

ANDREW J. HARDY, PE



AJAX Mountain Enterprises, LLC
(dba **AJAX Ltd**)

Engineering and Geology, Project and Construction Management
Evergreen, CO and Globe, AZ
(303) 241-2057
andrew@ajax-ltd.com

SUMMARY:

Mr. Hardy has 17 years experience in the mining industry specializing in mine geotechnics, water management, environmental compliance, and reclamation and closure. His mining experience includes reclamation permitting and negotiation, contract and project management, budget and schedule control, leading project teams, geotechnical and environmental field investigation programs, multi-disciplinary engineering designs, subcontractor and contractor supervision, bid development, evaluation and contractor selection, cost estimating and project controls, and client and stakeholder interaction at the federal, state, and local levels. Mr. Hardy also has progressive experience covering over 10 years of direct onsite experience as a Quality Assurance Engineer (1993-5), Resident Engineer (1996-7), and Project/Construction Manager (1999-present) for several large mine reclamation and water management projects in the Western U.S.A. Mr. Hardy's mining projects over the past 17 years have focused on the following key areas:

- Engineering and environmental risk assessments.
- Environmental compliance and monitoring programs.
- Water management and acid rock drainage treatment.
- Reclamation and closure planning, design, negotiation, and construction.
- Soil and rock geotechnical investigation, design, and construction.

EDUCATION:

MS, Geological Engineering, University of Arizona, Arizona, 1993

BSCE, Civil Engineering (*Summa Cum Laude*), Old Dominion University, Virginia, 1991

PROFESSIONAL DEVELOPMENT:

MSHA 40 Hour Surface and Underground Health and Safety (current)

OSHA 40 Hour HAZWOPER Health and Safety (current)

Session Chair, SME Annual Conference & Exhibit, "Sustainable Mine Closure," Salt Lake City (2005)

Gateway to Business Management, Dartmouth College, Hanover, NH (2003)

Senior Project Management, MWHU/University of Denver, CO (2003)

Effective Project Management, Skillpath Seminars, AZ (2001)

Excelling as a Highly Effective Team Leader, Skillpath Seminars, AZ (2000)

Project Management Fundamentals, MWHU/University of Denver, CO (1998)

EMPLOYMENT HISTORY:

AJAX Ltd, Evergreen, CO Principal GeoEnvironmental Engineer	2005 - Present
MWH, Phoenix, AZ and Denver, CO Staff to Principal Engineer, Regional Manager, Vice President	1994 - 2005
Ninyo & Moore, Irvine, CA Senior Staff Geotechnical Engineer	1993 - 1994



Call & Nicholas, Tucson, AZ
Engineering and Research Assistant

1992 - 1993

The Maguire Group, Virginia Beach, VA; Gannett Fleming, Newport News, VA
Engineering Intern

1990, 1991

PROJECT WORK HISTORY:

Freeport McMoRan Climax Mine, RECLAMATION AND CLOSURE, AZ, 2007-present

OWNER'S ONSITE PROJECT COORDINATOR/ENGINEER. Assisting with the project management, coordination, and engineering for several reclamation and construction projects at the Climax Mine situated above 11,000 feet in the Colorado Rocky Mountains. Projects include a variety of technical disciplines including geologic interpretation and environmental characterization; field investigations; engineering designs; construction and environmental monitoring programs; and agency permitting and negotiations. Key projects include the repair of a 50-ft vertical concrete block retaining wall; annual site reclamation of tailings ponds including a federally-recognized biosolids revegetation program; a complex 2-year remediation for over 40 historic mine waste rock dumps located at elevations between 10,500 and 12,500 feet; planning and closure for several historic mine shafts and adits; and management and negotiation support for over 30 individual environmental and building permits required for a 2-year permitting schedule for the Climax 2010 Restart Project. Direct report to the Owner's Environmental Manager and Chief Engineer.

BHP Copper's Pinto Valley No. 4 Tailings Dam, RECLAMATION AND CONSTRUCTION, AZ, 2007-present

ENGINEER'S PROJECT MANAGER. Closure scoping and planning, field investigation, engineering analysis and detailed construction-level design, remedial options analysis, and cost estimating for reclamation of a 550-ft high operating tailings dam located at the Pinto Valley Mine in the central Arizona copper mining district of Miami-Globe. Key tasks have included jurisdictional drainage protection, soil and rock borrow area development, diversion channel design, massive regrade and soil/rock cover plans, evaluation of a revegetation plan, and development of various construction plans. This project is scheduled for construction during the summer of 2008. Direct report to the Owner's Head of Technical Services and onsite Project Manager.

