and have to be meticulous when it comes to moving large magnitudes of products (i.e., plastics, paints, pharmaceuticals, etc.), across the world. The goals of the HS system and the need to harmonize tariff codes and descriptions across the globe are meant to increase governments' monitoring and evaluation capacity to understand the magnitude and granularity of trade flows with other countries.

2.3.1. General Observations

All chemical and chemical-related products originate outside of the FSM. The country does not have a production base for chemical or industrial products (aside from those used in construction, such as gravel, coral, and sand). Imports across Chapters 28 - 40 of the HS codes have steady trends. There were no significant spikes or deviations from the average within the baseline years.

However, observations within specific Chapters reveal different trends throughout the baseline years. In addition, a significant amount of imported products was also not specified within all the Chapters that are explored. Those products were labeled as “Others” and oftentimes had significantly high values compared to items that were described and had low values.

2.4. Yap Chemical Import Analysis: Baseline Year 2019 – 2021

Across the baseline years of 2019 – 2021, Yap State imported approximately $11.1 million USD of chemical and chemical-related products. In 2019, Yap had a total of $3.1 million chemicals imported into the state. The following year saw 56% increase in imports of chemical products totaling $4.3 million, and in 2021, total import values decreased to $3.1 million.

***Table 4**: Chemical Import Analysis: Baseline Year 2019 – 2021*

Year	Total (USD)
2019	$3,128,971
2020	$4,883,637
2021	$3,123,288
Grand Total	**$11,135,895**

In 2019, the highest value of chemicals imported into Yap primarily consisted of pharmaceutical products (under Chapter 30) amounting to $921,587, followed by plastics and articles thereof (under Chapter 39) at $757,559 and pesticides (under Chapter 38) at $404,438. In 2020, plastics and articles thereof had the highest value of imports at $2.1 million, followed by pharmaceutical products at $790,222 and pesticide products at $473,913. In 2021, pharmaceutical products had the highest value of chemical imports once again at $865,595, followed by plastics and articles thereof at $761,233. The amount of pesticide products had decreased rather significantly, and other chemical imports for tanning, dyeing, pigments, and paints (under Chapter 32) ranked higher for import value.

Table 5: Chemical Imports based on Chapters 28 to 40 of the HS codes.

Chapter	2019	2020	2021	Grand Total
28	54,954	109,891	4,403	**169,248**
29	18,140	67,957	29,388	**115,485**
30	921,587	790,222	865,595	**2,577,404**
31	39,373	8,761	29,320	**77,454**
32	307,681	380,586	263,943	**952,210**
33	170,830	122,071	232,704	**525,605**
34	267,630	344,157	329,919	**941,706**
35	12,683	22,593	18,838	**54,114**
36	6,087	3,141	4,893	**14,121**
37	1,871	3,267	3,984	**9,122**
38	404,438	473,913	269,704	**1,148,055**
39	757,559	2,118,310	761,233	**3,637,102**
40	166,134	438,773	309,365	**914,272**
Grand Total	**3,128,967**	**4,883,642**	**3,123,289**	**11,135,898**

2.5. Chemical and Allied Industries (Chapters 28 to 40)

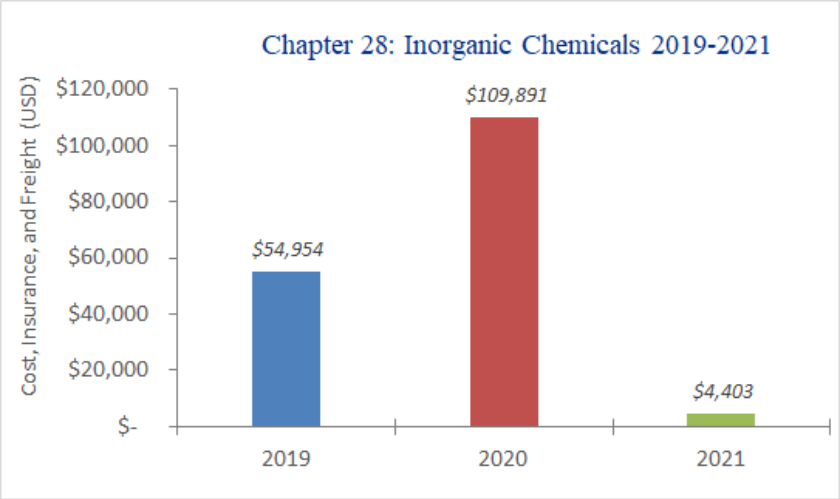
Chapters 28 to 40 of the HS code fall under the "Chemical & Allied Industries" section (Section 6). This section includes a wide range of chemical products and related materials, including inorganic chemicals, organic chemicals, pharmaceutical products, fertilizers, plastics, and rubber articles. The following report segments delve into trend reporting for each chapter, measuring CIF values in USD for the four states across the baseline years.

The chapters are reviewed in ascending order with an overview of the absolute trade values of imports for each chapter across the baseline year. Then, relative increases or decreases are looked at on a year-over-year basis. General trends are assessed for each chapter to examine if there are consistent or irregular patterns for certain chemicals within Yap State.

2.5.1. Chapter 28: Inorganic Chemicals; Organic or Inorganic Compounds of Precious Metals; Isotopes

The key chemical imports for Chapter 28, listed from most minor to most significant in terms of CIF value in Yap, include a variety of inorganic chemicals such as argon, oxygen, aluminum compounds, radioactive elements and isotopes, hydrogen chloride, sulphuric acid, chlorine, and nitrogen. However, a significant amount of inorganic chemicals that are imported are not specified and are labeled as “Others”.

Yap had the highest CIF value for inorganic chemicals in 2020, amounting to $109,891, increasing notably from the previous year in 2019 at $54,954. However, in 2021, CIF values drastically decreased by 95.9% to only $4,403.

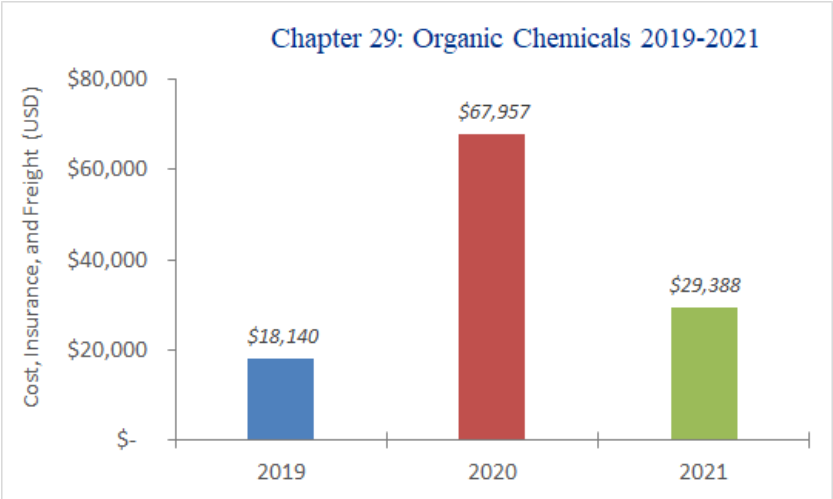


Graph 1: *CIF Value of Inorganic chemicals imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

2.5.2. Chapter 29: Organic Chemicals

The imports under Chapter 29 cover a range of various chemical products such as acetone, alcohol peroxides, ethylene glycol, and chlorodifluoromethane. A significant amount of organic chemicals imported into Yap throughout 2019 - 2021 are not specified and are listed as "Others".

