



Adrien Butler, P.E.
Project Civil Engineer

Education

BS, Engineering (Civil), Colorado School of Mines, 2004
Minor in Public Relations, Colorado School of Mines, 2004

Registrations/Certifications

Professional Engineer Colorado (#44862, 2011), Nevada (#022244, 2013)

Experience Summary

Ms. Butler is a Project Civil Engineer with 13 years of professional civil engineering experience in the mining industry. Her experience has focused on the design of tailings storage facilities (TSFs) and associated mining infrastructure such as ponds, spillways, pipelines, roads, and surface water diversion channels. Her multi-faceted experience includes performing hydrology studies and developing water balance models. Recent experience includes project management for the design, bid support, and construction management for several lined TSF projects on active mine sites. Ms. Butler is a registered professional engineer (licensed in Colorado and Nevada) and is conversational in Spanish.

Project Experience

Mining

PIT PLANNING | GYPSUM, COLORADO

Project Manager for long-term planning studies, including developing multiple options for new and existing pit layouts, haul road configurations, and sediment controls. (Tierra Group, 2016 to Present)

NEW TSF SCOPING STUDY, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

Project Manager for a scoping-level study to identify potential new TSF locations. Included conventional and dry stack TSF options as part of long-term planning. Developed cost estimates and Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis to compare tailings storage options. (Tierra Group, 2017)

NORTH BLOCK TAILINGS DISPOSAL FACILITY (NBTF) EXPANSION, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

Project Manager and Project Engineer for the final design, permitting, and construction for a three-phased raise on an existing TSF. Included relocating a portion of an existing diversion and optimizing tailings storage capacity with several geographic constraints such as property boundaries, ore stockpiles, adjacent TSFs, and processing facilities. Developed design documents for permitting and construction, and assisted with developing a reclamation plan, including reclamation cost estimating. Provided Resident Engineer services, including design support during construction, submittal review/approval, construction oversight, and As-Built Report preparation. Prior to final design, developed pre-feasibility study, alternatives analysis, and design optimization study. (Tierra Group, 2012 to Present)

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

Project Manager and Project Engineer for the construction of TSF3 located between two existing facilities. Provided Resident Engineer services, including design support during construction, submittal review/approval, and construction oversight. Designed the second, third, and fourth stages of the TSF, including embankment layout and optimization, grading plans, road crossings, pipeline corridors, emergency overflow channels, existing diversion relocation, drains, and sediment controls. Developed design documents for permitting and construction and performed Resident Engineer services. Included developing a commissioning plan for the reclaim water and tailings distribution systems, an Operating Plan,

and an Operations, Maintenance, and Surveillance (OMS) Manual. Developed feasibility-level designs prior to final design of each stage as needed, including working with Barrick on life-of-mine planning for tailings storage requirements and construction material availability. (Tierra Group, 2012 to Present)

NBTDF BASIN EXPANSION ON EXISTING TSF, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

Project Manager for the design and construction of a basin expansion for an existing TSF, including developing a grading plan and piping plan, calculating quantities, and preparing bid documents. Provided Resident Engineer services, including design support during construction, submittal review/approval, and construction oversight. (Tierra Group, 2012 to 2013)

NEW TSF FINAL DESIGN, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

Project Engineer for the design of a new TSF located between two existing facilities, including developing a grading plan, piping plan, construction drawing set, and final design report, as well as designing ancillary facilities such as ponds and surface water diversions. (Tetra Tech, 2010 to 2011)

NBTDF RAISE DESIGNS, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

Designed Stage 8 and Stage 9 centerline dam raises on the NBTDF, including developing a grading plan and piping plan, as well as calculating quantities and preparing bid documents. (Tetra Tech, 2007 to 2010)

TAILINGS STORAGE OPTION STUDY, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

Developed in-depth tailings storage scenarios, including raises on three existing facilities, designing new TSFs, and incorporating an existing facility raise coupled with a new facility. Designed embankments and optimized tailings capacities of impoundments. Calculated quantities of embankment materials and estimated tailings storage capacities. Wrote detailed report on tailings storage options and created decision matrix of all options explored. (Tetra Tech, 2007 to 2010)

FEASIBILITY LEVEL TSF, MT. TODD GOLD MINE | AUSTRALIA

Project Manager and Project Engineer on a feasibility-level study involving raising an existing facility and constructing a new facility. Included designs for underdrain and overdrain systems, toe drains, piping plans, and surface water diversion. Developed water balance models for each facility. Prepared detailed quantities, cost estimates, and report for each option. (Tetra Tech, 2011)

PRE-FEASIBILITY LEVEL TSF, MT. TODD GOLD MINE | AUSTRALIA

As Project Engineer, developed two separate pre-feasibility level studies for designs involving raising an existing facility and constructing a new facility. Included preliminary designs for underdrain and overdrain systems, toe drains, piping plans, and surface water diversion. Prepared detailed quantities, cost estimates, and report for each option. (Tetra Tech, 2010 to 2011)

TAILINGS SITE SELECTION STUDY, COPPER MINE | PERÚ

As Staff Engineer, performed hydrology analysis using HEC-HMS, including basin delineation and peak flow and lag time calculation, to aid in determining a location for a new TSF. (Tetra Tech, 2008)

WASTE ROCK DUMP AND TSF CLOSURE QUANTITIES, CONFIDENTIAL CLIENT | ARIZONA

As Staff Engineer, calculated closure quantities for waste rock dump, TSF, and associated structures. (Tetra Tech, 2008 to 2009)

