

CURRICULUM VITAE
(updated January, 2020)**CONTACT INFORMATION**

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USGS profile: <https://www.usgs.gov/staff-profiles/charles-n-alpers>

EDUCATION

University of California, Berkeley (9/81 – 8/86)
M.A. in Geology, December, 1983
Ph.D. in Geology, December, 1986
Ph.D. dissertation: "Geochemical and Geomorphological Dynamics of Supergene Copper Sulfide Ore Formation and Preservation at La Escondida, Antofagasta, Chile"

Harvard University (9/75 – 6/77 and 9/78 – 6/80)
A.B., Magna cum Laude, in Geological Sciences, June, 1980
Senior honors thesis: "Mineralogy, Paragenesis, and Zoning of the Luz Vein, Uchucchacua District, central Peru"

WORK EXPERIENCE

Research Chemist, GS-15 (5/18 – present)
Research Chemist, GS-14 (9/94 – 5/18)
Research Chemist, GS-13 (9/91 – 9/94)
U.S. Geological Survey, Water Mission Area, California Water Science Center
(formerly California District Office), Sacramento, California

Chief scientist on projects related to the environmental geochemistry of mineral deposits and the fate and transport of trace metals in groundwater and surface water. Past work has included studies of acid mine drainage, sulfate minerals, and trace-metal fate and transport in groundwater at Penn Mine, in underground mine workings at the Iron Mountain mine and Copper Bluff mine, CA, and in surface water and contaminated sediment in Keswick Reservoir and the Sacramento River. Current research includes multi-disciplinary investigations of: (1) mercury contamination and bioaccumulation associated with historical gold mining in the Sierra Nevada and Trinity Mountains, CA, mercury mining in the Coast Ranges, CA, and wetlands of the Cache Creek Settling Basin, CA; (2) effects of wildfire on metal transport in the Cache Creek Basin, (Rocky Fire, 2015; Mendocino Complex Fire, 2018) and in the Butte Creek Basin (Camp Fire, 2018), (3) erosion rates and sediment sources at Malakoff Diggins State Historic Park, CA; (4) copper and zinc geochemistry in acid mine waters and formation of iron-rich pipe scale at Iron Mountain, CA; and (5) statewide assessment of risk to humans and ecological receptors of abandoned mine lands in California by adding mineral deposit type to the USGS Mineral Resources Data System and developing relative risk factors. As project chief of several large, multi-disciplinary projects, is actively involved with outreach and coordination with stakeholder groups including federal, state, and local agencies as well as non-profit organizations. Serves on several technical advisory committees.

WORK EXPERIENCE (cont.)

- Assistant Professor (1/90 – 9/91)
Department of Geological Sciences
McGill University, Montréal, Québec, Canada
Taught courses in Environmental Geology, Geochemical Modeling, and Hydrogeochemistry of Contaminated Sites
- Chemist, GS-12 (9/89 – 12/89)
U.S. Geological Survey, Water Resources Division
Menlo Park, California
- Post-doctoral Research Associate (NRC Fellow) (9/87 – 8/89)
National Academy of Sciences/National Research Council
Research Advisor - D.K. Nordstrom
U.S. Geological Survey, Water Resources Division
Menlo Park, California
- Visiting Assistant Professor (9/86 – 8/87)
Dept. of Geological Sciences
University of Michigan, Ann Arbor
- Teaching Assistant (8/83 – 12/83 and 1/86 – 5/86)
for Professors H.C. Helgeson and W.E. Dietrich
Dept. of Geology and Geophysics
University of California, Berkeley
- Research Assistant (6/82 – 8/83 and 1/84 – 12/85)
Research Advisor - Prof. G. Brimhall
Dept. of Geology and Geophysics
University of California, Berkeley
- Exploration Geologist (6/80 – 6/81)
ASARCO, Inc.
Tucson, Arizona
- Research Associate (1/78 – 8/78)
Energy and Environmental Analysis, Inc.
Arlington, Virginia
- Roughneck (10/77 – 11/77)
Signal Drilling Co.
Rock Springs, Wyoming

ACADEMIC AFFILIATIONS

- Research Associate, Univ. of California, Davis, Dept. of Geology, 2001 – present
- Adjunct Professor, California State University, Sacramento, Geology Dept., 2006 – present

GRADUATE STUDENTS ADVISED / THESIS COMMITTEES***Doctoral Students***

1. Dold, Bernhard, 1999, "Mineralogical and geochemical changes of copper flotation tailings in relation to their original composition and climatic setting — Implications for acid mine drainage and element mobility." Ph.D. thesis, University of Geneva, Switzerland. (external examiner; primary advisor Prof. Lluís Fontboté)
2. Parsons, Michael, 2001, "Geochemical and mineralogical controls on trace element release from base-metal smelter slags." Ph.D. thesis, Dept. of Geology, Stanford University, Stanford, CA, 307 p. (committee member; primary advisor Prof. Dennis Bird)
3. Sobron, Pablo, 2008, "Raman spectroscopy of sulfate efflorescences from Iron Mountain Superfund Site, California." Ph.D. thesis, Centro de Astrobiología, Facultad de Ciencias, Universidad de Valladolid, Spain. (external examiner; primary advisor Prof. Fernando Ruhl)
4. Gibson, Blair D., 2011, "Integrated methods for characterizing the passive treatment of mercury and selenium in groundwater and sediment." Ph.D. thesis, Dept. of Earth and Environmental Sciences, University of Waterloo, Ontario, Canada. (external examiner; primary advisor Prof. Carol Ptacek)
5. DeSisto, Stephanie, 2014, "Hydrogeochemical evaluation and impact of remediation design on arsenic mobility at historical gold mine sites." Ph.D. thesis, Dept. of Geological Sciences and Geological Engineering, Queen's University, Kingston, Ontario, Canada. (external examiner; primary advisor Prof. Heather Jamieson)
6. Williams, Amy J., 2014, "Geobiology of acid-saline systems: implications for early martian habitats," Dept. of Geology, Univ. of California, Davis, California. (committee member; primary advisor Prof. Dawn Sumner)
7. Helmrich, Stefanie (in progress, expected 2020 or 2021), "Development of a thermodynamic-kinetic biogeochemical model of mercury cycling and application to field sites in northern California," Environmental Studies Graduate Program, Univ. of California, Merced, California (committee member; primary advisor Prof. Peggy O'Day).
8. Martinez, Emilia (in progress, expected 2022 or 2023), "Gradualism versus catastrophism during Neoproterozoic sulfidic intervals: Sulfur and iron chemistry from the first appearance of euxinia through a giant impact," (committee member for qualifying exam; primary advisor Prof. Dawn Sumner).

Master's Students

1. Rogers, Teresa M., 1996, "Bacterial diversity in acid mine drainage from Iron Mountain, Shasta County, California: a 16S ribosomal DNA approach." M.Sc. thesis, University of Wisconsin, Madison, WI. (committee member; primary advisor Prof. Jillian Banfield)
2. Robinson, Clare, 1999, "The role of jarosite and copiapite in the chemical evolution of acid drainage waters, Richmond Mine, Iron Mountain, California." M.Sc. thesis, Dept. of Geological Sciences and Geological Engineering, Queen's University, Kingston, Ontario, Canada, 206 p. (committee member; primary advisor Prof. Heather Jamieson)
3. Shipp, William G., 2001, "Determination of acid mine drainage using lake sediment porefluid geochemistry: Sulphur Bank Mercury Mine, Clear Lake Oaks, California." M.Sc. thesis, Dept. of Geology, University of California, Davis, CA, 129 p. (committee member; primary advisor Prof. Robert

Zierenberg)

4. Bambic, Dustin, 2004, "Hydrobiogeochemical cycling of copper and zinc near an AMD-affected stream." M.Sc. thesis, Dept. of Land, Air, and Water Resources, University of California, Davis, CA. (committee member; primary advisor Prof. Wendy Silk)
5. Phillippe, Jeanne, 2005, "Geochemical constraints on Herman Pit: Sulphur Bank Mercury Mine, US EPA Superfund Site." M.Sc. thesis, Dept. of Geology, University of California, Davis, CA. (committee member; primary advisor Prof. Robert Zierenberg)
6. Livingston, James, 2007, "The paragenesis of metal sulfate minerals in acid mine drainage environments and the synthesis of magnesiocopiapite." M.Sc. thesis, Dept. of Geology, California State University, Chico, CA, 174 p. (committee member; primary advisor Prof. William Murphy)
7. Tangalos, George, 2008, "Fe isotope fractionation by microbial iron reduction in a modern banded iron formation analog." M.Sc. thesis, Department of Geoscience, University of Wisconsin, Madison, WI. (committee member; primary advisor Prof. Eric Roden)
8. Burlak, Tamsen, 2012, "Geochemistry of iron- and arsenic-bearing minerals in soil and bedrock associated with gold-quartz vein mineralization at Empire Mine State Historic Park, Nevada County, California." M.Sc. thesis, Department of Geology, California State University, Sacramento, CA. (primary advisor)
<http://csus-dspace.calstate.edu/handle/10211.9/1885>
9. Stumpner, Elizabeth, 2014, "Development of best practices for preservation of reactive mercury(II) in sediment samples from three areas in northern California." M.Sc. thesis, Department of Geology, California State University, Sacramento, CA. (committee member; primary advisor Dr. Mark Marvin-DiPasquale) <http://csus-dspace.calstate.edu/handle/10211.3/123075>
10. Flower, Christopher, 2014, "Groundwater and soil geochemistry variation and correlation in the vicinity of Bakersfield, California." M.Sc. thesis, Department of Geology, California State University, Sacramento, CA. (primary advisor) <http://csus-dspace.calstate.edu/handle/10211.3/131642>
11. Haight, Erica M., 2014, "Spatial variation and correlation in groundwater and soil geochemistry in the southeast San Joaquin Valley, in the vicinity of Fresno, California." M.Sc. thesis, Department of Geology, California State University, Sacramento, CA. (primary advisor) <http://csus-dspace.calstate.edu/handle/10211.3/131644>
12. Siegel, Emily S., 2014, "A statistical approach to understanding influences on groundwater chemistry in California's central coast." M.Sc. thesis, Department of Geology, California State University, Sacramento, CA. (committee member; primary advisor Dr. Joseph Domagalski) <http://csus-dspace.calstate.edu/handle/10211.3/131571>
13. Sparks, Geneviève C., 2016, "Mercury and methylmercury related to historical mercury mining in three tributaries to Lake Berryessa, upper Putah Creek watershed, California." M.Sc. thesis, Department of Geology, California State University, Sacramento, CA. (committee member; primary advisor Prof. Timothy Horner) <http://csus-dspace.calstate.edu/handle/10211.3/171301>
14. Ward, Alfred John (in progress, expected 2020) "Mineralogical and geochemical fingerprinting of sediment sources at Malakoff Diggins State Historic Park, California." M.Sc. thesis, Department of Geology, California State University, Chico, CA. (committee member; primary advisor Prof. Carrie Monohan)
15. Hedgpeth, Michael (in progress, expected 2020), "Mineralogical and geochemical variations and

