CPB Exh 21

# Curriculum Vitae for
# Alan L. Mayo, Ph.D., P.H., PG

CPB Exh 21

# Mayo and Associates, LC
# Consultants in Hydrogeology

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**Alan L. Mayo, Ph.D., P.H., PG**
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## Education

Ph.D. Hydrogeology, 1982, University of Idaho
M.S. Geology, 1972, San Diego State University
B.S. Geology, 1970, San Diego State University

## Experience

Managing Partner, Mayo and Associates, LC, 1982 – present Consultants in Hydrogeology
Lindon, UT
Vice President and Chief Technical Officer, HydroGeo Group, LLC, 2011 – present.
Consultants to mining, energy, and water resources industries
Professor Emeritus of Hydrogeology, 1987 – 2012
Brigham Young University, Provo, UT
Assistant Professor of Geology, 1982-1986
University of Colorado at Colorado Springs, CO
Senior Hydrogeologist, 1981-1982
Law Engineering, Marietta, GA
Assistant Professor of Hydrogeology, 1980-1981
University of Idaho, Moscow, ID
Environmental Management Specialist III, 1972 – 1978
San Diego County, San Diego, CA

## Registrations

American Institute of Hydrology, Certified Professional Hydrologist #1476
California Registered Geologist #3256
Utah Professional Geologist #5248606-2250

## Honors and Memberships

Fulbright Scholar 2005
Hydrogeology Journal - Editors' Choice Award 2012, 2014
H.E.W. Fellow 1978-1980

J. Keith Rigby Research Award 1999, 2008
American Geophysical Union
American Institute of Hydrology
Geological Society of America
International Association of Hydrogeologist
National Groundwater Association
Nevada Water Resources Association
Sigma Xi

## Consulting

### Current Clients

Anderson Engineering (groundwater contamination)
Barrick Gold Corporation (hard rock mining groundwater related issues)
Bowen Collins (evaporate minerals)
Church of Jesus Christ of Later Day Saints Corporation of Presiding Bishopric (water rights)
Energy West (coal mine groundwater)
Lorax Environmental Services, LTD (hard rock mining)
Stantec (mining related groundwater issues)
Troutman Sanders LLP (expert witness)
USEPA (groundwater contamination)

### Projects

***Litigation Support and Expert Witness***

Cities of Reno and Sparks (Nevada) and the US Army - expert witness, evaluated the impact of groundwater extraction from the Honey Lake Basin, California-Nevada presented before the Nevada State Engineer.

Church of Jesus Christ of Later Day Saints (Utah) - expert witness and principal defendant's hydrogeologists in water rights lawsuit from Washington County (Washington County Water Conservancy District vs. Morgan, et al.)

Church of Jesus Christ of Later Day Saints (Nevada) – expert witness in Nevada State Engineers hearing of water rights appeal against the Southern Nevada Water Authority

Co-Op Mine (Utah) – expert witness testimony on groundwater resources before the Utah Division of Oil Gas and Mining

El Paso County (Colorado) – expert witness, defended the regulations in a lawsuit from the Home Builders Association.

Engstrom Lipscomb and Lack (California) - expert witness and principal hydrogeologist for the plaintiffs in the so-called Erin Brockovich Case. Chrome-6 groundwater contamination (Anderson, et al. vs. PG&E)

Engstrom Lipscomb and Lack (California) - expert witness and principal hydrogeologist for the plaintiffs in the so-called Erin Brockovich Case. Chrome-6 groundwater contamination (Aguayo/Adams vs. PG&E et al.)

Engstrom Lipscomb and Lack (California) - expert witness and principal hydrogeologist for the plaintiffs in a TCE groundwater contamination (Carrillo/Acklin, et al. vs. Lockheed Martin Corporation, et al.).

Greene Broillet and Wheller (California) - expert witness, chrome-6 groundwater contamination.

Hill, Johnson & Schmutz (Utah) - evaluated nitrogen groundwater contamination associated with explosives plant pond leakage.

