STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

In the Matter of:	)	
PROPOSED AMENDMENT TO 20.6.2 NMAC (Copper Rule)	)	**No. WQCC 12-01(R)**

EXHIBIT GRASS – 1

Education

M.S. Geological Engineering, Mackay School of Mines, University of Nevada, Reno, 1997

B.S. Geological Engineering, Mackay School of Mines, University of Nevada, Reno, 1994

Short Course Hydrologic Modeling Using HEC-HMS, American Society of Civil Engineers, June 2003

Golder Associates Inc. – Tucson

Employment History

Golder Associates – Tucson, Arizona
Associate/Senior Consultant (1997 to Present)

Mr. Grass's responsibilities include project management of geotechnical, geological, hydrologic, and hydraulic evaluation and design for regional mining and civil engineering projects. His technical expertise includes geotechnical site investigations, surface water hydrology, slope stability, and liquefaction analyses. Responsibilities also include CQA activities, CAD design and layout, and management of the Engineering Design Group in the Tucson office.

University of Nevada – Reno, Nevada
Teaching Assistant (1994 to 1996)

Responsibilities included maintaining laboratory equipment and teaching graduate/undergraduate level laboratories and lecture courses in slope stability, waste containment, mineralogy, geology summer field course, and introduction to geological engineering.

University of Nevada – Reno, Nevada
Lab Technician (1994 to 1996)

Conducted laboratory tests for unconfined compressive tests and joint shear tests, moisture content, specific gravity, liquid and plastic limits, standard and modified proctors, and triaxial shear tests. Calculation of rock mass rating for use in Hoek-Brown failure criterion. Use of various computer packages to analyze rock strength characteristics and slope stability.

PROJECT EXPERIENCE – GEOTECHNICAL

Colorado Interstate Gas Company
Nephi, Utah

Staff Engineer responsible for a geotechnical field investigation for a natural gas pipeline. The investigation included geotechnical drilling for liquefaction analysis, field identification of geologic hazards, fault mapping in the field and with aerial photography, and fault scarp morphology mapping. Additional responsibilities included the production of detailed figures for analysis, report production, and compilation of relevant data for FERC permitting.

Cyprus Miami Mining Corporation
Miami, Arizona

Staff Engineer responsible for the compilation of strength property data and geotechnical analysis of a major copper heap leach expansion. The analysis included slope stability analyses, finite element seepage analyses, diversion channel design, and report production for multiple dam structures.

ASARCO-Ray Mine
Hayden, Arizona

Responsible for the evaluation of slope stability for a copper tailings facility. Analyses included strength sensitivity analysis and response to various earthquake groundmotions for both overall and local stability conditions.

Cyprus Sierrita
Tucson, Arizona

Geotechnical field investigation for a foundation design of a 240-ton ore bin and conveyor system. Subsurface investigation included test pit logging of roadfill, natural soils, and weathered bedrock along conveyor alignment. Geologic and structural mapping of various rock units was performed to determine any adverse joint conditions and ease of excavation.

Chino Mines Company
Hurley, New Mexico

Geotechnical field investigation for a foundation evaluation for a waste rock ore stockpile that included a series of test pit excavations and bedrock geologic mapping. Responsibilities also included a water balance analysis to evaluate long-term storage of water from run-on and precipitation, and prevention of runoff.

Phelps Dodge Morenci, Inc.
Morenci, Arizona

Evaluated ore stockpile slope stability and provided design slope angles for a range of slope heights and foundation conditions. Analyses included evaluation of grain-size changes due to shearing under high normal stresses, slope stability of ore stockpiles over a range of foundation slope angles, and evaluation of stockpile stability for lined and unlined foundations. Responsibilities also included final report production.

PROJECT EXPERIENCE – SURFACE WATER HYDROLOGY

Freeport-McMoRan Safford Inc.
Safford, Arizona

Project Engineer for the detailed design for four small water retention dams and 17,000 feet of diversion channel excavated in rock to protect down gradient facilities. Work included construction quality assurance of earthworks, geosynthetics placement, riprap placement, and grouted riprap placement.

Resolution Copper Mining LLC
Superior, Arizona

Project Manager responsible for construction level design of a small water diversion structure to protect the facility administration area and route stormwater into downgradient channels. Work included construction CQA of clay core, structural fill, rock fill outer shell, outlet piping, and riprap lined emergency spillway.

