## Susan L. McCart P.E., P.G.

### **Education**

B.S., Geological Engineering, University of Missouri - Rolla, 1993

### **Professional Licenses**

Professional Engineer

Kansas

Missouri

Professional Geologist

Kansas

### **Professional Experience**

Ms. McCart has 30 years of experience in environmental consulting, and is a strong project and technical manager. Her project management capabilities include developing proposals and work plans, implementing field activities, submitting permits and reports to comply with County, City, and State regulations, developing status, documentation, and technical reports, presenting alternatives for remedial designs and modifications, and site closure activities. Ms. McCart is currently the Contract Administrator for the environmental service contract for the state of Kansas, and has served as Contract Administrator for multiple state-wide contracts in Kansas and Missouri for over 20 years. Additionally, Ms. McCart is the primary client manager for several petroleum industrial companies. Ms. McCart has excellent project management skills, with a high attention to detail and organization, and has developed many trusted professional relationships with clients and regulators. She has worked on a variety of projects in Kansas, Missouri, Iowa, Nebraska, and Oklahoma.

Ms. McCart has served as project manager for remediation and solid waste projects at sites ranging from former and active gasoline facilities, active and closed landfill facilities, bulk terminal stations, and process plants. On these sites, the contaminants of concern include petroleum hydrocarbons, such as benzene, methyl-tertiary butyl ether (MtBE), and diesel; chlorinated solvents, such as tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride; and ethylene dibromide (EDB). Her technical specialties include soil and groundwater remedial field investigations, feasibility studies, risk assessments, remedial design and implementation, remedial system operation, maintenance, and modifications/re-design, construction quality assurance (CQA) certification, landfill alternative cover closure design, and landfill permitting.

Ms. McCart has developed several remedial design plans and specifications, including groundwater recovery and treatment systems with air strippers and granular activated carbon vessels, free product recovery systems, vapor extraction of free phase petroleum from soil and the top of groundwater, air sparging, and vapor mitigation systems. Additionally, Ms. McCart completed the Risk-based Corrective Action (RBCA) training in Kansas, has performed many risk assessments following the Missouri RBCA guidelines for Missouri projects, and has also completed Tier 1A risk assessments following the Oklahoma RBCA guidelines. Ms. McCart has been involved in a variety of landfill projects, including siting, facility design and permitting, plume delineation, CQA certification, gas control and collection system installation, and leachate re-circulation system design. She has researched, evaluated, and designed alternative covers for landfill closures in central and eastern Kansas and submitted applications for permit modifications to allow the placement of construction and demolition waste disposal areas over former, closed municipal solid waste units.

**Statewide Environmental Contracts (Contract Manager)**

**Kansas Department of Health & Environment (KDHE) – Environmental Services Contract 50186.** Ms. McCart manages this statewide contract, which supports state and federally funded programs administered by the Bureau of Environmental Remediation (BER). Through this contract, SCS directly assists BER programs including Brownfields, Dry Cleaner Remediation, Storage Tanks, Environmental Use Control, Orphan Sites, Risk Management, Site Assessment, Spill Response, State Cooperative, Superfund, Surface Mining, and Voluntary Cleanup and Property Redevelopment. Ms. McCart is responsible for reviewing work plans and proposals, assigning appropriate staff to projects from multiple SCS office locations, providing technical support and quality assurance, and maintaining professional relationships with KDHE project managers in multiple agency programs. Ms. McCart has managed SCS’s statewide contracts with the KDHE BER since 2004. SCS has completed over 300 projects under the KDHE statewide contracts and continues to obtain and successfully execute projects to support the agency.

**Missouri Department of Natural Resources (MDNR) – Environmental Assessment Services, and Underground Storage Tank Investigation, Remediation, and Assessment Services.** SCS served the MDNR Environmental Remediation Program as a statewide consultant and contractor. Through these contracts, SCS directly assisted the regulatory agency with their Storage Tank Program, Brownfields Voluntary Cleanup Program (BVCP), and EPA Brownfield Grant funded Targeted Brownfields Assessment (TBA) Program. SCS has supported MDNR under these two contracts for numerous contract periods and have completed site assessments, UST closures, risk assessments, Phase I and II ESA services, and analysis of corrective action assessments for over 50 projects. Ms. McCart is responsible for reviewing work plans and proposals, assigning appropriate staff to projects from multiple SCS office locations, providing technical support and quality assurance, and maintaining professional relationships with MDNR project managers in the MDNR BVCP and Storage Tank programs. Ms. McCart managed SCS’s statewide contracts with the MDNR from 2009 through 2020.

