



Justin W. Knudsen, P.E., QP
Sr. Geotechnical Engineer

Education

MS, Geotechnical Engineering, University of Colorado, 2002
BS, Civil Engineering, University of Colorado, 2000

Registrations/Certifications

Professional Engineer: Nevada (#019172, 2008); Missouri (#2014032638, 2014); Minnesota (56157); Colorado (54591); Idaho (18054); Montana (60223)

Experience Summary

Mr. Knudsen is a Professional Engineer (Geotechnical BS and MS) and Project Manager with more than 15 years of experience in the mining industry applying his geotechnical expertise designing tailings dams, heap leach pads (HLP), waste rock dumps, and other earthen structures. Justin's field experience includes designing and executing geotechnical investigation plans using multiple drilling methods including hollow stem auger, diamond core, sonic, and cone penetration testing (CPT) equipment. Justin applied these field fundamentals to hone his analytical and modeling skills, which include geo-mechanical soil and rock testing, geosynthetic materials testing, slope stability, seepage, consolidation and settlement analyses.

With a fundamental foundation in field and analytical geo-techniques combined with sound mentoring and a team-player personality Justin advanced to a Lead Geotechnical Design Engineer and Project Manager leading projects from feasibility through final engineering and "for construction" designs. Many of Justin's designs have been built requiring him to serve as Resident Engineer and Deputy Engineer of Record (EoR) for operating tailings dam(s) throughout the Western United States, México, and Perú.

Project Experience

Mine Tailings / Waste Facilities

ENGINEER OF RECORD, JURISDICTIONAL DAMS, BARRICK GOLDSTRIKE MINE | ELKO, NEVADA

Deputy Dam Engineer for seven dams located at the mine requiring annual inspections and other EoR duties. Ongoing engineering support includes civil/geotechnical design of raises to existing tailings dams and design of new tailings dam. Recent experience includes a sonic drilling investigation, instrumentation installation, and advanced geotechnical analyses including 3-dimensional slope stability analyses evaluating dam raise design in a challenging geotechnical environment. Served as resident engineer during raise of a 500+ acre tailings dam. Prepared technical specifications, construction quality assurance manual, and As-Built Report, construction, and as-built drawings. Project Engineer during field investigations and analyses to maximize storage capacity in a tailings impoundment. Field investigation included CPT and soil and water sampling. Analysis included the use of FSConsol software. Supervised construction of two water diversion channels totaling approximately 5 miles in length. Completed the design of a seepage transfer pipeline to convey collected seepage in a double-contained pipeline over a distance of approximately 2,100 feet. Prepared construction drawings, technical specifications, and construction quality assurance manual. Directed multiple field investigations for design of future tailings impoundments. Completed designs of raises to existing tailings storage facility (TSF) and design of new facility. Designs include geotechnical modeling, civil design, hydrology, and geosynthetic liner design. (Tetra Tech 2004 to 2011; Tierra Group, 2012 to Present)

WILLOW CREEK DAM REHABILITATION | ELKO COUNTY, NEVADA

Project Manager responsible for concrete dam rehabilitation for a ±100-year old concrete water supply dam. Performed research and options study investigating methods and materials to rehabilitate the dam and outlet works. Rehabilitation plans were completed to repair damaged outlet valves, spalling concrete, and

general weathering. Completed rehabilitation plans and specifications. Provided resident engineering support during construction. (Tierra Group, 2017 to Present)

STIBNITE GOLD PROJECT TSF AND STORMWATER CONTROLS | STIBNITE, IDAHO

As Project Manager and Lead Geotechnical Engineer, led a team of engineers performing geotechnical investigations for the TSF, development rock storage facilities (DRSFs), mill, camp, and other infrastructures. Planned and directed sonic, cone penetration testing, geophysics, and hollow stem auger drilling campaigns. Trained client geologists to log and sample soil. Completed geotechnical characterization and design work based on findings to support feasibility study. Led an engineering team to develop diversion options to reroute creek flow around the TSF and DRSFs. A SWOT analysis and cost estimates performed providing an effective tool for mine planning. (Tierra Group, 2017 to 2018)

LAS BRISAS PEA | VENEZUELA

Project Manager responsible for 2.1-billion-tonne TSF design supporting a Preliminary Economic Assessment (PEA). Completed conceptual water management plan laying the groundwork for future engineering and studies. Worked with the external multi-disciplinary team to complete the PEA. (Tierra Group, 2017)

SWEETWATER TSF RAISE DESIGN | VIBURNUM, MISSOURI

Project Manager responsible for two raise designs for a 40+ year old TSF at Doe Run's Sweetwater Mine. Unique design challenges were overcome with a comprehensive field investigation including CPT and hollow stem auger drilling. Liquefaction analyses were performed and incorporated into the upstream raise design. A challenging hydrology model was completed and a raise to the existing spillway was designed. One raise design was approved by Missouri Department of Natural Resources (MDNR) Dam and Reservoir Safety Council in March 2016. Construction was completed in early 2017, support provided with Tierra Group overseeing construction activities and evaluating proposed design changes. An As-Built Report was completed in April 2017 conforming to MDNR requirements. A second raise (23 feet tall) included a rockfill buttress, saddle dam, and a new spillway which is currently being reviewed by MDNR Dam Safety. (Tierra Group, 2015 to Present)

BRUSHY CREEK TSF RAISE DESIGN | VIBURNUM, MISSOURI

Project Manager responsible for a 17-foot dam raise design for an existing TSF at Doe Run's Brushy Creek Mine. The dam was built in stages starting in 1973 using tailings cyclone underflow (coarse tailings) and the upstream construction method. The raise design required CPT, a liquefaction triggering analysis, seepage modeling, and slope stability modeling. In addition to the dam raise, a spillway raise was designed requiring hydrology and hydraulic modeling and riprap design. The design was approved by MDNR Dam and Reservoir Safety Council in February 2015. Provided EoR duties as the dam raise was constructed and completed an As-Built Report upon completion. (Tierra Group, 2014 to 2017)

BRUSHY CREEK 2 TSF | VIBURNUM, MISSOURI

Project Manager and Lead Engineer responsible for a new TSF design at Doe Run's Brushy Creek Mine capable of storing 36 million tons (Mt) of tailings solids. The new TSF requires a 185-foot tall dam planned for construction in four stages including a clay starter dam and three raises using tailings cyclone underflow. Hydrology and Hydraulic modeling was performed to design four spillways and a water balance was completed providing a planning tool for use throughout facility life. A geotechnical investigation was carried out which utilized both hollow stem auger and diamond coring techniques. The design was approved by MDNR Dam and Reservoir Safety Council in October 2015. (Tierra Group, 2014 to Present)

BRUSHY CREEK 3 TSF | VIBURNUM, MISSOURI

Project Manager and Lead Engineer responsible for designing an alternative iteration to the Brushy Creek 2 TSF designed to accommodate state requirements for land use. The TSF dam is 141 feet tall and capable of storing 16 Mt of tailings solids. Three stages are planned, including a clay starter dam and two downstream raises. A geotechnical investigation was performed using hollow stem auger and diamond core drilling. Challenging foundation conditions required a large key trench and integrated drainage system. Spillways were designed for each stage. The design was approved by MDNR Dam and Reservoir Safety Council in August 2017. (Tierra Group, 2016 to 2017)

DESMINIC TSF COVER OPTIMIZATION | LA LIBERTAD, NICARAGUA

Project Manager responsible for tailings consolidation modeling and deposition planning providing operators with a plan to deposit tailings late in the TSF life. Executing the end-of-life deposition plan will save significant closure costs because less fill will be required to cover the facility. Work included evaluating closure cover options providing B2Gold with a planning tool for strategic closure of the site. (Tierra Group, 2017 to Present)