Minefinders Corporation Inc.
Dolores, Mexico

Project Engineer for the feasibility design of an earth fill, zoned embankment for a water storage reservoir for a mining project in central Mexico. The design consisted of a 1.5 million cubic meter storage capacity earthen embankment, bedrock-excavated emergency spillway, and an internal concrete low flow primary spillway to supply the mining facilities with process water. In addition, surface water diversions were designed to handle design storm events and reservoir overflow from the emergency spillway. Flows were directed around process facilities and overburden stockpiles.

Resolution Copper Company
Superior, Arizona

Project Engineer responsible for construction-level designs of short-term and permanent stormwater upgrades to existing channels and a stormwater retention structure. Work included construction CQA of earthworks, channel lining with shotcrete and riprap, and engineering oversight of channel construction.

Phelps Dodge Morenci, Inc.
Morenci, Arizona

Senior Engineer for the construction design of the Southwest Stockpile upgrades for solution handling of process solutions. The evaluation included the development of surface water evaluation and gravity solution piping design for several drainages along the toe of the stockpile. In addition, grading plans were developed for the construction of headwalls within each drainage and solutions conveyed to either a stainless-steel production tank or a geomembrane-lined storm water pond. The designs were developed in accordance with ADEQ's prescriptive standards for conveyance structures and non-storm water ponds.

Phelps Dodge Sierrita, Inc.
Green Valley, Arizona

Senior Engineer for the construction level design of the BADCT upgrades of Headwalls No. 2 and 5 as well as the associated solution conveyance channels. The designs were developed in accordance with ADEQ's prescriptive standards for process ponds.

Cyprus Miami Mining Corporation
Miami, Arizona

Staff Engineer responsible for the collection of drainage basin data and computer analyses for a sitewide stormwater runoff evaluation. Field activities included measurement and field identification of storm water ponds and associated basin runoff areas and vegetation types. Computer analyses were utilized to evaluate storm water pond storage capacities relative to a major rainfall event.

Phelps Dodge Tyrone, Inc.
Tyrone, New Mexico

Engineer responsible for the conceptual design of storm water and stockpile seepage collection ponds. Tasks included the determination of expected runoff and seepage rates for a design storm event, development of several strategies for collection and distribution of impacted waters, development of final design drawings for construction, and CQA inspections of construction activities.

PROJECT EXPERIENCE – TAILINGS IMPOUNDMENTS

Barrick Bullfrog Mine
Beatty, Nevada

Senior Engineer and project manager for final closure design and construction of a closure cap used in the permanent closure of a gold tailings impoundment. The design included site regrading, placement of cover soils, and construction of the outlet spillway. The project included a final as-built certification report submitted to the state of Nevada for closure approval.

Barrick Bullfrog Mine
Beatty, Nevada

Senior Project Engineer responsible for the construction-level design for a geomembrane-lined evaporation pond used in the permanent closure of a gold tailings impoundment. Design included earthworks, geomembrane liner, and gravity piping design to route multiple flows to the new evaporation pond. Project included a permitting document submitted to the state of Nevada, bid documents to multiple bidders for contract construction, and ongoing engineering support during construction.

Resolution Copper Company
Superior, Arizona

Project Engineer responsible for conceptual-level siting study for a proposed 2 billion metric ton tailings facility for a new underground copper mine. Study reviewed current land use, available storage capacity, and regulatory requirements. Designs included review of potential mill sites, ore and tailings transportation corridors, and conceptual water balance.

Barrick Bullfrog Mine
Beatty, Nevada

Responsible for field investigation, using geotechnical and cone penetrometer methods, to evaluate the slope stability and liquefaction potential of a closed tailings impoundment. The analysis included slope stability, 1-dimensional linear-elastic methods for earthquake response of tailings, tailings water drainage conditions, and final report production.

Barrick Bullfrog Mine
Beatty, Nevada

Design of an embankment expansion for an existing tailings impoundment using downstream, centerline, and upstream construction techniques. Responsible for field investigation to determine in-situ tailings strength and water conditions using cone penetrometer and geotechnical drilling methods. An analysis of slope stability of the embankment raise and liquefaction potential of tailings was performed and final report production completed.

Barrick Mercur Mine
Tooele, Utah

Staff engineer responsible for stability analysis of an existing tailings impoundment consisting of two tailings dams and subsequent upstream raises. Other responsibilities included closure cover design, diversion channel design, settlement analysis of tailings surface due to tailings water draindown and cover surcharge, and development of a monitoring program of piezometers and prisms for closure construction activities and long-term embankment stability.

