**Field Report 2019
Huancavelica Heavy Metals Remediation Project
The Environmental Health Council**

During several field events in 2019, The Environmental Health Council (EHC) conducted assessment of homes and school grounds in Huancavelica and Sacsamarca, Peru, and coordinated externally funded remediation of garden soil at a local school in Huancavelica, and remediated one contaminated home in Sacsamarca.

The field work objectives were as follows:

* Assess additional homes in Huancavelica and Sacsamarca using field portable x-ray fluorescence (XRF) for total metals (As, Hg, and Pb). Sampling events conducted from 2010 to 2018 consisted of the assessment of about 60 homes in Huancavelica and about 30 homes in Sacsamarca homes. This was a continuation of assessment of homes in both Huancavelica and Sacsamarca.
* Assess soil in playgrounds at public schools in Huancavelica using XRF for total metals (As, Hg, and Pb)
* Remediate one home in Sacsamarca by covering interior walls with one-half inch gesso (plaster/stucco) and floors with three inches of concrete.
* Assess municipal water for Hg

**Assessment of Homes**

From July 4 to July 8, 2019, samples from fourteen homes in Huancavelica and nine homes in Sacsamarca were analyzed for total metals (As, Hg, and Pb) with XRF. Composite soil samples were collected from kitchens and bedrooms from the homes and were transferred to Lima for analysis at Laboratorios SAC.

As concentrations ranged from 83 to 4790 ppm with an average of 1248 ppm. Hg ranged from 5 to 757 ppm with an average of 155 ppm. Pb concentrations ranged from 34 to 4424 ppm with an average of 1129 ppm. All but 4 homes had all three contaminants above the Ministry of Environment’s (MINAM’s) residential screening values of 50, 6.6, and 140 ppm. All homes had at least one contaminant above the MINAM residential screening value.

All of the homes assessed during the 2019 event require remediation.

**Assessment of School Playgrounds**

On September 20, 2019 and October 10, 2019 soil samples were collected from nine school grounds for analysis of total metals (As, Hg, Pb) to assess potential risk to children from exposure to heavy metals in shallow soil associated with historic contamination. Samples were collected from a common area were children play at each school and transferred to Laboratorios SAC in Lima for XRF analysis.

The following are the range of detections for each metal of interest in the school soil:

 As – 18 to 343 parts per million (ppm)
 Hg – Not Detected to 552 ppm
 Pb – 18 to 1186 ppm

The limit of detection is approximately 7 ppm for all the metals.

Of the nine sample locations, seven of the samples had As above the MINAM screening value, eight of the samples had Hg above the MINAM Screening value, and 5 of the samples had Pb above the MINAM screening values. Only one school had metals concentrations below MINAM screening values. The rest of the samples had at least one of the metals above the MINAM screening value. Because of the unknown depth of contamination, the EHC did not recommend full removal of the contamination, unless additional depth discrete assessment was conducted. The EHC recommended that the contaminated playgrounds be capped with a hardened surface.

**Remediation**

On the basis of a risk-based ranking of contaminated adobe homes in Sacsamarca, the most contaminated home was remediated by treating the walls with one-half inch of gesso and pouring a 3 in concrete floor. The work was performed for the kitchen and one bedroom and conducted during July 2019. The work was overseen by engineer Gilmer Cortez Cauchos.

During 2019, North Carolina State University Student organization Peru.edu funded the remediation of contaminated soil in the greenhouse of the Preite school in Huancavelica as a result of previous analysis of heavy metal concentrations in soil nearby, as well as the general soil characteristics. Surface soil in Huancavelica commonly has elevated heavy metals from historic ore roasting, and this is especially the case in the San Cristóbal neighborhood where the school is located. Clean agricultural soil was imported to the greenhouse to reduce the risk of exposure to heavy metals by the students and staff. The work was overseen by engineer Gilmer Cortez Cauchos.

**Municipal Water Assessment**

In early 2019 several residents in Huancavelica, Peru found small blebs (several millimeters in size) of elemental Hg in their household water. The Hg came out of the kitchen faucet within the regular flow of water. There were no other visible signs of contamination.

EMAPA (the local municipal water supply) collected eight samples of water upstream of the homes at a water main fire hydrant. The samples were analyzed for Total Hg by Atomic Absorption Spectroscopy at a commercial lab (AGQ Labs) accredited by INACAL and not associated with EMAPA. The samples were also analyzed for field parameters (turbidity, pH, and conductivity as well as several conventional cations and anions and other inorganic metals.

Total mercury results ranged from less than 0.0001 milligrams per liter (mg/l) to detections up to 0.0004 mg/l. AGQ Labs presents two drinking water standards in their report which are 0.002 and 0.001 mg/l. All mercury detections were below the drinking water standards. The lab report presents text (in Spanish) that provides more detail about sample collection and analysis.

In July 2019, The EHC visited six homes that reported finding Hg in their water. The EHC attempted to replicate the flow conditions reported by the residents, visually inspected the contents of the p-traps beneath the kitchen sinks, and collected filter samples of the water from the kitchen faucet. Samples were collected using a sock filter to capture small blebs of Hg that may have been entrained in the water. The sock filters were analyzed as a solid sample using atomic absorption spectroscopy at CETOX labs in Lima, Peru. There were no detections of Hg above the laboratory reporting limit of 0.005 mg/kg.

For additional information, sample results, remediation field reports and other details about the 2019 field event, please contact the EHC via the “contact us” link on the EHC website (www.ehcouncil.org).