ROUX

PROFESSIONAL PROFILE

Rachel J. Maxwell, P.G.

Senior Scientist I

TECHNICAL SPECIALTIES

Ms. Maxwell has over nine years of experience in providing support on litigation and insurance projects including document reviews, environmental forensics, data management, past and future cost evaluations, and data analysis. She also provides support on various industrial and brownfields projects including communication with regulators and clients, management of subcontractors and field staff, and evaluating budget and schedule. Ms. Maxwell has worked with environmental issues at a wide array of industries, including dry-cleaning facilities, industrial manufacturing facilities, chemical manufacturing facilities, municipal and industrial landfills, metal smelting facilities, and manufactured gas plant facilities. Additionally, Ms. Maxwell conducts extensive water resource assessments, land mitigation assessments, and remoteness mineral assessments.

EXPERIENCE SUMMARY

Senior Scientist (2020-present), Project Scientist (2017-2020), and Staff Scientist (2014-2017) with Roux Associates, Inc., Oakland, California

Graduate Assistant with the University of Arizona's Environmental Biogeochemistry Group (2012-2013), Tucson, Arizona

Co-Founder of Compost Cats (2009-2013), Tucson, Arizona

Water Sustainability Program Fellow with the University of Arizona (2011-2012), Tucson, Arizona

Students for Sustainability Intern with the University of Arizona (2009-2012), Tucson, Arizona

Environmental Engineer Intern with Rio Tinto, Inc. (2011), Superior, Arizona

NASA Space Grant Intern with the University of Arizona (2010-2011), Tucson, Arizona

REU-NSF Intern with the Carnegie Institute of Science (2010), Washington, D.C.

CREDENTIALS

M.S., Soil and Water Science,
University of Arizona, Tucson, AZ, 2013

B.S., Environmental Science,
University of Arizona, Tucson, AZ, 2012

CERTIFICATIONS AND TRAINING

Professional Geologist, Arizona

OSHA 40-Hour/HAZWOPER Health and Safety Certification

Bloodborne Pathogens Certification

First Aid & CPR Certification

PROFESSIONAL AFFILIATIONS

National Groundwater Association

American Association for the Advancement of Science

KEY PROJECTS

- Reviewed available historical emissions/capacity data, performed fate and transport analyses, and assessed the extent and magnitude of lead and other heavy metals contamination in soil surrounding Exide Technologies' former lead battery recycling facility. Served as a field team manager for the rapid assessment of lead in soil at 500 residential parcels impacted by Exide Technologies' former operations. Field activities were completed over a two-week period in the communities of Commerce, Maywood, and East Los Angeles. Responsibilities included community coordination, soil assessment field team oversight, preparation of field documentation, onsite health and safety management, soil sample preparation, XRF analysis, and sample collection.
- Evaluated the sources and pathways of per- and polyfluorinated compounds (PFAS) to groundwater for a town in upstate New York. Developed a chemical database for PFAS in groundwater, reviewed historical operational activities for industries within the area, and determined the most probable pathway for PFAS to impact groundwater. Findings were summarized in an Expert Report.
- Assessed potential sources of chlorinated solvents to groundwater for a Superfund Site in Dayton, Ohio. Reviewed historical documentation (building permits, environmental investigations, aerial photographs, Sanborn fire insurance maps, city directories, and newspapers) to identify potentially liable parties. Other activities included compiling an analytical database, evaluating historical operational activities, and reviewing the area's historical groundwater conditions. Findings were summarized in an Expert Report.
- Evaluated a spectrum of aqueous film forming foam (AFFF) formulations to identify unique forensic signatures of source and timing of AFFF releases and relative contributions. Research and development project with goal of fingerprinting AFFF formulations in environmental samples.
- Conducted numerous spring surveys for various clients (NGOs, government entities, industrial clients, utilities, and private landowners) throughout the Mojave Desert. Spring surveys include site visits to remote locations, which often require off-road driving or hiking. Monitoring activities include measuring water quality, collecting surface water samples, and evaluating spring flora and fauna.
- Served as Project Manager for the 25% Design Plan for Jacques Gulch Remediation, Almaden Quicksilver County Park. This remediation project mitigated the transport of mercury, from historical mining operations, into the San Francisco Bay. Responsibilities include tracking project hours, budget, and schedule as well as communication with the client and regulator. Additionally, severed as team leader for various field surveys: site walks, soil

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collection campaigns, XRF screening events, and stormwater sampling.