depositional history of floodplain sediment in the Cache Creek Settling Basin, Yolo County, California.” M.Sc. thesis, Department of Geology, California State University, Sacramento, CA. (primary advisor A. Wagner)

16. McVey, Connor (in progress, expected 2021 or 2022), “Characterization of mine waste at Sulphur Bank Mercury Mine, California.” M.Sc. thesis, Department of Geology, California State University, Sacramento, CA. (committee member; primary advisor A. Wagner)

PROFESSIONAL AND ACADEMIC RESPONSIBILITIES

- Lead organizer for session on “Water and land management to reduce methylmercury bioaccumulation” at SETAC North America 39th Annual Meeting, Sacramento, CA, November, 2018
- Chaired session on “Assembling the puzzle pieces: Synthesis of mercury science in the San Francisco Bay-Delta and beyond – Part 2” at 9th Biennial Bay-Delta Science Conference, Sacramento, CA, November, 2016
- Co-organized theme sessions (oral and poster) on “Importance of redox processes in biogeochemistry” for 2015 Goldschmidt Meeting, Prague, Czech Republic, August 2015
- Member of Executive Organizing Committee, 2014 Goldschmidt Meeting, Sacramento, CA, June 2014, for The Geochemical Society
- Co-organized theme sessions (oral and poster) on “Biogeochemistry, bioaccumulation, bioavailability, and bioaccessibility of trace metals and metalloids in aquatic and terrestrial systems” (44 oral and 54 poster presentations) for 2014 Goldschmidt Meeting, Sacramento, CA, June 2014
- Co-organized and co-chaired topical sessions (oral and poster) on “Celebrating the scientific contributions of Kirk Nordstrom – Part 1: Acid to neutral mine drainage, geochemistry of iron and sulfur, sulfate minerals, natural background, and geochemical modeling and Part 2: Geochemistry of arsenic and antimony, microbial biogeochemistry, geothermal systems, radioactive waste disposal, and geochemical modeling,” 2013 annual meeting of the Geological Society of America, Denver, CO, October 2013
- Co-organized and co-chaired topical sessions (oral and poster) on “Vapors, Brines, Sulfides, and Mines: Understanding Metal Mobility in Magma-Hydrothermal Systems and their Supergene Successors” at Annual Meeting of the Geological Society of America, Denver, CO, October 2010
- Co-organized and co-chaired special session (poster) on “Peat Soils: Natural Archives of Information on Sea Level Rise, Landscape Evolution, and Anthropogenic Disturbance” at Fall Meeting of American Geophysical Union, San Francisco, CA, December 2008
- Co-organized and co-chaired topical sessions (oral and poster) on “Sulfate Minerals in High- and Low-Temperature Environments: A tribute to Robert O. Rye,” Annual Meeting of the Geological Society of America, Reno, NV, November 2000
- Co-organized short course on “Sulfate Minerals: Crystallography, Geochemistry, and Environmental Significance”, co-sponsored by the Mineralogical Society of America and The Geochemical Society, Tahoe City, CA, November 2000
- Associate Editor, Economic Geology, 1999–2003
- Co-organized and/or co-chaired four special sessions on historical mining at Centennial Meeting of the Cordilleran Section of the Geological Society of America, Berkeley, CA, June 1999
- Co-organized special sessions on “Environmental Chemistry of Sulfide Oxidation” at Annual Meeting of the American Chemical Society, Washington, D.C., August 1993
- Post-doctoral Resident Research Associate, 1987–1989

TECHNICAL ADVISORY PANELS

- 2019–present Technical Subcommittee, Blue Ribbon Committee for the Rehabilitation of Clear Lake, Lake County, CA
- 2003–present Technical Advisory Committee, Sulphur Bank Mercury Mine Superfund Site, for U.S. Environmental Protection Agency, Region 9, San Francisco, CA
- 1987–present Technical Advisory Committee, Iron Mountain Mine Superfund Site, for U.S. Environmental Protection Agency, Region 9, San Francisco, CA
- 2010–2015 Technical Advisory Committee, Leviathan Mine (CA) Superfund Site, for U.S. Environmental Protection Agency, Region 9, San Francisco, CA
- 2011–2012 Technical Advisory Committee, Cordero Mine (NV) Superfund Site, for U.S. Environmental Protection Agency, Region 9, San Francisco, CA
- 2009–2011 Technical Advisory Committee, Comins Lake (NV) Superfund Site, for U.S. Environmental Protection Agency, Region 9, San Francisco, CA
- 2007–2010 Science Review Panel, Questa Rock Pile Stability and Weathering Study, for Acid Drainage Technology Initiative (ADTI) and Chevron Minerals, Inc. (formerly Molycorp), Questa, NM
- 2006–2008 Leader of Mercury Team, CALFED Delta Regional Ecosystem Restoration Implementation Plan (DRERIP).
- 2006–2007 Agency Science Advisory Panel, Sierra Mining Toxics Initiative, Sierra Fund, Nevada City, CA
- 2004–2007 Review Panel, Copper Water-Effect Ratio (WER) Study for the Los Angeles River, for City of Los Angeles, CA and City of Burbank, CA
- 2004–2005 Review Panel, Questa Baseline and Pre-Mining Ground-Water Quality Investigation, Questa, NM, for U.S Geological Survey, Boulder, CO
- 2003–2004 Review Panel, Project on “Co-production of Silica from Geothermal Fluids” by Lawrence Livermore National Laboratory, for California Energy Commission, Sacramento, CA
- 1997–2002 Technical Advisory Committee, Penn Mine Long-Term Remediation, for Central Valley Regional Water Resources Control Board, Rancho Cordova, CA, and East Bay Municipal Utility District, Oakland, CA

STEERING COMMITTEES, TEAMS AND COUNCILS

- 2007–2014 California Environmental Legacy Project (CELP) Steering Committee: Coordinated technical reviews by USGS scientists on film scripts including *Becoming California*, a feature-length documentary that won two Regional EMMY awards in 2015.
- 2012–2013 Co-chair, Science and Engineering Exposition on Water (SEewater 2013), an outreach event by the U.S. Geological Survey and Sacramento State (planned for April, 2013 but cancelled because of federal government sequester)
- 2008–2011 U.S. Geological Survey California Water Science Center Diversity Team (ex-officio member)
- 2007–2009 U.S. Geological Survey Diversity Council
- 2006–2009 STEM (Science, Technology, Engineering, and Mathematics) Steering Committee, California State University Sacramento

1992–1994 U.S. Geological Survey Strategic Planning Team

MANUSCRIPT REVIEWS

Colleague reviews have been completed since 2001 for the following peer-reviewed journals:

American Mineralogist
Applied Geochemistry
Chemical Geology
Ecological Applications
Economic Geology
Environmental Health Perspectives
Environmental Science & Technology
Geochimica et Cosmochimica Acta
International Journal of Speleology
Journal of Environmental Quality
Journal of South American Geology
Nevada Water Resources Association Journal
PLOS One
Science of the Total Environment

In addition, I typically complete several peer reviews per year for USGS reports, journal articles, conference proceedings, and abstracts by USGS authors. On several occasions I have acted as the Water Quality Specialist for the California Water Science Center in reviewing USGS reports.

