Years of Experience: 40
Years with GEOSCIENCE: 36

Education:
B.S., Geology. University of Redlands
M.S., Ground Water Hydrology. New Mexico Institute of Mining and Technology
Ph. D., Hydrology. New Mexico Institute of Mining and Technology

Professional Registrations:
California Professional Geologist (No. 461)
Certified California Hydrogeologist (No. 139)
Certified Ground Water Hydrologist (American Institute of Hydrology) (No. 355)

GEOSCIENCE

DENNIS E. WILLIAMS, PH.D, PG, CHG

President/Principal Geohydrologist

Dr. Dennis Williams, founder and president of the Southern California based firm GEOSCIENCE Support Services, Inc. has 40 years of experience in ground water hydrology. During that time he has directed geohydrologic investigations domestically and worldwide which includes the design and supervision of over 1,000 deep large-scale municipal water supply wells. He has been a consultant to the United Nations and several foreign governments, is a research professor at the University of Southern California's Civil and Environmental Engineering Department, and has taught graduate level courses in geohydrology and ground water modeling since 1980. Dr. Williams also directs research on ground water and wells at USC's geohydrologic laboratory which houses the largest sand-tank model in the world. Dr. Williams is author of over 50 publications on ground water and wells and was the principal author of the Handbook of Ground Water Development (John Wiley & Sons, 1990), and chief reviewer for the American Society of Civil Engineers (ASCE) Manual of Water Well Design, Construction, Testing and Maintenance (2014). Dr. Williams also serves on many expert and blue ribbon panels for the ground water industry. Dr. Williams pioneered the use of subsurface intakes using slant wells for desalination feed water supply having constructed the first slant well beneath the ocean near Dana Point, CA. For over ten years, Dr. Williams has worked on almost all of the subsurface desalination feed water intake system studies in California. For these projects he was primarily responsible for project management, study design, and the design and analysis of the feasibility of the intake systems. Dr. Williams is a recognized expert in the design and analysis of subsurface feed water supply systems and has been the principal or contributing author on several papers published in scientific journals, including a recent chapter on slant well intake systems: design and construction in an upcoming book Intakes and Outfalls for Seawater Reverse Osmosis Desalination Facilities.

Dr. Williams has been involved in and directed all ground water projects conducted by GEOSCIENCE over the past 36 years.

PROFESSIONAL AFFILIATIONS:

- American Water Works Association
- Member AWWA Water Well Standards Committee
- American Society of Civil Engineers
- National Water Well Association
- Orange County Water Association
- Association of Special Districts – San Bernardino County

- American Institute of Hydrology
- Member Industry Advisory Committee – USC Department of Civil and Environmental Engineering

EXPERT / BLUE RIBBON PANELS / PEER REVIEW:

Independent Advisory Panel – IEUA, Recycled Water Recharge/NWRI
Expert Panel/NWRI/CDPH BDOC - Biodegradable Dissolved Organic Carbon (BDOC) as a suitable alternative surrogate to Total Organic Carbon (TOC) to assess the removal of unregulated wastewater-derived organics from recycled water to be used for groundwater recharge.
Peer Review – Riverside Arlington Ground Water Model-City of Riverside
Peer Review USGS Bunker Hill Basin Ground Water Model - USGS
Peer Review USGS Ground Water Flow Model of Beaumont Storage Unit, BCVWD
Peer Review of flow model developed for the Santa Clara Valley Water District.
Head of Taskforce for a Ground Water Model which included input from the USGS, Stetson Engineers, Rancho California Water District, the United States Marines at Camp Pendleton, and the Riverside County Watermaster.
Peer Review Orange County Water District Ground Water Model – Irvine Ranch Water District
Peer Review of a Ground Water Surface Model for the Monterey County Water Resources Agency.
Peer Review of Tetra Tech/Coachella Valley Water District and the Imperial Valley Irrigation District-Salton Sea Ground Water Model
Ground Water Replenishment System Expert Panel – Orange County Water District
Member of the Upper Santa Clara River Chloride TMDL Technical Advisory Panel
West Basin Expert Panel – Injection of 100% Recycled Water into the West Coast Basin Barrier
Salinas Valley -- White Paper Expert Panel - Monterey County Water Resources Agency
Azusa Landfill Taskforce – Head of MWD's Technical Team

PROFESSIONAL RECOGNITION – AWARDS:

Mathematics (Pi Mu Epsilon)
Earth Sciences (Sigma Gamma Epsilon)
2008 National Ground Water Association's Outstanding Ground Water Project Award for the Beaumont Cherry Valley Water District Recharge and Recreation Facility Project

2004 Research Achievement Award from the California Water Environment Association (Desert and Mountain Section) for the pilot scale artificial recharge testing of the Big Bear Area Regional Wastewater Agency's Recycled Water Artificial Recharge and Recovery Study
The Association of American Publishers' Honorable Mention in the Engineering Category of the Fifteenth Annual Awards for Excellence in Professional and Scholarly Publishing awarded to Dr. Williams in 1991 for his authorship of the Handbook of Ground Water Development (John Wiley & Sons, 1990)

TRAINING SEMINARS:

Well Design, Training Seminar for Webb Associates, September 2011
City of

Well Design, California Water Service Company Employees, San Jose, California. April 18 19, 2002 and June 8-9 2005.

Basic Geohydrology, Los Angeles Regional Water Quality Control Board. July 30, 1997.
Ground Water Development, Government of Vietnam, Hanoi. March 14-16, 1996.

PROFESSIONAL EXPERIENCE:

1978 to Present - Founder and President, GEOSCIENCE Support Services, Inc.
2001 to Present - Part-time Research Professor in Civil and Environmental Engineering Department, University of Southern California
1980 to 2001 - Part-time Instructor in Civil and Environmental Engineering and Earth Sciences Departments, University of Southern California, Los Angeles, California
1977 to 1980 - Consultant to the United Nations UNDP, United Nations Development Programme, India
1976 to 1978 - Special Advisor to the Ministry of Energy, Government of Iran, Iran
1973 to 1978 - Chief Hydrologist / General Manager, Agro-Water Consulting Engineers, Iran
1971 to 1973 - Project Manager, Louis Berger International Inc., Iran
1972 to 1974 - Special Consultant to the United Nations UNDP, United Nations Development Programme, India
1968 to 1971 - Engineering Geologist / Hydrologist, Los Angeles Department of Water and Power, Los Angeles, California
1970 - Instructor in Civil Engineering Department

Part-time Instructor in Hydraulic Engineering, Water Supply Engineering, Engineering Hydrology and Water Quality, California State Polytechnic University, Pomona, California
1966 to 1968 - Graduate Research Assistant, New Mexico Institute of Mining and Technology, Socorro, New Mexico
1965 to 1966 - Civil Engineering Assistant, Los Angeles Department of Water and Power, Los Angeles, California
1962 to 1965 - Graduate Research Assistant, New Mexico Institute of Mining and Technology, Socorro, New Mexico

PROFESSIONAL PUBLICATIONS:

- Author of Ch. 14, Slant Well Intake Systems: Design and Construction, Chapter in Book Intakes and Outfalls for Seawater Reverse Osmosis, Editor, Tom Missimer, et al., to be published end of 2014
- Chief Reviewer and author for the American Society of Civil Engineers International Manual on Well Hydraulics. Primary author for two chapters, Water Well Construction, and Developing and Testing, and of Appendix in Example of Water Well System Design. July, 2014.
- Desalination And Groundwater Subsurface Intakes, Groundwater Law An American Groundwater Trust Conference, Marina Del Rey May 2014
- Subsurface Intakes – Latest Developments In Slant Well Technology, AWWA/AMTA Membrane Conference, March 2014
- Drawdown Distribution in the Vicinity of Nonvertical Wells, Ground Water, Vol 51, No 5, Sep-Oct, 2013
- Hydraulic Fracturing Practices and Concerns, Inland Counties Water Association Meeting, November 13, 2013
- Elimination Of Desalination Pre-Treatment Using A Slant Well Feed water Supply, AWWA, Source, 2012
- Design of Slant and Vertical Wells for Desalination Feed water Supply, IDA, Perth, AUS, Sep 2011
- Understanding Well Efficiency, AWWA, Nov 2010
- Is now the time and is it worth it – Well Rehab, AWWA, Nov 2010
- Slant Well Application for Desalination Intake, AWWA, Mar 2010
- Subsurface Intake Feasibility, USTDA-Chilean Gov., Mar 2010
- Well Rehabilitation: Is It Time? Is It Worth It? Paper presented at American Ground Water Trust, Lakewood, CA, 2-Oct-08. Presentation on why and when well rehabilitation should be considered.
- Well Siting and Design, University of California at Riverside, Extension Geology Continuing Education Series Groundwater and Related Issues, March 10, 2007