Yap reported a high increase of CIF value regarding inorganic chemicals in 2020, amounting to $67,957 as opposed to the previous year at $18,140. However, CIF values declined in 2021 to $29,388.



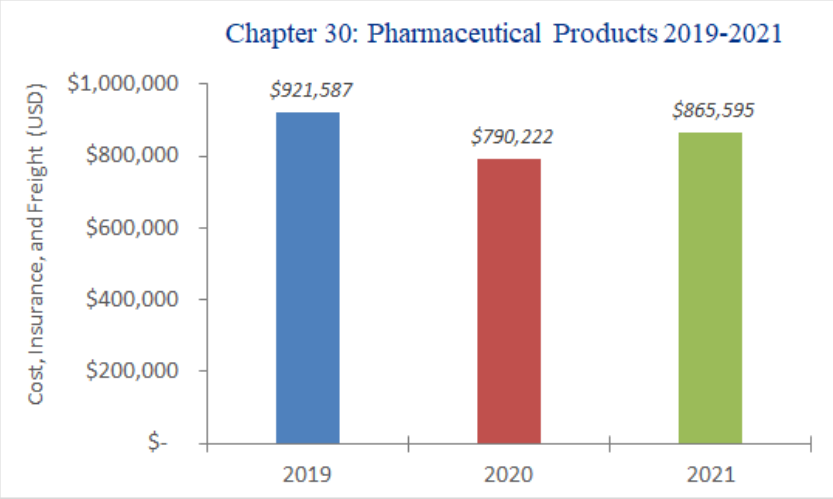
Graph 2: *CIF Value of Organic chemicals imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

2.5.3. Chapter 30: Pharmaceutical Products

Chemical imports under Chapter 30 with high values encompass various medical and healthcare-related products such as:

- Adhesive dressings and other articles with adhesive layers, used for wound care.
- First-aid boxes and kits, which contain various medical supplies for emergency situations.
- Vaccines for human medicine, essential for preventing infectious diseases but carry the risk of adverse reactions.
- Opacifying preparations for X-ray examinations and diagnostic reagents, crucial for medical diagnostics.
- Products containing penicillin, streptomycin, or their derivatives are vital for treating bacterial infections but can trigger allergic reactions.
- Dental cements, other dental fillings, and bone reconstruction cements for dental and orthopedic procedures.
- Products containing antibiotics, essential for combating bacterial infections but carry the risk of antibiotic resistance and allergic reactions.
- Sterile surgical catgut, similar sterile suture materials, and sterile tissue adhesives for surgical wound closure, critical for surgical procedures but carry the risk of infection if not properly sterilized.
- Sterile laminaria and sterile laminaria tents are also included in this category.
- Gel preparations used as lubricants during surgical operations, physical examinations, or coupling agents between the body and medical instruments are essential for minimizing friction and facilitating medical procedures.

It's important to note that a significant number of imports are also not specified and labeled as "Other." Across the three baseline years, Yap had the highest CIF value for pharmaceutical products in 2019, amounting to $921,587. Values decreased the following year to $790,222 and increased in 2021 to $865,595.

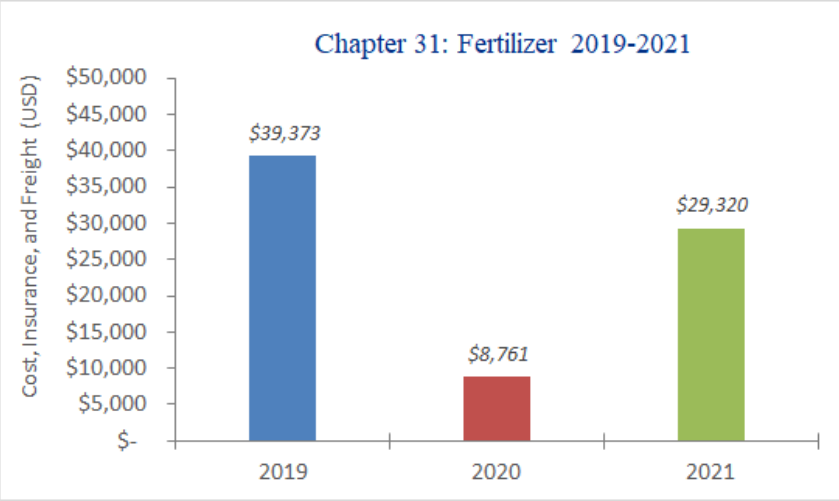


Graph 3: *CIF Value Pharmaceutical Products imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

2.5.4. Chapter 31: Fertilizers

The main chemical imports under Chapter 31 in the FSM encompass various fertilizers and associated products, ranked in ascending order based on their CIF value. The spectrum of these products extends from unspecified mixtures to mineral or chemical fertilizers enriched with essential nutrients like nitrogen, phosphorus, and potassium. It also includes goods from this chapter available in tablet form or similar or in packages not exceeding 10 kg, as well as fertilizers derived from animal or vegetable sources. It is crucial to consider the chemical hazards that are and can be associated with these products.

Yap recorded the highest CIF value for fertilizers, amounting to $39,373. However, CIF values decreased to only $8,761 and increased again in 2021 to $29,320.

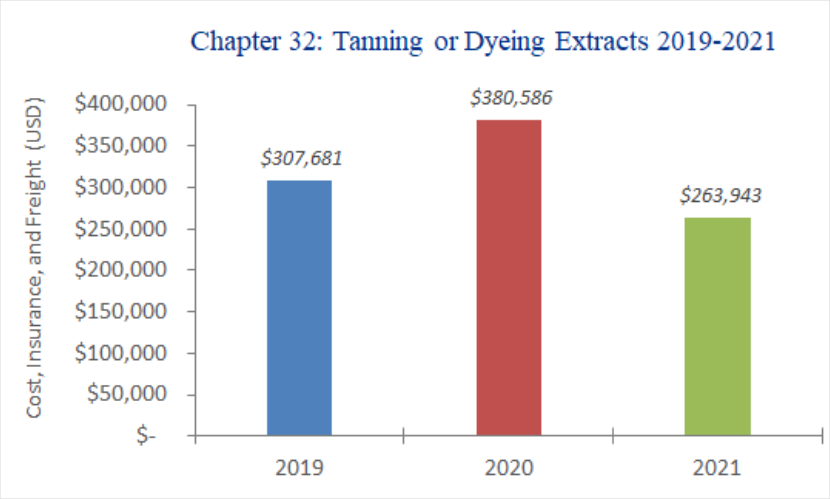


Graph 4: *CIF Value for Fertilizers imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

2.5.5. Chapter 32: Tanning or Dyeing Extracts; Tannins or Derivatives; Dyes, Pigments, and Other Colorants

The top imports under Chapter 32 include various products related to tanning, dyeing, pigments, and paints. Values include acrylic or vinyl polymers and automotive paints. However, a significant amount is not properly specified and is labeled under “Others”.

CIF values for tanning, dyes, and paints in Yap had a gradual increase from 2019 to 2020 by approximately 23.7%, as seen in the figure below. In 2021, CIF values decreased by 30.6% to $263,943.