CAETÉ AND TURMALINA MINING COMPLEXES | BRAZIL

Lead Geotechnical Engineer responsible for the geotechnical investigation including CPT, hollow stem auger drilling, and in-situ sampling of dry stack and slurry TSFs. Liquefaction potential was evaluated using CPT and SPT data. Laboratory testing was important in correlating and extrapolating field data to similar facilities at each mine. Recommendations were made regarding tailings excavation and stacking procedures. Tierra Group's work was necessary to continue tailings storage operations in a challenging regulatory environment. (Tierra Group, 2016)

EL AGUILA CONCEPTUAL TAILINGS STUDY | OAXACA, MÉXICO

Project Manager leading a multi-disciplinary team to complete a conceptual evaluation to determine economic feasibility to add a filter plant, paste plant, and dry stack TSF contributing to mine life extension. Cemented paste backfill was needed to expand the underground mine. The team evaluated filter and paste plant design calculating CAPEX and OPEX costs needed for overall mine planning. Multiple dry stack facility layouts of various sizes were designed and compared using a comparative matrix evaluating qualitative and quantitative criteria. (Tierra Group, 2017)

PITARRILLA PROJECT FEASIBILITY STUDY | DURANGO, MÉXICO

Project Manager responsible for feasibility level design of a 112-Mt TSF for a world-class silver deposit. Successfully led a multi-disciplined project team completing the civil layout, staging optimization, water balance optimization, geotechnical investigations, geologic hazard mapping, seepage and slope stability modeling, and surface water diversion design. The design team also completed a site-wide water management plan for the project allowing advanced water supply planning. Led project team to complete engineering reports and capital cost estimates included in an NI 43-101 compliant feasibility study for the Pitarrilla Project. (Tierra Group, 2012)

CHINCHÁN SOUTH DRY STACK TSF | SAN MATEO, PERÚ

Project Manager responsible for design of dry stack TSF and ongoing construction support during construction of the facility as well as during facility operations. Completed reports and other submittals to local regulatory agencies (OSINERGMIN and MEM). Special considerations include steep topography, construction during inclement weather, and multiple successful peer reviews. (Tetra Tech, 2008 to 2011; Tierra Group, 2012)

TUCUSH TSF | HUARI ANCASH, PERÚ

Project Manager responsible for design of raises for the TSF as well as As-Built Reports to comply with regulatory requirements. This dam is built using cyclone underflow for the main embankment along with a waste rock shell for added stability. Limited available footprint area created design challenges that were overcome with unique engineering solutions. (Tetra Tech, 2008 to 2011; Tierra Group, 2012)

BOVILL KAOLIN PROJECT | LATAH COUNTY, IDAHO

Project Manager responsible for NI 43-101 compliant Preliminary Economic Assessment for a 1.5-Mt TSF. Multiple trade-off studies were completed to optimize the facility design while minimizing project costs. (Tetra Tech, 2011)

MT. TODD TSF | NORTHERN TERRITORY, AUSTRALIA

Responsible for civil and geotechnical design of multiple large TSFs for pre-feasibility and definitive feasibility studies. Project included stability assessment of current TSF for possible expansion and design of new facility. Innovative liner design was needed to maintain containment of tailings while allowing cost effective construction techniques. Multiple site visits were made over the years to oversee two field investigation campaigns and gather site specific data. (Tetra Tech, 2008 to 2011)

COZAMIN MINE TSF | ZACATECAS, MÉXICO

Project Manager responsible for design of centerline raises for the TSF as well as As-Built Reports to comply with requirements set for by the local environmental regulatory agency (SEMARNAT). Submittals included design and as-built drawings, construction specifications, and various reports. Special considerations included water management concerns, geotechnical design, and operation of the facility to maximize water recovery for process plant use. (Tetra Tech 2008 to 2010)

SOLEDAD TAILINGS EMBANKMENT SEEPAGE ANALYSIS | EL MOCHITO MINE, HONDURAS

As Geotechnical Engineer, performed finite element seepage analysis for new embankment design. Responsible for stability modeling and cross-section design for new tailings embankment. (Vector Colorado, 2005)

PASCUA LAMA PROJECT STABILITY ANALYSES | WESTERN ARGENTINA

As Geotechnical Engineer, responsible for stability analysis for a 102-meter (m) high earthfill tailings dam and a 30-m high earthfill and rockfill water storage dam located in the high Andes near the Chile-Argentina border. (Vector Colorado, 2005)

OLD VIBURNUM EARTHFILL BUTTRESS DESIGN | FLETCHER, BRUSHY CREEK, NEW LEAD BELT, MISSOURI

As Geotechnical Engineer, designed earthfill buttress for dynamic stability of existing tailings storage embankment. Design utilized on-site materials to minimize construction costs. (Vector Colorado, 2004)

MARLIN PROJECT DYNAMIC ANALYSES | MARLIN MINE, GUATEMALA

As Geotechnical Engineer, performed dynamic deformation and stability evaluations for an 85-m rockfill tailings embankment. Performed dynamic analyses for multiple earthquakes (predicting deformation for multiple slopes on the embankment) and a seepage study for the clay core of the embankment. (Vector Colorado, 2004)

MINA EL DORADO PREFEASIBILITY STUDY | SENSUNTEPEQUE, EL SALVADOR

As Geotechnical Engineer, performed slope stability modeling for siting and designed a tailings embankment and impoundment. Performed detailed design of embankment cross-section. (Vector Colorado, 2004)

Heap Leach Pads

LA TRINIDAD | SINALOA, MEXICO

Project Manager leading an experienced team providing HLP construction recommendations and a water balance. Work continued with a HLP expansion design, slope stability analyses, hydrologic analyses, diversion design, liner design, and leach solution collection piping design. Slope stability analysis interpretation and results provided Oro Gold with a safe stacking plan to maximize ore storage capacity. Water balance analyses and “outside the box” ideas made it possible to forego a stormwater pond expansion saving significant HLP expansion construction costs. (Tierra Group, 2017)

STERLING MINE HLP EXPANSION AND NEW PAD DESIGN | BEATTY, NEVADA

As Project Manager and Lead Geotechnical Engineer, responsible for design of an in-fill leach pad expansion and design of a new 20-acre HLP. The projects included civil layout, hydrology, hydraulic design, ore capacity optimization, liner design, solution recovery system design, slope stability modeling, and completion of a stacking plan. Challenges included adapting new designs to existing infrastructure including solution collection piping, ponds, and stormwater controls. Design packages were submitted to the State of Nevada for the heap leach slot in-fill project, a process plant pond and pipeline reconfiguration, and the new leach pad. (Tierra Group, 2013 to 2015)

EL GALLO HLP EXPANSION | SINALOA, MÉXICO

Project Manager and Lead Engineer responsible for design and construction oversight for a 65,000-m² expansion of an existing HLP. The HLP expansion design included slope stability modeling, civil layout, ore capacity optimization, liner design, solution recovery system design, and completion of a stacking plan to guide ore placement during operations. Project challenges included incorporating existing infrastructure into the expansion design and choosing construction materials and methods that would allow rapid construction of a safe, environmentally sound facility. Provided construction oversight through multiple site visits working with local engineers to ensure the facility was built according to design. (Tierra Group, 2012)

ZONIA MINE HLP DESIGN | YAVAPAI COUNTY, ARIZONA

Completed a site investigation, stability analyses, and directed civil design of a HLP in mountainous terrain. The Zonia Project is a brownfields project so the site investigation focused on the existing HLP and surrounding area investigating potential expansion of the existing pad. Civil and geotechnical design was completed to pre-feasibility level resulting in engineering reports, drawings, and cost estimates included in an NI 43-101 compliant pre-feasibility report. (Tetra Tech, 2009)

