

Mail Control Number: 618757
Docket Number : 3038846
License Number : 05-35250-01
Licensee Name : ARCADIS U.S., Inc.



RECEIVED
APR 27 2020

Carol Hill, Licensing Assistant

DNMS

Materials Licensing Branch
U.S. Nuclear Regulatory Commission Region IV
1600 East Lamar Street
Dallas, TX 76011-4511

Arcadis U.S., Inc.
630 Plaza Drive
Suite 200
Highlands Ranch
Colorado 80129
Tel 720 344 3500
Fax 720 344 3535
www.arcadis.com

Environment

REF: NRC Radioactive Materials License No. 05-35250-01, Docket No. 03038846

Date:
April 23, 2020

Contact:
Richard Murphy

Ms. Hill.

Phone:
(303) 471-3464

Good day.

Attached please find hard copy of our request for a license amendment to increase the Authorized Users (AU's) on our NRC Radioactive Materials License No. 05-35250-01, Docket No. 03038846. In addition, we requested that three individuals please be removed as AU's, they no longer work for Arcadis.

Email:
Richard.Murphy@Arcadis.com

This is the hard copy of the same document I sent in an email on the 22nd of April 2020 as a complete .pdf file, as advised by Ms. Latischa Hanson.

Our ref:
NRC License

Thank you for your assistance. Please let me know if you may have any questions.

Respectfully,


Richard Murphy
Arcadis U.S., Inc.

Michelle M. Hammond, M. SC., Health Physicist
Nuclear Materials Safety Branch B
United States Nuclear Regulatory Commission Region IV
1600 East Lamar Boulevard
Arlington, Texas 76011-4511

Arcadis U.S., Inc.
17-17 Route 208 North
Suite 290 West
Fair Lawn
New Jersey 07410
Tel 201 797 7400
Fax 201 797 4399
www.arcadis.com

Subject:

Change of Authorized Users – License Amendment 3

Reference: License 05-35250-01 (Amendment No. 2), Docket 030-3884

ENVIRONMENT

Date:

22 April 2020

Dear Ms. Hammond:

Arcadis herein requests an amendment to Item 14 A. of our Radioactive Materials License 05-35250-01 (Amendment No. 2). This amendment revises the list of authorized users. Please remove Jo Ann Tischler, Jesse Kass and Amanda Townsend from the list as they are no longer employees of Arcadis.

Contact:

Les Skoski, Ph.D.
RSO

Phone:

(914) 815-8213

We would like to nominate the following as authorized users:

1. Richard Murphy
2. Heather Baxter
3. Brandon Nicholson
4. Krista Brown
5. Donald Carpenter
6. Douglas Chambers
7. Jesse Toepfer

Email:

Les.Skoski@arcadis.com

Our ref:

NRC License
05-35250-01

We have attached a NRC Form 313 and copies of resumes for the nominated authorized users for your review.

Thank you for your consideration in this matter.

Sincerely,

Arcadis U.S., Inc.



Janis Lutrick
Region Manager
Associate Vice President



Les Skoski, Ph.D.
Radiation Safety Officer

Copies:

R. Murphy (Arcadis)
J. Lutrick (Arcadis)
S. Palmer (Arcadis)

Enclosures:

NRC Form 313
Resumes

NRC FORM 313

2



(01-2020)
10 CFR 30, 32,
33, 34, 35, 36,
37, 39, and 40



APPLICATION FOR MATERIALS LICENSE

Estimated burden per response to comply with this mandatory collection request: 4.3 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Information Services Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

INSTRUCTIONS: SEE THE CURRENT VOLUMES OF THE NUREG-1556 TECHNICAL REPORT SERIES ("CONSOLIDATED GUIDANCE ABOUT MATERIALS LICENSES") FOR DETAILED INSTRUCTIONS FOR COMPLETING THIS FORM: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/>. SEND TWO COPIES OF THE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

MATERIALS SAFETY LICENSING BRANCH
DIVISION OF MATERIAL SAFETY, STATE, TRIBAL AND RULEMAKING PROGRAMS
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA,
GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE,
NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO,
RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN
ISLANDS, OR WEST VIRGINIA,

SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND
APPLICATIONS TO:

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

IF YOU ARE LOCATED IN:

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS,
LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH
DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS,
UTAH, WASHINGTON, OR WYOMING,

SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
1600 E. LAMAR BOULEVARD
ARLINGTON, TX 76011-4511

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

- ☐ A. NEW LICENSE
- ☒ B. AMENDMENT TO LICENSE NUMBER 05-35250-01
- ☐ C. RENEWAL OF LICENSE NUMBER

2. NAME AND MAILING ADDRESS OF APPLICANT (Include zip code)

Janis Lutrick, Associate Vice President
Arcadis U.S., Inc.
630 Plaza Drive
Highlands Ranch, CO 80129

3. ADDRESS WHERE LICENSED MATERIALS WILL BE USED OR POSSESSED

Please see Condition 13 of License

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Janis Lutrick

BUSINESS TELEPHONE NUMBER

(303) 344-3797

BUSINESS CELLULAR TELEPHONE NUMBER

BUSINESS E-MAIL ADDRESS

Janis.Lutrick@arcadis.com

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL

- a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSE FEES (Fees required only for new applications, with few exceptions*) (See 10 CFR 170 and Section 170.31)

*Amendments/Renewals that increase the scope of the existing license to a new or higher fee category will require a fee.

FEE
CATEGORY

AMOUNT
ENCLOSED \$

PER THE DEBT COLLECTION IMPROVEMENT ACT OF 1996 (PUBLIC LAW 104-134), YOU ARE REQUIRED TO PROVIDE YOUR TAXPAYER IDENTIFICATION NUMBER. PROVIDE THIS INFORMATION BY COMPLETING NRC FORM 531: <https://www.nrc.gov/reading-rm/doc-collections/forms/nrc531info.html>.

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 37, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER - TYPED/PRINTED NAME AND TITLE

Janis Lutrick, Associate Vice President

SIGNATURE

Janis Lutrick

DATE

21 April 2020

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			\$		
APPROVED BY				DATE	

RESUMES



RICHARD J. MURPHY, PHD

NATIONAL EXPERT

EDUCATION

PhD, Environmental Science & Engineering, Colorado School of Mines, 2000

MS, Environmental Science & Engineering, Colorado School of Mines, 1995

BS, Chemistry, University of Central Florida, 1982

BS, Forensic Science, University of Central Florida, 1982

YEARS OF EXPERIENCE

Total – 39 years

With Arcadis – 12 years

PROFESSIONAL ASSOCIATIONS

American Chemical Society

Richard Murphy is a technical expert with experience in radiochemistry, mixed waste, environmental science and engineering, geochemistry, and analytical chemistry. He is the Committee Chair for the Arcadis Radiation Safety Committee under our US Nuclear Regulatory Agency, Radioactive Materials License # 05-3520-01. He provides direction to the committee to ensure compliance with the license and works with the Arcadis Radiation Safety Officer to ensure all processes are performed in a safe manner and that potential doses are kept as low as reasonably achievable.

Richard also currently leads the Arcadis Radiological Solutions Growth Platform. In this position he leads a team of technical, health and safety, business development and project management staff responsible for creating growth, driving bookings and completing projects related to commercial and public operations impacted by radionuclides.

In this role his primary responsibility is the health and safety of staff, clients, the public and the environment. His primary external focus in the growth platform is to engage with client teams to ensure that the firm had developed a full understanding of client needs and required outcomes, and to develop staff teams and programs consistent with client strategies and requirements. His primary internal focus is to ensure the firm meets financial goals through appropriate staff assignments and application of innovative and best-in-class technologies.

His laboratory experience dates to 1979 and includes sample collection, field analyses, laboratory sample preparation and analyses, method development, quality assurance/quality control, health and safety, waste handling, report generation, courtroom testimony, and personnel leadership/management in academic, National Laboratory, research, state, and commercial facilities. While completing a Ph.D. his research focused on the binding of thorium to natural organic matter and mineral surfaces.

Radiological Experience

Laboratory Operations / DOE National Laboratory 1988 - 1991

Idaho National Laboratory, Idaho Falls, Idaho

Completed DOE Radiation Worker A and DOE Radiation Worker B

Project Experience Continued

training. Served as a technical leader, holding a Q Clearance, responsible for scheduling and performing the preparation, analysis and reporting of research, process, environmental waste, mixed waste and radioactive samples by gas chromatography and gas chromatography/mass spectrometry. Developed analytical methods for waste treatment technologies, complex matrices and special requests.

Laboratory Operations / Commercial Mixed Waste Laboratory

1991 - 1994

ENSECO Mixed Waste Laboratory, Arvada, Colorado

Served as a Team Manager responsible for staffing, equipping and team managing a laboratory dedicated to the analysis of radioactive and mixed samples following EPA methodologies. Provided instruction for a CHP approved 40-hour Radiation Worker training program. Provided training in the proper handling, preparation and analysis of environmental and waste samples contaminated with radionuclides. Performed or supervised laboratory operations such as sample preparation and analysis for organic, inorganic, and radiochemical constituents. Performed data review and generated or reviewed laboratory reports. In addition, prepared quality assurance plans, technical proposals, audit responses, standard operating procedures, and training materials. Member of the facility emergency response team. Supervised the Radiation Safety Technician function during operation, decontamination and decommissioning of the laboratory.

Graduate Researcher

1994 - 2000

Division of Environmental Science and Engineering, Colorado School of Mines

Provided Radiation Safety Technician services for the campus, completing routine radiation surveys and reporting as well as responding to radiological incidents. Performed laboratory studies and ultra-trace level aqueous chemistry experiments, literature reviews, and computer simulations with respect to the interactions of mineral surfaces and colloidal organic material with actinides. Completed radiolabelling procedures, isotope separations and sample counting by alpha spectrometry, beta liquid scintillation, and gamma spectroscopy. Also completed sample analyses by acid-base titrations, inductively couple plasma – mass spectrometry,

Provided laboratory and classroom instruction with respect to instrument theory and operation, safe handling of radionuclides, environmental chemistry and physical chemistry to graduate and undergraduate students.

