

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

In the Matter of)
)
HYDRO RESOURCES, INC.)
2929 Coors Road, Suite 101)
Albuquerque, NM 87120)

Docket No. 40-8968-ML
ASLBP No. 95-706-01

AFFIDAVIT OF MARYANN WASIOLEK AND MICHAEL P. SPINKS, P.E.

Maryann Wasiolek, geohydrologist, and Michael P. Spinks, P.E., being first duly sworn upon their oath, state and declare under penalty of federal law the following:

1. Maryann Wasiolek and Michael P. Spinks are the principals of Hydrosience Associates, Inc., a consulting firm specializing in providing expert geohydrologic services, ground-water modeling, and water rights advice to both the public and private sectors.
2. Ms. Wasiolek is a geohydrologist with 18 years of experience in hydrology and geohydrology. She holds a Masters Degree in hydrology from the New Mexico Institute of Mining and Technology (1981), and a Bachelors Degree in geology and english from Bucknell University (1976).
3. Ms. Wasiolek worked as a Water Resources Engineer in the Hydrology division of the New Mexico State Engineer Office for six and a half years. Her duties there included performing ground and surface water studies and analyses, constructing computer models of ground water systems, and coordinating the technical aspects of litigation.

4. Ms. Wasiolek has testified as an expert witnesses in ground-water hydrology, hydrogeology, geohydrology, and geohydrologic modeling in New Mexico State Engineer administrative proceedings, in New Mexico District Court, and before a United States Supreme Court Special Master in Texas v. New Mexico, No. 65, Original. She has also provided litigation support in Federal District Court, and in the U.S. Supreme Court in Nebraska v. Wyoming, No. 108, Original.

5. Mr. Spinks is a registered professional engineer with 22 years of experience in the field of ground-water hydrology. He holds Bachelors degrees in mathematics (1974) and civil engineering (1976) from the University of New Mexico.

6. Mr. Spinks worked as a Water Resources Engineer in the Hydrology division of the New Mexico State Engineer Office for twelve years. His duties there included performing ground and surface water studies and analyses, constructing computer models of ground water systems, and developing hydrologic systems software. He was in charge of the geohydrologic analyses and review of consultants' reports for all applications for permits to appropriate groundwater and for all applications for mine dewatering permits in the San Juan Structural Basin from 1979 through 1988. Mr. Spinks is very familiar with the geohydrology of the San Juan Structural Basin and the literature pertaining to it.

7. Mr. Spinks has testified as an expert witnesses in ground water hydrology and geohydrologic modeling in New Mexico State Engineer administrative proceedings, has provided litigation support in New Mexico District Court and Federal District Court, and has provided extensive litigation support and testified as an expert witness before a United States Supreme Court Special Master in Texas v. New Mexico, No. 65, Original. He has also provided litigation support in the U.S. Supreme Court in Nebraska v. Wyoming, No. 108, Original.

8. Hydrosience Associates, Inc., of which we are the principals, was retained by Simms & Stein, P.A., and HRI in March of 1996. We created a regional three-dimensional groundwater flow model of the Westwater Canyon Member through the Dakota Sandstone

section of the San Juan Structural Basin which was presented before the New Mexico State Engineer in a hearing on HRI's Application for Permit No. G-11. We are very familiar with the published and unpublished information concerning the geology and hydrology of the San Juan Basin of northwestern New Mexico.

9. We have reviewed pages 10 through 14 and 38 through 42 of the written testimony of Michael G. Wallace on behalf of the Eastern Navajo Dine' Against Uranium Mining and the Southwest Research and Information Center, dated January 8, 1999, concerning ground water issues regarding HRI's "amended application for a source materials license".

10. We find that Mr. Wallace's Written Testimony contains unfounded assumptions about the hydrogeologic nature of the Westwater Canyon Member of the Morrison Formation:

a) With respect to calculation of groundwater travel time through the Westwater Canyon Member of the Morrison Formation Mr. Wallace's analysis assumes that the Westwater Canyon Member is composed of what is primarily a matrix of very low permeability materials such as siltstones or clays within which a single sand channel acts as a "buried pipeline" through which the groundwater flows to the Crownpoint town wells;

b) In Mr. Wallace's analysis of groundwater travel time from the Unit 1 mine site to the center of the main Crownpoint municipal wells, he assumed that a discrete sand channel 100 feet in width directly connects the eastern edge of the Unit 1 mine site to the center of the main Crownpoint municipal wells approximately 13,200 feet (2.5 miles) away;

c) Mr. Wallace assumes that the 100 foot wide sand channel is the only source of water to the Crownpoint municipal wells.

