



University : National Chin-Yi University of Technology
Country : Taiwan
Web Address : www.ncut.edu.tw



[SDG6] Clean Water and Sanitation

[SDG6.2] Does your university as a body measure the reuse of water across the university?

NCUT Sewage Treatment Operation Process

5-1: Sewage Collection

Domestic sewage from faculty, staff, and students is collected from across the campus.

5-2: Treatment Operations Begin

The sewage treatment plant begins its operation. The manufacturer visits the school twice a month to assist with equipment inspections.

5-3: Water Quality Testing

Water quality tests are conducted to ensure the treated sewage meets discharge standards.

- **5-3-1: Qualified Discharge**
- If the water meets the standards, the treatment process is complete, and the water is reused.
- **5-3-2: Unqualified Discharge**
- If the water does not meet the standards, corrective actions are taken. Possible reasons for failure include:
 1. **Weather Conditions:** Significant temperature changes can affect oxygen levels in the water, impacting treatment results.
 2. **Vacations:** During winter and summer breaks, a reduction in student numbers leads to a decrease in sewage inflow, requiring adjustments in the treatment process.
 3. **Mechanical Failures:** Ongoing regular maintenance is necessary to prevent equipment malfunctions and ensure efficient operations.

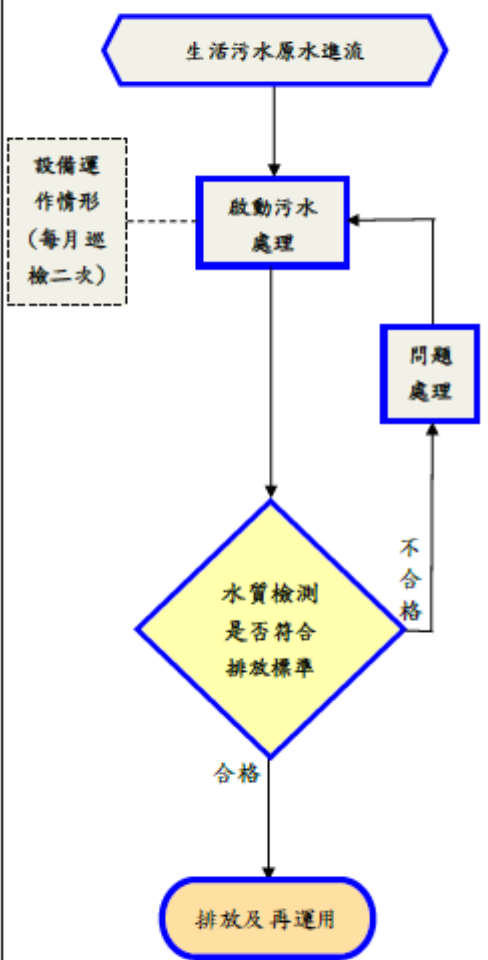
5-5: Reuse of Treated Water

After treatment, the water is discharged and reused for purposes like watering campus plants or as a water source for Mingxiu Lake.

This process ensures effective wastewater management while maintaining compliance with environmental standards.

國立勤益科技大學環境保護及安全衛生中心

污水處理作業流程

<p>1.目的：針對本校教職員工生之生活污水，以生物處理法作適當之處理，務使排放水符合法訂排放標準。</p> <p>2.依據：水污染防治法。</p> <p>3.範圍：全校各棟建築物所排放之生活污水。</p> <p>4.權責：詳如 5 作業說明。</p>			
作業流程	權責單位	執行時間	相關表冊
 <pre> graph TD A[生活污水原水進流] --> B[啟動污水處理] B --> C{水質檢測 是否符合 排放標準} C -- 合格 --> D[排放及再運用] C -- 不合格 --> E[問題處理] E --> B </pre> <p>設備運作情形 (每月巡檢二次)</p>	<p>環安中心 (邱明哲/2576)</p> <p>環安中心 (邱明哲/2576)</p> <p>環安中心 (邱明哲/2576)</p> <p>環安中心 (邱明哲/2576)</p>	<p>即時</p> <p>即時</p> <p>即時</p> <p>每半年 1 次</p> <p>即時</p>	<p>廢(污)水處理設施之操作、用電每次操作及檢查記錄表。</p>

