



Soil Evaluation of the School Grounds of Early Education Institution No. 538-3 in Quichas, Oyón District and Province, Lima Department, Peru

Date of sample collection: July 6, 2024 and July 8, 2025

Report of Results and Recommendations

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The Environmental Health Council (EHC) is a U.S.-based nonprofit organization dedicated to identifying, evaluating, and remediating the effects of environmental toxins on affected communities. The EHC works through a combination of scientific assessment, collaboration with communities and authorities and advocacy to promote environmental and public health.

Within the framework of the objectives of the Environmental Health Council, the soil of the school grounds of Pre School No. 538-3, located in the town of Quichas in the district and province of Oyon in the Department of Lima, Peru, was analyzed and evaluated.

The objectives of the evaluation were:

- To determine whether contamination from former mining operations involved in mineral processing and refining—from the 18th century to the present—have left heavy metal pollution, also known as “legacy contamination.”
- To assess the levels of lead (Pb), mercury (Hg), and arsenic (As) in the soil that children attending, and staff working at, Pre-School No. 538-3 may be exposed to.
- To quantify the concentrations of these heavy metals and compare them with the Environmental Quality Standards (ECAs in Spanish) established in Supreme Decree No. 011-2017-MINAM for soils of residential/park use in Peru.
- To identify areas within the school grounds that require attention, determine the potential health risk for the students and staff, and propose technical recommendations based on the findings.

In July 2024, several soil samples were collected in the community of Quichas. Two samples (QUIC-R-4 and QUIC-R-5) were collected near the school entrance at a location that may have been where mineral processing took place. These two soil samples were very contaminated. Pb, As, and Hg were all above the ECAs, by several orders of magnitude. For example, Pb in sample QUIC-R-5 was 16500 ppm and the ECA for a residential setting which includes the

school exposures for children, is 140 ppm. The samples were analyzed by portable X-ray fluorescence (XRF) using a Niton xl3t GOLDD+.

In July of 2025, The EHC returned to Quichas to collect additional samples on the schoolgrounds of IEI 538-3. Four soil samples were collected from specific areas of the school with exposed soil. To obtain representative soil samples, the following locations were chosen:

1. Schoolyard
2. Rear Schoolyard
3. School garden
4. School entrance

The soil samples were analyzed in the field using a portable XRF (SciAps Model X550), with results expressed in parts per million (ppm), also the same as milligrams per kilogram (mg/kg).

The analysis focused on heavy metals and metalloids of greatest toxicological relevance typically associated with mining activities which are also the main target analytes from the 2024 assessment: Pb, Hg, and As. The MINAM ECAs for the following contaminants in soil for residential/park use are:

- As: 50 mg/kg (ppm)
- Hg: 6.6 mg/kg (ppm)
- Pb: 140 mg/kg (ppm)

Results of soil samples (presented in the attached table)

Arsenic (As): Results ranged from 53 to 5468ppm, and all six samples exceeded the ECA of 50 ppm.

Mercury (Hg): Results ranged from 1 to 1333 ppm, and five of the six samples exceeded the ECA of 6.6 ppm.

Lead (Pb): Results ranged from 104 to 16,500 ppm, and five of the six samples exceeded the ECA of 140 ppm.

Areas of Concern

The results reveal contamination on and near the school grounds that raises serious concerns:

1. School Entrance (QUI25-R-4):
This sample shows alarming levels; exceeding the ECA by 21 times for arsenic, 10 times for mercury, and 16 times for lead. This area is of concern as it coincides with the main entrance of the school.

2. Schoolyard (QUI25-R-1, QUI25-R-2, and QUI25-R-3):
This area shows concerning levels of contamination as several parameters are several orders of magnitude above their respective ECAs. In addition, this area is the most likely area on the schoolgrounds where children interact with soil (ie playground, general outdoor area, and garden).
3. Outside of School grounds near entrance (QUI-R-4 and QUI-R-5):
This area has very high levels of all three heavy metals, suggesting that this is at or near the site of an historic furnace or milling operations. This is further suggested by the reference to this site by Antonio Raimondi in his work *Ancash* (p. 235) and *El Perú* (Vol. 1, p. 257; Vol. 5, p. 98).

Conclusions

1. Areas were identified within Preschool No. 538-3 that significantly exceed the ECAs established in Supreme Decree No. 011-2017-MINAM, for residential/park soils in Peru.
2. The school entrance (QUI25-R-4) and schoolyard (QUI25-R-1) constitute areas of serious health risk for students and staff, requiring immediate intervention by the relevant authorities to eliminate this risk. Children's exposure to these heavy metals in soil can cause irreversible neurological damage, attention deficits, reduced IQ, and other physiological disorders.
3. Significant contamination near the community indicates a broader risk of exposure to heavy metals in soil.

Recommendations

1. Immediately restrict access to contaminated areas, especially the school entrance and schoolyard.
2. Conduct additional evaluation of the soils in and around the school and wider community.
3. Remove contaminated soil and dispose following appropriate disposal requirements or cover the contaminated areas with clean materials, applying layers of clean soil and geotextile fabric, followed by grass, to prevent direct contact and dust generation.

Attachments

- Table – Soil Results
- Figure – Sample Locations

Table of Soil Sample Results
Early Education Institution No. 538-3
Quichas, Oyon, Peru

Sample	Sample Location	As (ppm)	Hg (ppm)	Pb (ppm)
QUI25-R-1	Schoolyard	382	85	1272
QUI25-R-2	Back yard	99	7.2	319
QUI25-R-3	School garden	53	ND	104
QUI25-R-4	School entrance	1050	67	2193
ECA		50	6.6	140

Note: ppm - parts per million or milligrams per kilogram (mg/kg)
 ECA - Environmental Quality Standard per MINAM, Supreme Decree No. 011-2017
 ND - Not detected
 Red shaded cells indicate that the sample result is above the respective ECA



Soil Sample Results
IEI 538-3 School Grounds and Nearby
Quichas, Oyon, Peru

The Environmental Health Council