BHP Copper's Solitude Tailings Property, ENGINEERING AND RECLAMATION DESIGN, AZ, 2007-present

ENGINEER'S PROJECT MANAGER. Closure scoping and planning, field investigation, engineering analysis and detailed construction-level design, remedial options analysis, and cost estimating for reclamation of a 500-acre tailing facility. Additional tasks are associated with protection of the mine tailing dam against the 100-year flood, containment and discharge of the 100-year design storm, abandonment of 2 flood drain tunnels and numerous wells and pipelines, and implementation of over 2,000,000 cy of overall site regrade and soil/rock cover plans for final closure of the property. This project is scheduled for construction during the summer of 2008. Direct report to the Owner's Closure Program Director and onsite Project Manager.

Freeport McMoRan, CLIMAX MINE WATER TREATMENT, Leadville, CO, 2005-2007

OWNER'S PROJECT MANAGER. Project and construction management for US\$24MM sludge management project involving over 40,000 lf of HDPE pipeline, one pump station, a 160-ft dia. clarifier, solution handling facilities consisting of two 212,000 gal neutralization/aeration tanks, two lime slurry tanks, a collection chamber, and a 6,900 GPM Sludge Densification Plant. Other project components include a SCADA system, two power feeds, radio telemetry, automated pH and turbidity instrumentation, video monitoring, and two 20-acre freeze/thaw sludge disposal beds. Project role involves permitting; stakeholder interaction at local and state levels; generating project management reports, presentations, and project bid documents; tracking project costs and providing cost forecasts; interfacing with Company Accounting and providing invoice and pay estimate review; coordination and approval of change order documentation and implementations; providing project planning and scheduling; acting as a liaison between Company, Design Engineer, and Contractors; providing Design Engineer and Contractor oversight; coordinating Company/Design Engineer/Contractor interface; assisting with material and equipment procurement in excess of US\$2.5MM; providing quality control oversight on behalf of Company; coordinating trouble-shooting during plant start-up; enforcing Company and Contractor safety and environmental requirements; controlling project file and document filing. Direct report to the Owner's Chief Engineer.



BHP Copper, OLD DOMINION MINE RECLAMATION, Globe, AZ, 1997-present

ENGINEER'S PROJECT MANAGER. Field investigation, final engineering analysis and design, permitting and construction bidding, and construction management/quality assurance for US\$12MM state superfund mine remediation project. Project involves environmental monitoring and compliance, community involvement and regulatory interaction at local, state, and federal levels. Reclamation included over 1,000,000 cy of regrading, 500,000 cy of earthen cover placement, 200 acres of revegetation, 6 miles of lined diversion channels, structure demolition, and regulated materials disposal. Managed the preparation of a Site Characterization Report, Remedial Construction Plan, Contractor Bid Package, and As-Built Completion Report submitted to EPA and ADEQ. Direct report to the Owner's Chief Engineer and Project Manager.

Freeport McMoRan /Cyprus Tohono Corp., RECLAMATION AND CONSTRUCTION, AZ, 1996-present

ENGINEER'S PROJECT MANAGER and/or PROJECT ENGINEER. Managed several engineering and construction projects at the Tohono Copper Mine situated on native American lands and under a complex federal regulatory framework. Projects have included the preparation of an Engineering Evaluation/Cost Analysis report for over 500 acres of mill and vat leach tailings including frequent client and regulatory interaction; project scoping for a Consent Decree, and field investigation, options analysis, and cost estimating for a Reclamation Plan. Additional projects managed include a hydrogeologic and environmental characterization study; field investigation, conceptual design, and construction quality assurance for a solution pond collection system; geotechnical engineering design and construction quality assurance for a 8,000,000 ton valley-fill and conventional expansion heap leach pad; and, geotechnical investigation and conceptual design of 111,000,000 ton "inverted" heap leach expansion pad. Direct report to the owner's Project Coordinator, Environmental Manager, Project Engineer, and Site Manager.