11. Mr. Wallace attempts to characterize the Westwater Canyon Member as composed of low permeability siltstones or clays containing laterally discontinuous "pipelines" of sandstone (Written Testimony, p. 10-14, 38-42). In support of this characterization, he cites an article by Kirk and Condon, 1995, at p. 111, and provides the following quote:

The Westwater Canyon Member was deposited by composite systems of moderate- to high-energy braided streams. This braided character of the streams

is recognized...by the tabular to lenticular geometry and stacking of sandstone beds.

In actuality, this quote is inaccurate. Mr. Wallace has omitted the part of the sentence which makes it clear that mudstone is a minor part of the Westwater Canyon, which is mostly sandstone. The actual quote is as follows:

The Westwater Canyon Member was deposited by composite systems of moderate- to high- energy braided streams (Turner-Peterson, this volume). The braided character of the streams is recognized...by the tabular to lenticular geometry and stacking of sandstone beds, **and by the minor amount of interbedded mudstone.**

Kirk and Condon, 1986 (reprinted 1995), *Structural Control of Sedimentation Patterns and the Distribution of Uranium Deposits in the Westwater Canyon Member of the Morrison Formation, Northwestern New Mexico-A Subsurface Study*, p. 111.

12. Typical descriptions of the Westwater Canyon Member from the professional literature are as follows:

The Westwater Canyon Member of the Morrison Formation (Figure 3) is a sequence of vertically stacked and laterally coalesced sandstone beds interbedded with thin, laterally discontinuous mudstone beds.

Kirk and Condon, 1986 (reprinted 1995), p. 111.

The Westwater Canyon Member of the Morrison typically forms ledgy cliffs or grit-covered slopes (Figure 18). It is composed of red, reddish-gray, or yellowish-gray, fine- to very coarse-grained, locally conglomeratic, poorly sorted, and firmly cemented to friable feldspathic sandstone. Bedding is very thin to very thick; sedimentary structures include trough and tabular-planar crossbeds, and horizontal laminations (Turner-Peterson, this volume). Locally the Westwater Canyon contains lenses of reddish-brown to greenish-gray siltstone and mudstone.

Condon and Peterson, 1986 (reprinted 1995), *Stratigraphy of the Middle and Upper Jurassic Rocks of the San Juan Basin: Historical Perspective, Current Ideas, and Remaining Problems*, p. 22.

These descriptions are typical for the Westwater Canyon Member and describes a hydrogeologic environment in which the sandstones are generally laterally connected as opposed to being separated by lateral barriers of low permeability mudstones assumed in Mr. Wallace's

analysis of "buried pipelines". Mr. Wallace's assumption that the Westwater Canyon Member of the Morrison Formation is characterized by sandstone "channels" which are laterally bounded, resulting in "buried pipelines," is inconsistent with the published literature.

13. Neither of us have ever encountered any characterization of the hydrogeology of or ground-water flow within the Westwater Canyon Member in the professional literature regarding the hydrogeology of and/or groundwater flow modeling of the Westwater Canyon Member by the U.S. Geological Survey or others which is as represented by Mr. Wallace's groundwater travel time analysis.

14. In our professional opinions Mr. Wallace's analysis of groundwater travel times from the Unit 1 mine site to the Crownpoint municipal wells through the Westwater Canyon Member is severely flawed by his mischaracterization of the hydrogeologic nature of the Westwater Canyon Member.

15. This statement is made by Michael P. Spinks and Maryann Wasiolek of Hydrosience Associates, Inc., individually and together under penalty of perjury, as provided by federal law. Further, the affiants sayeth naught.

Dated this 16th day of February, 1999.