Project Experience Continued

Consultant

2000 – Present

Select Projects:

Implementation of Active and Passive Water Treatment at an Inactive Uranium Mine Site

Confidential Client, Colorado

Provide technical guidance to the project team at an inactive uranium mine site with underground workings and an exposed pit and pit lake. Arcadis applied innovative injection-based treatment in two pilot tests in the underground workings to reduce dissolved uranium in groundwater and to passivate source rock in the subsurface. Supported implementation of a laboratory-scale treatability testing program and application of its findings to pilot tests in the field.

In Situ Groundwater Treatment at a Uranium-Impacted Mill Tailings Site

Confidential Client, New Mexico

Provide technical mentoring to a team working at a uranium-impacted mill site. Arcadis implemented a large-scale field pilot test to evaluate effectiveness of an injection-based treatment strategy to reduce uranium concentrations in groundwater. The system introduced 10 tons of tripolyphosphate into an alluvial aquifer, with the recirculation of 1 million gallons of water to emplace a reactive zone for uranium treatment.

Vandenberg AFB

AFCEC, Vandenberg Air Force Base, California

Provide technical guidance and oversight to field and engineering staff performing environmental remediation to sites impacted by naturally occurring radioactive materials, heavy metals, non-metal inorganics, high explosives and other organic compounds. Program chemist responsible for developing a UFP QAPP for environmental investigation and restoration services. Supervises project chemistry, data management, and data validation professionals. Provides program specifications to data management/data validation subcontractor. Evaluates subcontractor data base management and data validation processes, electronic data deliverables and QA/QC procedures to meet program and contract requirements.

RCRA Remediation of the Former ASARCO Smelter

Texas Custodial Trust, El Paso, Texas

Supported the Trustee managing the site investigation and remediation program at the closed Asarco Smelter in El Paso, Texas. Prepared and provided technical presentations to stakeholders and oversight organizations; including the United States and Texas Executive Branch Officials, legislative bodies and regulatory agencies. Program chemist for the evaluation of historical data, records of incoming materials, including radioactive and

Project Experience Continued

hazardous waste manifests, and smelting processes to determine potential environmental impacts (metals) generated when incoming materials were introduced to the smelter. Defined analyte lists and laboratory methods, both routine and non-routine, for site investigations. Provided geochemistry expertise to the project team with respect to remedial options, including bench studies and the installation of two zero-valent iron (ZVI) permeable reactive barriers and the application of an *in situ* treatment technology for metals in groundwater. Evaluated the results of groundwater and sediment samples collected from up gradient, within and down gradient of *in situ* permeable reactive barriers. Evaluated the analytical results of samples collected from over 500,000 CY of waste material and impacted soil for landfills segregation.

Performance-Based Remediation Services at 18 Natural Gas Processing Plants and 350 Ancillary Pipeline Compression, Dehydration Duke Energy Field Services, CO, LA, OK, TX and WY,

Program chemist for directing QA/QC programs, sampling and analysis efforts, developing and managing laboratory oversight programs, and directing method development for non-routine sample collection and specialized analytical methods. Provided technical support for contaminant chemistry (petroleum hydrocarbon, naturally occurring radioactive materials, heavy metal and non-metal inorganics) including hydrocarbon speciation as well as contaminant behavior in the environment. Helped develop and manage a web-based tool that included a site information database, a file-exchange function, and real-time mapping capability with interactive GIS tools. Audited laboratories to ensure compliance with sample handling procedures, method performance, waste handling procedures, H&S, and data quality. In addition, worked closely with contract laboratories to develop methods for non-routine analytes and to improve the quality of their processes and the reported data.

Military Base Site Investigation and Remediation

**Ft. Detrick, Ft. Drum, Lone Star Army Ammunition Plant, Former Reese AFB,
Mare Island, Joint Base McGuire-Dix-Lakehurst**

Provides technical support and leadership for multiple site investigation and remediation programs across several military facilities. Impacts to these sites include naturally occurring radioactive materials, depleted uranium, chlorinated solvents, metals, non-metal inorganics, volatile and semivolatile organic compounds, and explosives in landfills and lagoons, soil, groundwater, sediments, and surface water. He serves as a senior program chemist and QA officer directing the development of QAPPS and bid packages and providing QC oversight to subcontract organizations including field sampling teams and environmental laboratories. Supervises data management, project chemistry and data validation professionals. Provides environmental chemistry support and data evaluation/interpretation to project engineers and scientists. He works with laboratories to develop, improve and perform analytical methods. Provides chemistry support for the development of remedial programs, directs bench studies for emerging *in situ* remedial technologies, and assists in remedy optimization efforts.

Project Experience Continued

Hexavalent Chromium Site Investigation and Remediation Confidential Client

This project is for a major industrial client with two large chromium-impacted sites. It includes detailed site investigations, high-level technical consulting, design, planning and construction of *In Situ* Remediation Zones, routine monitoring, and regulatory support. Provides technical leadership to a multi-disciplinary team for an advanced sub-surface investigation to elucidate the distribution of chromium as well as geochemical reactants and products. The analytical techniques employed include X-ray absorption spectroscopy, X-ray diffraction, scanning electron microscopy/energy dispersive X-ray analysis, selective geochemical extractions, atomic spectroscopy, stable isotope analysis and several routine techniques. These investigations are designed to understand current site conditions that control the behavior of chromium and other metals at the site and to provide evidence supporting the long-term effectiveness of the remedial efforts. Also responsible for developing detailed conceptual site models including natural attenuation. Provided detailed data interpretation and works with geochemical and hydrogeological modelers to develop a better understanding of site conditions. Worked with team members to develop a technically sound approach to support the client's interactions with the public and regulatory agencies.

Landfill Geochemical Investigations Confidential Clients

Provided technical support to a number of clients with respect to landfill leachate and potential environmental impacts to the subsurface. Facilities include fly ash, industrial and municipal landfills, hazardous waste landfills, chemical plants, universities, and government operations. Evaluations included review and interpretation of historical organic and inorganic geochemical data associated with fill, cap, leachate and surrounding groundwater, development of conceptual site models, defining future analyses to help develop a more detailed understanding of the geochemistry underlying the landfills, directing geochemical modelling efforts, preparation of detailed presentations and reports for clients and regulators. Advised the project teams on efficient and cost-effective remedial alternatives and sampling programs to confirm remedial effectiveness.

Mercury Impact Evaluation Confidential Client

This project included a team evaluation of mercury and mercury compounds in coal, coal mining wastes, and coal combustion residues. Evaluated the nature of the mercury in each of these matrices, the potential pathways for release and the summarized the environmental and human health risks associated with the materials.

employ. Lead a team to ensure that the proper collection and analysis methods were used determine if organic and inorganic emissions were generated during product development and manufacturing. The analytical techniques include Fourier transform infrared spectroscopy and gas chromatography/mass spectrometry. The results of the analyses are evaluated to determine if hazardous substances are being generated. The emissions are correlated to the

Project Experience Continued

Arcadis U.S., Corporate Technical Support, Technical Knowledge and Innovation Positions

Arcadis Laboratory Program

Serves as Arcadis' laboratory program director. Provide leadership to a corporate program that includes a systematic approach to providing high-quality laboratory services to projects and clients that manage risk, generate consistent data that meets or exceeds data quality objectives, and provide proper deliverables at competitive pricing. Leads staff in performing data interpretation and validation, and in developing data quality objectives, QAPPs and laboratory bid packages. Works regularly with laboratories to develop, improve and perform analytical methods. Provides data interpretation, trouble shooting and QA guidance to project teams. Facilitates the exchange of information and acted as a subject matter expert.

Quality Management System

Member of the Quality Task Force, responsible for developing a new/improved Quality Management System (QMS) and Quality Manual (QM) for the Arcadis Environment Division. The team developed a QM, which has been approved by the Environment Division Senior Management Team. The task force is also responsible for development of a Quality Committee, a Continuous Improvement Program and templates for Project Quality Plans. The Quality Management System is currently being implemented across the Division.

Geochemistry Technical Discipline Director

Dr. Murphy was the National Director of the Geochemistry Discipline. He led an established team of over 75 talented geochemistry professionals that support Arcadis in providing strategy development and implementation guidance for site evaluation and remediation projects across the United States, particularly those involving metals, radionuclides, tailings, and other inorganic industrial process residuals. This included guiding the development of advanced sampling and analytical methods, conceptual site models and site-specific remediation solutions for new projects, as well as remedy optimization for ongoing projects (including optimization of *in situ* and above-ground treatment systems). Additional responsibilities included client and business development technical training, research and development of new investigation and remediation technologies, management of the remediation geochemistry knowledge base, and staff mentoring.

HEATHER BAXTER

PRINCIPAL SCIENTIST



EDUCATION

MS, Nuclear Chemistry, Texas A&M University, 1996

BS, Chemistry with Minor in Physics and Math, University of Mary Washington, 1993

Colorado State University, Health Physics, 2019

YEARS OF EXPERIENCE

Total – 25

With Arcadis – 1

PROFESSIONAL AWARDS

Duke Energy Ruth B Shaw Award

Department of Energy Patricia Robert Harris Fellow

Nuclear Energy Institute Top Industry Performance Finalist

PROFESSIONAL ASSOCIATIONS

Nuclear Energy Institute Radiological Effluent and Environmental Steering Committee (2010 to present, Chairperson 2016 – 2019)

U.S. Women in Nuclear (2008 – present, Lead 2010-2012, US Metrics Committee 2012-2018)

Ms. Baxter has over 25 years of professional experience including more than 12 years of direct experience working as the lead chemist and radiation protection scientist for a major nuclear utility in the southeastern United States. Through her roles as lead scientist in chemistry and radiation protection and manager of the radiological environmental program, she has direct experience measuring, controlling, and removing radioactivity in the environment and plant fluid systems. She designed innovated processing systems to reduce the concentration of radioactivity and chemical contaminants in waste and process water. In 2017, she was recognized as one of the nuclear industry top performers.

