Doctoral Dissertation Defense Announcement

THE VIABILITY OF REUSING OILFELD PRODUCED WATER FOR AGRICULTURE

Emily N. Sappington
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9:00 AM – 11:00 AM
Dean's Conference Room (E421H)

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ABSTRACT

Produced water (PW), the largest volume byproduct of oil and gas production, is typically perceived as wastewater and is disposed of via injection wells. Emerging concerns regarding PW disposal have prompted renewed interest in potential beneficial reuse of this lower quality water. The reuse of PW for agricultural purposes was investigated in this dissertation. A major technology gap exists in the monitoring of PW quality. Confocal laser fluorescence microscopy (CLFM) was evaluated in this dissertation as an alternative to USEPA Standard Method 1664 for quantifying oil and grease (O&G) in PW. Quantification of O&G was studied in the presence of chemical and environmental parameters including salinity, particles, and chemical additives. Overall, the CLFM method produced rigorous results that can be improved using advanced image processing techniques. Results from a germination and plant growth study indicated that iron and clay cowpeas (ICC) germinated and grew when irrigated with diluted PW containing 4,000-10,000 mg/L salt. Promising effects on plant growth such as longer, heavier, and larger leaves were observed in plants watered using PW as compared to plants watered using salt water suggesting a potential long term benefit of using PW to irrigate crops. Results from a spatial analysis using indexing showed the greatest potential to reuse PW for agricultural purposes in the Permian basin. Based on the data available for the study, the Permian contained an abundance of cultivated cropland and oil and gas wells resulting in high supply/demand ratios based on available PW volume and need for irrigation water. The Permian basin also receives the lowest precipitation among all basins in Texas, indicating a greater potential for water stress in times of drought; thus, further supporting the need and value of alternative irrigation water sources.