 _____ Maryann Wasiolek

Subscribed and sworn to before me this 16th day of February, 1999

 _____ Notary Public

My commission expires: 08.14.02

(SEAL)



OFFICIAL SEAL
Antoinette D. Moya
NOTARY PUBLIC—STATE OF NEW MEXICO
My commission expires: 08.14.02

[Handwritten signature]

Michael P. Spinks, P.E.

Subscribed and sworn to before me this 16th day of February, 1999

[Handwritten signature: Antoinette D. Moya]

Notary Public

My commission expires: 08.14.02

(SEAL)



OFFICIAL SEAL
Antoinette D. Moya
NOTARY PUBLIC—STATE OF NEW MEXICO
My commission expires: 08.14.02

**MARYANN WASIOLEK
Geohydrologist**

Ms. Wasiolek is President of Hydrosience Associates, Inc., and a geohydrologist with 17 years of experience. Her particular expertise is in ground water modeling, water rights, analysis of hydrogeologic systems, mountain-front recharge, and coordination of technical work in litigation. She has testified as an expert witness in hydrology and geology before U.S. Supreme Court Special Master Myers in Texas v. New Mexico, No. 65, Original, in New Mexico district courts, United States District Court, before the New Mexico Mine Reclamation Bureau, and in hearings before the New Mexico State Engineer.

EDUCATION:

M.S. Hydrology 1981	New Mexico Institute of Mining and Technology Socorro, New Mexico
B.A. Geology English 1976	Bucknell University Lewisburg, Pa.

TRAINING:

Princeton Course on Groundwater Pollution and Hydrology
San Francisco, California, 1997

University of Arizona conference on low-permeability rocks
Tucson, Arizona, 1985

NATO course on the hydrology of low-permeability rocks
Wilmington, Delaware, 1984

Finite Difference and Finite Element Methods (Wang & Anderson)
University of Wisconsin at Madison, 1983

PROFESSIONAL SOCIETIES:

Association of Ground Water Scientists and Engineers
American Geophysical Union

EXPERIENCE:

Ground water Modeling: Performed numerous geohydrologic modeling studies in New Mexico and other western states using various computer codes including MODFLOW, MODLMAKR, and Trescott, Pinder & Larson. Areas modeled include the Tesuque aquifer of the Santa Fe basin (published as USGS WRIR 87-4056 by McAda and Wasiolek), the Jemez River basin, the Pinos Altos area, the upper Pecos River, the Ortiz Mountain/Galisteo basin area, the Laramie River basin in Wyoming, and a part of the North Platte River basin in Wyoming.

Technical Coordination: Managed and coordinated the technical aspects of the Mescalero sub-section of State of New Mexico ex Rel. State Engineer v. Lewis, Chaves County Causes Nos. 20294 and 22600 consolidated, for the New Mexico State Engineer Office. Assisted attorneys with trial strategy in Lewis and other cases, and facilitated the working relationship of experts and attorneys, as well as providing peer review of expert work product. Hydroscience Associates, Inc. is currently under contract to the State of Nebraska to provide numerical modeling and technical support in Nebraska v. Wyoming, No. 108, Original.

Geohydrologic Investigations: Conducted geohydrologic investigations involving aquifer test design and analysis, logging of wells, measurement of water levels in wells, field testing of water, stream flow measurement, etc., as well as critical review and analysis of published and unpublished materials, and conceptualization of the ground- and surface water systems for numerous areas in New Mexico, including the Santa Fe basin, the Roswell Artesian basin, the upper and middle Rio Grande basin, the Taos area, the Sacramento Mountains, the Rio Hondo basin, the Cimarron area, the Pecos River, and the Mimbres basin area. Current investigations involve the Laramie River Basin in Wyoming, the North Platte River Basin in Wyoming, and the Lower Rio Grande Basin in New Mexico.

Water Rights: Provided expertise and advice pertaining to the establishment, supplementation, and transfer of water rights in New Mexico to both private individuals and public entities, including the New Mexico State Engineer Office. Currently involved in analyzing the technical basis for the allocation of water among Nebraska, Wyoming, and Colorado by the 1945 North Platte Decree (Nebraska v. Wyoming, No. 6, Original).

Geohydrologic Data Base Development: Designed and implemented a data base of wells and irrigation systems in the North Platte River Valley in Wyoming. Designed a data base format for a document data base of technical and legal materials in Nebraska v. Wyoming, No. 108, Original.

