Geoffrey D. Thyne – PhD. P.G.

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Laramie, Wyoming
307-766-2773

Professional Experience

2006-present ***Enhanced Oil Recovery Institute*** Senior Research Scientist

- Group Lead – Laboratory section
- Technical Lead for Adjusted Brine Chemistry for EOR.
- Co-teach seminar classes on carbon sequestration, climate change and energy.
- Phase II Role: Principle Investigator – Study of natural analog for carbonate storage.
  Project: Phase III – Wyoming Geological Lead ,Large Scale Field Tests
  Phase III Role: Formulate, prepare and present proposal for $40M large scale field test involving universities, National Laboratories and private industry partners. Brief legislative and public organizations on energy use and sequestration, establish and facilitate collaboration with industry partners.

2005-06 ***Colorado Energy Research Institute*** Project Manager

Project – $2M DOE-funded CBM Produced Water Management and Beneficial Use
Role: Coordinate, manage and report interaction of eight academic, National Laboratories, State agency and private industry partners.

1999-2009 ***Colorado School of Mines*** Research Associate Professor
1997-1998 Research Assistant Professor
1996-1997 Adjunct Assistant Professor

- Advisor or co-advisor for PhD and 12 MS students in G&GE and Geochemistry.
- Developed externally-funded research programs and taught Groundwater. Engineering, Contaminant Hydrogeology, Hydrochemical Data Analysis, PHREEQC Modeling, Chemical Modeling of Ground Water Systems, Hydrology Field Camp.
- Administrative lead for Lewis Shale Consortium, 2000-2003
  Project: Characterization of complete petroleum system in Cretaceous tight-gas sandstone with funding from multiple industry partners.
  Role: Administer and coordinate interdepartmental team of faculty and students.

1992-1996 ***California State University, Bakersfield*** Assistant Professor

- Developed an externally-funded research with US Navy-Geothermal Projects and NSF
- Formulated and implemented Hydrogeology degree and certificate programs.
- Taught Hydrogeology, Aqueous Geochemistry, Contaminant Hydrogeology, Geochemistry, Senior Seminar, and Geology 100.
- Supervised undergraduate and graduate students.

1990-1991 ***Colorado School of Mines*** Postdoctoral Research Fellow
1986-1990 ***University of Wyoming*** Graduate Research Assistant

1984-1986 ***ARCO Oil and Gas R&D*** Research Geochemist

Supervised lab technicians, research projects in organic geochemistry, formulated and supervised formation water analysis program.

1982-1984 Build and operated stable isotope lab Associate Geochemist

1980-1982 Conducted CO_2 EOR experiments Sr. Eng. Technician

Education

1986 - 1991:	University of Wyoming	Ph.D.	Geology
1975 - 1980:	Texas A & M University	M.S.	Oceanography
1970 - 1975:	University of South Florida	B.A.	Chemistry and Zoology

Professional Service

Member - National Research Council - Committee on Management and Effects of Coalbed Methane Development and Produced Water in the Western United States.
Peer Reviewer for: Environmental Science and Technology, Ground Water, Vadose Zone Journal, Applied Geochemistry, Sedimentology, Water Resources Research, AAPG Bulletin, Geochimica Cosmochimica Acta, J. of Sedimentary Research, Chemical Geology, U.S. Bureau of Land Management, Hydrologic Processes.

Research Interests

Water-rock interactions. Present areas of activity include carbon sequestration, effects of petroleum production on water resources, enhanced oil recovery and prediction of reservoir quality.

Research Tools

Experienced in collection, analysis and interpretation of hydrogeologic and hydrochemical data, thermodynamic equilibrium modeling and reactive-transport modeling (PHREEQC and Geochemist's Workbench®), thermal maturation and burial history modeling. Familiar with analytical equipment and techniques such as AAS, GC, MS, MPLC, UV-VIS, MPLC, specific ion and titrimetric analyses, XRD, SEM-EDAX, optical petrology, and light stable isotopic measurement.