#### Environmental

**Emergency Response – Vapors in Sanitary Sewer System, Shawnee, Kansas:** Johnson County Wastewater requested assistance from the Kansas Department of Health and Environment (KDHE) due to complaints from residents and commercial businesses of petroleum odors and vapors in their sanitary sewer system. As a contractor to the KDHE, SCS responded to this emergency request. A fuel release was discovered from underground storage tanks (USTs) at an active gas station, and the migration pathway was determined to be through fractured bedrock leading to the gravel bed of the sanitary sewer system. Fuel was entering the system via an open stub pipe located approximately 400 feet downgradient of the USTs. SCS advanced soil borings using a Geoprobe®, installed monitoring and recovery wells, collected soil and groundwater samples, installed a product recovery trench, and monitored the sanitary sewer manholes and nearby building interiors for vapors. Due to significantly high petroleum hydrocarbons and LEL measurements inside one commercial building, a sub-slab de-pressurization system was designed and installed, which has resolved the safety concerns. SCS also contracted services to install a petroleum-resistant liner in the sanitary sewer system for over 500 linear feet of main sewer piping, laterals to three commercial businesses, and five sewer manhole interiors.

**Underground Storage Tank Closures:** Provided project management and technical review for UST Closures for over 30 projects in Missouri, Kansas, and Oklahoma. Closure options included removal and in-place closure. Corresponded with regulatory agencies; coordinated with state-licensed contractors, provided field observations, prepared sampling plans, performed quality assurance/quality review, and submitted Closure Reports. Provided risk assessments as appropriate to obtain No Further Action determinations.

**Property Redevelopment Assistance; Former Petroleum Service Facility, Midwest City, Oklahoma:** Midwest City, Oklahoma is redeveloping several blighted areas of their community, including a strip of land that was destroyed by tornados in the early 1990s. One such property was a former retail gasoline service station and automotive repair shop. Four USTs remained on the property. SCS assisted the City with enrollment into the Oklahoma Corporation Commission (OCC) Petroleum Storage Tank (PST) Indemnity Fund as an impacted third party, enabling assessment and remediation work to be completed at no cost to the City. The USTs were removed in 2017, and impacted soil was encountered. At the same time, the City was improving its infrastructure, and discovered heavily petroleum-impacted soil with free product in a trench for a new natural gas line. Subsequent emergency response, assessment, and remedial activities included encasing approximately 300 feet of a new potable water supply line, closure of additional unknown/ unregistered USTs, collection of soil and groundwater samples, over-excavation of impacted soil and offsite disposal, and completion of a Tier 1A risk assessment. The site obtained a Closure Notice in early 2021, allowing continued redevelopment of the property.

**One North Urban Redevelopment Initiative, North Kansas City, Missouri:** “One North” is the City of North Kansas City’s premier land redevelopment initiative that covers approximately 50 acres of former industrial land contaminated with regulated substances. Ms. McCart supported the City with the southern 40 acres of the development. The “Eisenberg Property” was the former location of an unregulated soil/construction debris receiving facility. Environmental conditions were identified in the late 1990s and the MDNR restricted future site use exclusively for non-residential use. However, the planned development included a multi-unit residential component, critical to address the City’s housing needs. To achieve the client’s objective for the planned residential development, Ms. McCart was responsible for the technical data evaluation and prepared an innovative MRBCA assessment/regulatory comparison report submitted to the VCP. The MDNR accepted the overall technical strategy to obtain a modified environmental covenant to allow residential development. This was obtained within six months of initial involvement, supporting the overall development schedule.

**Phase I and II Environmental Site Assessments:** Provided project management and technical review for Phase I and Phase II Environmental Site Assessments for a variety of sites in the Midwest. Sites include vacant and active retail facilities, Brownfields properties, industrial, commercial, and agricultural land. Reviewed historical documentation and site observation records and determined the presence or absence of recognized environmental concerns.