Mountain-Front Recharge: Performed an evaluation of the amount of mountain-front recharge contributed from the Sangre de Cristo Mountains in the vicinity of Santa Fe to the Tesuque Aquifer in the Santa Fe basin. A combination of water balance techniques and computer modeling was used. (Published as USGS Water Resources Investigations Report 94-4072.)

EMPLOYMENT HISTORY:

Employer: Hydrosience Associates, Inc.
Dates: 1993-Present
Title: President

Employer: Hydrogeologic Consultant, Self Employed
Dates: 1988-1993
Title: Owner

Employer: Office of the New Mexico State Engineer
Dates: 1982-1988
Title: Water Resource Engineer

Employer: Geoscience Consultants, Ltd.
Dates: 1979-1982
Title: Vice President

Employer: New Mexico Institute of Mining and Technology and
New Mexico Bureau of Mines and Mineral Resources
Dates: 1979-1981
Title: Graduate Research Assistant

Employer: Evans' Exploration
Dates: 1978
Title: Contractor

EXPERT TESTIMONY:

- 1998 HRI, Inc. application for transfer of water rights from United Nuclear Corporation's Northeast Churchrock mine and mill site to a proposed in-situ uranium leach operation under Application G-11-A.
- 1997 Alta Gold, Inc. applications for mine permit and variance at the proposed Copper Flat Mine, Sierra County, New Mexico. New Mexico Mining Act Reclamation Bureau hearing.
- 1995 Application No. 02709 into RG-60418 and RG-56960. New Mexico State Engineer hearing.
- 1993 State of New Mexico ex Rel. State Engineer v. Lewis (Chaves County Causes Nos. 20294 and 22600 consolidated) Corn relation-back case.
- 1991/1992 El Prado Water and Sanitation District Application to transfer water from surface to underground use (Nos. 057, 0932 (Sub-file 9.4)-A-A; 057, 0931, (SF 9.8)-A-& A; 057, 0931, 0932, 0933, (SF 10.1, 10.1a) into RG-40450 through RG-40450-S-2). New Mexico State Engineer hearing.
- 1992 Lone Mountain Ranch Application to appropriate ground water (RG-52168, RG-52168-S, RG-52168-S-2). New Mexico State Engineer hearing.
- 1992 Pegasus Gold Corporation Application to Dewater. (RG-51887 through RG-51887-S-5 and RG-50321). New Mexico State Engineer hearing.
- 1988 United States et al. v. Abousleman et al. (U.S. District Court Cause No. CIV-83-1041 SC (Jemez, Zia and Santa Ana sub-sections).
- 1986 Texas v. New Mexico, No. 65, Original United States Supreme Court Special Master.
- 1986 State of New Mexico ex Rel. State Engineer v. Lewis (Chaves County Causes Nos. 20294 and 22600 consolidated) Mescalero sub-section.

1982-1988. Various hearings before the New Mexico State Engineer as State Engineer hydrologist.

SELECTED PUBLICATIONS AND REPORTS

Wasiolek, Maryann, 1982, Hale Spring, Lincoln County, New Mexico: New Mexico State Engineer Office Hydrologic Report.

_____ 1982, Hydrologic calculations for the Pecos adjudication, Part I: South of Ft. Sumner area: New Mexico State Engineer Hydrologic Report.

_____ 1982, Hydrologic calculations for the Pecos adjudication, Part II: Arroyo de Anil/Truches Creek area: New Mexico State Engineer Hydrologic Report.

_____ 1982, Hydrologic calculations for the Pecos adjudication, Part III: Taiban/Tolar area: New Mexico State Engineer Hydrologic Report.

_____ 1982, Hydrologic calculations for the Pecos adjudication, Part IV-A: Rio Hondo drainage basin/Rio Hondo: New Mexico State Engineer Hydrologic Report.

_____ 1982, Hydrologic calculations for the Pecos adjudication, Part IV-B: Rio Hondo drainage basin/Rio Bonito: New Mexico State Engineer Hydrologic Report.

_____ 1982, Hydrologic calculations for the Pecos adjudication, Part IV-C: Rio Hondo drainage basin/Rio Ruidoso: New Mexico State Engineer Hydrologic Report.

