Sean P. Dudley

PhD

Senior Staff Consultant

As a senior staff consultant in the polymers and composites group at Engineering Systems Inc. (ESi), Sean provides technical consulting in forensic investigations by drawing from his knowledge of polymers, metallurgy, materials characterization, and environmental and chemical processing.

Prior to joining ESi in 2021, he worked for four years as a Forensic Engineer in the Materials Science Group of Jensen Hughes. Sean's experience ranges from minor loss investigations to large-scale construction defect projects involving multi-party litigation. Additionally, Sean's experience includes working at the Puget Sound Naval Shipyard as a Nuclear Engineer specializing in procedure writing. Prior to returning to university to pursue his doctorate in materials science, he worked as an environmental/mineral processing/chemical engineer for CDM Smith. Sean also has a wide array of experience in the oil and gas industry, having completed three internships for ConocoPhillips.

Sean draws on his educational and work experience to be active in polymers, metals, environmental, and processing investigations for a variety of different products and industries. He brings a comprehensive approach to failure analysis and, by leveraging the diverse resources of ESi, seeks clear solutions to complex problems offered by clients.

Education

Ph.D., Materials Science, Montana Technological University, 2021

M.S., Metallurgical and Mineral Process Engineering, Montana Technological University of the University Of Montana, 2011

B.S., Environmental Engineering, Montana Technological University of the University of Montana, 2009

Languages

- English

Contact Information

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ESi Seattle

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Seattle, WA 98108

Areas of Specialization

- Polymers And Composites
- Failure Analysis
- Materials Technology and Characterization
- Environmental Engineering
- Water and Wastewater Engineering
- Concrete Building Materials
- Chemical Processing
- Mineral Processing and Extraction
- Oil and Gas Operations

Positions Held

Engineering Systems Inc., Seattle, Washington

- Senior Staff Consultant, 2021 – Present

Jensen Hughes, Mountlake Terrace, Washington

- Forensic Engineer, 2017 – 2021

Puget Sound Naval Shipyard, Bremerton, Washington

- Nuclear Engineer, 2016 – 2017

Office Of Naval Research and Army Research Laboratory Research Programs, Butte, Montana

- Researcher and Program Lead, 2013 – 2016

CDM Smith, Helena, Montana

- Environmental, Mineral Processing, And Chemical Engineer, 2011 – 2013

Center for Advanced Metallurgical and Mineral Processing, Butte, Montana

- Researcher, 2009 – 2011

ConocoPhillips, Houston, Texas & Borger, Texas

- Environmental Wastewater Intern and HSE Capital Projects Intern, 2007 – 2010

Professional Affiliations/Honors

American Water Works Association (AWWA)

- Member

American Institute Of Chemical Engineers (AIChE)

- Member

American Society for Testing Materials (ASTM)

- Member

Society of Plastics Engineers (SPE)

- Member

Tau Beta Pi, Engineering Honor Society

- Member

Project Experience

Investigations

Water Distribution Systems and Failures

Evaluation and investigation of polypropylene piping materials in multiple large and high-profile locations. Investigation included site documentation, evaluation and management of removal of evidence, laboratory investigation(s) and testing, and data reporting and analysis. Work product was a thorough investigation into the likely cause of failures and was successful in providing the material needed for a successful settlement.

Other water distribution materials evaluated through various projects include PVC, CPVC, PEX, Polyethylene, and other polyolefins.

Membrane Digestor Design and Failure Investigation

The failure of a digestor membrane led to a complete evaluation of failure mode, design, and permitting of the facility. This project had multiple facets including evidentiary management, correspondence with permitting authorities, and environmental / chemical design assessments.

Adhesive Evaluations

Multiple projects have included assessment of flooring, paint, and coating adhesion failures. These investigations involve systematic approaches to documenting everything from site conditions to understanding and testing the failure mode.

Architectural Panel Failure Investigation

The extensive failure of architectural panels on a high-rise in downtown Seattle required a comprehensive investigation to analyze the construction, installation, manufacturing, chemical formulation, and environmental exposure.

