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Session Title: Converting Industrial Process Water into High Quality Drinking Water for Food Processing Reuse

Abstract: The most promising sustainable solution to the growing global water shortage is water recovery and reuse. The water recycling allows industries to reduce their water footprints, prevent groundwater tables from dropping, become less dependent on groundwater and surface water and finally protect water resources from pollution. Frito-Lay Inc., as part of its approach to sustainability and reducing environmental footprint, has selected its corn and potato chip plant in Casa Grande, Arizona to be the first full-scale “Water recovery and reuse facility” in U.S. Annually, this plant will save more than 140,000,000 gallons of fresh water in state of Arizona.

The objective of this project was to identify the most viable technology that can convert food process water into high quality water for reuse at food manufacturing plants. The water at Frito-Lay sites is used to move and wash potatoes, wash corn, clean equipment, wash floors and for other cleaning and production needs. The quality of the water, which is used at Frito-Lay production facilities, must meet US EPA primary and secondary drinking water standards.

Methodology and Results:

During the phase one of the project, Frito-Lay environmental technical staff evaluated different types of water recovery and reuse technologies in the water markets including membrane filtration systems. During this study, different types of membranes including polymeric, ceramic and stainless steel membranes were evaluated and tested.

During phase two of this project Frito-Lay completed seven months of pilot study to treat process water for reuse and recycling. During this pilot study physical, chemical and biological characteristics (e.g. BOD, COD, TSS, TKN, NO₃, TN, PO₄, pH, Temp, FOG, Color, Taste & Odor, TDS, TOC, SDI, Temp.,) of raw process water, MBR permeate and NF permeates as well as operational parameters were measured and monitored. The pilot study was successful and clearly proved that utilizing combined MBR-NF can produce drinking water quality which can exceed U.S. EPA primary and drinking water standards.

The final phase, which was designing and construction of the full scale water recovery and reuse system. The project construction was completed and the plant started operating in summer of 2010. The design flow for this system is 650,000 gallons per day and 5700

milligram per liter COD loading. This water recovery facility treats most of daily process water and recycles 75% of the plant's water demands.

This is the first industrial water recovery and reuse plant in the United States which converts process water into drinking water quality for direct reuse in food processing.

This presentation will discuss the technologies selected and used, design and construction perspectives, lessons learned and demonstrate the applicability of these processes for water reuse.

Professional Background:

Al Goodman is a Principal with CDM Smith working on developing and completing industrial wastewater treatment and reuse projects and is based in the Louisville, KY area. He has been President of his own environmental consulting firm for 20 years prior to selling it to CDM. He has 38 years of wastewater experience including design, plant operations, industrial treatment, operations training and troubleshooting and expert litigation.

He is also Past President of the international Water Environment Federation with 40,000 members worldwide, and Past President of the Indiana Water Environment Association.

He served as Past President of several other professional environmental organizations and chaired over 14 wastewater and environmental committees.

Al has his college degree in chemistry, and is an Indiana and Kentucky certified wastewater plant operator at the highest levels. He is a registered Professional Engineer in 3 states, and a licensed Indiana plumber.