As a long time nuclear utility scientist she gained intimate familiarity with various site nuclear programs for pressurized water reactor (PWR) and boiling water reactor (BWR) plants including: low level waste management, the Radiological Environmental Monitoring Program (REMP), the Nuclear Energy Institute (NEI) 07-07 Groundwater Protection Initiative, the Radioactive Effluent Controls Program (RECs), National Pollutant Discharge Elimination System (NPDES), and power plant system chemistry.

She has authored various plant operating procedures, including the Offsite Dose Calculation Manual (ODCM) and Process Control Program (PCP), to direct radioactive effluent waste management, radioactive processing equipment operation, public dose assessment and chemistry system monitoring and trending. She has directed chemistry sampling and analysis of plant fluids, gases and liquid radioactive effluent as well as environmental media. As the site's subject matter expert on radiochemical and isotopic analysis, she directed the site's Count Room personnel radiochemical spectroscopy analysis and supported the calibration and verification of Count Room spectroscopy instruments.

Ms. Baxter has participated and directed many compliance audits including: Nuclear Oversight (NOS) assessments, Institute of Nuclear Power Operation (INPO), World Association of Nuclear Operators (WANO), Nuclear Regulatory Commission (NRC) radiological public protection, American Nuclear Insurers (ANI), and North Carolina Department of Natural Resources (NC-DENR). In addition, she has served as a peer assessor for over 20 different nuclear power plant stations across the United States and multiple utilities.

Ms. Baxter had a North Carolina Grade 2 Wastewater license and was designed at backup Operator Responsible Charge (ORC) for three sanitary wastewater treatment facilities and liquid processing system.

In addition to her vast experience working in the utility industry and authorship of multiple Annual Radiological Effluent Release Reports and Annual Radiological Environmental Operation Reports, Ms. Baxter has served as the industry chairperson for the NEI Radiological Effluent and Environmental Committee (2016-2019), was an NEI Radiological Effluent and Environment Steering Team member (2012-2016) and a NEI 07-07 Groundwater Protection Program Auditor (2016-2017), served as Electric Power Research Institute (EPRI) Workshops Session Chair (2010-2019), and is an American Society for Testing and Materials (ASTM) Low Level Waste Committee member.

Project Experience

Upgrade of Industrial Waste Processing System

Responsible for upgrade and repair of an industrial waste processing system. Work included replacing eight underground fiberglass pipes with high-density polyethylene pipes; coating and lining three storage basins; installing a passive protection system; adding new sealed containment dikes around all above grade pumps, valves and piping; and upgrading the system's control system. Project excavation identified subsurface diesel fuel and radiological contamination. Remediation was performed by removing 25 tons of soil, pumping groundwater to discharge basins and installing 12 groundwater monitoring wells. The original system was not maintained and had significant maintenance challenges, was an operator burden, and was leaking contamination into the groundwater. The new system replaced leaking pipes, improved system performance by removing temporary pumps and equipment, and eliminated leaks. Overall, this project reduced regulatory scrutiny and improved the plant's ability to process industrial waste.

Upgrade of Radwaste Processing System

Responsible for upgrade of a nuclear plant's radwaste processing system. The original system was not designed to adequately process the plant's low level wastes and consistently was ranked as one of the worst performers in the industry. The project involved replacement of the existing canister filtration system with two new granulated activated carbon (GAC) vessels and a bagged pre-filter assembly. The GAC vessels were designed to be reusable with preinstalled shielding packages. The units could be shipped to a vendor and the activate carbon chambers recharged with new material followed by return of the units to the site for installation. The replaced radwaste system filtration units were abandoned and shipped for off-site disposal. The new system improved the overall performance of the radwaste system by reducing the radioactive discharge activity by 90 percent and reducing the plant work dose by 95 percent. The project was identified as an EPRI Low Level Waste Strength.

Replacement of Cooling Tower Blowdown Line Discharge Pipe

Responsible for replacement of a leaking cooling system cooling tower blowdown line pipe with new high-density polyethylene (HDPE) pipe. The original 48-inch-diameter, 4-mile-long fiberglass pipe was failing due to segment separations, cracking and root intrusion. The project involved replacement of a 1.5-mile segment with 48-inch-diameter HDPE. The installation required clearing of a new 30-foot easement, tree removal, grading and trenching along the 1.5-mile project reach. New connection structures, sample points, manhole access and groundwater monitoring were installed along the new pipe. Groundwater contamination from the leaking pipe was remediated through the installation of groundwater monitoring wells and removal of contaminated vegetation and soil. Overall this project reduced regulatory scrutiny and improved the plant's ability to discharge its cooling water.

Upgrade of Low Level Liquid Waste Processing System

Responsible for installation of new gel bed resins to improve the performance of processing demineralizers. The original gel bed resins were expensive and failed to adequately control contaminants. The project team identified various gel bead, microporous and inorganic resins that could be used to process plant fluids. The resins installed included newly developed resins that could facilitate removal of silica in a borate system, improve the removal of nickel-63 in liquid waste processing systems, and reduce the concentration of colloidal cobalt-58 and manganese-54 from the reactor coolant. The overall project reduced the annual cost of resin purchase and disposal by 75 percent. This project was nominated in 2016 and 2017 for Nuclear Energy Institute Top Industry Performance award (NEI TIP) and 2018 INPO Chemistry Strength.

Replacement of Demineralizer Resins

Responsible for installation of new resins into the water processing demineralizers. The project team identified various gel bead, microporous and inorganic resins that could be used to process plant fluids. The resins developed and installed included newly developed resins that could facilitate removal of silica in a borate system, improve the removal of nickel-63 in liquid waste processing systems, and reduce the concentration of colloidal cobalt-58 and manganese-54 from reactor coolant. The overall project reduced the annual cost of resin purchase and disposal by 350 percent.

Repair and Replacement of Gaseous Waste Processing System

Responsible for refurbishment and replacement of the original gaseous waste processing system. The project involved repair or replacement of 48 diaphragm valves and associated piping. The waste gas analyzers were replaced with digital analyzers that could monitor the concentrations of helium, hydrogen and oxygen in the gas. New gas compressor and recombiner units were installed to improve system functionality and performance.

BRANDON NICHALSON

Project Ecologist/Radiological Lead

EDUCATION

M.S., Environmental Management,
University of San Francisco, 2009

B.A., Biology with minor in Geology,
University of Colorado, 2000

YEARS OF EXPERIENCE

Total – 15

With Arcadis – 9

QUALIFICATIONS

Dade Moeller Training Academy,

Gaithersburg, MD, Las Vegas, NV

- Radiation Safety Officer (RSO)
- Radioactive Materials Shipping and Transport (Class 7 DOT)
- Advanced Radiation Safety Officer (ARSO)

Mr. Nicholson is a Project Ecologist and Lead for the Arcadis Radiological Assessment and Design (RAD+) group. Mr. Nicholson has been involved in the area of Health Physics with 8 years of experience working primarily on Abandoned Uranium Mines in the Navajo Nation and a variety of other radiological sites directing and monitoring cleanup efforts that involve toxic and hazardous waste. Through this work, he has gained substantial knowledge concerning radiation detection equipment and surveying techniques, implementation and development of Work Plans and Final Status Surveys per MARSSIM requirements, DOT/IATA/NRC shipping regulations and personnel dosimetry and decontamination.

In addition, Mr. Nicholson has 15 years of experience in a wide range of biological sciences; from forest management, water resources and stream ecology, to habitat characterization mapping and endangered species reintroduction. His background also extends to conservation biology and ecosystem change and includes several years working for the United States Forest Service (USFS) conducting broad scale predator/prey population surveys, habitat suitability assessments, district wide stream and culvert analysis and winter field work. Work includes threatened, endangered and state listed species monitoring and relocation, bird, mammal, amphibian and reptile species and habitat surveys, rare plant surveys, habitat restoration and mapping.

Project Experience**Project Ecologist/Radiological Lead**

Led and monitored enforcement activities conducted by, or on behalf of, RPs, including in response to EPA enforcement actions on Navajo AUMs and a variety of other radiological sites.

Built, trained, and supervise a team of 8 field scientists, including a core team of 4 staff with extensive Navajo AUM experience, participating in, leading, and monitoring enforcement action work for RPs.

Led teams logging over 35,000 field hours on Navajo AUMs with no injuries or other H&S incidents, at remote sites working on difficult terrain and under extreme weather.

Internal and external resource advising on designing radiological investigations and remedial confirmation approaches.

Advisor and lead designing workplans to assess a variety of mine sites with surface uranium mineralization, to distinguish NORM and TENORM.

Developed soil sampling strategy and methods for remote sites including the use of a local horse outfitter.

Project Experience Continued

Developed novel “mining forensics” approach to RSE mine site assessment:

Methods refined and developed working closely with core Arcadis field technical team, EPA RPMs, EPA contractors, and RP legal and mining history experts.

Utilizes mining history, radiological, geological, geomorphic, hydrologic, and other lines of evidence to accurately distinguish NORM and TENORM, thoroughly map mining impacts, and cost-effectively plan further RSE work.

Directed contractual work efforts for RPs assuming cleanup duties, to assure that funds are properly expended and that contractors are utilized effectively and efficiently.

Worked as APM (Assistant Project Manager) for AUM sites. Have Arcadis CPM training.

Planned and led work efforts for RPs with a variety of investigative and cleanup duties, including 7 years of work for clients responsible for Navajo AUMs.

Budgeting and scoping for field investigations, radiological risk assessments, and radiological construction efforts, including accounting for difficult/remote site conditions and community relations considerations in the Navajo Nation.

Oversight of contractors and subcontractors on behalf of RPs, including culturally sensitive work with a wide variety of Navajo-owned firms and Navajo and other Native American workers – e.g. Dinehtadoo Cultural Resources Management (DCRM).

