



Peter E. Kowalewski, P.E., QP
Principal Engineer

Education

ME, Applied Mechanics, Colorado School of Mines, 1997
BS, Geological Engineering, Colorado School of Mines, 1992

Registrations/Certifications

Professional Engineer: Colorado (#32125); Wyoming (#9206); Missouri (#2001029633); Kansas (#16686); Texas (#883060); Nevada (#16772); Utah (#7409159-2202); Idaho (#15289); Arizona (#54444); New Mexico (#24495); South Dakota (#13934); Minnesota (#56060)

Experience Summary

Mr. Kowalewski is a Principal Engineer with over 30 years of water resources and geotechnical engineering experience in the mining industry. He is a registered Professional Engineer (Civil) in 12 states and is recognized as a Qualified Person (QP) under NI 43-101. He has broad experience in the design, construction, operation, and closure of tailings storage facilities (TSFs), heap leach facilities (HLFs), and water management facilities throughout the western U.S. and the world. He serves as the Engineer of Record (EoR) for multiple water dams and TSFs and has completed third-party and due diligence reviews of TSFs, HLFs, and associated water management facilities. His experience also includes providing permit application development and compliance for various aspects of mine development, operations, and closure. Areas of specialty include the geotechnical design of tailings, heap, leach, and waste rock facilities, hydrologic and hydraulic design for water management facilities (ponds, diversions, spillways, etc.), unsaturated flow modeling for waste rock and HLF operations as well as waste rock, HLF, and TSF closure, site-wide and facility-specific water balance development, and internal/external audit and due diligence review, including conducting management reviews and audits of operating facilities to assess compliance with internal (Corporate) or external (Regulatory) standards.

Project Experience

Hydrology / Hydraulics / Water Management

PERMITTING AND BASELINE DATA COLLECTION, LOST CREEK PROJECT | ROGGEN, COLORADO

As Project Principal, provided permitting support for Greenfields industrial sands project, including impacts assessment to alluvial aquifer underlying Project area. Supported client in state (Mined Land Reclamation Board) and county (Zoning Commission) hearings. Designed baseline groundwater monitoring well network, directed monitoring well installation, and oversaw quarterly well sampling program. (Tierra Group, 2019 to 2020)

STORMWATER DIVERSION CHANNEL DESIGN AND CONSTRUCTION PROJECT, MISSION MINE | SAHUARITA, ARIZONA

As Project Principal, supervised the hydrologic and hydraulic design of stormwater diversion channel improvements, including the use of HydroTurf™ for slope erosion protection in identified affected areas along the TSFs' embankment toes. Prepared permitting documents for construction approval, supervised Resident Engineering activities, completed site visits during construction, and directed As-Built Report preparation for submittal to the county agency. (Tierra Group, 2018 to 2020)

STORMWATER DIVERSION CHANNEL DESIGN | WYOMING

As Project Principal, directed the design of an integrated stormwater collection channel and seepage management system for a portion of the Project. Presented alignment options for a diversion channel

around a tailings storage area. Completed hydrology to determine peak flows for channel designs. (Tierra Group, 2019 to 2020)

FEASIBILITY-LEVEL WATER MANAGEMENT DESIGN, STIBNITE GOLD PROJECT | STIBNITE, IDAHO

As Principal-in-Charge, supervised the Feasibility-level design of surface water diversions around the proposed Hangar Flats TSF and Hangar Flats, West End, and Fiddle development rock storage facilities. (Tierra Group, 2017 to 2018).

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

As Project Principal, directed the conceptual design of a series of RIBs to dispose of dewatering water produced during mining operations. Project included preliminary civil design (layout) of RIB locations and developing a field investigation plan, including auger drilling and percolation tests to support the final design and permitting of a series of basins to accommodate flows over 35,000 gpm. Supervised and reviewed the preparation of drawings, calculations, and a conceptual design report in support of permitting efforts. (Tierra Group, 2018).

PRELIMINARY HYDROLOGIC EVALUATION, RHYOLITE RIDGE PROJECT | TONOPAH, NEVADA

As Principal-in-Charge, supervised the preliminary hydrologic evaluation for a proposed lithium boron-project. Work included preliminary basin hydrology and hydrogeologic characterization for the Project. Preliminary diversion sizing was completed to divert water away from the proposed infrastructure. (Tierra Group, 2017 to 2018)

DOUGLAS COUNTY STORMWATER MANAGEMENT PROGRAM SUPPORT | CASTLE ROCK, COLORADO

As Principal-in-Charge and Lead Author conducted site visits, updated Runoff Control Plans developed for Douglas County facilities (Southeast, EvTech, Trumbull, Sedalia, Highlands Heritage Park, Fairgrounds, Gailen Buck, and Castle Rock Operations), and developed a new Runoff Control Plan for the Moore Road EVOG Facility in support of the County's Municipal Stormwater Program. Reviewed, updated, and developed new Standard Operating Procedures for inclusion in the County's Stormwater Standard Operating Procedures Manual. (Tierra Group, 2017 to 2020)

CH04C DIVERSION CHANNEL, CORTEZ HILLS MINE | CRESCENT VALLEY, NEVADA

As Principal-in-Charge, supervised the design of an in-pit surface water diversion channel in the Cortez Hills Open Pit. Supervised the hydrology study, hydraulic design, and preparation of construction drawings, technical specifications, and Construction Quality Assurance (CQA) Manual. (Tierra Group, 2013 to 2014)

WATER BALANCE REVIEW, MASBATE MINE | MASBATE CITY, PHILIPPINES

As Principal Engineer, reviewed existing deterministic and probabilistic (GoldSim) water balance models developed for the existing TSF and water diversion dam to evaluate water and tailings management options within the two facilities. The evaluation also included confirming the required water treatment flowrates to be used in designing a water treatment plant to be constructed to allow for treatment and discharge of accumulated water from the TSF. (Tierra Group, 2013)

DIVERSION CHANNEL DESIGN AND CONSTRUCTION, GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Manager, supervised design and construction of two water diversion channels totaling approximately 5 miles in length. Design included grouted riprap drop structures for grade control and to limit erosion during 100-year flows. Completed the design of a seepage transfer pipeline to convey collected seepage in a double-contained pipeline over approximately 2,100 feet. Supervised preparation of construction drawings, technical specifications, and CQA Manual. While at Tetra Tech, supervised the design of an approximately 12,000-foot diversion pipeline (72-inch diameter) to re-route stormwater flows around an open pit. Work included preparing design drawings (for construction), technical specifications, and the Construction QA/QC Manual. (Vector Nevada, 2005 to 2007; Tetra Tech, 2007 to 2010)

