FIGURE 1. Graphical summary of mass spectrometer/gas chromatograph analysis of air samples collected around the two total energy recovery media types tested in Phase 1 at the Stever House dormitory. As shown, the 3Å media limited contaminant carry-over and resulted in a 35% cleaner indoor environment for a given ventilation rate. The silica gel wheel compromised the resultant indoor air quality due to high percentage of contaminant transfer which significantly reduced the ventilation effectiveness.

Phase 1: Stever House Data Comparing Air Quality with SEMCO 3Å and Silica Gel Wheels Retrofitted in Original Wheel Casing

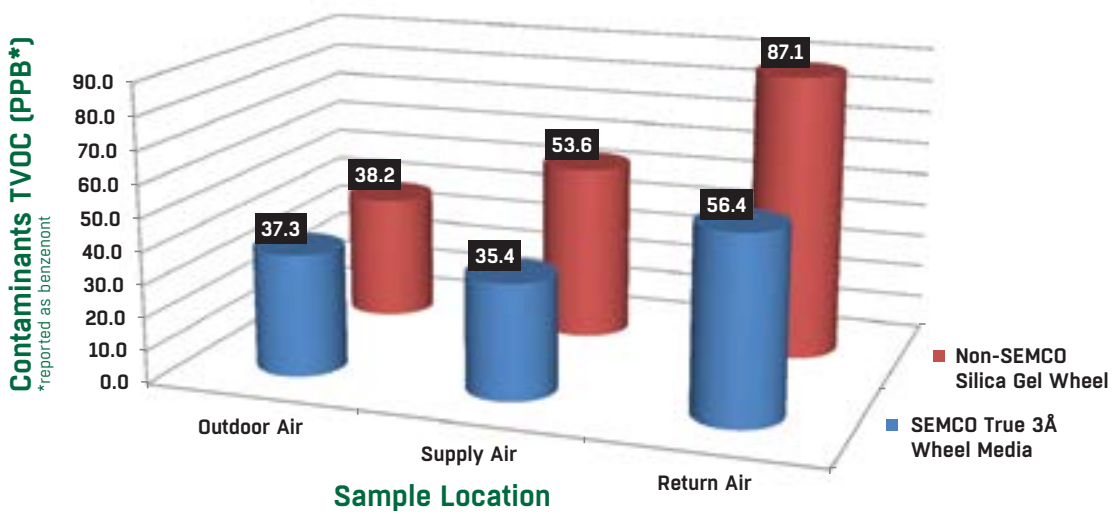

TABLE 1. CMU Stever House Facility - IAQ and Total Energy Wheel Carryover Research (Phase 1). Investigation of Two Wheel Media Types at Site - 3Å Molecular Sieve and Silica Gel. Date: June 2007

Mass Spec/GC Data	Outdoor Air Stream	Supply Air Stream	Return Air Stream	Comments
Wheel 1: Silica Gel				
TVOC from sample tubes mass spec/GC analysis (reported as benzene)	38.2 ppb	53.6 ppb	87.1 ppb	Identical to wheel 2 except silica gel desiccant is used in lieu of the molecular sieve
Wheel 2: 3Å Molecular Sieve				
TVOC from sample tubes mass spec/GC analysis (reported as benzene)	37.3 ppb	35.4 ppb	56.4 ppb	Identical to wheel 1 except 3Å molecular sieve desiccant is used in lieu of silica gel
Summary of Findings				
	Silica Gel	**3Å Molecular Sieve**		**Comments**
TVOC Contaminant wheel Carry-over Measured % [1]	31%	None detectable		Identical to wheel 1 except 3Å molecular sieve desiccant is used in lieu of silica gel
Supply air quality delivered to space	53.6 ppb	35.4 ppb		Silica gel wheel increases contaminants in the outdoor air by 37% while 3Å wheel does not [2]
Resulting indoor air quality level	87.1 ppb	56.4 ppb		The 3Å wheel resulted in a 36% better indoor environment using the same outdoor air volume [3,4]

Note 1: Carry-over percentage is calculated using the following contaminant levels: (Supply - Outdoor)/(Return - Outdoor)
Note 2: This increase is not desired since it compromises the indoor air quality and requires more outdoor air to reach the desired IAQ
Note 3: As expected, the higher supply air contaminant concentration associated with the silica gel wheel decreased this indoor air quality
Note 4: These results support the results of GTRI chamber testing (see GTRI report on desiccant carry-over and ventilation effectiveness)