_____ 1983, Hydrologic evaluation of the potential effects of Villa Marika's proposed water rights transfer: New Mexico State Engineer Office Hydrologic Report.

_____ 1984, Summary of field investigations instigated to determine the effects of implementing Boliden's pending application to transfer water rights from the Lower Gila system to the Pinos Altos area: New Mexico State Engineer Office Hydrologic Report, 13 p.

_____ 1986, Hydrologic evaluation and 3-Dimensional finite-difference model of the potential effects of Boliden Mineral's dewatering permit at Pinos Altos: New Mexico State Engineer Hydrologic Report, 30 p.

- _____ 1990, A Three-dimensional finite-difference model of ground and surface water flow within the Jemez River basin, New Mexico: consultant report for the New Mexico State Engineer Office, 79 p.
- _____ 1991, The hydrogeology of the Permian Yeso Formation within the upper Rio Hondo basin and the eastern Mescalero Apache Indian Reservation, Lincoln and Otero counties, New Mexico: in New Mexico Geological Society Guidebook, 42nd Field Conference, Sierra Blanca, Sacramento, Capitan Ranges, p. 343-351.
- _____ 1991, An investigation of the hydrogeologic conditions existing within the lower drainage basin of the Rio Hondo, Chaves, Lincoln and Otero counties, New Mexico: consultant report for the New Mexico State Engineer Office, 25 p.
- _____ 1991, An investigation of the hydrogeologic conditions existing within the drainage basins of the Arroyo del Macho and Salt Creek, Chaves, Lincoln and De Baca counties, New Mexico: consultant report for the New Mexico State Engineer Office, 30 p.
- _____ 1994, Relation-back claims associated with wells in the Rio Hondo drainage basin, DeBaca, Lincoln, and Chaves Counties, New Mexico: consultant report to the New Mexico State Engineer Office, 28 p., plates.
- _____ 1994, Assessment of return flow for Karr Canyon Estates Subdivision, Otero County, New Mexico: consultant report to Joe Chambers, 21 p.
- _____ 1995, Subsurface recharge to the Tesuque aquifer system from selected drainage basins along the western side of the Sangre de Cristo Mountains near Santa Fe, New Mexico: U.S. Geological Survey Water-Resources Investigations Report 94-4072, 57 p.
- _____ 1995, Evaluation of the potential impacts of two proposed supplemental wells, Rio en Medio, Santa Fe County, New Mexico: consultant report (Hydroscience Associates, Inc.) to Gilbert Hitchcock, 10 p.
- _____ 1996, Use of hydrologic models in water rights adjudications: in *Dividing the Waters III, A dialog for judges and Masters*, 25 p.
- _____ 1997, Return for plan for the El Prado Water and Sanitation District, Taos County, New Mexico: consultant report to the New Mexico State Engineer Office on behalf of the El Prado Water and Sanitation District, 37 p.
- _____ 1997, Evidence in the original record, Nebraska v. Wyoming, No. 6, Original: consultant report to the State of Nebraska, 104 p., Appendix.

