

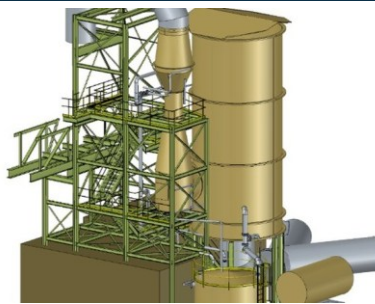


INDEPENDENT METALLURGICAL TESTING • ENGINEERING • CONSTRUCTION & FABRICATION

STATEMENT OF QUALIFICATIONS



TEST



DESIGN



BUILD

From Testing It to Building It — From Design through Construction

11475 West I-70 Frontage Road North • Wheat Ridge, Colorado 80033, USA
(970) 295-1827 info@rdiminerals.com www.rdiminerals.com

A Combined Capability of



March 2026

TABLE OF CONTENTS

01	Executive Summary	2
02	Company Overview	3
03	Our Approach	4
04	Services Overview	5
05	RDi Laboratory Capabilities	6
06	Engineering and Design Services	8
07	Construction and Fabrication	9
08	Commodities and Testing Expertise	10
09	Industries Served	11
10	Who We Partner With	12
11	Leadership and Key Personnel	13
12	Key Personnel — Detailed Profiles	14
	<i>S. Jayson Ripke, Ph.D., QP — Director of Operations</i>	14
	<i>David E. Perkins — Director of Technical Services</i>	17
	<i>Shashi Rao, M.S. — Laboratory Manager</i>	18
	<i>Matthew Stewart, QP — Senior Process Engineer</i>	21
	<i>Nickey Powell — Process Engineer</i>	23
	<i>Daniel C. Whiteley, P.E., QP — Engineer</i>	24
13	Representative Clients	26
14	The McCarl's Advantage	27
15	Contact Information	28

01 EXECUTIVE SUMMARY

McCarl's Technical Services LLC (MTS), doing business as RDi, is a fully integrated technical services provider serving the global mining, minerals, metals, chemical, and energy industries. We combine world-class metallurgical testing, process engineering, multi-discipline design, plant construction, and specialty fabrication under one roof—eliminating the friction, delays, and miscommunication inherent in traditional multi-vendor approaches.

Located in Wheat Ridge, Colorado, with MTS headquartered in Beaver Falls, Pennsylvania, our operations bring together more than three decades of metallurgical testing expertise, originally established as Resource Development Inc. (RDi) in 1990—with the engineering, construction, and fabrication capabilities of the McCarl's family of companies, founded in 1946.

We serve clients ranging from junior exploration companies to major producers executing multi-billion-dollar capital programs, spanning precious metals, base metals, polymetallics, rare earth and critical minerals, industrial minerals, and environmental remediation across six continents.

WHAT SETS RDI APART

Strict Confidentiality — Your intellectual property remains yours. We do not publish, reuse, or cross-apply client data.

No Academic Agenda — Our success is measured by buildable, operable solutions, not patents or publications.

Independent Advice — No equipment bias, no vendor lock-in. We specify what works for your ore.

Integrated Accountability — When we build your plant, we tested your ore, developed the flowsheet, and engineered every detail.

End-to-End Capability — Testing, flowsheet development, engineering, construction, fabrication, commissioning, and optimization under one roof.

02 COMPANY OVERVIEW

Heritage and Ownership

Resource Development Inc. (RDi) was established in 1990 to address the mining industry's need for high-quality, cost-effective, and timely metallurgical testing and consulting. In 2025, RDi was acquired by McCarl's Technical Services, LLC (MTS), a wholly owned subsidiary of McCarl's LLC, founded in 1946 by Foster McCarl Jr. The combined entity preserves RDi's deep metallurgical heritage while adding multi-discipline engineering, construction, and fabrication capabilities.

Facility

RDi's 10,000+ square-foot mineral processing laboratory is located at 11475 West I-70 Frontage Road North, Wheat Ridge, Colorado, near Denver. The facility houses separate, dedicated areas for sample preparation, comminution, flotation (sulfide and industrial mineral rooms), gravity and magnetic separation, leaching, hydrometallurgy, pyrometallurgy, solid-liquid separation, and analytical work. Seven fume hoods, a dedicated dust collection system, and a complete make-up air system support safe operations.



McCarl's maintains two 60,000-square-foot fabrication shops with ASME/National Board certifications and UL-certified panel shops, along with field operations deploying advanced 3D laser scanning, drone surveying, and digital twin technologies.

03 OUR APPROACH

Every engagement begins with a conversation. We start with a phone call or initial meeting to understand your project's scope of work, experimental design, test conditions, and objectives. From that discussion, we develop a draft statement of work for client and partner review.

After any adjustments to the initial scope, we prepare a formal proposal with a detailed budget, scope of work, timelines, and material requirements. Once agreements are executed and samples received, testwork begins.

Work is carefully managed through structured project management. We hold kickoff meetings to align all parties, establish a project schedule and control plan, and share periodic progress reports throughout the engagement. If results or conditions warrant a change in direction, we pivot promptly and communicate openly. Results and requests are addressed in a timely manner until all programs are completed.

We understand that metallurgical testing is inherently iterative. Additional scope beyond the original work plan is managed through change orders, and we remain flexible when initial conditions do not produce the expected outcomes. Final draft reports are submitted for client and client's agent review, with opportunity for comments and approval before issuance.

Project Lifecycle

1	Discovery — Initial call or meeting to define scope, experimental design, and test conditions
2	Statement of Work — Draft SOW prepared for client and partner review and alignment
3	Proposal — Formal proposal with budget, scope, timelines, and material requirements
4	Execution — Agreements executed, samples received, and testwork begins with kickoff meeting
5	Project Management — Schedules, control plans, progress reports, and prompt communication
6	Flexibility — Change orders for additional scope; pivot if results warrant a different approach
7	Reporting — Final draft reports for client and agent review, comments, and approval