HUMBOLDT PIT HYDROLOGY STUDY, ESERALDA MILL FACILITY | HAWTHORNE, NEVADA

As Project Manager/EoR, directed the development of a site hydrology model to assess inflows to the Humboldt Pit at the site and performed a risk-based evaluation of discharges from the pit for input into a Screening Level Ecological Risk Assessment (SLERA). (Tetra Tech, 2010)

DIVERSION DESIGN AND CONSTRUCTION, ESERALDA MILL FACILITY | HAWTHORNE, NEVADA

As Project Manager/EoR, directed the design of two diversions (north diversion and south diversion) to convey peak flows due to the 100-year 24-hour rainfall event around the proposed location of a new TSF2.

Prepared and submitted an Engineering Design Change (EDC) to the Nevada Division of Environmental Protection (NDEP) which was approved for construction in 2011. Directed on-site construction oversight services for mine access road realignment and diversion construction. (Tetra Tech, 2011)

SITE-WIDE WATER BALANCE EVALUATION, MINERA AGUAS TENIDAS (MATSA) | SPAIN

As Senior Consultant, directed the development of a site-wide probabilistic water balance model using @RISK to evaluate water accumulation scenarios, potential water disposal scenarios, and recommend necessity and sizing of water management facilities at a polymetallic mine in southwestern Spain. (Tetra Tech, 2011)

RIB DESIGN, ROBINSON MINE | RUTH, NEVADA

As Project Principal, directed the design of a series of RIBs to dispose of dewatering water produced during mining operations. Project included field investigation, including auger drilling and percolation tests, and design of a series of basins to accommodate flows in excess of 7,500 gpm. Supervised and reviewed the preparation of drawings, calculations, and a final design report in support of permitting efforts. (Tetra Tech, 2009)

RIB DESIGN, MIDWAY PROJECT | TONOPAH, NEVADA

As Project Principal, directed the design of a RIB to dispose of dewatering water produced during mining operations. Project included field investigation, including auger drilling and percolation tests, and design of a basin to accommodate flows up to 2,000 gpm. Supervised and reviewed the preparation of drawings, calculations, and a final design report in support of permitting efforts. (Tetra Tech, 2008)

RIB DESIGN, RAILROAD VALLEY | ELY, NEVADA

As Project Principal, directed the design of a RIB to dispose of water recovered during oil production. Project included field investigation, consisting of test pits and percolation tests, and basin design to accommodate flows up to 50 gpm. Reviewed the drawings and report submittal in support of permitting efforts. (Tetra Tech, 2008)

Water / Flood Control / Containment Dams

JD RANCH DAM LOW-LEVEL OUTLET REPLACEMENT PROJECT, JD RANCH | CARLIN, NEVADA

As Project Principal, directing the civil, geotechnical, hydrologic, and hydraulic design for the permitting and replacement of the dam's low-level outlet structure. Project included a geotechnical investigation to confirm embankment geotechnical properties and assess seepage through piezometer installation and existing spillway hydraulic assessment. Dam safety permitting was completed through the Nevada Division of Water Resources (NDWR). Low-level outlet replacement construction will commence following NDWR approval. (Tierra Group, 2020 to 2022)

JD RANCH DAM, DAM SAFETY ASSESSMENT, JD RANCH | CARLIN, NEVADA

As Lead Inspector, completed a visual inspection of the JD Ranch Dam following a report of a potential piping issue along the dam's low-level outlet (corrugated metal pipe culvert). Prepared an inspection including recommendations for low-level outlet replacement and further dam assessments to ensure stability and continued long-term operation of the dam. (Tierra Group, 2020)

COLLECTION PONDS RELINING PROJECT, GRANTS RECLAMATION PROJECT | GRANTS, NEW MEXICO

As Project Principal, directed the preparation of a Notice of Intent to Construct (NOIC) for the relining of two collection ponds at the Grants site. The NOIC included design drawings, technical specifications, and Construction QA/QC Manual. Obtained approval to reline the ponds from the New Mexico Environment Department (NMED). Conducted site visits during relining construction and directed As-Built Report preparation. NMED approved the Project with no comments. (Tierra Group, 2019 to 2020)

DAVIS CREEK RESERVOIR DAM SAFETY REVIEW, MCLAUGHLIN MINE | LOWER LAKE, CALIFORNIA

Supported Tierra Group's EoR completing a Dam Safety Review (DSR) as part of Tierra Group's transition into the EoR role for the facility. Work included a site visit, visual inspection of the dam, document/design review, personnel interviews, and recommendations developed to meet industry best practices for dam operations. (Tierra Group, 2019 to 2020)

WEST OVERBURDEN STORAGE AREA (WOSA) STORMWATER DAMS, ARTURO PROJECT | CARLIN, NEVADA

As Project Principal, directed the civil, geotechnical, hydrologic, and hydraulic design for the permitting and construction of the Arturo WOSA Stormwater Dams at the Arturo Project. Design work consisted of basin hydrology, water balance/water pool modeling, civil design of the dam, seepage analyses, and stability analyses. Tierra Group provided CQA during dam construction and produced the As-Built Report following construction completion. Tierra Group supported the Client to obtain the exclusion of dams from the NDWR Dam Safety program due to the presence of overburden storage area downstream of “dams”. Work included preparation and submission of As-Built Report to NDWR to document construction. (Tierra Group, 2019 to 2020)

EAST PIT STORMWATER DAM, ARTURO PROJECT | CARLIN, NEVADA

As Project Principal, directed the civil, geotechnical, hydrologic, and hydraulic design for the permitting and construction of the Arturo East Pit Stormwater Dam. Design work consisted of basin hydrology, sediment generation modeling, spillway design, civil design of the dam, seepage analyses, and stability analyses. Tierra Group provided oversight of CQA during dam construction and produced the As-Built Report following construction completion. Tierra Group completed a dam breach and downstream inundation analysis and developed the dam's Emergency Action Plan (EAP). Dam safety permitting completed through NDWR, including receipt of Authorization to Impound following completion of construction and submission of the As-Built Report. (Tierra Group, 2014 to 2015)

