Tentatively Identified Compounds
What are they and why are they important?

What are TICs?
Tentatively Identified Compounds (TICs) are another tool used by EPA to characterize hazardous sites. TIC analysis is a useful tool that can aid in clean-up or treatment decisions by identifying compounds that might otherwise be missed at the site. The "Target Compounds List" or parameter is a fixed set of compounds. Chemicals observed in the analysis, but not on the "Target Compound List" are referred to as unknown compounds.

How does EPA analyze for TICs?

The identification is not considered “absolute” or “confirmed” until a known standard for the suspect compound can be analyzed on the same instrument which made the tentative identification.

The method used to identify organic compounds in environmental samples is Mass Spectrometry. The GC/MS software includes a library of over 250,000 compounds. When the library is searched for the unknown compound, it can frequently give a tentative identification to the unknown; hence the name Tentatively Identified Compound – TIC. Extending the analysis to 250,000 compounds from a handful is the advantage of using GC/MS. Sometimes the TIC is only identified as a class of compounds (e.g., alkane). The reported concentration for a TIC is always an estimate where the identity can not be confirmed without further investigation. In a data validation report the TIC results will be qualified as estimated (“J” qualifier code).

How do I ensure that TICs are included with my analytical request?
The requirement for reporting of TICs needs to be incorporated into the Quality Assurance Project Plan or Sampling and Analysis Plan for every project which uses GC/MS. When requesting analytical services the laboratory needs to be instructed to include TICs as part of their reporting package. Additional costs may be incurred but should not be substantial.

If you are submitting a request through EPA Region III (analytical services request) you will need to indicate on the request form that TICs are needed.

Reporting TICs for non-GC-MS methods is not available. However, the non-target peaks can be reported for chromatographic methods but must be requested prior to analysis. The requirements for these requests need to be outlined in the Quality Assurance Project Plan.

Who should review TICs?
Because of the uncertainty of the identification of the TIC the interpretation of these results is difficult. TICs must be evaluated against their library “match” and requires an analytical chemist with mass spectral interpretation experience. When results are obtained through the analytical services process the TICs are evaluated during the data validation process.

When is it really necessary to include TICs with the results?

Using the history of site investigations can reveal examples of unconventional contaminants that are not target compounds in the usual test methods. Examples could include: 1,4-dioxane, a commonly used solvent (measured by Method 8260 or 8270 but with method modifications), glycol ethers, and methyl-*tert*-butyl ether (MTBE). It is usually best to require the reporting of TICs if a site is uncharacterized and there is a reasonable probability of contamination with unconventional pollutants.

If a TIC is discovered what should I do next?

In most cases, when a TIC is discovered the same method can be used to specifically identify that particular TIC. A standard can be introduced and compared to the sample result. If a match is evident then the TIC can be added as part of the target compound list for future samples with minimal additional cost. If the TIC is only identified as a particular class of compounds then the laboratory will need to conduct further investigations to determine the identity of that particular compound. This process can be costly and results can be inconclusive. However, sometimes knowing the class of compounds present can aid clean-up or treatment decisions.

For more information about TICs please email the Quality Assurance Team at:
R3 ESC-QA@epa.gov.