Professional Organizations

Board of Professional Geoscientists, Texas, P.G. #4389
American Association of Petroleum Geologists
American Geophysical Union
Wyoming Geological Association

References

Dr. John Drexler, Dept. of Geological Sciences, University of Colorado-Boulder, CO. drexlerj@spot.colorado.edu
Dr. John McCray, Division of Environmental Science and Engineering, Colorado School of Mines, Golden, CO (303-273-3490). jmccray@mines.edu
Dr. John Kaszuba, Dept. of Geology and Geophysics, University of Wyoming, (307) 766-6065. John.Kaszuba@uwyo.edu

Grants

CUAHSI, Vision Paper Grant for evaluation of scaling issues associated with watershed modeling, 2004
Delta County, CO, Development of a Hydrological Model for the Grand Mesa Area, 2003
National Decentralized Water Resources Capacity Development Program, Hydrogeological Evaluations for Larger Cluster and High Density Wastewater Soil Absorption Systems (w/ Poeter, McCray and Siegist), 2003
National Institute of Water Resources, Use of Low-Cost Data to simulate fractured aquifer watersheds for management for water quality and quantity (w/Poeter and McCray), 2002-2004
Petroleum Consortium, Lewis Shale Research Project (w/ Anderson and Hurley), 1998-2004
Norsk-Hydro a. s., Prediction of reservoir diagenesis, 1998-2000

Norsk-Hydro a. s., Reactive-transport modeling of illite precipitation, 1997-98
National Science Foundation, (w/ Gillespie), 1995-1997
US Navy Geothermal Program Office, (w/ Gillespie), 1994-1996

Publications

Peer Reviewed Articles

Thyne, G.D., M. Tomasso, S. V. Bywater-Reyes, D.A. Budd, and B.M. Reyes, 2010, Characterization of porosity and permeability for CO2 sequestration models in the Mississippian Madison Group, Moxa Arch-LaBarge Platform, southwestern Wyoming, Rocky Mountain Geology 45 (2), 133-150.

Albrecht, T. and **G. Thyne**, Evaluating Impacts of Natural Gas Development on Water Resources at Mamm Creek Field, Piceance Basin, Colorado (USA), submitted to Applied Geochemistry.

Skold, M, **Thyne, G**, Drexler, J. McCray, J., D. Macalady, 2009, Enhanced solubilization of a metal-organic contaminant mixture (Pb, Sr, Zn and PCE) by cyclodextrin, Environmental Science and Technology.

Skold, M, **Thyne, G**, Drexler, J. McCray, J., D. Macalady, 2009, Solubility enhancement of seven metal contaminants using carboxymethyl-beta-cyclodextrin (CMCD), Journal of Contaminant Hydrology.

Alvarado, V., **Thyne, G**. and G. R. Murrell, 2008, Screening strategy for chemical enhanced oil recovery in Wyoming basins, Society of Petroleum Engineers Proceedings, SPE Paper #115940.

Dano, K., Poeter, E., and **G. Thyne**, 2008, Fate of Individual Sewage Disposal System Wastewater within Regolith in Mountainous Terrain, Hydrogeology Journal 16, 691-699.

Skold, M., **Thyne, G.**, and J. Drexler and J. McCray, 2007, Determining conditional stability constants for Pb complexation by carboxymethyl-beta-cyclodextrin (CMCD). J. Contaminant Hydrology 93 (1-4), 203-15.

Gurdak, J.J., R. T. Hanson, P. B. McMahon, B. W. Bruce, J. E. McCray, **G. D. Thyne**, and R. C. Reedy, 2007, Climate variability controls on unsaturated water and chemical movement, High Plains aquifer, Vadose Zone J. 6:533–547, doi:10.2136/vzj2006.0087.

Skold, M. E., **G.D. Thyne** and J. E. McCray, 2007, Using UCODE_2005 and PHREEQC to Determine Thermodynamic Constants from Experimental Data. Groundwater 45(3), 368-373.