Concrete Specification, Integrity, and Environmental Response

Projects have included assessment of appropriate mix specifications, compatibility of additives, proper sealing techniques and materials, environmental and chemical degradation, and restoration.

Assessment of concrete relies heavily on the physical and chemical properties of the concrete but also the environment in which it is placed and expected to operate.

Biomass, Acid Mine Drainage, and Produced / Process Water Treatment Systems

Participated in the planning, development, operation, and troubleshooting of multiple pilot- and full-scale systems for water treatment and discharge. This includes compliance with regulatory components.

Environmental Hazards Assessment and Response

Multiple projects have involved the assessment of hazards and the fate and transport of environmental contaminants in soil, water, and air media. Compliance with regulatory affairs and appropriate testing and characterization procedures are always a major consideration of these projects.

Underground Storage Tank (UST) Retirement

A facility wanted to decommission their UST facilities at a number of warehouses across the US and required an audit for best management practices and disposal options available to them to comply with the various rules and regulations.

Refinery Process Systems

A systems analysis of a large oil refinery in Texas was performed to determine the areas of concern regarding a contaminant entering the wastewater stream. The full assessment included incoming oil characterization, waste and product stream analysis, water sampling and analysis, and systems modeling.

Safety Assessment and Compliance

A large "turn-around" was being performed at an oil refining facility in Illinois that involved multiple parallel activities and contractors. Buy-in and compliance to the evolving site safety plan was driven through the analysis of key metrics and working closely with on-the-ground personnel.

Publications

"Enhancement of Montana Coal: Sodium Removal Technology Evaluation and Development"; Jay McCloskey, Larry Twidwell, Paul Miranda, Doug Cameron, Courtney Young, **Sean Dudley**, Bill Pascoe; Lexington, Kentucky; XVI International Coal Preparation Congress Conference Proceedings, SME, pages 622-633; February 2010

"Rare Earth Element Recovery and Resulting Modification of Resin Structure"; **Sean Dudley**, Maureen Chorney, William Gleason, Ed Rosenberg, Larry Twidwell, Courtney Young; Rare Metal Technology 2015 – TMS 2015

"Removal Of Sodium from Low-Rank Coals", L.G. Twidwell and **Sean Dudley**, Center for Advanced Mineral and Metallurgical Processing (CAMP), Internal Report LIT-1, 54 p., 2010

"Water Treatment Technologies for Sodium Removal", Center for Advanced Mineral and Metallurgical Processing (CAMP), Internal Report LIT-5, 49 p., 2011

"Evaluation of Fly-Ash Based Artificial Zeolite Formation as Treatment for Salt-Laden Process Water from Eastern Montana Coal Operations", May 2011

"Formation of Long-Range Rare Earth Element Complexes Via Ligand Interaction in CIX / PIX Resins", December 2021

"Recovery Of Rare Earth Elements; Official Quarterly Reports for Office of Naval Research"; **S. Dudley**, G. Wallace, W. Gleason, J. Downey, C. Young, E. Rosenberg; 2013-continuing

“Recovery Of Rare Earth Elements”; Official Year Report for Army Research Laboratory; July 2015

Presentations

“Enhancement of Montana Coal: Sodium Removal and Technologies, Evaluations, and Development”, International Coal Preparation Congress (XVI ICPC), 2010, Lexington, Kentucky, February 2010 (Presenter: L.G. Twidwell, Co-authors: Jay McCloskey, Sean Dudley)

“Evaluation of fly-ash based artificial zeolite formation as treatment for salt-laden process water from eastern Montana coal operations”, International Coal Preparation Congress, 2011, Lexington, Kentucky, February 2011 (Presenter)

“Rare Earth Element Recovery – Progress and Path Forward”, Office Of Naval Research Project Status Conference, June 2013 (Presenters: Sean Dudley and G. Wallace)

2014 Mineral Processing Division of Colorado, Colorado Springs, Colorado, 2014 (Presenter)

“Rare Earth Element Recovery and Resulting Modification of Resin Structure”, Rare Metal Technology – TMS 2015 (Presenter)

“Rare Earth Element Research and The Use of Composite Materials”, 2015 Student Research Celebration, Montana State University, April 2015 (Presenter)