- Results of Drilling, Construction, Development and Testing of Dana Point Ocean Desalination Project Test Slant Well. Article, NGWA Horizontal Wells Newsletter, Jan 2007
- Use of Wells to Provide Water for Seawater Desalination Systems. Paper presented at 15th annual GRA meeting San Diego, CA, 22-Sep-06.
- Well Rehabilitation: Is It Time? Is It Worth It? Paper presented at AWWA CA-NV, May 17, 2005 in Lakewood, California. Presentation on why and when well rehabilitation should be considered.
- The Encyclopedia of Water. Contributor for three entries in the Encyclopedia, Radial Wells, Well Tests, and Well Screens. To be published by John Wiley and Sons in 2005.
- Dealing with Emerging Ground Water Contaminants: An Engineer's Perspective. Presented at Confirming Legal Education for Water Law Professionals, sponsored by the Association of California Water Agencies, September 22-23, 2004.
- Pilot Study to Determine the Feasibility of Artificial Recharge of Recycled Water in Surface Spreading Basins. Paper presented at the 11th Biennial Symposium on Ground Water Recharge, Arizona Hydrological Society, Salt River Project, U.S. Water Conservation Laboratory and Arizona Department of Water Resources, June 5-7, 2003, Tempe, Arizona
- Author Groundwater Pumping Methods in the Encyclopedia of Water Science. July 2003.
- Natural Recharge in the Cadiz Area, San Bernardino County, California. Paper presented at and published in the Symposium Proceedings of the Natural Recharge of Groundwater Symposium, sponsored by the Arizona Hydrological Society, Arizona Department of Water Resources, Salt River Project, U.S. Water Conservation Laboratory of USDA-ARS, and U.S. Geological Survey. June 2000, Tempe, Arizona. Presentation on the methods used to determine a range of recharge estimates for the Fenner Basin.
- The Cadiz Ground Water Storage and Dry-Year Supply Program.
  - Paper presented at the Annual Fall Conference California-Nevada Section of the AWWA. October 1999, San Diego, California.
  - Paper presented at the Innovations in Artificial Recharge Conference, Association of Ground Water Agencies, American Ground Water Trust. May 2000, Ontario, California.
  - Presentation of Pilot Recharge test results of the Cadiz project, a Metropolitan Water District Recharge and Recovery Program involving storage and retrieval of up to 150,000 acre-ft/yr via a 30 mile pipeline from the Colorado River Aqueduct.
- Field and Laboratory Research on Well Rehabilitation. Paper presented at the Water Well Maintenance and Rehabilitation Seminar, California-Nevada Section of the AWWA. May 1999.

- Well Rehabilitation: Is It Time? Is It Worth It? Paper presented at AWWA CA-NV, May 26, 1999 in Lakewood, California (also at AWWA Stockton May 1998). Presentation on the many facets of water well rehabilitation and an overview of why rehabilitation should be considered, what types of rehabilitation methods are available, and how to decide if rehabilitation is an appropriate step in any given situation.
- Corrosion Field Test of Steels Commonly Used in Well Casing and Screen. Paper presented at AWWA CA-NV. May 27, 1999. Lakewood, California.
- Training Seminar on Basic Geohydrology. Presented to the Los Angeles Regional Water Quality Control Board. July 1997.
- Modern Techniques in Ground Water Management. Paper presented at the AWWA Annual Conference. 1997. Atlanta, Georgia.
- International Study on Relining. 84 Case Studies. 1997. Paper prepared for court testimony in international arbitration. Unpublished until case is resolved.
- Seminar on Ground Water Development. Presented to the Government of Vietnam. Hanoi, Vietnam. March 1996.
- Pilot-Scale Field Test to Determine Pathogen Removal Beneath an Artificial Recharge Basin. Paper ASCE International Symposium on Artificial Recharge of Ground Water. July 17 22, 1994.
- Sea-Water Intrusion into Pleistocene Aquifers in the Dominguez Gap Area of Southern California. South Coast Geological Society. Fall 1992.
- Author of five chapters Handbook of Ground Water Development. Published by John Wiley and Sons, New York. January 1990. (Author of Chapters: Ground Water Movement, Hydraulics of Wells, Well and Aquifer Evaluation from Pumping Tests, Ground Water Management, and Artificial Recharge).
- Ground Water Modeling in the Orange County Area. Geological Society of America Guidebook. Hydrogeology of Southern California, Cordilleran Section, 82nd Annual Meeting. March 25 28, 1986.
- Modern Techniques in Water Well Design. Journal of the AWWA. September 1985.
- Computer Assisted Ground Water Management in Orange County, California. Presented at the American Society of Civil Engineers National Conference on Environmental Engineering. June 25 27, 1984. Los Angeles, California.
- Conjunctive Use and Ground Water Management in Orange County California. Paper presented at the NWWA Western Regional Ground Water Management Conference. October 24, 1983.
- The Well/Aquifer Model-Initial Test Results. Published by the Roscoe Moss Company. 1981. Los Angeles, California.
- The Dashte-Naz Ground Water Barrier and Recharge Project. Presented at the Third National Ground Water Quality Symposium. Las Vegas, Nevada.

