



Peter E. Kowalewski, P.E.
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, 1997); Wyoming (#9206, 1998); Missouri (#2001029633, 2001); Kansas (#16686, 2002); Texas (#88306, 2000); Nevada (#16772, 2004); Utah (#7409159-2202, 2009); Idaho (#15289, 2012); Arizona (#54444, 2013); New Mexico (#24495, 2017); South Dakota (13934); Minnesota (56060)

Experience Summary

Mr. Kowalewski is a Principal Engineer with over 26 years of experience in hydrology and hydraulics as well as geotechnical engineering of mine waste containment facilities such as heap leach facilities (HLF) and tailings dams and the design of water management facilities, such as water storage dams, spillways, and diversion canals. His experience includes permit application development and compliance for various aspects of mine operations and closure. Areas of specialty include:

- Geotechnical design of heap leach, waste rock, water management, and tailings facilities;
- Surface water modeling (CUHP, HEC-HMS, HEC-1, HEC-2, HEC-RAS, UDSWM);
- Open channel and spillway design;
- Detention/retention pond design;
- Saturated/unsaturated flow modeling (HELP, SoilCover, HYDRUS 1-D, SEEP/W, VADOSE/W, UNSAT-H);
- Stormwater management, including NPDES Phase II compliance, SPCC Plan development, and erosion and sediment generation modeling (SEDCAD+, RUSLE);
- Mine closure design, including reclamation soil cover design;
- Water balance model development for mine sites, including reservoirs and water impoundments, ponds, heap leach pads (HLPs), waste rock dumps (WRDs), and open pits; 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

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

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

COVE PROJECT RAPID INFILTRATION BASIN (RIB) DESIGN | 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 in excess of 35,000 gpm. Supervised and reviewed the preparation of drawings, calculations, and a conceptual design report in support of permitting efforts. (Tierra Group, 2018).

RHYOLITE RIDGE PROJECT PRELIMINARY HYDROLOGIC EVALUATION | 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 for the project to divert water away from 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 County facilities (Southeast, EvTech, Trumbull, Sedalia, Highlands Heritage Park, Fairgrounds, Gailen Buck, and Castle Rock Operations facilities), and developed a new Runoff Control Plan for the Moore Road EVOC 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 2018)

CH04C DIVERSION CHANNEL | 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 CQA Manual. (Tierra Group, 2013 to 2014)

MASBATE MINE WATER BALANCE REVIEW | 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 required water treatment flowrates to be used in the design of a water treatment plant that was to be constructed to allow for treatment and discharge of accumulated water from the TSF. (Tierra Group, 2013)

DIVERSION CHANNEL DESIGN AND CONSTRUCTION, BARRICK 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 a distance of approximately 2,100 feet. Supervised preparation of construction drawings, technical specifications, and CQA Manual. While at Tetra Tech, supervised design of approximately 12,000-foot diversion pipeline (72-inch diameter) to re-route stormwater flows around open pit. Work included supervision of preparation of design drawings (for construction), technical specifications, and Construction QA/QC Manual. (Vector Nevada, 2005 to 2007; Tetra Tech, 2007 to 2010)

ESMERALDA MILL FACILITY HUMBOLDT PIT HYDROLOGY STUDY | HAWTHORNE, NEVADA

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

ESMERALDA MILL FACILITY DIVERSION DESIGN AND CONSTRUCTION | 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)

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

ROBINSON MINE RIB DESIGN | 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)

MIDWAY PROJECT RIB DESIGN | 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)

RAILROAD VALLEY RIB DESIGN | ELY, NEVADA

As Project Principal, directed the design of a RIB for the disposal 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)

PASCUA LAMA PROJECT HYDROLOGY STUDY AND CONCEPTUAL DESIGN | ARGENTINA

As Project Engineer, completed preliminary site hydrology study and conceptual design of surface water diversion and detention structures, and emergency spillway for the tailings impoundment at Barrick's proposed Pascua Project. Completed conceptual design of tailings impoundment reclamation soil cover. (Olsson Associates, 2001 to 2003; Vector Colorado, 2003 to 2004)