REVIEWS OF PROPOSALS AND TECHNICAL DOCUMENTS

Reviews of proposals and technical reports have been completed since 2001 for the following institutions:

American Chemical Society, Petroleum Research Fund
Bureau of Land Management
California Department of Fish and Game
California Energy Commission
California Water Resources Center
CALFED (California Bay-Delta Authority)
Deutsche Forschungsgemeinschaft (DFG) (Government of Germany)
FONDECYT's Study Group of the Earth Science (Government of Chile)
Hudson River Foundation
National Academy of Sciences (NAS) — U.S. Science and Technology (S&T) Cooperation Program
National Aeronautics and Space Administration (NASA) — Mars Fundamental Research
National Science Foundation (NSF)
National Science and Engineering Research Council of Canada (NSERC)
Swiss National Science Foundation (SNSF)
U.S. Department of Agriculture — Forest Service
U.S. Geological Survey

REVIEW PANELS FOR PROMOTIONS AND AWARDS

- 1994 U.S. Geological Survey, Water Resources Division, Research Grade Evaluation Peer Review Panel, Groundwater Chemistry Discipline
- 2008 Bucknell University, Dept. of Geology, Promotion Panel
- 2017 Univ. of Saskatchewan, Dept. of Geological Sciences, Promotion Panel
- 2017–19 Geological Society of America, Mineralogy-Geochemistry-Petrology-Volcanology (MGPV) Distinguished Geological Career Award panel

AWARDS AND PROFESSIONAL RECOGNITION

- Recipient of 2019 Gold Award for Exceptional Service (team) from the U.S. Environmental Protection Agency for the Iron Mountain Mine Response Team (“*For successful implementation of the Iron Mountain Mine Carr Fire emergency response...*”) Shasta County, California, July-August, 2018.
- 2019 PROSE Award (Association of American Publishers) Subject Category Winner for Multivolume Reference/Science – *The Encyclopedia of Geochemistry*, edited by William M White, Jan. 2019 <https://newsroom.publishers.org/association-of-american-publishers-announces-subject-category-winners-of-2019-prose-awards/>
- USGS Performance Award (group): Nov. 2016 – for participation in Society of Environmental Journalists Conference, Sacramento, CA, Sept. 2016
- USGS Performance Awards (individual): fiscal years 1992, 1993, 2009, 2010, 2011, 2013, 2014, 2015, 2016, 2017, 2018
- USGS Quality Step Increase: 2002
- USGS Special Act Service Awards: 1992, 1994
- Sierra Crest Award for being a “visionary leader helping communities reclaim the Sierra,” at “Reclaiming the Sierra: Community Summit on Mining Impacts,” The Sierra Fund, Nevada City, CA, Nov. 2010
- Alpersite, a new mineral, approved by the International Commission on New Mineral Names, October 2003 [see Peterson, R.C., Hammarstrom, J.M., and Seal, R.R., II, 2006, Alpersite (Mg, Cu)SO₄·7H₂O, a new mineral of the melanterite group, and cuprian pentahydrate: Their occurrence within mine waste: *American Mineralogist*, v. 91, p. 261–269.]
- Editor’s Citation for Excellence in Manuscript Review, *Journal of Environmental Quality*, 1997
- Evan Just Award, San Francisco Section of the American Institute of Mining Engineering, 1986
- W.W. van Arsdale Fellow, University of California, Berkeley, 1981–82
- Dean’s List, Harvard College, 1975–76, 1976–77, 1978–79, 1979–80

PEER-REVIEWED PUBLICATIONS, THESES, AND CONFERENCE PROCEEDINGS

1980

1. Alpers, C.N., 1980, *Mineralogy, Paragenesis, and Zoning of the Luz Vein, Uchucchacua District, Central Peru*: Senior honors thesis, Harvard University, Cambridge, MA, 138 p.

1985

2. Brimhall, G.H., Alpers, C.N., and Cunningham, A.B., 1985, Analysis of supergene ore-forming processes and ground-water solute transport using mass balance principles: *Economic Geology*, v. 80, p. 1227–1256. (Concept and design 30%; Data collection 30%; Interpretation 30%; Writing 30%). <http://econgeol.geoscienceworld.org/content/80/5/1227> doi:10.2113/gsecongeo.80.5.1227

1986

3. Alpers, C.N., 1986, *Geochemical and Geomorphological Dynamics of Supergene Copper Sulfide Ore Formation and Preservation at La Escondida, Antofagasta, Chile*: Ph.D. dissertation, University of California, Berkeley, CA, 220 p.

1987

4. Stoffregen, R.E. and Alpers, C.N., 1987, Woodhouseite and svanbergite in hydrothermal ore deposits: Products of apatite destruction during advanced argillic alteration: *Canadian Mineralogist*, v. 45, p. 201–211. (Concept and design 40%; Data collection 50%; Interpretation 50%; Writing 40%). <http://www.canmin.org/content/25/2/201.full.pdf+html>

1988

5. Alpers, C.N., and Brimhall, G.H., 1988, Middle Miocene climatic change in the Atacama Desert, northern Chile: Evidence from supergene mineralization at La Escondida: *Geological Society of America Bulletin*, v. 100, p. 1640–1646. (Concept and design 90%; Data collection 100%; Interpretation 80%; Writing 90%). <https://pubs.geoscienceworld.org/gsabulletin/article-lookup/100/10/1640> doi: 10.1130%2F0016-7606%281988%29100%3C1640%3AMMCCIT%3E2.3.CO%3B2

1989

6. Alpers, C.N., and Brimhall, G.H., 1989, Paleohydrologic evolution and geochemical dynamics of cumulative supergene metal enrichment at La Escondida, Atacama Desert, northern Chile: *Economic Geology*, v. 84, p. 229–255. (Concept and design 90%; Data collection 100%; Interpretation 80%; Writing 90%). <http://econgeol.geoscienceworld.org/content/84/2/229> doi: 10.2113/gsecongeo.84.2.229
7. Alpers, C.N., Nordstrom, D.K., and Ball, J.W., 1989, Solubility of jarosite solid solutions precipitated from acid mine waters, Iron Mountain, California, U.S.A.: *Sciences Géologiques, Bulletin*, v. 42, p. 281–298. (Concept and design 90%; Data collection 100%; Interpretation 80%; Writing 90%). https://www.researchgate.net/profile/Charles_Alpers/publication/229083990_Solubility_of_jarosite_solid_solutions_precipitated_from_acid_mine_waters_Iron_Mountain_California_USA/links/0fcfd5001758c32dca000000.pdf

1990

8. Alpers, C.N., and Nordstrom, D.K., 1990, Stoichiometry of mineral reactions from mass balance computations for acid mine waters, Iron Mountain, California, in Gadsby, J.W., Mallick, J.A., and Day, S.J., eds., *Acid Mine Drainage — Designing for Closure*, Bi-Tech Pub. Ltd.: Vancouver, British Columbia, Canada, p. 23–33. (Concept and design 80%; Data collection 80%; Interpretation 80%; Writing 95%).

9. Alpers, C.N., and Whittemore, D.O., 1990, Hydrogeochemistry and stable isotopes of ground and surface waters from two adjacent closed basins, Atacama Desert, northern Chile: *Applied Geochemistry*, v. 5, p. 719–734. (Concept and design 90%; Data collection 60%; Interpretation 90%; Writing 80%). <http://www.sciencedirect.com/science/article/pii/088329279090067F> doi: 10.1016/0883-2927(90)90067-F
10. Alpers, C.N., Dettman, D., Lohmann, K.C., and Brabec, D., 1990, Stable isotopes of carbon dioxide in soil gas over massive sulfide mineralization at Crandon, Wisconsin: *Journal of Geochemical Exploration*, v. 38, p. 69–86. (Concept and design 90%; Data collection 60%; Interpretation 90%; Writing 90%). <http://www.sciencedirect.com/science/article/pii/037567429090093P> doi: 10.1016/0375-6742(90)90093-P
11. Bussell, M.A., Alpers, C.N., Petersen, U., Shepherd, T.J., Bermudez, C., and Baxter, A.N., 1990, The Ag-Pb-Zn-Mn skarn, vein, and replacement deposits at Uchucchacua, Peru: studies of structure, mineralogy, metal zoning, Sr isotopes, and fluid inclusions: *Economic Geology*, v. 85, p. 1348–1383. (Concept and design 30%; Data collection 30%; Interpretation 30%; Writing 30%). <http://econgeol.geoscienceworld.org/content/85/7/1348> doi: 10.2113/gsecongeo.85.7.1348
12. Nordstrom, D.K., Burchard, J.M., and Alpers, C.N., 1990, The production and variability of acid mine drainage at Iron Mountain, California: A Superfund site undergoing rehabilitation, in Gadsby, J.W., Mallick, J.A., and Day, S.J., eds., *Acid Mine Drainage — Designing for Closure*, Bi-Tech Pub. Ltd.: Vancouver, British Columbia, Canada, p. 13–21. (Concept and design 40%; Data collection 50%; Interpretation 50%; Writing 25%).

1991

13. Alpers, C.N., and Nordstrom, D.K., 1991, Evolution of extremely acid mine waters at Iron Mountain, California: Are there any lower limits to pH?, in *Proceedings, Second International Conference on the Abatement of Acidic Drainage*, Montréal, Québec, Canada, September 16-18, 1991, MEND (Mine Environment Neutral Drainage): Ottawa, Canada, v. 2, p. 321–342. (Concept and design 80%; Data collection 80%; Interpretation 80%; Writing 90%).

1992

14. Alpers, C.N., Nordstrom, D.K., and Burchard, J.M., 1992, *Compilation and interpretation of water-quality and discharge data for acidic mine waters at Iron Mountain, Shasta County, California, 1940-91*. U.S. Geological Survey Water-Resources Investigations Report 91-4160, 173 p. (Concept and design 50%; Data collection 50%; Interpretation 90%; Writing 90%). <https://pubs.er.usgs.gov/publication/wri914160>
15. Alpers, C.N., Rye, R.O., Nordstrom, D.K., White, L.D., and King, Bi-Shia, 1992, Chemical, crystallographic, and isotopic properties of alunite and jarosite from acid hypersaline Australian lakes: *Chemical Geology*, v. 96, p. 203–226. (Concept and design 90%; Data collection 60%; Interpretation 90%; Writing 80%). <http://www.sciencedirect.com/science/article/pii/000925419290129S> doi: 10.1016/0009-2541(92)90129-S
16. Stoffregen, R.E. and Alpers, C.N., 1992, Observations on the cell dimensions, water contents and δD of natural and synthetic alunite: *American Mineralogist*, v. 77, p. 1092–1098. (Concept and design 40%; Data collection 50%; Interpretation 40%; Writing 30%). http://www.minsocam.org/ammin/AM77/AM77_1092.pdf