Hill and Robins (Colorado) – expert witness, evaluate groundwater flow regimes associated with groundwater extraction proposal *(*AWDI v. City of Alamosa*).*

Kipp and Christian, PC (Utah) – expert witness regarding origin of thermal groundwater associated with tufa mounds.

Law Offices of Victor L. George (California) - evaluated contaminant plume associated with aircraft industry facility.

Manning Curtis Bradshaw and Bednar (Utah) – hydrogeologist for defendants in potential lawsuit between Pacific Corporation and Skyline Mines. Alleged draining of Electric Lake due to mining activities.

Smith Hartivgsen (Utath) – exert witness Nelson v. Arnold

Robert C Fillerup (Utah) – expert witness in support of water rights transfer.

Thomas Anton Associates (California) - expert witness and principal hydrogeologist for the plaintiffs in Chrome-6 groundwater contamination, Schroeder et al. vs. Pacific Gas and Electric.

Troutman Sanders LLP (Georgia) - expert witness and hydrogeologist in defense against Sierra Club alleged Public Services of New Mexico power plant groundwater contamination.

Troutman Sanders LLP (Virginia) expert witness and hydrogeologist in defense against Sierra Club suite of alleged Dominion Power (VA) ash landfilld groundwater contamination.

Smith Hartvigsen (Utah) – expert witness, evaluated groundwater resources associated with several water rights cases (Bushnell, el al. vs. Morgan, et al.).

***Mining Projects***

Allied Nevada Gold, Hycroft Mine (Nevada) - developed conceptual model of groundwater flow based on isotopic, geochemical, hydrostratigraphic, and physical data.

ASARCO (Utah) – subcontractor to JBR Environmental Consultants. Evaluated the fate and transport of an arsenic contamination plume.

Barrick Gold Corporation - (Nevada) Corrective Action Plan Pipeline Project – Lead investigator on nitrate groundwater contamination investigation.

Barrick Gold Corporation - (Nevada) Shallow and deep groundwater interactions in the vicinity of the Goldrush Project including the Cortez Mine site.

Bowie Resources (Colorado) – evaluated groundwater coal mine flow regimes using isotopic and physical data.

Bridger Coal Company (Wyoming) – evaluation of the hydrogeologic regime of the surface and underground mine workings.

British Petroleum (New Mexico) – subcontractor to Anderson Engineering. Evaluated uranium plume associated with tailing facility.

Brown and Caldwell (Nevada) – groundwater age determinations.

CO-OP Mine (Utah) - preparation of statements of Probable Hydrologic Consequences associated with proposed coal mining plans; hydrogeologic characterization in support of the Wild Horse Ride expansion.

Confidential Client (Nevada) - evaluated groundwater flow patterns and potential heavy metal migration associated with acid mine pit.

Confidential mining client (Nevada) - evaluated groundwater/surface water interactions using isotopic and solute geochemistry.

Cyprus Plateau Mining Corporation (Utah) – evaluated mine flooding at the Willow Creek Mine.

Dugout Mine (Utah) - investigation of the physical hydrogeologic and hydrogeochemical conditions associated with recent groundwater inflows.

Energy West Mining Company (Utah) - conducted various groundwater resources and mine flooding investigations, permit applications, iron issues, and preparation of statements of Probable Hydrologic Consequences associated with proposed coal mining plans.

Emery Deep (Utah) – calculated mass balance chemical loading associated with coal piles.

Greater Phoenix Mine expansion (Nevada) subcontractor to Stantec. Third party review of hydrogeochemistry and hydrogeology conceptual models for Environmental Impact Statement.

General Molly (Nevada) – subcontractor to JBR Environmental Consultants. Isotopic analysis and developed conceptual groundwater flow model.

Homestake Mining (California) – evaluated the source of elevated $SO_4^{2-}$ associated with the McLaughlin pit lake.

Homestake Mining (New Mexico) – evaluated uranium plume associated with tailing facility at Grants New Mexico.

Homestake Mining (South Dakota) – subcontractor to JBR Environmental Consultants. Evaluated the fate and transport of heavy metals (As, Cd, Zn, Cr, Mo etc.) associated with past mining activities.