KAZAN PROJECT ENGINEERING SERVICES | TURKEY

As Project Engineer, completed installation of transducers in two ephemeral drainages at a proposed project site in central Turkey to determine seasonal flow rates and peak flows during annual freshet. Channel surveys were also completed to determine channel geometry. (SRK Consulting, 2000)

PIERINA MINE STORMWATER FLOW MODEL | PERÚ

As Project Engineer, designed a site-wide event-based response model for controlling stormwater flows at Barrick's Pierina Mine in Perú using the HEC-HMS model. Work included visiting the site and completing a site-wide inventory of conveyance structures including culverts, chutes, stilling basins, and diversion channels, developing the model, and instructing site staff in the use of the model. Reviewed and optimized diversion channel designs for Phase 3 construction. (SRK Consulting, 2000)

GORO NICKEL PROJECT HYDROLOGICAL INVESTIGATION | NEW CALEDONIA

As Project Engineer, coordinated a hydrological investigation as part of a bankable feasibility study for a nickel mine in the South Pacific. Work included determination of site rainfall-runoff relationship, confirmation of site evaporation rates, development of site-wide water balance model, surface water diversion and spillway design, and pumping and piping requirements for the site. Water surface profile modeling using HEC-RAS was completed to assess potential impacts to downstream environment due to capture of water in a water-supply reservoir. Fieldwork included installation of tipping bucket rain gauges at multiple locations around the site and transducers in four river locations to determine flow depths and completion of river velocity profiles to allow for determination of flow rates. (SRK Consulting, 2000)

GROUSE CREEK UNIT ENGINEERING AND MODELING SERVICES | IDAHO

As Project Engineer, completed stream flow modeling and mixing analyses using the HEC-RAS and CORMIX models. Work included evaluating the performance of an in-stream diffuser and providing recommendations for defining a mixing zone in support of a permit application. Designed and evaluated waste rock storage facility (WRSF) reclamation soil cover. (SRK Consulting, 1997 to 2000)

THOMPSON CREEK MINE ENGINEERING EVALUATIONS | IDAHO

As Project Engineer, prepared estimates of maximum snowmelt rates and volumes for a confidential client in Idaho to allow for supplemental diversion implementation before anticipated peak event occurred. Evaluated proposed tailings impoundment reclamation soil cover for performance under extreme drought conditions using the SoilCover model. (SRK Consulting, 1997 to 1999)

CANNON MINE ENGINEERING EVALUATIONS | WENATCHEE, WASHINGTON

As Project Engineer, calculated impoundment capacity after final closure to determine the ability to capture the 2-, 5-, 10-, and 25-year storm events without discharge at Asamera's Cannon Mine. Used HELP program to evaluate cap designs for use in final closure of tailings impoundment. Used HEC-1 to determine impoundment and spillway response to Probable Maximum Flood (PMF) occurring at closure. Performed test pit exploration program to determine potential borrow sources for material to be used in tailings impoundment cap. Aided in design and performed hydraulic calculations for spray evaporation system for tailings impoundment at closure. (SRK Consulting, 1994 to 1995)

THUNDER MOUNTAIN PROJECT MODELING AND DESIGN SERVICES | IDAHO

As Project Engineer, wrote the stormwater management plan and designed HLF water balance model and site-wide water balance model for USMX's proposed Thunder Mountain Project. Work included runoff modeling, ditch design, culvert design, materials balance, climatic data reduction, land application calculations and waste rock management. Completed geotechnical drilling program, including logging, completion and sampling of seven monitoring wells, and collection of surface water samples from various locations throughout the site. (SRK Consulting, 1994 to 1995)