TONKIN RESERVOIR DAM STABILIZATION PROJECT, JD RANCH | CARLIN, NEVADA

As Project Principal, directed the civil, geotechnical, hydrologic, and hydraulic design for the permitting and construction of a downstream buttress to stabilize the Tonkin Reservoir Dam. Design work consisted of hydrology, spillway design, civil design of the buttress, seepage analyses, and stability analyses. Dam safety permitting was completed through NDWR. Construction was scheduled for summer of 2016. (Tierra Group, 2015 to 2017)

RANCH DAM SAFETY ASSESSMENTS, JD RANCH | CARLIN, NEVADA

As Lead Inspector, completed visual inspections of three water storage dams (JD Ranch Dam, Tonkin Reservoir Dam, and Lower Tonkin Dam) and reviewed historical records to assess their overall stability, identify risks to their continued operation, and provide recommendations for each dam going forward. Options evaluated included constructing downstream buttress for stabilization, improving spillways to prevent overtopping, dredging accumulated sediments to improve upstream storage, and breaching the dams. Tierra Group prepared the design for the construction of a downstream buttress for stabilization (Tonkin Reservoir Dam) and prepared two decommissioning plans for the potential breach and abandonment of the JD Ranch Dam and the Lower Tonkin Dam. (Tierra Group, 2014 to 2015)

AA HEAP LEACH PAD PROCESS PONDS CLOSURE, GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Principal, directed the civil and stormwater design for the closure of two of the AA Heap Leach Pad process ponds at the Goldstrike Mine. Design work consisted of a culvert, diversion channel, and stormwater pond design, as well as civil grading plan for pond closure. (Tierra Group, 2012)

WILLOW CREEK DAM, GOLDSTRIKE MINE | TUSCARORA, NEVADA

As Project Principal, supervised the rehabilitation design for the upstream face of the dam, the dam crest, the outlet tunnel, and the replacement of the slide gates. Provided oversight during rehabilitation construction (shotcrete application on dam face and crest, mechanical replacement of stems, guides, and slide gates). As Project Manager, supervised the replacement of five outlet gates in this rockfill dam. Prepared the EAP for the structure, including overseeing the breach and downstream inundation modeling for the plan. As Supervising Engineer and Project Manager at Tetra Tech, performed an annual inspection of the dam to meet Nevada dam safety requirements. As EoR at Tierra Group, complete semi-annual dam safety inspections (Vector Nevada, 2004 to 2007; Tetra Tech, 2007 to 2011; Tierra Group 2012 to 2022)

JURISDICTIONAL DAMS – ANNUAL INSPECTIONS AND EAP DEVELOPMENT, GOLDSTRIKE MINE | CARLIN, NEVADA

As Supervising Engineer and Project Manager, completed annual inspections and development of EAPs for the Rodeo Creek Diversion Dam (25-foot high earthen dam), the AA Emergency Containment Pond (20-foot high earthen dam), the Roaster Pond (25-foot high earthen dam), and the TS Ranch Dam (75-foot high zoned earthfill/rockfill dam). As EoR, complete annual dam inspections Perform inspections for the Boulder Valley Embankments (three 10-foot high earthen dams – each approximately a mile long). (Vector Nevada, 2004 to 2007; Tetra Tech, 2007 to 2011; Tierra Group, 2012 to 2022)

DAM DECOMMISSIONING PLANS, GOLDSTRIKE MINE | CARLIN, NEVADA

As Supervising Engineer and Project Manager, directed the development of the decommissioning plans (as per NAC 535.200) for the TS Ranch Delivery Ponds (White Ponds, J-400) and the AA Emergency Overflow Pond Dam (J-262), and the Rodeo Creek Diversion Dam (J-332). NDWR reviewed and approved both plans for decommissioning. TS Ranch Delivery Ponds were successfully decommissioned in 2009, AA Overflow Pond Dam was decommissioned in 2012, and Rodeo Creek Diversion Dam was decommissioned in 2013. (Tetra Tech, 2009; Tierra Group, 2012)

Tailings Dams

NEW JERSEY MILL TSF PHASE 5 AND 6 RAISE DESIGNS | KELLOGG, IDAHO

As Project Principal and EoR, directed Tierra Group's Design Team on the design of the Phase 5 and 6 raises to the existing New Jersey Mill TSF. Work included site investigation (test pit and CPT), geotechnical testing oversight, civil and geotechnical embankment design, downstream buttress design to provide seismic stability for the upstream constructed embankment, hydrologic assessment, upstream diversion channel design, and permitting documentation preparation. (Tierra Group, 2020 to 2022)

NEW JERSEY MILL TSF PHASE 5 CONSTRUCTION | KELLOGG, IDAHO

As Project Principal and EoR, provided oversight for the Phase 5 embankment raise and downstream buttress construction. Coordinated with on-site quality control (QC) technician, surveyor, and earthworks contractor to ensure construction was completed according to the design and Project specifications. (Tierra Group, 2022)

TSF DESIGN AND PERMITTING SUPPORT, STIBNITE GOLD PROJECT | STIBNITE, IDAHO

As Project Principal and QP, directed Tierra Group's Design Team to complete the design of the TSF and Meadow Creek Diversion. Work included geotechnical investigation (sonic and hollow stem auger drilling plus CPT), geotechnical testing, hydrologic and hydraulic analyses, embankment design, geotechnical analyses (slope stability, liquefaction triggering, and tailings consolidation), and diversion design. Provided permitting support for Project's dam safety application as well as Cyanidation Permit. Work commenced at the pre-feasibility level and progressed through feasibility-level design and permitting. Signed off as QP for the TSF, Water Management, and associated Closure contained in the Pre-Feasibility Study (PFS) and Feasibility Study (FS) reports. (Tierra Group, 2013 to 2022)

ELDER GULCH TSF DAM SAFETY REVIEW, RAY MINE | KEARNY, ARIZONA

As Project Principal, supporting Tierra Group's Review Team completing a DSR of the TSF. Work included a site visit, visual inspection of the dam, document/design review, personnel interviews, and recommendations developed to meet industry best practices for dam operations. (Tierra Group, 2020)