Lorax Environmental Services LTD (Canada) – evaluated surface/groundwater interaction in a deep hard rock mine.

Long Canyon Mine (Nevada) – subcontractor to JBR Environmental Consultants. Evaluated isotopic data and reviewed groundwater flow and modeling reports for EIS analysis.

North Kemess Mine (British Columbia, Canada) – subcontractor to Lorax Environmental.Analyzed isotopic data and assisted in the developed conceptual groundwater flow model.

Murry River Coal – (British Columbia, Canada) – subcontractor to ERM. Analyzed isotopic data and assisted in the developed conceptual groundwater flow model

Oxbow Mining (Colorado) – evaluated mine flooding at the Somerset facility.

Rio Tinto (Kennecott Copper, Utah) – Evaluation of Se plume, conducted isotopic investigations, and analyzed pumping test data.

Skyline Mines (Utah) – conducted various groundwater resources and mine flooding investigations, permit applications, and preparation of statements of Probable Hydrologic Consequences associated with proposed coal mining plans.

Simplot Mining (Idaho) – subcontractor to JBR Environmental Consultants. Evaluated groundwater resources and supervised the preparation of a groundwater flow model used to predict heavy metal contaminant migration (Se, As, Cd, Zn, etc) associated with proposed Smoky Canyon mine expansion plan.

Simplot Mining (Idaho) – subcontractor to JBR Environmental Consultants. Prepared conceptual

groundwater flow model, isotopic investigations and analyzed pumping test data.

Solder Creek Mine (Utah) – characterized underground groundwater flow.

SUFCO Mine (Utah) - numerous groundwater resources and mine flooding investigations, permit applications, and preparation of statements of Probable Hydrologic Consequences associated with proposed coal mining plans.

Tintic Utah Metals (Utah) – evaluated relationship between hard rock mine groundwater inflows and groundwater discharge into Utah Lake - Presented results at State Engineers Hearing.

Thompson Creek Mine (Idaho) - subcontractor to JBR Environmental Consultants. Third party review of environmental impact documents related to groundwater flow and heavy metal contamination.

West Elk Mine (Colorado) – conducted numerous investigation of in mine flooding and other groundwater related issues. Successfully defended the mine in appeal of Notice of Violation that claimed mine waters leaked into adjacent mine.

Willow Creek Mine (Utah) – isotopic investigations, evaluated mine flooding events, and prepared probable hydrologic consequences report.

Zapata Mine (Mexico) - subcontractor to Lorax Environmental LTD (Canada) - Analyzed isotopic data and assisted in the developed conceptual groundwater flow model.

***Energy, Water Resources, and Groundwater Contamination***

Alpine Cove Water Company (Utah) – Drinking water source protection plan.

British Petroleum (Utah) – subcontractor to Anderson Engineering. Evaluated potential groundwater plum migrations by Analyzing pump test and isotopic data and development of conceptual groundwater flow model.

Cedar Pass Ranches (UT) – evaluation of thermal and non-thermal groundwater resources by geochemical and physical hydrogeology methods.

Colusa county Water District (California) – evaluated unconfined aquifer groundwater availability.

Central Utah Water Conservancy District (Utah) – evaluation of groundwater ages associated with the Diamond Fork Vortex Tunnel

El Paso County, Colorado – prepared land use regulations related to long-term groundwater availability.

RBG Engineering (UT) – isotopic analysis associated with the Jordan Canal

Idaho Department of Natural Resources (Idaho) – evaluated geothermal resources in the Boise area.

IPPC (Utah) – subcontractor to JBR Environmental Consultants. Evaluated evaporation pond leakage.

Louisiana Department of Environmental Quality – evaluated hydrocarbon contamination at Old Inger waste oil facility.

Mobil Oil Company (Wyoming) – evaluated the fate and transport of hydrocarbon contamination at the Big Piney Facility.