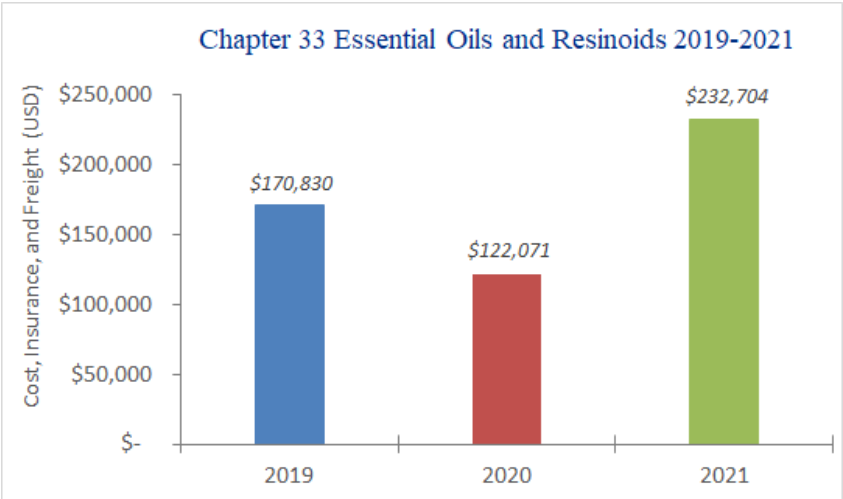


Graph 5: *CIF Value for products imported in Yap State under the HS's Chapter 32 over the period 2019-2021. CIF values are reported in USD.*

2.5.6. Chapter 33: Essential Oils and Resinoids; Perfumery, Cosmetic, or Toilet Preparations

Hair dye, perfumes, and chemical preparations for hair color or hair care, as well as lip and eye makeup, constitute the majority of the chemical imports under Chapter 33. However, a significant number of imports under Chapter 33 are not specified and are listed as "Others."

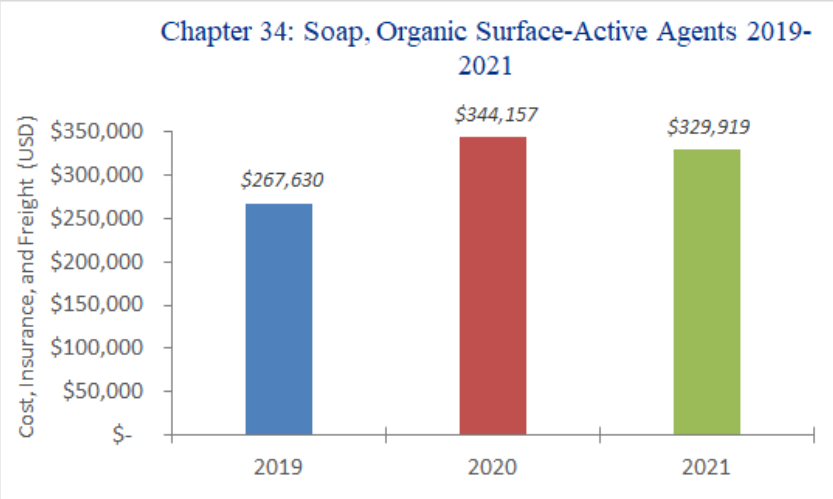
Yap imported $170,830 worth of chemical products under Chapter 33 in 2019. In 2020, import value slightly decreased by 28.6% to $122,071 and increased again in 2021 to $232,704.



Graph 6: *CIF Value for Essential Oils, Resinoids, Perfumery, Cosmetic, or Toilet Preparations products imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

2.5.7. Chapter 34: Soap, Organic Surface-Active Agents, Washing Preparations, Lubricating Preparations, Artificial Waxes, Prepared Waxes

Primary chemical imports under Chapter 34 include medicated or disinfectant soaps, bathing soaps, polishes, creams, and similar preparations for maintenance of wooden furniture, floors, and other woodwork, organic surface-active products, and candles. Similar to previous chapters, a notable amount of products are not specified and are labeled as "Other".

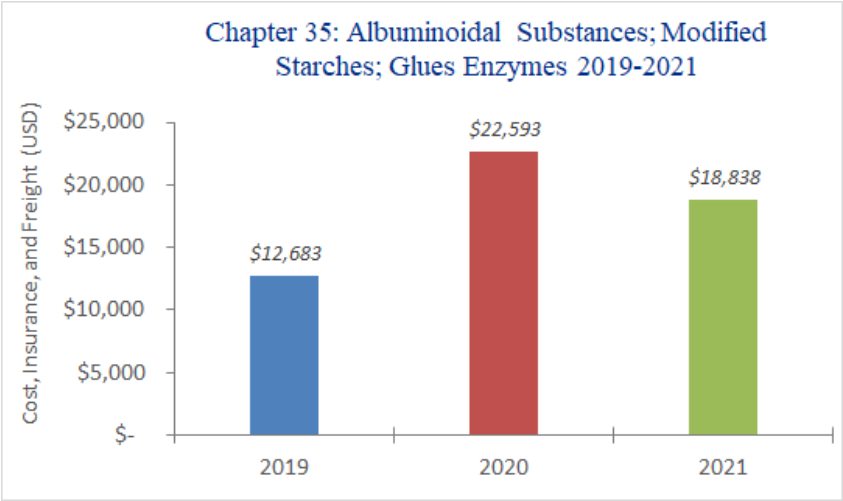


Graph 7: *CIF Value for Soap, Organic Surface-Active Agents, Washing Preparations, Lubricating Preparations, Artificial Waxes, and Prepared Waxes products imported into Yap State over the period 2019-2021. CIF values are reported in USD.*

2.5.8. Chapter 35: Albuminoidal Substances; Modified Starches; Glues; Enzymes

Primary products under Chapter 35 consist of adhesives based on polymers or rubber, glues, and other products suitable for use as glues or adhesives. A notable amount under this Chapter is also not specified and is labeled as "Other".

The value of products imported to Yap in 2019 amounted to $12,683. In 2020, the value increased to $22,593 and saw a decrease the following year to $18,838.

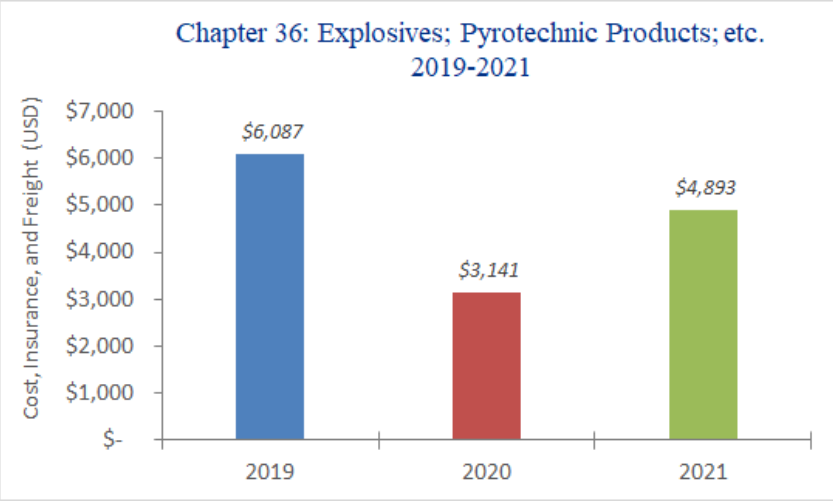


Graph 8: *CIF Values for products imported in Yap State under the HS's Chapter 35 over the period 2019-2021. CIF values are reported in USD.*

2.5.9. Chapter 36: Explosives; Pyrotechnic Products; Matches; Pyrophoric Alloys; Certain Combustible Preparations

Products with the highest value are labeled as "Other" making it difficult to determine what exactly is being imported under this Chapter. The only other descriptions of products listed are "wooden", "percussion cap", and "liquid or liquefied gas fuels in containers of a kind used for filling or refilling cigarette or similar lighters and of a capacity not exceeding 300cm^3".

