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LAUREN N. MUNDAY
STAFF CONSULTANT

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Ms. Lauren Munday is an analytical chemist with a background in small molecule analysis. Small molecule chemistry encapsulates many of the questions asked in a fire analysis and beyond along with volatile chemicals and ignitable liquids, drugs and metabolites, polymers, and many other common molecules. Some previous case work includes fire debris analysis, small scale testing, failure analysis of coatings, fuel contamination analysis, and drug analysis.

Ms. Munday manages the ESi Fuel Gas Odorant Analysis Program where odorant and composition analysis is performed for fuels such as: mercaptan and total sulfur levels, propane total hydrocarbon composition analysis, and further analysis using gas chromatography with mass spectrometry to further assess gas composition.

Her current work includes fire debris analysis, volatile liquid analysis, propane and fuel gas analysis, microanalysis, drug analysis, and general small molecule analysis techniques. Ms. Munday's analytical expertise includes gas and liquid chromatography, mass spectrometry, pulsed flame photometric detection, microscopy and microanalysis, and infrared spectroscopy. Ms. Munday is also certified in Dangerous Goods Shipping and a member of the National Association of Fire Investigators (NAFI).

Ms. Munday holds a bachelor's degree from Loyola University-Chicago in biochemistry and completed her master's degree in chemistry, specializing in analytical chemistry, at the University of Washington. She conducted research in the Forensics Research Lab at Loyola, investigated organometallics and C-H bond activation, and focused on analytical theory and instrumental methods at the University of Washington.

Areas of Specialization

Instrumental Analysis
Fuel Gas and Odorant Analysis Small Molecule Analysis
Fire and Explosion

Education

M.S., Chemistry, University of Washington, 2018
B.S., Biochemistry, Loyola University Chicago, 2017

February 2022

Positions Held

ESi (Engineering Systems Inc.), Seattle, WA
Staff Consultant, 2018 – Present
University of Washington - Department of Chemistry, Seattle, WA
Graduate Teaching Assistant, 2017 – 2018
Loyola University-Chicago - Department of Chemistry and Biochemistry, Chicago, IL
Undergraduate Research Assistant, 2015 – 2017

Project Experience Highlights

- Instrumentation Knowledge
- Proficient in operation and data analysis of:
- High pressure liquid chromatography (diode array detector)
- Gas chromatography-mass spectrometry
- Gas chromatography-pulsed flame photometric detection
- Gas chromatography-flame ionization detection
- Fourier transform infrared spectroscopy
- Nuclear magnetic resonance

Instrumentation Usage

- Developed and implemented the use of a state-of-the-art gas chromatography-pulsed flame photometric detector (GC-PFPD) system for the analysis and quantitation of light hydrocarbon gases and odorants in propane and natural gases. This included assembling to-go kits for internal engineers and providing expert analysis and quantitation of liquid petroleum gas (LPG) samples.

- Utilized High Pressure Liquid Chromatography (HPLC) for a number of uses including the quantitation of important cannabinoids Δ9-tetrahydrocannabinol (THC), Δ8-THC, tetrahydrocannabinolic acid (THCA), cannabinol (CBN), and cannabidiol (CBD) in hemp and cannabis products for both industrial and criminal projects.

- Utilized gas chromatography-mass spectrometry (GCMS) to analyze swabs taken from a compressed air system with suspected oil contamination. Previous Fourier transform infrared spectroscopy (FTIR) analysis yielded inconclusive results. GCMS was used to specifically identify a source of systematic contamination in the sampling technique and verify the status of the system.

- Utilized both stereomicroscopy and polarized light microscopy to analyze and identify particles on tape lifts taken from homes with suspected soot and smoke infiltration.

- Fire Debris Analysis

- Utilized GCMS for various ignitable liquids analyses of fire debris. Following ASTM E1412 and E1618, charred debris was analyzed for the presence of any accelerants including gasoline, light fluids, etc. Residues of gasoline and other accelerants have been successfully identified in burned matrices.

- Utilized both GCMS and small-scale testing to assess the self-heating capabilities of various wood stains. Using ASTM E2881, residues were extracted, derivatized, and analyzed by GCMS for any chemically significant components (fatty acid methyl esters, FAMEs) that can contribute to self-heating of plant oil containing materials. Exemplar materials were then subjected to accelerated heating conditions to verify self-heating capabilities.