



**Phillip E. Brown, CPG**

Senior Hydrologist / Engineer

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## Education

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BS, Geology, Virginia Polytechnic Institute and State University, 1972

MS, Civil Engineering, Virginia Polytechnic Institute and State University, 1974

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## Registrations/Certifications

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Professional Geologist (#CPG-6209)

Professional Geologist State of Alaska

40-hour OSHA Training

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## Experience Summary

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Mr. Brown has over 38 years of experience in water quality and pit inflow evaluation, pit and underground mine dewatering design, well drilling and aquifer testing, groundwater contamination delineation and modeling, groundwater development and artificial recharge, strategic planning or water development, potable water supply and wastewater treatment, and baseline hydrology studies. Mr. Brown has managed a variety of projects for the mining industry throughout the U.S. and internationally. He has also provided litigation support for lawsuits involving Superfund sites, water rights geotechnical foundation failure, and groundwater contaminations.

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## Project Experience

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### ***Mining***

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#### **WATER MANAGEMENT PROGRAM, MINA SANTA PANCHA | LIMON, NICARAGUA**

Evaluated underground mine water management at for B2Gold's Santa Pancha Mine in Nicaragua. This work involved the development of a conceptual groundwater model for the site and providing suggestions for water management within the underground workings including sump design, drainage, pump sizes, and vertical dewatering wells. (Tierra Group International, 2016)

#### **IN PIT TAILINGS DISPOSAL FEASIBILITY PROGRAM, MINA LA LIBERTAD | LIBERTAD, NICARAGUA**

Evaluated the potential impact of in-pit disposal of tailings in the Crimea Pit at Mina La Libertad in Nicaragua. This work entailed the installation and hydrogeologic testing of monitoring wells and the development of a groundwater flow and solute transport model for the site. (Tierra Group International, 2016)

#### **HYDROGEOLOGIC SITE CHARACTERIZATION, COSMO-HOWLEY PROJECT | NORTHERN TERRITORY, AUSTRALIA**

Carried out a site wide hydrogeologic characterization program for Newmarket Gold's Cosmo Howley Mine in Australia. This work involved the evaluation of acid rock drainage potential from waste rock dumps and the potential pathways for contamination generated from these to the groundwater system. The overall objective of this project was to develop a remediation program for not only the waste rock dumps but for final pit lakes. (Tierra Group International, 2015 to 2016)

#### **WATER MANAGEMENT PROGRAM, MINA PALMAREJO | CHIHUAHUA, MEXICO**

Performed a scoping study to provide guidance to the Coeur staff on better management of water in the underground workings. This work included sump design, pump location, and water treatment of discharge water. In addition, a program was designed to obtain data for future groundwater modeling efforts. (Global Resource Engineering, 2015 to 2016)

**PUMPKIN HOLLOW COPPER PROJECT | YERINGTON, NEVADA**

The work entails managing the hydrogeological and geochemical aspects of the project. Work is currently underway on delineating the hydrogeology, pit and shaft inflow to both surface/underground workings, and the potential for acid rock drainage. (The Mines Group and Nevada Copper, Inc., 2015)

**BAHUERACHI MINE FEASIBILITY STUDY | CHIHUAHUA, MEXICO**

Acted as the Quality Control Manager for geochemistry and water for the proposed Bahuerachi Mine Feasibility Study. As QP, he was responsible for ensuring the study met international standards. (Ausenco, 2015)

**WATER MANAGEMENT PROGRAM, MINA LA LIBERTAD | LIBERTAD, NICARAGUA**

Managed the development of mine water management program for La Libertad Mine. This involved the design of pump systems, sumps, and wells towards better water management of water in an area of high rainfall. (B2Gold Inc. and Global Resource Engineering, 2012 to 2014)

**FEASIBILITY STUDY | REPUBLIC OF CONGO**

Principal Hydrogeologist on a feasibility study for a copper mine project in the Republic of Congo. The objective of this work is to design of a feasibility level program for dewatering, water treatment, and surface water control for the proposed mining project. (Ausenco Vector, 2011 to 2012)

**HYDROLOGIC SERVICES | PERÚ**

Performed hydrologic studies and designs for passive water systems for ARD at the Proyecto Corihuarmi. (Ausenco Vector, 2012)

**SCOPING/PREFEASIBILITY STUDY | SULAWESI, INDONESIA**

Design of water management systems for a Scoping/Prefeasibility study for a potential Doup Gold Mine. (J Resources, 2012)

