

**DETECTION OF HEAVY METAL IN SEDIMENT COLLECTED
FROM COASTAL ZONES OF BARANGAY MALAUBANG
AND PULOT, PANGUIL BAY, OZAMIS CITY, MISAMIS
OCCIDENTAL, PHILIPPINES**

A RESEARCH PAPER

Presented to
the Faculty of Bachelor of Science in Medical Technology
Misamis University
Ozamiz City



In Partial Fulfillment
of the Requirements for the Degree
BACHELOR OF SCIENCE IN MEDICAL TECHNOLOGY

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June 2026



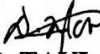
Misamis University
Ozamiz City
COLLEGE OF MEDICAL TECHNOLOGY



DEPARTMENT OF MEDICAL TECHNOLOGY

CERTIFICATE OF PANEL APPROVAL

The research paper attached hereto, entitled “DETECTION OF HEAVY METALS IN SEDIMENT COLLECTED FROM COASTAL ZONES OF BARANGAY AMALAUANG AND PULOT, PANGUIL BAY, OZAMIS CITY, MISAMIS OCCIDENTAL, PHILIPPINES”, prepared and submitted by **RENNCYZ R. LUMINGKIT, JAN CEASAREE D. MAHINAY, PRINCESS ABEGAIL B. SEGUERRA**, in partial fulfilment of the requirements for the degree **BACHELOR OF SCIENCE IN MEDICAL TECHNOLOGY**, is hereby recommended for approval.

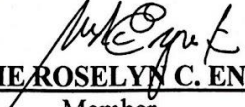

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ABSTRACT

Heavy metals such as mercury, cadmium, arsenic, chromium, nickel, copper, and lead occur naturally but become toxic when they accumulate in organisms. This study quantitatively detects and compares the concentrations of lead (Pb) and cadmium (Cd) in sediment collected from coastal zones of Barangay Malaubang and Pulot, Panguil Bay, Ozamiz City, Misamis Occidental, to identify possible anthropogenic sources of contamination. Using Shimadzu AA-7000 Manual and EPA Method 3050 B for Acid Digestion of Sediments, Sludges and Soils as reference methods, through the instrumentation of Flame Atomic Spectroscopy, the concentrations of Pb and Cd from samples collected in both barangays were determined. Pb was measured to have an average concentration of 4.06 mg/kg in Brgy. Pulot, and an average of 1.77 mg/kg in Brgy Malaubang. Cd had a lower concentration in both barangays compared to the reporting limit, yielding an undetected measurement for both barangays. Using Interim Sediment Quality Guidelines and NOAA SQuiRT Report, both parameters were identified to have no biological effect in its surroundings due to their low concentration.

Keywords: *Concentration, threshold effect limit, biological effect, contamination level, pollution*

DEDICATION

*This research study is wholeheartedly dedicated to our beloved parents, **Rene Boy S. Lumingkit, Nancy Fe R. Lumingkit, Hermie B. Seguerra, Benjamin M. Seguerra Jr., and Leonita Mahinay**, whose unwavering love, sacrifices, encouragement, and guidance became our constant source of strength throughout the completion of this study. Their patience, understanding, and support inspired us to persevere despite the challenges we encountered along the way.*

And,

We dedicate this work to ourselves for our dedication, hard work, resilience, and determination in pursuing these academic endeavors. Through sleepless nights, countless revisions, and continuous learning, we remained committed to achieving our goals and completing this research successfully.

Above all,

This study stands as a reflection of the collective efforts, faith, and perseverance that made this accomplishment possible.

Saree, Badang, & Abby

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The Researchers would like to express their sincere gratitude to everyone who contributed to the completion of this study.

First and foremost, we offer our deepest thanks to God for granting us wisdom, strength, guidance, and perseverance throughout this journey. His blessings gave us hope and courage during times of difficulty and uncertainty.

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We also sincerely thank our research teacher, **Mrs. Nelfa Canini**, for sharing her knowledge, guidance, and encouragement throughout the research process. Her support and teachings greatly contributed to the development of this study.

We extend our gratitude to the local government officials who generously permitted us to conduct sample collection within their jurisdictions. Special thanks to **Hon. Christopher S. Maghanoy, Barangay Captain of Malaubang, and Hon. Rockyfel M. Pactol, Barangay Captain of Pulot**, for their approval and cooperation, which made the field sampling and data gathering possible and safe.

Our deepest gratitude is also given to our beloved parents, **Rene Boy S. Lumingkit, Nancy Fe R. Lumingkit, Hermie B. Seguerra, Benjamin M. Seguerra Jr., and Leonita Mahinay**, for their unconditional love, sacrifices, financial support, understanding, and

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Lastly, we acknowledge our dedication, teamwork, patience, and determination in overcoming the challenges encountered throughout this study. This accomplishment serves as a testament to the collective effort and perseverance of everyone who joined this journey.

Saree, Badang, & Abby

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INTRODUCTION

Background of the study

Heavy metals naturally occur in the environment and are vital for survival, but they may become hazardous when they accumulate in organisms. A few of the most frequent heavy metals that contaminate the environment include mercury, cadmium, arsenic, chromium, nickel, copper, and lead. (Mitra et al., 2022). The term "heavy" often carries a negative connotation due to the perceived toxicity of these metals, which can provoke public concern and fear. In a 2022 Cleveland Clinic article titled "Heavy Metal Poisoning," the authors classified lead (Pb), mercury (Hg), arsenic (Ar), cadmium (Cd), and thallium as the most common toxic metals. Additionally, HMs enter the human body via ingestion, inhalation, medication, and skin absorption. This pollution disrupts the aquatic life cycle and poses a public safety risk to humans (Mofijur et al., 2021).

According to Rasin et al. (2025), cadmium (Cd) is one of the most harmful heavy metals commonly found in water, air, soil, and sediments. Cadmium (Cd) is a toxic element that is not required by all living organisms. It presents numerous environmental risks that might eventually lead to plant ailments and human illnesses. Briseño-Bugarín et al. (2024) also stated that lead (Pb) is a toxic metal associated with several health disorders. Based on toxicity and potential for human exposure, lead (Pb) is among the 10 chemicals of public health concern according to the World Health Organization (WHO) and ranks second on

the Agency for Toxic Substances and Disease Registry (ATSDR) Substance Priority List 2022. In seawater, lead (Pb) can build up in sediments and enter the food chain via marine species, endangering both aquatic life and humans.

According to Zhang et al. (2024), the coastal zone serves as the interface between land and water and provides vital habitats for both people and wildlife, including threatened species. However, anthropogenic disturbances have increased due to rising urbanization and industrialization, resulting in greater release of metal contaminants into coastal habitats. Metals persist in the environment and accumulate in sediments over time, in contrast to organic contaminants.

Sediments can be used to assess anthropogenic metal contamination in aquatic environments because they act as carriers and secondary sources of heavy metals in water. The distribution of heavy metals can be assessed by the extent of sediment contamination, potential risk, mobility, and bioavailability (Gopal et al., 2023). Although heavy metals can be deposited in sediments after being absorbed by suspended materials and amassing to high concentrations, this retention is not permanent, and the metals may be released if the surrounding environment changes (Custodio et al., 2020).