1993

17. Alpers, C.N., and Blowes, D.W. (eds.), 1993, *Environmental Geochemistry of Sulfide Oxidation*. ACS Symposium Series, v. 550, American Chemical Society: Washington D.C., 681 p. (Concept and

design 60%; Data collection NA; Interpretation NA; Writing (editing) 60%).
<http://pubs.acs.org/isbn/9780841227729> doi: 10.1021/bk-1994-0550

18. Alpers, C.N., and Blowes, D.W., 1993, Preface: In *Environmental Geochemistry of Sulfide Oxidation*, Alpers, C.N., and Blowes, D.W. (eds.), ACS Symposium Series, v. 550, American Chemical Society: Washington D.C., p. xii-xiv. (Concept and design 60%; Data collection NA; Interpretation NA; Writing 60%). <http://pubs.acs.org/isbn/9780841227729> doi: 10.1021/bk-1994-0550.pr001
19. Alpers, C.N., Nordstrom, D.K., and Thompson, J.M., 1993, Seasonal variations in the Zn/Cu ratio of acid mine drainage from Iron Mountain, California, in Alpers, C.N., and Blowes, D.W. (eds.), *Environmental Geochemistry of Sulfide Oxidation*, ACS Symposium Series, v. 550, American Chemical Society: Washington D.C., p. 324–344. (Concept and design 90%; Data collection 90%; Interpretation 90%; Writing 90%). <http://pubs.acs.org/isbn/9780841227729> doi: 10.1021/bk-1994-0550.ch022

1994

20. Alpers, C.N., Blowes, D.W., Nordstrom, D.K., and Jambor, J.L., 1994, Secondary Minerals and Acid Mine-Water Chemistry, in Jambor, J.L., and Blowes, D.W. (eds.), *Environmental Geochemistry of Sulfide Mine-Wastes*, Mineralogical Association of Canada, Short Course Notes, v. 22, Waterloo, Ontario, p. 247–270. (Concept and design 70%; Data collection 70%; Interpretation 70%; Writing 70%).

1995

21. Alpers, C.N., 1995, Responsibilities and activities of the U.S. Geological Survey related to mining and the environment, in *Workshop Report: Mine Waste Technical Forum*, Las Vegas, NV, July 25–27, 1995, U.S. Environmental Protection Agency, Washington, D.C., p. 3-53 to 3-63.
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172. Williams, A.J., Sumner, D.Y., Alpers, C.N., and Campbell, K.M., 2013b, Formation and biogenicity of hydrous ferric oxide mineralized microbial filaments at Iron Mountain, CA. 10th Annual Southern California Geobiology Symposium, Pasadena, CA, April 6, 2013. (TALK, presented by Williams) (IP-044512, USGS-approved June 12, 2013)
- 2014**
173. Alpers, C.N., Slotton, D.G., Orlando, J.L., Yee, J.L., Ackerman, J.T., Marvin-DiPasquale, M., Fleck, J.A., and Stumpner, E., 2014a, Distribution of historical gold mines helps predict mercury in fish tissue, Sierra Nevada, CA, USA. Goldschmidt 2014, Sacramento, CA, June 8–13, 2014. (PRESENTED POSTER). <https://goldschmidt.info/2014/abstracts/abstractView?abstractId=4808>
174. Alpers, C.N., Stumpner, E., Orlando, J.L., Fleck, J.A., and Marvin-DiPasquale, M., 2014b, Mercury contamination in water and sediment related to historical gold mining, Sierra Nevada, CA.

- Goldschmidt 2014, Sacramento, CA, June 8–13, 2014. (POSTER, presented by Stumpner) (IP-055832, USGS-approved April 1, 2014)
<https://goldschmidt.info/2014/abstracts/abstractView?abstractId=4810>
175. Basta, N.T., Whitacre, S., Meyers, P., Mitchell, V.L., Alpers, C.N., Foster, A.L., Casteel, S.W., and Kim, C.S., 2014, Using in vitro gastrointestinal and sequential extraction methods to characterize site-specific arsenic bioavailability. Goldschmidt 2014, Sacramento, CA, June 8–13, 2014. (TALK, presented by Basta)
<http://goldschmidt.info/2014/abstracts/abstractView?abstractId=2172>
176. Campbell, K.M., Alpers, C.N., Blum, A., Nordstrom, D.K., and Williams, A.J., 2014, Trace element accumulation in schwertmannite-rich precipitate in a pipeline carrying acid mine drainage at Iron Mountain Mine, CA, USA. Goldschmidt 2014, Sacramento, CA, June 8–13, 2014. (TALK, presented by Campbell) (IP-054643, USGS-approved Feb. 7, 2014)
<https://goldschmidt.info/2014/abstracts/abstractView?abstractId=3271>
177. Campbell, K.M., Alpers, C.N., Nordstrom, D.K., and Blum, A., 2014, Characterization and remediation of iron(III) oxide-rich scale in a pipeline carrying acid mine drainage at Iron Mountain Mine, California, U.S.A., in Bless, D. and Grosse, D. (eds.) U.S. EPA Proceedings of National Conference on Mining-Influenced Waters: Approaches for Characterization, Source Control and Treatment, August 12-14, 2014, Albuquerque, New Mexico, EPA/600/R-15/088, p. 59-60 (TALK, presented by Campbell) (IP-055873) Abstract:
<https://nepis.epa.gov/Exe/ZyPDF.cgi/P100MV2A.PDF?Dockey=P100MV2A.PDF>
Slides: https://clu-in.org/download/issues/mining/mining-influencedwater/Session_12_Water_Treatment/2_Campbell.pdf
178. Foster, A.L., Alpers, C.N., Burlak, T., Blum, A.E., Petersen, E.U., Basta, N.T., Whitacre, S., Casteel, S.W., Kim, C.S., and Brown, A.L., 2014, Arsenic chemistry, mineralogy, speciation, and bioavailability/bioaccessibility in soils and mine waste from the Empire Mine, CA, USA. Goldschmidt 2014, Sacramento, CA, June 8–13, 2014. (TALK, presented by Foster)
<http://goldschmidt.info/2014/abstracts/abstractView?abstractId=3341>
179. Marsh, E.E., Craw, D., Goldfarb, R.J., Alpers, C.N., Howell, R.J., and Lowers, H.A., 2014, Eocene paleoplacer gold, Sierra Nevada foothills, California: Characteristics and potential source(s). Geological Society of America, Annual Meeting, Portland, OR, Oct. 28-31, 2014. (TALK, presented by Marsh) (IP-058554).
<https://gsa.confex.com/gsa/2014AM/webprogram/Paper248904.html>
180. Nordstrom, D.K., and Alpers, C.N., 2014, Formation of iron-sulfate minerals by oxidation of pyrite and aqueous ferrous iron and evaporation of acid mine water. Geological Association of Canada / Mineralogical Association of Canada, Annual Meeting, Fredericton, New Brunswick, Canada, May 21-23, 2014. v. 37, p. 203 (INVITED KEYNOTE TALK, presented by Nordstrom) (IP-054905) <http://www.gac.ca/wp/wp-content/uploads/2011/09/AbstractVolume2014Final.pdf>
181. Sparks, G., Horner, T., Cornwell, K., Izzo, V., and Alpers, C.N., 2014, Upper Putah Creek Mercury Project. Eighth Biennial Bay-Delta Science Conference, Sacramento, CA, Oct. 28-30, 2014. (POSTER, presented by Sparks) (IP-057962, USGS-approved July 9, 2014)
182. Sparks, G., Horner, T., Cornwell, K., Izzo, V., and Alpers, C.N., 2014, Mercury and methylmercury related to historical mercury mining in three tributaries to Lake Berryessa, Putah Creek Watershed, California. American Geophysical Union, San Francisco, CA, Dec. 6-10, 2014. (POSTER, presented by Sparks) (IP-058765, USGS-approved Aug. 6, 2014)

<http://abstractsearch.agu.org/meetings/2014/FM/B43F-0313.html>

183. Williams, A.J., Sumner, D.Y., Alpers, C.N., Campbell, K.M., and Nordstrom, D.K., 2014, Biogenicity of hydrous ferric oxide mineralized microbial filaments and implications for detection with the Mars Curiosity Rover. Lunar and Planetary Science Conference, The Woodlands, TX, March 17-21, 2014. (TALK, presented by Williams) (IP-053593, USGS-approved Jan. 15, 2014)