DUE DILIGENCE REVIEW, CONFIDENTIAL CLIENT | MIDWESTERN UNITED STATES

As part of the Review Team, performed due diligence review of a TSF, in-pit tailings disposal, and water management (ponds) design in support of due diligence for an investment opportunity. Work included reviewing TSF design calculations, water balance calculations, stability calculations, and drawings to support estimated capital and operating expenditures (CAPEX and OPEX, respectively). (Tierra Group, 2020)

TSF No. 4 DAM SAFETY REVIEW, MISSION MINE | SAHUARITA, ARIZONA

As Project Principal, supported Tierra Group's Review Team completing a DSR of the TSF. Work included a site visit, visual inspection of the dam, document/design review, personnel interviews, and recommendations developed to meet industry best practices for dam operations. (Tierra Group, 2019)

TAILINGS IMPOUNDMENT FACILITY (TIF) DAM SAFETY REVIEW, McLAUGHLIN MINE | LOWER LAKE, CALIFORNIA

Supported Tierra Group's EoR completing a DSR as part of Tierra Group's transition into the EoR role for the facility. Work included a site visit, visual inspection of the dam, document/design review, personnel interviews, and recommendations developed to meet industry best practices for dam operations. (Tierra Group, 2019 to 2020)

INDEPENDENT TECHNICAL REVIEW BOARD (ITRB) ANNUAL REVIEW, EQUITY MINE | HOUSTON, BC, CANADA

Participated as a temporary replacement member on the ITRB to complete the annual site visit and review. Work consisted of a site visit to assess conditions at the closed (inactive) Tailings Management Facility

(TMF), review site activities, and provide path forward recommendations to the Owner and EoR. (Tierra Group, 2019)

TRENCH CAMP TSF 3RD PARTY DESIGN AND CONSTRUCTION REVIEW, HERMOSA MINE | PATAGONIA, ARIZONA

As Lead Reviewer, completed an independent review of the TSF design and Stage I construction to ensure the design was compliant with Arizona's Best Available Demonstrated Control Technology (BADCT) and Australian National Committee on Large Dams (ANCOLD) regulations. Completed a site visit to review Stage I construction activities and ensure construction and construction monitoring activities complied with design and permitting commitments. Prepared a review report for the Client's internal use. (Tierra Group, 2019)

CELLS AB-BC TSF DAM SAFETY REVIEW, HAYDEN OPERATIONS | HAYDEN, ARIZONA

As Project Principal, supported Tierra Group's Review Team completing a DSR of the TSF. Work included a site visit, visual inspection of the dam, document/design review, personnel interviews, and recommendations developed to meet industry best practices for dam operations. (Tierra Group, 2019)

TSF ANNUAL DAM INSPECTIONS, TURQUOISE RIDGE MINE | GOLCONDA, NEVADA

Serving as EoR, complete annual dam safety inspections of the inactive TSF. Project included a site visit, visual observation of the dam, monitoring data review, and inspection report preparation. Submitted inspection reports to the Client and NDWR for review. (Tierra Group, 2019 to 2021)

TSF TRADE-OFF STUDY, ROBINSON MINE | ELY, NEVADA

As Project Principal, directed a trade-off study to evaluate raising the existing TSF versus constructing a new off-footprint TSF to meet future tailings storage needs. Work included preparing preliminary designs for both the raise option as well as new TSF construction. Decision matrices were developed to determine the most economical path forward considering both CAPEX and OPEX. (Tierra Group, 2018)

IN-PIT TAILINGS DISPOSAL DESIGN, EL GALLO MINE | SINALOA, MEXICO

As Project Principal, directed the design of an in-pit tailings disposal facility. Work included in-pit seepage collection/containment system design, water balance, and consolidation analyses. (Tierra Group, 2018)

MANAGEMENT ASSURANCE REVIEW, GOLDEN SUNLIGHT MINE | WHITEHALL, MONTANA

Served as Audit Lead to conduct a review of tailings management procedures in place at the Golden Sunlight Mine and compare them to standards outlined in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to the site, conducted a site inspection, and interviewed staff and the facilities' EoR to understand practices in place and compare them to the requirements of the Standard. Prepared a report summarizing findings which was delivered to the Client. (Tierra Group, 2016)

MANAGEMENT ASSURANCE REVIEW, CORTEZ MINE | CRESCENT VALLEY, NEVADA

Served as Audit Lead to conduct a review of tailings management procedures in place at the Cortez Mine and compare them to standards outlined in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to the site, conducted a site inspection, and interviewed staff and the facilities' EoRs to understand practices in place and compare them to the requirements of the Standard. Prepared a report summarizing findings which was delivered to the Client. (Tierra Group, 2017)

MANAGEMENT ASSURANCE REVIEW, MERCUR MINE | MERCUR, UTAH

Served as Audit Lead to conduct a review of tailings management procedures in place at the closed Mercur Mine and compare them to standards outlined in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to the site, conducted a site inspection and interviewed staff to understand practices in place and compare them to the requirements of the Standard. Prepared a report summarizing findings which was delivered to the Client. (Tierra Group, 2017)

MANAGEMENT ASSURANCE REVIEW, BULLFROG MINE | BEATTY, NEVADA

Served as Audit Lead to conduct a review of tailings management procedures in place at the closed Bullfrog Mine and compare them to standards outlined in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to the site, conducted a site inspection, and interviewed staff to understand practices in place and compare them to the requirements of the Standard. Prepared a report summarizing findings which was delivered to the Client. (Tierra Group, 2018)

MANAGEMENT ASSURANCE REVIEW, COLOSSEUM MINE | COLOSSEUM, CALIFORNIA

Served as Audit Lead to conduct a review of tailings management procedures in place at the closed Colosseum Mine and compare them to standards outlined in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to the site, conducted a site inspection, and interviewed staff to understand practices in place and compare them to the requirements of the Standard. Prepared a report summarizing findings which was delivered to the Client. (Tierra Group, 2018)