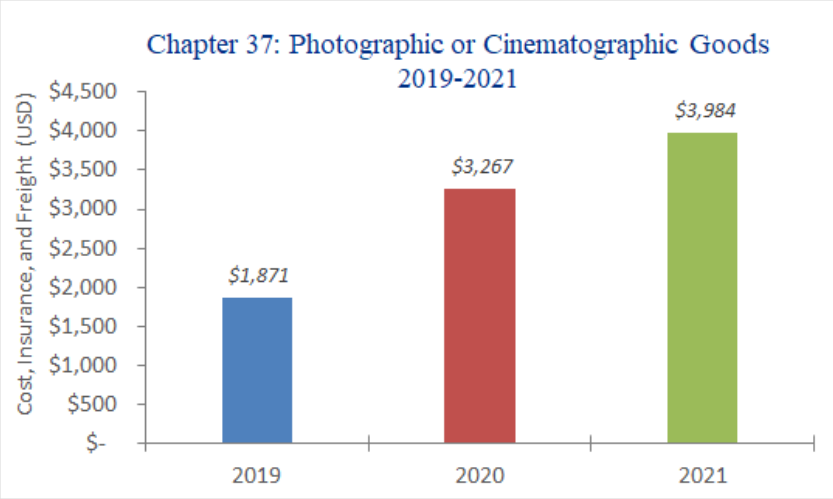
2019 had the highest CIF values under Chapter 36, amounting to $6,087. 2020 saw a decrease in values to $3,141, followed by an increase in 2021 at $4,893.



Graph 9: *CIF Values for products imported in Yap State under the HS's Chapter 36 over the period 2019-2021. CIF values are reported in USD.*

2.5.10. Chapter 37: Photographic or Cinematographic Goods

Yap reported a gradual increase in photographic or cinematographic goods imports throughout the three baseline years. In 2019, the value of goods amounted to $1,871 and increased to $3,267 in 2020. In 2021, the value of goods was the highest at $3,984.



Graph 10: *CIF Value for Photographic or Cinematographic goods imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

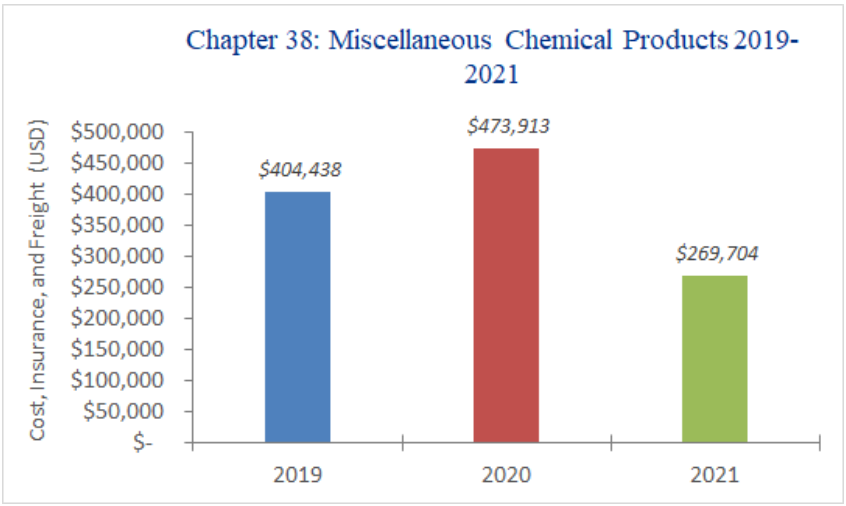
2.5.11. Chapter 38: Miscellaneous Chemical Products

Yap's chemical imports listed under Chapter 38 constitute miscellaneous products such as:

- Pesticides and related chemicals (e.g., fungicides, mosquito repellants)
- Diagnostic or laboratory reagents
- Non-agglomerated metal carbides mixed together or with metallic binders
- Anti-freezing preparations and prepared deicing fluids
- Prepared additives for cements, mortars, or concretes
- Rosin and resin acids

A significant value of products is also not specified and is labeled as "Other."

The year 2020 reported the highest value in imports of miscellaneous chemical products in Yap, amounting to $473,913, a 17.2% increase from the previous year's $404,438. In 2021, imports decreased by about 43.1% to $269,704.



Graph 11: *CIF Value for Pesticides and Related Chemicals imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

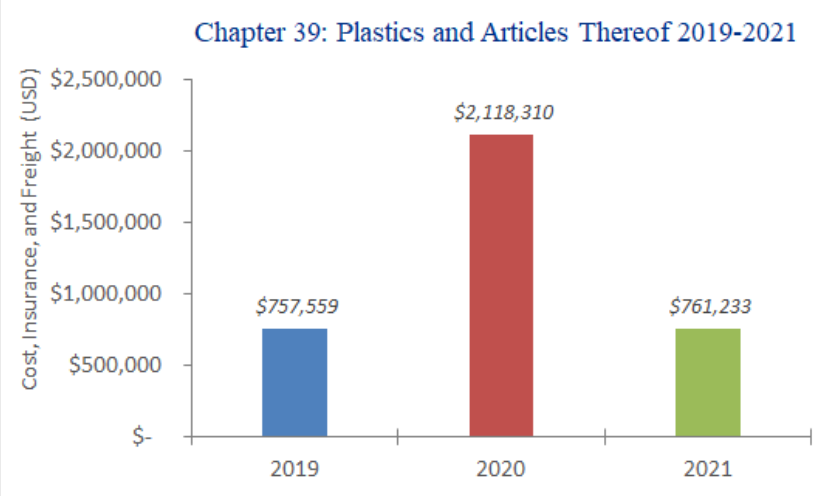
2.5.12. Chapter 39: Plastics and Articles Thereof

Primary chemical imports under Chapter 39 include:

- Artificial guts (sausage casings) of hardened protein or of cellulosic materials
- Reservoirs, tanks, vats, and other similar containers
- Carboys, bottles, flasks, and similar articles
- Natural rubber latex
- Tableware and kitchenware
- Articles of apparel and clothing accessories
- Office or school supplies

A significant amount of products listed under this Chapter were not specified and labeled as "Other".

Imports of plastics and articles had the highest value in 2020, at $2,118,310, about a 179.7% increase from the previous year, when they were at $757,559. However, their values drastically decreased in 2021 by about 64.1%, to $761,233.

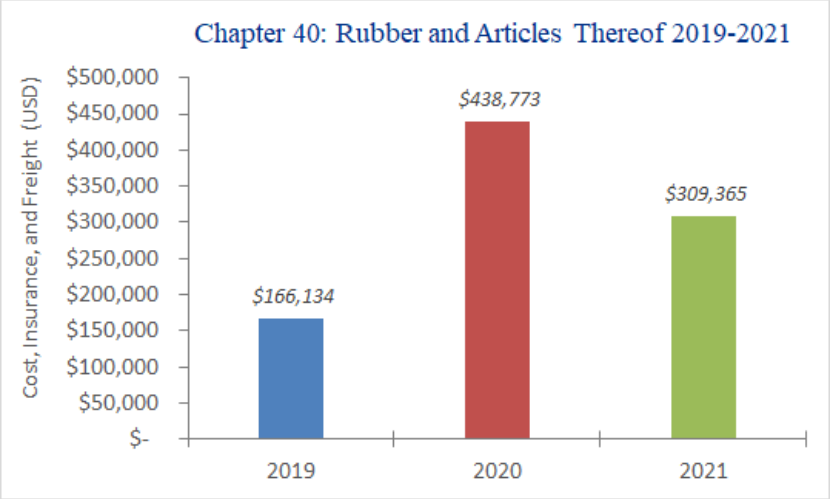


Graph 12: *CIF Value for Plastics and Articles Thereof imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

2.5.13. Chapter 40: Rubber and Articles Thereof

Primary products listed under Chapter 40 include hard rubber, rubber used on buses or lorries, rubber used for motor cars, used pneumatic tires, rubber used as replacement components in motor vehicles, vulcanized rubber, and rubber used on construction, mining, or industrial handling vehicles and machines.

