

**COMPARISON OF SIEMENS TO KECO METHODS
BY EXXONMOBIL**

The following test results compares the Siemens stripper to the Keco membrane transfer for sample preparation with a common GC read-out.

The data is adjusted for span differences to compare results.

<u>SAMPLE:</u>	<u>WATER TEMPERATURE:</u>	<u>SIEMENS STRIPPER RESPONSE</u>	<u>KECO MEMBRANE TRANSFER RESPONSE:</u>
ISOPRENE	AMBIENT 55 DEGREES C.	6.7 PPB 36.9	8.3 PPB 40.1
ETHYLENE	AMBIENT 55 DEGREES C	9.4 12.3	6.3 10.6
BENZENE	AMBIENT 55 DEGREES C	61.8	35.2
PROPANE	AMBIENT 55 DEGREES C	13.6 11.25	15.7 11.5
METHYL CHLORIDE	AMBIENT 55 DEGREES C	23.1 26.0	20.6 19.5
ISO-BUTYLENE	AMBIENT 55 DEGREES	29.7 40.4	28.0 40.8

This data is especially significant in that it was obtained under real life conditions on process cooling water that was spiked by adding hydrocarbons at a point near the heat exchangers.

The Keco membrane Sample Transfer (MST) can be used with a GC or with a Solid state Read-out, both of which measure from 1 PPBw to percent ranges.

In this comparison of the Siemens Sparger System to the Analytical Systems Int'l. /Keco Model 204 Sample Transfer Stripper (STS) the two methods

average readings are within 4.5 ppb w of each other.

Basic Principles for Measurement of Cooling Tower Water

1. Does the Sample Transfer Stripper (Patented Membrane Technology) and El Paso Method have comparable readings?
Yes, because both operate under Henry's law and Dalton's law.

Henry's law "the mass of gas that dissolves in a given mass of liquid is directly proportional to the partial pressure". Also the rate of permeation through a membrane is directly proportional to partial pressure. This means that both the El Paso method and the Membrane Sample Transfer results will be the same on cooling water towers.

Dalton's law of partial pressure "if a mixture of two or more gases in contact with a liquid, each gas obeys Henry's law as though the other were absent. This means that each of several VOC's will read at its true value even in the presence of other compounds.

2. What is the stripping efficiency of the Sample Transfer Stripper (Membrane Technology)?
Temperature and pressure are held constant and by measuring a reference standard of the compound of interest (perm tube tm sample) the end-adjusting span to this ppbv the readout number is in ppb w directly. Stripping efficiency is not a consideration as readout is in ppb w in the sample. The permeation tube readout also validates the analyzer operations.