- _____ 1997, Report demonstrating return flow at Rosario Cemetary, Santa Fe, New Mexico: consultant report to the Archdiocese of Santa Fe, 17 p.
- _____ 1997, Present and future water use at Rancho del Chaparral Girl Scout Camp, Sandoval County, New Mexico: consultant report to the Chaparral Girl Scout Council, 15 p., Attachments.
- _____ 1998, Historical beneficial use of ground water under Declarations G-11 and G-11 supplemental, McKinley County, New Mexico: consultant report to HRI, Inc., 43 p.
- _____ 1998, Evaluation of the expert reports of Bern S. Hinckley, Appendices C through H: consultant report to the State of Nebraska, 51 p.
- _____ 1998, Evaluation of the expert reports of John J. Cassidy, Marvin E. Jensen, and Charles M. Brendecke: consultant report to the State of Nebraska, 61 p.
- Wasiolek, Maryann, and Gross, G.W., 1983, Hydrogeology of the upper Rio Penasco drainage basin between James and Cox Canyons, Otero County, New Mexico: New Mexico Institute of Mining and Technology Geophysical Research Center Report H-13, 122 p.
- Wasiolek, M. and Spinks, M.P., 1992, Evaluation of the effects of proposed withdrawals by Pegasus Gold Corporation / Ortiz Project JV, RG-51887 through RG-51887-S-5 and RG-50321, Santa Fe County, New Mexico: consultant report to Lone Mountain Ranch, 27 p., App.
- _____ 1992, Evaluation of the effects of proposed withdrawals by Lone Mountain Ranch under Applications RG-52168, RG-52168-S, and RG-52168-S-2, Santa Fe County, New Mexico: consultant report to Lone Mountain Ranch, 25 p., App.
- Wasiolek, M. and Spinks, M.P., (as Hydroscience Associates, Inc.), 1993, Evaluation of Midvale Irrigation District's potential impact on the water supply available to the Worland area irrigators: consultant report by Hydroscience Associates, Inc. to Simms and Stein, 11 p.
- _____ 1993, Investigation of the historically irrigated acreage of the Urraca Ranch in Colfax County, New Mexico: consultant report by Hydroscience Associates, Inc. to David Hughes, 40 p.
- _____ 1995, Geohydrologic investigation of the ground water conditions in the proposed Haciendas Tranquilas subdivision, Santa Fe County, New Mexico: consultant report by Hydroscience Associates, Inc. to Saddleback Ranch, 25

p.

- _____ 1995, Analysis of water supply available to the non-Indian portion of the Fort Hall Irrigation Project under the 1990 Fort Hall Agreement, Fort Hall, Idaho: consultant report by Hydrosience Associates, Inc. to the Fort Hall Water Users, 22 p.
- _____ 1996, Analysis of aquifer test run using Well RG-58570-Expl., Cerro San Cristobal Ranch, Taos County, New Mexico: consultant report to Cerro San Cristobal Ranch, 21 p.
- _____ 1996, Critique of Pojoaque River basin ground water models: consultant report to attorneys in United States of America. v. Abousleman., U.S. District Court Cause No. CIV-83-1041 SC, 13 p.
- _____ 1997, Evaluation of the sufficiency of hydrogeologic information and models submitted by Alta Gold in support of its mine permit application for the proposed Copper Flat Mine: consultant report to the New Mexico Environmental Law Center and the Ladder Ranch, 36 p.
- _____ 1997, Depletions to the lower Laramie River system resulting from ground-water withdrawals and the Laramie River Power Station: consultant report to the State of Nebraska, 125 p., figures, tables, graphs, Appendices, diskettes.
- McAda, D.P., and Maryann Wasiolek, 1988, Simulation of the regional geohydrology of the Tesuque aquifer system near Santa Fe, New Mexico: U.S. Geological Survey Water-Resources Investigations Report 87-4056, 71 p.
- Spinks, M.P. and Wasiolek, M. (as Hydrosience Associates, Inc.), 1997 (revised 1998), Depletions to the North Platte River resulting from ground-water withdrawals from irrigation from Whalen Dam to the Nebraska-Wyoming state line: consultant report to the State of Nebraska, 74 p., Attachments and diskettes.
- _____ 1997, Modeled effects on water-levels and surface water flows due to ground water withdrawals by HRI under Application G-11-A for operation of an in-situ uranium leach operation: consultant report to HRI, Inc., 51 p., Appendices and diskettes, plates.

Additional geohydrologic reports which are proprietary in nature have been prepared by Maryann Wasiolek or Hydrosience Associates, Inc.

**MICHAEL P. SPINKS
Hydrologist/Engineer**

Mr. Spinks is Vice-President of Hydrosience Associates, Inc., and a hydrologist and civil engineer with 21 years of experience in the water resources field. His experience includes geohydrologic investigations, geohydrologic modeling, ground water monitoring, dam-breach/flood wave modeling, water surface profile modeling, watershed runoff modeling, development of hydrologic simulation software for groundwater and surface water systems, and design of interactive-graphics based software with advanced user interfaces for use in development of geohydrologic models.