04 SERVICES OVERVIEW

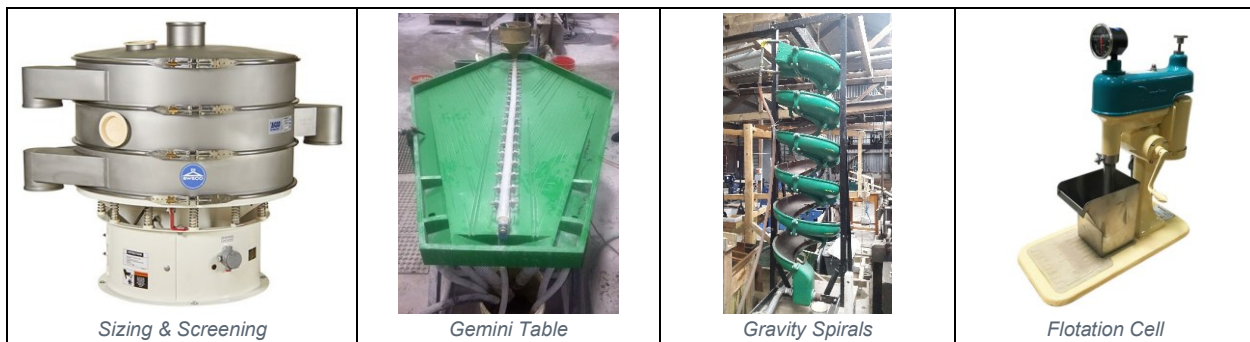
RDi offers a full spectrum of services tailored to every stage of the mining lifecycle, from exploration through construction and ongoing optimization.

Service Area	Scope
Mineral Processing & Testing	Bench-scale and mini-pilot testing for ore characterization including flotation, leaching, gravity and magnetic separation, oxidation, and diagnostic leaching
Analytical Testing	In-house AA spectrometry, ICP-MS, and fire assay. Partnered with neighboring labs for XRD, XRF, ICP-OES, QEMSCAN/MLA
Flowsheet Development	Custom flowsheet design for improved recovery, throughput, and cost reduction across all commodity types. METSIM modeling.
Plant Audits & De-bottlenecking	Comprehensive operational assessments to identify inefficiencies and increase productivity
Feasibility & Consulting	Pre-feasibility, bankable feasibility, PEA, due diligence, and techno-economic assessment
Engineering & Design	Multi-discipline process, mechanical, structural, and E&I engineering from concept through detailed design
3D Scanning & Digital Twins	Sub-millimeter laser scanning to large-facility drone surveys; clash detection and reverse engineering
Pre-Construction & Estimating	AACE Class I through IV estimates with execution plans and schedules
Construction	Small capital projects through multi-billion-dollar facility joint ventures
Specialty Fabrication	ASME/NB-certified vessels, boilers, piping, repairs; UL-certified panel fabrication
Quality Control	Internal and third-party QC including invasive and non-destructive testing
Waste Management	Converting tailings and waste streams into high-value products including critical minerals from legacy sites

05 RDi LABORATORY CAPABILITIES

RDi's laboratory provides a full spectrum of metallurgical testing services from initial drill-core preparation to complete process flowsheet development and techno-economic assessment.

Discipline	Methods and Equipment
Sample Preparation	Core cutting; jaw crushers (3×5", 4×6", 8×10"); roll crusher; cone crushers; chipmunk crusher; hammer mill; Bico disc and ring pulverizers; ribbon blender; rotary sample splitter; riffle splitters
Comminution & Sizing	Bond work index (BWi) grinding unit; CWi; abrasion index (Ai); rod/ball mills; Ro-Tap sieve shakers; Gilson portable screen; Sweco Gyra-Vib separator; Warman Cyclosizer; Krebs cyclone test stand; wet sieve apparatus
Gravity Separation	Knelson concentrator; Gemini, Deister, and Wilfley shaking tables; spirals (1 ft, 2 ft, 4 ft); gold wheel; laboratory centrifuge
Magnetic & Electrostatic	Carpco WHIMS; lift-type dry separator; dry magnetic roll separators; rare-earth roll and belt separators; electrostatic separator
Froth Flotation	Denver D12 float machines; Wemco lab float machine / attrition scrubber; cubic-foot float cell; additional float cells (various sizes); dedicated sulfide and industrial mineral flotation rooms
Solid-Liquid Separation	Pressure filters (including stainless steel); vacuum filter housing; thickening equipment; rheology measurement



Facility Utilities and Support

Equipment	Manufacturer
Laboratory Fume Hoods (individual exhaust)	Various
Sample Preparation Hoods	—
Champion Air Compressor	Champion
Main Dust Collector	Techna-Flo
Direct-Fire Make-Up Air Unit	—
Vacuum Unit with Receiver	—
Drying Ovens (Despatch LEB Series)	Despatch
Thermolyne Oven	Thermolyne
Vacuum Tray Dryer	Phaytune Sci
Freezers (sample storage)	Various
Forklift (4,000 lb capacity)	Wagner/CAT
Air Curtain/Exhaust Systems	E&E Sheet Metal

06 ENGINEERING AND DESIGN SERVICES

MTS provides multi-discipline engineering from conceptual studies through detailed design, leveraging hands-on industrial experience across mining, mineral processing, chemical processing, metals, power, and oil and gas sectors.

Process Engineering and Consulting

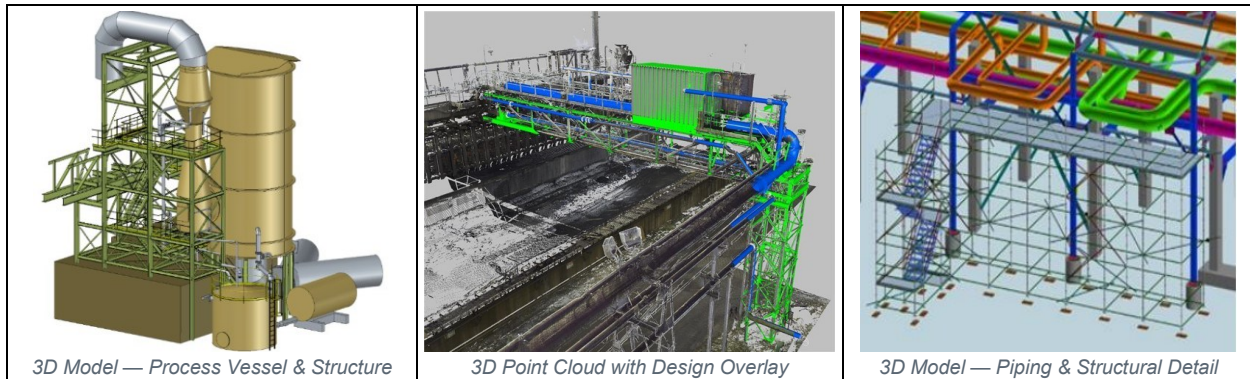
Conceptual studies, detailed process engineering, de-bottlenecking, and optimization. Software capabilities include METSIM, AutoCAD, and Aspen for modeling, simulation, and design.

