



Cristian Cardenas Triana
Staff Engineer

Education

MS, Mining Engineering, University of Kentucky, 2021
BS, Mining and Metallurgical Engineering, Universidad Nacional de Colombia, 2017
Academic Exchange Program, Mining Engineering, University of Adelaide, 2016

Registrations/Certifications

Professional Engineer Colombia, South America (#05256-393994)

Experience Summary

Mr. Cardenas is a Mining/Geotechnical Engineer with over 3 years of experience in the mining industry. He has worked in multiple mining areas, including surface mining operations, mine planning, and geotechnical engineering. His international experience includes projects throughout the United States, Australia, and Latin America (Colombia, México, Nicaragua, and the Dominican Republic). Mr. Cardenas is proficient in AutoCAD, Leapfrog, Surpac, Slide, RS2, SLOPE/W (GeoStudio), and Inclinalysis software.

Project Experience

Tailings Storage Facilities

TAILINGS STORAGE FACILITY (TSF) ENGINEER OF RECORD (EOR) SERVICES, LOS GATOS MINE | MÉXICO

Assisted with quarterly and annual monitoring reports. Reviewed TSF monitoring data from inclinometers, piezometers, and storage capacity. Assisted with developing the TSF Trigger Action Response Plan (TARP). (Tierra Group, 2022 to Present)

TSF 7 AUDIT, LA CARIDAD MINE | MÉXICO

Provided support in preparing the audit report and data gap-analysis memorandum. Reviewed design reports, construction reports, monitoring reports, Emergency Action Plans (EAP), and other relevant information as part of the audit. (Tierra Group, 2022 to Present)

FILTERED TSF (FTSF) MONITORING, SURVEILLANCE, AND OPERATIONS SUPPORT, MORELOS MINE | MÉXICO

Assisted with quarterly and annual monitoring reports. Reviewed quarterly and annual monitoring data (piezometers, quality control test results, survey monuments, and seismicity). (Tierra Group 2022 to Present)

TSF #2 INDEPENDENT TECHNICAL REVIEW, VELARDEÑA MINE | MÉXICO

Provided support in preparing the Independent Technical Review Report. (Tierra Group, 2022)

TSF STAGE II PHASE 2, LOS GATOS MINE | MÉXICO

Assisted with the TSF Stage II Phase 2 design, As-Built Reports, and performed slope stability modeling. (Tierra Group, 2022)

TSF STAGE II PHASE 1, LOS GATOS MINE | MÉXICO

Assisted with the Phase 1 design and As-Built Reports. (Tierra Group, 2022)

TSF MANAGEMENT, LOS GATOS MINE | MÉXICO

Assisted in developing and updating the Operations, Maintenance, and Surveillance (OMS) Manual and EAP. (Tierra Group, 2022)

LA INDIA TSF | NICARAGUA

Provided support in preparing the NI 43-101 Technical Report relevant sections for the La India TSF and La Simona Pond. (Tierra Group, 2022)

AB-BC TSF OMS MANUAL DEVELOPMENT, HAYDEN MINE | ARIZONA

Assisted with developing and updating the AB-BC TSF OMS Manual and quick reference guides. (Tierra Group, 2022)

D TSF OMS MANUAL DEVELOPMENT, HAYDEN MINE | ARIZONA

Assisted with developing the D TSF OMS Manual and quick reference guides. (Tierra Group, 2022)

Heap Leach Pads

ROUND TOP COMMERCIAL PLANT HEAP LEACH PAD (HLP) DESIGN | TEXAS

Conducted a trade-off study to compare two heap leach facility (HLF) alternatives (permanent and hybrid). The conceptual design for each HLF alternative was evaluated for capital costs, operating costs, and risks. (Tierra Group, 2022)

CANDELONES HLP AND WASTE ROCK STORAGE (WRS) FEASIBILITY DESIGN | DOMINICAN REPUBLIC

Assisted in the HLP and WRS engineering capital cost estimation, including earthworks, geosynthetics, and piping. (Tierra Group, 2022)

Mining & Environmental

VOLCAN OPEN PIT GEOTECHNICAL ASSESSMENT | NICARAGUA

Assisted with the geotechnical assessment report, compiled and reviewed borehole logs, and laboratory testing data. (Tierra Group, 2023 to Present)

PANTEON UNDERGROUND GEOTECHNICAL INVESTIGATION | NICARAGUA

Assisted with the geotechnical investigation report, compiled and reviewed borehole logs, and laboratory testing data. (Tierra Group, 2023)