Fostered friendly, respectful relationships with local Navajo residents living in and near AUM sites during 7 years of fieldwork in the Navajo Nation. Trained and led field teams which make a high priority of stopping to talk with residents, to address concerns and explain the purpose of assessment or construction work—e.g. Mariano Lake Mine, Charles Huskon 12, and A&B No. 3.

Worked closely with a number of Navajo community liaisons to describe ongoing work to residents and chapter members and seek their input on how best to do assessment work in respectful ways.

Determined appropriate cleanup actions, methods, and tools at Navajo abandoned uranium mine sites (AUMs) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and at numerous other radiological sites.

RSEs: Wrote workplans, led field mobilizations, and wrote reports for 5 Removal Site Evaluations (RSEs) at Navajo AUMs, with preliminary workplans and RSE assessment work in progress at 32 additional AUMs in Western and Eastern Agency.

Other Arcadis Project Work.

Conducted threatened, endangered and state listed species monitoring and relocation, bird, mammal, amphibian and reptile species and habitat surveys, rare plant surveys, habitat restoration and mapping.

Provided support for debris removal at two California wildfire affected areas including site assessments, debris removal monitoring, soil sampling and quality control/oversight for debris removal teams.

Worked as a field biologist in the support of a data collection program for mine planning, future permitting and NEPA processes at several active and exploratory gold mines in Nevada.

Served as an Environmental Inspector at numerous natural gas transmission projects in western and central Nevada.

Provided immediate emergency support for an oil transmission pipeline rupture. Served as a field lead for a wildlife crew responsible for the collection, rescue and capture of a diverse variety of species including numerous venomous snakes.

KRISTA BROWN

Staff Geologist/Radiological Lead

EDUCATION

M.S., Geology, Kent State University,
2019

B.S., Conservation Biology, Kent State
University, 2009

YEARS OF EXPERIENCE

Total – 10 years

With Arcadis – 5.5

QUALIFICATIONS

Radiation Safety Officer (RSO) Training

OSHA 40-hour Hazardous Waste
Operations

OSHA 10-hour Construction

MARBOP Certification

Confined Space Certified

Asbestos Hazard Evaluation Specialist -
Ohio

FRA Certified – Roadway Worker

Protection/Contractor Safety

eRailSafe System Certified

First Aid/CPR/BBP Certified

DOT Hazardous Materials

Transportation

Emergency Response/HazCom

Certified

Ariel Manlift Certified

Krista Brown is a highly motivated and enthusiastic young professional who has been with ARCADIS for 4.5 years, working as a field geologist on a variety of projects through-out the United States. Her field experiences include: Abandon Uranium Mine (AUM) field work, hazardous materials and asbestos surveys, emergency response activities, well installation, well abandonment, groundwater sampling, geoprobe direct push, injections, sonic drilling, hydraulic profiling, laser induced fluorescence (LIF), free product recovery, vacuum truck extraction, excavation oversight and SPCC planning. Ms. Brown is very detailed with field record-keeping and organization on large-scale projects. Experienced in data entry, QA/QC of logs and reports, creating potentiometric maps, groundwater logs, profile maps, and technical reports.

Project Experience

Radiological Survey- Cameron, Arizona

Client: Varies, Cameron Area Mines. August 2016 – Present.

Member and co-lead for a field team performing surface gamma scanning, lateral delineation, background study and soil sampling at Abandon Uranium Mines (AUMs) within Navajo Abandon Mine Lands (NAML). Our team covered over 600 acres by foot, using 2x2 scintillators coupled to a rate meter and GPS.

Performs Task Management and Assistant Project Management task including cost estimating, proposals, financials, planning, and reports for multiple projects:

Determined appropriate cleanup actions, methods, and tools for toxic and hazardous waste sites, at Navajo Abandoned Uranium Mine Sites (NAUMs) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and at numerous other radiological sites.

Co-lead design workplans to assess a variety of mine sites with surface uranium mineralization, to distinguish NORM and TENORM.

Hazardous Building Material Survey- Varies Locations

Client: 3M-Marathon-Northeast Ohio Regional Sewer District. August 2016 – Present.

Conducted hazardous building material surveys and sampling of asbestos, lead, cadmium, and PCB's at varies location. Created detailed sample location maps, area footage maps, photo logs and technical reports for each project.

Project Experience Continued

Wetland Survey- Canton, Ohio

Client: Marathon. September 2017.

Assist with pipeline wetland monitoring on formerly delineated wetlands. Assessed wetland quality and vegetation regrowth after first year post-construction. Re-evaluated Ohio Rapid Assessment Method for Wetlands (ORAMS), Qualitative Habitat Evaluation Index forms (QHEI), and Primary Headwater Habitat Evaluation forms (HHEI) from former evaluation.

Bulk Terminal Baseline Assessment- Cleveland, Ohio

Client: Cuyahoga County Port Authority. February 2017.

Conducted soil sampling for a baseline assessment on a 45-acre property prior to leasing property to new client. Assisted in two-man team to hang auger and sample for laboratory analyses.

Stream Restoration- Circleville, Ohio

Client: General Electric Company. October – December 2016.

Lead field staff responsible for daily oversight of construction crews, air monitoring, stream quality monitoring and sampling, and archaeological monitoring. Facilitated communication between project management, client, construction staff, and regulatory agencies. Conducted daily morning health and safety meetings and provided ongoing health and safety oversight, including air monitoring, for all field staff.

Phase I Archaeological Investigation- Circleville, Ohio

Client: General Electric Company. July 2016.

Assisted with Phase I fieldwork; hand digging in potential sensitive areas, collecting any archaeological sensitive materials along with a detailed inventory of findings for the Ohio History Connection in support of a Pre-Construction Notification (PCN).

Red-Flag Wetland Survey- Columbus, Ohio

Client: City of Columbus. June 2016.

Assisted with red flag survey for city wastewater department for future construction along the Scioto River. The red flag survey included identifying any soils and/or plants that would indicate the presence of any wetlands.

Emergency Response – Calaveras and Lake Counties, California

Client: Cal Recycle. January – June 2016.

Provided field support during emergency response activities for debris clean-up of approximate 70,000+ acres in Calaveras County and 76,000+ acres in Lake County in response to the 2015 California wild fires. Worked within the incident command system structure, providing excavation oversight (task management) for the over 2000 impacted structures, conducted initial site assessments creating detailed drawings, collecting soil samples to verify heavy metals were removed during clean up, and final inspections before turning properties over to the county. Continued to support the project throughout the entire course of the project, providing data management and project field team lead in Calaveras County for the final weeks.

Project Experience Continued

Surface Water and Sediment Sampling at Cuyahoga River - Cleveland, Ohio

Client: BASF. December 2015.

Prepared all sample bottles from 3 separate laboratories prior to sampling event. Surface water and sediments were sampled, and depending on analysis, was shipped to the appropriate laboratory. Acted as lead quality control personnel for all sample collection and shipment.

Ohio Department of Transportation

Client: ODOT- Various Locations in northeastern Ohio. May – September 2015.

Assisted with the inventory and inspection of approximately 6,500 culverts crossing state routes within Ohio's District 11, which is comprised of 7 counties. Field work consisted of utilizing GPS equipment to collect the latitude and longitude coordinates of each culvert. Each culvert was inventoried for geometry, material, and water body attributes conforming to for the current ODOT culvert structure management system utilizing a Trimble. Inspections documented the condition of each culvert to identify the current condition of culvert and waterway, and provide an estimation of potential maintenance needs. Many of the culverts were inspected by entering the culvert using confined space procedures. Supported health and safety discussions for the project which has won the Health and Safety Excellence Award, Silver Winner.

Emergency Response – Midland, Texas

Client: Confidential Client. August 2015.

Provided field support during initial emergency response activities for residential drinking water field investigation. Field work included sampling residential faucets and wells, conducting field geology for plume delineation using sonic rig drilling, and serving as homeowner liaison for over 50 residences where detailed and confidential questionnaires were completed for each home and well owner. Assisted in the installation and startup of a point of use treatment (GAC), which was installed for each impacted residential water system.

BP Sites

Client: BP Amoco. 2015 – Present.

The BP sites are currently or were formerly retail petroleum sites. Role included ground water monitoring, soil boring and monitoring well installation, soil sampling, Vacuum Truck Extraction events, free product recovery, excavations to remove impacted soil, injections (via direct push drill rig) to enhance bioremediation, along with post-injection testing and sampling. The sites are regulated by the Bureau of Underground Storage Tank Regulations (BUSTR). Aided in analyzing and tabulating data as well as writing many different BUSTR reports including Tier I, Tier II, Groundwater Monitoring, LNAPL Recovery, and Interim Response Action.

DONALD J. CARPENTER, CPG, PG

Senior Vice President/Chief Geochemist

EDUCATIONMS, Geochemistry, Colorado School of
Mines, Golden, CO, 1980BS, Geology, Michigan State University,
East Lansing, MI, 1976**YEARS OF EXPERIENCE**

Total – 39

With Arcadis – 12

**PROFESSIONAL
REGISTRATIONS**

Professional Geologist, AK, since 1991

Professional Geologist, IN, since 1990

Professional Geologist, PA, since 1994

Professional Geologist, WI, since 1995

Professional Geology, NY since 2017

**PROFESSIONAL
ASSOCIATIONS**American Institute of Professional
Geologists (AIPG)

Mr. Carpenter has more than 39 years of experience and has successfully managed many major radiological projects, including, geochemical and geological support to the Yucca Mountain High Level Waste Repository, a failed nuclear reactor, reactor decommissioning, spent fuel storage analysis, large uranium mill tailings and soil-related projects and radium treatment design and operation. He also has experience in managing and technically contributing to radiological decommissioning and demolition efforts, including those related to nuclear reactors and fission product contamination. He has extensive experience detailing remedial strategies to both regulatory agencies and the public and has a broad background in applying solution equilibria-based geochemical, and geostatistical computer modeling methods to radiological waste projects, including Natural Occurring Radioactive Material (NORM), such as dissolved phase radium removal from wastewater, and fission product-related issues. This combined expertise has been particularly valuable in modeling treatment processes associated with the remediation of radiologically contaminated sediments and soils, as well as contaminated groundwater systems.