Mine Operations

AMERICAN GYPSUM HAUL ROAD SAFETY IMPROVEMENT EVALUATION | GYPSUM, COLORADO

As Project Manager, conducted an alternatives analysis to determine the most appropriate measures to improve safety on a steep haul road section. The analysis included basic engineering of runaway truck ramps, a mechanical vehicle arresting system, haul road realignment, and center berm arrestors. Alternatives were evaluated on effectiveness, construction requirements, maintenance needs, operational impacts, and environmental impacts. The alternatives analysis provided American Gypsum a tool to determine the most effective way to improve haul road safety. (Tierra Group, 2014)

FLORIDA CANYON ROCK SLOPE STABILITY EVALUATION | WINNEMUCCA, NEVADA

As Geotechnical Engineer, conducted an evaluation of rock slope stability at this large operating open pit gold mine to determine safe slope angles for continued pit expansion. Analyses included assessment of weak, shattered rock masses. (Vector Colorado, 2004)

Water Resources

MASBATE WATER TREATMENT PLANT DESIGN AND CONSTRUCTION | MASBATE, PHILIPPINES

As Project Manager, oversaw design and provided construction and commissioning support to a 15,000 m³ per day water treatment plant (WTP) and over 7 km of pipelines. The WTP incorporates INCO and microfiltration processes to treat TSF supernatant water to Philippine discharge standards. The design team completed a geotechnical investigation and foundation design, pipeline design, and full WTP design including structural, chemical, and process engineering. Additional work included modifications to the WTP flowsheet due to changes in discharge standards. (Tierra Group, 2013 to Present)

SHERMAN DAM EVALUATION | LOUP CITY, NEBRASKA

As Geotechnical Engineer, performed evaluation of existing toe-drain and blanket drain. Investigation included trench excavation and geotechnical borings. (Vector Colorado, 2004)

MIDWAY PROJECT RAPID INFILTRATION BASIN DESIGN | TONOPAH, NEVADA

As Project Engineer, designed a rapid infiltration basin for the disposal of de-watering water produced during mining operations. Conducted field investigation including auger drilling and percolation tests and designed the basin to accommodate flows up to 2,000 gallons per minute (gpm). Prepared drawings, calculations and a final report in support of permitting efforts. (Tetra Tech, 2008)

RAILROAD VALLEY RAPID INFILTRATION BASIN DESIGN | ELY, NEVADA

As Project Engineer, designed a rapid infiltration basin for the disposal of water recovered during oil production. Conducted field investigation including test pits and percolation tests and designed the basin to accommodate flows up to 50 gpm. Prepared drawings and submittals in support of permitting efforts. (Tetra Tech, 2008)

Professional Affiliations

American Society of Civil Engineers; Member (2008 to 2011)
Society for Mining, Metallurgy, & Exploration (2011 to Present)
Colorado Mining Association; Member (2015)

Employment History

CURRENT EMPLOYER	TIERRA GROUP INTERNATIONAL, LTD.
POSITION	Senior Engineer
YEARS	2012 to Present
EMPLOYER	TETRA TECH, INC.
POSITION	Project Engineer
YEARS	2007 to 2011
EMPLOYER	VECTOR COLORADO, LLC
POSITION	Staff Civil Engineer
YEARS	2003 to 2007
EMPLOYER	KRAZAN & ASSOCIATES
POSITION	Staff Engineer
YEARS	2002 to 2003
EMPLOYER	GOLDER ASSOCIATES INC.
POSITION	Field Technician
YEARS	2000
EMPLOYER	ADVANCED TERRA TESTING
POSITION	Soil Technician
YEARS	1998 to 2000



James A. Willis, P.E.
Sr. Civil Engineer

Education

BS, Civil Engineering, December 2004, University of Utah, Salt Lake City, Utah

Registrations/Certifications

Professional Engineer Utah (#5340238-2202, 2011), Nevada (#23544, 2015)

Experience Summary

Mr. Willis is a Sr. Civil Engineer with over 14 years of experience in civil design and water resource engineering. As a Project Manager, he has managed projects ranging from feasibility level designs to final engineering and construction. His project experience in the mining industry includes heap leach pads, tailings dams, dam rehabilitation, facility closure plans, and the design of water management facilities, including water storage dams, spillways, and diversion channels for mines located internationally and throughout the U.S. His design experience on these projects includes site grading design, stormwater management, hydrologic modeling, seepage mitigation, erosion/sediment control, and roadway design. Areas of expertise include:

- Water and mass balance modeling;
- Dam breach and flood inundation analysis;
- Civil design and modeling of heap leach, waste rock, water management, and tailings storage facilities (TSF) using AutoCAD Land Desktop and Civil 3D;
- Stormwater management and sediment control design (SEDCAD, RUSLE);
- Diversion channel and spillway modeling and design;
- Surface water modeling (HydroCAD, Rational Method, TR-55, HEC-RAS, HEC-HMS); and
- Mine closure design.

He also has designed/reviewed plans, made design recommendations, and prepared reports for residential developments, highways, and commercial development projects.

Project Experience

Civil Design / Hydrology / Hydraulics

EL GALLO IN-PIT TSF DESIGN | EL GALLO MINE, MEXICO

Prepared engineering design of an in-pit TSF including the phased design of the seepage collection system and instrumentation. (Tierra Group, 2018)

SAN JOSÉ TSF TAILINGS PIPELINE DESIGN | MINA EL LIMÓN, NICARAGUA

Completed the design of a tailings delivery and reclaim pipeline system from the mine's process plant to the San José TSF using EPANet. Recommended required pumps and pipeline for use in the design. (Tierra Group, 2018)

LA ESPERANZA CLOSURE DESIGN, DESMINIC | LA LIBERTAD, NICARAGUA

As Project Engineer, evaluated multiple closure cover options including using slurry deposition of the closure cover materials. Design included selecting the location of the closure spillway and closure cover grading design. (Tierra Group, 2018 to Present)

SAN JOSÉ TSF BREACH ANALYSIS | MINA EL LIMÓN, NICARAGUA

Completed a breach analysis of the existing TSF design to determine the tailings runout from the facility as well as the downstream limits of inundation. Results were summarized in a design memo and incorporated into the mine's Emergency Action Plan (EAP). (Tierra Group, 2017)

CIVIL ENGINEERING SUPPORT, BARRICK McLAUGHLIN MINE | CALIFORNIA

Prepared multiple civil design projects including seepage mitigation from existing waste rock facilities to support maintenance of closed facilities. Provided resident engineering services and oversaw construction of prepared civil design. (Tierra Group, 2017 to Present)

LOS GATOS TSF BREACH ANALYSIS, PREMIER GOLD MINES LTD. | MEXICO

Completed a breach analysis of the proposed TSF design. Analysis included calculation of the tailings runout from the facility as well as the limits of inundation. Results were summarized in a design memo and incorporated into the mine's EAP. (Tierra Group, 2017)

HOLLISTER MINE PEER REVIEW, KLONDEX GOLD & SILVER MINING COMPANY | NEVADA

Conducted a peer review of waste rock storage facility (WRSF) design for the mine. Prepared report identifying design issues and detailing proposed modification to allow the project to meet regulatory guidelines. (Tierra Group, 2016 to Present)

FIRE CREEK MINE WRSF, KLONDEX GOLD & SILVER MINING COMPANY | CRESCENT VALLEY, NEVADA

Project Manager and Lead Engineer for the design and construction of a second (WRSF) to support mining operations. Project's design aspects included open channel design, surface water modeling, and civil grading design. Assisted in permitting and reporting as part of an update to the projects water pollution control permit. (Tierra Group, 2016 to Present)