- Evaluated PFAS impacts to groundwater from the land application of biosolids throughout Maine. Project included identifying the sources of PFAS within the biosolids, tracking the land application of the biosolids, and determining the potential liable parties. To complete this task thousands of documents were reviewed, and a database was developed.
- Completed a limited Phase II Environmental Site Assessments (ESA) within the Mojave Riverbed in Victorville, California. The limited Phase II ESA included the advancement of soil borings for the analysis of PFAS in soil and groundwater. Results from the investigation were drafted in a report and communicated with our client.
- Developed an Allocation Methodology for apportioning future remediation costs associated with a major navigable waterway in Washington State. Developed and recommended allocation methodologies for the apportionment of future remediation costs associated with PCB, carcinogenic polycyclic aromatic hydrocarbon (cPAH), metal, and dioxin/furan impacts in sediment within a major navigable waterway in Washington. A similar assessment is currently underway for a major navigable waterway in Oregon.
- Served as Project Manager for the Site Management Plan activities at a development in Sunnyvale, California. Conducted field and construction oversight activities in relation to soil handing for the proposed residential apartments and townhomes, as well as public park. Facilitated in the design and O&M of active sub-slab depressurization systems for residential complexes. Activities included coordaining with the client, sampling soil and groundwater, scheduling construction oversight, communicating with the regulator, and tracking budget.
- Assisted in the evaluation of the annual total suspended solid (TSS) discharges from 14 facilities to the Kalamazoo River sediments for the 25+ year relevant period of applicable discharges. Helped prepare an Expert Report which allocated TSS discharges to generator facility when secondary facility was used for wastewater treatment.
- Participated in the sampling of airplane wash water at an airline company's facility management site in San Francisco, California. Wash water was analyzed for cadmium to determine if treatment of wash water was required prior to discharge to the storm sewer system. Activities included communicating with the client regarding airplane maintenance schedules, designing a sample collection system, collecting wash water samples (often during graveyard shifts), and coordinating sample pick-up with the analytical laboratory.
- Performed various Phase I ESA and Remoteness Mineral Assessments throughout the Mojave Desert. The purpose of these reports was to assess the mitigation lands a solar company proposed to purchase for their future solar projects. The assessments included a site visit (often to remote locations, i.e., Fremont-Kramer), document review, and public records requests.
- Served as Project Manager for the interior remedial excavation of a former dry-cleaning facility in San Rafael, California. Prior to completing the interior excavation, the site was characterized through the collection and analysis of soil, soil vapor, groundwater, and indoor air samples. After the source area was identified, the remedial excavation was advanced in stages for building structural integrity. When the remedial excavation was complete, the former dry cleaner received a No Further Action (case closure) from the regulator.
- Served as Project Manager for the groundwater monitoring program at three biosolids composting facilities. Responsibilities include scheduling groundwater sampling events, evaluating data, drafting reports, communing with state regulators, and tracking project budget and schedule.
- Evaluated past and future site activities and associated future costs for a school within the Long Beach Unified School District. Completed an analysis of subsurface environmental data from the land's historical operations and future remediation costs associated with the impacts observed at the school. Conduct monthly review of vendor invoices relating to the site remedial activities.
- Conducted various soil and groundwater sampling events at Santa Clara Square Retail, Office, and Apartments. Sampling included hand augering, direct push Geoprobe®, grab groundwater samples, stockpile sampling, confirmation soil sampling, and sidewall soil sampling. Managed several tasks associated with field investigations such as subcontractor management and soil sampling plans. Additionally, performed dust monitoring and construction oversight. Construction oversight primarily included excavation oversight, soil management, and demolition oversight.
- Served as field manager for the identification and testing of hazardous materials at various water utility sites throughout the South San Francisco Bay. Field activities included identification of mercury-containing materials, asbestos-containing materials, and lead-based paint materials. Additionally, sites were surveyed and sampled for evidence of environmental impacts due to the application of pesticides, the accidental spills of petroleum/PCBs, etc. Sampling required collection of hundreds of soil/groundwater samples as well as various building materials (paint, pipe wrapping, concrete, etc.).