**EVALUATION OF AMD WASTE STREAMS, NORTH LANUT MINE | INDONESIA**

Evaluation of passive treatment of AMD waste streams including aerobic wetlands, anoxic wetlands, mechanical lime dispensers, and other methodologies appropriate for ferric waters. (J Resources, 2012)

**SAN ANTON MINE | DOLORES DE HILDAGO, MEXICO**

Evaluated inflows to underground workings for San Anton Mine. This involved the completion of an aquifer test in existing workings and the development of groundwater inflow model. (The Mines Group and King Minerals, 2011)

**CENTENNIAL IN-SITU URANIUM PROJECT | WELD COUNTY, COLORADO**

Supervised drilling, pump testing, and groundwater evaluation for the Centennial In-situ Uranium Project. Also completed surface water and soil loss modeling for the project area. (PowerTech through R2 Consultants, 2007 to 2010)

**USEPA | CENTRAL AMERICA**

Working with USEPA through a USAID contractor, developed EIA guidelines for mining operations for countries making up CAFTA-DR in Central America. (Chemonics International, 2009 to 2012)

**USTDA | KYRGYZSTAN**

Evaluated potential mining projects in Kyrgyzstan for the potential for American goods and services for USTDA. (American Geological Services, 2004)

**KISLADAJ GOLD MINE | TURKEY**

Performed a cyanide balance for a heap leach for the Kisladağ Gold Mine in Turkey. (The Mines Group, 2008 to 2009)

**FORT KNOX MINE | FAIRBANKS, ALASKA**

Developed an analytical and water balance model for the Fort Knox Mine in Fairbanks, Alaska to determine the rate for infilling of the ultimate pit based on 2004 data. (Doubek HydroLogic, 2007)

**PALMAREJO GOLD PROJECT | MEXICO**

In charge of geotechnical drilling for a water supply dam and mill siting for the Palmarejo Gold Project in Mexico. (The Mines Group, 2007 to 2008)

**POST-CLOSURE REVIEW, ANACONDA JACKPILE URANIUM MINE | NEW MEXICO**

Reviewed post-closure documents involving the closure of the former Anaconda Jackpile Uranium Mine. This involved the analysis of over 16 years of groundwater and surface water monitoring data ensuring that remediation has met the conditions of the Record of Decision. (OA Systems, 2006)

**LT RANCH URANIUM CLOSURE PROJECT | NEW MEXICO**

Performed a complete analytical review of the LT Ranch Uranium Closure Project on the Laguna Pueblo. (OA Systems, 2006)

**PROSPECTIVE COAL MINES | COLORADO AND NORTH DAKOTA**

Evaluated coal resources and environmental constraints in opening prospective mines in Colorado and North Dakota. (Coal Resources America, 2006)

**BRISAS GOLD MINE | VENEZUELA**

Supervised the drilling of deep boreholes (> 400 m), installation of wells, and aquifer testing for a major proposed Brisas Gold Mine in Venezuela, developed mine dewatering design and completed the hydrogeology for a feasibility study. The objective of this work was to develop a numeric model, design a dewatering scheme, and develop dewatering costs. (Gold Resources Inc. and Vector Colorado (now Tetra Tech), 2005 to 2006)

**AMERICAN BEAUTY MINE | NEVADA**

Evaluated surface and groundwater resources for the American Beauty Mine in Nevada. (The Mines Group, 2005)

**KAPUSKASING PHOSPHATE MINE | ONTARIO, CANADA**

Performed a groundwater modeling exercise for the Agrium – Kapuskasing Phosphate Mine in Ontario, Canada. (Doubek HydroLogic, 2004 to 2005)

**WATER EXPLORATION PROJECT, AMAX GOLD GUANACO MINE | NORTHERN CHILE**

Managed a major water exploration project for the AMAX Gold Guanaco Mine in the Atacama Desert. This project involved the use of geophysics, aerial photography interpretation, and the supervision of a well drilling and testing program. A combination of deep and shallow wells were drilled. Deep wells were generally deeper than 500 m. (AMAX Gold through Water Management, 2004)

**SPJV McDONALD PROJECT | MONTANA**

Assisted in the preparation of the baseline hydrogeologic study for the SPJV McDonald Project, Montana. This involved the development of an analytical dewatering model and dewatering design for the project. (Water Management Consultants, 2003)