Mr. Carpenter sat on a Governor-appointed Advisory Panel reviewing Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) regulations that produced a White Paper affirming the efficacy of the 50 picoCuries per gram (pCi/g) criterion for Radium-226 along with additional recommends. Certain recommendations were included in preliminary legislation that Mr. Carpenter was asked to review during 2018 with most of these additionally offered recommendations included in the recent promulgated Public Act 687, which further augments previous TENORM regulation.

Project Experience**Yucca Mountain High Level Radioactive Waste Repository
U.S. Department of Energy, Las Vegas, NV**

Provided technical support to the permanent disposal of high-level radioactive waste at the Yucca Mountain Repository. This work focused on geochemical modeling the effects as to the use of Portland cement-based versus steel-based ground support structures within the repository and the effects on radionuclide transport. This required detailed modeling of the geochemical impacts of the different structures and the impacts the local environment had on the longevity of the systems. Further, provided geochemical modeling of waste package corrosion and ensuing radionuclide release. This later effort

Project Experience Continued

also focused on brine development due to radiogenic heat-generated evaporation of modestly saline groundwater in the vicinity of the repository and its resultant geochemical effects.

Fukushima Reactor

Confidential Client, Fukushima, Japan

Providing senior technical input as to the radiological issues raised for manufacturing processes, import restrictions and worker safety pertaining to the "melt-through" reactor at the Fukushima Complex.

Fukushima Reactor

Entergy Grand Gulf Reactor

Developed a mathematical model helping to identify and quantify the mechanisms leading to tritium deposition in operation water. This study documented the importance of gas phase-mediated tritium transferal from tritiated humid air into thin films of pooled water, either derived from precipitation or condensation. This analysis also documented that comparatively little tritium was derived from "washout"-related processes during rainfall events.

Former Westinghouse Reactor Decommissioning and Site Closure

CBS, Waltz's Mill, Pennsylvania

Served as technical manager designing and supervising remedial efforts associated with decommissioning of a failed test nuclear reactor and associated fission product contamination, including strontium-90, cesium-137 and other fission products, in site soils at this Pennsylvania facility. The remediation required development of radioactive waste delineation, excavation, shipment and off-site disposal and associated cost estimate. Effort was completed without safety events and per the proposed schedule and budget.

Concrete Formulation-related Consultation to Chernobyl Reactor

Sarcophagus

U.S. DOE and State Department

Served as the technical lead for an expedited analysis leading to recommendations for the temporary sarcophagus used to encapsulated the failed reactor at Chernobyl. This work required development of a concrete admixture that could be readily employed and emplacement under the difficult operating conditions at Chernobyl and tolerate the elevated neutron fluence and high heat flow emanating from the failed reactor.

Concrete Longevity Modeling Analysis at the Oak Ridge DOE Facility

U.S. DOE and State Department

Performed neutron-based degradation modeling to determine the optimal formation for concrete surrounding an operating reactor. This analysis estimated the longevity of different concrete formulations under a high neutron fluence and assessed the benefits of neutron attenuating agent, such as borates, in providing the required degree of neutron resistance while achieve the concrete-related performance specifications.

Project Experience Continued

U.S. Department of Defense

Army Materials Test Laboratory, Watertown, Massachusetts

Served as technical manager designing and supervising remedial efforts associated with decommissioning of a test reactor at this military test facility. Subsequent investigation revealed the presence of significance amounts of depleted uranium in the form of machine turnings derived from projectile (or “penetrator”) manufacturing. The uranium fragments had been widely dispersed across the site and into an adjacent wetlands. Geochemical modeling documented the use of the natural geochemical reducing conditions to help attenuate and isolate the uranium in conjunction with a protective cap. Effort was completed without safety events and per the proposed schedule and budget.

Former Westinghouse Radiological Site in Pennsylvania

BNFL Inc. and Washington Group International (now URS)

Managed the due diligence associated with BNFL's acquisition of the former Westinghouse nuclear fuel operations, focusing on those in the vicinity of Pittsburgh, Pennsylvania. This due diligence emphasized understanding the near-current condition of the radionuclide-related contamination and development of remedial response costs. Subsequent to the acquisition technically managed the investigation and remediation of radionuclide-impacted material at a number of sites. Was subsequently involved in negotiations years after the acquisition to discuss the known radiological contamination at a site.

Former Westinghouse Radiological Processing Facility

BNFL, Ltd., Cheswick, Pennsylvania

Served as technical and project manager designing and supervising remedial efforts associated with remediation of radioactive site soils at this Pennsylvania facility. The remediation required development of radioactive waste delineation, excavation, shipment, and off-site disposal. This work involved removal of contaminated floor drains and subsurface soils within an active office and manufacturing operation. A component of this effort involved justification for cost recovery under Nuclear Regulatory Commission (NRC) policies. Effort was completed without safety events and per the proposed schedule and budget.

U.S. Department of Energy (DOE) Mound Facility

U.S. DOE, Mound, Ohio

Served as senior technical geochemist contributing to the analysis and modeling of a tritium plume in groundwater at this site. The combination of hydrologic and geochemical modeling established the in-ground retention of the tritiated groundwater was optimal in ensuring a sufficient duration to allow for radioactive decay to allow the groundwater to reach regulated standards.

U.S. Department of Energy (DOE) Savannah River Facility

U.S. DOE, Aiken, South Carolina

Served as senior technical geochemical oversight to investigation and remedial approaches for tritiated groundwater plumes present at this DOE facility. Tritium had been released due to both condensation and various modes of discharge of tritiated water and vapor. Geochemical and hydrological modeling was used to document the long-term retention of groundwater sufficient for the radiologic decay of tritium to permitted standards. Geochemical modeling also established the use of Portland cement-based confinement of highly radioactive tritiated water.

Project Experience Continued

NORM Waste

Confidential Oil and Gas Client

Currently providing geochemical and radiological support to the investigation of oil and gas well-associated NORM waste generated during processing of wellfield extracted brines. This work is directed at providing a geochemical basis for the understanding of NORM formation and its geochemical behavior in the environment; an intertidal portion of a saline embayment. Geochemical modeling is helping to relate barium concentration with surface gamma scan data and estimated radioactivity of the discrete fragments of radium-226 enriched barium sulfate [Barite: BaSO₄] scale and precipitate. Work has also focused on the affects that variable water content of the soils and sediments containing the radioactive barite scale may have on the measured gamma signature and issues with radioactive fragments causing spatial variability encountered during surface gamma scan programs.

NORM Waste

Confidential Oil and Gas Client

Providing geochemical and radiological support to the investigation of oil and gas well-associated NORM waste generated during processing of wellfield extracted brines. Provided a geochemical basis for the understanding of NORM formation and its geochemical behavior in the environment. Provided a 4-hour in-house "primer" on the formation, regulatory status, and geochemical behavior and the associated implications of NORM to client's legal and environmental staff.

Final Disposal of Radium-Enriched Barium Sulfate Waste

Confidential Client

Providing litigation support to the final deposition and disposal of radium-enriched barium sulfate wastes resulting from uranium ore processing. Geochemical modeling providing important insight into waste composition in terms of radionuclide content as well as the potential for mobilization of these radionuclides when exposed to the ambient environment.

Related Support to Decommissioning of Natural Gas Treatment Facility NorthWestern Energy – NORM (Lead-210)

Currently supporting the decommissioning of a natural gas facility that may contain adverse activities of Lead-210 and associated decay products resulting from the processing of Radon-222-bearing natural gas. Predictive geochemical modeling is aiding in investigations, material disposal, and development of a radiological health and safety program.

NORM Waste

Confidential Oil and Gas Client

Providing geochemical and investigatory support to an oil and gas client challenged with the in situ closure of 200,000 cubic yards of NORM soil and sediment containing radium enriched barium sulfate (barite) scale. Issue pertains to convincing regulators as to the proper regulatory classification of this material and applicable regulations associated with capping in place. Also providing technical expertise as to the capping requirements associated with cap longevity and radon control issues.

Project Experience Continued

Weldon Spring Site Remedial Action Project

U.S. Department of Energy (DOE), Weldon Spring, Missouri

Served as deputy design manager supervising staff activities (45 members) and managing the evaluation of technologies to remediate material contaminated during munitions manufacturing and uranium processing at a massive DOE CERCLA site. Managed the conceptual design of ex situ chemical solidification/stabilization (CSS) and vitrification facilities. Evaluated potential remedial technologies to treat various RCRA and TSCA wastes, including those containing PCBs, and to remediate contaminated groundwater, including the bacterial remediation of nitroaromatic-bearing wastes. Conducted presentations to the public and regulators, which facilitated acceptance of a comprehensive remedial strategy. A major component of this work involved working with stakeholders as to projected remedial costs for the treatment and disposal of radioactive wastes and the demolition and disposal of debris from 45 large treatment buildings present on site. This work also included the examination of an on-site disposal cell with a 1,000-year design life in safety store concentrated uranium and its associated decay products. This effort lead to a sophisticated combined design of UMTRA and RCRA criteria as well as an in situ permeable reactive barrier for uranium attenuation.

Uranium Mill Tailings Remedial Action (UMTRA) Program

U.S. Department of Energy, United States

Developed the geochemical barrier concept of incorporating a thin organic-rich membrane into a uranium mill tailings disposal cell to attenuate dissolved uranium and associated elements, including selenium, arsenic, molybdenum, and vanadium, by stimulating bacteriological processes demonstrating a unique method to achieve discharge compliance. Assessed methods to develop in-situ geochemical barrier for the long-term attenuation of uranium, molybdenum and selenium using sulfide-based reagents. The basis for this study was to replicate the naturally occurring reduction and precipitation of these contaminants of concern in sulfidic environments. Bench-scale testing was guided by solution equilibria modeling. Cadmium- and zinc-bearing solutions were also tested in order to confirm reaction kinetics and thermodynamic predictions of contaminant removal efficiencies. Also, assessed methods to remediate uranium-contaminated groundwater emanating from a former open pit and underground uranium mine. Efforts have centered on enhancing in-situ dissolution and transport of uranium in order to expedite time for remedial goals to be reached.