Water / Flood Control / Containment Dams

ARTURO 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 at Barrick's Arturo Project. 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 EAP for the dam. Dam safety permitting completed through Nevada Division of Water Resources (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 is scheduled for summer 2016. (Tierra Group, 2015 to Present)

DAM SAFETY ASSESSMENTS OF RANCH DAMS, 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 a review of 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 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 Present)

AA HEAP LEACH PAD PROCESS PONDS CLOSURE, BARRICK 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 culvert, diversion channel, and stormwater pond design as well as civil grading plan for pond closure. (Tierra Group, 2012)

WILLOW CREEK DAM, BARRICK GOLDSTRIKE MINE | CARLIN, 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 Emergency Action Plan (EAP) for the structure, including supervising the breach and downstream inundation modeling for the plan. As Supervising Engineer and Project Manager at Tetra Tech,

performed annual inspection of dam to meet Nevada dam safety requirements. (Vector Nevada, 2004 to 2007; Tetra Tech, 2007 to 2011; Tierra Group 2017 to 2018)

JURISDICTIONAL DAMS – ANNUAL INSPECTIONS AND EAP DEVELOPMENT, BARRICK 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). 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 Present)

BARRICK GOLDSTRIKE MINE DAMS – DECOMMISSIONING PLANS | 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

MANAGEMENT ASSURANCE REVIEW, BARRICK 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 set forth in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to site, conducted a site inspection and interviewed staff and the facilities' EoR to gain an understanding of 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, 2016)

MANAGEMENT ASSURANCE REVIEW, BARRICK 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 set forth in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to site, conducted a site inspection, and interviewed staff and the facilities' EoRs to gain an understanding of 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)

MANAGEMENT ASSURANCE REVIEW, BARRICK 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 set forth in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to site, conducted a site inspection and interviewed staff to gain an understanding of 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)

MANAGEMENT ASSURANCE REVIEW, BARRICK 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 set forth in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to site, conducted a site inspection and interviewed staff to gain an understanding of 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, 2018)

MANAGEMENT ASSURANCE REVIEW, BARRICK 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 set forth in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to site, conducted a site inspection and interviewed staff to gain an understanding of 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, 2018)

CAETE AND TURMALINA TSFs WATER MANAGEMENT PLANS, JAGUAR MINING | BRAZIL

As Principal Engineer, directed the civil, hydrologic, and hydraulic design and evaluations for the development of water management plans (WMPs) for both 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, ASARCO 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 through the implementation of 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 ASARCO Corporate personnel. (Tierra Group, 2016)

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

As Project Manager/Client Liaison, directed the design of the Stage 8, 9A, 9B, 10A, 10B, 11A, and 11B raises to the NBTDF. 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 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 Present)

TAILINGS STORAGE FACILITY 3 DESIGN, BARRICK 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 Stage 1, Stage 2A, 2B, Stage 3, and Stage 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 Present)

TSF3 STAGES 1, 2A, 2B, AND 3 CONSTRUCTION, BARRICK 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, and 3 construction. Obtained Authorization to Impound for the Stage 1, Stage 2, and Stage 3 facility. Currently providing oversight of the Stage 4 Notice of Intent to Construct. (Tierra Group, 2012 to Present)

BARRICK GOLDSTRIKE MINE FACILITY MONITORING SUPPORT | 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 Present)

KLONDEX MIDAS MINE TAILINGS MANAGEMENT | MIDAS, NEVADA

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

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

Senior member of team providing review of 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 Client. Providing 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 includes development of 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 Present)

ESMERALDA MILL FACILITY TAILINGS IMPOUNDMENT AUDIT | HAWTHORNE, NEVADA

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

ESMERALDA MILL FACILITY TAILINGS IMPOUNDMENT No.1 LINING | HAWTHORNE, NEVADA

As Project Manager/EoR, prepared an EDC submittal to the NDEP to allow for the installation of an 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. EDC submittal was approved by NDEP 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 NDEP. (Tetra Tech, 2010 to 2011)