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- Evaluated past site activities for an Allocation Party of a sediment Superfund Site in Washington State. Activities included reviewing client invoices, client work products, and regulatory requirements. Currently attend monthly status calls with the project team to assess Future Costs associated with the remediation.
- Performed fate, transport, and degradation analysis of gasoline to determine the timing of gasoline releases for the State of Colorado. Helped prepare an Expert Report regarding the release of gasoline from 80+ fueling facilities.
- Conducted sanitary sewer assessments throughout California for chlorinated solvent impacts from historical dry-cleaning operations. Assessments were completed in public rights-of-way and private properties. Pre-field activities included coordination with state regulators, city and county officials, as well as the community. Field activities included private utility checks, hand augering, drilling, environmental sampling (soil, soil vapor, groundwater, and indoor air), and in-situ logging (Membrane Interface Probe and Hydraulic Profiling Tool).
- Reviewed available historical data at the Gowanus Canal Superfund Site and developed a detailed understanding of facility operations. Helped prepare Expert Report to support the facility designation of *de minimis* status.
- Performed various soil sampling events at the Cove in South San Francisco, California. Including hand augering, direct push Geoprobe®, stockpile sampling, and screening soils with an XRF unit. Additionally, conducted excavation oversight and soil management while construction activities were being performed.
- Evaluated available historical operations, soil lead and arsenic data, and chemical signatures of steel manufacturing from soils within and adjacent to the historic steel manufacturing facility.
- Assisted in soil sampling, the installation of groundwater monitoring and soil vapor wells, and the logging of soil borings at a former pesticide manufacturing facility in San Jose, California.
- Installed four groundwater monitoring wells at an amusement park in California. The purpose of the monitoring wells was to assess if the site's proposed infiltration basin impacts groundwater.
- Evaluated Past and Future Site Activities and associated Future Costs for multiple former landfills within Arizona. Analysis of subsurface environmental impacts at and emanating from two former landfills within Arizona and associated future remediation costs associated with impacts at, and emanating from, each landfill.
- Managed and completed various Phase I/II ESAs. This included requesting publicly available documents, conducting site walks, performing document reviews, drafting reports, scheduling subcontractors for field investigations, and communicating with state regulators.

Previous Key Projects

- Co-created the first student managed and student employed composting university in the nation. Duties included grant writing, expanding sustainability at the University of Arizona, educating the Tucson Community, and delegating tasks to student employees.
- Participated in the University of Arizona's Students for Sustainability (SFS) internship program. The goals of the program were to empower students, build leaders, and pursue institutionalized sustainability at the University of Arizona and within the surrounding community. Activities included the creation of Compost Cats, organizing Earth Day, managing a community garden, and holding various education events for the campus and Tucson area.
- Analyzed the fate and transport of emerging contaminants (PFAS, flame retardants, etc.), metals, and inorganic compounds, from a wastewater treatment plant, through soils and stream water from the University of Arizona's Critical Zone Observatory (CZO) Project. Work was completed for Master's Thesis.
- Collected stream water, soil water, soil, rainwater, and snow samples for CZO Field Sites. Field work required off road driving with a four-wheel drive vehicle, hiking with a pack (~80 lbs.) to remote locations, and downloading information from data loggers, samplers, and flow meters.
- Assisted in the installation of solar panels (to run electrical field equipment) and in-situ soil water samplers (prenarts) for CZO sites as well as flumes for stream water sampling.
- Prepped and analyzed water samples from CZO sites for analysis via IC-MS, Fluoromax, UV-vis, LC-MS, ICP-MS, GC-MS, Total Carbon, and Total Nitrogen. Drafted reports, validated laboratory results, and created presentations based on findings.
- Studied the presence of Persistent Organic Pollutants in the CZO as part of the Water Sustainability Program Fellowship. Collected and analyzed soil samples from remote areas for PCBs. The purpose of the project was to determine the ubiquitous nature of PCBs in the environment.
- Worked alongside Heath, Safety, and Environmental professionals at Rio Tinto, Inc.'s Resolution Copper Mine in Superior, Arizona. Co-authored the property's water management plan, organized the annual external audit, drafted the site's employee safety training manual, and conducted field investigations (collected soil and water samples, conducted sound and vibration testing,