2015

184. Alpers, C.N., 2015, Upstream prioritization through modeling: Sierra Nevada Mercury Impairment Project. Reclaiming the Sierra 2015: The New Gold Rush, Sacramento, CA, April 20-21, 2015. (INVITED TALK) (no abstract).
185. Alpers, C.N., 2015, Arsenic and mercury contamination from historical gold mining in the Sierra Nevada, California. 27th International Applied Geochemistry Symposium (IAGS) hosted by the Association of Applied Geochemists (AAG) in Tucson, AZ, April 20-24, 2015. (INVITED KEYNOTE TALK) (IP-063703, USGS-approved Feb. 23, 2015).
186. Alpers, C.N., Yee, J.L., Ackerman, J.T., Orlando, J.L., Slotton, D.G., and Marvin-DiPasquale, M.C., 2015, Mercury concentrations in fish and sediment within streams are influenced by watershed and landscape variables including historical gold mining in the Sierra Nevada, California, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015. (PRESENTED TALK) (IP-067356, USGS-approved Aug. 17, 2015). <http://abstractsearch.agu.org/meetings/2015/FM/B13I-06.html>
187. Campbell, K.M., Alpers, C.N., Runkel, R.L., and Nordstrom, D.K., 2015, Field and laboratory measurements for modeling microbial and abiotic Fe(II) oxidation at mine sites. Goldschmidt 2015, Prague, Czech Republic, August 20-24, 2015. (PRESENTED TALK) (IP-064785, USGS-approved April 2, 2015). <https://goldschmidt.info/2015/abstracts/abstractView?abstractId=5740>
188. Curtis, J.A., Alpers, C.N., Howle, J.F., Monohan, C., Ward, A.J., Bailey, T., Burke, B., and Walck, C., 2015, An investigation of upland erosion and sources of fine-grained sediment using aerial and terrestrial LiDAR, mineralogy, geochemistry, and particle-size, Humbug Creek and Malakoff Diggings State Historic Park, California. American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015. (POSTER, presented by Curtis) (IP-067683, USGS approved Sept. 11, 2015). <http://abstractsearch.agu.org/meetings/2015/FM/EP21C-0924.html>
189. Domagalski, J.D., Majewski, M.S., Alpers, C.N., and Eckley, C., 2015, Comparison of mercury mass loading in streams to atmospheric deposition in selected watersheds in the western United States: Evidence for non-atmospheric mercury sources. Society of Environmental Toxicology and Chemistry, North America, 36th Annual Meeting, Salt Lake City, Utah, November 1-5, 2015. (TALK, not presented) (IP-066162, USGS-approved June 10, 2015).
190. Domagalski, J.D., Majewski, M.S., Alpers, C.N., and Eckley, C., 2015, Comparison of mercury mass loading in streams to wet and dry atmospheric deposition in watersheds of the western US: Evidence for non-atmospheric mercury sources. American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015. (POSTER, presented by Domagalski) (IP-067898, USGS-approved Aug. 31, 2015). <http://abstractsearch.agu.org/meetings/2015/FM/B11D-0456.html>
191. Drexler, J.Z., and Alpers, C.N., 2015, A millennial-scale record of mercury and lead contamination in peatlands of the Sacramento-San Joaquin Delta of California. American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015. (POSTER, presented by Drexler) (IP-

067616, USGS-approved Aug. 13, 2015).

<http://abstractsearch.agu.org/meetings/2015/FM/GC13G-1239.html>

192. Drexler, J.Z., Alpers, C.N., Neymark, L.A., Paces, J.B., Taylor, H.E., and Fuller, C.C., 2015, The history of Pb and Hg contamination preserved in tidal peatlands in the Sacramento-San Joaquin Delta of California, USA. Coastal and Estuarine Research Federation Annual Meeting, Portland, OR, November 8-12, 2015 (POSTER, presented by Drexler) (IP-065345, USGS-approved May 8, 2015).
193. Sparks, G., Horner, T., Alpers, C.N., Cornwell, K., and Izzo, V., 2015, Mercury and methylmercury related to historical mercury mining in three tributaries to Lake Berryessa, Putah Creek Watershed, California. Reclaiming the Sierra 2015: The New Gold Rush, held in Sacramento, CA, April 20-21, 2015. (POSTER, presented by Sparks; won third place in student poster competition) (IP-062103, USGS-approved Jan. 8, 2015).

2016

194. Alpers, C.N., Campbell, K.M., Nordstrom, D.K., Carver, R., and Elbe, T., 2016, Spatial and temporal variations in mine water geochemistry and challenges for water treatment at Iron Mountain, California. 2016 Annual Meeting, Geological Society of America, Denver, CO, Sept. 25-28, 2016. Geological Society of America Abstracts with Programs. Vol. 48, No. 7. (PRESENTED TALK) (IP-077684, USGS-approved July 12, 2016). doi: 10.1130/abs/2016AM-286257 <https://gsa.confex.com/gsa/2016AM/webprogram/Paper286257.html>
195. Alpers, C.N., Marvin-DiPasquale, M., Ackerman, J.T., Fleck, J.A., Windham-Myers, L., and Brown, K.J., 2016, Mercury studies in the Cache Creek Settling Basin, Yolo County: Preliminary results from 2010–2014. Bay-Delta Science Conference, Sacramento, CA, November 15-17, 2016. (PRESENTED TALK) (IP-076538, USGS-approved June 3, 2016).
196. Alpers, C.N., Marvin-DiPasquale, M.C., Fleck, J.A., Ackerman, J.T., Eagles-Smith, C.A., Stewart, A.R., and Windham-Myers, L., 2016, Methods for investigating mercury speciation, transport, methylation, and bioaccumulation in watersheds affected by historical mining. American Geophysical Union, Fall 2016 meeting, San Francisco, CA, December 12-16, 2016 (PRESENTED TALK) (IP-078319, USGS-approved Aug. 3, 2016). <http://abstractsearch.agu.org/meetings/2016/FM/PA44A-01.html>
197. Campbell-Hay, K.M., Alpers, C.N., and Nordstrom, D.K., 2016, Challenges and potential benefits of managing acidic mining influenced water. 251st American Chemical Society National Meeting and Exposition, San Diego, CA, March 13-17, 2016. (TALK, presented by K. Campbell) (IP-070102, USGS-approved Oct. 27, 2015).
198. Foster, A.L., Alpers, C.N., Regnier, T.B., Blum, A., Petersen, E.U., Basta, N.T., Whitacre, S., Casteel, S., and Kim, C.S., 2016, Identifying predictors of arsenic bioavailability in low-sulfide, quartz-hosted gold deposits: case study at the Empire Mine State Historic Park, CA, USA. American Geophysical Union, Fall 2016 meeting, San Francisco, CA, December 12-16, 2016 (TALK, presented by A. Foster) (IP-078509, USGS-approved Aug. 2, 2016). <http://abstractsearch.agu.org/meetings/2016/FM/PA44A-06.html>
199. Mitguard, M., McMIndes, D.C., Hillenbrand, J., Hoang, K., Fears, R., Alpers, C.N., Seal, R.R., and Long, K.R., 2016, Development of GIS application for ranking and prioritizing mine sites for assessment and remediation in California. 2016 Annual Meeting, Geological Society of America, Denver, CO, Sept. 25-28, 2016. Geological Society of America Abstracts with Programs. Vol. 48, No. 7. (PRESENTED POSTER) (IP-077703, USGS-approved July 14, 2016). doi:

10.1130/abs/2016AM-287988

<https://gsa.confex.com/gsa/2016AM/webprogram/Paper287988.html>

200. Monohan, C., Alpers, C.N., and Marvin-DiPasquale, M., 2016, Mechanical Mercury Extraction Process® Test Results at Combie Reservoir. American Geophysical Union, Fall 2016 meeting, San Francisco, CA, December 12-16, 2016 (POSTER, presented by C. Monohan) (IP-087522, USGS-approved Aug. 10, 2016). <http://abstractsearch.agu.org/meetings/2016/FM/PA41B-2141.html>
201. Sparks, G.C., Alpers, C.N., Horner, T.C., Cornwell, K., and Izzo, V., 2016, Mercury and Methylmercury Related to Historical Mercury Mining in Three Major Tributaries to Lake Berryessa, Upper Putah Creek Watershed, California. American Geophysical Union, Fall 2016 meeting, San Francisco, CA, December 12-16, 2016 (TALK, presented by G. Sparks) (IP-078315, USGS-approved Aug. 2, 2016). <http://abstractsearch.agu.org/meetings/2016/FM/PA44A-04.html>
202. Ward, A.J., Monohan, C., Matiasek, S., Alpers, C.N., Curtis, J.A., Campbell, K.M., Roth, D.A., and Howle, J.F., 2016, Sediment source analysis at Malakoff Diggins State Historic Park, California. American Geophysical Union, Fall 2016 meeting, San Francisco, CA, December 12-16, 2016 (POSTER, presented by A.J. Ward) (IP-078321, USGS-approved Aug. 2, 2016). <http://abstractsearch.agu.org/meetings/2016/FM/PA41B-2139.html>
- 2017**
203. Alpers, C.N., Fleck, J.A., Marvin-DiPasquale, M., and Aiken, G., 2017, Influence of dissolved organic carbon on mercury transport in watersheds affected by historical gold and mercury mining in northern California. American Chemical Society, Spring 2017 national meeting, San Francisco, CA, April 2-6, 2017 (POSTER, not presented because of illness) (IP-081025, USGS-approved Oct. 31, 2016).
204. Alpers, C.N., Marvin-DiPasquale, M.C., Ackerman, J.T., Fleck, J.A., Arias, M.R., Windham-Myers, L., and Fuller, C.C., 2017, Hydrologic and biogeochemical factors affecting spatial and temporal variation of methylmercury in water, sediment, and biota in a managed floodplain, northern California, U.S.A. 13th International Conference on Mercury as a Global Pollutant, Providence, RI, July 16-21, 2017 (TALK, to be presented by Marvin-DiPasquale) (IP-082078, USGS-approved Jan. 4, 2017).
205. Alpers, C.N., Yee, J.L., Ackerman, J.T., Orlando, J.L., Slotton, D.G., and Marvin-DiPasquale, M.C., 2017, Prediction of fish and sediment mercury in Sierra Nevada streams using landscape variables and historical mining, Reclaiming the Sierra 2017, May 8-9, 2017, Sacramento, CA (PRESENTED TALK) (IP-083892, USGS-approved Feb. 17, 2017).
206. Fleck, J.A., Alpers, C.N., Marvin-DiPasquale, M., and Aiken, G., 2017, Relationships between dissolved organic matter and mercury cycling in California ecosystems affected by historic mining. American Chemical Society, Spring 2017 national meeting, San Francisco, CA, April 2-6, 2017 (POSTER, not presented because of illness) (IP-081001, USGS-approved Oct. 31, 2016).
207. Nachon, M., Sumner D., Alpers C.N., Campbell-Hay K.M., Grettenberger C., 2017, Diagenetic signatures within acidic lacustrine deposits on Earth – application to Mars. International Meeting of Sedimentology 2017, to be held October 10-12, 2017 in Toulouse, France (TALK or POSTER, to be presented by Nachon) (IP-088151, USGS-approved June 19, 2017).
208. Nordstrom, D.K., Bowell, R.J., Campbell, K.M., and Alpers, C.N., 2017, Challenges in recovering

resources from acid mine drainage. 13th International Mine Water Association Congress, June 25-30, 2017, Rauha, Finland (INVITED KEYNOTE TALK, presented by Nordstrom) (IP-086476, USGS-approved April 25, 2017).