September 1976. Also published in Ground Water. January-February 1977.

- Digital Computer Models and Ground Water Basin Management. Presented at the International Symposium on Development of Ground Water Resources, sponsored by I.H.D. November 1973. Madras, India.
- Gasoline Pollution of a Ground Water Reservoir. A paper presented at the First National Ground Water Quality Symposium. August 1971. Also published in Ground Water. Nov Dec 1971.
- Modern Techniques in Ground Water Studies. A paper presented at the 91st Annual Conference of the AWWA. June 1971. Also published in the Journal of the AWWA. July 1971.
- Ground Water Development and Management in the Owens Valley. Presented at the 90th Annual Conference of the AWWA. October 1970.
- Ground Water Basin Management. A paper presented at the California Section Meeting AWWA. September 1970. (Consulting Engineers Panel).
- Use of Alluvial Faults in the Storage and Retention of Ground Water. A paper presented at the Annual Fall Meeting of the AGU. December 1969. Also published in Ground Water. September October 1970.
- Management of Gasoline Leaks - A Positive Outlook. A paper presented at the NWWA Seventh National Ground Water Quality Symposium. Sep 27, 1984. Las Vegas, Nevada.
- Geohydrologic Investigation of the Owens Valley Ground Water Reservoir.
- Ph.D. Dissertation. New Mexico Institute of Mining and Technology. June 1969.
- Viscous-Model Study of Ground Water Flow in a Wedge-Shaped Aquifer. Water Resources Research, Volume 2, Third Quarter 1966.
- Cenozoic Rocks of Socorro Valley and Vicinity. New Mexico Geologic Society Guidebook. 1963.

PROFESSIONAL PRESENTATIONS AND TRAINING SEMINARS:

- Well Siting and the Prediction of Well Performance. Ground Water Wells and Pumping Efficiency Workshop, California-Nevada Section AWWA, November 4, 2009.
- Subsurface Intake System Feasibility. Alden Desalination Intake/Outfall Workshop. El Segundo, California. October 15, 2009.
- Slant Wells and Other New Techniques in Well Design. Association of San Bernardino County Special District. September 28, 2009.
- Use of Slant Water for Desalination Feed water Supply – Case Study Dana Point. Pre-Conference Membranes for Water Treatment: Federal and State Research Advances. American Membrane Technology Association Conference. July 13, 2009.