In 2019, the value of products under Chapter 40 amounted to $166,134. The year 2020 reported the highest value at $438,773, and in 2021, the value of rubber goods decreased to $309,365.



Graph 13: *CIF Value for Rubber and Articles Thereof imported in Yap State over the period 2019-2021. CIF values are reported in USD.*

2.6. Chemical Inventory Survey

Several public and private entities have provided inventory lists containing chemicals applicable to medical care, refrigerants, pesticides, herbicides, and fertilizers. The chemical inventory lists provided in the upcoming sections have categorized and displayed key information into four categories: (1) the chemical name, (2) the Chemical Abstract Services (CAS)[11] number, (3) the amount that the chemical is ordered in, and (4) the quantity available. However, the lists provided by the different agencies were found to have missing key information, particularly the CAS number and the quantity that is currently available.

[11] The Chemical Abstracts Service (CAS) numbers refer to the pure substances, not necessarily the solutions or mixtures; solutions or mixtures can vary in composition.

3. Current Chemical Management Practices

The inspection and enforcement of chemicals coming into Yap State primarily falls within the jurisdiction of FSM Customs Office and the Yap State Environmental Protection Agency (EPA). All chemicals imported into Yap State must be transported by ship and cleared by FSM Customs and EPA upon arrival at Waab Transportation Dock. Upon clearing inspection, the government or private sector entity is then responsible for transporting their shipments to their respective storage facility.

EPA is responsible for inspecting chemicals being brought into the State and making sure the supplies are abiding by state laws and regulations. However, there are several challenges regarding the management of chemicals within Yap State due to a lack of human resources and coordination between the relevant departments and/or agencies involved in these procedures. With limited staff, EPA is not able to inspect all the types of chemicals being brought into and stored in different public and private sector entities. Currently, EPA only inspects chemical imports that are of higher caution levels and are not usually sold in stores such as pesticides and fertilizers for Yap's Agriculture and Forestry (DAF), a division under the Department of Resources & Development. Chemical imports that have lower caution levels and can be sold over the counter are not inspected by EPA.

3.1. Major Public and Private Sector Entities Involved in the Import and Use of Chemicals

3.1a Pharmaceuticals

Yap Memorial Hospital

Pharmaceuticals are imported into Yap primarily by the Yap State Department of Health Services (DHS). Protocols for the procurement of chemical supplies for Yap State Health Services fall under the responsibility of the Health Services Procurement Office. The Health Services Procurement Officer highlighted that about 80-90% of chemical supplies that come into the state are sourced from the U.S., and about 10% is sourced from the Philippines. Genesis Hospital in the FSM's capital state of Pohnpei also supplies the Health Department with chemical supplies.

The DHS has a main storage area at the State Hospital that houses most chemical supplies, as well as several smaller storage areas on site located in the dental, pharmacy, and laboratory divisions. Proper storage management is challenging as there is limited capacity. The DHS is looking into finding available land nearby to build a proper storage facility that will house and organize chemical supplies.

DHS's inventory consists of chemicals used in medical care. The chemicals that are listed account for all the Department's divisions.

***Table 6**: Yap DHS Chemical Inventory List*

CAS Number	Chemical Name	Amount	Quantity Available
1310-73-2	Hydrochloric Acid	4 liters	n/a
7664-93-9	Phenol Reagent Crystalline	500 grams	n/a
64-19-7	Acetic Acid	1 liter	n/a
	Gram Stain Kit St/Iodine, Decolorizer, Crystal Violet, Safranin	250 milliliters	n/a
7553-56-2	Iodine Solution	12 grams	n/a
67-56-1	Methanol Solution	1000 milliliters	n/a
64-17-5	Ethanol Solution	32 ounces	n/a
1310-58-3	Potassium Hydroxide Solution	1 liter	n/a
50-0-0	Formaldehyde Powder	500 grams	n/a
632-99-5	Fuschin Basic	100 grams	n/a
2893-56-4	Methyl Blue	25 grams	n/a
548-62-9	Crystal Violet	100 grams	n/a
1330-20-7	Xylene	1 gallon	n/a
24631-29-6	p-amino dimethylaniline oxalate	¼ pounds	n/a
67-64-1	Acetone	1 liter	n/a
7681-11-0	Potassium Iodide	125 grams	n/a
7647-14-5	Sodium Chloride	1 pound	n/a
64-17-5	Reagent Alcohol	1 liter	n/a
7722-84-1	Hydrogen peroxide	n/a	n/a
7681-52-9	Sodium Hypochlorite	n/a	n/a
12125-02-9	Ammonium Chloride	n/a	n/a
111-30-8	Glutaraldehyde	n/a	n/a
	Capsulated amalgam fillings	Assort. boxes	n/a

***Image 2**: Stock of chemicals at Yap Memorial Hospital*

The disposal of used or expired chemical waste is mainly coordinated with the maintenance division which handles the hospital's incinerator. Once the waste is prepared by the division, a maintenance officer will procure the item for incineration. DHS currently has one incinerator in operation.

***Image 3**: Incinerator at Yap Memorial Hospital*

Expired chemical supplies such as tablets from the pharmacy are usually prepared during the day by the pharmaceutical division so that the maintenance officers can incinerate them later in the day.

***Image 4**: Preparation of chemicals and supplies stocked for incineration at Yap Memorial Hospital*

The hospital also has one autoclave in operation in the laboratory division, which sterilizes certain chemical supplies before being incinerated. If future funding is available, the laboratory staff are looking into purchasing an additional autoclave, which could be used as an additional incinerator for chemical waste.

Yap Community Health Center (YCHC)

YCHC is under the DHS and has clinic centers in several municipalities. Each clinic is usually supplied with pharmaceuticals that are restocked weekly based on what the nearby residents need. All medical waste from the clinic centers is set aside in color designated red bags and returned to the hospital to be incinerated.

Island Mortuary Services (IMS)

Mortuary services were a part of the State's Hospital services until 1996, when the State government downsized. Since then, the mortuary became a private family business which is now IMS. All chemical supplies for the IMS are currently being ordered from Australia. The only exceptions are sanitation items such as bleach and gloves that are purchased locally. The business owner is hoping to look into a supplier from the Philippines that would allow for faster shipping and lower transportation costs. For operational procedures such as embalming that require handling of embalming fluid, staff members use medical protective coveralls, face shields, and gloves.

IMS does not have a storage unit specifically for chemical supplies. All chemical and sanitation supplies that are brought in are stored in one of the company's rooms.

***Image 5**: Chemicals stocked at Yap's mortuary.*

Once chemical supplies are opened, they are kept in the operating room until they are used up. IMS is located right across from the State hospital and, as such, utilizes the hospital's incinerator to dispose of waste accumulated from embalming operations, such as gloves, masks, and overalls. Other waste that is disposed of in the incinerator is the containers for fluids used in operations.