TONKIN DAM DESIGN MODIFICATIONS, BARRICK CORTEZ INC. | JD RANCH, NEVADA

As Project Engineer, managed the preparation of design work and construction of modifications to the existing Tonkin Dam. Design work consisted of a geotechnical analysis, civil grading design, site hydrologic analysis, and a hydraulic analysis of the dam's existing spillway. Modifications to the dam included a buttress design and spillway regrading with the addition of riprap protection. (Tierra Group, 2015 to 2016)

LA ESPERANZA STAGE 6 RAISE AND CONCEPTUAL CLOSURE DESIGN, DESMINIC | LA LIBERTAD, NICARAGUA

As Project Engineer, reviewed and managed the preparation of the TSF Stage 6 raise's construction documents. Directed the preparation of surface water management plans including grouted riprap outfall structures, and diversion channels. Also, evaluated conceptual closure design including closure spillway and closure cover grading designs. (Tierra Group, 2015)

MIDAS TSF ANALYSIS, KLONDEX GOLD & SILVER MINING COMPANY | MIDAS, NEVADA

As Project Engineer, prepared analyses to assist Klondex in the operation and future planning at their Midas mine. Analyses included the preparation of a facility water balance, analysis of existing storage capacity, and a siting study for a new tailings facility. (Tierra Group, 2014)

WRSF, KLONDEX GOLD & SILVER MINING COMPANY | CRESCENT VALLEY, NEVADA

As Project Engineer, reviewed and managed the preparation and design of permitting documents for a proposed WRSF at the Fire Creek Mine. Design included the preparation of the surface water management plan and civil grading design. (Tierra Group, 2014)

ESMERALDA MINE TSF CLOSURE PLAN, GREAT BASIN GOLD | HAWTHORNE, NEVADA

As Project Engineer, reviewed and managed the preparation of construction documents for the TSF 1 Closure Plan. Directed the preparation of the surface water management plan including spillway, diversion channel, and closure cover grading designs. (Tierra Group, 2013)

PITARRILLA PROJECT DEFINITIVE FEASIBILITY STUDY | DURANGO, MÉXICO

As Project Engineer, managed the civil design and plan preparation for the TSF. Reviewed the civil plan set and design for completeness. Prepared sections of the MIA and TSF Design Report corresponding to the civil design and analysis. (Tierra Group, 2012)

SANTA ROSA WEST CLOSURE PLAN | MINA EL LIMÓN, NICARAGUA

As Project Engineer, helped to direct the design and plan set development of the closure plan for the Santa Rosa West tailings facility. The design included preparing a closure grading plan to re-route upland drainage across the facility, and stormwater channel design using HEC-HMS model to determine flows. (Tierra Group, 2012)

ESMERALDA MINE, GREAT BASIN GOLD | HAWTHORNE, NEVADA

As Project Engineer, reviewed and directed the preparation of construction documents for the new tailings facility. (Tierra Group, 2012)

ESMERALDA MINE TSF 2, GREAT BASIN GOLD | HAWTHORNE, NEVADA

As Engineer II, designed dams, diversions, and roadways required for a new TSF at the Esmeralda Mine. The design included site grading, liner layout, earthwork estimates, site hydrologic analysis, and preparation of civil drawings. Helped prepare engineering design report as part of the permitting submittals to the NDEP and NDWR in the state of Nevada. (Tetra Tech, 2011 to 2012)

SOLEDAD STAGE 2 DESIGN | EL MOCHITO, HONDURAS

As Engineer II, developed designs for the stage two raise at the existing tailings facility, including grading design, liner layout, earthwork estimates, and preparation of civil drawings. (Tetra Tech, 2011)

SAN JOSÉ TSF DESIGN | MINA EL LIMÓN, NICARAGUA

As Engineer II, developed designs for the grading and layout of the tailings facility, including grading design, liner layout, earthwork estimates, water balance calculations, and preparation of civil drawings. (Tetra Tech, 2011)

RODEO CREEK SOUTH WALL DIVERSION, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

As Engineer II, conducted HydroCAD analysis of existing conditions and proposed diversion conditions, assisted in design and sizing of diversion culvert and prepared civil plans for review. (Tetra Tech, 2010)

PONDS 7 & 8 DIVERSION DESIGN, RIO ALGOM | GRANTS, NEW MEXICO

Developed conceptual designs for diversion of surface water around a closed uranium process water facility, including riprap design, HEC-RAS modeling, earthwork estimates, alternatives analysis, and preparation of civil plans for review. (Tetra Tech, 2010)

SOLEDAD SPILLWAY PRELIMINARY DESIGN | EL MOCHITO, HONDURAS

As Engineer II, developed conceptual designs for spillway at the existing tailings facility, including channel design, proposed channel alignment, earthwork estimates, alternatives analysis, and preparation of civil exhibits for review. (Tetra Tech, 2010)

HUMBOLDT PIT, GREAT BASIN GOLD | HAWTHORNE, NEVADA

As Engineer II, developed hydrological model for surface water around a pit lake, PMP storm computations, and HEC-HMS modeling. (Tetra Tech, 2010)

NEWPARK DEVELOPMENT | PARK CITY, UTAH

Civil Engineer responsible for preparing the stormwater management model for the Newpark Development. Analyzed existing stormwater system design, and prepared watershed analysis for pre- and post-development conditions. Designed and prepared civil stormwater plans for the development meeting state and county requirements for discharge and pollution control. Provided on-site engineering quality control and inspection during construction of civil plans, coordinating design, and installation with contractors. (Jack Johnson Company, 2005 to 2009)

PROMONTORY | PARK CITY, UTAH

As Civil Engineer, helped prepare the watershed analysis and stormwater prevention plans for the development. Designed a stormwater collection system to meet county standards for stormwater detention and treatment using detention ponds and ditch design. (Jack Johnson Company, 2005 to 2007)

Heap Leach Pads

STERLING MINE HEAP LEACH FACILITY, STERLING GOLD MINING CORPORATION | BEATTY, NEVADA

As Project Engineer, managed the civil design, and stormwater management plan for a new 20-acre heap leach pad at the Sterling Mine. The new heap leach pad design included slope stability modeling, civil layout, ore capacity optimization, liner design, solution recovery system design, and completion of a stacking plan to guide ore placement during operations. (Tierra Group, 2014)

STERLING MINE SLOT HEAP LEACH FACILITY, STERLING GOLD MINING CORPORATION | BEATTY, NEVADA

As Project Engineer, managed the civil design, and stormwater management plan for the expansion of an existing heap leach facility at the Sterling Mine. The heap leach pad expansion included slope stability modeling, civil layout, ore capacity optimization, liner design, and solution recovery system design. (Tierra Group, 2013)

Site Design

RAPID INFILTRATION BASIN (RIB) CONCEPTUAL DESIGN, COVE PROJECT | BATTLE MOUNTAIN, NEVADA

As Project Manager, directed the conceptual design of RIBs at the Cove Project, evaluating previous field investigations to determine representative permeability rates for sizing RIBs. Also directed geotechnical field investigation to establish site lithology below RIBs and permeability rate for final design. (Tierra Group, 2018 to Present)

GOLDFIELDS BONANZA UNDERGROUND WASTE ROCK STORAGE, LODE STAR GOLD | NEVADA

Prepared construction plans for underground storage of waste rock and the backfilling of existing shafts. Supported permitting process by developing figures and preparing design report. (Tierra Group, 2017 to Present)