Design Engineering

The design team works within 3D models serving as digital twins. Disciplines include process, mechanical, structural, and E&I engineering, integrated with McCarl's construction and fabrication for constructability from the outset.

3D Scanning and Digital Twin Technology

Sub-millimeter laser scanning to aerial drone surveying with sub-inch accuracy. As-built verification, clash detection, and reverse engineering—reducing rework, often to zero.



Pre-Construction and Estimating

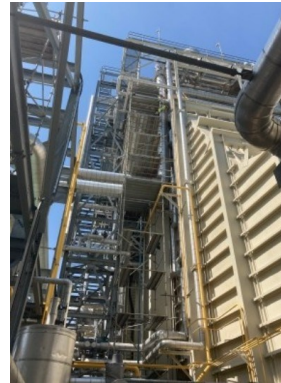
AACE Class I through IV estimates from professionals with direct construction experience, supported by detailed execution plans and schedules.

07 CONSTRUCTION AND FABRICATION

Through McCarl's LLC, we provide full-service construction and specialty fabrication in a true design-build model. Two 60,000-square-foot fabrication facilities hold ASME S, PP, U, and R certifications plus UL-certified panel shops. McCarl's executes projects from small capital work through multi-billion-dollar joint ventures.



Fabricated Process Skid — McCarl's Shop



Construction Erection

08 COMMODITIES AND TESTING EXPERTISE

RDi has completed testwork programs across a broad range of commodity groups and deposit types. Each program is designed around the specific orebody, project stage, and economic objectives.

Precious Metals	Base Metals	Critical & Battery	Industrial & Other
Gold (oxide & refractory)	Copper	Rare Earth Elements	Barite / Celestite
Silver	Nickel	Lithium	Carbonates / Calcite
Platinum Group Metals	Zinc	Graphite	Clays / Feldspar
	Lead	Manganese	Phosphate / Potash
	Polymetallic sulfides	Vanadium	Coal / Iron Ore
	Tungsten / Bismuth	Cobalt	Diatomite / Perlite
	Arsenic-bearing ores	Titanium	Wollastonite / Zeolite
	Molybdenum	Specialty materials	Ultra-high purity silica

09 INDUSTRIES SERVED

Industry	Typical Scope
Mining & Mineral Processing	Testwork, process design, plant optimization, EPC delivery, construction
Precious Metals (Au, Ag, PGM)	Diagnostic leaching, flowsheet development, feasibility support, plant audits
Base Metals (Cu, Pb, Zn, Ni)	Flotation, leaching, electrowinning, concentrate quality optimization
Critical & Battery Minerals	REE, lithium, graphite, vanadium, cobalt: process development and scale-up
Industrial Minerals	Beneficiation of carbonates, clays, phosphate, potash, silica, wollastonite, and others
Chemical Processing	Process engineering, reactor and vessel design, fabrication
Metals (Ferrous & Non-Ferrous)	Rolling mill support, cast house optimization, green steelmaking
Power Generation	Boiler fabrication, piping, maintenance turnarounds
Oil & Gas	Piping, vessels, structural, facility maintenance
Wastewater & Environmental	Treatment system design, cyanide destruction, mine drainage, tailings remediation

10 WHO WE PARTNER WITH

RDi thrives on partnerships that foster mutual growth without IP concerns or institutional hurdles.

- **Mining Companies:** Junior explorers through senior producers for resource definition, flowsheets, EPC, audits, de-bottlenecking, and capacity expansion.
- **OEMs:** Technology integration, validation, and demonstration facilities.
- **Engineering & Construction Companies:** Joint ventures and subcontract scopes on EPC programs.
- **Drilling Companies:** Rapid testing and analysis turnaround supporting exploration.
- **Financial Institutions & Investors:** Independent technical reviews, due diligence, and risk assessment for project financing.
- **Government Agencies:** Sustainable mining, critical minerals strategy, regulatory compliance, and mine waste remediation.
- **Other Laboratories:** Complementary collaborations to expand capabilities and capacity.

11 LEADERSHIP AND KEY PERSONNEL

The RDi/MTS team brings together professionals with deep operational, engineering, and research backgrounds.

Name & Title	Profile
Tom Rauch, P.E. <i>Chief Operating Officer & President</i>	Leads McCarl's Technical Services. BS Mining Engineering (Mineral Processing) and BS Energy Business & Finance, Penn State. Licensed PE. Prior experience at Black Mountain, Kappes Cassiday & Associates, Jacobs, and Taggart Global. EPC delivery across mining, metals, and chemical sectors. President of SME Foundation (2023–2025).
Jayson Ripke, Ph.D., QP <i>Director of Operations</i>	20+ years in metals, minerals, and chemical sectors. Increased annual revenue by \$24M at major mining operations. Invented MIDREX H2™ concept (95% ironmaking carbon reduction). Ph.D. Chemical Engineering; B.S./M.S. Metallurgical & Materials Engineering, Michigan Tech. SME Arthur F. Taggart Award recipient.
Jessica Ayers, P.E. <i>Director of Engineering</i>	20+ years leading multidisciplinary teams on complex capital projects across oil & gas, pharmaceutical, utilities, and manufacturing. Full-lifecycle EPC and design-build execution. BS Mechanical Engineering; MS Environmental Science & Engineering, Colorado School of Mines; MBA, Washington State University. PE (6 states), PMP.
David Perkins <i>Director of Technical Services</i>	30+ years across manufacturing, mining, and metals. Former positions at US Bureau of Mines, Alcoa, Freeport-McMoRan, and Derrick Corporation. Dual-patent holder (aluminum sheet manufacturing, gold recovery technology). B.S. Metallurgical Engineering, Missouri S&T. Active in SME and AIST.
Shashi Rao, M.S. <i>Laboratory Manager & Senior Metallurgical Engineer</i>	15+ years global experience in minerals processing, extraction, and sustainable metallurgy. Specialist in industrial and critical minerals. Doubled recovery rates for low-grade ores; designed modular water treatment systems for sulfate reduction. Expert in TiO ₂ and vanadium extraction. Published SME author. M.Eng.Sc. Metallurgy, Curtin University.
Matthew Stewart, QP <i>Senior Process Engineer</i>	Leads engineering and project management for mining/industrial plant design across the Americas. DOE-funded rare-earth and coal recovery projects. FEED for greenfield battery recycling. Former roles at KCA and Altairnano (projects to \$200M). B.S. Materials Science & Engineering, UNR.
Nickey Powell <i>Process Engineer</i>	Flowsheet design, process optimization, and advanced data analytics. METSIM, AutoCAD, and Aspen proficiency. Former senior metallurgist, Doe Run Company. B.S. Chemical Engineering, Missouri S&T.
Daniel Whiteley, P.E., QP <i>Engineer</i>	Licensed PE and QP for economic analysis and NI 43-101 reporting. Global project portfolio from heap leach to refinery retrofits. B.S. Mining Engineering, UNR. Current Chair, Nevada Mineral Processors Division.
Scott Kerbaugh <i>Senior Technician</i>	Decades of expertise in flotation, roasting, autoclaving, leaching, gravity, and magnetic separation. Former positions at CSMRI, InterPro, and Barrick Gold Corporation.
Travis Kerbaugh <i>Senior Technician</i>	Extensive experience in gravity separation, flotation, column leaching, cyanidation, acid leaching, and magnetic separation across diverse ore types.