209. Nordstrom, D.K., Alpers, C.N., and Campbell, K.M., 2017, The acid mine drainage legacy: Resource recovery as a remedial option. 2017 Annual Meeting, Geological Society of America, Seattle, WA, Oct. 22-25, 2017. Geological Society of America Abstracts with Programs. Abstract #303390. (TALK presented by Nordstrom)

2018

210. Alpers, C.N., Fuller, C.C., Marvin-DiPasquale, M.C., Arias, M.R., Hedgpeth, M., Brown, K., and Nosacka, J., 2018, Deposition rates of floodplain sediment in the Cache Creek Settling Basin based on vertical profiles of cesium-137 and mercury. Delta Stewardship Council, Biennial Bay-Delta Science Conference, 10th, Sacramento, Calif., September 10-12, 2018, Poster Abstracts, p. 157. (POSTER) (IP-097501, USGS-approved Apr. 23, 2018).
<http://scienceconf2018.deltacouncil.ca.gov/content/all-poster-abstracts>
211. Alpers, C.N., Marvin-DiPasquale, M.C., Fleck, J.A., Brown, K., and Nosacka, J., 2018, The effect of 2015 wildfires on concentrations of particulate total mercury in Cache Creek. 10th Biennial Bay-Delta Science Conference, Sept. 10-12, 2018, Sacramento, CA (TALK) (IP-097543, USGS-approved Apr. 25, 2018). <http://scienceconf2018.deltacouncil.ca.gov/content/all-oral-abstracts>
212. Alpers, C.N., Marvin-DiPasquale, M.C., Windham-Myers, L., Ackerman, J.T., Fleck, J.A., Stricker, C.A., and Brown, K., 2018, Importance of habitat to methylmercury distribution in water, sediment, and biota in a managed floodplain, northern California, U.S.A. SETAC North America 39th annual meeting, to be held in Sacramento, CA, Nov. 4-8, 2018. (TALK) (IP-098751, USGS-approved June 12, 2018).
213. Alpers, C.N., Wang, J., Lai, Y.G., King, V., Webster, J., Quinn, N., Weigand, J., Marvin-DiPasquale, M., and Fleck, J.A., 2018, Modeling the effects of wildfire on mercury and methylmercury transport at the watershed scale, 2018 Annual Meeting, California Water & Environmental Modeling Forum, April 2-4, 2018 in Folsom, CA (TALK) (IP-094624, USGS-approved Mar. 30, 2018).
214. Campbell, K.M., Alpers, C.N., and Nordstrom, D.K., 2018, Understanding coupled biogeochemical and mineralogical processes that control trace-metal fate in acidic mine water to support water treatment at Iron Mountain Mine, CA. 2018 Annual Meeting, American Chemical Society, New Orleans, LA, March 18-22, 2018 (TALK, presented by Campbell) (IP-091580, USGS-approved Oct. 12, 2017).
215. Fleck, J.A., DeParsia, E., Kraus, T., Ackerman, J., Stumpner, E., Krabbenhoft, D.P., Marvin-DiPasquale, M., Alpers, C.N., and Bachand, P., 2018, In situ coagulation systems can lower wetland mercury export and bioaccumulation. 2018 SETAC North America, Sacramento, CA, Nov. 2-4, 2018 (TALK, presented by J. Fleck) (IP-XXXXXX, USGS-approved June 13, 2018).
216. Foster, A.L., Alpers, C.N., Regnier, T., Blum, A.E., Petersen, E.U., Basta, N.T., Whitacre, S.D., Casteel, S.W., Kim, C.S., and Brown, A.L., 2018, Linking mineralogy to gastrointestinal bioavailability and bioaccessibility of arsenic at the Empire Mine State Park, CA, USA. 2018 Annual Meeting, Geological Society of America, Indianapolis, IN, Nov. 4-7, 2018. Geological Society of America Abstracts with Programs. Vol. 50, No. 6., paper no. 154-22. (TALK, to be presented by A. Foster) (IP-XXXXXX, USGS-approved) doi: 10.1130/abs/2018AM-322818

217. Helmrich, S., Vlassopoulos, D., Alpers, C.N., and O'Day, P.A., 2018, Critical review of mercury methylation and demethylation rate laws for biogeochemical reaction modeling. 2018 Goldschmidt Conference, Boston, MA, Aug. 12-18, 2018 (TALK, presented by Helmrich) (IP-097099, USGS-approved Apr. 10, 2018).
218. Helmrich, S., Vlassopoulos, D., Alpers, C.N., and O'Day, P.A., 2018, Simulation of biogeochemical processes driving methylmercury production in different sediment habitats of the Delta. Delta Stewardship Council, Biennial Bay-Delta Science Conference, 10th, Sacramento, Calif., September 10-12, 2018, Oral Abstracts, p. 232, (TALK, presented by Helmrich) (IP-097411, USGS-approved Apr. 20, 2018). <http://scienceconf2018.deltacouncil.ca.gov/content/all-oral-abstracts>
219. Lai, Y.G., Wang, J., King, V., Stern, M., Flint, L., and Alpers, C.N., 2018, Modeling soil erosion and sediment transport at the watershed scale, 2018 Annual Meeting, California Water & Environmental Modeling Forum, April 2-4, 2018, Folsom, CA (TALK presented by Lai) (IP-094862).
220. Wang, J., King, V., Lai, Y.G., Stern, M., Flint, L., Flint, A., and Alpers, C.N., 2018, Modeling the effects of wildfire on runoff at the watershed scale, 2018 Annual Meeting, California Water & Environmental Modeling Forum, April 2-4, 2018, Folsom, CA (TALK presented by Wang) (IP-094861).
- 2019**
221. Alpers, C.N., Campbell, K., Grettenberger, C., Wallis, T., and Nordstrom, D.K., 2019, Transport and fate of metals in extremely acid mine water at Iron Mountain, California and downstream environments. 2019 Annual Meeting, Geological Society of America, Phoenix, AZ, Sept. 22-25, 2019. Geological Society of America Abstracts with Programs. (INVITED TALK) (IP-109280, USGS-approved Jun. 24, 2019).
222. Campbell, K.M., Alpers, C.N., and Nordstrom, D.K., 2019, Iron-rich scaling in acid mine drainage pipelines: mineralogy, biogeochemical modeling, and remediation strategies. Remediation Technology (RemTEC) Summit, Feb. 26-28, 2019, Denver, CO. (TALK presented by Campbell).
223. Campbell, Alpers, C.N., Grettenberger, C., Wallis, T., Kane, T., and Nordstrom, D.K., 2019, Geochemical modeling of hard-rock mine drainage and mine-impacted waters. 2019 Annual Meeting, Geological Society of America, Phoenix, AZ, Sept. 22-25, 2019. Geological Society of America Abstracts with Programs. (INVITED TALK presented by Campbell) (IP-109316, USGS-approved Jun. 25, 2019).
224. Grettenberger, C.L., Campbell, K.M., Nachon, M., Alpers, C.N., and Sumner, D.Y., 2019, Microbial cycling of sulfur and iron contributes to poor water quality in Spring Creek Reservoir, downstream of Iron Mountain, California. 2019 Annual Meeting, Geological Society of America, Phoenix, AZ, Sept. 22-25, 2019. Geological Society of America Abstracts with Programs. (TALK presented by Grettenberger) (IP-109315, USGS-approved Jun. 24, 2019).
225. Helmrich, S., Vlassopoulos, D., Alpers, C.N., and O'Day, P.A., 2019, Simulation of mercury methylation and demethylation coupled to oxidation-reduction reactions in sediments of Delta tributaries. 2019 Annual Meeting, California Water & Environmental Modeling Forum, April 22-24, 2019, Folsom, CA (TALK presented by Helmrich).
226. Helmrich, S., Vlassopoulos, D., Alpers, C.N., and O'Day, P.A., 2019, Development of a kinetic-thermodynamic model to simulate the mercury cycle in freshwater sediments. Fall 2019 National

Meeting, American Chemical Society, Aug. 21-25, 2019, San Diego, CA (TALK presented by Helmrich) (IP-106760, USGS-approved Mar. 25, 2019).

227. Ku, P., Tsui, M., Uzun, H., Robinson, H., Chen, H., Karanfil, T., Chow, A., Hoang, T., Webster, J., Dahlgren, R., and Alpers, C.N., 2019, Mercury transport from burned wildland and wildland-urban-interface watersheds in northern California, U.S.A. 2019 International Conference on Mercury as a Global Pollutant (ICMGP) Krakow, Poland, Sept. 8-13, 2019. (POSTER, not presented) (IP-106152, USGS-approved Mar. 9, 2019).

228. Marvin-DiPaquale, M., Hestir, E., Windham-Myers, L., Bergamaschi, B., Fleck, J.A., Alpers, C.N., and Downing-Kunz, M., 2019, Use of high-resolution in-situ and remote sensing for water quality and mercury monitoring, 14th Biennial State of the San Francisco Estuary Conference, Oakland, CA, October 21-22, 2019. (IP-111469, USGS-approved Aug. 27, 2019).

INVITED TALKS, LECTURES, FIELD TRIPS, AND SHORT COURSES

1985-1999 – Summary and highlights

Invited talks at workshops, universities, and other research institutions:

During this period, I gave approximately 40 invited talks at various research institutions including universities and USGS offices. Some highlights: Stanford Univ. (1987), USGS-Menlo Park (1987), Univ. of Calif., Berkeley (1988, 1994, 1996), USGS-Denver (1988, 1989), USGS-Reston (1989), Univ. of Montana (1988), Univ. of Illinois (1989), McGill Univ. (1989), Univ. of Waterloo (1990), Univ. of Calif., Davis (1990, 1992, 1999), Univ. of Nevada, Reno (1992), Calif. State Univ. Sacramento (1994, 1998), Harvard Univ. (1996), Univ. of Calif., Santa Cruz (1996), and Univ. of Nebraska (1997).