PLANT ENGINEERING DESIGN CHANGE, STERLING GOLD MINING CORPORATION | BEATTY, NEVADA

As Project Engineer, directed the preparation of an engineering design change submittal for design modifications to the existing process plant piping and repurposing of existing process ponds at the Sterling Mine. (Tierra Group, 2014)

CORE STORAGE EXPANSION | COPPERTON, UTAH

As an Engineer II, designed the stormwater and site grading portions of the expansion of an existing core storage facility at the Bingham Canyon Mine. Prepared civil construction documents and cost estimate for the site grading and stormwater collection system. Modeled the upland site using HEC-HMS to aid in sizing the stormwater system. (Tierra Group, 2012)

ANTHEM AT MERRILL RANCH | FLORENCE, ARIZONA

Civil Engineer assisted in the preparation of roadway designs, utility plans, and site grading plans for the residential development. Design included the preparation of three sets of plans meeting city design standards including site grading, utilities, and roadway plans. (Jack Johnson Company, 2004 to 2009)

Professional Affiliations

American Society of Civil Engineers (ASCE), Member
Society for Mining, Metallurgy & Exploration (SME), Member

Employment History

CURRENT EMPLOYER	TIERRA GROUP INTERNATIONAL, LTD.
POSITION	Sr. Civil Engineer / Project Manager
YEARS	2012 to Present

EMPLOYER	TETRA TECH, INC.
POSITION	Staff Engineer
YEARS	2010 to 2012
EMPLOYER	JACK JOHNSON COMPANY
POSITION	Civil Engineer, EIT
YEARS	2005 to 2009
EMPLOYER	UNIVERSITY OF UTAH
POSITION	Engineering Internship
YEARS	2004 to 2005

Language Proficiency

English: Native
Spanish: Fluent (spoken and written)



Troy Meyer, P.E., P.Eng

Corporate Technical Quality Manager

Education

BS, Civil Engineering, University of Colorado, 1993

Registrations/Certifications

Professional Engineer: Colorado, Nebraska, Wyoming, Arizona, Utah, Alaska, Texas, Idaho, Nevada

Professional Engineer (Canada): Saskatchewan, British Columbia, Yukon Territory

Experience Summary

Mr. Meyer is a Geotechnical Engineer with more than 25 years' experience in project management, field investigations, design, and construction oversight for a wide variety of mining, civil, geotechnical, environmental, landfill, and airport projects. Uniquely balanced professional with diverse and pragmatic engineering abilities and valuable management, leadership, and interpersonal skills. Diverse experience in civil engineering projects, primarily in the areas of geotechnical field investigations, feasibility studies, design, and construction oversight for a wide variety of mining and heavy civil projects worldwide.

Project Experience

Mining Projects

EAGLE GOLD HEAP LEACH DESIGN | YUKON, CANADA

Project Manager responsible for managing feasibility design through final design and construction of a heap leach facility (HLF) for a gold project in Yukon Territory, Canada. Project included geotechnical studies, site water management, design of geomembrane and GCL lined heap leach pad and stormwater ponds, design of Leachate Collection and Recovery System (LCRS), design of heap leach drainage system, stormwater diversion design, closure and reclamation design, and development of capital and operating costs for the HLFs. (Tetra Tech, 2011 to 2014; DOWL, 2014 to 2016; BGC, 2016 to 2019)

FORT KNOX HEAP LEACH FACILITY | ALASKA

Completed a review of the final design report completed by others to identify opportunities to improve the Barnes Creek HLF design concerning constructability and cost. Findings and recommendations were summarized in a project memorandum for consideration of a path forward and several improvement options were identified for further analysis. (BGC, 2017)

MAX MINE TAILINGS FACILITY | BRITISH COLUMBIA, CANADA

A Dam Safety Review (DSR) was carried out for the tailings storage facility (TSF) at the MAX Mine in British Columbia. This was an initial formal DSR for the facility which has been in Care and Maintenance since 2011. The DSR was carried out in compliance with Canadian Dam Safety Guidelines (CDA, 2007), Guidelines for Annual Dam Safety Inspection Reports (BC, 2013) and Association of Professional Engineers and Geoscientists of BC Professional Practice Guidelines for Legislated Dam Safety Reviews (APEGBC, 2013). The evaluation is also considered compliant with the provisions for dam inspections from the Mining Association of Canada (MAC) Guide to the Management of Tailings Facilities (MAC, 1998). (BGC, 2017)

SIERRA GORDA TAILINGS STORAGE FACILITY | CHILE

Performed static and pseudo-static slope stability analysis of tailings dam, analysis of liquefaction potential using SPT-based and CPT-based liquefaction triggering analysis, and design of stabilization measures. The TSF has experienced significant seepage through and under Dams 3 and 4, which had saturated and weakened the Caliche material in the dam foundations and the areas downstream of the dams. The Stage 2

raise design incorporated additional foundation preparation to excavate and replace soluble salt rich Caliche with rockfill below dams to provide for reliable long-term stability of the structures. (BGC, 2017)

RESOLUTION COPPER ENVIRONMENTAL IMPACT STATEMENT (EIS) | ARIZONA

Third-Party Contractor to the USDA Forest Service for preparation of an Environmental Impact Statement (EIS) for approval of a plan of operations for the Resolution Copper Project and associated land exchange. The Tonto National Forest is preparing the EIS to evaluate and disclose the potential environmental effects from approval of a Resolution Copper's General Plan of Operations, for operations on National Forest System land associated with a proposed mine, the exchange of land between Resolution Copper and the United States, and amendments to the Tonto National Forest Land and Resource Management Plan. As a member of the Physical Sciences team, provided expertise in geotechnical and tailings disposal issues. (DOWL, 2015 to 2016; BGC, 2016 to 2019; Strate-Geo LLC, 2020)

RED DOG MINE | ALASKA

Detailed technical review for application to expand the Stage X Raise of the Red Dog Mine Tailings Dam for the State of Alaska Large Mines and Dam Safety Program. Review of reports, plans, specifications, engineering analyses, and operational performance data. (BGC, 2017)

HECLA'S LUCKY FRIDAY MINE TAILINGS ENGINEERING SERVICES | IDAHO

Hecla's Lucky Friday underground silver mine in northern Idaho includes tailings disposal facilities utilizing conventional slurry deposition in engineered containment structures. The steep rugged terrain and heavy snowfall at the mine site limits suitable tailings disposal sites and have necessitated the use of a sidehill dam for currently active tailings disposal (Pond 4). The project involved geotechnical investigations, engineering design of a downstream raise for the dam, extension of the liner system and preparation of final construction documents. Additional tasks include QA/QC oversight and testing during construction and permitting support. Engineer of Record for the tailings disposal operations at Lucky Friday. Primary responsibilities include engineering design, permitting, and construction monitoring services for the current tailings dam (Pond 4), and development of Operations Surveillance and Maintenance (OSM) and abandonment plans for the tailings facility. Responsible for performing periodic dam and facility inspections. (Tetra Tech, 2012 to 2014; DOWL 2014 to 2016; BGC 2016 to 2019)

CAMECO KINTYRE PROJECT | AUSTRALIA

Design Engineer responsible for evaluation of tailings disposal options for disposal of uranium tailings and pre-feasibility design of a geomembrane and GCL lined dry stack tailings management facility for a proposed mine in Western Australia. The project involved evaluation of Best Available Technologies (BAT) for containment of tailings and contaminated stormwater, and design of the liner systems for the dry stack facility and stormwater collection pond, geotechnical studies, stability analyses, and stormwater controls. (Tetra Tech, 2011 to 2012)

ANGS GAS STORAGE PROJECT | ARIZONA

Design Engineer responsible for geomembrane-lined brine pond design for a salt solution mining project. Design included geotechnical investigations and analyses, dam design, liner (geomembrane and GCL) selection and design, Leachate Collection and Recovery System (LCRS) design, water balance evaluations, and permitting support. (Tetra Tech, 2009 to 2011)