An evaluation of heavy metal accumulation in sediments along the shorelines of Malaubang and Pulot is both relevant and necessary, given recent infrastructure developments, such as the boulevard in Barangay Malaubang, the growth of stalls and stores along the shoreline, and the coexistence of residential and commercial zones along the coast. Although sediment is a major repository of heavy metals and a marker of persistent environmental pollution, previous studies in this area have rarely examined sediment contamination. Determining the concentration levels of heavy metals in the

shoreline sediments are crucial to assessing potential ecological concerns and providing baseline data for future environmental monitoring and management because sediments can accumulate toxins from intense anthropogenic activity.

Conceptual Framework

Figure 1 shows the process of collecting sediment samples from Barangays Malaubang and Pulot using grab sampling, transporting them to the F.A.S.T. Laboratory, and analyzing them to assess and compare heavy metal concentrations.

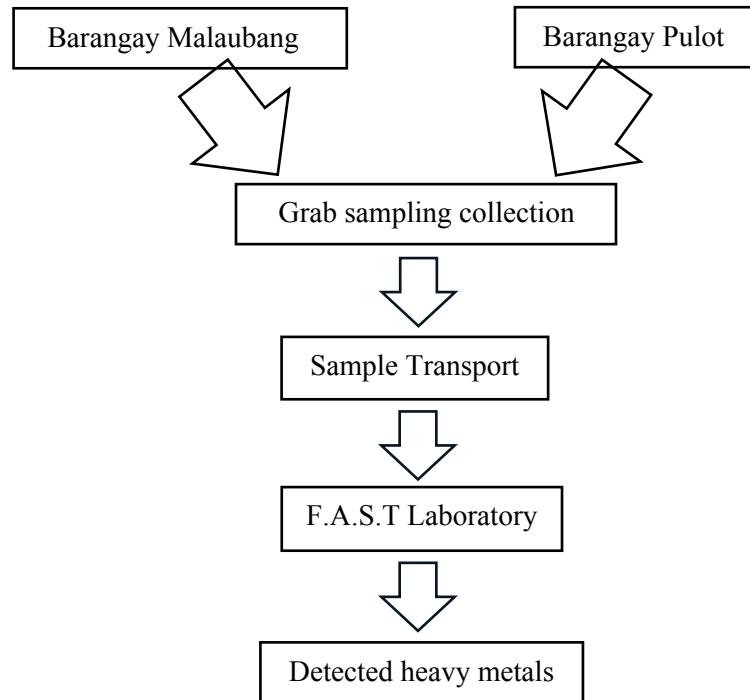


Figure 1. Conceptual Framework of Sediment Sampling and Heavy Metal Analysis in Barangays Malaubang and Pulot

Objectives

The primary objective of this study was to detect and analyze the concentrations of selected heavy metals in sediments from the coastal zones of Malaubang and Pulot, Ozamiz City, Misamis Occidental. The study specifically aimed to:

1. Assess the concentrations of specific heavy metals, including Pb and Cd, in sediment samples taken from coastal zones of Malaubang and Pulot, Ozamis City; and
2. Compare the concentrations of Pb and Cd among different sampling stations along Malaubang and Pulot shorelines.

Significance of the Study

This study was significant for assessing environmental safety in aquaculture areas along the Malaubang and Pulot shores by determining heavy metal concentrations in coastal sediments. Given the on-going importance of aquaculture to food security and local economies, assessing sediment contamination levels was fundamental to identifying potential hazards. The results of this study offered significant insights to various stakeholders: Public Health and Safety by supplying information on sediment quality in aquaculture sites, and it also assisted the aquaculture sector, especially fish cage owners and aquaculture consumers. The Environmental Monitoring and Regulation provides baseline information on the distribution and concentration of heavy metals in coastal sediments. Local Government Units (LGUs) and environmental organizations used these data as a guide to improve coastal pollution monitoring and implement appropriate management plans. Furthermore, by understanding the accumulation of heavy metals in sediments and their potential ecological effects, the study contributed to the existing body of knowledge on marine pollution in Philippine coastal ecosystems, providing a foundation for further environmental studies and evaluations.

Scope and Delimitation

This study was conducted in the coastal Barangays Malaubang and Pulot of Panguil Bay, Ozamiz City, Misamis Occidental. As part of the study, sediment samples from selected sampling points along the shorelines of the two barangays were collected and analyzed in the laboratory. Due to time and resource constraints, only two sampling sites were established, and one sediment sample was collected from each site. Proper labeling of samples was done, and samples were stored and transported to F.A.S.T. Laboratory, Cagayan de Oro City, Misamis Oriental, for analysis by qualified laboratory personnel using Flame Atomic Absorption Spectrophotometry (Flame AAS).

The study was limited to the analysis of sediment samples for lead (Pb) and cadmium (Cd). It did not include other potentially hazardous heavy metals, nor did it include heavy metal concentrations in seawater, aquatic organisms, shellfish, or fish. Furthermore, the study only examined lead (Pb) and cadmium (Cd) content levels and compared them across sample locations. The sources of contamination, seasonal variations, heavy metal diversity, bioavailability, and ecological risk assessment and the direct impacts of heavy metals on aquatic life and human health were not assessed. As a result, the findings were limited to providing basic information on the concentrations of Pb and Cd in the shoreline sediments of the selected coastal regions during the sampling period.

MATERIALS AND METHODS

Research Design

This study employed a quantitative-descriptive research design to determine the numerical concentrations of lead (Pb) and cadmium (Cd) in sediments, compare them across two sampling stations, and perform statistical analysis. Sediment samples were submitted to the F.A.S.T Laboratory in Cagayan de Oro City, Misamis Oriental, where they underwent analysis using EPA Method 3050B for acid digestion and Flame Atomic Absorption Spectrophotometry (Flame AAS) for heavy metal determination.

The analytical process included digesting sediment samples to extract specific metals, followed by quantification using Flame Atomic Absorption Spectroscopy (AAS). In this method, the digested samples were drawn into an air-acetylene flame, where the metals were atomized and subjected to element-specific wavelengths of light. The concentration of each metal was calculated by assessing the amount of light absorbed by the free atoms. This standardized methodology yielded accurate, precise, and dependable measurements of lead and cadmium levels in the collected sediment samples.

Research Setting

This study was conducted in the coastal zones of Barangay Malaubang and Barangay Pulot, Panguil Bay, Ozamiz City, Misamis Occidental, Mindanao, Philippines, 7200. To assess anthropogenic impacts, the distance of each sampling site to the nearest residential area was measured.

Figure 2 shows the sampling sites in Barangay Pulot and Barangay Malaubang. Barangay Pulot is located approximately 64 meters from the residential area. The surroundings are densely populated with houses and show improper waste disposal. Pig pens are located near the site, and wastewater from cleaning, washing, and household activities is discharged directly into the sampling area. The site is also close to a port, indicating a high potential for pollution from human activities.