Newmont Gold, IDARADO MINE REMEDIATION, Red Mountain and Telluride, CO, 1994-7

ENGINEER'S RESIDENT ENGINEER. Field design and construction management/quality assurance for a US\$22MM high-profile, high-altitude (9,000-12,500 ft amsl) state superfund mine waste remediation project. Responsible for evaluation of underground conditions and remedial structures, and surface construction activities that included over 45,000 feet of concrete-lined diversions, 1,000,000 cy of regrading, and closure of 36 historic mine dumps and adits. Five-year seasonal construction project was completed 12 months ahead of schedule and received the AGC's 1997 Build America Award in the Heavy Civil/Industrial Division. Managed the preparation of several As-Built Completion Reports submitted to CDPHE. Direct report to the Owner's General Manager.

ASARCO Ray Mine, MINERAL CREEK TUNNEL / CHANNEL, Kearny, AZ, 1998-2000

ENGINEER'S REGIONAL PROJECT MANAGER. Regional Project Manager for the geotechnical investigation, detail engineering design, and construction oversight for the Mineral Creek Diversion Project, a US\$55MM mine tunnel and channel. Diversion structures included two rockfill dams and cutoff walls, a concrete-lined channel, and an 18-foot diameter, 2½-mile long concrete-lined tunnel. Responsible for all management aspects of Arizona staff assignments and coordinated activities of local design and construction teams. Responsible for budget control, preliminary engineering, preparation of a Geotechnical Baseline Report for the tunnel contractors, and staff and subcontractor oversight. Direct report to the MWH Project Manager and Owner's Engineering Manager.

BHP Copper's Miami Mine, CHARACTERIZATION AND RECLAMATION, AZ, 1999-2004

ENGINEER'S PROJECT MANAGER. Closure scoping and planning, field investigation, engineering analysis and conceptual design, remedial options analysis, and cost estimating for reclamation of a 700-acre tailing, SX-EW, and open pit facility; in-situ remediation of an alluvial flood plain; and demolition of several historic structures. Additional management for ongoing environmental monitoring, groundwater permitting, and agency interaction at the state level. Design components for the reclamation included tailings pile regrading and capping/revegetation, stormwater control, shaft sealing, demolition and decommissioning, and flood control channel design. Managed the preparation of a Site Characterization Report and Remedial Construction Plan submitted to ADEQ. Direct report to the Owner's Environmental Manager and Chief Engineer.



Usibelli Coal Mine, GEOTECHNICAL AND REMEDIATION PROJECTS, AK, 1994-present

ENGINEER'S PROJECT ENGINEER. Lead the field investigation, laboratory testing program, and geotechnical design for several large earthworks remediation projects including remediation of an 11,000,000 cy active landslide. Responsible for the geotechnical analysis for the design and performance monitoring of a 2,000,000 cy buttress to stabilize the landslide. Managed the preparation of a Geotechnical Characterization and Remedial Design Report submitted to DMWM and OSM. Project Manager for the design of a, 8,000,000 cy, 250-ft high valley-fill excess spoil pile and for the review of highwall, post-mining, and spoil slope stability for operating and proposed operations. Direct report to the Owner's Chief Engineer.

Various Mine Reclamation, Closure, and Environmental Projects, WA, AZ, CO, CA, and Peru, 1995-2005

ENGINEER'S PROJECT MANAGER or PROJECT ENGINEER for over 10 uranium, copper, and gold mining reclamation and closure projects. Activities involved business and financial audits; technical oversight and project management; Reclamation/Closure Plan preparation and negotiation; geotechnical, geochemical, and hydrogeological field investigations; environmental and compliance monitoring programs; permit preparation and negotiation; development of conceptual and detail engineering designs, and contractor bid packages; and construction bidding of remedial alternatives; and interaction with stakeholders and regulators.