Semester-long courses:

- Univ. of Michigan, Dept. of Geol. Sci. (1987) “Geochemical Thermodynamics”
- McGill Univ., Dept. of Geol. Sci. (1990) “Environmental Geology”
- McGill Univ., Dept. of Geol. Sci. (1991) “Hydrology and Geochemistry of Waste Disposal”

Short courses:

- Society of Economic Geology, short course on Environmental Geochemistry of Mineral Deposits (1993) “Geochemical Modeling in Mining Environments”
- Short course on Geochemical Modeling, American Society for Surface Mining Reclamation, Spokane, WA (1993) “Geochemical Modeling of Acid Mine Waters,”
- Short course on Metallogeny of Volcanic Arcs, British Columbia Geological Survey, Vancouver, BC, Canada (1998) “Geoenvironmental characteristics of massive sulfide deposits”

2000 - present

Invited talks at workshops, universities, research institutions, and stakeholder groups:

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|------|---|
| 8/00 | Western Region Colloquium, U.S. Geological Survey, Menlo Park, CA
“Environmental Legacy of the California Gold Rush: Mercury contamination and bioaccumulation” |
| 2/01 | Dept. of Geology colloquium, California State University, Sacramento, CA
“Environmental Legacy of the California Gold Rush: Mercury contamination and bioaccumulation” |
| 3/01 | Dept. of Geology seminar, California State University, Chico, CA
“Environmental Legacy of the California Gold Rush: Mercury contamination and |

- bioaccumulation”
- 4/01 Dept. of Geology colloquium, Arizona State University, Tempe, AZ
“Evolution of negative pH waters and associated sulfate minerals at Iron Mountain, California”
- 9/02 CALFED Mercury Workshop-I, Monterrey, CA
“Conceptual model of mercury in Cache Creek”
“Mercury and methylmercury concentrations and loads within the Cache Creek watershed, California, January 2000 through May 2001”
“Synthesis of Cache Creek studies”
- 10/02 CALFED Mercury Workshop-II, Monterrey, CA
“Geoenvironmental setting: Natural and mining-related anthropogenic sources of mercury”
- 11/02 USGS-CSU Sacramento Science Symposium Series, Sacramento, CA
“Mercury contamination from historical gold and mercury mining in the Sierra Nevada and Trinity Mountains”
- 11/03 USGS, WRD brown-bag, Menlo Park, CA, “Mercury contamination from historical gold mining in the Sierra Nevada”
- 4/04 Dept. of Geology seminar, California State University, Chico, CA
“Gold Rush Mercury Contamination in the Sierra Nevada: An Update on USGS Studies”
- 8/04 USGS 2004 Mercury Workshop, Reston, VA, “Non-atmospheric mercury contamination and bioaccumulation in mining-impacted watersheds”
- 2/05 Land, Air, and Water Resources Dept. colloquium, University of California, Davis, “Mercury contamination, methylation, and bioaccumulation in the Sierra Nevada: A Gold Rush Legacy.”
- 11/05 CALFED Mercury Workshop, Sacramento, CA “Summary of Upper Yuba River Studies Mercury Research”
- 5/06 Dept. of Geology, California State University, Sacramento, lecture to undergraduate class in Ore Deposits: “Extreme acid mine drainage and associated sulfate minerals at Iron Mountain, California”
- 4/07 CALFED Mercury Workshop, Sacramento, CA, “DRERIP (Delta Regional Ecosystem Restoration Implementation Program) Mercury Conceptual Model”
- 4/08 Dept. of Geology, California State University, Sacramento, CA, lectures to undergraduate class in Ore Deposits: “Extreme acid mine drainage and associated sulfate minerals at Iron Mountain, California” and “Mercury contamination associated with historical gold and mercury mining in California”
- 5/08 Shlemon Conference on the Geological Assessment of Naturally Occurring Hazardous Substances, Association of Engineering Geologists (invited talk), Folsom, CA: “Naturally Occurring Mercury in the California Coast Range and Sierra Nevada”
- 5/09-7/09 USGS WRD Lecture Series (6 USGS Water Science Centers: CO, ID, IN, MT, OH, and SD): “Mercury contamination, transport, methylation, and bioaccumulation in California watersheds affected by historical gold and mercury mining”
- 4/10 Larry A. Haskin Memorial Colloquium at Dept. of Earth and Planetary Sciences, Washington University in St. Louis, MO (invited talk): “Extremely acid mine drainage and associated iron-sulfate minerals at Iron Mountain, California”
- 3/11 California Environmental Education Foundation, 2010/11 workshop on Best Practices of Environmental Education and Stewardship (for K-12 teachers), Woodland, CA: “Mercury and arsenic contamination associated with historical mining in the Sierra Nevada, CA”
- 1/11 Univ. of Western Ontario, London, Ontario, Canada: “Mercury contamination, transport, methylation, and bioaccumulation in California watersheds affected by historical gold and mercury mining”

- 1/11 Univ. of Waterloo, Ontario, Canada: “Mercury contamination, transport, methylation, and bioaccumulation in California watersheds affected by historical gold and mercury mining”
- 1/12 Flyway Nights Lecture Series, Yolo Basin Foundation, Davis, CA: "A tale of two sources: Mercury contamination from historical mining in the Coast Ranges and Sierra Nevada, California"
- 10/12 Gateway Science Museum, Chico, CA: “A Gold Rush Legacy: Mercury contamination, methylation, and bioaccumulation associated with historical gold mining in the Sierra Nevada”
- 12/12 California Bioavailability Symposium, Richmond, CA: “Sierra Nevada Mercury Projects”
- 2/13 University of the Pacific, Stockton, CA: “Mercury contamination and bioaccumulation associated with historical gold mining in the Sierra Nevada”
- 9/13 U.S. Environmental Protection Agency, San Francisco, CA, Region 9 State-of-the-Science Workshop on Mercury Remediation in Aquatic Environments: “Mercury Contamination and Bioaccumulation from Historical Gold Mining in the Sierra Nevada – Site Characterization and Remediation”
- 5/14 Queen’s Univ., Kingston, Ontario, Canada: “Iron Mountain, California”
- 10/14 Dept. of Geological and Environmental Sciences seminar, California State University, Chico, CA: “Arsenic Mineralogy, Geochemistry, and Bioavailability at Empire Mine and Other Historic Gold Mines in the Sierra Nevada Foothills” (IP-060390, USGS-approved Oct. 9, 2014) <https://www.youtube.com/watch?v=IeiwWUo9HCU>
- 11/15 Geology-Ecology-Environmental Science Colloquium, California State University, Sacramento, CA: “Arsenic Bioavailability at Historical Gold Mines in the Sierra Nevada”
- 11/15 Sierrans for Responsible Resources Development, Grass Valley, CA; “Research on Sediment and Mercury Transport in the South Yuba River, California”
- 8/16 Mercury Forum, Nevada City, CA, “Preliminary results of Erosion Rate and Sediment Source Studies, Malakoff Diggins State Historic Park”
- 9/16 Delta Tributaries Mercury Council, West Sacramento, CA, “Preliminary Results from Mercury Studies in the Cache Creek Settling Basin”
- 10/17 Headwaters Mercury Watershed Reduction TAC, Auburn, CA: “Mercury in Reservoir Sediments, Sierra Nevada, CA,”
- 11/17 University of the Pacific, Stockton, CA: “Arsenic Mineralogy and Bioavailability at Historical Gold Mines in the Sierra Nevada”
- 1/18 Delta Tributaries Mercury Council, West Sacramento, CA: “Mercury studies in the Cache Creek Settling Basin”
- 7/18 Evening Public Lecture, U.S. Geological Survey, Menlo Park, CA: “Iron Mountain, California: An Extreme Acid Mine Drainage Environment”
- 8/18 Sierra Nevada Headwaters Technical Advisory Committee, Auburn, CA: "Predicting fish-tissue mercury levels in Sierra Nevada streams using hydraulic-mine distribution and other geospatial data"
- 2/19 Sierra Nevada Headwaters Technical Advisory Committee, Auburn, CA: “Post-fire transport of suspended sediment and mercury in the Cache Creek watershed”
- 10/19 Reclaiming the Sierra, Headwater Mercury Source Reduction Workshop, Grass Valley CA: Participated in two panels: “Hydraulic Mines and Mine Features,” and “Mercury in Forest and Land Management”

Field trips:

- 9/01 Led field trip, CALFED Upper Yuba River Studies Program – for Technical Review Panel
- 5/02 Led field trip, National meeting of USGS Water Resources Division District Chiefs, “Legacy Mercury Contamination from Gold Rush Era Mining in the Sierra Nevada”
- 9/03 Led field trip, CALFED Upper Yuba River Studies Program – for Technical Review Panel
- 10/04 Led field trip to Yuba River for National Research Council / National Academy of Sciences, Review of USGS River Science, Sacramento, CA – field trip to Yuba River