**DEWATERING AND WATER TREATMENT STUDIES | COLORADO**

Performed dewatering, modeling, and water treatment studies for construction projects overlaying former mine sites in Blackhawk and Central City, Colorado. (Stewart Env. Consultants, 1995 to 1998)

**SCOPING STUDY, MONYWA COPPER PROJECT | MYANMAR**

Performed a detailed Scoping Study for the mining hydrology of the Monywa Copper Project. This included a preliminary assessment of mine dewatering requirements, an evaluation of the hydrochemistry of surface water and groundwater in the direct vicinity of the mine. (WESTEC, 1994 to 1995)

**BULL MOUNTAINS | MONTANA**

Evaluated the hydrogeology of the Bull Mountains for the development of a longwall coal mining operation for Meridian Minerals. (Meridian Minerals, 1992 to 1994)

**MACRAES FLAT MINING COMPANY | NEW ZEALAND**

Analyzed seepage using 2D groundwater models in a granular tailings dam and assessment of impacts associated with the cyanide leaching of gold, Macraes Flat Mining Company. (Woodward-Clyde, 1991)

**ENVIRONMENTAL IMPACT STATEMENT, TIN MINE | MALAYSIA**

Acted as the Hydrologic Task Leader for an Environmental Impact Statement for a major Tin Mine in Malaysia. (Woodward-Clyde, 1990)

**DEWATERING AND TAILINGS DAM ANALYSES, VARIOUS MINES | NEW ZEALAND**

Performed dewatering and tailings dam analyses for numerous mines in New Zealand, including Cyprus Golden Cross, Waihi, and Macraes Flat. (Woodward-Clyde, 1989 to 1991)

**HYDROLOGIC STUDIES | NEW MEXICO**

Performed baseline hydrologic studies, hydrogeologic modeling, both analytical and numeric (MODFLOW), and permit submittal for the Fence Lake Coal Mine. (Salt River Project, 1988 to 1990)

**MCLAUGHLIN GOLD PROJECT | LAKE COUNTY, CALIFORNIA**

Designed, installed, and tested groundwater observation wells for the McLaughlin Gold Project. (SRK Consulting, 1985)

**SLEEPER MINE | NEVADA**

Evaluated groundwater resources for the Sleeper Mine in Nevada. (SRK Consulting, 1985)

**WESTHOFF #6 MINE | COALGATE, OKLAHOMA**

Performed baseline hydrologic studies for the Westhoff #6 Mine, Coalgate, Oklahoma. (J. T. Boyd Co., 1984)

**JOHN HENRY MINE | KING COUNTY, WASHINGTON**

Designed drainage control structures including surface water flow modeling for the John Henry Mine, Pacific Coast Coal Co., King County, Washington. (J.T. Boyd Co., 1984)

***Strategic Planning for Water Development and Watershed Management***

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**GROUNDWATER AND SURFACE WATER PROGRAMS | NORTH CYPRUS**

Currently working in North Cyprus on programs to enhance groundwater and surface water availability in a variety of watershed. Under the SAVE Project funded by USAID, this program involves training members of the Water Works and Mining and Geology Department on methods to evaluate and protect their water resources through proper watershed management through numeric modeling. (IRG, 2006 to Present)

**VARIOUS MINING PROJECTS | KYRGYZSTAN**

Developed of water supply alternatives as well as an assessment of potential environmental impacts for eight potential mining projects throughout Kyrgyzstan. This project was funded by the U.S. Trade Development Agency which is interested in providing American goods and services to Kyrgyzstan. (American Geological Services, 2006 to 2007)

**WATER AND ENERGY POLICIES | CENTRAL ASIA**

Evaluated water resources and energy in Central Asia towards assisting countries such as Kyrgyzstan in developing water and energy policies. Project included a complete evaluation of trans-boundary concerns, irrigation practices, use of hydroelectricity, and other concern. (Chemonics International, 1995)

**HYDROLOGIC AND WATERSHED MANAGEMENT PROGRAM | WASHINGTON, D.C.**

Acted as a Senior Engineer evaluating the hydrologic and watershed management program for the Panama Canal Authority. Developed a conceptual design for a comprehensive information watershed data management system and made recommendations for further program needs. This included the evaluation of existing water quality and quantity databases used by the Panama Canal Authority; and using ORACLE, designed a consolidated information and database system. (International Resources Group, 2004 to 2005)

