



Jared Purdy, P.E.

Sr. Geotechnical Engineer

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## Education

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MS, Mining and Earth Systems Engineering, Colorado School of Mines, 2003

BS, Civil Engineering, Colorado School of Mines, 2000

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## Registrations/Certifications

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Professional Engineer: Colorado (#38517), Utah (#6223171-2202), Nevada (#20570), California (#C 85959)

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## Experience Summary

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Mr. Purdy has 23 years of professional experience in mining geotechnics, geotechnical investigations, foundation design, and construction management projects in the United States and Latin America. Specialties include geotechnical investigations; slope stability; mechanically stabilized earth walls/slopes; seepage, tailings storage facility (TSF) design, operation, closure, and stewardship; and the identification and mitigation of geotechnical and geologic hazards.

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## Project Experience

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### ***Mine Tailings / Waste Facilities***

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#### **MINA EL LIMÓN | EL LIMÓN, NICARAGUA**

Project Manager for the field exploration, design, and construction of a tailings dam raise to an existing embankment (Santa Rosa TSF). Designed the raise of the Santa Rosa dam using a reinforced earth wall for the crest raise – the first application of geosynthetics for dam raising currently known.

Project Manager and Lead Engineer for the geosynthetic-lined San José TSF. Managed geotechnical field investigation programs, managed engineering design, supervised construction, and performed field engineering as needed.

Project Manager and Lead Engineer for the new geosynthetic-lined San Pancho TSF. Managed the geotechnical field investigation and detailed final design.

Project Manager for the diversion channel design around the Tajo Limon central open pit.

Project Manager for a third-party review of an open pit downslope from the San José TSF.

Project Manager and Lead Engineer for all geotechnical/civil projects associated with the TSF, including monitoring and inspections. Provided operational support, ensuring the TSF was operated safely, efficiently, and effectively. (Vector Colorado, 2003 to 2005; Tetra Tech, 2009 to 2012; Tierra Group, 2012 to 2023)

#### **MINA EL MOCHITO | LAS VEGAS, HONDURAS**

Aided in designing and modeling an upstream raise of a tailings embankment. Work included a seismic hazard assessment, liquefaction modeling, seepage modeling, and static and pseudo-static slope stability analyses. Designed a toe berm for an existing tailings embankment (Pozo Azul TSF).

Aided in the siting and preliminary design of a future tailings impoundment (Soledad TSF). Project Manager and Lead Engineer for the Stage 2, 3, and 4 raises of the Soledad TSF, including a unique method for lining near vertical limestone slopes with geosynthetics. Supervises TSF construction QA and provides field engineering as required.

Project Manager and Lead Design Engineer for the closure engineering for the Pozo Azul and El Bosque TSFs.

Project Manager for the initial site investigation and preliminary design of a new TSF (Douglas TSF).

Conducted annual inspections of three tailings embankments and storage facilities. Provided consulting for all geotechnical site issues ranging from slope stability for a landslide to erosion and surface water management.

Project Manager and Lead Engineer for all geotechnical/civil projects associated with TSF, TSF monitoring, and TSF inspections since 2008. Provide operational support, ensuring TSFs operate safely, efficiently, and effectively. (Olsson Associates, 2002 to 2003; Vector Colorado, 2003 to 2005; Tetra Tech, 2008 to 2012; Tierra Group, 2012 to 2018 and 2021 to 2023)

#### **MINA LA LIBERTAD | LA LIBERTAD, NICARAGUA**

Project Manager and Lead Engineer for designing and constructing the downstream-raised, geosynthetic-lined La Esperanza TSF. Project Manager and Lead Engineer for the expansion of the La Esperanza TSF utilizing a mechanically stabilized earth (MSE) wall to raise the dam crest vertically to maintain the facility within property boundaries and reduce construction time and costs. Supervises TSF construction QA and provides field engineering as required.

Developed and managed a preliminary field investigation and completed an alternatives analysis/site trade-off study to identify a new, conventional TSF. Supervised a geotechnical/hydrogeological investigation and managed the conceptual engineering for a TSF within an expended open pit.

Project Manager and Lead Engineer for a new TSF within an expended open pit (Crimea TSF), including engineering support for the Environmental Impact Assessment (EIA), detailed engineering design, construction quality assurance, and facility commissioning.