TSF WATER MANAGEMENT PLANS, CAETE AND TURMALINA MINES | BRAZIL

As Principal Engineer, directed the civil, hydrologic, and hydraulic design and evaluations to develop water management plans for the Turmalina and Caete sites. Work included developing site-specific mass balances to model tailings and water inflows to TSFs located at each site. Work included evaluating alternative water management schemes to maximize tailings storage capacity and minimize operating risk. Performed hydraulic evaluations of existing spillways and provided recommendations for enhancements to increase conveyance capacity to safely pass inflow design storm events. (Tierra Group, 2016)

TAILINGS MANAGEMENT REVIEW, RAY MINE, HAYDEN COMPLEX, AND MISSION COMPLEX | ARIZONA

As Project Principal, participated in the review of tailings management practices at the Ray Mine, and Hayden and Mission Complexes to assess the potential benefits of standardizing tailings management best practices by implementing a Company-wide tailings stewardship program. Visited each site, conducted a site inspection, and interviewed staff to understand roles and responsibilities as well as current practices related to tailings management. Prepared an assessment report that was delivered to each site's Tailings Manager as well as Corporate personnel. (Tierra Group, 2016)

NORTH BLOCK TAILINGS DISPOSAL FACILITY (NBTDF) RAISE DESIGNS, GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Manager/Client Liaison, directed the NBTDF design raised for Stages 8, 9A, 9B, 10A, 10B, 11A, and 11B. As Project Principal, oversaw the design of Stages 10, 11, and 12 for permitting and the preparation of Notices of Intent to Construct for Stages 10 and 11 of the NBTDF. Directed strategic tailings planning activities for the life of NBTDF. Coordinated multi-disciplinary design team to produce design documents and submittals to satisfy both NDEP and NDWR permitting requirements. (Tetra Tech, 2007 to 2011; Tierra Group, 2012 to 2022)

TAILINGS STORAGE FACILITY 3 (TSF3) DESIGN, GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Manager/Client Liaison, directed the design of the TSF3 at the Goldstrike property for permitting. As Project Principal, oversaw the completion of design packages for construction of Stages 1, 2A, 2B, 3, and 4. Coordinated multi-disciplinary design team to produce design documents and submittals to satisfy both NDEP and NDWR permitting requirements. (Tetra Tech, 2008 to 2011; Tierra Group 2012 to 2020)

TSF3 STAGES 1, 2A, 2B, 3, AND 4 CONSTRUCTION, GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Principal, oversaw the construction activities of TSF3 at the Goldstrike property. Provided review of design changes that arose during construction activities and provided oversight for the preparation of the As-Built Reports for Stages 1, 2, 3, and 4 construction. Obtained Authorization to Impound for all four Stages. Currently providing oversight of the Stage 5A Notice of Intent to Construct. (Tierra Group, 2012 to 2020)

FACILITY MONITORING SUPPORT, GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Manager/Client Liaison, provided operational monitoring support for the NBTDF, Mill 4 Tailings Dam, and AA Tailings Dam. Provided tailings planning support, including supporting the design of Stage 7 and Stage 8 raises to the North Block Dam, the preparation of EAPs for the North Block Tailings Dam, Mill 4 Tailings Dam, Roaster Pond, TSF3, and AA Tailings Dam, and provide closure planning services including the development of closure plans for the North Block Tailings Dam and AA Tailings Dam. (Vector Nevada, 2004 to 2007; Tetra Tech, 2011; Tierra Group, 2012 to 2022)

TAILINGS MANAGEMENT EVALUATION, MIDAS MINE | MIDAS, NEVADA

As Project Principal/Client Liaison, provided support for evaluating tailings storage options at the site, including raising options for the existing TSF and preliminary planning for a new TSF. (Tierra Group, 2014)

CONFIDENTIAL CLIENT, TAILINGS MANAGEMENT AND FACILITY ENGINEERING | MIDWESTERN UNITED STATES

Senior team member providing a review of the existing proposed design of a new TSF to identify opportunities for design optimization and potential cost savings while minimizing risks (economic, technical,

and environmental) to the Client. Provided geotechnical consulting to assess dam stability in light of sinkhole development in the vicinity of two existing dams and also providing consulting services for sinkhole mitigation. Work included developing an investigation plan using both geophysical methods (resistivity surveys) and limited geotechnical drilling to assess foundation conditions in and around the dam, which is located in a karst environment. (Tierra Group, 2014 to 2016)

TAILINGS IMPOUNDMENT AUDIT, ESMERALDA MILL FACILITY | HAWTHORNE, NEVADA

As Senior Consultant, completed a third-party audit of the fluid management system, including the tailings impoundment to meet NDEP request. The evaluation included an overview of facility water balance, geotechnical stability, and future tailings management practices. (Tetra Tech, 2009)

TSF1 LINING, ESMERALDA MILL FACILITY | HAWTHORNE, NEVADA

As Project Manager/EoR, prepared an EDC submittal to the NDEP to allow for the installation of linear low-density polyethylene (LLDPE) liner over existing tailings at the request of the NDEP. Directed design team to produce civil drawings, technical specifications, and Construction QA/QC Manual for work. NDEP approved the EDC submittal for construction. Provided guidance during liner installation and directed field inspector. Directed on-site construction supervision for the liner installation project. Liner installation was completed in 2010. Prepared the as-built report for submittal to the NDEP. (Tetra Tech, 2010 to 2011)

TSF1 OPERATIONS SUPPORT, ESMERALDA MILL FACILITY | HAWTHORNE, NEVADA

As Project Manager/EoR, prepared an EDC submittal to the NDEP to allow for the installation of a hydrocyclone to facilitate tailings and water management within the existing TSF. EDC was approved by the NDEP, and the hydrocyclone was installed in 2011. (Tetra Tech, 2011)

TSF1 OPERATIONS SUPPORT, ESMERALDA MILL FACILITY | HAWTHORNE, NEVADA

As Project Manager/EoR, prepared a Minor Modification and an EDC submittal to the NDEP to allow for modifications to the tailings distribution plan in TSF1 and to reline the existing Reclaim Pond. (Tierra Group, 2012)

TSF2 DESIGN, ESMERALDA MILL FACILITY | HAWTHORNE, NEVADA

As Project Manager/EoR, directed a siting study, preliminary design, geotechnical investigation, laboratory testing, and design for permitting of a new lined TSF. Design was prepared for submittal to both NDEP (as part of a major modification to WPCP) and NDWR (for dam safety approval). Design approved for construction by both NDEP and NDWR in 2012. (Tetra Tech, 2011; Tierra Group, 2012)