ROSEMONT COPPER MINE SITING STUDIES AND FEASIBILITY DESIGN | ARIZONA

Project Manager responsible for managing siting studies and feasibility design for a 60-million ton (Mt) HLF and 500 Mt dry stack TSF and associated containment and process ponds for a copper project south of Tucson. Project included geotechnical and geologic hazard studies, site water management, geochemical assessment, BADCT analyses, closure and reclamation, alternatives analysis and development of capital and operating costs. Included detailed alternatives evaluation for siting of facilities using Multiple Accounts Analysis methods with merit scoring for environmental and socio-economic factors, technical components, and project economics. (Vector Colorado, 2006 to 2008; Tetra Tech, 2008 to 2009)

ROSEMONT COPPER MINE HEAP LEACH DESIGN | ARIZONA

Project Manager responsible for managing feasibility and final design for a 60-Mt HLF for a copper project south of Tucson. Project included geotechnical and geologic hazard studies, site water management, design of geomembrane and GCL lined process and stormwater ponds, design of LCRS, design of heap leach liner and drainage system, geochemical assessment, BADCT analyses for Aquifer Protection Permit,

closure and reclamation design, alternatives analysis and development of capital and operating costs for the HLFs. (Vector Colorado, 2006 to 2008; Tetra Tech, 2008 to 2009)

GOLD ROAD PROJECT TAILINGS FACILITY EXPANSION | ARIZONA

Project Manager responsible for evaluation of tailings disposal options and related Aquifer Protection Permit application for siting studies and feasibility design for an underground gold mine in northern Arizona. The project involved conversion of the disposal method from conventional to dry stack, and included BADCT analyses, geomembrane-lined pond design, geotechnical studies, stability analyses, and final design of the facility. (Tetra Tech, 2008 to 2009)

VALE POTASIO RIO COLORADO PROJECT | MENDOZA PROVINCE ARGENTINA SA

Performed a high-level gap analysis for a salt storage facility (SSF) for a proposed potash solution mine in Argentina. Specific areas reviewed were geotechnical aspects, seismic hazards, containment design, liner system selection, water management, and material handling. A follow-up study was completed to address concerns related to static and seismic stability of the salt pile, and wind uplift potential and mitigation options for the geomembrane liner. Engineering analyses and calculations were performed and recommendations developed. (Tetra Tech, 2010)

INTREPID POTASH NORTH MINE | NEW MEXICO

Technical Lead responsible for geotechnical evaluations and tailings facility and brine pond design. Feasibility study to evaluate the re-opening of an underground mine and construct new surface processing, and storage and product load-out facilities. Work included trade-off studies evaluating options for tailing disposal and a review of potential environmental and permitting issues associated with reopening the mine. (Tetra Tech, 2009)

CAMECO KEY LAKE DTMF | SASKATCHEWAN, CANADA

Project Manager responsible for geotechnical studies and final design of tailings facility remediation. Project involves pit slope stabilization design, construction for uranium tailings storage, and infrastructure relocation design. (Tetra Tech, 2009 to 2014; DOWL 2014 to 2016; BGC, 2016 to 2019; Strata-Geo, LLC, 2020)

MOUNTAIN COAL COMPANY WEST ELK MINE | COLORADO

Project Engineer responsible for re-evaluation of the mine water control plan at West Elk Mine. The revision involved an updated SEDCAD analysis of the mine's surface water collection and treatment system, based on field inspections of the existing ditches and culverts. (Tetra Tech, 2008)

COLOWYO COLLUM COAL MINE | COLORADO

Project Engineer responsible for permit-level design of surface water control structures for proposed expansion of the Collum Mine. The work involved the development of a surface water control plan, sizing and design of control structures, and preparation of design documentation to support permitting efforts. (Tetra Tech, 2008)

MOLYCORP MOUNTAIN PASS BRINE PONDS DESIGN | CALIFORNIA

As Senior Geotechnical Engineer, assisted in the design of large lined evaporation ponds and land application system for treatment of mine waste and drainage. An enhanced evaporation system was developed to increase the evaporation rate. The project included water balance calculations, design of the geomembrane pond liner and leak detection systems and evaluation and design of enhanced evaporation systems. (Harding Lawson, 1999)

SHOOTARING CANYON MILL | UTAH

Technical Advisor to Uranium One for tailings facility design and permitting. The project focus was to expedite permitting and mill start-up while optimizing design and incorporating regulatory guidelines. The tailings facility will consist of 5 million cubic yards of uranium mill tailings contained within two 40-acre cells. Project deliverables provided by Tetra Tech included design report, engineers cost estimate, operations plan, compliance and monitoring plan, construction drawings and specifications, environmental report, and reclamation and decommissioning plan. (Tetra Tech, 2008 to 2009)

KENNECOTT UTAH COPPER TAILINGS FACILITY SEISMIC EVALUATION | UTAH

Project Manager responsible for seismic stability evaluation of existing tailings facility. Study included a review of previous studies and recent monitoring data, liquefaction potential analysis, and post-earthquake stability. (Tetra Tech, 2008 to 2009)

CAÑARIACO COPPER PROJECT FEASIBILITY DESIGN | PERU

Project manager responsible for studies to support Preliminary Economic Analysis for a 500M-tonne tailings impoundment including siting studies and alternatives evaluation for technical, environmental, socio-economic and project economics comparison. (Vector Colorado, 2007; Tetra Tech, 2008)

TAILINGS FACILITY FINAL DESIGN, PASCUA-LAMA PROJECT | ARGENTINA

Project Manager responsible for directing technical design team for engineering analyses and design of the tailings dam, impoundment and pond geomembrane liner systems, water storage reservoir, and surface water diversions in a region with high seismic activity. Prepared documents for regulator permitting and participated in regulatory meetings in Argentina. (Vector Colorado, 2006)

TAILINGS FACILITY PRE-FEASIBILITY STUDY, EL DORADO MINE | EL SALVADOR

Technical Manager for multi-disciplined team. Project involved engineering analyses and design for a rockfill dam and geosynthetic-lined tailings impoundment. (Vector Colorado, 2005)

TAILINGS FACILITY DESIGN, EL MOCHITO MINE | HONDURAS

Technical Manager responsible for managing geotechnical investigations and feasibility studies for a new tailings dam. Project included evaluation of various tailings disposal methods and geomembrane liner systems and a site selection study for the new dam utilizing risk analysis. Performed final design and develop construction plans and specifications for the chosen alternative (Soledad Tailings Facility). Performed QA/QC during construction of the Phase I dam and impoundment. (Vector Colorado, 2004 to 2005)

DOE RUN WEST FORK TAILINGS FACILITY | MISSOURI

As Design Engineer, managed the design of permanent spillway to accommodate the design peak flow event. Project included an initial engineering evaluation to identify required modifications to the existing spillway and outfall and provide a cost/benefit comparison of alternative spillway locations (i.e., modifying the existing spillway vs. constructing a new spillway at an alternative location), and final design of the selected alternative, including specifications and construction drawings. (SRK, 1998)

BARTON MINES TAILINGS IMPOUNDMENTS | NEW YORK

As Staff Engineer, performed tailings placement, construction sequencing, and geotechnical monitoring plan, geotechnical analyses for new and existing tailings impoundments including two-dimensional pore pressure modeling using finite difference methods and associated static and pseudo-static stability analyses, tailings sampling, and testing plan development and implementation. (SRK, 1995)