Project Manager and Lead Engineer for all geotechnical/civil projects associated with TSF, TSF monitoring, and TSF inspections. Provide operational support, ensuring TSFs operate safely, efficiently, and effectively. (Tetra Tech, 2008 to 2012; Tierra Group, 2012 to 2023)

#### **CORPORATE TAILINGS STEWARDSHIP STRATEGY | AUSTRALIA AND CANADA**

Tailings Steward for the TSFs and qualified water dams at Cadia (Australia), Telfer (Australia), and Red Chris (Canada) mines. Tailings Stewardship required independently evaluating the design, operations, and safety of all tailings and water dams, including hazards classifications, facilitated risk assessments, systems and processes reviews, operations team training, Dam Safety Inspections, and evaluating TSF conformance with GISTM requirements. This multi-year role requires annual updates. (Tierra Group, 2022 to 2023)

#### **CORPORATE TAILINGS STEWARDSHIP STRATEGY | LATIN AMERICA**

Tailings Steward for TSFs located in Latin America, which include Peñasquito and Los Filos (Mexico), Marlin (Guatemala), and Cerro Negro (Argentina) mines. Tailings Stewardship required independently evaluating the design, operations, and safety of all tailings and water dams, including hazards classifications, facilitated risk assessments, systems and processes reviews, operations team training, Dam Safety Inspections, and preparing a 5-year Dam Safety Review Report (DSR) consistent with Canadian Dam Association (CDA) guidelines. This multi-year role requires annual updates. (Tierra Group, 2015 to 2020)

#### **CORPORATE TAILINGS STEWARDSHIP STRATEGY | CANADA**

Lead Engineer for a DSR of all dams at the Dona Lake Mine in Pickle Lake, Ontario. Prepared a DSR report consistent with CDA guidelines. (Tierra Group, 2019 to 2020)

#### **MCLAUGHLIN MINE | LOWER LAKE, CALIFORNIA**

Engineer of Record for the McLaughlin Mine Tailings Impoundment Facility (TIF) and Davis Creek Reservoir (DCR). Responsible for facility engineering, monitoring, and inspections. Project Manager and Lead Engineer for various surface water and groundwater control projects for the mine waste rock disposal facilities. Managed and supervised instrumentation improvements at the mine facilities (TIF, waste rock dumps, and DCR dam), including inclinometers, piezometers, monitoring wells, and data collection automation. (Tierra Group, 2016 to 2023)

#### **RAY, HAYDEN, AND MISSION MINES INDEPENDENT REVIEW | ARIZONA**

Senior independent review for TSFs at ASARCO's Ray, Hayden, and Mission Mines. Reviews included evaluating the design, operations, and safety of the tailings dams, as well as compliance with regulatory requirements, industry guidelines, and best practices. (Tierra Group, 2021 to 2022)

**MCLAUGHLIN MINE, TAILINGS IMPOUNDMENT FACILITY | LOWER LAKE, CALIFORNIA**

Managed dam break and inundation analyses for the TIF and prepared inundation maps consistent with State of California regulations. Prepared an emergency action plan consistent with State of California regulations. Prepared a DSR report consistent with CDA guidelines and Barrick Gold Corporate internal standards. (Tierra Group, 2016 to 2023)

**MINA LOS GATOS | CHIHUAHUA STATE, MÉXICO**

Senior geotechnical support for TSF design and operations. Performed annual dam safety inspections. (Tierra Group, 2021 to 2023)

**ARANZAZÚ | ZACATECAS STATE, MÉXICO**

Project Manager and Lead Engineer for the geotechnical field investigation and final engineering design of a new TSF (TD5). Provided third-party engineering design review for the expansion/raise of the existing TD4 tailings facility. (Tierra Group, 2014 to 2020)

**MINA EL AGUILA | OAXACA STATE, MÉXICO**

Managed field construction quality assurance and provided engineering oversight during the construction of the Phase 3 TSF. (Tierra Group, 2014 to 2016)

**PITARRILLA | DURANGO STATE, MÉXICO**

Developed and managed the geotechnical field investigation and laboratory testing program to support a Definitive Feasibility Study for a 112-million-tonne TSF. (Tierra Group, 2012)

**MINA EL CUBO | GUANAJUATO, MÉXICO**

Performed a geotechnical audit of a series of tailings impoundments to evaluate compliance with Mexican mining regulations. Work included seepage, stability and liquefaction analyses, and a site-specific seismic hazard analysis. Provided recommendations for operations and construction to comply with Mexican regulations and industry standards of practice. (Tetra Tech, 2010 to 2011)

Provided tailings operations support and tailing cyclone design review. (Tierra Group, 2016)

**MINA EL DORADO | SENSUNTEPEQUE, EL SALVADOR**

Performed geotechnical site investigations and designed a new tailings impoundment. Investigations included geotechnical drilling, wireline drilling, in-situ permeability testing, test pitting to locate potential borrow materials, and geological field mapping of the impoundment basin. Project Manager and Lead Engineer for the final design of the tailings facility. (Vector Colorado, 2004 to 2005; Tetra Tech, 2008 to 2009)