**In-Situ Investigation Technologies; Multiple Sites throughout Kansas and Missouri:** Project Manager and Field Professional for numerous site characterizations utilizing specialized in-situ screening technologies dating back to the 1990s, including the use of Lazer Induced Flourescence (LIF), Membrane Interface Probe (MIP), and Electric Conductivity Logging. Ms. McCart has conducted LIF investigations at over six sites for both public and private clients, MIP investigations at over ten sites for both public and private clients, and EC logging using both downhole and probe sensors at over ten sites.

**Limited Site Assessments; Multiple Sites throughout Kansas:** Project manager for limited site assessment projects in various locations throughout Kansas. Project requirements include developing field work plans; advancing soil borings for the collection of soil samples from specific depths to evaluate risk exposures and extent of petroleum contamination; collecting soil samples for geotechnical analyses; collecting and evaluating groundwater analytical data; evaluating site historical activities; preparing comprehensive reports; performing quarterly groundwater monitoring; and recommending additional activities such as risk assessments or remediation as appropriate.

**Risk-based Corrective Action Evaluations; Multiple Sites throughout Kansas:** Managed Kansas limited RBCA projects, located all across the state. Project requirements include developing field work plans; advancing soil borings for the collection of soil samples from specific depths to evaluate risk exposures; collecting soil samples for geotechnical analyses; collecting and evaluating groundwater analytical data; evaluating site historical activities; developing site conceptual exposure models (SCEM) for current and future conditions; preparing comprehensive reports; and recommending site closure as appropriate.

**Risk-based Corrective Action; Multiple Sites in Missouri:** Performed risk assessments of active and former petroleum storage facilities (generally retail gasoline stations) in accordance with the Missouri RBCA guidelines. Project requirements include determining exposure pathways and evaluating acceptable risks by collecting soil and groundwater samples for chemical analysis, soil samples for geotechnical analysis, evaluated the probability of domestic groundwater usage, and preparing comprehensive reports. Obtained “No Further Action” (NFA) determinations for four facilities in a one-year period for a private client, and NFA determinations for seven facilities in a one-year period that were administered by the Missouri Department of Natural Resources (MDNR) using funds granted under the American Reinvestment Recovery Act (ARRA) in 2010.

**Groundwater Plume Stability Analysis, Multiple Sites in Missouri.** Performed statistical analysis of historical groundwater data to evaluate groundwater plume stability. Using the Mann-Kendall/Sen’s Slope statistic, linear regression trends, and/or Ricker Method analysis, evaluated four to 12 rounds of groundwater data to demonstrate plume stability in order to obtain NFA determinations for multiple sites.

**Public Water Supply Wellhead Treatment Systems; Kansas**: Assisted in the design, installation, and/or monitoring of 10,000 and 20,000-pound granular activated carbon vessels for wellhead treatment of impacted public water supply wells in Frankfort, Moscow, Satanta, Park, Manter, Ellis, and Wichita, Kansas. Monitored and maintained a treatment system of three public water supply wells in Hays, Kansas, consisting of an air stripper along with two, 10,000-pound granular activated carbon vessels. Collected and reported monthly and quarterly groundwater samples to fulfill NPDES and regulatory requirements. Developed instruction manuals to train city employees on maintenance and monitoring procedures. Corresponded with city personnel and resolved installation and operational difficulties as needed.

**Spill Prevention Control and Countermeasure Plans (SPCC):** Prepared SPCC plans for a wide range of facilities in Missouri and Kansas. Concurrent with SPCC plan development, at many sites, data were collected for use in developing General and Individual NPDES Storm Water Permit Applications.

#### Remediation

**Express Lube, Great Bend, Kansas.** In 1993, area flooding caused the water table to rise and free product to collect in the basement of an Express Lube automotive maintenance facility downgradient of a retail gasoline station. A groundwater suppression and pump and treatment system was designed and installed, together with an SVE system to capture vapors from free-phase product under the facility. The 200 gpm packed tower air stripper and SVE systems operated periodically until 2019. The groundwater suppression system remains operational, and is triggered when the water sensor below the Express Lube building indicates the water table is less than 5 feet below the floor slab, with discharge to the local sanitary sewer. After shutdown of the remedial system in 2019, heavy rains overwhelmed the groundwater suppression system and again resulted in flooding the basement, with an oil sheen on top of the water. Emergency response activities were performed to remove the impacted water. Subsequently, a two-sump Dry-Trak remedial system was designed and installed, sealing off the basement foundation joints and routing collected water from the basement to discharge above-ground via a landscaped rock “channel” leading into the city curb and storm sewer, with local approval.