***Image 6**: Yap's mortuary set up and chemicals used.*

The owner of IMS noted some challenges, such as a shortage of human resources, especially additional female staff to take care of female corpses. In addition, IMS doesn't currently offer cremation services. Although people's requests for cremations are few, it could be an additional

option that IMS can provide in the future. Purchasing a machine for cremation could also help with the disposal of organs, as the hospital's incinerator isn't allowed to burn organs. Not necessarily a challenge, but a recommendation also noted was additional storage units, as IMS currently has 6 chilled containers for bodies. The owner was also aware that there is no state law that requires routine embalming for every death. The morgue service is optional, and family members decide what happens to the body. The inventory list provided consists of arterial fluids that are used for operation procedures.

***Table 7**: IMS Chemical Inventory List*

CAS Number	Chemical Name	Amount	Quantity Available
	Dodge Introfiant DC[12]	1 liter	n/a
	Dodge Dri-Cav[13]	500 milliliters	n/a
	Dodge Metaflow[14]	1 liter	n/a
	Dodge Rectifiant[15]	1 liter	n/a
	Dodge Metasyn Firming	475 milliliters	n/a

3.1b Laboratories

Three entities are known to have laboratories within Yap State: DHS, DOE, and EPA. The DHS has a working laboratory division located in Yap Memorial Hospital. The DOE used to import chemical supplies for Yap High School's laboratories but has discontinued it in previous years due to limited knowledge of how to properly store their chemicals or dispose of them after usage. Yap COM does have a working laboratory along with a supply of chemicals. YSEPA also has a working laboratory, but it is only used for water quality testing.

Environmental Protection Agency (EPA)

EPA's chemical inventory list consists of chemicals used by the agency and those brought in from outside sources in the state. A handful of chemicals listed below were tagged as hazardous. Discussions with the agency's current acting Director and a site visit revealed that the items themselves are not properly labeled, making it difficult to discern which chemicals in the storage unit are indeed hazardous.

***Table 8**: Yap EPA Chemical Inventory List*

CAS Number[16]	Chemical Name	Amount	Quantity Available
1310-73-2	Sodium Hydroxide	55 gallons	18
7664-93-9	Buffered Sulfuric Acid	50 gallons	114
126-73-8	Tributyl phosphate	1 gallon	68

[12] A main active ingredient of this product is formaldehyde – CAS no. 50-00-0

[13] A main active ingredient of this product is formaldehyde.

[14] A main active ingredient of this product is propylene Glycol – CAS no. 57-55-6

[15] Main active ingredients of this product include propylene glycol and trisodium EDTA – CAS no. 150-38-9

[16] The Chemical Abstracts Service (CAS) numbers refer to the pure substances, not necessarily the solutions or mixtures; solutions or mixtures can vary in composition.

126-73-8	Tributyl phosphate	5 gallons	2
68921-45-9	Alkylated Diphenylamine	1 Quart	45
61791-53-5	N-Tallow-1,3-diaminopropane dioleate	5.5 pounds	28
64742-54-7	Hydrotreated Heavy Paraffinic Distillate	Quart size	70
	Petroleum Asphalt/Mineral Spirits	5 gallons	1
64-19-7	Acetic Acid	5 pints	3
7467-01-0	Hydrochloric Acid	5 pints	2
7664-93-9	Sulfuric Acid	5 pints	3
7664-38-2	Phosphoric Acid	5 pints	1
	Bisphenol A/ Epichlorohydrin	5 gallons	5
7778-54-3	Calcium hypochlorite	10 gallons	3
1310-58-3	Potassium hydroxide	10 gallons	6
12449-55-7	Magnesium fluorosilicate	5 gallons	2
68987-79-1	Aliphatic Urethane	5 gallons	11
64742-88-7	Medium Aliphatic/Aromatic 100 Hydrocarbon	5 gallons	1
111109-77-4	Diproylene glycol methyl ether	5 gallons	1
50-00-0/67-56-1	Formaldehyde/Methyl alcohol	Assorted Sizes	60

3.1c Medical Waste

Medical waste is largely produced by Yap State Hospital and the Community Health Centers. All medical waste is brought to the Hospital's maintenance staff, who are in charge of operating the incinerator.

3.1d Pesticides, Fertilizers, and Herbicides

Yap State Division of Agriculture and Forestry

The DAF imports chemical supplies, such as pesticides, fertilizers, and herbicides. However, the purchasing of supplies is not regular and mainly depends on which project(s) the department is currently undertaking. The process of ordering chemical supplies starts with the staff of the department making a list of supplies they think are needed. The list is then sent out to partners such as the United States Forest Service (USFS), FSMNG, Secretariat of the Pacific Community (SPC), the University of Guam, and the University of Hawaii for further revision and recommendations. The partners look at the list and make suggestions based on assessments of other areas with similar environments to see what types of chemicals they import for agriculture/forestry use and what works best. After recommendations have been sent back to DAF, they go ahead and fill out a pesticide form to be given to EPA for final approval. Once chemical supplies are approved, then DAF is cleared to order their supplies.

All chemical supplies are transported by ship and cleared by FSM Customs and EPA after arrival at Waab Transportation Dock. After inspection, DAF transports their supplies back to their facilities. The DAF currently has a separate storage unit that houses its chemical supplies and other equipment. The DAF staff noted that their latest shipment only consisted of several herbicide products, which are currently stored in the storage unit.

***Image 7**: Chemicals stocked at DAF's storage.*

Containers of chemical supplies that have been used up are kept in a separate building for EPA to pick up and transport to their chemical storage unit. However, it was noted that the officers do not know which current EPA officer is responsible for picking up the containers and that some have been kept in the separate building for quite some time.

***Image 8**: Exhausted chemicals stocked at DAF's storage.*

EPA's storage unit is located on the DPWT's lot, which is next to the main road and out of town. It is considered an all-purpose storage unit as it houses its own chemical waste and other departments as well. Although EPA has an inventory list of supplies stored inside their unit, the items themselves are not properly labeled. It's important to note that the inventory list mentions a considerable number of chemical wastes that are dangerous/hazardous. Discussions with EPA staff, along with a site visit, reveal that the storage unit has reached its capacity for some time. Therefore, EPA has not been able to take in storage requests from other departments that need to dispose of their waste.

The inventory list provided by the DAF consists of chemicals that are currently stored within the department's storage unit, which consists of herbicides.

***Table 9**: Yap DAF Chemical Inventory List*

CAS Number	Chemical Name	Amount	Quantity Available
	Round Up[17]	2.5 gallons	25 gallons
	Garlon 4 Ultra[18]	2.5 gallons	1 gallon
	Escort XP[19]	3.2 ounces	4 ounces

[17] A broad-spectrum glyphosate-based herbicide; glyphosate – CAS no. 1071-83-6

[18] A main active ingredient of Garlon 4 Ultra is triclopyr – CAS no. 55335-06-3.

[19] A main active ingredient of Escort XP is metsulfuron – CAS no. 74223-64-6.

Yap Cooperative Association (YCA)

YCA is a private entity that imports general use pesticides, herbicides, and fertilizers to sell. The company also imports refrigerants for its shop technicians to use on YCA buildings as well as to sell to other technicians on the island.