- 10/07 Led field trip to hydraulic mining sites, Bear and Yuba Rivers, CA for USGS and Calif. State Univ., Sacramento Geology Dept.
- 11/09 Led field trip to Penn Mine, CA for Calif. State Univ., Sacramento Geology Dept. geochemistry class
- 4/10 Led field trips to Iron Mountain, CA for Calif. State Univ., Sacramento, CA and Calif. State Univ., Chico, CA Geology Depts.
- 10/11 Co-led field trip to Empire Mine State Historic Park, Grass Valley, CA, and Malakoff Diggins State Historic Park, Nevada City, CA for annual meeting of National Association of Abandoned Mine Lands Programs (NAAML), held in Squaw Valley, CA
- 11/11 Led field trip to Penn Mine, CA for Calif. State Univ., Sacramento Geology Dept. geochemistry class
- 5/12 Co-led field trip to Empire Mine State Historic Park, Grass Valley, CA for Reclaiming the Sierra conference, held in Nevada City, CA
- 6/12 Led field trip to Iron Mountain, CA for Univ. of California, Davis, Geology Dept.
- 6/14 Led field trip to Iron Mountain, CA for 2014 Goldschmidt Conference (30 participants)
- 6/14 Led field trip to Empire Mine State Historic Park, Grass Valley, CA for 2014 Goldschmidt Conference (50 participants)
- 4/15 Assisted with field trip to Malakoff Diggins State Historic Park and Combie Reservoir (Nevada and Placer Counties, CA) for Reclaiming the Sierra 2015 conference (25 participants)
- 10/15 Led field trip stop at South Fork American River, CA for California Science Teachers Association and California Water Education Foundation (30 participants)
- 9/16 Co-led field trip to Malakoff Diggins State Historic Park (Nevada County, CA) for Society of Environmental Journalists 2016 Conference, held in Sacramento, CA (25 participants).
- 6/17 Co-led field trip to Bear River (Placer County, CA) for Nueva Upper School (12 participants).
- 6/18 Led 2-day field trip to Cache Creek Settling Basin, Yolo Bypass, and Combie Reservoir for Univ. of California, Merced research group (4 participants)
- 9/19 Field trip to Iron Mountain, CA for student group from Bayreuth Univ., Germany (17 participants)
- 9/19 Field trip to Empire Mine State Historic Park, Grass Valley, CA, and Malakoff Diggins State Historic Park, Nevada City, CA for student group from Bayreuth Univ. (17 participants)

Short courses:

- 11/00 Organizer and Instructor – 2-day Short Course on “Sulfate Minerals – Crystallography, Geochemistry, and Environmental Significance,” Mineralogical Society of America and the Geochemical Society, Tahoe City, CA. (110 participants, plus 14 instructors). I took the lead on arranging the logistics of the short course. I made presentations on “Metal-sulfate salts from sulfide oxidation” and “Alunite-jarosite crystallography, thermodynamics, and geochronology.” I was lead editor of the resulting volume in *Reviews in Mineralogy and Geochemistry* (v. 40).
- 5/03 Lecture on “Extreme acid mine drainage from a pyritic massive sulfide deposit: The Iron Mountain end-member,” Mineralogical Association of Canada, Short Course on Environmental Aspects of Sulfide Oxidation, Vancouver, BC, Canada
- 5/09 Co-instructor, Short Course on “Characterizing, Predicting, and Modeling Water from Mine Sites” (4 days including field trip), sponsored by California State Water Resources Control Board. I was responsible for teaching sections on mineral deposits, characterization methods, and geochemical modeling. Other instructors included D.K. Nordstrom (USGS), J. Hillenbrand (U.S. EPA) and three private-sector consultants.
- 6/14 Organizer and Instructor, 2-day Short Course on “Environmental Geochemistry, Mineralogy and Microbiology of Arsenic,” Mineralogical Society of America and the Geochemical Society, Nevada City, CA. (50 participants, plus 13 instructors). I took the lead on arranging the logistics of the short course. I made a presentation on “Arsenic Associated

with Historical Gold Mining in the Sierra Nevada Foothills.” I was co-editor of the resulting volume in *Reviews in Mineralogy and Geochemistry* (v. 79).

Semester-long courses and guest lectures:

- 9/09 – 12/09 “Geochemistry” (Geology 123; 4 units) California State University Sacramento, Geology Department. (Co-instructor, with J. Domagalski; taught 50% of lectures, laboratories, and field trip)
- 8/11 – 12/11 “Geochemistry” (Geology 123; 3 units), California State University Sacramento, Geology Department. (Co-instructor; with J. Domagalski; taught 50% of lectures and field trip)
- 3/12 – 5/12 “Aqueous Geochemistry” (Geology 202; 3 units), California State University Sacramento, Geology Department (College of Continuing Education). (Co-instructor, with J. Domagalski; taught 50% of lectures)
- 8/12 – 12/12 “Environmental Geochemistry” (Geology 230; 3 units), California State University Sacramento, Geology Department (College of Continuing Education). (Co-instructor, with J. Domagalski; taught 50% of lectures and geochemical modeling exercises)
- 8/13 – 12/13 “Geochemistry” (Geology 123; 3 units), California State University Sacramento, Geology Department. (Co-instructor; with J. Domagalski; taught 50% of lectures and led field trip)
- 1/14 – 5/14 “Master’s Thesis” (Geology 500; 6 units), California State University Sacramento, Geology Department. (Co-advised three graduate students on master’s thesis research)
- 10/15 “Environmental Geochemistry” (Biology 186b; 3 units), California State University Sacramento, Biological Sciences Department (Guest lecture)
- 5/16 “Mercury contamination associated with historical gold mining in the Sierra Nevada” (Geosciences 499; 3 units), California State University, Chico, Geological Sciences Department (guest lecture)

WEB PAGES – ACTIVE PROJECTS

Determination of Mercury Loads for Cache Creek Settling Basin Inflow and Outflows and Related Investigations

<https://www.usgs.gov/centers/ca-water/science/determination-mercury-loads-cache-creek-settling-basin-inflow-and-outflows>

Add-on to: Determination of Mercury Loads for Cache Creek Settling Basin Inflow and Outflows and Related Investigations

<https://www.usgs.gov/centers/ca-water/science/add-determination-mercury-loads-cache-creek-settling-basin-inflow-and-outflows>

Developing Spatial Data on Mineral Deposits Found on Abandoned Mine Lands

<https://www.usgs.gov/centers/ca-water/science/developing-spatial-data-mineral-deposits-found-on-abandoned-mine-lands>

Iron Mountain: An Extraordinary and Extreme Environment

<https://www.usgs.gov/centers/ca-water/science/iron-mountain-extraordinary-and-extreme-environment>

- History

https://ca.water.usgs.gov/projects/iron_mountain/history.html

- The Geology and Mining of Iron Mountain

https://ca.water.usgs.gov/projects/iron_mountain/mining.html

- Environmental Effects of Iron Mountain

https://ca.water.usgs.gov/projects/iron_mountain/environment.html

- Pipe Scale Study

https://ca.water.usgs.gov/projects/iron_mountain/pipescale.html

- Sulfate Minerals at Iron Mountain
https://ca.water.usgs.gov/projects/iron_mountain/sulfate_minerals.html
- Iron Mountain and the Red Planet (Connections to Mars Research)
https://ca.water.usgs.gov/projects/iron_mountain/mars_analog.html
- References
https://ca.water.usgs.gov/projects/iron_mountain/references.html

Mercury

<https://www.usgs.gov/centers/ca-water/science/mercury>

Mercury Studies at Sulphur Bank Mercury Mine and Clear Lake, California

<https://www.usgs.gov/centers/ca-water/science/mercury-studies-sulphur-bank-mercury-mine-and-clear-lake-california>

Monitoring Mercury and Methylmercury in Water, Sediment and Biota in Combie Reservoir Before and After Dredging and Mercury Removal

<https://www.usgs.gov/centers/ca-water/science/monitoring-mercury-and-methylmercury-water-sediment-and-biota-combie>

WEB PAGES – COMPLETED PROJECTS

Additional characterization of the impact of suction dredging, South Yuba River – Humbug Creek

<https://www.usgs.gov/centers/ca-water/science/additional-characterization-impact-suction-dredging-south-yuba-river-humbug>

Analysis of Factors Causing Mercury Impairment in Water Bodies of the Sierra Nevada, California

<https://www.usgs.gov/centers/ca-water/science/analysis-factors-causing-mercury-impairment-water-bodies-sierra-nevada>

Assessment of environmental impacts of mercury treatability test using suction dredging, South Yuba River

<https://www.usgs.gov/centers/ca-water/science/assessment-environmental-impacts-mercury-treatability-test-using-suction>

Examining Erosion at Malakoff Diggins State Historic Park, a Sierra Nevada Gold Mine

<https://www.usgs.gov/centers/ca-water/science/examining-erosion-malakoff-diggins-state-historic-park-a-sierra-nevada-gold>

Mercury cycling, bioaccumulation, and risk across western North America: a landscape scale synthesis linking long-term datasets

<https://www.usgs.gov/centers/powell-ctr/science/mercury-cycling-bioaccumulation-and-risk-across-western-north-america-a>

Mercury Methylation and Bioaccumulation in the Bear River Watershed

<https://www.usgs.gov/centers/ca-water/science/mercury-methylation-and-bioaccumulation-bear-river-watershed>

Quantification of Mercury Flux in Eroding Mining Debris, Yuba River Watershed, California

<https://www.usgs.gov/centers/ca-water/science/quantification-mercury-flux-eroding-mining-debris-yuba-river-watershed>

Wildfire Effect on Mercury Levels in Putah and Cache Creek Watersheds

<https://www.usgs.gov/centers/ca-water/science/wildfire-effect-mercury-levels-putah-and-cache-creek-watersheds>

PROFESSIONAL MEMBERSHIPS

American Geophysical Union (AGU)

Geochemical Society

Geological Society of America (GSA)

- Environmental & Engineering Geology Division
- Geobiology & Geomicrobiology Division
- Geology & Health Division
- Hydrogeology Division
- Limnogeology Division
- Mineralogy, Geochemistry, Petrology & Volcanology Division
- Planetary Geology Division
- Quaternary Geology & Geomorphology Division