12 KEY PERSONNEL — DETAILED PROFILES

The following profiles detail the experience and credentials of the key personnel who lead and deliver RDi/MTS programs. Content is presented as provided by each professional.

S. Jayson Ripke, Ph.D., QP

SME Arthur F. Taggart Award Recipient

Director of Operations

Jayson has demonstrated a continuous drive to accomplish success throughout his 20-year career. He has delivered project and operational deliverables in the fields of process engineering, research & development, industrial plant design & operations, mineral processing, and metallurgy achieving financial results and technical innovations. His technical prowess has enabled thoughtful solutions to operational challenges with robust and lasting effects.

PROFESSIONAL EXPERIENCE

McCarl's Technical Services LLC

06/2023 – Present

Director of Operations

Responsible for growing McCarl's operations in Charlotte, NC and Wheat Ridge, CO including:

- Project manager and principal engineer to various metals, minerals and chemical clients
- Consult as Subject Matter Expert (SME) in ferrous and non-ferrous metallurgy
- Account ownership for regional core clients
- Author proposals and cost estimates
- Grow technical team capacity and capabilities
- Liaise and deploy resources from other McCarl's operations into the Charlotte region
- Senior leadership in McCarl's Technical Services management team

The Doe Run Company

02/2023 – 06/2023

Brushy Creek Mine & Mill Site Manager and Chief Metallurgist – Boss, MO

- Managed coordination among mine and mill operations and maintenance

The Doe Run Company

07/2019 – 06/2023

Chief Metallurgist, Exploration & Development – Viburnum, MO

- Built and managed a team of five metallurgists; four at individual Pb-Zn-Cu sulfide concentrators
- Increased revenue by \$24M/yr. by updating the entire reagent scheme via bench testing and commercial implementation at one concentrator that allowed processing of a significant ore resource containing high iron sulfide that was previously not processable, resulting in additional 3k st/y copper concentrate
- Led quarterly Metallurgy Summits (internal technical sessions and external short courses)
- Awarded \$2.0M contract through the U.S. DOE's CMI for a Co and Ni project including bench and pilot beneficiation and hydrometallurgy
- Evaluated potential copper resource acquisition and identified significant cost saving opportunities
- Implemented OsiSoft PI at all four mills within 6-months and developed department dashboards
- Managed two separate successful pilot plants: 1) Beneficiation of Co, Ni ore (at R&D facility), based on our comprehensive geometallurgy testing 2) Improved liberation through tertiary grinding and fine wet screening (at Buick Mill). Used METSIM to evaluate and optimize the flowsheets (and grinding capacity)
- Authored Iron Ore Beneficiation Chapter for the 2019 SME Mineral Processing Handbook

Solvay

03/2018 – 07/2019

Sr. Application Engineer

- Conducted safe, hands-on laboratory and in-plant JMP statistically designed trials with novel reagents for iron ore froth flotation at commercial plants in Minnesota and laboratories in Connecticut, Arizona, and South Carolina
- Directed \$150k/year Michigan Technological University metallurgical research program on novel iron ore flotation reagents
- Directed pressure filter aid research program at University of Minnesota's CMRL

Midrex Technologies, Inc.

2005–2008 & 2014–2018

Manager – R&D

- Invented and developed novel MIDREX H2™ concept to reduce ironmaking CO2 emissions by 95%, including heat and mass balances (with sophisticated in-house software). A 2.1Mtpy commercial plant is being constructed in Sweden (announced October 2022)
- Awarded DOE Cooperative Research & Development Agreement (CRADA)
- Developed annual R&D strategy and budget; implemented projects
- Managed technology improvement project(s) considered most critical to the company
- Expert on raw materials (iron ore pellets) and evaluations for the MIDREX® process
- Conducted DRI shaft furnace basket tests in Hamburg, Germany

Midrex Technologies, Inc.

01/2014 – 03/2016

Manager – Technology Center Operations

- Effectively led 27 full-time employees (M.S and B.S. engineers, chemists, technicians, and mechanics) at new state of the art R&D facility; effectively managed \$6M/yr. schedule & budget
- Completed Executive Leadership Institute, Queens University McColl School of Business
- Developed both a "Safe Productivity" and a Positive-Teamwork culture; created popular monthly safety audits; instituted Incident Reporting System (severity, notification, and close-out), Incident Analysis, Lock-out Tag-Out Try-Out (LOTOTO), Initial Safety Assessments (ISA); coached effectively; improved productivity through Time & Life Management

Cardero Iron Ore Company, Ltd.

04/2008 – 01/2014

Manager – R&D

- CARDERO MATERIALS TESTING LABORATORY (CMTL) — Designed and built state of the art \$1.0 million beneficiation laboratory on-time and on-budget. Developed and effectuated internal laboratory work contracts (including schedule and budget) for Cardero Ghana Ltd., Wealth Minerals, and external projects for KazaX Minerals and Pea Ridge all completed on-time and on-budget; also managed the entire lab including 5+ employees.
- PAMPA DE PONGO (PdeP) PROPERTY — Played key roles in successfully selling PdeP to Nanjinzhaio in 2010 for \$100 million after Cardero invested only \$1 million; managed external laboratory and pilot-scale testing program on-time and on-budget. Developed internal metallurgical (beneficiation & pelletizing) preliminary economic assessment (PEA) including metallurgical CAPEX and OPEX for targeted 15 million mtpy iron ore pellet plant project; signed-off on the metallurgy portion as QP.
- NORTH ATLANTIC IRON CORPORATION (NAIC) PROJECT — JV partnership between Cardero Iron Ore, Grand River Ironsands (GRI) Inc., and Petmin Ltd. (South Africa). Engineered and operated pilot plant in Goose Bay, Labrador based on the flowsheet developed in the CMTL laboratory. The pilot plant produced 400 tons of concentrate for pig iron production demonstration at Midrex. The commercial plant will be 500,000 tpa pig iron.
- CARDERO GHANA LTD. PROPERTY — Visited Ghana, met with local Chiefs of Sheini and Yendi. Prepared comprehensive proposal; awarded with three exploration licenses covering 400,000 km2 in the Sheini Hills iron project. This is one of Africa's last undeveloped iron formations; multi-billion-ton potential. Exploration by diamond drilling; managed Metallurgical testing.

