

**Soil as a source of lead exposure in Peruvian mining towns:  
A national assessment supported by two contrasting examples**

Alexander van Geen<sup>1\*</sup>, Carolina Bravo<sup>2</sup>, Vladimir Gil<sup>3,4</sup>, Shaky Sherpa<sup>5</sup>, and Darby Jack<sup>2</sup>

<sup>1</sup>Lamont-Doherty Earth Observatory of Columbia University

<sup>2</sup>Mailman School of Public Health, Columbia University

<sup>3</sup>Graduate Environmental Development Program & Department of Social Sciences  
Pontificia Universidad Católica del Perú

<sup>4</sup>Center for Environmental Research and Conservation, Columbia University

<sup>5</sup>Center for International Earth Science Information Network, Columbia University

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\*Corresponding author

Lamont-Doherty Earth Observatory

Route 9W

Palisades, NY 10964

USA

Phone: +1 845 365 8644

Fax: +1 845 365 8155

E-mail: [avangeen@ldeo.columbia.edu](mailto:avangeen@ldeo.columbia.edu)

## Appendix A

(1) The 2001 document “Principales Unidades de Producción Minera Metálica” is the most extensive list of sites available and includes 148 entries which include company name, location by district, location by geographic coordinates, and the type of ore extracted or processed. From this list, a total of 64 “gravas auríferas” (i.e. alluvial placer gold mines) were not considered because they are not likely to be associated with Pb exposure, leaving 84 sites for analysis.

(2) A 2007 map from the Instituto Geológico Minero y Metalúrgico (INGEMMET) was used to identify 55 active mining sites and determine their approximate locations. This document does not include geographic coordinates, however, and the location of these sites was therefore verified using other sources.

(3) The USGS (2006) listing of mineral facilities in Peru documents 101 sites of various types, 60 of which were classified as mines and therefore included in this category of our analysis.

(4) The Ocurrencias Minerales del Perú database by INGEMMET and Google Earth imagery was used to verify the coordinate data. From the three documents above, 96 unique sites were identified after duplicate entries were eliminated, typically retaining the coordinates from the more comprehensive list of “Principales Unidades de Producción Minera Metálica”. Eight mines for which no obvious activity could be identified in Google Earth are included in the list, in some cases because an image of sufficient resolution, or without cloud cover, was not available at the time of the analysis.

(5) An additional 25 mining sites were considered based on a 2008 INGEMMET map for 2008, of which only 17 were retained because the other 8 were not included in any of the other listing or visible in Google Earth. The entire process produced a list of 113 verified, active industrial mining sites distributed across the country.

In the case of ore processing plants, the comprehensive Relación de Plantas de Beneficio en el País issued by the Ministry of Mines that includes coordinates was already available. Of the 162 sites listed in this document, we retained the 138 active sites involving metallic ore. In the case of smelters, there are only three official facilities located in Ilo, La Oroya, and Cajamarquilla. We excluded from this analysis the Engelhard/Colibri gold and silver ore concentration plant whose location within a densely populated area of Lima could not be confirmed.

Finally, the location of mining legacy sites was generated from a 2012 list of compiled by the Ministry of Mines entitled “Informe Inventario de Pasivos Ambientales Mineros” identifying 7743 individual sites with 7152 distinct geographic coordinates. No attempt was made to try to verify this data set independently.

### Data sources:

Peru: Operations and Mining Projects: Instituto Geologico Minero y Metalurgico (INGEMMET) 2007.

Mapa Metalogenetico del Peru: Operaciones y Proyectos Mineros: Instituto Geologico

Minero y Metalurgico (INGEMMET) 2008.

MINEC (Minera Interandina de Consultores S.R.L.). Estudio de Impacto Ambiental: Ampliación de la capacidad instalada de la planta de beneficio Colquisiri y otros, de UM María Teresa – Minera Colquisiri S.A. September 2002.

Ministerio de Energía y Minas. Principales Unidades de Producción Minera Metálica. In: Atlas Minería y Energía en el Perú; 2001.

Occurrencias Minerales del Peru. Instituto Geologico Minero y Metalurgico (INGEMMET); 1999.

U.S. Geological Survey. Table 1: Mineral Facilities of Latin America and Canada; 2006.

Ministerio de Energía y Minas, Dirección General General de Minería. Relación de Plantas de Beneficio en el País; 2004.

Ministerio de Energía y Minas, Dirección General General de Minería. Informe Preliminar: Inventario de Pasivos Ambientales Mineros. 2012.

## **Appendix B**

MS Excel file listing coordinates and available information for individual mines, ore concentration plants, smelters, and mining legacies, as well as total population and surface area of individual buffers.

## **Appendix C**

Google Earth kmz files

- (1) Outline of 312 buffers labeled according to their rank in terms of population
- (2) Location of all individual mining-related activities and legacy sites
- (3) GRUMP population density map for Peru
- (4) Soil Pb data in Cerro de Pasco and Huaral