Gurdak, J.J., J. E. McCray, **G. Thyne**, and S. L. Qi , 2007, Latin Hypercube Approach to Estimate Uncertainty in Ground Water Vulnerability Ground Water 45 (3), 348–361.

Navarre-Sitchler, A. and **G.D. Thyne**, 2007, Effects of carbon dioxide on mineral weathering rates at earth surface conditions, Chemical Geology 243(1-2), p. 53-63.

Lipson, D.L., McCray, J.E., **Thyne, G.D.**, 2007, Using PHREEQC to simulate solute transport in fractured bedrock, Ground Water, 45(4), 468-472.

Statom, R.A., McCray, J.E, **Thyne, G.D.**, 2006, Conceptual model for landfill hydrologic transport developed using chloride tracer data and dual-domain modeling, *Environmental and Engineering Geosciences*, 12(1), 67–78.

Güler, C. and **G. D. Thyne**, 2006, Statistical Clustering of Major Solutes: Use as a Tracer for Evaluating Interbasin Groundwater Flow into Indian Wells Valley, California, *Environmental and Engineering Geoscience* 12(1), 53-65.

Poeter, E. J. McCray, **G. Thyne**, and R. Siegrist, 2005, Designing Cluster and High-Density Wastewater Soil Absorption Systems to Control Groundwater Mounding, *Small Flows Quarterly*, Fall 2005, v. 7, No. 4.

Link, L., Jakosky, B. and **G. Thyne**, 2005, Biological Potential of Low Temperature Aqueous Environments on Mars, *International Journal of Astrobiology*, 4(2), 155-164.

Doyle, S., McCray, J.E., Lowe, K.S., **Thyne, G.D.**, 2005, Modeling phosphorus reaction and transport at an experimental onsite wastewater site, In: *Proceedings of the NOWRA Annual Mtg*, Cleveland, OH., National Onsite Wastewater Recycling Association (NOWRA), Laurel, MD.

Thyne, G., 2005, Geochemical Modeling - Computer Codes, GW-246. In *The Encyclopedia of Water*, Jay Lehr, Editor, John Wiley and Sons.

McCray, J.E., Kirkland, S.L., Siegrist, R.L., and **Thyne, G.D.**, 2005, Transport-model input parameters for onsite-wastewater nutrients, *Ground Water* 43(4), 628-639.

Divine, C.E. and **Thyne, G.**, 2005, Detecting modern groundwaters with Kr, GW-161. In *The Encyclopedia of Water*, Jay Lehr, Editor, John Wiley and Sons.

Güler C. and **Thyne, G.D.**, 2004, Delineation of hydrochemical facies distribution in watersheds with Fuzzy *c*-Means clustering. *Water Resources Research* 40, W12503.

Thyne, G.D., Guler, C. and Poeter, E., 2004, Sequential analysis of hydrochemical data for watershed characterization, *Ground Water* 42 (5), 711-723.

Statom, R.A., **Thyne, G.D.** and McCray, J. E., 2004, Temporal Changes in Leachate Chemistry of a Municipal Solid Waste Landfill in Florida, *Environmental Geology* 45(7), 982-991.

Thyne, G.D., Pasternack, I. and Anderson, D.S., 2004, Contributions to *Wyoming Geological Association Guidebook*, Preliminary Assessment of Reservoir Quality Controls in Lewis Shale Sandstones, south-central Wyoming.

Güler C. and **Thyne, G.D.**, 2004, Hydrologic and geologic factors controlling surface and ground water chemistry in Indian Wells-Owens Valley area and surrounding ranges, California, U.S.A. *J. Hydrology* 285, 177-198.

Güler C. and **Thyne, G.D.**, 2003, Reply to comment by T.Dreher to Güler C, Thyne GD, McCray JE, Turner AK (2002): Evaluation of graphical and multivariate statistical methods for classification of water chemistry data. *Hydrogeology Journal* 11, 607-608.

