

Socrates

Customer night-use and leakage analyser

Socrates is an instrument for analysing night-flows, legitimate customer use and leakage in water distribution systems. Socrates uses patented, autocorrelation plus artefact filtering techniques to carry out accurate surveys of District Meter Areas.

Applications

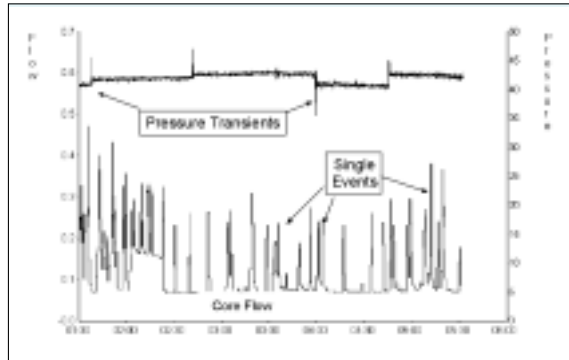
- **Troubleshooting District Meter Areas**
Socrates probes deep into night-flows to reveal the lowest baseline flows, focusing leakage engineers towards real areas of high leakage. This is very useful in District Metering Areas with trade users who are using water intermittently.
- **Accurate customer night use determination**
Seasonally accurate customer night use data is important. Inaccurate data will result in leakage levels being both wrongly assessed and wrongly reported. This can lead to major inefficiencies as valuable leakage reduction resources are deployed to the wrong areas.
- **Realistic estimation of leakage**
Socrates forms a statistical model over several weeks. On larger District Metering Areas the baseline leakage is deduced from this information.



Daily plot of minimum night-flows. *Socrates* shows true minimum flow and separates out trade flows. High night flow is due to usage and not leakage

Socrates measures minimum night-flows accurately

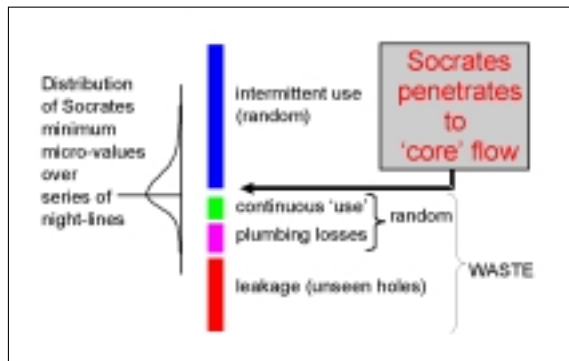
Socrates collects thousands of data values per night. After removing measurement system error the data is autocorrelated to find its micro-period - the shortest period over which values must be averaged to remove extraneous hydraulic effects such as oscillations and surges. This reduces the raw data to typically 500 *micro-period values* which show the details of the night flow.



Intermittent events (toilet flushes, etc.) superimposed on the core-flow

Conventionally, averaged minimum flow data is collected (typically 15 minute averages) and from this a fixed estimate of night-use is subtracted. However, night-use varies! Fixed values can never reflect the changing conditions that actually prevail on site.

In small District Meter Areas the night flow comprises intermittent user events, such as toilet flushes, superimposed on a core flow level which will be very close to the actual leakage level. *Socrates* penetrates to the core flow.



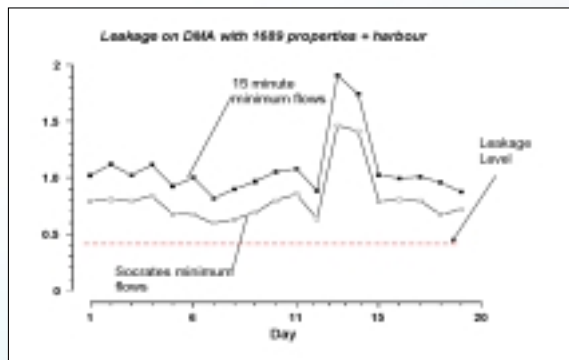
Components of core-flow in small, domestic only, District Metering Areas

Customer Night Use

In small District Meters Areas the minimum nightly *micro-period values* vary about mean levels and the distribution of these values indicates the likely position where random use becomes insignificant. This allows the determination of steady state leakage and legitimate night use.

Determination of Leakage

In District Meter Areas with larger numbers of properties the user events merge together to prevent *Socrates* penetrating to the core flow. This effect is termed penetration error and this is proportional to property count. The *Socrates* statistical method incorporates penetration error to determine leakage in larger District Meter Areas.



Socrates unique statistical method estimates leakage at District Metering Area level

Part Number

Socrates Leakage Analyser

SXG 102