- PAMPA EL TORO (PET) PROPERTY — Managed the metallurgical portions of Peruvian PET resource/project development programs for pig iron production from iron sand concentrate. Campaigned pilot plant; produced 40 tons of magnetite concentrate; increased throughput from 2 to 30 tph with improved grade and recovery.
- LONGNOSE & TITAC PROPERTIES — Personally brought the exploration project to the permitting stage on-time and under budget; Hired and supervised the project manager who supervised several others; 43-101 resource estimate completed on-time and at budget January 31, 2012.
- GENERAL — Authored corporate news releases as a QP in accordance with the Toronto Stock Exchange, SEC.

MIDREX Technologies, Inc.

07/2005 – 04/2008

Plant Sales Manager

- Managed plant supply contracts for MIDREX coal based RHF including FASTMET®, FASTMELT®, and ITmk3®
- Effectuated \$12.3 million contract for first \$235 million commercial iron nugget plant
- Effectuated 3 Advanced Engineering contracts, \$1.8M, for FASTMELT and ITmk3 (iron nugget)
- Developed and negotiated Plant Supply Agreements (PSA), Technical Specifications, Process License Agreements (PLA), and Alliance Agreements (AA)
- Developed Capital Cost (CAPEX) estimates for FASTMELT® and ITmk3®
- Business travel: Germany and UK, Italy, Japan; Australia / New Zealand; Turkey, Ukraine, Venezuela; Vancouver.

Cleveland-Cliffs, Inc.

11/2004 – 07/2005

Wabush Mines – Chief Metallurgical Engineer (Promotion)

- Managed twelve employees, including the laboratory supervisor, and a \$1.4M annual budget
- Promoted by Executive VP Ops to fix the plant's significant decrease in grade and recovery from 2001 to 2004
- Saved the plant \$5 million per year; determined precisely what reduced plant performance, and how to fix it; the key was to produce a Hydrosizer product that performed best in high-tension (electrostatic) separation
- Worked with Chief Mining Engineer and ore grading geologists to improve ore blending and develop Mine-to-Mill performance correlations; Led team members into higher productivity

EDUCATION

- Michigan Technological University | Ph.D. Chemical Engineering (12/2002)
- Michigan Technological University | M.S. Metallurgical & Materials Engineering (04/1999)
- Michigan Technological University | B.S. Metallurgical & Materials Engineering (05/1997)

HONORS & AWARDS

- MTU Distinguished Academy of Chemical Engineering, 2015
- 2012 SME Arthur F. Taggart Award for "significant advancement in mineral processing" (best SME technical publication of the year)
- 2005 MTU Outstanding Young Alumni Award
- 1 of 12 SME 2004–2006 Young Leaders
- The 2003 SME MPD Outstanding Young Engineer Award

PUBLICATIONS

- 60 total, 17 peer reviewed, 520 citations (per scholar.google.com, Stephen Ripke)

David E. Perkins*Dual U.S. Patent Holder***Director of Technical Services**

With over 30 years in the manufacturing, mining and metals sectors, David brings a wealth of experience and knowledge to processing operations. His passion for efficiency and productivity enables a cost effective approach to problem solving that focuses on capacity, recovery and the environment.

PROFESSIONAL EXPERIENCE**McCarl's Technical Services LLC**

2022 – Present

Director of Technical Services – Beaver Falls, PA

- Guide Client development and core client management program
- Expand design/build opportunities to grow revenue
- Lead engineering and design, and procurement teams
- Manage strategic contracts and grow vendor agreements

Disa Technologies, Inc.

2022 – 2023

*Technical Advisor***Derrick Corporation**

2011 – 2022

*Director of Technical Sales – Mining & Industrial Division***Aurubis**

2009 – 2011

*Senior Process Engineer***Alcoa Mill Products (Arconic)**

1999 – 2009

Staff Metallurgist – Lancaster Mill; Customer Technical Support Engineer – Nissan North America; Senior Metallurgist – Texarkana Mill

Freeport-McMoRan

1993 – 1998

*Metallurgist***EDUCATION**

- Missouri University of Science and Technology — BS Metallurgical Engineering ('95); BS Economics (incomplete); MS Metallurgical Engineering (incomplete) (1990–1995)
- University of Houston, C.T. Bauer College of Business — Sales Excellence (2018)
- University at Buffalo — Lean Six Sigma Green Belt (2008–2009)

HONORS & AWARDS

- Member of the Mines and Metallurgy Academy of Missouri University of Science and Technology
- Member of Society for Mining, Metallurgical and Exploration Engineers (SME) since 1993
- SME Committee Member of Association Growth Strategic Committee
- Session Chair SME MPD Physical Separations; Chair SME MPD Scholarship Committee; Chair MPD Ron Yu Yuan Award; Chair MPD Richards Award
- US Patent 20150197827 pending for novel gold recovery process
- US Patent 6543122 issued for development of novel aluminum sheet manufacturing process
- Lean Six Sigma Green Belt

Shashi Rao, M.S.

Published SME Author

Laboratory Manager & Senior
Metallurgical Engineer

Shashi is a process engineering leader with nearly 15 years of experience in minerals processing and extraction, specializing in characterization, flotation, geometallurgy, hydrometallurgy, pyrometallurgy, and sustainable practices for industrial and critical minerals. He currently leads laboratory operations at RDi, managing client programs, delivering scalable process designs, and translating lab test work into engineering and construction projects. Over his career, he successfully doubled recovery for low-grade ores, developed high-purity critical mineral products such as titanium dioxide and vanadium, and designed a water treatment plant meeting Minnesota's strict 10 ppm sulfate standard. He excels at building high-performing teams, mentoring technicians and early-career engineers, and implementing systems that improve safety, quality, and project delivery. His expertise bridges exploration, process design, and production-ready operations, combining technical precision, innovative problem-solving, and collaborative leadership to drive efficient and sustainable mineral resource development.