Projects completed at the following sites:

- ASARCO Black Cloud Mine, CO
- Freeport McMoRan Sierrita Copper Mine, AZ
- Freeport McMoRan Bagdad's Bruce Copper-Zinc Mine, AZ
- BHP Copper's Copper Cities Mine, AZ
- BHP Copper's Solitude Property, AZ
- BHP Copper's Pinto Valley Mine, AZ
- Newmont's Dawn Mine and Mill Site, WA
- Newmont's Cadiz Valley Salt Mine, CA
- Newmont's Maqui Maqui Gold Mine, Peru
- Newmont's Carachugo Gold Mine, Peru

Various Mine Geotechnical Projects, AK, AZ, CO, NV, ID, CA, Peru, Bolivia, Chile, Argentina, Kyrgyzstan, 1994-present

ENGINEER'S PROJECT MANAGER, PROJECT ENGINEER, or STAFF ENGINEER for over 20 molybdenum, copper, gold, and limestone mining geotechnical projects. Activities involved technical oversight and project management; geotechnical field and laboratory investigations; geotechnical analysis involving low strength material including soft peats, clays, and tailing slimes; rock fragmentation studies; development of preliminary and detail engineering designs primarily in the areas of open pits, tailing and waste rock facilities, lined solution ponds, and underground mine openings; engineering risk assessments; preparation of contractor bid packages; construction bidding and selection; and construction quality assurance.

Projects completed at the following sites:

- Freeport McMoRan Climax Molybdenum Mine, CO
- Freeport McMoRan Henderson Molybdenum Mine, CO
- Freeport McMoRan Bagdad Copper Mine, AZ
- Freeport McMoRan Miami Copper Mine, AZ
- Pinal Creek Group WQARF Site, AZ
- Cyprus Mineral Park Copper Mine, AZ
- Cyprus Tonopah Copper Mine, NV
- Cyprus Thompson Creek Molybdenum Mine, ID
- Usibelli Coal Mine, AK
- BHP Copper's Pinto Valley Mine, AZ
- BHP Copper's Copper Cities Mine, AZ



- Addwest Minerals' Gold Road Mine, AZ
- Specialty Minerals' Lucerne Valley Limestone Quarries, CA
- San Xavier Underground Experimental Mine, AZ
- Cambior's Carlota Copper Mine, AZ
- Newmont's Carachugo Gold Mine, Peru
- Vista Gold's Amayapampa Gold Mine, Bolivia
- Barrick Gold's Pascua Gold Mine, Chile
- Cameco's Kumtor Gold Mine, Kyrgyzstan
- Bajo De La Alumbreira Copper Mine, Argentina

ORGANIZATIONS / MEMBERSHIPS / REGISTRATIONS:

Society of Mining Engineers
American Society of Mining and Reclamation
Mining History Association
Professional Engineer (PE) – Arizona #31584

PUBLICATIONS & PRESENTATIONS:

- Hardy, A.J., "Fragment Size Distribution of In-Situ Rock Masses from Drill Core," M.S. Thesis, University of Arizona, 1993, 173 p.
- Hardy, A.J., Corser, P.G., Graham, D.C., "Geotechnical Study and Remediation Design for Coal Mine Spoil Instability in Discontinuous Permafrost," Proc., 8th Intl. Conf. On Cold Regions Engineering, Fairbanks, Alaska, 1996, pp. 712-723.
- Hardy, A.J., Ryan, T.M., Kemeny, J.K., "Block Size Distribution of In-Situ Rock Masses Using Digital Image Processing of Drill Core," Intl. J. Rock Mech. Min. Sci. & Geomech. Abstr., V.34, n. 2, 1997, pp. 303-307.
- Hardy, A.J., "Challenges at the Old Dominion Mine, Globe, Arizona – Floods and Firepower," Mining History Association 9th Annual Conference, Bisbee, Arizona, June 4-7, 1998.
- Hardy, A.J., "Idarado – 100 Miles of Consolidation", Mining History Association 10th Annual Conference, Ouray, Colorado, June 3-6, 1999.
- Hardy, A.J., Redmond, J.V., River, R.A., Davis, C.S., "High Altitude Mine Waste Remediation – Implementation of the Idarado Remedial Action Plan", 16th Annual National Conference of the American Society for Surface Mining and Reclamation, Scottsdale, Arizona, August 13-19, 1999.
- Hardy, A.J., "Integrated Mine Closure Program Management," 3rd Annual MWH Breckenridge Conference, Warwick, England, 2002.
- Hardy, A.J., Lindstrom N.R., Bingham, E.L., Fuller, W.A., Krohn, R.C., "Characterization and Design of the Old Dominion Remedial Action Plan," 20th Annual National Conference of the American Society of Mining and Reclamation, Billings, Montana, June 3-6, 2003.