In contrast, Barangay Malaubang is located approximately 13 meters from the residential area and is strongly affected by urbanization. The construction of roads and seawalls, together with improper industrial waste disposal, has altered the natural ecosystem. The area is also commonly used as a passageway by residents, leading to the accumulation of garbage and solid waste due to poor waste disposal practices. Sediment samples from both Barangay Pulot and Barangay Malaubang were collected during the wet season.

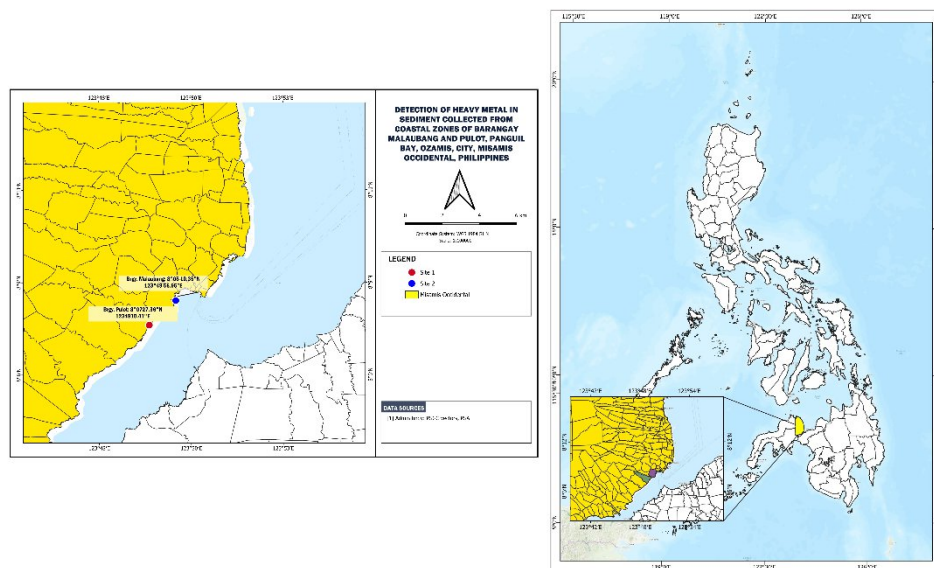


Figure 2. Map of the collection site

Sediment Collection

Formal permission from the local government was first obtained before collecting sediment samples along the shorelines. This study collected sediment samples from the coastal zones of Barangays Malaubang and Pulot, Panguil Bay, Ozamis City, to determine the concentrations of specific heavy metals in the sediment. Sediments were collected using the grab sampling technique. To ensure the accuracy of the findings, two sampling sites were established, and duplicate sediment samples were collected from each barangay. Grab sampling, according to the Central Pollution Control Board (CPCB, 2021), is taking a single sample at a given time and place. For collecting representative sand samples from coastal regions for heavy metal analysis, this technique is suitable.

Samples were collected using a ziplock bag, which was thoroughly cleaned before used. Before sampling, each bag was rinsed several times with site water to reduce contamination. As specified in Standard Method 3030A (APHA, AWWA, & WEF, 2017), flexible containers used for sampling had to be free of any contaminants, and contact with rubber, metal-based paints, cigarette smoke, paper tissues, and other metal objects should be avoided to prevent contamination.

Figure 3 shows the collected sediment sample from the selected site, contained in a ziplock bag that has been rinsed several times with site water to reduce contamination. Figures 4 and 5 present grab sampling at selected sites in Barangay Pulot and Barangay Malaubang, respectively. The sediment samples were analyzed by the F.A.S.T Laboratories using the EPA method 3050B for acid digestion and Flame Atomic Absorption Spectrophotometry (Flame AAS) for heavy metal determination.



Figure 3. Ziplock containing sediment samples



Figure 4. Grab Sample Collection in Barangay Pulot



Figure 5. Grab Sample Collection in Barangay Malaubang

Data Analysis

The data collected from the two sampling locations were analyzed using descriptive statistics. Three replicate measurements were obtained at each sampling site, and the arithmetic mean was calculated to determine the average concentration of the parameter under study. The mean served as the representative value for each location, summarizing the observed measurements.

To obtain a single value for each sampling location, the three replicate measurements were averaged. This method helped reduce the effect of minor variations among individual measurements and provided a more reliable estimate of the parameter concentration at each site.

The computed mean values were then compared with the applicable reference value or regulatory guideline. This comparison was used to determine whether the

measured concentrations were within acceptable limits, exceeded the established threshold, or fell below the benchmark value. Using this approach, the compliance level of each sampling location with the selected environmental quality standard was assessed.

Given the limited number of observations and the study's objective of evaluating compliance with a reference standard, no inferential statistical tests were performed. Instead, the analysis focused on describing the observed values and interpreting the mean concentrations in relation to the established benchmark criterion.

Ethical Consideration

This study adhered to environmental and ethical standards to avoid needless harm. To minimize the environmental impact, only the necessary numbers of sediment samples were collected. All laboratory work was conducted in accordance with biosafety guidelines. The findings were reported honestly, without falsification or manipulation. Sources were appropriately acknowledged, and the findings were utilized solely for academic and scientific purposes. Necessary approvals from the local authority were obtained before proceeding with sample collection.

RESULTS AND DISCUSSIONS

Assessment of Lead (Pb) and Cadmium (Cd) Concentrations in Coastal Zones of Barangay Malaubang and Pulot, Ozamis City

Table 1 shows the raw data of the analysed sediment samples collected from Panguil Bay, Barangay Pulot, Ozamis City. The table presents a comparison of measured values for the detection of Pb and Cd across three (3) trials or replicates.

Table 1. Concentrations of Pb and Cd in sediment samples taken from coastal zones of Barangay Pulot, Panguil Bay, Ozamiz City

Parameters	Trial 1	Trial 2	Trial 3	Average	Interim Sediment Quality Guidelines (ISGQ)
Pb	4.09 mg/kg	3.99 mg/kg	4.09 mg/kg	4.06 mg.kg	30.2 mg/kg
Cd	Not Detected	Not Detected	Not Detected	Not Detected	0.7 mg/kg

Note: Reporting Limit or Cadmium is 0.1 mg/kg; Lead (Pb); Cadmium (Cd)

The data demonstrate strong consistency across both parameters; cadmium (Cd) remained undetected in all trials, while lead (Pb) showed precise and reproducible measurements, yielding an average concentration of 4.06 mg/kg. The undetected measurement of Cd in the samples collected from the indicated sampling site is implied either due to its very low concentration or the total absence of inorganic matter. The indicated reporting limit for the parameter is 0.1 mg/kg. Due to its undetected concentration, the instrument used for this parameter was unable to provide a concentration value, yielding a not detected result.

On a benchmark published in the Interim Sediment Quality Guidelines of the Canadian Council of Ministers of the Environment, values below the ISGQ are least likely to affect the biological activity of the environment. Based on the measured values of both

parameters, the inorganic matter is below ISGQ values, with its concentration within a tolerable range and no expected minimal or adverse effects on biological activities.