ESMERALDA MILL FACILITY TAILINGS IMPOUNDMENT No. 1 OPERATIONS SUPPORT | 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 NDEP and hydrocyclone was installed in 2011. (Tetra Tech, 2011)

ESMERALDA MILL FACILITY TAILINGS IMPOUNDMENT No. 1 OPERATIONS SUPPORT | HAWTHORNE, NEVADA

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

ESMERALDA MILL FACILITY TSF2 DESIGN | 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)

ESMERALDA MILL FACILITY TSF2 STAGE 1 CONSTRUCTION OVERSIGHT | 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)

ESMERALDA MILL FACILITY ANNUAL DAM INSPECTIONS | HAWTHORNE, NEVADA

As EoR, provided annual inspection of both TSF No.1 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 overall stability of the two facilities. Prepared and submitted Inspection reports for each facility to NDWR. (Tierra Group, 2014 to 2016)

ROBINSON MINE TAILINGS IMPOUNDMENT AUDIT | 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 company's internal use. (Tetra Tech, 2008)

ST. JOE STATE PARK REMEDIATION PLAN | MISSOURI

As Project Engineer, assisted in the site remediation plan for the St. Joe State Park tailings dam fortification project in Missouri. Performed stability analyses on existing and reconfigured embankments, aided in the design of a large (12,500 cfs) flow spillway, used the computer program HEC-1 to determine total runoff contributions from individual catchment areas located on site. Designed a small (1,000 cfs) flow spillway to aid in surface water routing. Performed backwater analyses on all spillways using HEC-2 computer program to compute necessary riprap sizes to avoid channel erosion, designed a sediment dam to control sediment generated during construction at the park. Using the computer model, SEDCAD+, anticipated sediment generation during construction. Prepared the Engineer's cost estimate. (SRK Consulting, 1992 to 1994)

BARTON MINES TAILINGS IMPOUNDMENT EXPANSION DESIGN | NEW YORK

As Project Engineer, assisted in the design of the tailings impoundment expansion at Barton Mines industrial garnet mine. The expansions included increasing tailings capacity for an additional 30 years of storage. Work included stability analyses, calculation of pore pressure development in underlying slimes due to rapid loading, hydraulic design of diversion structures, and development of an operational water balance. (SRK Consulting, 1993 to 1994)

Closure and Reclamation

BARRICK GOLDSTRIKE AA TSF FINAL PERMANENT CLOSURE PLAN (FPCP) | 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 the development of an impoundment grading plan to direct surface water to the closure spillway, final design of the closure spillway, and design of the post-closure water management facilities (E-cells). NDEP approved the FPCP in April 2018. (Tierra Group, 2017)

BARRICK GOLDSTRIKE AA TSF TENTATIVE PERMANENT CLOSURE PLAN (TPCP) REVISIONS | CARLIN, NEVADA

As Project Principal, provided oversight and guidance to staff to complete the revision of the TPCP 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)

BARRICK GOLDSTRIKE MILL 4 TSF FPCP | 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)

ESMERALDA TSF2 DRAINDOWN MODELING AND COVER EVALUATION | 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 will be used as input into the interim fluid management (IFM) and process fluid stabilization (PFS) portions of the site reclamation bond. (Tierra Group, 2012 to Present)

ESMERALDA RECLAMATION PLAN UPDATE AND BOND RECALCULATION | 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)

RIO TINTO MINE CLOSURE | MOUNTAIN CITY, NEVADA

As Deputy Project Manager and Technical Advisor for Design, participated in the preparation of the site closure design. Participated in the development and production of 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 development of the Record of Decision (ROD) and Consent Decree (CD) for the Project. Oversaw the collection of water quality samples and preparation of Semi-Annual and Annual Water Quality Monitoring Reports for the Project. (Tetra Tech, 2009 to 2011)

RIO TINTO MINE CLOSURE CQA | 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)