Nevada Power – Ely Energy Center (Nevada) – subcontractor to JBR Environmental Consultants. Principal hydrogeologist for Environmental Impact Statement for proposed 1.8 billion dollar power plant.

Public Services New Mexico – evaluated the elevated factors responsible for elevated TDS in surface and groundwater.

Rio Grande Water Conservancy District (Colorado) – evaluated factors related to salinity of the unconfined aquifer in the San Luis Valley.
Warren Resources (Wyoming) – developed conceptual model of groundwater flow.
Williams Feld Services (New Mexico and Wyoming) – evaluated fate and transport of hydrocarbon contamination and developed conceptual groundwater flow models for several sites in Wyoming and New Mexico.
Utah Department of Natural Resources (Utah) – evaluated groundwater resources for redevelopment of fish hatchery. The issue was could a Whirling Free groundwater resource be found and developed.
United Arab Emirates (UAE) – subcontractor to Aquaveo, evaluated isotopic data and developed conceptual groundwater flow model.
Virgina Timperline (Virgina) – subcontractor to Aquaveo, analysis of pumping test data.

## Publications

### Papers

Brutans, J., Kamas, J., Filip;I, M., Zare, M., Mayo, A.L., 2017, Hydrology of salt karst under different cap soils and climates (Persian Gulf and Zagros Mts., Iran): Internarial Journal of Speleology, v. 46, n. 2.

Rey, K.A., Mayo, A.L., Nelson, S.T., and Tingey, D.G., 2016, Late Pleistocene to Early Holocene Sedimentary History of the Lake Bonneville Pilot Valley Embayment, Utah-Nevada, USA *in* Lake Bonneville: a scientific update, Oviatt, C,G, and Shroder, J.F., *eds*: Elsevier, Development in Earth Surface Processes Vol. 20, Chapter 10, p 184-220, Vol. 20, ISBN 978-0-444-63590-7, ISS 0928-2025

South, J.V., McBride, J.H., Carling G.T., Mayo, A.L., Tingey, D.G., Rey, K.A., and Nelson, S.T., 2016 Imaging the Margins of Pleistocene Lake Deposits with High-Resolution Seismic Reflection in the Eastern Basin and Range: Pilot Valley, Utah (USA) *in* Lake Bonneville: a scientific update, Oviatt, C,G, and Shroder, J.F., *eds*: Elsevier, Development in Earth Surface Processes Vol. 20, Chapter 19, p. 526-550, ISBN 978-0-444-63590-7, ISS 0928-2025

Mayo, A.L., Himes, S., and Tingey, D., 2014, Self-Organizing Thermal Fluid Flow in Crystalline Rock: Theoretical and Laboratory Approach to the Hydrothermal Systems in the Middle Fork of the Boise River, Idaho, USA: Hydrogeology Journal, v 22, n 1, p.25-45. ***Editors' Choice Award 2014***

Mayo, A.L., and Bruthans, J., 2014, Using heat flow and radiocarbon ages to estimate the extent of recharge area of thermal springs in granitoid rock: example from Southern Idaho Batholith, USA *in* Fractured Rock Hydrology: IAH Special Papers in Hydrology, p. 225-239.

Nelson, S.T., and Mayo, A.L., 2014, The role of interbasin groundwater transfers in geologically complex terrains, demonstrated by the Great Basin in the western United States,

Hydrogeology Journal, DOI 10.1007/s10040-014-1104-6

Bruthans, J., Soukup, J., Vaculikova, J., Filippi, M., Schweigstillova, J., Mayo, A.L., Masin, D., Kletetschka, G., and Rihosek, J., 2014, Sandstone landforms shaped by negative feedback between stress and erosion: Nature Geoscience, v, 7, p. 597-601, doi:10.1038/ngeo2209.

Mayo, A.L., Nelson, S.T., McBride, J.H., Durrant, C., and Tingey, D., 2013, Understanding inverted hydrochemical gradients: A case study at midway, Utah, USA employing geophysics, geochemistry, and hydrostratigraphy: Natural Hazards, v. 69, n.1, p. 545-571.