STABILITY ANALYSIS, SAN LUIS PROJECT | COLORADO

As Staff Engineer, performed detailed stability analysis for various embankment configurations and soil properties, included both static and seismic analysis. (SRK, 1995)

STABILITY ANALYSIS, KENNECOTT RIDGEWAY PROJECT | SOUTH CAROLINA

As Senior Geotechnical engineer, performed stability analysis on existing and reconfigured embankments, estimated settlement in tailings based on cone penetration test data and laboratory consolidation test data using a finite difference settlement model. (SRK, 1998)

ENGINEERING ANALYSIS AND DESIGN, KENSINGTON PROJECT | ALASKA

As Geotechnical Engineer, performed detailed engineering analysis and design for a dry tailings facility. Tasks included seepage analysis; settlement and stability analysis; and development of a surface water management plan, technical specifications, QA plan, and operations and monitoring plans. Conducted field exploration plan and laboratory testing program to access foundation conditions and identify possible construction material sources. Assisted in development of permitting submittals. (SRK, 1997)

RAIN MINE TAILINGS FACILITY EXPANSION | NEVADA

As Engineering Technician, performed QA/QC testing at the tailings facility expansion and embankment raise, including compaction control and liner placement. (Knight Piesold, 1991)

BIG SPRINGS TAILINGS FACILITY EMBANKMENT | NEVADA

As Engineering Technician, performed QA/QC testing for the tailings facility embankment raise and conducted nuclear density/moisture testing for compaction control as well as in-situ permeability using the air entry permeameter. (Knight Piesold, 1992)

BOROO HEAP LEACH FEASIBILITY STUDY AND FINAL DESIGN | MONGOLIA

Manager of multi-disciplinary design team for feasibility studies to construct a new HLF at an existing gold mine in northern Mongolia. Project included development of the metallurgical basis; design of the geomembrane-lined heap leach pad, ponds, solution delivery pipelines and pumping systems, surface water diversions, carbon column and plant tie-in, and associated facilities; development of capital and operating costs; and design of provision for cold weather protection and operation. (Vector Colorado, 2006 to 2007; Tetra Tech 2007 to 2008)

ESCONDIDA HEAP LEACH FACILITY ANALYSES AND DESIGN | CHILE, SOUTH AMERICA

As Design Engineer, performed detailed analysis and design including dynamic displacement, settlement, liner drainage pipe network system design, seepage analysis, hydrogeologic assessment, and foundation recommendations for plant and crusher facilities. Developed and oversaw QA field program for construction of the leach pad and solution ponds. (SRK, 1995 to 1996)

CERRO VERDE MINE HEAP LEACH FACILITY DESIGN | PERU, SOUTH AMERICA

As Design Engineer, assisted in the design of a HLF to be constructed over an existing waste rock dump. Designed regrading plan and heap layout, liner system, and drainage pipe network design for solution collection system. (SRK, 1995)

LA COLORADO MINE LEACH PAD FACILITY DESIGN AND ANALYSIS | MEXICO

As Design Engineer, performed leach pad facility design and analysis, including alternative layout configurations, stability analysis, and surface water hydrology assessment. (SRK, 1996)

HEAP LEACH PAD LAYOUT AND DESIGN, ILLINOIS CREEK PROJECT | ALASKA

As Design Engineer, assisted with facility layout and design for the heap leach pad. Conducted field exploration and laboratory testing program to characterize foundation conditions and identify construction material sources. (SRK, 1997)

NORTH AREA LEACH EXPANSION QA/QC TESTING | NEVADA

As Engineering Technician, performed QA/QC testing including all soils testing and compaction control for fill and liner system components. (SRK, 1994)

GILT EDGE MINE WASTE ROCK DUMP REMEDIATION | SOUTH DAKOTA

As Staff Engineer, assisted in development of a waste rock dump remediation plan. Calculated earthwork volumes for regrading of the dump and performed layout work for the water treatment ponds and facilities. (SRK, 1997)

THUNDER MOUNTAIN PROJECT STABILITY ANALYSIS | IDAHO

As Senior Geotechnical Engineer, performed stability analysis for waste rock and HLFs, including finite difference modeling for determination of pore pressures in clay foundation for alternate loading scenarios and application of resulting pore pressures to static and pseudo-static stability analysis. (SRK, 1997)

Closure and Reclamation

CODY QUARRY RECLAMATION DESIGN | CODY, WYOMING

As Senior Geotechnical Engineer, assisted in the development of a reclamation design of an abandoned quarry under the Wyoming Abandoned Mine Lands (AML) Program. The project involved regrading the site and constructing retaining to accommodate a planned amphitheater and park. (Vector Colorado, 2006)

CODY SULFUR MINES RECLAMATION | WYOMING

As Senior Geotechnical Engineer, performed site investigations and developed reclamation recommendations for numerous abandoned underground and above-ground sulfur mines near Cody. The work was performed under the Wyoming AML Program. (Vector Colorado, 2006 to Present)

CLOSURE CAP DESIGN, CANNON MINE | WASHINGTON

As Geotechnical Engineer, assisted in the design of a closure cap on the tailings facility. Performed settlement analysis on tailings material due to cap loads using cone penetration test data. (SRK, 1998)

Landfills

BFI FOOTHILLS LANDFILL CAP | COLORADO

Construction QA Manager for construction of an alternate evapotranspiration cap permitted to meet RCRA Subtitle D requirements. (Vector Colorado, 2004)

FORT CARSON LANDFILL 5 MOTORPOOL CAP DESIGN | COLORADO

Lead Design Engineer for an innovative cap system incorporating an asphaltic concrete surface overlying an aggregate base course, sand drainage layer, composite barrier layer, biaxial geogrid reinforcement, and gas venting system. The cap was designed and permitted to meet RCRA Subtitle C requirements and covered an area of approximately 5 acres. (Harding Lawson, 1999)

FORT CARSON LANDFILL EVAPOTRANSPIRATION (ET) CAP | COLORADO

As Lead Design Engineer, prepared design and technical specifications for an ET cap system. The cap covered approximately 12 acres and was permitted to meet RCRA Subtitle C requirements. Prepared design drawings, technical specifications, QA/QC plan, health and safety plan, and long-term monitoring plan. (Harding Lawson, 1999)

MUNICIPAL SOLID WASTE MSW LANDFILL EXPANSION, BFI FOUNTAIN COLORADO | COLORADO

Lead Design Engineer for MSW landfill expansion. Work included design and permitting of liner and leachate collection systems for a 40-acre expansion. Prepared design drawings, technical specifications, construction QA/QC plan, and bid documents. (Harding Lawson, 1999)

CHANDLER LANDFILL CAP EVALUATION | OWEGO, NEW YORK

As Geotechnical Engineer, performed a cap component alternative evaluation to demonstrate a technically equivalent cap alternative to the State-prescribed cap while providing cost savings to the client. Work included design and permitting of the resulting multi-layer cap consisting of a geosynthetic clay liner (GCL), geocomposite drainage layer, and vegetative soil layer. (Harding Lawson, 1998)

COPE ASH LANDFILL SEEPAGE ANALYSIS | SOUTH CAROLINA

As Geotechnical Engineer, performed seepage analysis using the US Environmental Protection Agency's HELP model to estimate percolation of leachate through the landfill. Performed sensitivity analysis using varying combinations of soil conditions. (SRK, 1994)

McMEEKIN STATION ASH LANDFILL DESIGN AND SURFACE WATER MANAGEMENT STUDY | SOUTH CAROLINA

As Geotechnical Engineer, performed facility design and surface water management study as part of Phase II hydrological site assessment. (SRK, 1995)