Additionally, the Screening Quick Reference Tables (SQuiRT) developed by the National Oceanic and Atmospheric Administration (NOAA, 1999) establish threshold values with corresponding ecological interpretations. Based on this benchmark, the measured Pb concentration is well below the Threshold Effect Level (TEL) of 30,240 ppb (30.24 mg/kg), indicating that Pb in the sampled area is within a range not expected to cause biological harm.

Table 2 presents the raw analytical data of sediment samples collected from Panguil Bay in Barangay Malaubang, Ozamiz City. It also compares the detected values of lead (Pb) and cadmium (Cd), based on three (3) trials or replicates conducted for each parameter.

Table 2. Concentration of Pb and Cd in sediment samples taken from coastal zones of Barangay Malaubang, Panguil Bay, Ozamis City

Parameters	Trial 1	Trial 2	Trial 3	Average	Interim Sediment Quality Guidelines (ISGQ)
Pb	1.82 mg/kg	1.78 mg/kg	1.70 mg/kg	1.77 mg/kg	30.2 mg/kg
Cd	Not Detected	Not Detected	Not Detected	Not Detected	0.7 mg/kg

Note: Reporting Limit of Cadmium is 0.1 mg/kg; Lead (Pb); Cadmium (Cd)

Similarly, Cd has a TEL of 676 ppb (0.676 mg/kg) under the SQuiRT guidelines. Given that Cd was not detected in the samples, its concentration is below levels associated with potential biological effects. Overall, both parameters fall within safe limits, reinforcing the conclusion that the sediment quality in the studied area poses minimal ecological risk.

The results indicate consistent findings for both parameters: cadmium (Cd) was not

detected, and lead (Pb) had an average concentration of 1.77 mg/kg. The undetected Cd levels are reported as such either because they are very low or because they are absent at the sampling location, as the instrument used for measurement fails to detect them. Similar to the previous sampling location, the relatively low levels observed in the samples from this barangay suggest that they are classified as having no adverse effects on biological resources and are not expected to pose significant harm. Deposition of inorganic matter can be driven by various factors, including rock erosion, river water runoff, anthropogenic activities, storm water runoff, and accidental spills (Marine and Estuarine Protection and Restoration Strategies, n.d.). Despite these factors and exposure to anthropogenic activities, both sampling locations still had Pb and Cd concentrations at low levels, with concentrations too low to be considered harmful. The number of inorganic contaminants found in coastal sediments can appear lower than expected because natural processes constantly "mix and spread out" these materials. When rivers, shoreline erosion, and coastal currents bring in large amounts of relatively clean sediments, they can dilute the concentration of heavy metals and other inorganic pollutants already present. In areas with sandy sediments or high rates of sediment deposition, these contaminants become distributed across a much larger volume of material. As a result, even if pollution continues to enter the system from human activities, the measured concentrations may still seem low because the pollutants are not concentrated in one place but are instead widely dispersed within the sediment matrix (Hu et al., 2021).

The Philippines currently lacks the official, legally adopted sediment quality standards. However, the Environment Management Bureau (EMB) is developing an Interim Sediment Quality Guidelines for Metals in Freshwater, intended to support existing

regulations and help improve the overall assessment of both freshwater and marine environments. Although this initiative aims to provide evidence-based reference values, it still relies heavily on internationally recognized standards, particularly those from the National Oceanic and Atmospheric Administration (NOAA), when evaluating sediment quality. Despite its out-of-date publication, NOAA data are still used as a reference in some articles, particularly in the study by Pleto, J., Migo, V., & Arboleda, M. (2020), as standard values for comparison with the data collected in the study.

Comparative Analysis of Lead (Pb) and Cadmium (Cd) Concentrations across Sampling Stations in Barangay Malaubang and Pulot

Table 3 shows the comparison between the collected sediment data and the reference values established by the National Oceanic and Atmospheric Administration (NOAA) in 1999. NOAA-SQuiRT values are intended only as screening-level benchmarks and should not be considered as legal limits or official threshold values.

According to NOAA, the Threshold Effect Limit represents the concentration below which adverse biological effects are not observed, and the values of inorganic substances, such as heavy metals, measured in collected sediments are expected to cause no biological effects in their surroundings.

This criterion was used as a reference for interpreting the datasets across parameters, as the measured concentrations of the target heavy metals at all sampling sites remained low and did not exceed the established threshold values. Accordingly, none of the recorded values met or surpassed the limits defined in the NOAA SQuiRT report, rendering the application of higher-level designations or alternative criteria unnecessary in this discussion. Based on these benchmarks, the concentrations of the measured parameters

across samples from both sampling locations are considered very low.

Table 3. Comparison of average concentrations of Pb and Cd at different sampling locations and the TEL Value from NOAA-SQuiRT Report

Parameters	Brgy. Pulot	Brgy. Malubang	Threshold Effect Limit
Pb	4.06 mg/kg	1.77 mg/kg	30.24 mg/kg
Cd	Not Detected	Not Detected	0.7 mg/kg

Note: Reporting Limit of Cadmium is 0.1 mg/kg; Lead (Pb); Cadmium (Cd)

The deposition and accumulation of inorganic matter, such as trace metals, in coastal sediments are not governed by a single factor but rather result from the interaction among sediment characteristics, hydrodynamic processes, and biogeochemical conditions (Harmesa et al., 2022; Hu et al., 2022; Paul et al., 2024).

In general, sediments with finer particles like clay and silt tend to hold higher concentrations of metals because their larger surface area and reactive mineral components allow contaminants to attach and remain stored more easily, compared to sandy or coarse sediments, where binding capacity is much lower (Hu et al., 2022; Harmesa et al., 2022). At the same time, coastal environments are constantly shaped by waves, tides, and currents, which continuously move and resuspend sediments, often preventing long-term buildup of contaminants and spreading them across wider areas instead of allowing them to concentrate in one place (Geng et al., 2024; Paul et al., 2024). River inputs and coastal circulation can also introduce relatively clean sediments into affected zones, which further reduce observed contaminant levels through natural mixing and dilution processes (Hu et al., 2022).

In addition, chemical conditions such as oxygen availability, pH, and redox potential influence whether metals remain stable and trapped within sediments or are released back into the water column in more mobile forms (Paul et al., 2024). Biological activity by

benthic organisms, along with human disturbances such as dredging and coastal development, further enhances sediment mixing and redistribution, adding another layer of complexity to contaminant accumulation in coastal systems (Geng et al., 2024; Harnesa et al., 2022). Overall, these interacting physical, chemical, and biological processes determine whether inorganic contaminants are effectively sequestered in sediments or remain dispersed and less concentrated in the marine environment.

According to the Philippine Statistics Authority in their 2025 report, Brgy. Malaubang has a population of 9,421 and is classified as a rural barangay—additionally, Brgy. Pulot has a population of 4,116 and is classified the same as Brgy. Malaubang. Despite these factors, the tested concentrations of the determined parameters remained low. According to the paper published by Fan, Li, Lin, Yang, Chen, Cao, Wang, Zhang, Jiang, and Wan in 2024, tidal movement, river flow, and estuarine mixing may contribute to the dilution, redistribution, and transport of heavy metals, limiting their accumulation in sediment samples despite the presence of nearby residential areas and possible anthropogenic inputs. Considering these factors, the low concentrations of focused heavy metals are explained.