Bruthans, J., Svetlik, D., Soukup, J., Schweigstillova, J., Valek, J., Petrova, M., and Mayo, A., 2012, Fast evolving conduits in clay-bonded sandstone: Characterization, erosion processes and significance for origin of sandstone landforms: Geomorphology, v 177,p. 178-193.

Gillespie J, Nelson ST, Mayo AL, Tingey DG, 2012, Why conceptual flow models matter: a trans-boundary example from the arid Great Basin, western USA. Hydrogeology Journal, v. 20, p.1133-1147. ***Editors' Choice Award 2012***

Carling, G.T**.**, Mayo, A.L., Tingey, D.G., and J. Bruthans, 2011, Mechanisms, timing, and rates of arid region mountain front recharge. Journal of Hydrology: v. 428-429, p.. 15-31.

Parks, E.M., McBride, J.H., Nelson, S.T., Tingey, D.G., Mayo, A.L., Guthrie, W.S., and, Hoopes, J.C., 2011, Comparing electromagnetic and seismic geophysical methods: Estimating the depth to water in geological simples and complex arid environments: Engineering Geology, v. 117, n 1-2, p. 62-77.

Mayo, A.L., Nelson, S., Herron, D.A., Tingey, D., Tranel, M.J. and Bruthans, J, 2010, Geology and Hydrogeology of Timpanogos Cave National Monument, Utah, Geology, Hydrogeology and Implications to Movement of the Wasatch Fault *in* The Geology of Utah's Parks and Monuments, 3rd edition, Sprinkel, D.A., Chidsey, T.C. Jr., and Anderson, P.B. editors: Utah Geological Association Publication 28, p. 271-285.

Mayo, A.L., 2010, Ambient well bore and aquifer mixing, pumping stress, and water quality in long-screened wells: what is sampled and what is not?: Hydrogeology Journal, v. 18, p. 823-837, DOI 10.1007/s10040-009-0568-2

Mayo, A.L., Henderson, R., and Tingey, D., 2010, Chemical evolution of shallow playa groundwater in response to post-pluvial isostatic rebound, Honey Lake Basin, California-Nevada, USA: Hydrogeology Journal, v 18, p. 725-747.

Mayo, A.L., Bruthans, J., Kradlec, J., and Tingey, D., 2009, Insights into Wasatch fault vertical slip rates using the age of sediments in Timpanogos Cave, Utah: Quaternary Research, v. 72, p. 275-283.

Schlegel, M.E., Mayo, A.L., Nelson, S.T., Tingey, D., Eggett, D., and Henderson, R., 2009, Paleo-climate of the Boise area, Idaho from the last glacial maximum to the present based

on groundwater $\delta^2H$ and $\delta^{18}O$ compositions: Quaternary Research, v 71, p. 172-180.

Nelson, S.T., Mayo, A.L., Gilfillan, S., Dutson, S.J., Harris, R.A., Shipton, Z.K., and Tingey, D.G., 2009, Enhanced fracture permeability and accompanying fluid flow in the footwall of a normal fault: The Hurricane fault at Pah Tempe hot springs, Washington, County, Utah: Geological Society of America Bulletin, v. 121, n. 1-2, p. 236-246.

Mayo, A.L., Davey, A., and Christiansen, D., 2007, Groundwater flow patterns in the San Luis Valley, Colorado, USA, revisited: An evaluation of solute and isotopic data; Hydrogeology Journal, v. 15, n. 2, p. 383-408.

Anderson, K., Nelson, S., Mayo, A., and Tingey, D.G., 2006, Interbasin flow revisited: the contribution of local recharge to high-discharge springs, Death Valley, CA: Journal of Hydrology, v.323, p. 276-302.

Nelson, S.T., Anderson, K., and Mayo, A.L., 2005, Reply to Winograd et al., comment on Testing the interbasin flow hypothesis at Death Valley, CA: EOS, v. 86, n. 32, p.296.