HYDROGEOLOGIC CHARACTERIZATION, TERRONERA MINE | MÉXICO

Assisted with the site plan drafting and piezometers drawings. (Tierra Group, 2022)

COAL BURST POTENTIAL INVESTIGATION | KENTUCKY

Estimated the coal burst potential of two coal pillars in a longwall gate road system using numerical modeling and rockburst indices. The case study corresponded to a coal burst event at a deep longwall mine. (University of Kentucky, 2020 to 2021)

OPEN PIT MINE PLANNING AND DESIGN | MEDELLIN, COLOMBIA

Performed short, middle, and long-term mine planning for three aggregate production centers in Medellin, Piedra Verde, and Manizales. Verified that the operational process was executed according to the approved mining designs, guaranteeing the fulfillment of the mining and environmental legal requirements, and coordinated all the activities to ensure reserve availability for the production department. (Conasfaltos, 2018 to 2019)

MINERAL RESERVES ASSESSMENT | LA UNION, COLOMBIA

Updated and enhanced the operation's maps of five different kaolin mines using AutoCAD and recalculated the mineral reserves and the mine's operational life. (Organizacion Corona, 2018)

ENVIRONMENTAL MANAGEMENT PLAN DEVELOPMENT | MEDELLIN, COLOMBIA

Assisted in developing the environmental management plan of a kaolin mine for ceramic production and prepared technical reports presented to Environmental and Mining Authorities. (Organizacion Corona, 2017 to 2018)

PRELIMINARY BACKFILL ANALYSIS AND DESIGN, GEITA MINE | GEITA, TANZANIA

Assisted in a study to select the most cost-effective and practical backfill method for a new underground project in Tanzania. Performed the reticulation design using mine planning software and conducted a risk analysis on the selected backfill method. (AngloGold Ashanti Australia, 2016)

Professional Affiliations

Society for Mining, Metallurgy, and Exploration (SME), Associate Member
American Rock Mechanics Association (ARMA), Associate Member
The Australasian Institute of Mining and Metallurgy (The AusIMM), Associate Member

Publications / Presentations

Cardenas Triana C, Flattery R, and Agioutantis Z, 2022. *Coupling numerical modeling and rock burst potential indices to predict coal bursts*. SME Annual Conference & Expo; 26 February-2 March 2022, Salt Lake City, Utah (abstract and oral presentation).

Cardenas Triana C, 2021. *Investigation of Coal Burst Potential Using Numerical Modeling and Rock Burst Indices*. Theses and Dissertations-Mining Engineering. Volume 64; University of Kentucky.

Cardenas Triana C and Agioutantis Z, 2021. *Evaluation of coal burst potential using numerical modeling*. Kentucky Professional Engineers in Mining Seminar; 27 August 2021; Lexington, Kentucky (oral presentation).

Cardenas Triana C, Castillo J, and Agioutantis Z, 2021. *Investigation of Coal Burst Potential Using a Finite Element Method Approach*. In Proceedings of the 40th International Conference on Ground Control in Mining, 26-28 July 2021.

Castillo J, **Cardenas Triana C**, and Agioutantis Z, 2021. *Support Design Using the Ground Reaction Curve and Support Reaction Curves at Underground Limestone Mines*. In Proceedings of the 55th US Rock Mechanics/Geomechanics Symposium, 20-25 June 2021.

Castillo J, **Cardenas Triana C**, and Agioutantis Z, 2021. *Numerical modeling of the ground reaction curve and support reaction curve for pillars in underground limestone mines: A case study*. SME Annual Conference & Expo; 1-5 March 2021; Online (abstract and oral presentation).

Employment History

CURRENT EMPLOYER	TIERRA GROUP INTERNATIONAL, LTD.
POSITION	Staff Engineer
YEARS	2022 to Present
EMPLOYER	UNIVERSITY OF KENTUCKY
POSITION	Graduate Research and Teaching Assistant
YEARS	2020 to 2021
EMPLOYER	CONASFALTOS
POSITION	Mine Planning Engineer
YEARS	2018 to 2019
EMPLOYER	ORGANIZACION CORONA
POSITION	Mining Engineer
YEARS	2017 to 2018
EMPLOYER	ANGLOGOLD ASHANTI AUSTRALIA, LTD.
POSITION	Mining Engineer Intern
YEARS	2016

Language Proficiency

English: Fluent
Spanish: Native
Portuguese: Basic