Poeter, E, **Thyne, G.**, VanderBeek, G. and Guler, C., 2003, Ground Water in Turkey Creek Basin of the Rocky Mountain Front Range in Colorado, in Engineering Geology in Colorado - Contributions, Trends, and Case Histories, Association of Engineering Geologists, Denver, CO.

Smith, H.L., McCray, J.E., **Thyne, G.D.**, Lowe, K.S. and Siegrist, R. L., 2003, Characterization of the groundwater system in the Blue River Watershed, Colorado with application to the evaluating impact of onsite wastewater pollutants, in Engineering Geology in Colorado - Contributions, Trends, and Case Histories, Association of Engineering Geologists, Denver, CO.

Dugan, P. J., J.E. McCray and **Thyne, G. D.**, 2003, The Influence of Cyclodextrin on NAPL-Water Partition Coefficients and Partitioning Tracer Test Results. *Water Resources Research* 39 (5), 1123.

Güler, C., **Thyne, G.D.**, McCray, J.E. and Turner, A.K., 2002, Evaluation of the graphical and multivariate statistical methods used for classification of water-chemistry data. *Hydrogeology Journal* 10, 455-474.

Thyne, G.D., 2001, A model for diagenetic mass transfer between adjacent sandstone and shale. *Marine and Petroleum Geology* 18, 743-755.

Thyne, G.D., Boudreau, B., Ramm, M. and Midtbø, R.E., 2001, A reaction-transport model of K-spar dissolution and illitization in the Statfjord Formation, North Sea. *AAPG Bulletin* 85, 621-636.

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Thyne, G.D. and Gwinn, C.J., 1994, Evidence for a paleoaquifer from early diagenetic siderite of the Cardium Formation, Alberta Canada. *J. Sedimentary Research*, A64, 726-732.

Harrison, W.J. and **Thyne, G.D.**, 1994, Geochemical models of rock-water interactions in the presence of organic acids. Ch. 12 in Organic Acids in Geological Processes, (Pittman and Lewan, eds.). Springer-Verlag, NY.

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Thyne, G.D. and Boles, J. R., 1989, Isotopic evidence for the origin of the Moeraki septarian concretions, New Zealand. *J. Sedimentary. Petrology*, 59 (2), 272-279.

Proceedings

Tucholke, M.B., McCray, J.E., **Thyne, G.D.**, Waskom, R.M., 2007 Variability in denitrification rates: literature review and analysis, Proceedings of the National Onsite Wastewater Recycling Association (NOWRA) 16h Annual Technical Education Conference, Laurel MD.

Smith, H.L., **Thyne, G.D.**, McCray, J.E., Lowe, K.S., Guelfo J., Siegrist, R.L., 2004, Preliminary Evaluation of Anthropogenic Effects on Water Quality Within the Blue River Watershed, Summit County, Colorado. In:

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Thyne, G.D., Dodds, M and McCray, J.E., 2003, Modeling Natural Attenuation of BTEX and Chlorinated Ethenes in a Landfill Leachate Plume. Proceedings of 2003 MODFLOW Conference: 296-300.

Poeter, E., **Thyne, G.D.**, McCray, J.E., Lee, J-Y. and VanderBeek, G., 2002, Low-cost data for characterization and management of fractured-crystalline aquifers. Proceedings of EPA Fractured Rock Aquifers 2002 Focus Conference, Denver, Colorado.

Technical Reports

Thyne, G.D., 2008, Review of Phase II Hydrogeologic Study, http://www.garfield-county.com/Index.aspx?page+570.

Thyne, G. D., 2004, Review and analysis of Divide Creek gas seep for Garfield County. Presented at August 16th COGCC hearing, Glenwood Springs, CO.

Dano, K., Poeter, E. and **Thyne, G.**, 2004, Investigation of the fate of individual sewage disposal system effluent in Turkey Creek Basin, Colorado. Colorado Water Resources Research Institute Completion Report #200.