**Vapor Mitigation System Design and Installation, Olathe, Kansas.** Contracted to design and install a vapor mitigation system during the construction of a coffee shop on property formerly occupied by a retail gasoline station. Site closure had been issued by the regulatory agency following UST closure and over-excavation activities; however, the coffee shop owner desired to install a mitigation system as a pro-active measure for its employees. SCS was contacted after construction started; therefore timing and strategy was complicated to allow construction to progress and meet the owner’s performance criteria. Designed and installed a vapor barrier within the subgrade of the new construction, avoiding underground building piping, and installed a Radon blower to vent the mitigation system. Design completed within 30 days and install completed in two days, in coordination with, and without delaying, ongoing construction.

**High Vacuum Multi-Phase Extraction, Kansas City, Missouri.** In response to petroleum vapors and odors in the basement of an apartment complex located adjacent to an active retail gasoline station, performed an extended period (30-day) high vacuum multi-phase extraction (HVME) action. Required obtaining a short-term waste water discharge permit from a large municipality, and access from an irritated property owner. Coordinated work with MDNR and PSTIF, provided oversight during the HVME activities, reviewed data daily, and recommended modifications to the HVME efforts.

**Multiple Zone Soil Vapor Extraction System with Air Sparging; Colby, Kansas:** Based on pilot testing results, designed a soil vapor extraction system to remediate two distinct contaminated zones, located at different depths, at a former retail gasoline station and service shop. Designed an air sparge system to remediate the BTEX-impacted groundwater in the source area. Conducted five pilot tests, developed site layout, consulted with city personnel and property owners on equipment buildings, detailed performance and equipment requirements, and completed applicable air discharge and UIC permits.

**Groundwater Recovery, Soil Vapor Extraction, and Vapor Treatment; Waverly, Kansas:** Project manager for remediation project at an active retail gasoline station with above ground storage tanks for unleaded and diesel fuel. Operated, maintained, and monitored a groundwater recovery and treatment system intended to control the migration of petroleum-impacted groundwater toward residential basements near the site. Designed and implemented a remedial system to remove vapor phase hydrocarbons from the unsaturated soil utilizing existing groundwater recovery trenches for vapor extraction. Based on expected emissions and odor levels, designed and installed a thermal oxidizer to treat the recovered vapors prior to discharge.

**Soil Vapor Extraction and Air Sparge Mobile Remediation Trailer; Salina, Kansas:** Designed a soil vapor extraction and air sparge remediation equipment trailer for use at multiple sites in Kansas, including a former gasoline and service station and a former dry cleaning facility in Salina, Kansas. Specified two regenerative blowers and one air compressor to allow for alternate or combined use at a variety of sites with different characteristics. Developed performance curves for the specified equipment to evaluate when determining applications at new sites. Included a header system consisting of six soil vapor extraction lines and eight air sparge lines which have the ability to operate together, alternately, or individually. Designed an appropriate control system and panel to operate the remedial trailer, including timers, motor starters, and hour meters.

**Soil Vapor Extraction and Air Sparge System; Cimarron, Kansas:** Project manager and design/staff engineer for a remediation project at a former gasoline station and grain cooperative facility, where the petroleum and chlorinated solvent groundwater plume extends over two blocks downgradient from the site. Conducted a remedial investigation, including the installation of monitoring and pilot test wells, performed three soil vapor extraction tests, and designed a remedial system consisting of three vapor extraction wells to remove separate and dissolved phase hydrocarbons from the unsaturated zone and water surface. Based on review of the site lithology, designed an air sparge system consisting of eight injection wells to remediate the groundwater in the source area. Purchased and installed equipment, implemented construction activities, and operated the system.

**Deep Zone Soil Vapor Extraction and Air Sparge System; Marienthal, Kansas:** Project manager and design/staff engineer for a remediation project at an active cooperative facility in western Kansas, where the depth to water is 130 feet below grade and soil contamination exists from the ground surface to the top of the water. Developed a field work plan to conduct pilot testing activities and collect soil, groundwater, and air samples. Evaluated data and recommended an SVE system consisting of two shallow and two deep extraction wells to remediate impacted soil. Recommended five to seven air sparge injection wells to remediate petroleum (BTEX, MtBE) and chlorinated solvent (PCE, TCE) impacted groundwater in the source area. Specified equipment and operational parameters, such as flow rates, applied vacuums, and injection pressures.