TSF2 STAGE 1 CONSTRUCTION OVERSIGHT, ESMERALDA MILL FACILITY | HAWTHORNE, NEVADA

As Project Manager/EoR, oversaw the construction of the Stage 1 embankment and impoundment facility at Esmeralda. Performed regular inspections during construction to ensure construction activities were in conformance with the facility design. Provided review of design changes that arose during construction activities. Prepared the As-Built Report for submission to both NDEP and NDWR. Approval received from both agencies for Authorization to Impound. (Tierra Group, 2012)

ANNUAL DAM INSPECTIONS, ESMERALDA MILL FACILITY | HAWTHORNE, NEVADA

As EoR, provided annual inspection of both TSF1 and TSF2 at the Esmeralda Mill Facility. Responsibilities included performing a visual inspection of the embankments, impoundments, diversion channels, and ancillary facilities and reviewing monitoring (survey and piezometer) data to assess the overall stability of the two facilities. Prepared and submitted Inspection reports for each facility to NDWR. (Tierra Group, 2014 to 2021)

TAILINGS IMPOUNDMENT AUDIT, ROBINSON MINE | ELY, NEVADA

As Senior Consultant, completed a third-party audit of the tailings impoundment at the Robinson Mine. Audit included a review of operational procedures, monitoring, design, and future tailings storage planning for the mine. Produced an audit report for the company's internal use. (Tetra Tech, 2008)

Closure and Reclamation

WASTE ROCK CLOSURE COVER EVALUATION, FIRE CREEK MINE | CRESCENT VALLEY, NEVADA

As Project Principal, reviewed unsaturated modeling to assess cover performance, draindown rates, and passive water management options for both waste rock storage facilities at the Fire Creek Mine (Tierra Group, 2020)

HEAP LEACH CLOSURE COVER STABILITY EVALUATION, BARNEY'S CANYON MINE | MAGNA, UTAH

As Project Principal, directed an independent (third-party) review of reclaimed heap leach pad stability at the Barney's Canyon Mine. The stability of five reclaimed HLFs was reviewed to ensure they meet Rio Tinto and regulatory stability criteria under both static and pseudo-static (earthquake loading) conditions. (Tierra Group, 2019)

HEAP LEACH SEEPAGE COLLECTION SYSTEM EVALUATION, BARNEY'S CANYON MINE | MAGNA, UTAH

As Project Principal, directed an independent (third-party) review of the seepage collection system that manages draindown flows from five reclaimed heap leach pads at the Barney's Canyon Mine. System hydraulics were evaluated to determine "pinch points" in the system leading to excursions from the system during high flows. Impacted areas were identified and recommendations for improved performance were provided for implementation by the Client. (Tierra Group, 2019)

AA TSF FINAL PERMANENT CLOSURE PLAN (FPCP), GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Principal, provided oversight and guidance to staff to complete the preparation of the FPCP for the AA TSF at the Goldstrike Mine. The closure plan included developing an impoundment grading plan to direct surface water to the closure spillway, the final design of the closure spillway, and the design of the post-closure water management facilities (E-cells). NDEP approved the FPCP in April 2018. (Tierra Group, 2017)

AA TSF TENTATIVE PERMANENT CLOSURE PLAN (TCP) REVISIONS, GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Principal, provided oversight and guidance to staff to complete the revision of the TCP for the AA TSF at the Goldstrike Mine. The revisions included the development of an impoundment grading plan to direct surface water to the closure spillway, preliminary design of the closure spillway, and conceptual design of the post-closure water management facilities (E-cells). (Tierra Group, 2015)

MILL 4 TSF FPCP, GOLDSTRIKE MINE | CARLIN, NEVADA

As Project Principal, provided oversight and guidance to staff to complete the development of the FPCP for the Mill 4 TSF located at the Goldstrike Mine. The FPCP was submitted to and approved by the NDEP. Work included the civil design of the closure soil cover grading plan, spillway design, and spillway outlet channel design. (Tierra Group, 2012 to 2013)

TSF2 DRAINDOWN MODELING AND COVER EVALUATION, ESERALDA MINE | HAWTHORNE, NEVADA

As Project Principal, providing oversight and guidance to staff to complete tailings draindown modeling and cover evaluation for TSF2. Results of the analyses were used as input into the interim fluid management (IFM) and process fluid stabilization (PFS) portions of the site reclamation bond. (Tierra Group, 2012)

RECLAMATION PLAN UPDATE AND BOND RECALCULATION, ESERALDA MINE | HAWTHORNE, NEVADA

As Project Principal, provided oversight and guidance to staff working along with Great Basin Gold staff to update the site reclamation plan and estimate reclamation costs for updating the reclamation bond held by NDEP. (Tetra Tech, 2009 to 2011)

MINE CLOSURE DESIGN, RIO TINTO MINE | MOUNTAIN CITY, NEVADA

As Deputy Project Manager and Technical Advisor for Design, assisted in the preparation of the site closure design. Participated in developing and producing the Proposed Plan, Ambient Monitoring Protocol, Water Quality Compliance Protocol, Operation and Maintenance (O&M) Work Plan, Remedial Design/Remedial Action (RD/RA) Work Plan, and Draft Design documents. Participated in regulatory interactions with the United States Environmental Protection Agency (USEPA), NDEP, Nevada Division of Wildlife (NDOW), and representatives of the Shoshone-Paiute Tribes of the Duck Valley Indian Reservation during the development of the Record of Decision (ROD) and Consent Decree (CD) for the Project. Oversaw the collection of water quality samples and preparation of the Semi-Annual and Annual Water Quality Monitoring Reports. (Tetra Tech, 2009 to 2011)

MINE CLOSURE CQA, RIO TINTO MINE | MOUNTAIN CITY, NEVADA

As Principal Engineer, provided CQA reviews for site preparation and initial stage of site closure construction. Work included site visits and reviews of all documentation to ensure on-site testing was conforming to the requirements of the design documents. (Tierra Group, 2013)