**USAID ESP PROGRAM | INDONESIA**

Working in the tsunami affected Aceh Region of Indonesia as part of the USAID ESP program, developed a program to evaluate the impacts of post-tsunami construction on the Kr. Aceh and its tributaries. This involved a region wide water quality and quantity monitoring program. This program was designed to evaluate the impacts of deforestation and sand/gravel mining. The program also looked at the potential positive impacts of planting trees and other watershed management programs. (DAI, 2005 to 2007)

**HYDROLOGY AND HYDROGEOLOGY ANALYSES | AQABA REGION, JORDAN**

Performed a detail analysis of the hydrology and hydrogeology of the Aqaba Region in Jordan to suggest alternative water supplied to the fossil Disi Aquifer and desalination. Assisted in the performance of a water demand study and the development of an alternative paper for water supply. (Chemonics International, 2005 to 2006)

**PERFORMANCE MANAGEMENT SYSTEMS | YOGYAKARTA, INDONESIA**

Team Water Management Specialist for the development of a performance management system for solid waste management, water supply and waste water treatment under a decentralization program in Yogyakarta, Indonesia. Known as DEMY, this program was sponsored by USAID under the BIGG Project. (International Resources Group, 2002)

**EROSION AND SEDIMENT STRUCTURES | EAST KALIMANTAN, INDONESIA**

Evaluated and designed erosion and sediment control structures and the training of mine personnel on reclamation grading methods for BHP Coal. (BHP Indonesia, 1997)

**SOLID WASTE LANDFILLS | EGYPT**

Worked with the Egyptian Environmental Authority (EEAA) in Egypt to develop a training course on the siting of solid waste landfills. This involved the development of three courses, one based on lessons learn at the Abu Zabaal land; another one to train the trainers; and a third to work with landfill operators. (International Resources Inc., 2002)

**CONTAMINATED SOIL AND WASTE PROGRAM | EGYPT**

Working under the USAID funded LIFE Project in Egypt, I am in the process of developing a program for the remediation of lead smelters and the proper handling and disposal of contaminated soil and waste. (Chemonics International, 2005)

**DEVELOPMENT OF WATER QUALITY MONITORING STATIONS | ROMANIA**

Developed an Emergency Rapid Response Center should an accidental spill occur in the Arges River Basin in Romania under the USAID SEPIC Project. This project included the development of remote water quality monitoring stations. (International Resources Group and Chemonics International, 2004 to 2006)

**USAID, APRA PROJECT | ROMANIA**

Working with the Government of Romania, responsible for the development of mobile water quality sampling laboratory as well as training personnel in ANAR (the National Water Company) on proper sampling techniques. This work was completed under the USAID funded APRA project. The objective of this work is to assist Romania in meeting the EU Nitrate Directive. (2004)

**WATER MANAGEMENT PRACTICES | PANAMA CANAL**

Worked with CICH, an organization formed to promote sound water management practices in the Panama Canal Watershed, to develop an information clearinghouse for geographical Information, publications, and water quality/quantity data. This included the development of a World Wide Web based data retrieval system for water resource information. This information system played a key role for strategic planning in the watershed. (International Resources Group, 2001 to 2002)

**LEAD SMELTER DEMOLITION | EGYPT**

Worked with the EEAA through the USAID Cairo Air Project to develop a strategic plan for the evaluation and safe demolition of Secondary Lead Smelters. This included the evaluation of an existing lead smelter in terms of the nature of hazardous on site and development of a remediation plan. (Chemonics International, 2001 to 2003)

**WATER QUALITY MONITORING PROJECT | EGYPT**

Acted as the Chief-of-Party for a water quality monitoring project for Nile River Basin. During this project, a Risk Assessment Approach was taken toward developing a Water Quality Management Program for the Egyptian National Water Research Center under the USAID PRIDE Project. This included an assessment of water quality hazards to Egyptian agriculture. (Chemonics International, 1994 to 1995)

#### **OPERATIONS PLAN – LANDFILL | CAIRO**

Assisted in the development of an operations plan for the Abu Zabaal landfill just north of Cairo. The objective of this plan was to assist the local government of make the landfill suitable for lead smelter waste. (Chemonics International, 2000)