AREAS OF EXPERTISE

- **Mineral Processing:** Flotation, selective flocculation, desliming, comminution, dewatering, filtration, agglomeration, geometallurgy, mineralogical characterization.
- **Pyrometallurgy:** Smelting, pelletizing, direct reduction ironmaking.
- **Hydrometallurgy:** Leaching, solvent extraction, precipitation.
- **Sustainability:** Decarbonization, green steelmaking, steel mill waste recycling, wastewater treatment.

PROFESSIONAL EXPERIENCE**McCarl's Technical Services (RDi), Denver, CO**

Jan 2026 – Present

Laboratory Manager

- Lead day-to-day operations of a minerals processing laboratory, ensuring safe, reliable, and high-quality metallurgical test work.
- Manage client programs from proposal through delivery, aligning technical scope, timelines, and budgets with project objectives.
- Solve complex processing challenges and develop practical, cost-effective flowsheets for resource and process development projects.
- Translate laboratory results into scalable process designs, supporting engineering studies and downstream project execution.
- Build and manage the project pipeline, converting laboratory programs into engineering, design, and construction opportunities.
- Mentor technicians and junior process engineers, strengthening technical capability, accountability, and project management skills.
- Implement systems to improve safety, quality control, sample tracking, and overall project delivery.

Mesabi Metallica, Nashwauk, MN

Aug 2024 – Dec 2025

Process Engineering Manager

- Led completion of NI 43-101 technical report with DRA Global to ensure resource compliance with industry standards.
- Validated legacy flowsheet with new ores at COREM, NRRI, and SGS, implementing Concorde™ flotation technology to remove silica while minimizing fine iron losses.
- Developed relationships with customers to sell direct reduction grade pellets, leading product development and on-site testing to meet quality requirements.

- Secured vendor contracts for raw materials (limestone, bentonite, flotation reagents, tailings thickening flocculants, organic binders) to optimize product quality and productivity.
- Mentored young graduates and process engineers in mineral processing, pelletizing, and direct reduction ironmaking.
- Finalized mine blending and ore grading program to support mining and geology departments in mine planning.
- Designed, constructed, and procured a world-class processing laboratory for daily quality control, debottlenecking, and plant performance quantification.
- Collaborated with Stantec to finalize air permit applications for pellet plant air pollution control systems.
- Evaluated potential exploration targets, including oxidized ex situ and in situ iron ore resources, to expand company reserves.
- Developed DR-grade pellets exceeding industry benchmarks, surpassing incumbent pellet quality standards at customer sites.

Natural Resources Research Institute, Duluth, MN

Apr 2014 – Aug 2024

Senior Research Associate and Metallurgical Engineer

- Designed, constructed, commissioned, and operated a modular water treatment plant with precipitation tanks, flocculation, sedimentation, plate settlers, and rapid sand filtration, reducing sulfates in Minnesota wastewaters to meet 10 ppm wild rice standards.
- Directed flowsheet design and optimization for iron ores from Canada, South Africa, Algeria, Mauritania, Brazil, USA, Honduras, India, and Chile, enhancing recovery and efficiency.
- Developed selective flocculation, desliming, and flotation process for South Africa's Sishen low-grade iron ores, doubling weight recovery.
- Upgraded Western Mesabi tailings, achieving 100% recovery improvement at Grand Rapids, MN plant.
- Pioneered phosphorus removal process for Honduran iron ores, transforming uneconomic orebodies into marketable products.
- Led hydrometallurgical programs to extract high-purity titanium dioxide, vanadium, and iron oxide from titanomagnetite and ilmenite ores via leaching, solvent extraction, and precipitation.
- Designed and led recovery programs for nickel, PGMs, cobalt, titanium, vanadium, manganese, and other critical metals from electronic waste and industrial residues.
- Spearheaded a national e-waste recycling program, collaborating with manufacturers, recyclers, smelters, and battery producers to address sustainability challenges.
- Replaced coke breeze with biomass in lead smelting, significantly reducing carbon footprint for the nation's leading lead recycler.
- Led U.S. Department of Energy initiatives to advance iron ore processing and sustainable metallurgy.
- Partnered with engineering firms to develop comminution circuits for silica sand, limestone, garnets, iron ores, gold ores, spodumene, and PGM ores.
- Collaborated with Solvay, BASF, Nouryon, Kemira, Nalco, Evonik, Clariant, Metso, SMS Group, Weir Minerals, ThyssenKrupp, FLSmidth, and Eriez to develop proprietary chemicals and equipment.
- Oversaw ASTM and ISO-compliant testing for DRI and blast furnace-grade pellets, ensuring world-class quality.
- Provided technical advisory services to U.S. Steel, Cleveland Cliffs, MagIron, ArcelorMittal, Steel Dynamics, and Nucor Steel, optimizing operations.

Cobar Consolidated Resources Limited, NSW, Australia

Dec 2012 – Feb 2013

Metallurgical Engineer

- Commissioned gravity table circuit to recover galena and operated carbon-in-leach circuit for silver extraction using cyanide leaching.

- Optimized carbon loading, stripping, and ore washing to enhance silver recovery and remove clays.
- Evaluated activated carbons from global sources to improve cyanide leaching efficiency.

JSW Steel Ltd, Bellary, India

Aug 2010 – Aug 2011

Graduate Engineer Trainee (Metallurgy)

- Contributed to commissioning India's largest 10-million-ton integrated steel mill, focusing on beneficiation, pelletization, sintering, coke making, blast furnace, and Corex ironmaking.
- Conducted studies to troubleshoot and improve plant productivity and quality.

EDUCATION

- Curtin University, Kalgoorlie, WA, Australia — Master of Engineering Science, Metallurgy (2013)
- National Institute of Technology, Surathkal, India — Bachelor of Technology, Metallurgical and Materials Engineering (2010)

CERTIFICATIONS & AFFILIATIONS

- Recycling Metals from Industrial Waste, Colorado School of Mines; Big Data and Social Analytics, MIT; Blandin Community Leadership Program; MSHA New Miner, U.S. Department of Labor
- Board Member, Minnesota Section of SME; Member, SME; Member, Association for Iron & Steel Technology (AIST)
- Session Co-chair: 90th & 91st Annual Meetings of the Minnesota Section of SME; 7th North American Iron Ore Symposium, Pelletizing Section (Montreal, May 2019)

Matthew Stewart, QP

Qualified Person (QP #01564)

Senior Process Engineer

Experienced process engineer in mining and industrial process plant design, with lead responsibility from concept studies through detail engineering, procurement, and construction engineering support for several projects throughout the US, Mexico, and South America. Significant experience in the development of flowsheets, mass balances, piping and instrument diagrams, equipment selection, procurement support, cost estimation, project financial/cashflow analyses, and performing metallurgical analyses and technical evaluations. Strong research and development background with experience in both metallurgical and fine chemicals development laboratories and pilot plants, and novel process flowsheet development.