Civil Geotechnics

MARLIN MINE GEOTECHNICAL INVESTIGATION | GUATEMALA

As Project Manager, performed geotechnical field investigation, geophysical study, and development of geotechnical design parameters and recommendations for a new plant facility and a tailings dam. (Vector Colorado, 2004)

STORAGE HANGAR DESIGN AND CONSTRUCTION, TELLURIDE REGIONAL AIRPORT | TELLURIDE, COLORADO

As Project Manager, performed or supervised all aspects of the structural, mechanical, electrical, and civil design of the 12,000 square-foot airport hangar, including design, cost estimation, budgeting, bid administration, and construction management. Construction management services included scheduling for work and materials testing services, submittal review, and pay request approval. (William E. Payne & Associates, 2001)

CORPORATE HANGARS DESIGN AND PERMITTING, CENTENNIAL AIRPORT | ENGLEWOOD, COLORADO

As Project Manager, performed design and permitting of a large corporate hangar and office complex at Centennial Airport. Coordinated a large design team consisting of architectural, mechanical, metal building, plumbing, structural, and electrical disciplines. Performed site civil engineering and utility service design and permitting. Acted as Owners' Representative to provide construction oversight services to ensure the facilities were built according to the specifications and schedule. (William E. Payne & Associates, 2002)

HANGAR FACILITY DESIGN, CENTENNIAL AIRPORT | ENGLEWOOD, COLORADO

As Project Manager, managed design and permitting of a large maintenance hangar and adjoining office. Coordinated a large design team consisting of architectural, mechanical, metal building, plumbing, structural, and electrical disciplines. Performed site civil engineering and utility service design and permitting. (William E. Payne & Associates, 2002)

HANGAR COMPLEX, CENTENNIAL AIRPORT | ENGLEWOOD, COLORADO

As Project Manager, managed design and permitting of Air Park Center, a 47,000 square-foot hangar complex. Coordinated a large design team consisting of architectural, mechanical, metal building, plumbing, structural, and electrical disciplines. Performed site civil engineering and utility service design and permitting. (William E. Payne & Associates, 2000)

SELF-FUELING STATION, TAC AIR | ENGLEWOOD, COLORADO

As Project Manager, managed design and permitting of a light aircraft self-fueling station for TAC Air. Station was designed for Centennial Airport to meet the Uniform Fire Code and local codes. System incorporated a card reader and remote fueling island. Developed site civil, structural, mechanical, and electrical plans. (William E. Payne & Associates, 2002)

HANGAR/OFFICE COMPLEX DESIGN, CENTENNIAL AIRPORT | ENGLEWOOD, COLORADO

As Project Manager, managed design of 150,000-square feet of hangar space, 6,000-square feet of office space in five buildings, parking lots, access road, and a taxiway extension for Willowbrook Air. Performed site civil engineering and utility service design and permitting. (William E. Payne & Associates, 2001)

MAYO AVIATION HANGAR PHASE III DRAINAGE STUDY | ENGLEWOOD, COLORADO

As Project Manager, performed a Phase III drainage study for Mayo Aviation Hangar to support the storm sewer design for a new hangar construction project on Centennial Airport. (William E. Payne & Associates, 2001)

ROCKY MOUNTAIN STRAIGHT FLIGHT HANGAR DESIGN | ENGLEWOOD, COLORADO

As Project Manager, managed the design of site utilities for Rocky Mountain Straight Flight Hangar. Performed a sewer and water study to size and design site utilities. Developed plan and profile sheets for permitting and construction. (2000)

AIR TRAFFIC CONTROL TOWER ENGINEERING SUPPORT, SUGAR LAND MUNICIPAL AIRPORT | SUGAR LAND, TEXAS

As Project Manager, provided engineering support during design, permitting, and construction of an 81-foot high air traffic control tower. The tower was designed to address the specific needs of the Sugar Land Airport. All construction details for the tower, cab, exterior finish, interior layout, stairway, elevator, and basic equipment layout were provided and an engineer's construction cost estimate was prepared to assist in budgeting and bid review. All aspects of the design and permitting were performed or overseen including architectural design and structural, mechanical, and electrical engineering. (William E. Payne & Associates, 2001)

MARTIN STATE AIRPORT AIR TRAFFIC CONTROL TOWER DESIGN | BALTIMORE, MARYLAND

As Project Manager, managed 30% design of the air traffic control tower for the Martin State Airport. This proposed 60-foot-high control tower was designed to address the specific needs of the Martin State Airport. Provided preliminary details for tower, cab, exterior finish, interior layout, stairway, elevator, and basic equipment layout. (William E. Payne & Associates, 2002)

DRAINAGE STUDY, CENTENNIAL AIRPORT | ENGLEWOOD, COLORADO

As Project Manager, managed large drainage study and design for East Development Area at Centennial Airport. Managed all aspects of the project, including preparation of a Phase III drainage study, permitting, preparation of bid and construction documents, storm sewer design, outfall design, bid administration and contract preparation, construction oversight, and preparation of record documents. (William E. Payne & Associates, 2001)

FLORIDA CANYON MINE FIELD EXPLORATION AND LABORATORY TESTING | NEVADA

As Design Engineer, developed and implemented field exploration and laboratory testing program to access foundation conditions and identify construction material sources. (Harding Lawson, 1998)

Professional Affiliations

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

Publications

Meyer T. Stacking dewatered tailings on a conventional slurry impoundment.
Meyer T, Athanassopoulos C. GCLs in Heap Leach Pads: State of the Art and Practice.
Hudson A, **Meyer T,** 2008. Challenges in Heap Leach Pad Design: Consideration of Thermal Conditions.
Arnold K, **Meyer T,** Henderson R, 2006. Dry tailings: an alternative to conventional tailings management.
Purdy J, Fuller M, **Meyer T,** Douglas S, Lagos A, 2012. Lining Steep Rock Slopes with a Geomembrane Liner to Facilitate Tailings Facility Expansion.

Employment History

CURRENT EMPLOYER	TIERRA GROUP INTERNATIONAL, LTD.
POSITION	Corporate Technical Quality Manager
YEARS	2020 to Present
EMPLOYER	STRATA-GEO LLC
POSITION	Principal Owner
YEARS	2020 to Present
EMPLOYER	BGC
POSITION	Principal Geotechnical Engineer
YEARS	2016 to 2019
EMPLOYER	DOWL
POSITION	Senior Geotechnical Engineer
YEARS	2014 to 2016
EMPLOYER	TETRA TECH
POSITION	Office Manager
YEARS	2008 to 2014
EMPLOYER	TETRA TECH
POSITION	Senior Geotechnical Engineer
YEARS	2007 to 2008
EMPLOYER	VECTOR COLORADO, LLC
POSITION	Principal Owner
YEARS	2003 to 2007

EMPLOYER	OLSSON ASSOCIATES
POSITION	Senior Engineer
YEARS	2002 to 2003
EMPLOYER	WILLIAM E. PAYNE & ASSOCIATES
POSITION	SENIOR ENGINEER
YEARS	2000 to 2002
EMPLOYER	HARDING LAWSON
POSITION	Senior Engineer
YEARS	1998 to 2000
EMPLOYER	STEFFEN ROBERTSON AND KRISTEN (U.S.)
POSITION	Senior Professional - Geotechnical Division
YEARS	1997 to 1998
EMPLOYER	STEFFEN ROBERTSON AND KIRSTEN (U.S.)
POSITION	Project Engineer
YEARS	1996 to 1997
EMPLOYER	STEFFEN ROBERTSON AND KIRSTEN (U.S.)
POSITION	Staff Engineer
YEARS	1994 to 1996
EMPLOYER	KNIGHT PIESOLD
POSITION	Field and Lab Technician
YEARS	1990 to 1993

Language Proficiency

Spanish: Conversational (written)