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removed invasive plant species, and tracked animal wildlife populations).

- Accepted into the University of Arizona NASA Space Grant Program. Conducted research on the possibility of an extraterrestrial (ET) impact 12.9 ka by looking at ET markers from soils around the Lower Younger Dryas Boundary, called the black mat. Today it remains unclear how the black mat formed but one hypothesis is that a meteorite hit the Laurentide Ice Sheet and deposited a thin black layer across parts of the Earth. Received a NASA Astrobiology Travel Grant to evaluate and collect soil/sediment samples from the black mat at locations in Belgium and the Netherlands.
- Completed a summer internship with the Carnegie Institute of Science in Washington, D.C. Investigated how life could have survived in unsuitable environments like hydrothermal vent systems. These vents are located at the bottom of the ocean where neither light nor oxygen exists, temperatures range from 200-300 °C, and pressures around 200 MPa. These four factors would kill most life, yet it is one of the proposed locations for the origins of life.

CONFERENCES

Brooks, P., Barnard, H., Chorover, J., Fan, Y., Gallo, E., Godsey, S., Maxwell, R., McNamara, J., Swetnam, Y., and Tague, N.; (2015) Scale-dependent interactions between vegetation, landscape, and climate: How critical zone structure influences ecohydrological resilience in a rapidly changing world. H23J-05 Ecohydrology in the Critical Zone II, presented at 2015 Fall Meeting, AGU, San Francisco, CA, 14-18 Dec. 2015.

Love, A., Maxwell, R., and Harris, B.; (2022) Identification of Aqueous Film-Forming Foam Chemical Fingerprints From Product Concentrates. F4. PFAS Source and Forensic Considerations, presented at the Twelfth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Battelle, Palm Springs, CA, 22-26 May 2022.

Henke, R., Edmonds, S., Maxwell, R., and Rohrer, J.; (2022) Microplastics: California and Beyond – A Survey of State Approaches to Microplastic Research and Regulation. I4. Microplastics, Pharmaceuticals, and Other Emerging Contaminants, presented at the Twelfth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Battelle, Palm Springs, CA, 22-26 May 2022.

Edmonds, S., Henke, R., Maxwell, R., and Rohrer, J.; (2022) Microplastics – California and Beyond, A Survey of State and Federal Approaches to Microplastic Regulations, SETAC North America 43rd Annual Meeting, Pittsburg, PA, 13-17 Nov. 2022.

Rohrer, J. and Maxwell, R.; (2022) Microplastics: Coming Soon to a Well Near You? Groundwater Quality & Sustainability II, NGWA Groundwater Week, Las Vegas, NV, 5-8 Dec. 2022.

Love, A., Maxwell, R., Stevenson, K., and Harris, B.; (2023) Identification of Aqueous Film-Forming Foam Chemical Fingerprints From Concentrates. Session 07: Environmental Forensics, presented at the 32nd Annual International Conference on Soil, Water, Energy, and Air, San Diego, CA, 21-23 March 2023.

PUBLICATIONS

Love, A., Zdon, A., Fraga, N., Cohen, B., Palacios Mejia, M., Maxwell, R., and Parker, S. 2022. Statistical Evaluation of the Similarity of Characteristics in Springs of the California Desert, United States. Fronters in Environmental Science. 10:1020243. doi: 10.3389/fenvs.2022.1020243.

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