

## ABSTRACT

**THESIS:** Influence of Antibiotic and Heavy Metal Concentration on Antibiotic Resistance Gene Abundance in Wastewater Biosolids

**STUDENT:** Jacob M. Price

**DEGREE:** Master of Science

**College:** Sciences and Humanities

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Solids (sludges) from wastewater treatment are known to harbor significant concentrations of antibiotic compounds. Wastewater sludges are commonly disposed in landfills and by spreading onto soil. There is, therefore, an urgent need to characterize the risks of land disposal of wastewater sludge. The reported study determines the abundance of antibiotic resistance genes of bacteria from selected wastewater treatment plants in central Indiana. These data are correlated to antibiotic concentrations in wastewater sludge in order to formulate a dose-response relationship. The study has focused on two antibiotic compounds – trimethoprim and sulfamethoxazole. Real-time PCR was used to determine the abundance of genes among bacterial samples cultured from the sludge; liquid chromatography-mass spectrometry was used for determination the concentrations of antibiotic compounds present, and flame atomic absorption spectrometry was used to measure metal concentrations. A significant relationship was found between the concentration of cadmium (Cd) and *sulI* gene abundance. Positive correlations were observed between Cd, zinc (Zn), and lead (Pb) to *dfrA1*. Positive correlations were also observed between lithium (Li) and *sulI*, and sulfamethoxazole and trimethoprim concentrations and *sulI* and *dfrA1*, respectively.