ABSTRACT

TITLE:	Pharmaceuticals and Endocrine Disruptors in Municipal Wastewater Effluent
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ABSTRACT: A 2008 Associated Press study of 28 major United States municipalities' water provider testing results uncovered traces of a wide variety of pharmaceuticals, hormones, and antibiotics in 24 of the cities' drinking water. These chemical compounds have been linked to two sources: the flushing or dumping of medications down the drain and the passage of excess chemicals through the human body and into municipal wastewater. Municipal wastewater treatment plants do not have the technology or infrastructure to remove these chemicals from the water, so they enter a stream or river and are carried downstream. In the Animas River Basin, in and around Durango, Colorado, no testing has been conducted for the presence of pharmaceutical compounds or endocrine disrupting chemicals. Many case studies have screened wastewater effluent and stream water for these chemicals throughout the country, the majority with similar results. A cooperative study with United States Geological Survey and Pennsylvania Department of Environmental Protection of the Environmental Protection Agency tested streams near drinking water intakes in Pennsylvania in 2007. Over a three-year study, 27 drinking water intake sites were tested throughout the state. These intakes were tested for levels of pharmaceuticals, hormones, and antibiotics. All of the 27 sites had at least one compound detected. The most commonly detected pharmaceuticals were caffeine, Carbamazepine, acetaminophen, antihistamines, and cotinine, a derivative of nicotine. The most commonly detected hormones included estrone, androstene, 17-beta estradiol, and cis-androsterone, all human male and female hormones. All levels of contaminants were found at very minimal levels in the parts per trillion concentrations. Although low, these levels have been proven detrimental to wildlife. Aquatic species are most reactive to these chemicals and have been proven to intersex and stop reproduction altogether when introduced to certain human hormones like estrone or estradiol, common hormones in birth control. Emerging research has prompted the research and development of wastewater chemical removal methods such as ozonation, activated carbon removal, and forward osmosis removal. This research suggests a screening of the Animas River needs to be conducted for the presence of pharmaceuticals and endocrine disruptors so solutions and prevention strategies can be implemented if needed.