**KENNECOTT | MAGNA, UTAH**

Performed an independent audit of the liquefaction potential of the southeast portion of the tailings impoundment adjacent to the city of Magna, UT. (Tetra Tech, 2009)

**KEY LAKE | SASKATCHEWAN, CANADA**

Performed static and dynamic liquefaction analysis of the Deilmann Tailings Management Facility slopes. (Tetra Tech, 2010)

**TAILINGS IMPOUNDMENT MODELING, GOLDSTRIKE MINE | CARLIN, NEVADA**

Performed cone penetration testing (CPT) on the AA Tailings Impoundment, reduced data collected from the field investigation and performed a suite of geotechnical modeling. The modeling included tailings mass modeling to determine the feasibility of placing a low-grade ore stockpile on the surface of the tailings impoundment. Modeling included determining the present flow regime of the tailings impoundment, transient flow modeling of the impoundment, consolidation, and pore pressure generation resulting from the application of a potential stockpile, flow and cyclic liquefaction modeling, and static and pseudo-static slope stability. (Olsson Associates, 2002 to 2003; Vector Colorado, LLC, 2003 to 2005)

**STORAGE CAPACITY / IMPOUNDMENT CONSOLIDATION FEASIBILITY STUDY | COLORADO**

Performed CPT investigation on silt pond to determine the feasibility of consolidating the impoundment and increasing storage capacity. Data collected during the field investigation was reduced to provide material properties used in liquefaction, seepage, and consolidation modeling. Additional services to the client included feasibility designs for slurry cut-off walls and reservoir embankments. Provided geotechnical

drilling supervision, in-situ permeability testing, and core logging at numerous sites along the Colorado Front Range. (Olsson Associates, 2002 to 2003; Vector Colorado, 2003 to 2004)

**HOMESTAKE MINE SOIL AND CONCRETE SAMPLING | LEAD, SOUTH DAKOTA**

Logging and sampling of soil and concrete using a truck-mounted Geo-Probe and a dolly-mounted core drill, respectively. (SRK Consulting, 2001)

**PUEBLO VIEJO | DOMINICAN REPUBLIC**

Designed three RCC-faced dams; Arroyo San Juan, Arroyo Candido, and the 25-m Margajita. The Candido and the 25-m Margajita Dam were designed to capture and retain acid rock drainage (ARD). Determined construction quantities for each dam using AutoCAD software. (SRK Consulting, 2001)

**GORO NICKEL PROJECT | NEW CALEDONIA**

Provided design support for the feasibility design of a nickel laterite mine. Duties included reducing geotechnical field data, civil design, and geotechnical modeling for several dams. Performed extensive static and pseudo-static slope stability analyses on all stages of each dam. Work also included translating documents from French to English and English to French. (SRK Consulting, 2000 to 2001)

**ATLAS URANIUM MILL SITE | MOAB, UTAH**

Compiled spreadsheet to summarize geotechnical testing data spanning more than 25 years and thousands of pages from various reports. Prepared digital borehole logs for report presentation using WINLOG. Calculated soil characteristics from field data and CPT testing. Determined both 'in-pile' and groundwater gradients from field data, bore logs, and CPT testing. Performed settlement calculations for the tailings pile under its design cover. Designed a dewatering program using vertical wick drains to achieve 90% consolidation in 18 months. Provided construction oversight for installing vertical wicks and continued in-field engineering of the dewatering design. Prepared as-built documents following completion of work. (SRK Consulting, 2000 to 2001; Olsson Associates, 2002)

**PASCUA LAMA PROJECT DAM LAYOUT DESIGN | CHILE-ARGENTINA**

Designed dam layout to maximize storage and minimize cost. Performed extensive static and pseudo-static slope stability analyses for each stage of the dam and the surrounding slopes. Developed drawings and sections using AutoCAD. (SRK Consulting, 2000 to 2001)

**SILT POND EMBANKMENT FAILURE ANALYSIS | HENDERSON, COLORADO**

Responsible for the back analysis and evaluation of the cause of a silt pond embankment failure. (Olsson Associates, 2002 to 2003)

***Heap Leach Facilities***

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**BELLAVISTA | MIRAMAR, COSTA RICA**

Project Manager overseeing the installation of geotechnical instrumentation to monitor the movement of an active landslide that underlies the heap leach facilities and waste rock stockpile. Provided interpretation of monitoring data and recommendations for landslide mitigation. (Tetra Tech, 2008 to 2010)