- Well Design Construction, Development and Testing Training Seminar. City of Torrance, Engineering Division, Public Works Department. February 25, 2009.
- Overview of the Dana Point Desalination Project, GRA Southern Branch, San Juan Capistrano, CA, May 14, 2008
- Impacts of Implementing the Proposed SARWQCB Resolution on Conjunctive Use in the San Bernardino Basin Area, 2006 Water Policy & Law Briefing, July 20, 2006
- Well Design Training Seminar. Conducted a 1½ day Well Design Seminar for California Water Service Company employees that operate wells throughout the State of California. June 8-9 2005. San Jose, California.
- Pumping Tests and Data Analysis. Paper presented at the America Water Works Association California – Nevada Section Well Design & Construction Seminar. May 1, 2002. Lakewood, California.
- Well Design Training Seminar. Conducted a two-day Well Design Seminar for California Water Service Company employees that operate wells throughout the State of California. April 18 19, 2002. San Jose, California.
- Natural Recharge in the Cadiz Area, San Bernardino County, California. Paper presented at and published in the Symposium Proceedings of the Natural Recharge of Ground Water Symposium, sponsored by the Arizona Hydrological Society, Arizona Department of Water Resources, Salt River Project, U.S. Water Conservation Laboratory of USDA-ARS, and U.S. Geological Survey. June 2, 2000. Tempe, Arizona. Presentation on the methods used to determine a range of recharge estimates for the Fenner Basin.
- The Cadiz Ground Water Storage and Dry-Year Supply Program.
  - Paper presented at the Innovations in Artificial Recharge Conference, Association of Ground Water Agencies and the American Ground Water Trust. May 4-5, 2000. Ontario, California.
  - Paper presented at the Annual Fall Conference California-Nevada Section of the AWWA. October 27, 1999. San Diego, California.
- Presentation of Pilot Recharge test results of the Cadiz Project, a Metropolitan Water District Recharge and Recovery Program involving storage and retrieval of up to 150,000 acre-ft/yr via a 30 mile pipeline from the Colorado River Aqueduct.
- Paper presented at the Innovations in Artificial Recharge Conference, Association of Ground Water Agencies and the American Ground Water Trust. May 4-5, 2000. Ontario, California.
- Paper presented at the Annual Fall Conference California-Nevada Section of the AWWA. October 27, 1999. San Diego, California.
- Field and Laboratory Research on Well Rehabilitation. Paper presented at the Water Well Maintenance and Rehabilitation Seminar, California-Nevada Section of the AWWA. May 27, 1999.

- Corrosion Field Test of Steels Commonly Used in Well Casing and Screen. Paper presented at the Water Well Maintenance and Rehabilitation Seminar, California-Nevada Section, American Water Works Association. May 27, 1999. Lakewood, California.
- Dr. Williams was the keynote speaker at the Water Well Maintenance and Rehabilitation Seminar, California-Nevada Section, American Water Works Association in May 1998 (AWWA in Stockton) and May 1999 Workshop (AWWA in Lakewood), and presented the paper entitled "Well Rehabilitation: Is It Time? Is It Worth It?" The presentation discussed the many facets of water well rehabilitation including an overview of why rehabilitation should be considered, what types of rehabilitation methods are available, and how to decide if rehabilitation is an appropriate step in a given situation.
- In 1997, Dr. Williams conducted an International Study on Relining. Eighty-four case studies were gathered and analyzed. A paper was prepared for court testimony in international arbitration, aimed at educating the Tribunal in methods of rehabilitation for large-capacity water wells. The paper remains unpublished until the case is resolved. The case involved 126 wells in northern Africa, 60 of which have failed due to corrosion. Dr. Williams also prepared a rehabilitation plan for the entire well field.
- Training Seminar on Basic Geohydrology. Presented to the Los Angeles Regional Water Quality Control Board. July 30, 1997.
- Modern Techniques in Ground Water Management. Paper presented at the Annual Conference, American Water Works Association. June 19, 1997. Atlanta, Georgia.
- A Case Study of Unprecedented Well Failures and Rehabilitation Efforts. Paper presented at the Well Construction, Operation, and Rehabilitation Seminar, American Water Works Association. September 20, 1996.
- Seminar on Ground Water Development. Presented to the Government of Vietnam. March 14 16, 1996. Hanoi, Vietnam.
- Aquifer Pump Tests and Data Analysis. Presented at the California-Nevada Section Water Well Construction Workshop, American Water Works Association. March 22, 1995.
- Pilot-Scale Field Test to Determine Pathogen Removal Beneath an Artificial Recharge Basin. Presented at the Second International Symposium on Artificial Recharge of Ground Water, American Society of Civil Engineers. July 17 22, 1994.
- Seawater Intrusion into Pleistocene Aquifers in the Dominguez Gap Area of Southern California. Paper presented to the South Coast Geological Society. August 1992.
- Ground Water Modeling in the Orange County Area. Paper presented at the Cordilleran Section, 82nd Annual Meeting, Geological Society of

America Guidebook. Hydrogeology of Southern California. March 25-28, 1986.