**Multiple Site Soil Vapor Extraction and Air Sparging System; Hugoton, Kansas:** Performed soil vapor extraction and air sparging pilot tests in Hugoton, Kansas to obtain data for the design of a system to remediate a soil and groundwater plume covering two city blocks, and extending toward a public water supply well. There were multiple sources for the plume, including a former dry cleaner, a former retail gasoline station, above ground storage tanks for the local power plant, and active gasoline dispensers. Designed a soil vapor extraction system to address the BTEX, MtBE, and PCE soil groundwater contamination, consisting of seven deep and three shallow zone extraction wells, and an air sparge system consisting of 26 air sparge wells. Stationed equipment in three separate buildings and operated the systems. After nine months, a 97% plume reduction was achieved and 90% of the groundwater concentrations monitored at the site were below cleanup levels.

**Excavation and Landfarming Activities; Gridley, Ellis, Riley, Great Bend, Hugoton, and Atwood, Kansas:** Developed and implemented excavation and landfarming plans for multiple sites in Kansas. Submitted landfarm plans and applications to the Kansas Bureau of Waste Management to landfarm petroleum hydrocarbon contaminated soil without solid waste permits. Excavated 300 to 3,500 cubic yards of contaminated soil and constructed landfarm cells to aerate the soils. Backfilled the excavation basins with permeable material and perforated piping to enable vapor recovery for possible future use with groundwater remedial systems (air sparging systems).

**Oxygen Release Compound® Injections; Kansas:** Implemented three oxygen release compound® studies to evaluate the effectiveness in enhancing the natural attenuation process at petroleum sites. Conducted a two-year oxygen release compound® study using filter socks in monitoring wells in Wichita, Kansas. Injected oxygen release compound® as a slurry into the saturated sand layer in Great Bend, Kansas utilizing a GeoProbe®. Injected oxygen release compound® as a slurry into fractured limestone bedrock in Riley, Kansas. Collected dissolved oxygen measurements, reduction-oxidation potential, and groundwater samples and analyzed the effectiveness. Based on the results, re-injected the oxygen in Great Bend, targeting the zone containing the highest petroleum impacts.

#### Spill Prevention Control and Countermeasure (SPCC Plans)

**Spill Prevention Control and Countermeasure (SPCC) Plans; Kansas and Missouri:** Prepared and certified SPCC plans for a variety of sites, including a meat packing and distribution center, a freight transportation facility, military equipment maintenance facilities, rock quarry sites, landfills, and a materials recycling and distribution center. Inspected sites for compliance with the regulations and made recommendations for improvements.

**Meat Packaging and Distribution Center; Junction City, Kansas – Private Client:** Reviewed the existing SPCC Plan and site conditions. Recommended modifications, including adding appropriate signs and labels and additional spill kit components. Evaluated surface flow and containment structures. Certified SPCC Plan.

**Kansas City, Kansas – ABF Freight Systems, Inc.:** Developed and certified an SPCC Plan for a freight transportation refueling and parking facility. Underground and above ground storage tanks and fuel dispensers are present on the site. Evaluated secondary containment structures and potential spill volumes, rates, and direction. The site is located within ½-mile of the Kansas River, a navigable water.

**Johnson County Landfill; Shawnee, Kansas:** Developed and certified an SPCC Plan for the Johnson County Landfill, which includes maintenance shops and fuel dispensers for the trash hauling services provided by the landfill operator. Evaluated secondary containment for over 40 storage tanks located on site, mobile fueling tanks, and dispensers. The site is located within ½-mile of the Kansas River, a navigable water.

**Materials Recycling Facility; Kansas City, Kansas:** Developed and certified an SPCC Plan for the Materials Recycling Facility, a sorting and distribution center for recycling paper, plastic, bottles, and aluminum. Evaluated secondary containment for four storage tanks, ranging in size from 100 to 7,000 gallons, and associated fuel dispensers.