**HEAP LEACH FACILITY GEOTECHNICAL MODELING AND PRELIMINARY DESIGN | SAFFORD, ARIZONA**

Aided in the preliminary design and geotechnical modeling of a heap leach facility. Modeling included static and dynamic slope stability. (Vector Colorado, 2003 to 2004)

**PERÚ COPPER | PERÚ**

Aided in the design of leach pad staging and layout. Calculated quantities using CAD software. Developed drawings and sections using AutoCAD. (SRK Consulting, 2000 to 2001)

***Mine Design***

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**MINA EL LIMON | NICARAGUA**

Lead Engineer and Project Manager for the field investigation and feasibility design for the Limon Central, Norte, Tigra, and Pozo Bono open pits and the Tigra-Atravesada and Panteon underground mines. Field investigations included oriented core drilling, in-situ permeability testing, and laboratory testing. Developed feasibility designs for each pit. (Tierra Group, 2020 to 2023)

**MINA LA LIBERTAD | NICARAGUA**

Lead Engineer and Project Manager for the field investigation and feasibility design for the Rosario, Tranca and Volcan open pits. Field investigations included oriented core drilling, in-situ permeability testing, and laboratory testing. Developed feasibility designs for each pit. (Tierra Group, 2020 to 2023)

**MINA GUAPINOL | NICARAGUA**

Lead Engineer and Project Manager for the field investigation and feasibility design for the Guapinol Open Pit and field investigation for the Guapinol Waste Dumps and Ore Stockpiles. Field investigations included oriented core drilling, in-situ permeability testing, and laboratory testing. Developed feasibility design for the pit. (Tierra Group, 2021 to 2022)

***Dams / Reservoirs / Levees***

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**McLAUGHLIN MINE, DAVIS CREEK RESERVOIR | LOWER LAKE, CALIFORNIA**

Engineer of Record for the McLaughlin Mine DCR. Responsible for facility engineering, monitoring, and inspections. Managed dam break and inundation analyses for the facility and prepared inundation maps and an Emergency Action Plan consistent with State of California regulations. Project Manager and Lead Engineer for conducting the DCR DSR and prepared a DSR report consistent with CDA guidelines and Barrick Gold Corporation internal standards. (Tierra Group, 2016 to 2023)

**LA ESTANCIA RESIDENTIAL SUBDIVISION | KANAB, UTAH**

Performed a geotechnical site investigation and provided geotechnical recommendations for the design of a stormwater retention basin/embankment. (AGEC, 2006 to 2007)

**EARTHFILL EMBANKMENT INVESTIGATION, SARGENT IRRIGATION DISTRICT | MILBURN, NEBRASKA**

Oversaw geotechnical drilling and in-situ testing of an active earthfill embankment dam. Data collected was used to determine the dam's stability under present operating conditions and potentially active conditions during the partial embankment excavation to construct a new spillway. Provided engineering support in designing and evaluating cantilever and tied-back walls acting as soil retaining structures and bridge abutments/supports. (Olsson Associates, 2002 to 2003)

***Geologic Studies / Hazard Investigations***

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**LANDSLIDE HAZARD EVALUATION, EL DIAMANTE HYDROELECTRIC PROJECT | NICARAGUA**

Evaluated landslide hazards for a pipeline based on field observations and aerial photo review. (Tierra Group, 2018 to 2020)

**ROCKFALL HAZARDS MODELING FOR RESIDENTIAL SUBDIVISION | ST. GEORGE, UTAH**

Identified and modeled potential rockfall hazards for a master-planned residential subdivision. (AGEC, 2007)

**AVALANCHE POTENTIAL MODELING | ASPEN, COLORADO**

Identified and modeled potential snow avalanches and determined the impact pressures from the design avalanche on existing structures. (Vector Colorado, 2003 to 2004)

**AVALANCHE AND ROCKFALL HAZARD INVESTIGATION | CRESTED BUTTE, COLORADO**

Identified and modeled potential snow avalanches and rockfall hazards for Parcels 7 and 8 of the Skyland Development. Differing hazard levels were delineated, and locations where hazards intercepted planned developments, were identified. Developed designs for feasible mitigation measures. (Vector Colorado, 2002 to 2004)

***Site Investigations***

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**VALLEY VIEW MEDICAL CENTER | CEDAR CITY, UTAH**

Performed geotechnical site investigation work and provided foundation recommendations for the design of a radiology wing addition. Work included foundation underpinning and shoring to construct a basement addition adjacent to the operating radiology wing. (AGEC, 2006 to 2008)