NORM Waste

Confidential Oil and Gas Client –

Providing geochemical and radiological support to the investigation of oil and gas well-associated NORM waste generated during processing of wellfield extracted brines. Provided a geochemical basis for the understanding of NORM formation and its geochemical behavior in the environment. Provided a 4-hour in-house “primer” on the formation, regulatory status, and geochemical behavior and the associated implications of NORM to client’s legal and environmental staff.

NORM Waste

Confidential Client

Providing geochemical and investigatory support to an oil and gas client challenged with the in situ closure of 200,000 cubic yards of NORM soil and sediment containing radium enriched barium sulfate (barite) scale. Issue pertains to convincing regulators as to the proper regulatory classification of this material and applicable regulations associated with capping in place. Also providing technical expertise as to the capping requirements associated with cap longevity and radon control issues.

Project Experience Continued

Geochemical Solution Mineral Equilibria Modeling Chevron Resources Mining Operations

Performed geochemical solution mineral equilibria modeling to design and optimize a treatment plant for the removal of dissolved phase radium in mine effluent at three mining operations. This modeling revealed the optimum reagents, including sodium sulfate and barium chloride that led to the effective formation of low solubility radium-enriched barium sulfate (barite [BaSO₄]) and its subsequent removal from solution. This treatment approach achieved radium- and barium-based discharge standards for the treated waters allowing their discharge. Technical support was also provided to the construction and operation of these plants. The precipitate was then disposed as non-radiological waste per the predicted modeling results.

Eastern Michaud Flats Superfund Site – Phosphogypsum-related Investigation Confidential Client

In the late 1990s while employed with Morrison Knudsen (now part of URS) Mr. Carpenter supported both Simplot and a Confidential Client at the Eastern Michaud Flats Superfund site located near Pocatello, Idaho. The primary challenge concerned release of dissolved metals (cadmium and arsenic), including radionuclides, such as uranium and radium, along with orthophosphate and sulfate, especially from the Simplot site where a large stockpile of phosphogypsum was present. Mr. Carpenter conducted geochemical modeling in an effort to better understand the fate of these constituents in the groundwater plume emanating from these combined sites. This effort focused on possible in situ treatment efforts.

Uranium Mine Site Confidential Client

As the senior technical leader managed the assessment of uranium and co-contaminants, which were released from a mill tailings holding facility and to determine potential mitigative actions. This review determined that uranium and other constituents had likely been released in the early history of operation of the mill tailings pond. Closure of the tailings pond prevented further releases but the low hydraulic gradient now present at the site hampers pumping induced recovery of the released contaminants; a process further complicated by the excursion of the tailings fluids onto the adjacent property. Modeling was performed to show how release of electrochemical reducing reagents could aid in attenuation of the uranium and co-contaminants present in the subsurface.

Remediation of Uranium Contaminant Plume Confidential Client, Hobson, Texas

Provided technical support to the remediation of a uranium contaminant plume in an in-situ leach field (Palangana Operation) and uranium mill tailings remediation at the Panna Maria Uranium Operation. Managed the analysis of the neutralization of 3 million gallons of uranium-bearing sulfuric acid in a tailings facility. Solution equilibria modeling established the amount and type of local caliche that would successfully neutralize the solution. Performed bench-scale tests to prove theoretical modeling results. Tailings solution was successfully neutralized using the developed approach. At the Palangana site, geotechnical modeling and the innovative use of aluminum chloride led to remediation of both uranium and ammonia contamination.

Education

B.Sc. (Honours), Physics,
1968, University of Waterloo
(University of Waterloo Tuition
Scholarship)

Ph.D., Physics, 1973,
McMaster University (National
Research Council Science
Scholarship)

Two Sessions at the Advanced
School for Statistical
Mechanics and
Thermodynamics, University of
Texas, Austin, 1970 and 1971

Air Pollution Diffusion, U.S.
EPA, Research Triangle Park,
1974

Annual Health Physics Course,
Chalk River Nuclear
Laboratories, 1974

Observations on Human
Populations, School of
Hygiene, University of Toronto,
1979

Years of Experience
Total – 40+

Professional Registrations
Advisory Committee on
Radiation Protection (1993 to
2002 – this former committee
advised the Canadian Nuclear
Safety Commission on matters
concerning radiation
protection)

American Nuclear Society

Canadian Standards
Association, Member of
Technical Committee on
Environmental Radiation
Protection (1978 to present,
Chairman 1987 to 1994);
Member of Technical
Committee on Risk Analysis
(1989) 2006 Member CSA
N288 TC and CSA N292

Canadian Radiation Protection
Association

Health Physics Society (U.S.),
Past President Environment
and Radon Sector

Douglas B. Chambers, Ph.D.

Director Technical Knowledge and Innovation-Radiation Services

Detailed Experience

At Arcadis Canada Inc. 1980-Present:

Dr. Douglas Chambers was a founder, Executive Vice President and Director of Risk and Radioactivity at SENES Consultants (SENES). Dr. Chambers received his Hon BSc in Physics from the University of Waterloo in 1968 and a Ph.D. in Physics from McMaster University in 1973. He subsequently took graduate level courses in biostatistics. He has more than 40 years of consulting experience with industry, government and various national and international agencies. SENES was acquired by Arcadis, a well-known international engineering consulting firm in March 2013. Dr Chambers is currently a Vice President at Arcadis Canada and Technical Knowledge and Innovation (TKI) discipline lead for radioactivity services in Arcadis.

Strategic Advice – He provides strategic advice to industry and government concerning radioactivity, risk assessment and nuclear fuel cycle activities including licencing, reclamation and decommissioning. Examples include Port Hope Survey and remedial actions, supporting the (then) Kerr McGee Chemical Corporation with remedial actions and litigation concerning their thorium contaminated site, in West Chicago directing a large multi-year reclamation project for the Federal Ministry of Environment in Germany(BMU) concerning the decommissioning of acid generating uranium tailings and waste rock heaps and process plants in the former GDR, advising GEH (now BWXT), OPG, Cameco and others on Environmental assessment, facility hazards and licencing strategies; and advising the Fertilizer Industry and the Florida Institute of Phosphate Research (FIPR) and The Fertilizer Institute (TFI) on risk assessments and regulatory issues with USEPA on alternatives for safe re-use of phosphogypsum (a radioactive by-product from fertilizer production). Other examples include acting as expert advisor following the failure of Boliden's Los Frailes tailing dam and developing a hazard and risk assessment for ARD (for INAP). Evaluated Public Private Partnership for nuclear generation in Chile (Chilean Energy) and supported studies of use of PG from Phosphate fertilizer production in Brazil. Dr Chambers has performed assessments and provides strategic advice to BHP and Rio Tinto on uranium mining activities in Canada, the USA and internationally.

Uranium Mining – He has worked closely with the engineers at uranium mines across Canada in the development of mining and milling practices for the expansion of uranium mining in Saskatchewan and Ontario and additionally in support of decommissioning of uranium mining facilities in Ontario, Saskatchewan and internationally. He was Project Director and senior scientist for the development of a uranium tailings assessment program (UTAP) which was developed to assess the environmental implications of uranium mines, tailings and waste rock. This model has been applied in various formulations to uranium mines in Ontario and northern Saskatchewan. He has also worked with mine engineering teams of Denison, Cameco, Areva Rio Tinto, BHP and others in developing radiation protection practices to mining high grade deposits in northern Saskatchewan. He has directed many environmental assessments and numerous safety studies of nuclear fuel cycle activities in Canada, the USA, and internationally

Hazard Identification – He has developed hazard assessments for storage of hazardous chemicals, including 90 tonne railcars of chlorine, rail cars of anhydrous ammonia and anhydrous HF. He also lead a hazard assessment of a very large LNG storage facility in BC and performed numerous hazard assessments of waste management facilities for radioactive

**Professional Registrations
(Cont'd)**

Past Member of International
Commission on Radiological
Protection (ICRP), Committee
2

Member of Scientific
Committee 85 on Risk of Lung
Cancer from Radon, United
States National Council on
Radiation Protection and
Measurements (U.S. NCR)

Past Member United States
Environmental Protection
Agency (U.S. EPA) Science
Advisory Board, Radiation
Advisory Committee

United Nations Scientific
Committee on the Effects of
Atomic Radiation (UNSCEAR),
Member 1998 to 2011,
Canadian delegation

Consultant to UNSCEAR for
preparation of Annexes on
"Sources-to-Effect Assessment
of Radon in Homes and
Workplaces" and "Effects of
Ionizing Radiation on Non-
Human Biota". Developed
initial drafts of
2017 UNSCEAR annexes for
levels and effects of tritium and
uranium.

wastes – from the nuclear fuel cycle and NORM. He has recently completed an investigation of hazards from a hot metals plant where radiological concerns are focussed on Pb-210 and Po-210.

Risk assessment and Consequence Analysis – Among the numerous consequence analyses performed by or lead by Dr. Chambers are the reconstruction of the 1987 UF₆ cylinder rupture at Sequoyah Fuels, hydrogen fires at nuclear plants, and beyond design basis assessments for several nuclear fuel cycle activities. Other examples include numerous facility risk (consequence) assessments involving petrochemicals, ammonia, uranium hexafluoride, and chlorine. He has supervised a number of transportation risk studies involving petrochemicals, marine transport of LNG, and uranium tailings dam failures. Dr Chambers has supported INCO (now Vale) on numerous activities, among them risk assessment of use of slag as rail ballast, risk from nickel legacy in Port Colborne Ontario and modelling of SO₂ and acid deposition across eastern north america arising from stack emissions from Thompson manitoba and Sudbury Ontario Operations and supporting regulatory negotiations. Performed risk assessments for coal discard heaps and other mining activities in S Africa

Technical Reviews/Support – Dr. Chambers is routinely asked to provide expert reviews of studies and reports. Examples include review of the IAEAs NukPacts model (which calculates the potential health effects arising from routine atmospheric releases from nuclear facilities); ongoing involvement with the CSA over more than 40 years with the development and review of nuclear standards, review of ISO standards- most recently concerning ingestion of uranium; and numerous technical reports prepared by industry and various government agencies as well as international organizations such as the IAEA.