1. Specific Practices and Performance of Water-Saving Measures:

- Develop a comprehensive water conservation management plan or implementation strategy and establish a dedicated promotion team.
- Appoint full-time or part-time water conservation management personnel responsible for overseeing and promoting the execution of water-saving initiatives.
- Conduct a thorough analysis of water-saving opportunities, including but not limited to: laboratory water usage, agricultural (forest) farm water consumption, domestic water (dormitories and dining facilities), restroom water usage, condensate recovery from air conditioning systems, rainwater harvesting, and the reuse of discharged water from the sewage treatment plant.
- Enroll staff members in water conservation courses or seminars organized by government agencies or professional institutions to enhance their knowledge and skills.
- Integrate water conservation into routine operations and utilize gatherings or events as opportunities to advocate for water conservation principles and practices.

2. Specific Improvement Measures for Water Conservation:

a. Enhance Water Savings in the Air-Conditioning System:

- Implement more efficient cooling technologies and equipment.
- Regularly inspect and maintain the air-conditioning system to fix leaks and optimize its water usage.
- Consider the installation of condensate recovery systems to recycle water.

b. Enhance Water Saving Methods for Water Equipment:

- Retrofit water equipment with water-saving devices such as low-flow faucets and showerheads.
- Implement a regular maintenance schedule to address leaks and minimize water wastage.
- Investigate the use of smart meters and sensors for real-time monitoring and control of water equipment.

c. Implement Improvement Measures for Water Saving in Toilets:

- Install dual-flush toilets or retrofit existing ones to allow for varying levels of flushing based on need.
- Replace outdated toilet models with more water-efficient ones that meet industry standards.
- Educate users about responsible toilet use and reporting of leaks.

d. Implement Improvement Measures for Water Saving in Dormitories and Restaurants:

- Encourage responsible water use among residents and patrons through awareness campaigns.
- Install water-saving appliances and fixtures in common areas, such as restrooms and kitchens.
- Develop guidelines for efficient laundry and dishwashing practices.

e. Implement Improvement Measures for Water Conservation in Gardens and Green Spaces:

- Utilize drought-resistant plants and xeriscaping techniques to reduce outdoor water demand.
- Employ smart irrigation systems that adjust watering schedules based on weather conditions.
- Capture and reuse rainwater for irrigation purposes.
- Implement mulching to retain soil moisture and reduce evaporation.



These measures aim to comprehensively address water conservation efforts across various areas of the institution.

3. Rainwater Collection and Reclaimed Water Utilization Measures:

Specific Improvement Measures for Rainwater Collection and Reuse:

a. Enhanced Rainwater Harvesting Systems:

- Upgrade and expand rainwater collection infrastructure to capture and store a greater volume of rainwater.
- Implement advanced filtration and purification techniques to ensure collected rainwater meets quality standards for its intended use.

b. Application Diversification:

- Develop a comprehensive plan for utilizing harvested rainwater across the campus, including irrigation, landscape maintenance, and non-potable water needs.
- Investigate the feasibility of using treated rainwater for flushing toilets and other non-potable applications.

c. Maintenance and Monitoring:

- Establish routine maintenance protocols to keep rainwater harvesting systems in optimal working condition.
- Utilize monitoring systems to track rainwater collection, storage levels, and quality to maximize efficiency and ensure reliability.

Reclaimed Water Reuse Improvement Measures:

a. Advanced Treatment Technology:

- Upgrade reclaimed water treatment facilities with state-of-the-art technology to enhance water quality.
- Ensure that reclaimed water meets all safety and regulatory standards for its intended applications.

b. Expanded Usage Scenarios:

- Explore additional opportunities for using reclaimed water, such as cooling systems, landscape irrigation, or industrial processes.
- Develop clear guidelines and protocols for each reclaimed water application to minimize health and environmental risks.

c. Public Awareness and Education:

- Educate the campus community and stakeholders about the benefits and safety of reclaimed water usage to build trust and encourage its responsible use.