**Shawnee, Bonner Springs, and Olathe, Kansas – Shawnee Rock Company:** Developed and certified SPCC Plans for three rock quarries in Kansas. The sites consist of rock crushers operating on diesel fuel, large generators, and above ground fuel storage tanks and dispensers to fuel the onsite equipment. Evaluated secondary containment, storage containers, and potential spill volumes, rates, and direction. Recommended materials for spill kits and developed training program for the facility.

#### Solid Waste

**Landfill Alternative Cover Demonstration and Design; Kansas:** Evaluated several different alternative cover options for two landfills in central and eastern Kansas, including evapotranspiration (ET) using select grasses and/or trees, capillary barriers, and geosynthetic clay liners. Researched and modeled an ET-grass cover, including performing over 100 modeling scenarios with variations in cover thickness, cover material, and vegetative parameters. Designed an equivalent alternative cover to the prescriptive Subtitle D cover for a 75-acre municipal solid waste disposal area, which reduced the cost of installing and maintaining the cover approximately 40 to 50%. Specific projects include:

**Johnson County Landfill, Phase 3 and C&D (2002-2003).** Modeled, designed, and constructed an ET alternative final cover for a 75-acre municipal solid waste (MSW) disposal area and a 10-acre construction and demolition (C&D) disposal area. The cover consisted of 4.5 feet of shale material underlying 1 foot of clay material and deep-rooted native grasses. Two pan-type lysimeters were constructed under the cover to monitor infiltration of storm water.

**Johnson County Landfill, Phase 5 (2009-2011).** Following the requirements of the 2004 EPA promulgated Research, Development, and Demonstration Rule (RD&D Rule), designed and constructed an earthen alternative final cover over approximately 50 acres of MSW. The cover consisted of 2.5 feet of shale material underlying 1 foot of clay material and vegetation specific for erosion control and low maintenance. In addition, included vegetation to promote a habitat for the monarch butterfly, as requested by the County. One pan-type lysimeter was constructed under the cover to record infiltration of storm water as part of the demonstration aspect of the RD&D approval.

**Landfill Plume Delineation; Kansas:** Evaluated groundwater monitoring data and the extent of a 40‑acre groundwater plume associated with a closed landfill in southeast Kansas. Recommended site improvements and remediation alternatives, including the injection of a variety of sugar sources to increase the natural biodegradation process and a pilot study of permeable reactive barriers. Recommended revisions to the sampling and analysis plan for assessment monitoring.

**Landfill CQA Services; Kansas:** Reviewed and evaluated data collected during the construction of landfill cells in northeast and eastern Kansas and construction of final covers over landfill cells in central and western Missouri. Developed certification reports and submitted for regulatory approval. Served as the CQA Engineer for new landfill cell constructions, ranging in size from 4 to 36 acres.

**C&D Landfill Compliance Services; Kansas:** Reviewed existing plans and site conditions at seven construction and demolition (C&D) landfills in Kansas and prepared plans to bring facilities into compliance with new Kansas regulations. Sites varied from 15 to 50 acres in size, and waste acceptance ranged from 2,000 to 12,000 tons per year. Developed final contours, storm water drainage plans, waste screening programs, and other various design and operations specifications.

### Publications and Presentations

S.L. Race and P.M. Goeke, *Study of Natural Bioremediation Projects Using Time Release Oxygen Compounds* (Proceedings of the Fifth International In Situ and On-Site Bioremediation Symposium, Volume 3, San Diego, California, June 1999), pp. 295-300.

Michael S. Kukuk, PG, Nathan A. Hamm, PE, Susan L. McCart, PE, PG, Anastasia J. Welch, PE, and Mark Witt, PE, *Evapotranspiration Final Covers: The Kansas Experience – From Concept To Reality* (Landfill Symposium, June 2007).

Darryl Basham, PE, and Susan McCart, PE, PG, *Construction Issues and CQA Solutions* (Presentation at the Kansas SWANA Solid Waste Management Conference and Operator Training Course, November 10, 2011).

Susan McCart, PE, PG, *Lessons Learned: The Importance of the Site Conceptual Model* (Missouri Waste Control Coalition Conference, July 1, 2013).

Margaret Richards, Lathrop & Gage, and Susan McCart, PE, PG, *Common NPDES Mistakes and the Importance of Good Data* (Midwest Environmental Compliance Conference, May 11, 2016).