#### **ENVIRONMENTAL EVALUATION | ROMANIA**

Managed an environmental evaluation and technical assistance program funded by USAID for the Phoenix Copper Smelter and Romplumb Lead Smelter in Baia Mare, Romania. (Chemonics International, 1999 to 2002)

### ***Petrochemical, Oil/Gas, and Hazardous Wastes Evaluations***

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#### **WASTE WATER EVALUATION OF THE WIND RIVER BASIN | DENVER, COLORADO**

Provided baseline hydrochemistry and evaluated the potential impacts of the underground injections of waste water from oil field operations in the Wind River Basin, Wyoming. (Buys and Associates, 2004 to 2005)

#### **WATER QUALITY EVALUATION | WELD COUNTY, COLORADO**

Provided projection of water quality and co-mingling of wastewater from a gas compression station with oil field waste brines. (Buys and Associates, 2000 to 2004)

#### **VESSELS' OIL AND GAS WATTENBERG PLANT | DENVER, COLORADO**

Performed soil and groundwater site evaluation including the development of a probabilistic groundwater model for the site. (Buys and Associates, 2003 to 2004)

#### **LAKE CITY ARMY AMMUNITION PLANT | INDEPENDENCE, MISSOURI**

Calibrated RAND3D, a solute transport model, for the development of a groundwater management plan. The object of the model was to determine the extent of TCE in a thick alluvial aquifer. (ETA, 2000 to 2001)

#### **WATER SUPPLY RISK ASSESSMENTS | NEW ZEALAND**

Using the groundwater MOC developed by the U.S. Geologic Survey, performed risk assessments for a leaky underground storage tanks involving a major spill overlying a regional glacial aquifer. The objective of the assessment was to show that nearby water supply wells would not be affected by the spill and that additional cleanup efforts were not necessary. (Woodward-Clyde, 1989 to 1991)

#### **EVALUATED HYDROCARBON PLUMES USING GROUNDWATER MODELING TECHNIQUES | NEW ZEALAND**

Evaluated the migration of hydrocarbon plumes from leaky underground storage tanks in glacial outwash plains on the South Island of New Zealand. Studies included the use of both analytical and numeric groundwater modeling techniques. (Woodward-Clyde, 1989 to 1991)

#### **GROUNDWATER MODELING SYSTEM | DENVER, COLORADO**

Developed a 3D groundwater flow model (MODFLOW) and coupling it with a 3D solute transport model to evaluate the potential impacts of TCE on a groundwater system beneath a US Naval Base. (SAIC, 2003)

#### **GROUNDWATER MODELING | NEW ZEALAND**

Using groundwater modeling, developed a clean-up strategy for hydrocarbons in a groundwater system underlying a major petroleum refinery, New Zealand Refining Company. (Woodward-Clyde, 1989 to 1991)

#### **DUGWAY PROVING GROUND PRELIMINARY ASSESSMENT | DUGWAY, UTAH**

Acted as a principal author for the Preliminary Assessment in compliance with CERCLA regulations for the Dugway Proving Ground. (Engineering Technologies, 2000)

#### **ANACONDA ROCKY HILL COAL GASIFICATION PROJECT | WYOMING**

Performed hydrogeology studies regarding the Anaconda Rocky Hill Coal Gasification Project. (Koch and Associates, 1983)

#### **REMEDIATION SYSTEMS | COLORADO**

Evaluated and designed remediation systems for leaky underground storage tanks for numerous sites along the Front Range of Colorado. (Spaine Environmental, 1995 to 2003)

## ***Database Development***

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### **ABANDONED MINE DATABASE SYSTEM | SUMMIT COUNTY, COLORADO**

Developed a database system used to evaluate over 120 abandoned mine sites in the Peru Creek Basin in Summit County, Colorado. This database was the basis for the development of a ranking system to justify the remediation of selected sites. The database was developed using ACCESS. (American Geological Services, 2004)

### **NATIONAL WATER RESEARCH CENTER – WATER QUALITY DATABASE | EGYPT**

Managed a 3-year long project which involved the development of a water quality database linked with GIS application for the Government of Egypt, National Water Research Center. The final project was named Egypt Water Quality Information System (EWaQIS). (Chemonics International, 1993 to 1994)