Nelson, S.T., Wood, J., Mayo, A.L., Tingey, D.G., and Eggett, D.L., 2005, Shoreline Tufa and Tufaglomerate from Pleistocene Lake Bonneville, Utah, USA: Stable isotopic and mineralogical records of lake conditions, processes, and climate: Journal of Quaternary Science, v. 20 p. 3-19.

Anderson, S.D., Cosper, K.B., Buck B.W., Lemon, A.M., and Mayo, A.L., 2004, Not all contamination comes from mining operations: 2004 Tailings and Waste Conference, Vail Colorado, October 10-13, p. 415-425.

Nelson, S.T., Anderson, K.W., and Mayo, A.L., 2004, Testing the interbasin flow hypothesis at Death Valley, CA, USA: EOS, v. 85, n. 37, p. 349-356.

Mayo, A.L., Morris, T.H., Peltier, S., Petersen, E.C., Payne, K., Holman, L.S., Fogel, T., Black, B.J., and Gibbs, T.D., 2003, Active and inactive groundwater flow systems: evidence from stratified mountainous terrain: Bulletin Geological Society of America, v. 115, n. 12. p. 1456-1472.

Mayo, A.L., Nelson, S., Tingey, D., Dutson, S., and Harris, R., 2003, Flux-induced solution weathering in a large displacement fault damage zone *in* International Conference on Groundwater in Fracture Rocks, proceedings, Krasny J., Hrkal, Z, and Bruthans, J., ed.: IHP-VI, Series on Groundwater No. 7, Prague, Czech Republic, p. 75-76.

Catteon-Diazconti, C., Nelson, S.T., and Mayo, A.L., 2003: The geohydrology of the Midway area, Utah, U.S.A., with emphasis on subsurface mixing of end member waters and the potential for transmission of whirling disease by irrigation recharge: Journal of Hydrology, v. 273, p. 119-138.

Luthi, A., Harris, R., Mayo, A.L., and Koontz, W., 2002, Structural controls of hydrodynamic anisotropy in the West Elk Mine Region, Western Colorado, USA: Environmental and Engineering Geosciences, v. 8, p. 93-102

Morris, T.H., Mayo, A.L., Bills, T.L., Black, B.J., and Holeman, L.S., 2001, Barriers, baffles, and bounding surfaces: Keys to understanding the hydrogeology of the coal-bearing Wasatch Plateau, Utah: Utah Geological Association, v. 33, n. 3, p.1-2.

Mayo, A.L., Petersen, E.C., and Kravits, C., 2000, Chemical evolution of coal mine drainage in a non-acid producing environment, Wasatch Plateau, UT: Journal of Hydrology v. 236, n. 1-2, p. 1-16.

Mayo, A.L., and Koontz, W., 2000, Fracture flow and groundwater compartmentalization in the Rollins Sandstone, lower Mesaverde Group, Colorado, USA: Hydrogeology Journal, v. 8, n. 4, p. 430-446.

Mayo, A.L., Nelson, S., Herron, D.A., Tingey, D., and Tranel, M.J., 2000, Geology and Hydrogeology of Timpanogos Cave National Monument, Utah *in* The Geology of Utah's Parks and Monuments, Sprinkel, D.A., Chidsey, T.C. Jr., and Anderson, P.B. editors: Utah Geological Association Publication 28, p 363-377.

Mayo, A.L., and Morris, T.H., 2000, Conceptual model of groundwater flow in stratified mountainous terrain, Utah, USA *in* Groundwater: Past achievements and future challenges, Sililo, O, ed: Proceedings of the XXX International Association of Hydrogeologist (IAH) Congress on Groundwater, Cape Town South Africa, p. 225-229.

Mayo, A.L., and Klauk, 2000, Hydrogeology of Antelope Island, Great Salt Lake, Utah *in* King, J.K., and Willis, G.C., editors, The geology of Antelope Island, Davis County, Utah: Utah Geological Survey Miscellaneous Publication 00-1, p. 135-150. (Reprinted from Journal of Hydrology)

Mayo, A.L., and Muller, A.B., 1997, Contributions of external $CO_2$ gas to a shallow groundwater system: Journal of Hydrology, v. 194, p. 286-304.

