# The Treatment of Synthetic Organic Pollutants by the Solar Aquatics Wastewater Treatment System, Providence RI

by
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**Abstract:**

Analysis was done for the presence of the volatile organic compounds (VOCs) trichloroethylene (TCE) and tetrachloroethylene (TETRA) in the influent, effluent, first tank, third tank, and sludge settling tank of line B in the Providence Solar Aquatics experimental wastewater treatment facility (PSAS). Samples were taken over a three day period (3/29/94-3/31/94) at 12 hour intervals to correspond to the 12 hour detention time of each tank. The use of a portable, highly sensitive, ambient temperature Photovac_ 10s plus gas chromatograph allowed for immediate field testing of water samples by head space analysis. Average time from sampling to analysis was 90 seconds. Analysis demonstrated that overall, both compounds were removed to +90% by the third tank of the system. While calibration difficulties and time constraints limited the qualitative analysis to two relatively distinct chromatographic peaks, the presence of other compounds was also noted. As measured by peak area, these compounds were also reduced to +90% by the third tank in the system. Two unknown peaks were consistently distinct in the sludge present in the settling sixth tank. These two peaks were the largest recorded throughout the course of the analysis and were also found in the supernatant above the sludge and later parts of the Solar Aquatics system. The later eluting of the two peaks was identified as toluene in a concentration range of 100 - 200 ppb in the sludge of the sixth tank. Experimentation and field data thus suggest that during the three day experimental period, the wastewater flow through the Solar Aquatics system was purified of volatile organics in the first five tanks then dirtied in the sixth tank by the leaching of sedimented toluene back into the waste stream. Final removal efficiencies for VOCs were better than those achieved by the Field's Point conventional treatment facility at approximately 99% removal for both TETRA and TCE (as compared to 80%).