## ***Water Supply/Wastewater Treatment***

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### **DEVELOPMENT OF WATER SUPPLY IN THE ANACOMA DESERT | CHILE**

Managed a comprehensive program to develop a water supply (potable and industrial) for a major mining project in the Anacoma Desert in Chile. Numerous sources for water were evaluated and a field program was carried out. Sources for water included groundwater, springs, surface water, and the ocean. Treatment options for potable water considered included desalination, sand filtering, and numerous others. (AMAX Gold, 1996 to 1997)

### **FEASIBILITY STUDY FOR A SEASIDE RESORT AND GOLF COURSE | SAIPAN**

Acted as the Engineer-in-Charge of developing a feasibility study for water supply for a seaside Resort and golf course in Saipan. This project included the evaluation and preliminary design of fresh water sources of water including springs, surface water, and groundwater. Potable water treatment options included desalination of brackish groundwater and filtration and chlorination of fresh water supplies. (American Geological Services, 2001 to 2002)

### **EVALUATION OF NITRATES IN GROUNDWATER | ROMANIA**

Evaluated the impacts of nitrates in groundwater from agricultural sources as part of a pilot study to assist the Government of Romania in meeting the EU Nitrates Directive under the USAID APRA project. (IRG, 2003)

### **ALUMINUM SMELTER | NEW ZEALAND**

Developed a water supply from a coastal aquifer for a large aluminum smelter in New Zealand. Evaluated saltwater intrusion potential and designed a water management plan. (Woodward-Clyde, 1989 to 2001)

### **PANAMA CANAL WATERSHED WATER QUALITY MONITORING PROGRAM | PANAMA CANAL**

Worked with the Panama Canal Authority in developing a water quality monitoring program to ensure that existing potable water treatment remains efficient and that current wastewater treatment practices maintain international standards in the Panama Canal Watershed. (International Resources Group, 2002)

### **WASTEWATER TREATMENT SYSTEMS | NEW ZEALAND**

Supervised the design and installation of primary wastewater treatment systems including septic tanks, aerated ponds, and settling structures for small and large villages in New Zealand. (Woodward-Clyde, 1989 to 1991)

### **ZARGA RIVER WASTEWATER TREATMENT | REPUBLIC OF JORDAN**

Evaluated the efficiencies of wastewater treatment in the Zarga River in the Republic of Jordan and presented an alternative paper including costing for better and improved systems that would treat wastewater so that the gray water would be acceptable for agriculture. (International Resources Group, 2002)

### **WASTEWATER TREATMENT PLANTS | CAIRO EGYPT**

Evaluated wastewater treatment plants in Cairo, Egypt in terms of their efficiencies to treat wastewater so that the gray water could be used for agriculture. (Chemonics International, 1993)

#### **WETLAND DEVELOPMENT | COLORADO**

Designed wetlands to treat stormwater and primary/secondary wastewater streams at numerous sites throughout Colorado. (Bamberg Associates, 1999 to 2005)

#### **NATIONAL WATER POLICY PROGRAM | KINGDOM OF JORDAN**

Assisted in the development of National Water Policy Program for the Kingdom of Jordan. This included the evaluation of irrigation systems and drainage problems in the Jordan River Valley; the development a water policy toward irrigation; and the design of a “policy driven” project to be funded by USAID. (International Resources Group, 2002)

#### **WATERSHED MANAGEMENT | KAZAKHSTAN, UZBEKISTAN, AND KRYGYZSTAN**

Evaluated salinity and watershed management problems due to irrigation in Kazakhstan, Uzbekistan, and Krygyzstan. (Chemonics International, 2000 to 2001)

#### **HYDRO-METEOROLOGICAL MONITORING SYSTEM | PANAMA CANAL**

Evaluated the hydro-meteorological monitoring system including making recommendations for additional equipment for the Panama Canal Watershed and assisted in the development of an overall watershed monitoring program for the USAID EPIC Project. (2002 to 2003)

#### **BASIN MANAGEMENT PLAN | COLORADO**

Developed a basin-wide water balance determining the role of groundwater recharge for the San Luis Valley in southern Colorado as part of the overall basin management plan. (Koch and Associates, 1985)

#### **Miscellaneous**

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#### **NEW ZEALAND ALUMINUM SMELTER INC. | NEW ZEALAND**

Defined extent of contamination, plume modeling, and installation of monitoring wells for a spent cathode storage facility. (Woodward-Clyde, 1989 to 1991)

#### **NEW ZEALAND RAILWAYS | NEW ZEALAND**

Assisted in the preparation of a nationwide Risk Assessment for the transport of hazardous goods on New Zealand Railways. (Woodward-Clyde, 1991)

#### **COLUMBIA RIVER BASALT | WASHINGTON**

Assessed the potential hydrologic risks of sitting a high-level nuclear repository in the Columbia River Basalt. (CERT, 1985 to 1987)

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### **Publications / Presentations**

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**Brown PE** and Kady M, 1995. *Concept Paper on Using a Risk Assessment Approach Toward Water Quality Management in Egypt*, PRIDE Egypt.