Mayo, A.L., and Lucks, M.D., 1995, Solute and isotopic geochemistry and ground water flow in the central Wasatch Range, Utah: Journal of Hydrology, v. 172, p. 31-59.

Mayo, A.L., and Slosson, J.E., 1992, The application of ground-water flow models as predictive tools - A review of two ground water models in eastern Honey Lake Valley, California-Nevada: Assoc. Eng. Geol. Bul., v. XXIX, n. 2, p. 151-163.

Tranel, M. A., Mayo A.L., Jensen, T.M., 1992, Preliminary investigation of the hydrogeology and hydrogeochemistry at Timpanogos Cave, Timpanogos Cave National Monument, Utah, in proceedings 1991 National Cave Management Symposium, Bowling Green, Kentucky, Oct. 23-26, 1991: Am. Cave Cons. Assoc., p. 162-176.

Mayo, A.L., and Loucks, M., 1992, Ground water flow systems in the Central Wasatch Range, Utah: Utah Department of Natural Resources, Contract Report 92-6, 81 p.

Mayo, A.L., Nielsen, P., Loucks, M.D., and Brimhall, W., 1992, Use of solute and isotopic chemistry to identify the factors which limit acid mine drainage in the Wasatch Range,

Utah: Groundwater, v. 30 n. 2, p. 243-249.

Mayo, A.L., and Klauk, R., 1991, Contributions to the solute and isotopic ground water geochemistry, Antelope Island, Great Salt Lake, Utah: Journal of Hydrology, v. 127, p. 307-335.

Mayo, A.L., Shrum, D.B., and Chidsey, T.C., Jr., 1991, Factors contributing to the exsolving carbon dioxide in ground water systems in the Colorado Plateau in T.C. Chidsey, Jr., Ed. Geology of East Central Utah: Utah Geol. Assoc, Pub. 19, p. 335-339.

Mayo, A.L., and Webber W., 1991, Preliminary evaluation of the factors contributing to the spatial and temporal water quality variation in Stage 3 - Closed Basin Project Salvage Wells, San Luis Valley, Colorado: Technical completion report U.S. Bureau of Reclamation and Rio Grande Water Conservation District.

Mayo. A.L., 1990, A 300 year-water supply requirement - One County's approach: Journal of the American Planning Association, Spring 1990, p. 197-208.

Nielsen, P.J., and Mayo A.L., 1989, Chemical and isotopic investigation of the cause of acid and neutral mine discharges in the central Wasatch Range, Utah: Utah Geol. Assoc. Pub. 17, p. 121-134.

Muller, A.B., and Mayo, A.L., 1986, $\delta^{13}C$ variation in limestone on an aquifer wide scale and its effects on groundwater $^{14}C$ dating models: Radiocarbon, v. 28, n. 34, p. 1041-1054.

Mayo, A.L., Muller, A.B., and Ralston, D.R., 1985, Hydrogeochemistry of the Meade thrust allochthon southeastern Idaho, and its relevance to the stratigraphic and structural groundwater flow control: Journal of Hydrology, v. 76, n. 1/2, p. 27-61.

Mayo, A.L., Muller, A.B., and Mitchell, J., 1984, Geochemical and isotopic investigations of the thermal water occurrences in the Boise Front geothermal system, Ada County, Idaho: Idaho Department of Water Resources, Water Info. Bull., n. 30, pt. 14, 55 p.

Muller, A.B., and Mayo, A.L., 1983, Ground-water circulation in the Meade thrust allochthon evaluated by radiocarbon techniques: Radiocarbon, v. 25, n. 2, p. 357-372.

Ralston, D.R., Mayo, A.L., Arrigo, J.L., Baglio, J.V., Coleman, L.M., Hubbell, J.M., and Souder, K., 1981, Geothermal evaluation of the thrust zone in southeastern Idaho: Research Technical Report, Idaho Water Energy Res. Inst., 110 p.