Improvement Measures for Reuse of Discharged Water from Sewage Treatment Plants:

a. Enhanced Treatment Processes:

- Upgrade sewage treatment facilities to improve the quality of discharged water, making it suitable for specific reuse purposes.

- Implement tertiary treatment processes to remove contaminants and pathogens effectively.

Targeted Reuse Applications:

- Identify and prioritize potential reuse applications for the treated wastewater, such as irrigation, industrial processes, or groundwater recharge.
- Develop infrastructure and distribution systems to deliver reclaimed water to designated areas.

Regulatory Compliance:

- Ensure that all reuse practices comply with local, regional, and national regulations regarding reclaimed water quality and safety.
- Regularly monitor and report on the quality of discharged water to relevant authorities.

By implementing these measures, the institution can make significant strides in maximizing the utilization of rainwater, reclaimed water, and treated wastewater while promoting sustainability and resource conservation.

4. Water Conservation Performance Evaluation:

a. Reduction in Target Water Consumption:

- Define and monitor specific reduction goals for water consumption in accordance with the institution's water conservation plan.

b. Change in Average Water Consumption per Person per Year:

- Calculate and track the average water consumption per person annually to measure progress and identify trends.

c. Total Water Savings:

- Calculate the total volume of water saved through various conservation initiatives and practices.

d. Achieved Value of Water Consumption Target:

- Determine the extent to which the water consumption reduction goals have been met or exceeded.

e. Total Water Savings (cubic meters/year):

- Express the total water savings achieved in cubic meters per year.

f. Average Water Consumption per Person per Year (liter/year/person):

- Express the average water consumption per person per year in liters.

g. Cost of Water Saving and Improvement Measures:

- Document the expenses associated with implementing water-saving measures, including equipment, maintenance, and personnel costs.

h. Economic Benefits of Water Saving:

- Calculate the financial benefits resulting from reduced water bills throughout the year due to the implemented water conservation measures.

By evaluating these performance metrics, the institution can gauge the effectiveness of its water conservation efforts, measure cost-effectiveness, and demonstrate the economic benefits of sustainable water management practices.

5. Recognition by the Government for Excellence and Special Innovations:

a. "Water Conservation Outstanding Unit and Outstanding Individual Award" by the Water Resources Department of the Ministry of Economic Affairs:

- Acknowledgment and accolades from the Water Resources Department of the Ministry of Economic Affairs for outstanding achievements in water conservation.

b. Commendations from Other Government Departments:

- Receipt of certificates or official documents of commendation from various government departments recognizing excellence in water conservation efforts.

c. Showcasing Innovative Water-Saving Methods:

- Sharing innovative water-saving methods as exemplary models for other educational institutions to follow and adopt.

These recognitions and innovations underscore the institution's commitment to water conservation and serve as inspiration for others



Sewage plant central control room

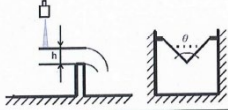


Ultrafiltration device

超音波明渠堰流量計校正報告

校正使用單位:	國立勤益科技大學	報告序號:	DN1121127-04
設備安裝地點:	放流口		
流量計廠牌:	Pulsar ultra3+db6		
流量傳訊器 S/N:	F345719	使用狀態:	正常
超音波感知器 S/N:	142941/2014	使用狀態:	正常

■ 測量方式: V 型三角堰 (V-notch weir)



■ 計算公式: 堰角 $\theta = 90^\circ$ $20 < \theta < 100$

$$Q_s = 4752 \cdot \tan(\theta/2) \cdot h^{2.47}$$

現場流量計	實測水頭	依據水頭高度	器差值 ¹	
顯示即時流量	高度 ³	計算標準即時流量	%	
Q (m ³ /h)	h (cm)	Qs (m ³ /h)	%	
12.3	8.89	12.041	2.15	
16.3	9.95	15.904	2.49	
20.2	10.84	19.665	2.72	