Poeter, E., **Thyne, G.D.**, McCray, J.E., and Siegist, R., 2003, Guidance for Evaluation for Ground Water Mounding associated with Cluster and High Density Wastewater Soil Absorption Systems (WSAS). Technical Report prepared for National Decentralized Water Resources Capacity Development Project.

Thyne, G.D., Dodds, M., Greaser, K.K., Miskimins, J., and Murray, K.E., 2003, Hydrologic Model for Grand Mesa Watershed, Delta County, Colorado: Effects of Coal Bed Methane Exploration Wells on Water Resources. Technical Report for Delta County, CO. 84p.

McCray, J.E., **Thyne, G.D.** and. Statom, R.A, 2001, Natural Attenuation of CAH Compounds in Landfills: Influence of Hydrology, Geochemistry, and Groundwater Recirculation. Technical Report prepared for Parsons Engineering Science, Denver, CO.

Thyne, G. D., 2000, Evaluation of the proposed kerogen cementation model to predict the changes in reservoir quality during burial due to diagenesis. Technical Report for Norsk Hydro A. S., 52p.

Thyne, G.D., 2000, Evaluation of Reservoir Quality and Diagenesis in the Oseberg Formation, Oseberg Field. Technical Report prepared for Norsk Hydro A. S., 62p.

Thyne, G.D. and B. Boudreau, 1999, A reactive-transport model of K-spar dissolution and illitization in the Statfjord Formation. Technical Report for Norsk Hydro A. S., 84p.

Thyne, G.D., 1998, Analysis of experimental data and modeling of copper leaching from an andesitic ore. Technical Report prepared for Savci Environmental Inc. Golden, CO.

Thyne, G.D. and Gillespie, J.M., 1997, Indian Wells Valley Hydrogeology. Technical report for the NAWS-Geothermal Projects Office, China Lakes Naval Weapons Center, China Lake, CA. 43 p.

Thyne, G.D., 1997, Prediction of pit lake chemistry for the Gold Quarry project. Technical Report prepared for Geomega Inc. Boulder CO.

Thyne, G.D., 1995, Analysis of copper and zinc behavior in streams, Iron Mountain, California. Technical report prepared for Shepherd-Miller Inc., Fort Collins, CO.

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McCray, J.E. and **G.D. Thyne**, 2009, Joint Sustainability of Petroleum Production and Water Resources, Ground Water Guest Editorial, 47 (5), 611.

Thyne, G.D., 2003, Review of PHREEQC, Southwest Hydrology 2(4): 37.

McCray, J.E., **Thyne, G.D.**, Boving, T., 2003. Preface from the guest editors: Contaminant characterization, transport, and remediation in complex multiphase systems , *Vadose Zone J.*, 2(2), 115.

Thyne, G.D., 2000, Review of Geochemist's Workbench, Geotimes 45(8), 35.

Abstracts and presentations

Meuzelaar, T., **G. Thyne**, D. Budd, and A. Alcott, 2010, Reactive transport model parameterization via a CO2 sequestration analog, GSA National Meeting, GSA Abstracts with Program #183-10.

Thyne, G. D., 2010, Powder River Basin CBM: Perspectives on water production or why it's a whole different animal, WGA Field Conference, Casper, Wyoming.

Chopping, C., A. Navarre-Sitchler, J. Kaszuba and **G. Thyne**, 2009, A natural analogue in Wyoming for Co-sequestration. GSA National Meeting, GSA Abstracts with Program V. 41 (7).

Thyne, G.D., Alvarado, V. and G Murrell, 2009, Evaluation of Chemical Flooding in the Minnelusa Formation, Powder River Basin, Wyoming, AAPG National Meeting, Denver, Colorado, Abstracts, p.60.

Myers, J.D., D.K. Myers and **G.D. Thyne**, 2009, The Well Catalog: A First Step in Meeting Future Geologic Carbon Capture and Storage (GCCS) Permitting Requirements. NETL review of University of Wyoming Progress.