Battle Mountain Gold Co.
Battle Mountain, Nevada

Responsible for the pre-feasibility-level design of several tailings impoundment options. Work performed included design of cut/fill earthworks for a multi-phase tailings facility using various design mill throughputs and phase construction scenarios to optimize tailings distribution and costs. Developed cost estimates for each scenario considering site-specific conditions and potential concerns throughout the life of the facility. Other responsibilities included Softdesk/AutoCAD™ design and final report preparation.

IMC, Kalium
Carlsbad, New Mexico

Responsible for a detailed field investigation. Geotechnical field investigation included test pits, hollow-stem auger, and continuous sampling and coring of potash tailings and natural lake sediments to identify construction conditions for a tailings expansion. The hydrologic investigation consisted of drilling with a mud/rotary rig, well construction, pump testing, and sample collection for laboratory analysis.

Molycorp
Mountain Pass, California

Completed conceptual and feasibility-level designs for a paste tailings disposal facility. Responsibilities included detailed grading plans, surface water diversion design, tailings stacking plans, construction scheduling, and cost estimates. In addition, completed in-situ testing and sample collection of paste for laboratory testing to determine in-situ material characteristics.

PROJECT EXPERIENCE – HEAP LEACH FACILITIES

Freeport-McMoRan Safford Inc.
Safford, Arizona

Project Manager for the construction quality assurance monitoring including the construction of the heap leach pad, solution collection piping system, PLS Pond, a stormwater pond, and conveyor corridor. Responsibilities include management of a nine person field team, on-call engineering support, and production of a construction certification report to be submitted to the State of Arizona to demonstrate compliance with applicable permit requirements.

Freeport-McMoRan Morenci Inc.
Morenci, Arizona

Senior Engineer for the permitting level design of the Southwest MFL Project upgrades for solution handling of process solutions. The design included the regrading of the existing Southwest Stockpile to contain 750 million tons of crushed ore and convey process solutions through a gravity solution piping design to either an sx plant or to several impoundments along the toe of the stockpile. In addition, grading plans were developed for the construction of headwalls within each down gradient drainage and solutions conveyed to geomembrane lined storm water ponds.

Phelps Dodge Safford, Inc.
Safford, Arizona

Senior Project Engineer for the construction-level design of a 600-foot high, geomembrane-lined heap leach pad. Design included the phased construction of the heap leach pad, solution collection piping system, PLS Pond, a stormwater pond, and conveyor corridor. Included in the design are permanent and temporary (for during construction and initial phase of operations) stormwater diversions and culverts. Responsibilities also included close coordination with client and the client's engineering and procurement contractor.

Cobre del Mayo, S.A. de C.V.
Sonora, Mexico

Project Manager responsible for the construction-level designs of a 500,000-square-meter heap leach pad, process ponds, and foundation designs for the facilities of a 190 million metric ton copper mining project. The work included site reconnaissance, detailed field investigation, and laboratory testing. Additional responsibilities include development of design drawings, technical construction specifications, construction quality assurance plans for earthworks and geomembrane installation, and supply support to EPCM contractor for subcontractor bid documents and meetings

Minefinders Corporation Inc.
Dolores, Mexico

Project Engineer for the feasibility design of a geomembrane-lined heap leach pad. Design considerations include steep, mountainous topography; 130-meter high heap height; and phased construction to minimize capital. Design also included process and stormwater ponds, detailed water balance, slope stability analysis, and solution collection piping design

Phelps Dodge Safford, Inc.
Safford, Arizona

Project Engineer for the feasibility design of a geomembrane-lined heap leach pad. Design considerations include 600-foot high heap height and phased construction to minimize capital. The evaluation also considered alternative sources for the low-permeability soil layer and the overliner drainage layers. A geotechnical field investigation and foundation recommendations were also performed for the process facilities.

Phelps Dodge Morenci, Inc.
Morenci, Arizona

Senior Engineer for the construction design of the Southwest Stockpile upgrades for solution handling of process solutions. The evaluation included the development of surface water evaluation and gravity solution piping design for several drainages along the toe of the stockpile. In addition, grading plans were developed for the construction of headwalls within each drainage and solutions conveyed to either a stainless-steel production tank or a geomembrane-lined storm water pond. The designs were developed in accordance with ADEQ's prescriptive standards for conveyance structures and non-storm water ponds.