#### **SOUTH MOUNTAIN VILLAGE GEOTECHNICAL SITE INVESTIGATION | WASHINGTON, UTAH**

Performed geotechnical site investigation work and provided foundation recommendations for designing a master-planned community on property underlain by highly collapsible soils and expansive bedrock. Work included subgrade preparation through pre-wetting operations, supplementary subsurface investigation, and intensive laboratory testing. (AGEC, 2006 to 2008)

#### **LA ESTANCIA RESIDENTIAL DEVELOPMENT | KANAB, UTAH**

Performed geotechnical site investigation work and provided foundation recommendations for the design of single-family and multi-family residences constructed in areas of expansive bedrock and collapsible soils. (AGEC, 2005 to 2007)

#### **THE CLIFFS OF SNOW CANYON GEOTECHNICAL SITE INVESTIGATION | ST. GEORGE, UTAH**

Performed geotechnical site investigation work and provided foundation recommendations for the design of single-family residences. Designed boulder-faced slopes and MSE walls to facilitate the construction of residences on steep slopes. (AGEC, 2005 to 2007)

#### **THE LEDGES OF SAINT GEORGE | ST. GEORGE, UTAH**

Performed geotechnical site investigation work and provided foundation recommendations for designing a large, master-planned golf course community. (AGEC, 2005 to 2008)

#### **HALL COUNTY AIRPORT AUTHORITY HANGAR FOUNDATION DESIGN | GRAND ISLAND, NEBRASKA**

Designed the foundation for a 50,000+ square foot hangar subject to extremely high uplift pressures. The design included numerous spread footers connected with structural beams, hangar slab, and airport ramp design. (Olsson Associates, 2002 to 2003)

#### **FITZSIMMONS HEALTH COMPLEX MRI FACILITY FOUNDATION DESIGN | DENVER, COLORADO**

Provided preliminary foundation designs for an MRI facility sensitive to ground vibration and settlement. (Olsson Associates, 2002)

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### **Professional Affiliations**

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American Society of Civil Engineers, Member  
Society for Mining, Metallurgy and Exploration, Member

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### **Publications / Presentations**

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- Purdy J**, et al., 2012. *Lining Steep Rock Slopes with a Geomembrane Liner to Facilitate Tailings Facility Expansion*. Tailings and Mine Waste 2012, Proceedings of the 16<sup>th</sup> Tailings and Mine Waste Conference, Keystone, CO, 2012.
- Purdy J**, et al., 2004. *Cerro Santa Rosa Tailings Dam: Storage Capacity Increased Using a Unique Mechanically Stabilized Earth Design*” Tailings and Mine Waste 2004, Proceedings of the 11<sup>th</sup> Tailings and Mine Waste Conference, Vail, CO, 2004.
- Purdy J**, Henderson M, and Delaney T, 2002. *Performance of Vertical Wick Drains at the Atlas Uranium Mill Tailings Facility After 1 Year*. Tailings and Mine Waste 2002, Proceedings of the 9<sup>th</sup> Tailings and Mine Waste Conference, Fort Collins, CO, 2002.
- Purdy J**, 2001. *Performance of Vertical Wick Drains at the Atlas Moab Uranium Mill Tailings Facility*. Geotechnical News, 2001.

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### **Employment History**

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**CURRENT EMPLOYER**  
**POSITION**  
**YEARS**

**TIERRA GROUP INTERNATIONAL, LTD.**  
Sr. Geotechnical Engineer/Project Manager  
2012 to Present

<b>EMPLOYER</b>	<b>TETRA TECH, INC.</b>
<b>POSITION</b>	Senior Geotechnical Engineer
<b>YEARS</b>	2008 to 2011
<b>EMPLOYER</b>	<b>APPLIED GEOTECHNICAL ENGINEERING, INC.</b>
<b>POSITION</b>	Geotechnical Engineer
<b>YEARS</b>	2005 to 2008
<b>EMPLOYER</b>	<b>VECTOR COLORADO, LLC</b>
<b>POSITION</b>	Geotechnical Engineer
<b>YEARS</b>	2003 to 2005
<b>EMPLOYER</b>	<b>OLSSON ASSOCIATES</b>
<b>POSITION</b>	Staff Engineer
<b>YEARS</b>	2002 to 2003
<b>EMPLOYER</b>	<b>STEFFEN ROBERTSON AND KIRSTEN (US), INC.</b>
<b>POSITION</b>	Staff Engineer
<b>YEARS</b>	2000 to 2001

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## Language Proficiency

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French:           Fluent  
Spanish:         Conversational (spoken, written)