- Management of Gasoline Leaks - A Positive Outlook. A paper presented at the NWWA Seventh National Ground Water Quality Symposium. September 27, 1984. Las Vegas, Nevada.
- Computer Assisted Ground Water Management in Orange County, California. Presented at the National Conference on Environmental Engineering, American Society of Civil Engineers. June 25-27, 1984. Los Angeles, California.
- Conjunctive Use and Ground Water Management in Orange County, California. Paper presented at the Western Regional Ground Water Management Conference, National Water Works Association. October 24, 1983.
- Seminar on Ground Water Development. Presented to the Asian Institute of Technology. Bangkok, Thailand. 1980.
- The Dashte-Naz Ground Water Barrier and Recharge Project. Presented at the Third National Ground Water Quality Symposium. September, 1976. Las Vegas, Nevada. Also published in Ground Water. January-February 1977.
- Digital Computer Models and Ground Water Basin Management. Presented at the International Symposium on Development of Ground Water Resources, sponsored by I.H.D. November 1973. Madras, India.
- Gasoline Pollution of a Ground Water Reservoir. A paper presented at the First National Ground Water Quality Symposium. August 1971. Also published in Ground Water. November December 1971.
- Modern Techniques in Ground Water Studies. A paper presented at the 91st Annual Conference, American Water Works Association. June 15, 1971. Also published in Journal of the American Water Works Association. July 1971.
- Ground Water Development and Management in the Owens Valley. Presented at the 90th Annual Conference, American Water Works Association. October 1, 1970.
- Use of Alluvial Faults in the Storage and Retention of Ground Water. A paper presented at American Geophysical Union National Fall Meeting. December 15-18, 1969. Also published in Ground Water, Vol. 8, No. 5. September-October 1970.
- Ground Water Basin Management. A paper presented at the California Section Meeting AWWA. September 1970. (Consulting Engineers Panel).

PROFESSIONAL EXPERIENCE – DETAILED:

GEOSCIENCE Support Services, Inc., Claremont, California
January 1978 to Present. Founder and President of GEOSCIENCE Support Services Inc., a California Corporation specializing in geohydrologic studies leading to development and management of ground water resources. GEOSCIENCE's client list includes most of the major Water Districts and agencies in the Southern California area, as well as clients in South America, Europe, and the Middle and Far East). Dr. Williams has also served as an expert witness on numerous legal issues (including arbitration, mediation, and court trials) for both domestic and international clients.

UNIVERSITY OF SOUTHERN CALIFORNIA, Civil and Environmental Engineering Department, Los Angeles, California
August 2001 to Present. Part-Time Research Professor. Currently teaching graduate-level class in geohydrology and directing research at USC's geohydrology laboratory related to well design and rehabilitation.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, California
Civil and Environmental Engineering and Earth Sciences Departments
1980 to August 2001. Part-time Instructor. Taught graduate-level classes in geohydrology and ground water modeling.

UNITED NATIONS DEVELOPMENT PROGRAMME, India
November 1979 to November 1980 - Consultant to the United Nations (UNDP). Expert member of a UNDP team sent to Madras, India to develop a conjunctive use water supply plan designed to meet the needs of the City of Madras until the year 1990 (population: 8 million).

UNITED NATIONS DEVELOPMENT PROGRAMME, India
September 1977 to October 1978. Consultant to the United Nations Development Programme (UNDP). Retained as a ground water modeling expert on a team of UNDP experts conducting a feasibility study on the Ghaggar River Basin (Northwest India). Project responsibilities included evaluation of raw data and direction of local Indian Government personnel in the gathering, reduction and organization of data necessary to construct a digital computer ground water model of the Ghaggar River Basin.

CONSULTANT TO THE GOVERNMENT OF IRAN, Iran
March 1976 to March 1978. Special advisor to the Ministry of Energy, Government of Iran on hydrological problems involving water resources

evaluation and development. Directed teams of Iranian government personnel in the conduct of feasibility investigations of various basins for purposes of total water resources development. Also provided guidance in development of a computer database for the collection, organization, storage and retrieval of hydrologic data.

AGRO-WATER CONSULTING ENGINEERS, Tehran, Iran
July 1973 to November 1978. Chief Hydrologist/General Manager. In charge of managing the activities of a consulting engineering firm specializing in planning, design and supervision of construction of large-scale irrigation project development. Specific duties included technical and administrative duties for feasibility, final design and supervision of construction and management for irrigation development projects in Iran. Set up a complete mini-computer center for engineering and management computer programs. Directly supervised 30 civil engineers and various other technical personnel as required on various irrigation projects (geologists, hydrologists, soil mechanics experts, surveyors, agronomists and planners).