**Brown PE**, Tawfic M, and Baleigh S, 1994. *Water Quality Hazards to Agriculture in Egypt*, PRIDE Egypt.

**Brown PE** and Wood S, 1990. *The Use of Risk Assessment in Evaluating the Hydrogeological Aspects of a Hydrocarbon Spill*, presented at Groundwater and Seepage Symposium, Auckland, New Zealand, May 1990.

**Brown PE** and Wood S, 1990. *Application of Risk Management Principles in Environmental Protection Programs*, IPENZ 1990, Wellington, New Zealand.

**Brown PE**, 1989. *Preliminary Evaluation of the Potential Hydrologic Impacts of the Fence Lake Project*, Catron County, New Mexico, SRP Internal report.

**Brown PE**, Arndt BM, and Bamberg S, 1988. *Evaluation of the Hydrogeological Risk Involved in the Siting of Mining Operations*, presented at The Third International Mine Water Congress, Melbourne, Australia.

**Brown PE** and Greenberg MA, 1987. *Coal Mine Dewatering as a Key Aspect in Pre-Mine Feasibility Planning in the Semi-arid Western United States*, presented at Hydrogeology of Coal Basins International Symposium, Katowice, Poland, September 1987.



- Lane AG and **Brown PE**, 1986. *A Risk Assessment Development Methodology for the Siting of High Level Nuclear Waste Repositories*, Haztech International, Denver, Colorado, August 1986.
- Brown PE**, Smith RG, and Lombardo L, 1985. *Development of an Open Pit Coal Mine Dewatering Plan in Cesar Department, Colombia, S.A.* presented at Mine Water, Granada, Spain 1985.
- Brown PE**, 1985. Estimation of Pit Inflows with Dewatering Cost Analysis for Sections 20, 28, 29, and 30 T4N, R16W, Salt River Project's Fence Lake Property, Catron County, New Mexico, SRP Internal report.
- Brown PE**, 1984. *Installation of Surface Water Monitoring Stations at the Salt River Project's Fence Lake Property*, SRP Internal report.
- Brown PE**, Smith R, and Wendt G, 1980. *Interrelationship of Groundwater with Overburden and Reclaimed Spoil at an Active Mine in Southwestern Colorado*, Proceeding of the 1980 Symposium on Surface Mining Hydrology, Sedimentology and Reclamation.
- Brown PE**, 1974. *A Study on the Effects of the Artificial Recharge of Urban Runoff in Roanoke, Virginia*, M.S. Thesis, Virginia Polytechnic Institute and State University.
- Mr. Brown was also a Co-chairman of the Groundwater and Seepage Symposium held in Auckland, New Zealand, May 1990.

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## Employment History

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<b>CURRENT EMPLOYER</b>	<b>TIERRA GROUP INTERNATIONAL, LTD.</b>
<b>POSITION</b>	Senior Hydrologic/Water Resource Engineer
<b>YEARS</b>	2015 to Present
<b>EMPLOYER</b>	<b>INDEPENDENT CONSULTANT</b>
<b>POSITION</b>	Principal Hydrogeologist
<b>YEARS</b>	1983 to 2015
<b>EMPLOYER</b>	<b>SRK CONSULTING</b>
<b>POSITION</b>	Senior Hydrogeologist
<b>YEARS</b>	1981 to 1983
<b>EMPLOYER</b>	<b>PEABODY COAL COMPANY</b>
<b>POSITION</b>	Senior Hydrologist
<b>YEARS</b>	1978 to 1981
<b>EMPLOYER</b>	<b>U.S. GEOLOGICAL SURVEY</b>
<b>POSITION</b>	Technical Consultant
<b>YEARS</b>	1977 to 1978
<b>EMPLOYER</b>	<b>HITTMAN ASSOCIATES</b>
<b>POSITION</b>	Geologist / Engineer
<b>YEARS</b>	1975 to 1977