HEAP LEACH PAD DESIGN, CONFIDENTIAL CLIENT | ARIZONA

As Staff Engineer, designed four heap leach pads for pre-feasibility report, including calculating quantities and designing preliminary leach collection system. (Tetra Tech, 2008)

HEAP LEACH DESIGN, BELLAVISTA, MIRAMAR | COSTA RICA

As Staff Engineer, designed a raincoat for an existing heap leach and new closed water diversion system to replace the existing sump, including thrust blocks for new pipelines. Designed a heap leach pad expansion on steep mountain terrain, including design of underdrains, surface drains, developing a stacking plan to maximize storage, and calculating construction quantities. (Vector Colorado, 2006)

COAL MINE SUBSIDENCE EVALUATION AND MITIGATION, CONFIDENTIAL CLIENT | ROCK SPRINGS, WYOMING

Analyzed historic mapping, borehole, and subsidence event data, along with 2007 and 2008 drilling program, to provide accurate depiction of subsurface conditions for historic underground room and pillar coal mines. Used gINT to reproduce boring logs and fence diagrams. (Tetra Tech, 2007 to 2009)

Hydraulics/Hydrology

TSF WATER BALANCE SCENARIOS, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

Assisted in developing and managing spreadsheet-based water balance models for two operating TSFs at the same site. Included updating the model on a monthly time step for measured values such as precipitation, evaporation, tailings production, and reclaim water, while using average conditions when measured values were not available. Developed several scenarios to predict impacts of fluctuating reclaim water rates on the supernatant pond size at one TSF. Developed scenarios at the second TSF to quantify effects of an addition inflow from underground dewatering operations. Also evaluated tailings deposition modifications to change the supernatant pond location. Assisted with periodic updates and interpretations using measured values for production data. (Tierra Group, 2012 to Present)

WATER BALANCE, EXISTING TSF | MISSOURI

Developed spreadsheet-based water balance model for an existing TSF accounting for tailings production, design storm storage during emergency spillway discharge, precipitation, evaporation on tailings beach vs. supernatant pond, and required freeboard. Included estimating required reclaim water pumping rates to maintain a fairly constant supernatant pond size. (Tierra Group, 2017)

WATER BALANCE, NEW TSF | MISSOURI

Developed detailed water balance (spreadsheet model) to predict water levels in a TSF. Accounted for tailings slurry properties, flood storage capacity, an emergency spillway, and minimum freeboard requirements. (Tierra Group, 2014)

DIVERSION DESIGN, MT. TODD GOLD MINE | AUSTRALIA

Designed surface water diversions around existing runoff pond and TSF, including delineating basins, calculating lag time/peak flow, and developing HEC-HMS model for use in sizing diversions. Prepared bid documents for designs. (Tetra Tech, 2010)

WATER BALANCE, NEW TSF | LA LIBERTAD, NICARAGUA

Developed detailed water balance (spreadsheet model) to predict water levels in a TSF. Accounted for seasonal variations in ore moisture content and water usage at processing facilities, tailings slurry properties, flood storage capacity, and minimum freeboard requirements. (Tetra Tech, 2009 to 2010)

TAILINGS PIPELINE DESIGN, SOLEDAD TAILINGS IMPOUNDMENT | HONDURAS

Designed tailings distribution pipeline to satisfy hydraulic requirements, pipe sizing requirements, and to conform to tailings deposition plan. Used WaterCAD to analyze pressure at different points along distribution pipeline. (Tetra Tech, 2008)

RAFFINATE PIPELINE DESIGN, CONFIDENTIAL CLIENT | BAGDAD, ARIZONA

Designed HDPE pipelines to deliver raffinate solution to multi-level heap leach pads. (Tetra Tech, 2008)

DIVERSION AND SPILLWAY DESIGN, CONFIDENTIAL CLIENT | MISSOURI

Modified emergency spillway design and designed new water diversion system, including design of culverts and roads. (Tetra Tech, 2007)

Geotechnical

GEOTECHNICAL DATABASE MANAGEMENT, BARRICK GOLDSTRIKE MINE | CARLIN, NEVADA

Organized historic and new data to compile all site investigation data for gINT database. Generated logs, cross sections, fence diagrams, maps, etc. in gINT, as well as contour maps of depth to groundwater and bedrock using data from gINT and AutoCAD LDD. (Vector Colorado, 2006; Tetra Tech, 2007; Tierra Group, 2013 to Present)

GEOTECHNICAL DATABASE MANAGEMENT, CONFIDENTIAL CLIENT | ARIZONA

Set up gINT and PLog interaction for new site investigation program. Maintained gINT database of borehole data, including producing logs, fence diagrams, maps, etc. in gINT and AutoCAD LDD. (Vector Colorado, 2006)

GEOTECHNICAL DATABASE MANAGEMENT, PASCUA LAMA | ARGENTINA

Maintained gINT database of borehole data (logs, field tests, lab tests, seismic refraction study), in Spanish and English. Generated cross-sections, fence diagrams, and maps in gINT and RockWorks, as well as maps of depth to groundwater and bedrock using data from gINT, RockWorks, and AutoCAD LDD. (Vector Colorado, 2005 to 2006)

Professional Affiliations

Society for Mining, Metallurgy & Exploration, Member

Employment History

CURRENT EMPLOYER	TIERRA GROUP INTERNATIONAL, LTD.
POSITION	Project Civil Engineer
YEARS	2012 to Present
EMPLOYER	TETRA TECH, INC.
POSITION	Project Engineer
YEARS	2007 to 2012
EMPLOYER	VECTOR COLORADO, LLC
POSITION	Staff Engineer
YEARS	2005 to 2007

Language Proficiency

Spanish: Conversational