Ralston, D.R., and Mayo, A.L., 1980, Utilization of regional ground water flow systems to aid dewatering in phosphate mining: Idaho Mining Mineral Res. Inst. Report, 51 p.

Mayo, A.L., 1973, Flood hazards in the San Diego River Basin *in* Studies of the Geology and geologic hazards of the greater San Diego area: Assoc. San Diego Geol., p. 119-123.

Mayo, A.L., 2017, Evaluating the origin and flow history of thermal groundwater systems: Mine Water Management Symposium, Nevada Water Resource Association, Conference Proceedings, p.9.

Mayo, A.L., 2016, Stream baseflow- active and inactive groundwater systems: Nevada Water Resources Association, 2016 Annual Meeting Reno, Nevada, Conference Proceedings, p. 30.

Mayo, A.L., 2015, Mountain front recharge in arid regions – Mechanisms, timing and rates: Nevada Water Resources Association, 2015 Annual Meeting Reno, Nevada, Conference Proceedings, p. 29.

Mayo, A.L., 2015, The role of interbasin groundwater transfers in geologically complex terrains, demonstrated by the Great Basin: Nevada Water Resources Association, 2015 Annual Meeting Reno, Nevada, Conference Proceedings, p. 28.

Mayo, A.L., and Tingey, D., 2014, Closed basin freshwater-brine groundwater interface and interactions – Pilot Valley, Utah-Nevada: Geological Society of America, Abs/w programs, v. 96, n. 6, p. 409.

South, J., McBride, J., Mayo, A., Tingey, D., and Rey K.A., 2014, Imaging the margins of Pleistocene lake deposits with high-resolution seismic reflection in the eastern Basin and Range: Pilot Valley, Utah (USA): Geological Society of America, Abs/w programs, v. 96, n. 6, p. 410.

Smilowitz, M. and Mayo, A.L., 2014, Using stable and radiogenic isotopes to resolve mine groundwater issues: Geological Society of America, Abs/w programs, v. 96, n. 6, p. 407.

Bianchin, M., Bent, H., and Mayo, A,L., 2014, Use of stable and radiogenic isotopes in an integrative approach for characterizing groundwater flow in a moderately fractured bedrock aquifer: Geological Society of America, Abs/w programs, v. 96, n. 6, p. 410.

Nelson, S.T., and Mayo, A.L., 2014, Assessing the importance of interbasin flow in the Great Basin, western USA: Geological Society of America, Abs/w programs, v. 96, n. 6, p. 410.

Mayo, A.L., 2013, Major ion and isotopic geochemistry: Beyond stiff diagrams and trilinear plots: Nevada Water Resources Association, 2013 Mine Water Management Symposium Program January 28-29, 2013, Program, p. 21.

Mayo, A.L., 2013, Mine specific examples of isotopic applications – using isotopes to evaluate connectivity of water resources: Nevada Water Resources Association, 2013 Mine Water Management Symposium Program January 28-29, 2013, Program, p. 21.

Mayo, A.L., Bruthans, J., Himes, S., 2012, Using heat flow and radiocarbon ages to calculate the recharge zone of thermal groundwater systems in granitoid rocks: International Conference on Groundwater in Fractured Rocks, International Association of Hydrogeologists, May 21-24, 2012, Prague, Czech Republic

Nelson, S.T., Mayo, A.L., Gillespie, J., and Tingey, D., 2011, Conceptual groundwater flow models matter: Trans-boundary flow in the arid Great Basin: Geological Society of America, Abs/w programs, v. 43, n. 4, p. 59

Mayo, A.L., 2010, Well bore cross-aquifer contamination: International Association of Hydrogeologists, XXXVII Congress, September 12-17, Krakow, Poland, Extended Abstracts, p. 201.

Mayo, A.L, Bruthans, J., Tingey, D., McBride J., Radebaugh, J., and Wiggins, S., 2010, Pre-fluvial incipient bedrock channel development: preliminary investigation of the role of phreatic fracture flow and vadose weathering: Geological Society of America, Abs/w programs, v. 42, n. 5, paper 72-2.

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