Thyne, G., Kaszuba, J., and A. Navarre-Sitchler, 2009, Geochemical models of carbon sequestration based on the natural analog of the Moxa Arch, Wyoming, USA., AAPG National Meeting, Denver, Colorado, Abstracts, p.44.

Chopping, C., A. Navarre-Sitchler, J. Kaszuba and **G. Thyne**, 2009, Using a natural analogue to examine geologic carbon sequestration, GSA Rocky Mountain Meeting, GSA Abstracts with Program V. 41 (6).

Navarre-Sitchler, A. M, **Thyne, G.D.** and J. Kaszuba, 2008, Using a natural analog to investigate chemical reactions associated with carbon dioxide sequestration, AGU Fall Meeting, San Francisco.

Murrell, G.R. and **G.D. Thyne**, 2007, Physical and Economic Integration of Carbon Capture Methods with Sequestration Sinks, AGU Fall Meeting, San Francisco.

Thyne, G. and G.R. Murrell, 2007, The Relationship between Carbon Capture Technologies for Coal Power Fired Power Plants and Sequestration Methodology, ACS Regional Meeting, Denver, Colorado.

Thyne, G., 2007, CBM in Wyoming - It's all about the water. Wyoming Geological Association Field Conference, August 1-5, Casper Wyoming.

Albrecht, T.R., and **Thyne, G.D.**, 2007, Using sequential hydrochemical analyses to distinguish natural and anthropogenic sources of water quality variability, Piceance Basin, CO, 2007 Ground Water Summit, Albuquerque, New Mexico, April 29-May 3, National Ground Water Assoc., Westerville, OH.

Albrecht, T.R. and **G. Thyne**, 2007, Distinguishing natural and anthropogenic sources of water quality variability, southeastern Piceance Basin, Colorado. GSA 59th Rocky Mountain Section Meeting, St. George, UT, p.46.

Thyne, G., 2006, Evaluation of potential impacts to water resources from petroleum drilling – Grand Mesa, Colorado, AAPG RMS Annual Meeting, Billings MT, Program with Abstracts, p. 41. **

Thyne, G., M.E. Skold, Magnus E., J. E. McCray, John .E., and John W. Drexler, 2006, Modeling Mixed Waste Remedation with cyclodextrin, GSA Philadelphia Annual Meeting (22–25 October 2006).

Skold, M.D., **Thyne, G.D**, McCray, J. E. and J. W. Drexler, 2006, Methodology for automatically estimating stability constants form experimental data, GSA abstracts with programs 38, p. 13.

Nummedal, D. and **G. D. Thyne**, 2005, Produced Water Management and Beneficial Use, Award#: DE-FC26-05NT15549, Progress Report presented at the DOE-WERF meeting, Annapolis Maryland, November.

Skold, M. R., **Thyne, G. D.**, McCray, J. E. and J. W. Drexler, 2005, Use of Carboxymethyl-beta-cyclodextrin (CMCD) as Flushing Agent for Remedation of Metal Contaminated Soil, AGU Fall Meeting, San Francisco.

Grudak, J. and **G. Thyne**, 2005, Sorption controlled arsenic mobility in groundwater of the Zimapán Valley, Mexico. GSA National Meeting, Salt Lake City, UT, Abstracts with prgrams 37, p. 376.

Link, L., Jakosky, B. and **G. Thyne**, 2005, Low-temperature Aqueous Alteration on Mars and the Potential for Life, Astrobiology Science Conference.

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Yacob, S. and **G. Thyne**, 2004, Delineation of groundwater-surface water connections and processes using hydrochemical data in a mountain watershed, Jefferson County, Colorado, GSA Abstracts with Programs 36, No. 5.

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Park, A.J., Budd, D., **Thyne, G.** and P. Ortoleva, 2004, Diagenesis and Mechanical Compaction in Clastic and Carbonate Sediments: Sediment Heterogeneity and Mass-transfer. AAPG National Meeting, Houston, Texas, Program with abstracts, v.

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