***Table 10**: YCA Chemical Inventory List, Pesticides, Fertilizers, and Herbicides*

CAS Number	Chemical Name	Amount	Quantity Available
	Raid Insect Spray[20]	n/a	n/a
	Mortein Spray[21]	n/a	n/a
	Black Flag[22]	n/a	n/a
	Baygon Multi-Insect Killer[23]	n/a	n/a
	Termite Killer[24]	n/a	n/a
	Chicken Manure[25]	n/a	n/a
	Top Soil[26]	n/a	n/a

3.1e Refrigerants

Yap Cooperative Association (YCA)

***Image 9**: Refrigerants in stock at YCA.*

YCA is a private entity that imports refrigerants for its shop technicians to use on YCA buildings as well as to sell to other technicians on the island. Refrigerants supplies are not ordered regularly and are based on how much is left in stock. Refrigerants are imported from Taiwan and are mainly for YCA use and to sell to technicians on the island. They are separated from other store products and are kept in the technician's shop. YCA staff are aware of the FSM Customs

[20] Main active ingredients of this product are imiprothrin – CAS no. 7263-72-5 and cypermethrin – CAS no. 52315-07-8.
[21] Extremely flammable; A high percentage of ingredient in this product is butane – CAS no. 106-97-8
[22] Contents not specified.
[23] Main active ingredients of this product include tetramethrin – CAS no. 7696-12-0.
[24] Contents not specified.
[25] Contents not specified.
[26] Contents not specified.

Office's role in inspecting supplies once they arrive in the State but are not aware of EPA's role in inspecting as well. They are aware that EPA conducts random shelf checks throughout the year on what products are being sold in the store. Expired products are usually brought and disposed of at the dumpsite as there is no disposal process that staff members are aware of that is imposed by the State government.

***Table 11**: YCA Chemical Inventory List, refrigerants*

CAS Number	Chemical Name	Amount	Quantity Available
811-97-2	Refrigerant 134a[27]	25 pounds	6
359-53-2	Automotive 134[28]	25 pounds	10
	Refrigerant 404a[29]	25 pounds	20
	Refrigerant 438a[30]	25 pounds	4
	Refrigerant 449a[31]	25 pounds	4
	Refrigerant 410a[32]	25 pounds	12

Yap Save More (YSM)

YSM is another private entity that has a general store and a workshop, and that also imports and sells their own refrigerants. The entity imports refrigerants for its shop technicians to use and sell to other technicians on the islands. YSM has a general store and a repair shop. Two types of refrigerants are ordered from the Philippines for shop use and to sell to other technicians on the island. Based on discussions with the store manager, there is no awareness regarding state legislation that requires a license to import refrigerants. Stocks of refrigerants were stored in the back storage room alongside flammable items and were also found displayed in the outdoor shop section of the store. YSM is another private entity.

[27] R-134a is also known as 1,1,1,2-tetrafluoroethane.

[28] 134 Auto is also known as 1,1,2,2-tetrafluoroethane.

[29] Also known as Freon 404a, a blended HFC refrigerant composed of several chemical compounds such as pentafluoroethane (CAS: 354-33-6), R-134a, and 1,1,1-trifluoroethane (CAS: 420-46-2)

[30] R-438a has a complex structure with a blend of various hydrofluorocarbons including pentafluoroethane (45%) and tetrafluoroethane (44.2%).

[31] Main chemical compounds include difluoromethane (CAS:75-10-5) and penthafluruoethane.

[32] Main chemical compounds include difluoromethane and penthafluruoethane.

***Image 10**: Refrigerants in stock at YSM.*

Management staff and technicians from both private entities are aware that Yap has a team of refrigeration and air-conditioning (RAC) handlers. However, in terms of current officers or level of activeness, that is not well known. One technician from YSM noted that the last RAC meeting in Yap was held early this year due to a state visit by the RAC head officer from Pohnpei. However, he was unaware if there was a head officer in Yap or a source that would know more about Yap's RAC meetings and activities.

***Table 12**: YSM Refrigerant Inventory List*

CAS Number	Refrigerant Type	Amount	Quantity Available
811-97-2	Refrigerant 134a[33]	25 pounds	3
	Refrigerant 410a[34]	25 pounds	3

3.1f Fuel and Petrochemicals

Information from Vital was not available or provided during the assessment period.

3.1g Market Review/Inspection of Chemical Products Available Locally

Market reviews and inspections were completed at two general stores, a hardware store, and one hardware store. Although the island has a drug store located in the town center, pharmaceutical items (e.g., Ibuprofen, Acetaminophen, Aspirin) are available in other general stores. All pharmaceutical items are kept in an air-conditioned room and organized in a neat manner. Items were displayed and labeled in English.

[33] R-134a is also known as 1,1,1,2-tetrafluoroethane.

[34] Main chemical compounds include difluoromethane and penthafluruoethane.

***Image 11**: Pharmaceutical available in general stores.*

The two general stores, along with the hardware store that was assessed, were found to also sell several types of pesticides, fertilizers, and herbicides. Other common household petrochemical items, such as bleach and laundry detergents, were also sold on the store floor. All items were displayed and labeled in English.

***Image 12**: Pesticides, Fertilizers and Herbicides available at Yap's hardware stores.*

4. Legislation and Regulations

Yap State's EPA has the power and duty to control and prohibit pollution of air, land, and water, as stated in YSC Title 18. Chapter 15. Environmental Quality Protection Act (Y.S.L. 3-73). The agency establishes and oversees any programs or regulations that are utilized for air, land, and water usage. In addition, it also oversees pesticide use and administers a permit system for any burning of property or discharge of pollutants into the environment. The agency is responsible for submitting an annual report of its activities to the State Governor and Legislature at a set date towards the end of the year.

EPA has several regulations that can be directly or indirectly linked to chemicals and management of chemicals. The Persistent Organic Pollutant Regulation was implemented in 2015 and provides a priority list of substances that are banned from being possessed, sold, bought, used, applied, stored, transported, discarded, or otherwise discharged by any person. These substances are listed in the table below.

***Table 13**: Priority List of banned substances*

A Priority List of substances declared by Yap State EPA's Persistent Organic Pollutants Regulation, implemented under Yap State Environmental Quality Protection Act.
1. Aldrin
2. Alpha Hexachlorocyclohexane
3. Beta Hexachlorocyclohexane
4. Chlordane
5. Dichlorodiphenyltrichloroethane (DDT)
6. Dieldrin
7. Dioxins
8. Endosulfan
9. Endrin
10. Heptachlor
11. Hexabromobiphenyl and Hexabromobiphenyl ether
12. Hexabromocyclododecane
13. Hexachlorobenzene (HCB)
14. Lindance
15. Murex
16. Pentachlorobenzene
17. Pentabromodiphenyl ether
18. Polychlorinated Biphenyls (PCBs)
19. Polychlorinated dibenzofurans
20. Tetrabromodiphenyl ether
21. Toxaphene

EPA has also implemented several other regulations that are relevant to chemical management:

EPA Regulation	**Purposes relevant to chemical management**
Hazardous Substances Regulation (No. 2015-02)	• Regulating the order, arrival, sale, storage, transport, treatment, and disposal of Hazardous Substances throughout Yap State to minimize the risks to human and environmental health associated with Hazardous Substances. • Provides description of hazardous substances and storage requirements for hazardous waste.
Pesticide Regulation (No. 2014-11)	• Establishing a system that controls the order, arrival, sale, storage, application, handling, use, distribution, disposal and removal of pesticides to protect human health and the environment.
Solid Waste Management Regulation (No. 2015-03)	• Establish standards and criteria for the establishment, maintenance, use, and Decommission of Landfill Facilities within Yap State. • Disposal requirements for hazardous substances, hazardous healthcare waste, organic waste, e-waste and electronics, waste crude oil or petroleum products, and more.
Environmental Requirement for Transport Vessels (No. 2014-04)	• Ensure that maritime and aviation activities of Government, commercial and private vessels within Yap cause minimal environmental harm. • Inorganic waste storage and disposal – where all inorganic waste must be stored on a vessel until it can be responsibly disposed of at Yap State Waste Management Center, or any other waste facility authorized by EPA.
Regulations for the Environmental Clearance of Marine Vessels (No. 2014-06)	• Establishing a procedure for the environmental clearance of incoming marine vessels into Yap State. • Preventing the entry into Yap State of any substances controlled under the Stockholm Convention on Persistent Organic Pollutants; the Montreal Protocol on Substances that Deplete the Ozone Layer (a protocol to the Vienna Convention for the Protection of the Ozone Layer); and the Waigani 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. • Ensuring compliance with (1) the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and (2) the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

4.1 Labeling Requirements

EPA's Hazardous Substance Regulation details labeling requirements for hazardous wastes, stating that "proper labeling of containers must be maintained such that the contents are easily identifiable."