PROFESSIONAL EXPERIENCE**McCarl's Technical Services LLC**

04/2021 – Present

Technical Services Engineer – Beaver Falls, PA / Reno, NV

McCarl's Technical Services Project Delivery Experience:

- MTS PM/Lead for FEED Study Design/Engineering for rare-earth/coal recovery project in support of Barr Engineering and the University of North Dakota.
- Project Management for concept and detailed design of equipment and piping for brownfield and greenfield projects in a variety of metals industries.
- Engineering and design support PM (FEL-2 and FEL-3) for greenfield battery recycling plant project.
- Fluid flow modeling for gas and liquid piping systems, for assessment and optimization of piping system changes and upgrades.
- Concept engineering and design co-lead for two rare-earth/coal recovery projects in coordination with Pennsylvania State University, funded by the Department of Energy.
- Pre-construction support — work packaging and piping hydro/pneumatic test packaging for the power and metals industries.
- Estimating support and detailed construction bid preparation.

Kappes, Cassiday & Associates (KCA) – Reno, NV

06/2010 – 03/2020

Process Engineer / Project Manager

- Project lead and engineering design support for basic and detailed engineering, along with concept through feasibility studies for several gold and silver heap leach and milling projects in the US, Mexico and throughout South America.
- Total project values ranged from \$10M to \$200M, with KCA responsibility ranging from \$200k to \$3M.
- Projects included process engineering of comminution, material handling, pumping and irrigation, leaching and precious metals recovery circuits.
- Developed flowsheets, mass balances, piping and instrument diagrams, equipment lists and equipment sizing and selection, process descriptions, procurement support, capex and opex estimates, engineering-level project financial/cashflow analyses.
- Provided technical evaluations and metallurgical analyses for clients independently and in support of engineering studies.
- Supported and prepared proposal and bid documentation for studies and engineering and procurement support.
- Co-author and coordinator of several Canadian NI 43-101 technical reports for clients and thorough understanding of the reporting requirements.

Altairnano – Reno, NV

02/2004 – 06/2010

Battery Laboratory Manager / Engineer; Research Engineer

- Managed a team of technicians to develop improved Lithium-ion battery cell designs and novel anode/cathode chemistry for cell performance enhancements; managed departmental and project budgets and schedules.
- Increased throughput capacity of the laboratory by 25% by improving upon lab process methods, procedures and instrumentation.
- Conducted materials research, processing design, and optimization for novel small-particle electrode materials for high-power Lithium-ion batteries; developed pilot-scale plants/processes for the production of these materials.
- Performed key research and process design for a rare-earth inorganic compound for use as an active pharmaceutical ingredient, a multi-year development project. Named co-inventor on published Patent. Process methods included leaching, precipitation, and solid-liquid separations.

EDUCATION

- University of Nevada, Reno — Bachelor of Science, Materials Science and Engineering (05/2003)

PROFESSIONAL AFFILIATIONS & PUBLICATIONS

- Qualified Person (QP #01564) and Member, Mining and Metallurgical Society of America; Member, Society for Mining, Metallurgy and Exploration
- Stewart, M., Kappes, D. SART for Copper Control in Cyanide Heap Leaching, SAIMM v. 112, Dec. 2012, pp. 1037–1043.
- Gore, A., Schauer, E., Stewart, M., Singh, R.; Spectrum Pharmaceuticals, Inc. Lanthanum Carbonate Hydroxide, Lanthanum Oxycarbonate and Methods of their Manufacture and Use. United States Patent US 8,961,917. 2015.

Nickey Powell

METSIM | AutoCAD | Aspen

Process Engineer

Nickey's knowledge and experience have helped him deliver project and operational deliverables in the fields of process engineering, research & development, metallurgy, and operations.

PROFESSIONAL EXPERIENCE**McCarl's Technical Services LLC**

2024 – Present

Technical Services Engineer – Charlotte, NC

- Provide engineering services for mining, mineral process and related industries.
- Support flowsheet design, water and mass balance calculation, organization and optimization of process facilities, equipment sizing and selection.
- Apply experience to greenfield and brownfield projects.
- Account ownership for regional core clients; author proposals and cost estimates.

The Doe Run Company – Viburnum, Missouri

2019 – 2024

Metallurgist II / Metallurgist I / Research Engineer / Research Technician

- Customized and utilized data analytics to regularly maximize Pb, Zn, and Cu concentrate recovery, at target grade, by evaluating key performance indicators (KPIs) within Tableau and OSISoft PI systems at three separate concentrators: Buick, Brushy Creek, and Fletcher mills.
- Commissioned and led the installation of cutting-edge froth flotation cameras at the various mills across the trend resulting in improved recoveries of Pb by 0.5% and Zn by 2% at target grade, resulting in increased revenue of \$2M/yr.
- Led all benchtop flotation testing for the company to evaluate alternative reagents and a geometallurgy test program on new stopes.
- Generated, maintained, renormalized, and recalibrated a much-needed calibration for the on-line XRF analyzers that included identifying and replacing broken components.
- Led Pilot Plant to help upgrade the flotation machines at the Brushy Creek mill; evaluated alternative froth flotation cells at Fletcher and Buick mills.
- Commissioned new PSI on-line particle size analyzer at Buick mill and worked to install a slurry density gauge to maximize grinding efficiency.
- Generated METSIM models to evaluate novel copper circuits at the Buick mill, and to evaluate alternate flow sheets replacing hydrocyclones with Derrick Screens.
- Used JMP Pro to design, complete, and evaluate a three-factor design of experiments (DOE) for a flotation test matrix.
- Led metallurgical operations in the Ni-Co pilot plant to achieve target grades and recoveries; conducted test work on centrifuges as an alternative to filtration in a pilot plant setting.