COPLER MINE PRELIMINARY CLOSURE PLANS | 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 the writing of 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)

STERLING MINE FINAL HLP CLOSURE PLAN | 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 evapotranspirative 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 certification report for submittal to NDEP. (Vector Nevada, 2004 to 2005)

RIDGEWAY MINE OPERATIONS AND CLOSURE ENGINEERING SERVICES | SOUTH CAROLINA

As Project Engineer, completed site-wide surface WMP, including design of diversion channels and evaluation of pumping capacity to transfer water to various locations on site. Developed a pit back-filling model to track progress in flooding the two open pits at the site. Developed an operational tailings regrading plan to minimize the amount of regrading required at closure. Designed a soil cover to be constructed at closure and performed an evaluation to identify the most efficient construction method for the cover placement. Developed instrumentation and monitoring plan to monitor the long-term performance of the cover. (SRK Consulting, 1992 to 2000)

BALD MOUNTAIN MINE, YANKEE HEAP DESIGN AND MODELING SERVICES | ELKO, NEVADA

As Senior Engineer, assisted in the development of a laboratory testing program and completed the design of a reclamation soil cover for Bald Mountain Mine's Yankee Heap. Performed numerical modeling to assess long-term performance of the proposed cover and several alternative cover configurations proposed for the site. (SRK Consulting, 1999 to 2000)

CONQUISTA PROJECT CLOSURE ENGINEERING SERVICES | FALLS CITY, TEXAS

As EoR/Project Manager/Client Liaison, developed cover repair plan to repair the closure cover at Conoco's Conquista Project. Supervised cone penetration testing of uranium tailings slimes to determine 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)

PUEBLO VIEJO PROJECT ENVIRONMENTAL LIABILITY AND CLOSURE COST EVALUATIONS | DOMINICAN REPUBLIC

As Project Engineer, worked on behalf of the Dominican government to assess environmental liability and closure costs for the non-operating site. Evaluated the construction of several large detention structures to allow for capture and treatment of acidic drainage emanating from the pits and waste rock disposal areas. Performed site-wide hydrologic analyses and completed the hydraulic design of numerous diversion channels and spillways. (SRK Consulting, 1999)

WISMUT URANIUM CLOSURE SOIL COVER MODEL | GERMANY

As Senior Engineer, conducted preliminary soil cover modeling to aid in the selection of 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 the use of the SoilCover model. (SRK Consulting, 1998)

RECLAMATION EROSION AND SEDIMENT CONTROL DESIGN, CORTEZ GOLD MINES | CRESCENT VALLEY, NEVADA

As Project Engineer, prepared estimates of long-term erosion from reclaimed WRD, HLPs, and tailings impoundments at the Cortez Mine in support of closure planning activities. A matrix approach was used to allow for rapid comparison of the effectiveness of implementing various sediment control options, including regrading slopes, revegetation, and using silt fences. (SRK Consulting, 1997)

PASSIVE TREATMENT SUMP REHABILITATION, CORTEZ GOLD MINES | CRESCENT VALLEY, NEVADA

As Principal-in-Charge/Project Manager/Client Liaison, completed a design to rehabilitate passive limestone-filled treatment sumps that deteriorated over time. Prepared construction drawings for submittal

to NDEP for approval. Oversaw construction of sump re-construction and prepared an as-built report for submittal to NDEP. (Vector Nevada, 2006)

CLOSURE ENGINEERING DESIGN SERVICES, CORTEZ GOLD MINES | CRESCENT VALLEY, NEVADA

As Project Manager/Client Liaison, completed a design for a passive sulfate-reducing bioreactor. Completed bench-scale testing of various substrate combinations for effectiveness in reducing sulfate concentrations from seepage from a historic waste rock facility. Oversaw the civil design of the bioreactor, supervised construction, and supervised the preparation of the as-built report for submittal. (Tetra Tech, 2007 to 2008)