Preparation of Safety Analysis Documents – Dr. Chambers has participated and directed many safety assessments ranging from BDB assessments of uranium mining and fuel fabrication, LNG storage and marine transport; and assessment of risks from radiation exposures in underground uranium mines. In addition, he was Project Director and senior scientist for the development of a uranium tailings assessment program (UTAP) which was developed to assess the environmental implications of uranium mines, tailings and waste rock. He also directed safety assessments in support of both new-build and refurbishment at DNGS and in support of continued operation of NRU.

Design Assist Analysis – He has worked both independently and embedded in engineering teams to support the development of ventilation and radiation protection at underground highgrade uranium mines, uranium conversion facilities, used fuel dry storage facilities, and various NORM industries.

Operational Support – Dr. Chambers is from time-to-time asked to review operating practices and provide input to decisions concerning potential process modifications and/or operating protocols. One example is a recent review of hazards from a hot metals plant where radiological concerns are focussed on Pb-210 and Po-210. Other examples include handling of uranium pellets at a fuel fabrication facility, radon releases from underground mines and management of sulphur emissions from large smelting operations. Other examples include the development of a drinking water risk assessment model for use in assessing risks from biological, chemical and radiological hazards in water and associated training course for use by regional health divisions to support their activities.

Licensing – Dr. Chambers has a very extensive background in successfully performing EAs (e.g., uranium mining, refining, conversion, fuel fabrication, NGS and waste management; LNG storage facilities, LNG marine, gas fired power plants, transportation(roads and electrification of rail) amongst others). Providing regulatory and licensing support for a wide variety of nuclear and non-nuclear facilities. Dr. Chambers is well known and respected by industry and provincial and federal regulatory agencies, by EPA and NRC in this regard.

Associations

Dr. Chambers is a member of numerous professional societies. He was a founding member of the Canadian Radiation Protection Association and has been a member of the Canadian Standards Association N288 Committee on Environmental Radiation Protection since 1977 and continues to support the activities of CSA N288, including contributing to the CSA N288.6 Standard on ERA and TSC for update of N288.2. He became a member of the Canadian Atomic Energy Control Board's (former) Advisory Committee on Radiological Protection (ACRP) in 1993 and was vice-chairman in 2001. He was a member of the US NCRP Committee 85 on radon. Dr. Chambers was a member of the Canadian delegation to UNSCEAR from 1998 through 2011 during which period he prepared two UNSCEAR Annexes (UNSCEAR 2006 Annex E) on "Sources-to-effects assessment of radon in homes and workplaces" and UNSCEAR 2008 Annex E on "Effects of ionizing radiation on non-human biota" and has contributed to the preparation of two new UNSCEAR Annexes on tritium and uranium (recently published by UNSCEAR). He is a member of an ICRP Task Group evaluating RBE for non-human biota and has been a member of ICRP Committee 2 (dosimetry). He has been active in a number of IAEA expert groups, most recently on developing a data base of exposures to uranium miners and in co-authoring an IAEA report on radiation protection in mining (in progress). In addition, he has been a member of the US EPA's Radiation Advisory Committee (RAC) and past President of the Environment and Radon Section of the US Health Physics Society. Dr. Chambers was the recipient of the 1997 W.B. Lewis award of the Canadian Nuclear Society for his achievements in environmental radioactivity. In February 2002, Dr. Chambers was the Morgan lecturer for the Health Physics mid-year symposium in Orlando. Dr. Chambers was on the organizing Committee for IRPA 14 (2016) and the programme committee for the IAEA's 2nd International Conference on Occupational Radiation Protection held in 2014. He has more than 150 technical papers, reports publications and presentations (list available upon request). He has also presented seminars and workshops on a variety of topics, in Canada, the United States, Europe, South America, Australia, and Africa.

Jesse Toepfer, PhD, PE, PMP, CPM, RSO

Nuclear Program Manager & Radiation Protection Expert

EDUCATION

PhD, Engineering Management,
Old Dominion University
MS, Engineering Management,
Old Dominion University
BS, Nuclear Engineering
Technology, Excelsior College

YEARS OF EXPERIENCE

Total – 20
With Arcadis – 3

PROFESSIONAL REGISTRATIONS

Professional Engineer – VA
Project Management Professional

PROFESSIONAL ASSOCIATIONS

Project Management Institute
Dade Moeller Training Academy
(DMTA)
National Registry of Environmental
Professionals
American Society for Engineering
Management
Registered Environmental
Professional

RELEVANT TRAINING

Certified Project Manager (CPM),
Arcadis
5-Star Leadership Program,
Academy Leadership
Radiation Safety Officer (Initial 40-
hour Course), DMTA
Radiation Safety Officer (40-hour
Refresher Course), DMTA

Highlights:

- +20 years total experience; 18 of which are nuclear & radiation related.
- Graduate of the US Navy's Nuclear Propulsion Program; qualified Reactor Technician aboard USS Montpelier.
- Firsthand operator experience starting up and shutting down a Pressurized Water Reactor and responding to various plant scenarios.
- Performed sampling and maintenance activities on reactor plant equipment and air particular monitors.
- Developed approximately five short lectures covering fundamentals of radiation, radiation safety, nuclear physics, reactor plant operation, and biological effects of ionizing radiation; these lectures were initially intended for non-nuclear mechanics aboard the USS Carl Vinson, but I have since given this training to several audiences over the past 16 years.
- Approximately three years' experience as a project manager in charge of "Safety Related" motor and generator repair projects for various nuclear utility plants along the Atlantic seaboard – (repairs to Safety Related components are highly regulated/ proscriptive, as they are components whose failure in service could have a direct and deleterious impact on the safe operation of the reactor).
- Topic of doctoral dissertation focused on exploring rational decision making/ multicriteria decision-making techniques to assist engineering and environmental managers, and involved a case study in determining the most geographically appropriate location to represent the relative natural background value for radon (in air) for areas where no pre-anthropogenic values were established.
- Attended the Dade-Moeller Training Academy 40-hour Radiation Safety Officer (RSO) course three times.
- **Five years' experience as an RSO** with broad responsibilities and ensuring compliance of two separate Radioactive Materials Licenses; one for the US Nuclear Regulatory Commission (NRC), the other for the Colorado Department of Public Health and Environment.
- Familiar with proper use, function, care, and maintenance of various radiation measurement instruments.
- Several years' experience preparing for- and addressing the challenges of formal audits by Naval Reactors (NR), NRC, and state agencies.

Project Experience Continued

Research Interests:

Dr. Toepfer has had a lifelong interest in nuclear energy, especially with respect to Small Modular Reactor (SMR) design, infrastructure support, and power-grid de-centralization. In addition, Dr. Toepfer has also studied nuclear fusion, Tokamak reactor design, and magneto-plasmadynamic propulsion systems.

Summary of Relevant Career Experience:

A seasoned Engineering Manager with +20 years of cumulative, progressive experience in the nuclear and environmental fields, Dr. Toepfer has directed dozens of projects across multiple disciplines. To date, he has managed more than \$300 million in capital project involving complicated mechanical, electrical, chemical, and nuclear systems. As such, Dr. Toepfer is well adept to directing technical work that involves significant regulatory oversight and corporate reporting requirements.

Dr. Toepfer is a subject matter expert in formal Multi-Criteria Decision-Making techniques with practical application in engineering management; he has operator-level experience working around hazardous chemicals and high-energy steam plant and compressed air systems. In addition, Dr. Toepfer has significant experience leading and performing **optimization studies**, especially for fluid, thermodynamic/steam plant, and mechanical systems, and with respect to water and brine management, water stewardship, and water treatment systems. Having taken leading roles in the design, construction, and hands-on operation of various water and brine management systems, Dr. Toepfer is familiar with the advantages, disadvantages, risks, and benefits of a variety of in situ and ex situ technologies.

Work History

Optimization Study for Steam and Compressed Dry Air Distribution Systems, Radford Army Ammunition Plant

BAE Systems – Radford, Virginia

Led and directed a high-level asset condition assessment and optimization study. The overall challenge of the project was to determine with confidence and in the most cost-effective manner possible, the efficiency and salvageability of major components of the CDA and steam distribution systems, which were comprised of nearly 60 miles of conveyance lines with hundreds of pipe fittings, valves, reliefs, reducers, and other appurtenances servicing approximately 400 small building loads at a 70-year-old military installation where asbestos and other chemical hazards are present. To seek the most optimal alternative, various changes to the systems' configurations were considered, including centralized and de-centralized alternatives. The Analytic Hierarchy Process was used to facilitate the optimization decision.

Remediation of UNC Naval Products Site, New Haven, CT

United Nuclear Corporation – New Haven, Connecticut

Served as regulatory expert and senior advisor for radiological surveying, transportation, and disposal of contaminated structures and earthen material for UNC's Naval Products Site. Remediation project involved heavy regulatory interaction and community engagement with

Project Experience Continued

respect to the classification, characterization, and disposition of Special Nuclear Material, Byproduct Material, Source Material, NORM, and TENORM.

Concept-Level Design and Capital Investment Estimate for a Water Treatment Facility Targeting Radium

Confidential Client – Nassau County, Long Island, New York

Developed a preliminary water treatment plant design and associated cost estimate (CAPEX and per annum OPEX) for an ion-exchange-based water treatment system specifically designed to target Radium-226/228, Uranium Oxide Compounds (UO₂X), as well as various Volatile Organic Compounds (VOCs) and other radioactive constituents in the U-238 and U-235 radioactive decay series. The system's design and cost estimate included the initial construction costs, total cost of ownership over a 30-year period, transportation of radioactive materials, permitting and licensing requirements, as well as annual operating costs.