PRELIMINARY CLOSURE PLANS, ÇÖPLER MINE | TURKEY

As Senior Engineer, prepared Preliminary Closure Plans for the Heap Leach Pad Facility (HLPF) and the TSF at this proposed mine site located in northeastern Turkey. Authored the Preliminary Closure Plan for HLPF, completed preliminary soil cover design and evaluation using SoilCover, and supervised draindown modeling of the heap using SEEP/W. Assisted with writing the Preliminary Closure Plan for the TSF, completed preliminary soil cover design and evaluation using SoilCover, and supervised draindown modeling of the tailings using SEEP/W. (Tetra Tech, 2007 to 2008)

FINAL HLP CLOSURE PLAN, STERLING MINE | BEATTY, NEVADA

As Senior Engineer, prepared the final permanent closure plan for the HLP. Work included regrading the heap, designing stormwater controls, and designing and evaluating the performance of an evapotranspiration cover for the heap. Coordinated a field investigation and laboratory testing program to determine local soil availability and suitability for use in closure cover. Closure documents were prepared and submitted to the NDEP, where they were approved for construction. Oversaw construction of closure soil cover for HLF and prepared As-Built Report for submittal to NDEP. (Vector Nevada, 2004 to 2005)

CONQUISTA PROJECT CLOSURE ENGINEERING SERVICES | FALLS CITY, TEXAS

As Engineer of Record/Project Manager/Client Liaison, developed a cover repair plan to repair the closure cover at Conoco's Conquista Project. Supervised cone penetration testing of uranium tailings slimes to determine the potential future settlement of the closure cover. Completed on-site borrow source investigation to identify acceptable fill soils for placement on the tailings impoundment cover as part of the cover repair. Supervised laboratory testing program and developed specifications for fill replacement, including moisture conditioning and compaction. (SRK Consulting, 1999 to 2000)

WISMUT URANIUM CLOSURE SOIL COVER MODEL | GERMANY

As Senior Engineer, conducted preliminary soil cover modeling to aid in selecting soil cover configurations to be used in large-scale field tests for the Wismut uranium closure. Covers were to be placed on waste rock piles and a backfilled pit. Soil cover modeling was conducted using the SoilCover finite element model. Traveled to Germany to provide training to staff in using the SoilCover model. (SRK Consulting, 1998)

Heap Leach Facilities

DUE DILIGENCE REVIEW, CONFIDENTIAL CLIENT | NEVADA

Performed due diligence review of a Pre-feasibility-level (PFS) HLF design in support of due diligence for an investment opportunity. Work included reviewing HLF design calculations and drawings to support estimated capital and operating expenditures (CAPEX and OPEX, respectively). (Tierra Group, 2020)

DUE DILIGENCE REVIEW, CONFIDENTIAL CLIENT | NEVADA

Performed due diligence review of HLF design in support of due diligence for an investment opportunity. Work included reviewing HLF design calculations and drawings to support estimated capital and operating expenditures (CAPEX and OPEX, respectively). (Tierra Group, 2020)

MANAGEMENT ASSURANCE REVIEW, CORTEZ MINE | CRESCENT VALLEY, NEVADA

Served as Audit Lead to conduct a review of heap leach management procedures in place at the Cortez Mine and compare them to standards outlined in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to the site, conducted a site inspection, and interviewed staff and the facilities' EoR to understand practices in place and compared them to the requirements of the Standard. Prepared a report summarizing findings which was delivered to the Client. (Tierra Group, 2017)

HLF DESIGN REVIEW, ISABELLA PEARL | HAWTHORNE, NEVADA

As Project Principal, provided peer review of HLF design. Identified areas of potential non-compliance with State of Nevada regulations and provided recommendations for additional work to confirm design assumptions. (Tierra Group, 2016)

ENGINEERING DESIGN AND CONSTRUCTION SERVICES, MARIGOLD MINE | WINNEMUCCA, NEVADA

EoR for the design of Cell 12 and Cell 14 expansions to the HLP, and EoR (Certifying Engineer) for construction of Cell 12 (Phases 1, 2, and 3). Supervised CQA services. (Vector Nevada, 2004 to 2006)

Waste Rock Dumps

DUE DILIGENCE REVIEW, CONFIDENTIAL CLIENT | NEVADA

Performed due diligence review of a waste rock dump (WRD) Pre-feasibility-level design in support of due diligence for an investment opportunity. Work included reviewing WRD design calculations and drawings to support estimated capital and operating expenditures (CAPEX and OPEX, respectively). (Tierra Group, 2020)

SNOW CANYON ROCK DISPOSAL AREA (RDA) CLOSURE DESIGN | ELKO, NEVADA

As Project Principal, directing the closure design for the Snow Canyon RDA. Work included a Trade-off Study to evaluate regrading and closure cover options for the RDA and closure cover design incorporating geosynthetic liner to minimize meteoric infiltration into potentially reactive waste rock. The design included geotechnical stability analyses, hydrology, hydraulic design of surface channels, and erosion and sediment control design. (Tierra Group, 2019 to 2020)

OVERBURDEN STORAGE AREA EXPANSION DESIGN, ARTURO PROJECT | CARLIN, NEVADA

Supervised the evaluation of overdumping three HLFs and a tailings impoundment with new waste rock from expanding an existing open pit mine. Work included consolidation modeling using SIGMA/W coupled with seepage modeling using SEEP/W. The work intended to assess impacts on draindown rates from the inactive heaps and tailings facility and develop a long-term draindown management plan for the facilities. Updated stability analyses to reflect changes in mine plan. (Tetra Tech, 2009 to 2010 and Tierra Group, 2014)

ENGINEERING DESIGN, FIRE CREEK PROJECT | CRESCENT VALLEY, NEVADA

As Principal-in-Charge/Project Manager, directed the design of a new 3-million-ton WRSF to accommodate future production at the site. Work included engineering design of diversion channels, the WRSF, seepage collection and stormwater ponds, and a geotechnical investigation to confirm foundation conditions beneath the facility. Provided permitting support to the environmental consultant preparing the Environmental Assessment (EA). Also prepared an EDC for submittal to the NDEP to allow the additional waste rock to be placed within the footprint of the existing WRSF at the site. (Tierra Group, 2013 to 2016)

SOIL COVER EVALUATION, PHOENIX MINE | BATTLE MOUNTAIN, NEVADA

Principal-in-Charge/Project Manager, completing an evaluation to determine if an alluvial soil cover could be used in lieu of a 5-foot thick oxide waste cover for existing WRDs at the site. Work included developing a material testing program, determining program inputs, completing numerical modeling of cover performance, and preparing a technical report summarizing results and presenting recommendations for a path forward. (Vector Nevada, 2006 to 2007)