EPA's Pesticide Regulation states that "any pesticide brought into Yap State must have all labeling clearly legible and printed in the English language."

5. Area for Improvement – Recommendations

5.1. Database/Information Sharing

- It is imperative that all organizations engaged in chemical imports maintain an up-to-date inventory list that comprehensively details the chemical products they procure and store.

5.2. Chemical Identification

- Chemical inventory lists should have a section that specifies the CAS number for chemical products that are listed.

5.3. Labeling

- All imported chemicals should have proper and visible labelling when they are inspected at Waab Transportation Dock.

5.4. Transportation

- Chemical transport procedures should be clearly defined for all entities that import chemicals into the State.

5.5. Storage

- Each entity involved in chemical imports should possess a storage unit or facility intended specifically for the containment and management of chemicals according to their hazardousness, toxicity, and other relevant characteristics.

5.6. Disposal/Destruction

- A state-specific management plan is required to address the proper disposal procedure for hazardous compounds that have reached their expiration date.
- The state must conduct a comprehensive assessment of the present condition of the Public Landfill site and the leachate pond, in addition to implementing effective monitoring and management protocols to regulate chemical discharge into the environment.
- The most recent Solid Waste Management Action Plan (2018-2022) for Yap only addressed solid wastes originating from the main island's residential, institutional, and commercial sectors. Although greenhouse gas emissions from waste activities were accounted for, medical waste, hazardous wastes, and liquid and gaseous waste were excluded. The governor of the state has authorized Yap's current Solid Waste

Management Strategy (2018-2027), which includes the "commitment to a clean and beautiful Pacific Region" as one of its guiding principles. Hence, it is imperative that the solid waste management strategy of the state government incorporates medical, hazardous, and other chemical refuse, the proper disposal of which can result in severe environmental consequences.

5.7. Enforcement

- Although the state has implemented regulations concerning the management of chemical and hazardous wastes, the personnel needed to effectively enforce these regulations remain severely constrained.

5.8. Monitoring and Evaluation of Chemical Management Practices

- There is limited capacity both in human resources and technical knowledge to handle and monitor chemical wastes that are accumulating in the State.
- Despite the implementation of several environmental regulations, a comprehensive management plan for the storage, handling, and disposal of hazardous waste remains elusive.

6. Conclusion

Yap State has enacted legislation that established a principal regulatory agency with a dual mandate of safeguarding human health and the environment. A number of regulations have been enforced by the agency to prohibit the importation of specific hazardous POPs chemicals, establish protocols for the management of chemical handling upon their entry into the state, dictate their transportation and handling, and specify the appropriate methods for proper storage and disposal. Nevertheless, an enduring obstacle that has persisted for decades is the insufficiency of human resources to effectively monitor and enforce these regulations in order to ensure compliance.

Appendix I: Hazard ID, Health Effects, and Laboratory Purposes – Department of Health Services

CAS Number	Chemical Name	Hazard ID	Health Effects	Purpose & Potential Use
7647-01-0	Hydrochloric Acid (HCL)	Highly corrosive, can cause severe burns and eye damage.	Inhalation can cause coughing, choking, and inflammation of the respiratory tract.	pH adjuster, used in various industrial processes, cleaning agent.
108-95-2	Phenol Reagent; Crystalline	Causes severe skin burns and eye damage	Can cause irritation, damage, and poisoning to various organs and systems in humans.	Disinfecting skin, removing skin lesions, and providing bacterial properties for plant tissues and human health
64-19-7	Acetic Acid	Corrosive at high concentrations, causing skin burns, and eye damage.	Inhalation can cause coughing or lung irritation; ingestion can cause throat burns.	Vinegar (in dilute form), production of synthetic fibers, and polymers.
7553-56-2	Iodine Solution	Can be irritating to eyes and skin, toxic of ingested in large quantities.	High concentrations can cause thyroid issues, skin irritation.	Antiseptic; used in medical diagnostics, and water purification.
548-62-9	Crystal Violet	Harmful if swallowed	Can cause serious eye damage or irritation	Staining reagent used in Gram staining to differentiate bacteria into groups
477-73-6	Safranin	Considered safe, though may cause slight irritation.	Minimal in small quantities; avoid ingestion and contact with eyes.	Biological stain for highlighting structures in cell biology and microbiology.
67-56-1	Methanol Solution	Highly flammable, toxic if ingested, inhaled, or absorbed through skin.	Can cause blindness, organ damage, or death if ingested.	Solvent, antifreeze, fuel, and denaturant for ethanol.

64-17-5	Ethanol Solution	Highly flammable, can be irritating to eyes and respiratory system.	Inhalation can cause dizziness; ingestion can be harmful or fatal.	Solvent, disinfectant, fuel, and recreational beverage.
1310-58-3	Potassium Hydroxide Solution	Corrosive; poisonous gases are produced if contact with fire	Can severely irritate and burn skin and eyes; inhaling can irritate the lungs	Used in making soap, as an electrolyte in alkaline batteries and in electroplating, lithography, and paint and varnish removers.
50-00-0	Formaldehyde Powder	Carcinogenic; highly irritating to eyes, skin, and respiratory system.	Can cause respiratory issues and cancer upon prolonged exposure.	Preservative in medical laboratories, embalming agent, and industrial applications.
632-99-5	Fuschin Basic			
2893-56-4	Methyl Blue	Flammable liquid and vapor	Harmful if inhaled; causes damage to organs	Used for various reasons: as a dye in diagnostic procedures, a medications for certain conditions, an antidote, or a stain in histology
1330-20-7	Xylene	Highly flammable and toxic	Can irritate skin and eyes through repeated exposure; can be fatal if swallowed	Used as a clearing agent in medicine, dentistry, and laboratories
24631-29-6	p-amino dimethylaniline oxalate	Harmful if swallowed or in contact with skin	Can irritate skin and eyes, causing headache, fatigue, dizziness, and a blue color to the skin	
67-64-1	Acetone	Highly flammable, irritant to eyes and respiratory system.	Inhalation can cause dizziness, headaches; long-term exposure may affect the central nervous system.	Solvent, nail polish remover, laboratory reagent.

7681-11-0	Potassium Iodide	Causes damage to organs through prolonged or repeated exposure	Can cause fever, headache, and nausea	Used to thin mucus and loosen congestion in the chest and throat..
7647-14-5	Sodium Chloride	Not considered hazardous	Can irritate eyes and skin through repeated contact	Used to prevent dehydration and treat various conditions in medicine, such as injections, solutions, wounds, and drops
	Reagent Alcohol			
	Hydrogen peroxide			
	Sodium Hypochlorite			
	Ammonium Chloride			
	Glutaraldehyde			
	Capsulated amalgam fillings[35]			

[35] Contents were not specified, but amalgam fillings are generally made of a mixture of metals including liquid mercury – CAS no. 7439-97-6 and silver – CAS no. 7440-22-4.