Designed an advanced supervisory control system for the Dashte-Naz Project incorporating modern telemetering/telecontrol equipment to monitor and control surface and ground water resources of a 6,000-acre irrigation project in Northern Iran.

Incorporated into this project was the first ground water barrier project in Iran, a pilot project that prevented salt-water encroachment by means of a ground water pressure ridge.

Planned and supervised ground water development projects in Karstic limestone areas of Northern and Western Iran. Planned and supervised teams involved in the ground water exploration and development of the limestone formations for municipal and agricultural supplies in Southwest Iran.

LOUIS BERGER INTERNATIONAL INC., Tehran, Iran
July 1971 to July 1973. Project Manager in charge of project management and supervision for the Gorgan area project, a one million acre irrigation project in Northeast Iran. Work involved coordinating and supervising the efforts of geologists, civil engineers, hydro-agronomists, economists, and various other scientific and technical personnel. Specifically, the project was oriented toward producing feasibility designs upon which the government could economically justify funds for large-scale agriculture and animal husbandry development (surface and ground water), optimized using modern computer techniques for maximum development of irrigated agriculture, animal husbandry and agro-business.

UNITED NATIONS DEVELOPMENT PROGRAMME, India

October 1972 to September 1974. Special consultant to the United Nations Development Programme (UNDP). UNDP Expert responsible for direction and coordination of work by United Nations and local personnel in India in connection with development and testing of a digital computer model of the Gujarat ground water reservoir.

LOS ANGELES DEPARTMENT OF WATER AND POWER, Los Angeles, California
July 1968 to July 1971. Engineering Geologist/Hydrologist. Planned and directed geologic and hydrologic studies in the Los Angeles and Owens Valley areas with regard to the amount and disposition of surface and ground water resources available for supply to the City of Los Angeles. Supervised engineering personnel and various construction and technical personnel in geologic and hydrologic investigations. Initiated and coordinated programs involving well drilling, aquifer testing and analysis, and ground water quality monitoring and cleanup.

Developed master plan for optimum basin development and management in the Owens Valley area involving digital computer model simulation. Applied analytical methods to evaluate ground water quantity and quality problems in the Los Angeles area.

Conducted various engineering geology studies including slope stability analyses, foundation and site studies and various tunnel investigations.

Designed injection well barrier for control of a gasoline contaminated ground water reservoir near Los Angeles. Built a model of the system to test analytical and field results of the two-fluid flow regime (gasoline and water).

CALIFORNIA STATE POLYTECHNIC UNIVERSITY Pomona, California
January to June 1970
Instructor in Civil Engineering Department. Part-time instructor in Hydraulic Engineering, Water Supply Engineering, Engineering Hydrology and Water Quality.

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY (NMIMT), Socorro, New Mexico
September 1966 to July 1968. Graduate Research Assistant. Worked for the Research and Development Division of NMIMT while attending graduate school. Involved on both model and field-testing of using air injection into ground water reservoirs as an effective means of combating salt-water encroachment. Built viscous-flow model of the system. Field-tested theory using a compressor-tank system into wells drilled by students with school rotary drilling rigs.

Involved in complete water resources study of the Pecos Basin of Southwest New Mexico.

Developed and tested an automatic water-level recording device based on a strain gage transducer coupled to a simple bridge circuit and displayed on a strip chart recorder. Also participated in the design of an experimental borehole-sampling gun powered by an explosive charge designed to take fast, undisturbed samples in the bottom of a well.

LOS ANGELES DEPARTMENT OF WATER AND POWER, Los Angeles, California June 1965 to September 1966. Civil Engineering Assistant. Initiated and planned exploration program for water resources development in the Owens Valley area. Supervised drilling and testing operations of exploratory wells in conjunction with development of a supplemental ground water supply to the Los Angeles Aqueduct System. Worked on ground water management models in the Los Angeles area involving well drilling, aquifer testing and data analysis. Assisted in water quality investigations in the Los Angeles area. Worked on bank storage problems in many of the city reservoirs. Helped formulate operational regimens incorporating flood routing.

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY, Socorro, New Mexico June 1962 to June 1965. Graduate Research Assistant. Half time work for Research and Development Division. Involved in thermal water studies of New Mexico. Constructed various models (sand, viscous flow), of complex hydrologic systems. Conducted aquifer tests and geologic field mapping in Central New Mexico.