CONCLUSION AND RECOMMENDATION

This study determined the concentrations of lead (Pb) and cadmium (Cd) in

sediment samples collected from Barangay Pulot and Malaubang in Panguil Bay, Ozamiz City. The analysis revealed low concentrations of Lead in both sampling sites, while cadmium was not detected in any of the samples. When compared to the NOAA SQuiRT Threshold effects (TEL), every observation went below the set threshold levels. These results indicate that there is no significant Pb or Cd pollution in the sediments from Barangays Malaubang and Pulot; they are within safe environmental limits and do not indicate significant contamination.

Continuous monitoring is recommended to ensure that environmental conditions remain stable and to detect any potential future increase in contamination. With the growing impact of human activities in aquaculture areas, especially in fish pen systems, there is a need for further study on sediment conditions. It is recommended to collect sediment samples from these areas to better understand how feeding practices and other activities may contribute to heavy metal accumulation. Factors such as feeding intensity, stocking density, and nearby pollution sources should also be considered, as they may influence metal accumulation. In addition, identifying possible sources of contamination and examining how heavy metals affect biological activity in the sediments would provide deeper insight. Seasonal changes should also be considered to see how they affect the distribution and concentration of these metals over time.

DECLARATION OF AI TOOLS

The researchers would like to acknowledge the use of Grammarly in assisting me to

review the spelling, grammar, spacing, sentence structure, clarity, and overall readability of my paper during the final stage of writing. The manuscript's grammar, spelling, sentence construction, clarity, and general readability were improved with the use of this AI tool.

The researcher would like to acknowledge the use of Chatgpt [<https://chatgpt.com>] in assisting with modifying and generating ideas, structures, summarizing and organizations of concepts related to the study

The following prompt were used:

“Summarize the main points in a clear and concise conclusion”

“Provide suggestions with examples and alternative wording and sentence improvements”

“Modify the structure so the ideas are organized and easy to follow”

The outputs generated by the AI tools were simply used to help with writing and editing, and they were changed as needed to make sure the content appropriately represented our own thoughts and comprehensions.

LITERATURE CITED

Briseño-Bugarín, J., Araujo-Padilla, X., Escot-Espinoza, V. M., Cardoso-Ortiz, J., Flores de la Torre, J. A., & López-Luna, A. (2024). Lead (Pb) pollution in soil: A systematic review and meta-analysis of contamination grade and health risk in Mexico. *Environments*, 11(3), 43. <https://doi.org/10.3390/environments11030043>

- Central Pollution Control Board (CPCB). (2021). *Water quality monitoring guidelines*. Ministry of Environment, Forest and Climate Change, Government of India. <https://cpcb.nic.in/uploads/Projects-WaterQuality/Water-Quality-Monitoring-Guidelines.pdf>
- Central Pollution Control Board. (n.d.). *Water sampling and preservation techniques*. Retrieved from <https://cpcb.nic.in/displaypdf>
- Cleveland Clinic. (n.d.). *Heavy metal poisoning (toxicity)*. In Cleveland Clinic Health Library. Retrieved from <https://my.clevelandclinic.org/21162-heavy-metal-poisoning>
- Custodio, M., Orellana-Mendoza, E., Peñaloza, R., De La Cruz-Solano, H., Bulege-Gutiérrez, W., & Quispe-Mendoza, R. (2020). Heavy Metal Accumulation in Sediment and Removal Efficiency in the Stabilization Ponds with the Hydrocotyle ranunculoides Filter. *Journal of Ecological Engineering*, 21(5), 72–79. <https://doi.org/10.12911/22998993/122189>
- DENR. (2016). *Water Quality Guidelines and General Effluent Standards of 2016 (DAO 2016-08)*. Department of Environment and Natural Resources. <https://emb.gov.ph/wp-content/uploads/2019/07/DAO-2016-08-WQG-and-GES-2016-1.pdf>
- Fan, Y., Li, Y., Lin, Y., Yang, S., Chen, Z., Cao, X., Wang, C., Zhang, S., Jiang, J., Jiang, M., & Wan, K. (2024). *Mechanistic Links Between Suspended Sediment Dynamics and Metal Partitioning Under Tidal Forcing: A Case Study of Quanzhou Bay*. *Journal of Marine Science and Engineering*. <https://doi.org/10.3390/jmse14040395>
- Gopal, V., Krishnamurthy, R. R., Vignesh, R., Nathan, C. S., Anshu, R., Kalaivanan, R., Mohana, P., Magesh, N. S., Bharath, K. M., Bessa, A. Z. E., Abdelrahman, K., & Abioui, M. (n.d.). Assessment of heavy metal contamination in the surface sediments of the Vedaranyam coast, Southern India. *Regional Studies in Marine Science*, 65, 103081. <https://doi.org/10.1016/j.rsma.2023.103081>
- Harmesa, Wahyudi, A. J., Lestari, & Taufiqurrahman, E. (2022). Variability of trace metals in coastal and estuary: Distribution, profile, and drivers. *Marine Pollution Bulletin*, 174, 113173. <https://doi.org/10.1016/j.marpolbul.2021.113173>
- Hu, R., Wang, Y., Zhang, X., Zhu, L., Luo, M., Liu, B., & Yuan, X. (2022). Sources and factors controlling the distribution of heavy metals in coastal sediments of Haiyang, China. *Marine Pollution Bulletin*, 175, 113152. <https://doi.org/10.1016/j.marpolbul.2021.113152>
- Mitra, S., Chakraborty, A. J., Tareq, A. M., Emran, T. B., Nainu, F., Khusro, A., Idris, A. M., Khandaker, M. U., Osman, H., Alhumaydhi, F. A., & Simal-Gandara, J. (2022). Impact of heavy metals on the environment and human health: Novel therapeutic insights to counter the toxicity. *Journal of King Saud University – Science*, 34(3), 101865. <https://doi.org/10.1016/j.jksus.2022.101865>
- Mofijur, M., Fattah, I. R., Alam, M. A., Islam, A. S., Ong, H. C., Rahman, S. A., Najafi,