EDUCATION

- Missouri University of Science and Technology — Bachelor of Science, Chemical Engineering (2014–2018)

ABILITIES

- METSIM — modeling software used in the mining industry; developed crushing, grinding, and flotation circuits
- AutoCAD design software; Aspen process simulation (equipment sizing including heat exchangers)
- Programming: C++, Python, APL, PI; Analytical tools: AA, XRF (generated calibration curves and maintained equipment)

Daniel C. Whiteley, P.E., QP

Licensed PE (NV) | Qualified Person

Engineer

Dan's knowledge of the mining and mineral process industry includes experience in managing numerous project studies, involvement in various stages of permitting, process flowsheet development, metallurgical laboratory testing and R&D projects.

PROFESSIONAL EXPERIENCE**McCarl's Technical Services LLC**

2023 – Present

Technical Services Engineer – Reno, NV

- Provide engineering services for mining, mineral process and related industries; apply study and permitting experience to greenfield and brownfield projects.
- Support flowsheet design, water and mass balance calculation, organization and optimization of process facilities, equipment sizing and selection, estimating support for equipment and construction disciplines.
- Qualified Person for project economic analysis and Technical Report authoring.
- Pennsylvania, USA: assisted with a Class 1 AACE study for a facility producing Styrofoam beads, including engineering, design and project estimation for an appropriately sized pumphouse treating approximately 20,000 gallons per minute discharged back to the river.
- West Virginia, USA: managed two AACE class 3 retrofit projects for an oil refinery and petroleum products storage facility, adding new pumps and supply lines to optimize plant operation and reduce operating costs.
- North Dakota, USA: assisted with a FEED study for two coal projects with rare earth metals, including equipment sizing, plant layout, reagent consumption/sourcing, and tradeoff studies for plant optimization.

Kappes, Cassiday & Associates

2017 – 2023

Junior Engineer, Support Engineer, Project Manager

- Camino Rojo, Mexico: NI 43-101 compliant PEA followed by Feasibility study for an 18,000 tpd gold and silver heap leach with Merrill-Crowe recovery plant.
- Cerro Quema, Panama: NI 43-101 compliant Pre-Feasibility study, 10,000 tpd gold heap leach with ADR recovery circuit.
- Essakane, Burkina Faso: NI 43-101 compliant Pre-Feasibility study for a 25,000 tpd gold heap leach with ADR recovery plant.
- Hog Mountain, Alabama: NI 43-101 compliant Pre-Feasibility study for a 5,000 tpd gold CIL with ADR recovery plant.
- Silicon-Merlin, Nevada: numerous tradeoff studies ranging from 15,000 tpd to 150,000 tpd gold heap leach with ADR recovery plant.
- Gabbs, Nevada: Project Manager and Qualified Person and lead author for a NI 43-101 compliant PEA Technical Report for an 11,000 tpd gold heap leach and SART with ADR recovery plant.
- Reward, Nevada: Project Manager for a Feasibility study on a 5,500 tpd gold heap leach with agglomeration, conveyor stacking and ADR recovery plant.
- Mesquite, California: Project Foreman and Support Engineer for the engineering and construction management of an ADR plant expansion.

EDUCATION

- University of Nevada, Reno — Bachelor of Science, Mining Engineering, Geology Minor (2013–2017)

HONORS & AFFILIATIONS

- Licensed Professional Engineer, Nevada License No. 028887

- Co-Chair for Nevada Mineral Processors Division (NV MPD); Member, SME; Treasurer, Northern Nevada SME Subsection (2019–2022); Member, Geological Society of Nevada (GSN)

13 REPRESENTATIVE CLIENTS

The following includes both historical clients served by RDi prior to acquisition and current clients of the combined RDi/MTS organization.

Alamos Gold Inc.	American Barrick	Anatolia Minerals
Apex Silver Corp.	ASARCO Inc.	Assarel Medet (Bulgaria)
Avanti Mining Services	Battle Mountain Gold	Bear Creek Mining
Bentonite Perf. Minerals	Boliden Inc.	Cambior Inc.
Canarc Resources	Chaarat Gold	Chesapeake Gold
Cia. Disputada (Chile)	Corriente Resources	Cyprus Amax Minerals
FMC Corp.	Freeport McMoRan	P.T. Freeport Indonesia
Gold Reserve	Gold Resource Corp.	Guyana Gold
Hecla Mining Co.	Hindustan Zinc (India)	Homestake Mining
Intl. Finance Corp.	Intl. Tower Mines	Intrepid Potash
Jaguar Mining	Kennecott / RTZ	SNC Lavalin
Luismin Inc.	Magma Copper Corp.	Midway Gold
Milpo Inc.	Molycorp	Newmont Gold
Ogilebay Norton	Oracle Ridge Mining	Phelps Dodge Corp.
Pincock Allen & Holt	Placer Dome	Polimetal Madencilik
Romarco Inc.	Rosario Dominicana	Santacruz Silver
Sierra Metals	SRK Consulting	Stillwater Mining
Southern Peru Copper	Summo Minerals	Sunshine Minerals
Tetra Tech	Texas Rare Earth Res.	Thompson Creek Metals
United Nations	U.S. Gold	Viceroy Exploration
Vista Gold Corp.	Vulcan Materials	Western Strontium

14 THE McCARL'S ADVANTAGE

Each McCarl's entity is specialized and independently managed, yet strong interdependence and shared services minimize overhead and maximize value.

Entity	Capability
RDi	Mineral processing laboratory testing, metallurgical consulting, analytical services coordination
McCarl's Technical Services	Multi-discipline engineering & design, 3D scanning, project management & delivery, project controls, preconstruction & estimating, QA/QC and procurement
McCarl's LLC	Industrial construction, specialty fabrication (ASME/NB certified), critical outage execution, and plant maintenance support
Allen Architectural Metals	Specialized metallic restoration and historic preservation
E-Care	Industrial compressed air supply, installation, and maintenance
DM Coatings	Specialty industrial coatings

This structure gives clients the ability to engage a single organization for laboratory testing, engineering, fabrication, and construction—or any capability standalone. The result is reduced risk, streamlined communication, and a partner that scales from small capital work to megaprojects.

15 CONTACT INFORMATION

RDi & McCarl's Technical Services LLC

Address: 11475 West I-70 Frontage Road North, Wheat Ridge, Colorado 80033, USA

Phone: (970) 295-1827

Email: info@rdiminerals.com

Websites: www.rdiminerals.com • www.mccarlstech.com • www.mccarl.com

ENGAGE WITH US

Schedule a Consultation — 30-minute discovery call with one of our technical experts.

Request a Proposal — Detailed technical and commercial proposal within 5 business days.

Visit Our Facilities — See our laboratories and meet the team who will work on your project.

From Testing It to Building It — From Design through Construction

Your Success Is Our Success