Water Treatment System Optimization Evaluation & Water Balance / Water Management Adequacy Review

Confidential Client – Montana

Assisted project team in the capacity of a senior advisor to evaluate and optimize an existing High Density Sludge (HDS) water treatment plant at a CERCLA site in western Montana; this work involved piloting various configurations and new, alternative treatment technologies. In addition, my efforts as a senior advisor were also utilized as part of the broader scope of work, to evaluate and optimize the site's entire water balance and water management practices.

Wastewater Treatment Plant (WWTP) Condition Assessment

Dominion Energy – Surry (Nuclear) Power Station, Isle of Wight County, Virginia

Work closely with Surry and Arcadis project team members to ensure the needs of Dominion Energy are being met. Project involves an in-depth understanding of EPA and Virginia DEQ water and environmental regulations, WWTP design, construction, and operation, as well as the applicable discharge limits for the various constituents of concern.

National Priority List (NPL) Environmental Superfund Site Groundwater Remediation Program & Water Treatment Program

Homestake Mining Company, Grants Reclamation Project, Cibola County, New Mexico | 2013 - 2017

Primary duties included leading, managing and directing the ongoing activities of all office staff, consultants, engineering staff and crew technical operators. The site's environmental remediation almost entirely revolves around groundwater treatment via one of three water treatment systems; radon and radiation exposure are also regulated at the site. Oversaw the planning, design and construction of three water treatment systems targeting: uranium, selenium, sulfates, nitrates, vanadium, total dissolved solids and molybdenum. Directed and

Project Experience Continued

oversaw the completion of the site's Corrective Action Plan (CAP), Decommissioning and Reclamation Plan (DRP), as well as several procedural updates to the site's safety, health, and environmental protocols. Developing closure cost estimates, financial surety packages, at site budgets was an annual activity. Directed and oversaw the coordinated review of soil analyses targeting radium-226, 228, natural uranium, vanadium, and selenium; managed and directed a years-long assessment and reassessment of groundwater background standard establishment for primary constituents of concern. Intimately familiar with NRC regulations governing UMTRCA sites, 11e.(2) by-product material, radiation protection, dose limits to occupational workers and to members of the public, radon measurement, radon fate and transport modes, RSO requirements, and protocols for license changes and amendments.

I directed the efforts of Arcadis' geochemical experts to implement an in-situ tripolyphosphate groundwater treatment system; I also directed and oversaw the engineering and design efforts of a 1,200 gpm Reverse Osmosis plant, as well as a 1,200 gpm zeolite-based water softening system designed to recover uranyl ions from impacted groundwater.

I also worked routinely with the company's legal department on various water rights issues, and provided expert testimony during public hearings involving water rights and water treatment projects. With my formal training in media and government relations, a water rights permit that was deemed crucial to the site's future operations was successfully renewed.

Project Manager, Regional Projects Group Barrick Gold Corporation | 2011 - 2013

Planned, designed and permitted a hazardous waste treatment and storage facility (TSF) for mercury; Executed and oversaw the construction of two mine ventilation shafts via blind boring at the Cortez mine in Nevada.

Working with the company's legal department, we were able to successfully permit the first Mercury in Nevada as a RCRA Subtitle C facility. An understanding of water rights and groundwater regulations was vital to obtaining this permit.

Project Manager Nuclear Services Department, Electric Motor and Contracting Company, Chesapeake, Virginia | 2008 - 2011

Oversaw the design and build-out of the exhaust system for the main autoclave during the construction of the company's new production building. Managed the complete oversight of dozens of motor/generator repair and refurbishment projects.

Sailor, Nuclear Operator, Engine Room Technician United States Navy | Charleston, South Carolina; Portsmouth, New Hampshire; Newport News, Virginia; and Norfolk, Virginia | 2002 - 2008

Graduate of US Navy Nuclear Propulsion Program. Familiar with management and minimization of exposure to various radionuclides of concern, including Cs-137, Co-60, Sr-90, and other fission products. Occupational radiation worker familiar with the use of personal dosimetry devices, occupational radiation exposure limits, and principles of ALARA.

Project Experience Continued

Trained nuclear operator with expert knowledge of complex mechanical, thermal, and fluid systems (e.g., diesel generators, boilers, electrical turbine generators, pumps, propulsion turbines, gears, piping arrays and valve networks).

Performed maintenance on submarine titanium-shelled 2,000-psi seawater Reverse Osmosis system, engine room valves, pumps, and reactor instrumentation and control equipment.

Worked for five years in industrialized areas; familiar with port authority and waterfront operations.

Reusable

RECEIVED APR 24 2020

[illegible]



ACKNOWLEDGEMENT - RECEIPT OF CORRESPONDENCE

Name and Address of Applicant and/or Licensee

Les Skoski, Ph.D.
Radiation Safety Officer
ARCADIS U.S., Inc.
630 Plaza Drive, Suite 100
Highlands Ranch, Colorado 80129

Date

04/29/2020

License Number(s)

05-35250-01

Mail Control Number(s)

618757

Licensing and/or Technical Reviewer or Branch

C. Hill

This is to acknowledge receipt of your: ☒ Letter and/or ☐ Application Dated: 04/23/2020

The initial processing, which included an administrative review, has been performed.

☒ Amendment ☐ Termination ☐ New License ☐ Renewal

☐ There were no administrative omissions identified during our initial review.

☐ This is to acknowledge receipt of your application for renewal of the material(s) license identified above. Your application is deemed timely filed, and accordingly, the license will not expire until final action has been taken by this office.

☐ Your application for a new NRC license did not include your taxpayer identification number. Please complete and submit NRC Form 531, Request for Taxpayer Identification Number, located at the following link: <http://www.nrc.gov/reading-rm/doc-collections/forms/nrc531.pdf>
Follow the instructions on the form for submission.

☐ The following administrative omissions have been identified:

Your application has been assigned the above listed MAIL CONTROL NUMBER. When calling to inquire about this action, please refer to this control number. Your application has been forwarded to a technical reviewer. Please note that the technical review, which is normally completed within 180 days for a renewal application (90 days for all other requests), may identify additional omissions or require additional information. If you have any questions concerning the processing of your application, our contact information is listed below:

Region IV
U. S. Nuclear Regulatory Commission
DNMS/NMSB - B
1600 E. Lamar Boulevard
Arlington, TX 76011-4511
(817) 200-1103 or (817) 200-1140

Accounts Receivable/Payable and Regional Licensing Branches

Program Code: 03234
Status Code: Pending Amendment
Fee Category: 1D 2F 3N 4B
Exp. Date: 08/31/2025
Fee Comments: 3N is fee exempt under 4B
Decom Fin Assur Req'd: N

A. REGION

Applicant/Licensee: ARCADIS U.S., Inc.
Received Date: 04/17/2020
Docket Number: 3038846
Mail Control Number: 618757
License Number: 05-35250-01
Action Type: Decommissioning

Amount: N/A

Check No.: N/A

Signed: Carol L. Hill

Date: 04/29/2020

1. Fee Category and Amount:

Amendment: _____

Renewal: _____

License:

Signed: _____

Date: _____

Agency: NRC

WBL WORKSHEET

DOCKET NUMBER: 3038846	LICENSE NUMBER: 05-35250-01	STATUS: Pending Amendment
MAIL CONTROL NUMBER: 618757	RECEIPT DATE: 04/17/2020	ACTION TYPE: Decommissioning
DUE DATE: 07/16/2020	INST. CODE: 35250	LICENSE REGION: Region 4
LICENSE TYPE: 30	ENTITY TYPE: C	LICENSE GROUP: Industrial
ISSUE DATE: 11/19/2019	ORIGINAL DATE: 08/10/2015	EXPIRATION DATE: 08/31/2025
DECOMMISSIONING CATEGORY:	LAST ISSUE DATE: 11/19/2019	
LICENSEE NAME: ARCADIS U.S., Inc.	DECOM FIN ASSUR REQD: N SUBM: N	
MAILING ADDRESS LINE1: 630 Plaza Drive, Suite 100	CONT PLAN REQD: N	APPRV: N
MAILING ADDRESS LINE 2:		
CITY: Highlands Ranch	STATE: CO	ZIP: 80129
CONTACT PERSON: PREFIX:	FIRST NAME: Janis	MIDDLE INITIAL:
LAST NAME: Lutrick	SUFFIX:	
JOB TITLE: Associate Vice President	PHONE: 720-344-3797 FAX:	EMAIL: Janis.Lutrick@arcadis.com
BILLING ADDRESS LINE 1: 630 Plaza Dr., Suite 100		
BILLING ADDRESS LINE 2:		
CITY: Highlands Ranch	STATE: Colorado	ZIP: 80129
BILLING CONTACT PERSON: FIRST NAME: Ralph	MIDDLE INITIAL:	LAST NAME: Heyer
PHONE: 512-388-9100	EMAIL:	FAX:
PRIMARY PGM CODE: 03234	SECONDARY PGM CODE: 03219,03225,11300,22110,22111,22150,22151	
INSPECTION REGION: Region 4	PRIORITY: 2	
RSO: PREFIX:	FIRST NAME: Les	MIDDLE INITIAL: LAST NAME Skoski
SUFFIX: Ph.D	RSO JOB TITLE: RSO	
RSO PHONE: 720-344-3500	RSO FAX: 720-344-3535	RSO EMAIL: Les.Skoski@arcadis.com
STATES WHERE USE IS AUTHORIZED:	0- ALL LISTED STATES 1- SAME AS STATE IN ADDRESS 2- ALL STATES 3- NON-AGREEMENT-STATES	
AUTHORIZED STATES (USE ONLY IF ABOVE IS ZERO):		