EDUCATION:

B.S.; Civil Engineering (with Distinction); University of New Mexico; Albuquerque, New Mexico; 1976

B.S.; Mathematics; University of New Mexico; Albuquerque, New Mexico; 1974

HONOR SOCIETIES:

Tau Beta Pi, National Engineering Honor Society

TRAINING:

Princeton Course on Groundwater Pollution and Hydrology
San Francisco, California, 1997

Princeton Transport Code Course - Princeton University
Princeton, New Jersey, 1986

Finite Element Modeling of Groundwater Flow - U.S. Geological Survey Course
Denver, Colorado, 1984

Advanced Modeling of Groundwater Flow - U.S. Geological Survey Course
Denver, Colorado, 1980

Modeling of Groundwater Flow - U.S. Geological Survey Course
Denver, Colorado, 1979

Dam Break Modeling and Flood Routing - National Weather Service Course
Tulsa, Oklahoma, 1978

Well Testing - Los Alamos Scientific Laboratories Course
Los Alamos, New Mexico, 1977

CERTIFICATIONS:

Registered Professional Engineer, New Mexico, since 1980, License Number 7699

EXPERIENCE:

Geohydrologic Investigations - Conducted geohydrologic investigations and analyses in many areas in New Mexico. Most of the work was done in the San Juan, Bluewater and Gallup basins of northwest New Mexico, the Rio Grande and Sandia basins in central New Mexico, the WIPP site area in southeastern New Mexico and the Mimbres basin in southwestern New Mexico.

Geohydrologic Modeling - Constructed ground water flow models for parts of the San Juan, Bluewater, and Sandia Underground Water Basins in New Mexico. Experienced in the use of geohydrologic simulators, and have developed, marketed, and provided support in using geohydrologic, surface water, and related simulators.

Development of Geohydrologic Simulation Software - Developed and marketed an interactive-graphics based pre-processor which facilitates creating and modifying groundwater flow and transport models based on the finite-difference method, and developed and marketed numerical and analytic geohydrologic simulators.

Development of Surface Water System Simulators - Developed several surface water system simulators. One of these surface water simulators represented the Pecos River system in New Mexico and Texas, including all reservoirs and their operations. The results of this simulator were used extensively in the Pecos River litigation (Texas v. New Mexico, No. 65, Original).

Geohydrologic Data Base Development - Designed and implemented a computerized data base of wells and irrigation systems in the North Platte River Valley in Wyoming. Designed a data base format for a data base of technical and legal materials for use in Nebraska v. Wyoming, No. 108, Original. Designed computerized data bases and data access and reporting software for all dams and ditch systems in New Mexico.

Watershed Runoff and Water Surface Profile Modeling - Conducted modeling studies of large watershed runoff events and resulting water surface profiles for the U.S. Department of the Army at the proposed Electromagnetic Pulse Simulator sites in Arizona, Utah, and New Mexico.

Ground water Monitoring - Conducted a ground water monitoring program in the Ortiz Mountains area of north-central New Mexico relative to potential acid mine drainage and cyanide and metals contamination due to gold mining and heap-leach operations in the area.

TECHNICAL SUPPORT FOR LITIGATION:

Technical support for litigation and/or expert testimony in hydrology was provided for a number of State Engineer Office hearings and a New Mexico District Court case regarding applications to appropriate ground water and applications for mine dewatering permits in the Rio Grande, San Juan, Bluewater, Gallup, Sandia, Mimbres and Hondo Underground Water Basins. Technical support for litigation was also provided in Texas v. New Mexico, No. 65, Original. Hydroscience Associates, Inc. is currently under contract to the State of Nebraska to provide numerical modeling and technical support in Nebraska v. Wyoming, No. 108, Original.

A partial list of cases for which technical support and/or expert testimony was provided includes:

- 1986 New Mexico State Engineer hearing regarding application S-41-Enlg.-3 by Harwood Rice to appropriate ground water for the purpose of creating a water utility to serve the east side of the Sandia Mountains in the Sandia Underground Water Basin.
- 1986 New Mexico State Engineer hearing regarding application S-1065 by Ameriwest Corporation to appropriate ground water for a proposed subdivision on the east side of the Sandia Mountains in the Sandia Underground Water Basin.
- 1985-1987 Various New Mexico State Engineer hearings and a State District Court hearing regarding several Plains Electric Cooperative applications to change the place and purpose of use of ground water rights from irrigation to industrial use in the Bluewater Underground Water Basin.
- 1983 New Mexico State Engineer hearing regarding applications SJ-125 and SJ-125 PR, consolidated; SJ-146 and SJ-146 Supplemental; SJ-147 and SJ-147 Supplemental; SJ-146 PR; and SJ-147 PR. This hearing dealt

with the issue of selecting the appropriate ground water flow model for predicting effects of proposed withdrawals by Wyoming Minerals Corporation and Mobil Oil Corporation in the San Juan Underground Water Basin.

