



SEAN P. DUDLEY, Ph.D.

SENIOR STAFF CONSULTANT – POLYMERS AND COMPOSITES

spdudley@engsys.com

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.

Sean's experience ranges from minor loss investigations to large-scale construction defect projects involving multi-party litigation. Prior to joining ESi in 2021, he worked for four years as a Forensic Engineer in the Materials Science Group of Jensen Hughes. 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 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.

Areas Of Specialization

Polymers and Composites
Failure Analysis
Materials Technology and Characterization
Environmental Engineering
Chemical Processing
Mineral Processing and Extraction
Oil and Gas Operations

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

Professional Affiliations/Honors

American Water Works Association (AWWA)

Member

American Institute of Chemical Engineers (AIChE)

Member

Society of Plastics Engineers (SPE)

Member

The Minerals, Metals & Materials Society (TMS)

Member

Tau Beta Pi, Engineering Honor Society

Member

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

Publications/Presentations

Presentations

- International Coal Preparation Congress (XVI ICPC), 2010, “Enhancement of Montana Coal: Sodium Removal and Technologies, Evaluations, and Development”, Lexington, Kentucky, February 2010 (Presenter: L.G. Twidwell, Co-authors: Jay McCloskey, Sean Dudley)
- International Coal Preparation Congress, 2011, “Evaluation of fly-ash based artificial zeolite formation as treatment for salt-laden process water from eastern Montana coal operations”, Lexington, Kentucky, February 2011 (Presenter)
- Office Of Naval Research Project Status Conference, “Rare Earth Element Recovery – Progress and Path Forward”, June 2013 (Presenters: Sean Dudley and G. Wallace)
- 2014 Mineral Processing Division of Colorado, Colorado Springs, Colorado, 2014 (Presenter)
- Rare Metal Technology 2015 – TMS 2015, “Rare Earth Element Recovery and Resulting Modification of Resin Structure”, 2015 (Presenter)

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

Proceedings

- Jay McCloskey, Larry Twidwell, Paul Miranda, Doug Cameron, Courtney Young, Sean Dudley, Bill Pascoe; “Enhancement of Montana Coal: Sodium Removal Technology Evaluation and Development”; Lexington, Kentucky; XVI International Coal Preparation Congress Conference Proceedings, SME, pages 622-633; February 2010
- Sean Dudley, Maureen Chorney, William Gleason, Ed Rosenberg, Larry Twidwell, Courtney Young; “Rare Earth Element Recovery and Resulting Modification of Resin Structure”; Rare Metal Technology 2015 – TMS 2015

Literature Review

- “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

Master’s Thesis

Evaluation of fly-ash based artificial zeolite formation as treatment for salt-laden process water from eastern Montana coal operations, May 2011

Doctoral Dissertation

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

Official Reports

- 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

Selected Project Experience

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 effective 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 Digester Design and Failure Investigation

The failure of a polymer digester 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 and 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.

Underground Storage Tank (UST) Retirement

A facility wanted to decommission their UST facilities at several 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.