Newmont Mining Company
Valmy, Nevada

Senior Engineer for the construction-level design of a gold heap leach pad expansion. Work completed for the project included a detailed field investigation for borrow source delineation and characterization, foundation conditions, and review of constructability of local cut/fill earthworks. Surface water calculations were completed to design storm water diversion channels and sizing of event pond storage capacity. Construction-level grading plans and design drawings were completed for permitting and construction of two expansion cells. Additional calculations completed during the design included pipe crushing, pipe flow capacity, slope stability, and liner load capacity.

Cerro Vanguardia Sociedad Anonima
Cerro Vanguardia, Argentina

Senior Engineer for the conceptual design of a series of gold heap leach pad options. The evaluation included the development of several grading plans utilizing balanced cut to fill earthworks, evaluation of solution handling alternatives, expansion capabilities, and a comparison of the capital and operating costs for the various alternatives.

Phelps Dodge Morenci, Inc.
Morenci, Arizona

Senior Engineer for the Preliminary Design of the Southwest Stockpile upgrades for the Mine for Leach Project. The evaluation included the development of a grading plan to accommodate differential settlement, liner alternatives, solution handling alternatives, and a comparison of the capital and operating costs for the various alternatives.

Phelps Dodge Sierrita, Inc.
Green Valley, Arizona

Senior Engineer for the construction-level design of the BADCT upgrades of Headwalls No. 2 and 5 as well as the associated solution conveyance channels. The designs were developed in accordance with ADEQ's prescriptive standards for process ponds.

CENRE/Geomaque Explorations LTD.
Sula, Honduras

Project Engineer for the construction-level design of a gold heap leach pad expansion. Work completed for the project included a detailed grading plan using local cut/fill earthworks. Hydraulic calculations were completed to design the solution collection system and upgrades to the existing solution ponds. Construction-level grading plans and design drawings were completed.

Phelps Dodge Morenci, Inc.
Morenci, Arizona

Project Engineer for Golder's geotechnical support for feasibility and final design phases of the Stargo Mine for Leach facility. Components of the investigation included evaluations of geotechnical and flow parameters of various crushed ore sizes, soil borrow investigations, heap flow modeling, embankment stability, settlement estimates, grading plans, liner designs, pipe crushing analyses, and development of a monitoring program.

Battle Mountain Gold Co.
Battle Mountain, Nevada

Responsible for the feasibility-level design of a gold heap leach pad. Work performed included design of cut/fill earthworks for a multi-phase heap leach facility using various design production rates and phase construction scenarios to optimize storage volume and costs. Developed cost estimates for each scenario considering site-specific conditions and potential concerns throughout the life of the facility. Other responsibilities included Softdesk/AutoCAD™ design and final report preparation.

La Balsa Project
Michoacan, Mexico

Responsible for a bankable feasibility-level design of a copper heap leach pad. Work performed included design of cut/fill earthworks for a multi-phase heap leach facility using various design production rates and phase construction scenarios to optimize storage volume and costs. Developed cost estimates for each scenario considering site-specific conditions and potential concerns throughout the life of the facility. Other responsibilities included Softdesk/AutoCAD™ design and final report preparation.

PROJECT EXPERIENCE – OPEN PIT/HIGHWALL DESIGN

La Granja Copper Project
Lima, Peru

Slope stability analysis of 1,700-meter deep open pit copper mine. Responsibilities included generation of strength property distributions, probabilistic analysis of inter-ramp and overall pit highwalls, and report production.

BHP San Manuel
San Manuel, Arizona

Geotechnical field investigation of rock mass properties for a copper-oxide pit expansion. Responsibilities included point load testing, cell mapping of structural data, and generation of geologic maps and cross-sections for several pit wall configurations

Western Copper Pit
Morenci, Arizona

Project Engineer responsible for logging of oriented core and sample collection. Also responsible for development of geologic maps, report figures, and final report production.

El Sauzal Project
Chihuahua, Mexico

Project Engineer responsible for logging of oriented core and sample collection. Analyzed laboratory testing and reviewed existing geotechnical logging to develop design parameters for bench-scale and overall highwall slope stability. Also responsible for development of geologic maps, report figures, and final report production.

PROFESSIONAL AFFILIATIONS

Registered Professional Engineer - Utah

Registered Professional Engineer - Arizona

Registered Professional Geologist - Arizona

American Society of Civil Engineers (ASCE)

Phi Kappa Phi Honor Society