- G., Ahmed, S., Uddin, M. A., & Mahlia, T. (2020). Impact of COVID-19 on the social, economic, environmental and energy domains: Lessons learnt from a global pandemic. *Sustainable Production and Consumption*, 26, 343–359. <https://doi.org/10.1016/j.spc.2020.10.016>
- National Oceanic and Atmospheric Administration. (n.d.). <https://www.noaa.gov/>
- Paul, K. M., van Helmond, N. A. G. M., Slomp, C. P., & Jilbert, T. (2024). Trace metals in coastal marine sediments: Natural and anthropogenic sources, correlation patterns, and proxy potentials. *Science of the Total Environment*, 951, 175789. <https://doi.org/10.1016/j.scitotenv.2024.175789>
- Philippine Statistics Authority. (2025). *Philippine Standard Geographic Code (PSGC) – Barangays*. <https://psa.gov.ph/classification/psgc/barangays/1004210000>
- Pleto, J. V. R., Migo, V. P., & Arboleda, M. D. M. (2020). Preliminary water and sediment quality assessment of the Meycauayan River segment of the Marilao-Meycauayan-Obando River System in Bulacan, the Philippines. *Journal of Health and Pollution*, 10(26), 200609. <https://doi.org/10.5696/2156-9614-10.26.200609>
- Rasin, P., V., A. A., Basheer, S. M., Haribabu, J., Santibanez, J. F., Garrote, C. A., Arulraj, A., & Mangalaraja, R. V. (2025). Exposure to cadmium and its impacts on human health: A short review. *Journal of Hazardous Materials Advances*, 17, 100608. <https://doi.org/10.1016/j.hazadv.2025.100608>
- WAC 173-204-310: (2013). <https://app.leg.wa.gov/wac/default.aspx?cite=173-204-310>
- Zhang, L., Tsui, M. T., Kwong, R. W., & Pan, K. (2024). Editorial: Metal contamination, bioaccumulation, and toxicity in coastal environments under increasing anthropogenic impacts. *Frontiers in Marine Science*, 10. <https://doi.org/10.3389/fmars.2023.1349435>
- 3030 Preliminary Treatment of Samples – *Standard Methods for the Examination of Water and Wastewater*. (n.d.). Retrieved from <https://www.standardmethods.org/doi/10.2105>

APPENDICES

APPENDIX A. INFORMED CONSENT FORM

 **Misamis University**
Ozamiz City

 **MISAMIS UNIVERSITY RESEARCH CENTER**
CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)

MU-RC-042/13 November 2024

Thesis/Research Data Gathering Approval Form

Date: 01-15-26

Name of Authors: Renz R. Luningkit, Jan Seavare, O. Mahinay, Prince Atagail p. Aguilera
College/Department: College of Medical Technology
Research Title: Detection of Heavy Metals in Sediment collected from Coastal Zone of Pangasinan, Malabang and Pulet, Pangasinan Bay, Zamboanga City, Misamis Occidental, Philippines

Data Gathering Procedures:



MISAMIS UNIVERSITY
Ozamiz City
Department of Student Affairs & Services

MU-DSAS-006/02June2023

PARENT'S CONSENT

Sponsoring Group/Organization

I am allowing my son/daughter/ward, Rency R. Lumingkit, to join the Laboratory Analysis (activity) to be held on JANUARY 10 APRIL 2024 at CAGAYAN DE ORO CITY under the supervision of MR. Darwin R. Taylaram (Adviser/Faculty).

I understand that Misamis University exercises the necessary safety precautions in this activity.

In consideration of the benefits to be derived from the above activity, I expressly waive any and all claims against the administration or any member of the faculty and staff of the Misamis University on account of any unforeseen accident or injury that my son/daughter/ward might incur in connection with the aforementioned activity.

NANCY R. LUMINGKIT
Signature over printed name of
Parent/Guardian

01-17-2024
Date

RENCY R. LUMINGKIT
Signature over printed name of
Student

01-21-2024
Date

Important: This form shall be submitted to the DSAS Office at least two (2) days before the conduct of the activity.

SUBSCRIBED AND SWORN to before me, this 10 day of JAN 2024 at Ozamiz City, Philippines, that the herein affiant personally came and appeared with his/her _____, as evidence of his/her personal identity.

Doc. No. 1
Page No. 1
Book No. 1
Series of 20 24

ATTY. REY E. BERNAL, RMT
Notarial Commission No. 2025-18
Notary Public for Ozamiz City and Clarin
City Hall Drive, Bernad Subdivision, Aguada, Ozamiz City
PTR No. 6007751; 01/05/2026; Ozamiz City
IBP O.I. No. 576165; 12/29/2025; Pasig City
Attorney's Roll No. 70543
MCLE Compliance No. VIII-0914127; Valid until 04/14/2028

Notary Public

Until _____
PTR No. _____
IBP No. _____
TIN No. _____
Roll No. _____

(For DSAS Personnel only)

Attested by:

RODEL L. BALDADO, MHist, MAEd
OIC, Department of Student Affairs & Services

Date: _____



MISAMIS UNIVERSITY
Ozamiz City
Department of Student Affairs & Services

MU-DSAS-006/02June2023

PARENT'S CONSENT

CLUBE OF MEDICAL TECHNOLOGY
Sponsoring Group/Organization

I am allowing my son/daughter/ward, MAHINAY, JAN CESARDE D., to join the laboratory Analysis (activity) to be held on January, 2024 at Cagayan de Oro City under the supervision of Mr. Darwin R. Taykran (Adviser/Faculty).

I understand that Misamis University exercises the necessary safety precautions in this activity.

In consideration of the benefits to be derived from the above activity, I expressly waive any and all claims against the administration or any member of the faculty and staff of the Misamis University on account of any unforeseen accident or injury that my son/daughter/ward might incur in connection with the aforementioned activity.

[Signature]
LEONITA D. MAHINAY
Signature over printed name of
Parent/Guardian

01-17-2024
Date

[Signature]
JAN CESARDE D. MAHINAY
Signature over printed name of
Student

01-21-2024
Date

Important: This form shall be submitted to the DSAS Office at least two (2) days before the conduct of the activity.

SUBSCRIBED AND SWORN to before me, this 21 JAN 2024 day of January at Ozamiz City, Philippines, that the herein affiant personally came and appeared with his/her _____, as evidence of his/her personal identity.

Doc. No. 939
Page No. 62
Book No. 12
Series of 20 24

ATTY. REY B. BINAG, RMT
Notarial Commission No. 2025-18
Notary Public for Ozamiz City and Clarin
City Hall Drive, Benito Subdivision, Aguada, Ozamiz City
PTR No. 6007451; 01/05/2026; Ozamiz City
IBP O.R. No. 576155; 12/29/2025; Pasig City
Attorney's Roll No. 70348
MCLE Compliance No. VIII-0014127; Valid until 04/14/2028

Notary Public
Until _____
PTR No. _____
IBP No. _____
TIN No. _____
Roll No. _____

(For DSAS Personnel only)

Attested by:

[Signature]
RODEL D. BALDADO, MHist, MAEd
OIC, Department of Student Affairs & Services
Date: _____

APPENDIX B. Cont'd



MISAMIS UNIVERSITY
Ozamiz City
Department of Student Affairs & Services

MU-DSAS-006/02 June 2023

PARENT'S CONSENT

COLLEGE OF MEDICAL TECHNOLOGY
Sponsoring Group/Organization

I am allowing my son/daughter/ward, VEGUERRA, PRINCESS ABEGAIL B., to join
the Laboratory Analysis (activity) to be held on
JANUARY to APRIL 2024 at Cagayan de Oro City under the supervision of
Mr. Darwin R. Taylaran (Adviser/Faculty).

I understand that Misamis University exercises the necessary safety precautions in this activity.

In consideration of the benefits to be derived from the above activity, I expressly waive any and all



Misamis University

Ozamiz City



COLLEGE OF MEDICAL TECHNOLOGY

CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)

Office of the Barangay Captain
Barangay Malaubong, Ozamiz City
Misamis Occidental, Philippines

To whom it may concern,

Warmest Greeting!