Miscellaneous Projects

WEATHER STATION SITING ASSESSMENT, AURORA PROJECT | HAWTHORNE, NEVADA

As Project Principal, led the assessment of a Client-proposed location for a new weather station. Work included a site visit to assess surface conditions and provide recommendations for anchoring weather station tower. (Tierra Group, 2020)

BLAST VIBRATION MONITORING PLAN DEVELOPMENT, GEMFIELDS PROJECT | GOLDFIELD, NEVADA

As Project Principal, led the development of a blast vibration monitoring plan to assess potential impacts to historic structures in the town of Goldfield during planned open pit blasting operations at the proposed Project. Work included identifying monitoring locations and specifying monitoring equipment. (Tierra Group, 2019 to 2020)

Professional Affiliations

Society for Mining, Metallurgy, and Exploration, Inc. (SME); Registered Member
Association of State Dam Safety Officials (ASDSO); Member
Nevada Mining Association; Member

Publications / Presentations

- Kowalewski PE**, 2020. *Tailings Dam Design and Tailings Management Best Practices*. Nevada Water Resources Association 2020 Dam Safety Symposium; 10 February 2020; Las Vegas, Nevada.
- Kowalewski PE**, 2018. *Tailings Stewardship: Improving Operations, Reducing Risk, and Increasing Value*. Idaho Mining Association Conference; 16 November 2018; Boise, Idaho.
- Kowalewski PE**, Sessions KS, Knudsen JW, Butler AK, Jung A, 2016. *Field identification and mitigation of geosynthetic clay liner seam separation in a tailings impoundment composite liner system*. Tailings and Mine Waste 2016; 2-5 October 2016; Keystone, Colorado.
- Bosley GK, **Kowalewski PE**, Dowell M, 2014. *Uncertainty in PMP and Recurrence Interval-Based Design Storm Estimates from Sparse Data*. Society for Mining, Metallurgy, and Exploration (SME) Annual Conference; 23-26 February 2014; Salt Lake City, Utah.
- Hudson AL, Dowell M, **Kowalewski PE**, 2012. *Consideration of snow melt and physical aspect in simulating cover performance*. 9th International Conference on Acid Rock Drainage; proceedings; 20-26 May 2012. Ottawa, Ontario, Canada.
- Kowalewski PE**, Boyce S, Buffington R, 2002. *Field investigation to support the closure design of the Yankee heap*. 9th International Conference on Tailings and Mine Waste '02; 27-30 January 2002; Fort Collins, Colorado.
- Kowalewski PE**, 1999. *Design and evaluation of engineered soil covers for infiltration control in heap leach closure*. Closure, Remediation & Management of Precious Metals Heap Leach Facilities; proceedings; 14-15 January 1999; University of Nevada-Reno, Reno, Nevada.
- Kowalewski PE**, 1999. *Comparative reclamation soil cover modeling in an arid environment*. 6th International Conference on Tailings and Mine Waste '99; proceedings; 24-27 January 1999; Fort Collins, Colorado.
- Kowalewski PE**, Dorey R, Wilson GW, Duckett R, 1998. *Tailings impoundment reclamation soil cover design at the Ridgeway Mine*. 5th International Conference on Tailings and Mine Waste '98; proceedings; 26-28 January 1998; Fort Collins, Colorado.
- Kowalewski PE**, 1997. *Comparative water balance modeling of a reclamation soil cover in an arid environment* [master's degree engineering report]. Available from: Colorado School of Mines, Golden, Colorado.
- Kowalewski PE**, 2010. Heritage Hills Metropolitan District stormwater. Annual stormwater refresher training. Heritage Hills Metropolitan District Contractors and Employees; 11 May 2010; Lone Tree, Colorado.
- Kowalewski PE**, 2006. Commerce City stormwater. Multiple presentations to four Homeowners Associations and one Metropolitan District; Jun, Aug, Sep 2006; Commerce City, Colorado.
- Kowalewski PE**, 2007, 2006. Commerce City stormwater. Annual stormwater training. Commerce City Parks & Recreation, Operations, Maintenance, and Road Departments; 11 December 2007; 12 October 2006; Commerce City, Colorado.
- Kowalewski PE**, 2007, 2006, 2005, 2004. Douglas County annual stormwater training, operations group. Douglas County Road & Bridge Department; 1 November 2007; 29 November 2005; 12 October 2004; Castle Rock, Colorado.
- Kowalewski PE**, Henderson ME, Giraudo J, Espell R, 2004. *Closure options for the Goldstrike tailings facilities*. University of Nevada-Reno Mining Life-Cycle Center Tailings Impoundment Closure Conference; 8-9 June 2004; Elko, Nevada.
- Henderson ME, **Kowalewski PE**, Breitenbach AJ, 2001. *Geomembrane liner design workshop*; Two-day workshop presented to Arizona Department of Environmental Quality staff; 16-17 July 2001; Phoenix, Arizona.
- Kowalewski PE**, 2001. *Planning for closure: field and laboratory investigations for soil cover design*. University of Nevada-Reno Mining Life-Cycle Center Heap Leach Closure Conference; 6 April 2001; Elko, Nevada.

Employment History

CURRENT EMPLOYER	TIERRA GROUP INTERNATIONAL, LTD.
POSITION	Founding Principal
YEARS	2012 to Present
EMPLOYER	TETRA TECH, INC.
POSITION	Vice President / Intermountain West Regional Manager / Senior Consultant
YEARS	2007 to 2011
EMPLOYER	VECTOR NEVADA, LLC
POSITION	Founder / Principal Engineer
YEARS	2004 to 2007
EMPLOYER	VECTOR COLORADO, LLC
POSITION	Founder / Senior Engineer
YEARS	2003 to 2004
EMPLOYER	OLSSON ASSOCIATES
POSITION	Water Resources Group Manager
YEARS	2001 to 2003
EMPLOYER	STEFFEN ROBERTSON AND KIRSTEN (US), INC.
POSITION	Various, Staff Engineer to Geo-Environmental Division Manager
YEARS	1992 to 2001