校正日期	112/11/27	操作者	崔仁育
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■ 備註說明:
 *1. 器差值 = $(Q - Q_s) / Q_s \times 100\%$.
 *2. 校正結果依據使用者要求, 判別合格與否。
 *3. 取樣方式: 同時以拍攝截取同一時間現場流量計與已校驗標準件測得水頭高度值

校驗單位:
東量科技股份有限公司
 112.11.28
 檢驗章

公司住址: 台中市大里區仁美路137巷26號
 電話: 04-24910688
 傳真: 04-24938488

Regular calibration of ultrasonic flow meter water meter

興亞環保科技股份有限公司

環境部環境檢字第 201 號(原環署環檢字第 201 號)
 檢驗室地址: 台中市西屯區工業區七路11號1樓 電話: 04-23507275 傳真: 04-23507280

水質樣品檢測報告

客戶名稱: 勤益科技大學 專案編號: MR112WA02145
 行業別: 大學校院(大學校院) 報告編號: MR112WA02145
 採樣單位: 興亞環保科技股份有限公司 採樣日期: 112 年 11 月 08 日
 採樣方法: NIEA W109.53B 收樣日期: 112 年 11 月 08 日
 採樣地點: 臺中市大平區坪林里中山路二段57號 報告日期: 112 年 11 月 22 日
 採樣行經編號: HWFA23110033 聯絡人: 曾仁育
 檢測目的: 定檢申報

樣品編號	WAI12110803		檢測方法	最大限值	備註
	-01	-02			
採樣時間	13:49-13:59	13:43-13:48			
樣品名稱(特性)	廢水(液體)	廢水(液體)			
檢測項目	檢測值				
水質參數(組別)	8.0	7.8	NIEA W024.53A	*	
水溫	29.4	29.3	NIEA W217.51A	*	
懸浮固體	73.0	24.5	NIEA W210.58A	*	
化學需氧量	202	58.8	NIEA W015.55A	*	
生化需氧量	52.2	15.2	NIEA W010.55B	*	
大腸桿菌群	CFU/100mL 2.5X10 ⁵	7.5X10 ⁴	NIEA E202.55B	*	
	以下空白				

備註: 1.本報告共 1 頁, 分發使用無效。
 2.關於方法採測檢測之測定值以 "ND" 表示, 至於檢測檢測之方法係指測測法(MDL)。
 3.關於本報告檢測之測定值係指檢測之數值, 以 "Qs" 表示並說明其測定係指。
 4.報告由本檢驗室執行採樣, 本報告僅對採樣負責, 不得隨意複製或作為宣傳廣告之用, 測值僅供參考。
 5.當數據為客戶所提報時請以 "ND" 表示, 當數據為客戶所提報且可能影響結果者, 本報告僅對數據負責。
 6.若檢驗室採樣檢測數據有不符合規定事項, 請檢測報告上備註, 測值僅供參考。
 7.本報告檢測系統資料: 檢測時間 13:38-14:01

聲明書: 1. 茲保證本報告內容完全依照標準及有關機關之標準方法及品質管理相關規定, 秉持公正、誠實進行採樣、檢測, 絕無虛偽不實, 如有違反, 之行政府處分及刑事處罰。
 2. 本檢驗室所承接之業務除受委託辦理外, 並接受主管機關依法令所為之行政處分及刑事處罰。
 3. 各人瞭解知悉本檢驗室係受委託辦理, 亦屬於附屬上之公務員, 並應遵守上述相關法律、公務員懲戒法及公務員懲戒法之相關規定, 如有違反, 亦為附屬及公務員懲戒法之適用對象, 應受最嚴厲之法律制裁。

公司名稱: 興亞環保科技股份有限公司
 負責人: 楊仁治
 檢驗室主任: 曾仁育
 報告專用章
 興亞環保科技股份有限公司
 負責人: 楊仁治
 檢驗室主任: 曾仁育
 (第 1 頁)

Regular water quality testing

Additional evidence link:

[能源與環境人才培訓 | 國立勤益科技大學 能源與環境科技中心 \(igets.org\)](http://www.igets.org)