A possible solution to an ongoing environmental problem at one of Utah’s wastewater treatment ponds could leave the site smelling like roses. A team of environmental engineering students at Utah State University’s College of Engineering took home a national award last week for designing an innovative process to remove two major players in the wastewater nutrient dilemma: nitrogen and phosphorous. The USU student chapter of the Water Environment Association of Utah wowed a panel of judges at WEFTEC, the largest water conference in the nation on Sept. 28 in New Orleans, La., and took second place at the student competition. The Team is composed of Alex Rasband, Ayman Alafifi, William Fullmer and Daniel Horne.

Alafifi says the team evaluated multiple wastewater treatment alternatives and recommended a path forward to help Morgan Wastewater Treatment Plant meet future nutrient regulations and protect endangered species at receiving waters. Several alternatives were considered and a treatment solution was recommended based on costs, input from the City, and feasibility. Team leader Alex Rasband says nutrient levels in effluent at the Morgan, Utah wastewater treatment site can be minimized by cultivating biosolids and phosphorous-rich sludge into fertilizer pellets. In addition, nitrogen can be removed from the effluent by reusing it to irrigate ornamental crops – including roses – that would be grown in on-site greenhouses and sold to floral shops. Faculty adviser Dr. Michael McFarland says the system is designed to circulate water through the greenhouses for a total of four hours. As wastewater flows through the crops, plants take up nitrogen, leaving it free of added nutrients. If the treated wastewater then meets certain quality standards, it would be used to recharge groundwater through an infiltration basin. McFarland says removing nutrients from effluent is a challenge all wastewater facilities have to address. He says using treated wastewater for a greenhouse growing operation makes good economic sense for small communities like Morgan where flow is minimal. “There are a number of small lagoons around the state of Utah all facing the same challenge of meeting these nutrient limits,” he said. “The only way we can do this is because the flow at Morgan is so low. This idea was abandoned in larger communities because the flow is just too high.” Discharging effluent that contains high nitrogen levels can create toxic conditions for aquatic environments and lead to algae blooms, dissolved oxygen depletion and fish die-offs.

Alafifi says that the team proposed a zero discharge alternative by land applying treated wastewater in summer months and applying the effluents to a combined hydroponics-infiltration basin system in winter months. The proposal shows a great potential of generating revenues by growing and selling animal feed crops during summer months and ornamental flowers in winter months. The system also helps recharge the aquifer. He says the concept of using wastewater in hydroponics would need additional research and a pilot project to test its efficiency and profitability before city officials in Morgan could adopt any formal proposal.