We, the undersigned third year students of the College of Medical Technology of Misamis University, respectfully request permission to conduct sample collection for our research study entitled "**Assesment of Heavy Metals in Sediment from Coastal Zones of Barangay Malaubang and Pulot, Panguil Bay, Ozamiz City.**"

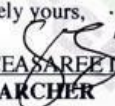
In line with this study, we are required to collect an adequate amount of sediment samples from the shoreline of Barangay Malaubong, which will be subjected to laboratory analysis as part of our research objectives.

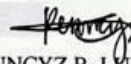
In this regard, we humbly seek for your authorization to allow us to collect sediment samples within your barangay, which is under your jurisdiction. We assure you that the sampling activity will be conducted responsibly, with strict adherence to ethical research standards, environmental safety, and existing local regulations. No damage to the environment or disturbance to the community will result from this activity.

We sincerely hope for your favorable consideration of this request. Should you require further information or clarification, we would be glad to comply.

Thank you very much for your time and support.

Sincerely yours,


JAN CEASARE D. MAHINAY
RESEARCHER
BS MedTech-3


RENNCYZ R. LUMINGKIT
RESEARCHER
BS MedTech-3


PRINCESS ABIGAIL B. SEGUERRA
RESEARCHER
BS MedTech-3



Misamis University

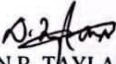
Ozamiz City



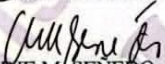
COLLEGE OF MEDICAL TECHNOLOGY

CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)

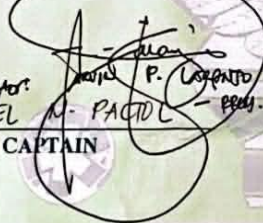
Noted by:


DARWIN R. TALARAN, LPT.
Research Adviser


NELFA D. CANINI, Ph. D.
RESEARCH INSTRUCTOR


EVANGELINE M. SENEDO, RMT., MATMRS.
Dean, College of Medical Technology

Approved by:


ROCK/TEL M. PARDO
BARANGAY CAPTAIN

— 09810191030
— PRES. KAGAWAD - CHIEF COM. ON

APPENDIX C. Cont'd

APPENDIX C. Cont'd

	Misamis University <i>Ozamiz City</i>	
COLLEGE OF MEDICAL TECHNOLOGY		
CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)		
Office of the Barangay Captain Barangay <u>Rio</u>, Ozamiz City Misamis Occidental, Philippines		
To whom it may concern, Warmest Greeting! We, the undersigned third year students of the College of Medical Technology of Misamis University,		



Misamis University

Ozamiz City



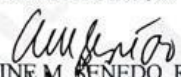
COLLEGE OF MEDICAL TECHNOLOGY

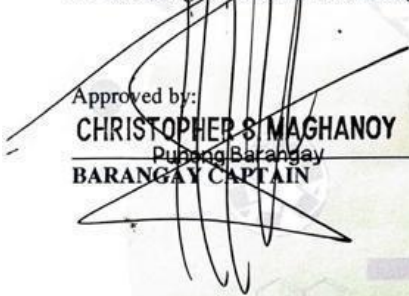
CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)

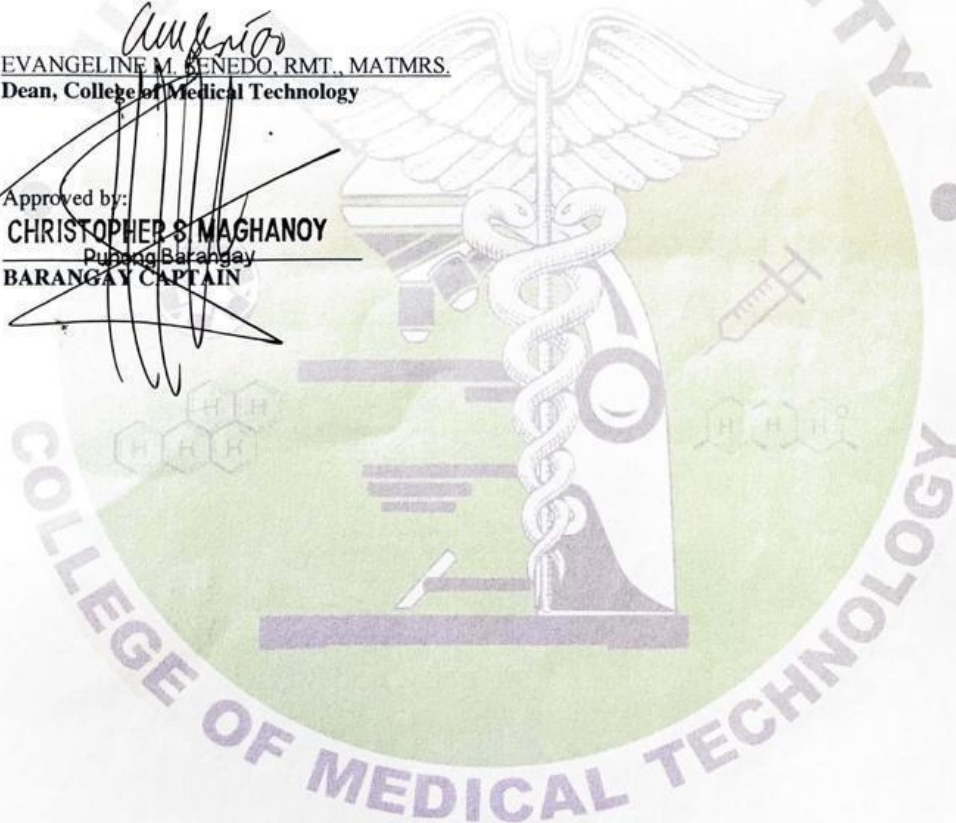
Noted by:


DARWIN R. TAYLARAN, LPT.
Research Adviser


NELFA D. CANINI, Ph. D.
RESEARCH INSTRUCTOR

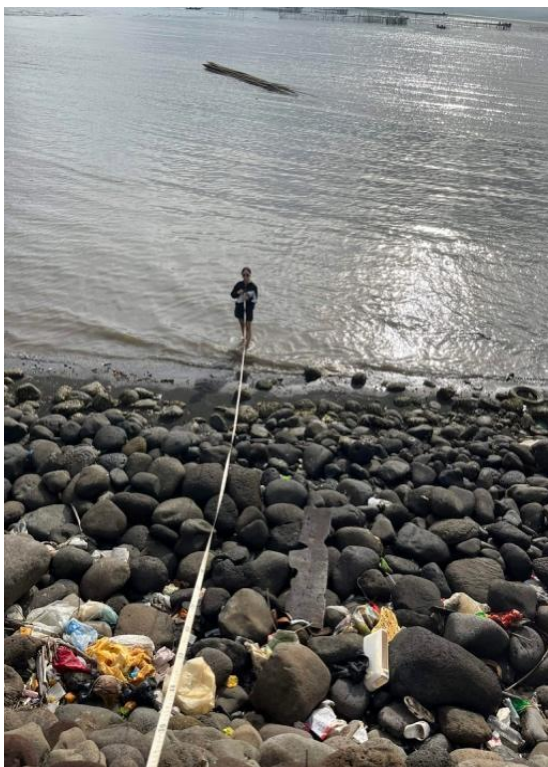

EVANGELINE M. BENEDO, RMT., MATMRS.
Dean, College of Medical Technology

Approved by:

CHRISTOPHER S. MAGHANOY
Pupong Barangay
BARANGAY CAPTAIN



APPENDIX D. Documentation





APPENDIX D. Cont'd





APPENDIX E. Results



F.A.S.T. Laboratories
The First Analytical Services And Technical Cooperative

FOCUS ON EXCELLENCE • ADAPTABILITY TO CHANGE • SOCIAL RESPONSIBILITY • TEAMWORK • LEARNING AND GROWTH • ACCOUNTABILITY • BALANCED

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

Reference No. CD2601-0496
Page 1 of 2

TEST REPORT

CUSTOMER	: JAN CEASAREE D. MAHINAY
ADDRESS	: Ozamiz City, Misamis Occidental
CONTACT PERSON	: Jan Ceasaree D. Mahinay
CONTACT DETAILS	: janceasaree@gmail.com
SAMPLE(S) SUBMITTED	: SEDIMENTS (As Declared)
SAMPLE CODE	: CD2601-0496-01
SAMPLED BY	: Customer
DATE / TIME RECEIVED	: 23 January 2026 / 12:58 PM
DATE ANALYZED	: 02 – 12 February 2026
ANALYZED BY	: S.S. PAHILAN, J.A. CANATOY
DATE REPORTED	: 16 February 2026

Results	

APPENDIX E. Cont'd



FOCUS ON EXCELLENCE • ADAPTABILITY TO CHANGE • SOCIAL RESPONSIBILITY • TEAMWORK • LEARNING AND GROWTH • ACCOUNTABILITY • BALANCED

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

Reference No. CD2601-0496
Page 2 of 2

TEST REPORT

CUSTOMER	: JAN CEASAREE D. MAHINAY
ADDRESS	: Ozamiz City, Misamis Occidental
CONTACT PERSON	: Jan Ceasaree D. Mahinay
CONTACT DETAILS	: jamceasaree@gmail.com
SAMPLE(S) SUBMITTED	: SEDIMENTS (As Declared)
SAMPLE CODE	: CD2601-0496-02
SAMPLED BY	: Customer
DATE / TIME RECEIVED	: 23 January 2026 / 12:58 PM
DATE ANALYZED	: 02 – 12 February 2026
ANALYZED BY	: S.S. PAHILAN, J.A. CANATOY
DATE REPORTED	: 16 February 2026

	Results	
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19% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography

Exclusions

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Match Groups

-  **73 Not Cited or Quoted 17%**
Matches with neither in-text citation nor quotation marks
-  **5 Missing Quotations 2%**
Matches that are still very similar to source material
-  **0 Missing Citation 0%**
Matches that have quotation marks, but no in-text citation
-  **0 Cited and Quoted 0%**
Matches with in-text citation present, but no quotation marks

Top Sources

- 13%  Internet sources
- 9%  Publications
- 13%  Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

No suspicious text manipulations found.

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

APPENDIX F. GRAMMARLY AND TURNITIN RESULTS

DETECTION OF HEAVY METAL IN SEDIMENT COLLECTED FROM COASTAL ZONES OF BARANGAY MALAUBANG AND PULOT, PANGUIL BAY, OZAMIZ CITY, MISAMIS OCCIDENTAL, PHILIPPINES

by Misamis University

General metrics

26,352	3,754	218	15 min 0 sec	28 min 52 sec
characters	words	sentences	reading time	speaking time

Score



This text scores better than 99%
of all texts checked by Grammarly

Writing Issues

1		1
Issues left	Critical	Advanced

Plagiarism

This text hasn't been checked for plagiarism

CURRICULUM VITAE

I. Personal Information

Full Name: Renncyz R. Lumingkit
Date of Birth: December 02, 2004
Age: 21 years old
Ethnicity/Tribe: Cebuano
Place of Birth: Mahayag, Zamboanga del Sur
Gender: Female
Religion: Roman Catholic
Father: Rene Boy S. Lumingkit
Mother: Nancy Fe R. Lumingkit



II. Educational Attainment

College Misamis University

(2023-present)

Secondary Mahayag School of Arts and Trade (Senior High)
Mahayag, Zamboanga del Sur
(2021 to 2023)
Completed Senior High as With Honors

Mahayag School of Arts and Trade (Junior High)
Mahayag, Zamboanga del Sur
(2017-2021)
Completed Junior High as With Honors

Elementary Mahayag Central School
(2011-2017)

III. Honors/Award Received

- With Honors (2017-2021)
- With Honors (2021-2023)

CURRICULUM VITAE

I. Personal Information

Full Name: Jan Ceasaree Mahinay
Date of Birth: January 17, 2006
Age: 20 years old
Ethnicity/Tribe: Cebuano
Place of Birth: Ozamiz City
Gender: Male
Religion: Seventh Day Adventist
Mother: Leonita L. Dalangin



II. Educational Attainment

College Misamis University
(2023-present)
Secondary Pagadian City Science High School (Senior High)

	Tuburan District, Pagadian City (2021 to date)
	Lenoardo National High School (Junior High)
	Leonardo, Josefina, Zamboanga del Sur (2017-2021)
	Completed Junior High as With Honors
Elementary	Calape Central Elementary School Calape, Bohol (2011-2017)
	Graduated with Honors

III. Honors/Award Received

- Division Level Qualifier on Copy Reading English Category in Journalism (2017- 2019)
- 3rd Placer on Radio Broadcasting Qual-C Level (2019-2020)
- With Honors (2017-2020)
- With High Honors (2020-2021)
- Dean's Lister (2025-2026)

IV. Membership in School/Youth Organizations

- Grade 7 and Grade 8 Representative for Supreme Student Government
- Organization (2017-2018)
- Science Club Vice President (2018-2019)
- Local Student Council – Board of Director (2026-2027)

CURRICULUM VITAE

I. Personal Information

<i>Full Name:</i>	Princess Abegail B. Seguerra
<i>Date of Birth:</i>	November 15, 2004
<i>Age:</i>	21 years old
<i>Ethnicity/Tribe:</i>	Cebuano
<i>Place of Birth:</i>	Ozamiz City
<i>Gender:</i>	Female
<i>Religion:</i>	Roman Catholic
<i>Mother:</i>	Hermie B. Seguerra
<i>Father:</i>	Benjamin M. Seguerra Jr.



II. Educational Attainment

College	Misamis University (2023-present)
---------	--------------------------------------

Secondary	Northwestern Mindanao State College of Science and Technology (Senior High) Labuyo Tangub City (2021 to date) Diwat National High School (Junior High) Tusik, Bonifacio Misamis Occidental (2017-2021) Completed Junior High as With Honors
Elementary	Bonifacio Central School D. Fernan Bonifacio Misamis Occidental (2011-2017) Graduated with Honors

III. Honors/Award Received

- With Honors (2017-2020)
- With High Honors (2021-2023)