1982 New Mexico State Engineer hearing regarding application G-22 by Plains Electric Generation and Transmission Cooperative to appropriate ground water for electric power generation at Plains' Escalante Generating Station.

1979 New Mexico State Engineer hearing regarding application SJ-109 by Phillips Uranium Corporation for a mine dewatering permit for a mine located northeast of Crownpoint in the San Juan Underground Water Basin.

EMPLOYMENT HISTORY:

Employer: Hydrosience Associates, Inc.

Dates: 1993 - Present

Title: Vice President

Employer: Hydrologic Consultant, Self Employed

Dates: 1991 - 1992

Title: Owner

Employer: Microcode, Inc.

Dates: 1988 - Present

Title: President

Employer: Office of the New Mexico State Engineer

Dates: 1976 - 1988

Title: Water Resource Engineer

SELECTED PUBLICATIONS AND REPORTS

- Spinks, M.P., 1979, The Waste Isolation Pilot Plant (WIPP): New Mexico State Engineer Office Technical Division Hydrology Report, 10 p.
- ___ 1979, Application for permit no's. SJ-949 and SJ-949-S by Santa Fe Mining, Inc.: New Mexico State Engineer Office Technical Division Hydrology Report, 6 p.
- ___ 1979, Application for permit to appropriate file no. B-562 by L.R. Felicetti, et al: New Mexico State Engineer Office Technical Division Hydrology Report, 6 p.
- ___ 1980, Application for permit to appropriate file no. B-605 through B-605-S-8 by Phillips Uranium Corporation: New Mexico State Engineer Office Technical Division Hydrology Report, 10 p.
- ___ 1980, Applications RG-33551 and RG-33551-S and RG-33552 by IBI Coal Company: New Mexico State Engineer Office Technical Division Hydrology Report, 7 p.
- ___ 1980, Application for permit no's. 1605 and B-44, B-45, and B-45-S by Star Lake Railroad Company: New Mexico State Engineer Office Technical Division Hydrology Report, 8 p.
- ___ 1981, Review of M-X missile draft environmental impact statement: New Mexico State Engineer Office Technical Division Hydrology Report, 14 p.
- ___ 1981, Application RG-29678 and RG-29678 Enlarged by Chaco Energy Company: New Mexico State Engineer Office Technical Division Hydrology Report, 10 p.
- ___ 1982, Application RG-35159 by Gulf Oil Corporation for permit to appropriate at proposed Mount Taylor mill: New Mexico State Engineer Office Technical Division Hydrology Report, 6 p.
- ___ 1982, Application to appropriate no. RG-35275 by Santa Fe Mining, Inc.: New Mexico State Engineer Office Technical Division Hydrology Report, 12 p.
- ___ 1982, Application G-97-S-8 and G-97-S-9 by the City of Gallup: New Mexico State Engineer Office Technical Division Hydrology Report, 5 p.
- ___ 1983, Application B-455 through B-455-S-9 by Henry Andrews: New Mexico State Engineer Office Technical Division Hydrology Report, 6 p.

- ____ 1985, Application S-41 and S-41-S Enlarged (2) by Harwood Rice: New Mexico State Engineer Office Technical Division Hydrology Report, 8 p.
- ____ 1985, Application SJ-1647 by the San Juan Coal Company: New Mexico State Engineer Office Technical Division Hydrology Report, 6 p.
- ____ 1986, National Weather Service DAMBRK computer program for the IBM PC and compatibles: New Mexico State Engineer Office Technical Division Hydrology Report, 8 p.
- ____ 1986, Geology, hydrology, hydrologic model and estimated drawdown effects relative to the proposed use of replacement well by Dick Holben in the Sandia Underground Water Basin: New Mexico State Engineer Office Technical Division Hydrology Report, 6 p.
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