COPPER FLAT PROJECT RECLAMATION COVER DESIGN AND EVALUATION | NEW MEXICO

As Project Engineer, designed and evaluated potential reclamation soil covers for the tailings impoundment and waste rock disposal areas at Alta Gold's proposed Copper Flat project near Hillsboro, New Mexico, including the use of capillary barriers in the cover system, using HELP and HYDRUS 1-D. Modeled anticipated sediment generation from the four waste rock disposal areas using SEDCAD+. Designed sediment retention structures to accommodate sediment and runoff resulting from both the 25-year 24-hour, and 100-year 24-hour storms. Designed diversion ditch system to convey runoff from undisturbed areas around the disturbed areas on site. (SRK Consulting, 1995 to 1997)

Heap Leach Facilities

MANAGEMENT ASSURANCE REVIEW, BARRICK 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 set forth in Barrick's Corporate Tailings and Heap Leach Management Standard. Traveled to site, conducted a site inspection and interviewed staff and the facilities' EoR to gain an understanding of 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)

ISABELLA PEARL HLFDESIGN REVIEW | 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)

MARIGOLD MINE ENGINEERING DESIGN AND CONSTRUCTION SERVICES | WINNEMUCCA, NEVADA

EoR for 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 the CQA services. (Vector Nevada, 2004 to 2006)

CONCEPTUAL DESIGN, SOUTHERN PERÚ COPPER COMPANY | PERÚ

As Project Engineer, completed conceptual design of a solution collection system for a proposed dump leach in the Torata Valley. Work included system design as well as dump leach development plans for optimization of leach operations. Proposed heap heights for the project could approach 300 meters. Site work also included development of a surface water monitoring program to determine flow rates in the valley identified for dump leach development. Coordinated stability analyses and remedial design to stabilize WRD experiencing slope instability. (SRK Consulting, 2000)

SAFFORD PROJECT ENGINEERING DESIGN AND MODELING SERVICES | ARIZONA

As Senior Engineer, completed underdrain and solution collection design and modeled heap leach performance under varying solution application rates using SEEP/W to assess saturation levels and potential impacts to heap stability. (SRK Consulting, 1998 to 2001; Olsson Associates, 2001)

ESCONDIDA SULFIDE LEACH PROJECT SEEP/W MODEL | CHILE

As Senior Engineer, completed a SEEP/W model of single lift and full-height heap to assess heap performance under varying solution application rates and to confirm effectiveness of proposed solution collection underdrains. (Vector Colorado, 2003)

Waste Rock Dumps

ARTURO PROJECT | ELKO, NEVADA

Supervised the evaluation of overdumping three HLPF 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. Intent of the work was 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)

KLONDEX FIRE CREEK PROJECT ENGINEERING DESIGN | CRESCENT VALLEY, NEVADA

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

PHOENIX MINE SOIL COVER EVALUATION | 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)

ZALDIVAR MINE TAILINGS AND WASTE ROCK EVALUATION | CHILE

As Project Engineer, evaluated the potential co-disposal of tailings and waste rock at the Zaldivar Mine. Work included evaluation of thickening options including high compression thickening of tailings. Supervised bench-scale testing program to evaluate performance of high compression thickener and flocculant dosage. (SRK Consulting, 1999)

GILT EDGE MINE ENGINEERING DESIGNS | SOUTH DAKOTA

As Project Engineer, designed a treatment pond and sediment pond to treat runoff due to expansion of the Ruby Gulch waste repository. Modeled sediment generation through all phases of waste rock development using computer program SEDCAD+ to determine necessary capacity of ponds. Aided in the design of all hydraulic structures including spillway, embedded decant structure, diversion ditches, and pipe culverts. Calculated channel protections necessary for diversion ditches. (SRK Consulting, 1994 to 1995)

Professional Affiliations

Society for Mining, Metallurgy, and Exploration, Inc. (SME); Registered Member

Publications / Presentations

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