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September 24, 2007

Daniel Hautman  
Drinking Water, Technical Support Center (MS140)  
26 W. Martin Luther King Dr.  
Cincinnati, OH 45268

Dear Mr. Hautman:

From time to time we are asked about the requirement for, and the choice of, a surrogate compound when using EPA Method 300.1. Accordingly, I have created the accompanying document that I hope will accurately represent the EPA's position on this surrogate issue.

I would appreciate it if you would review this document and give me your opinion on its accuracy and adequacy relative to the requirements of EPA Method 300.1.

Robert J. Joyce

A handwritten signature in cursive script that reads 'Robert J. Joyce'.

Consultant,  
Dionex Corporation

Attachment: EPA Method 300.1 and the Surrogate Requirement

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Cincinnati, OH 45268



Office of Ground Water and Drinking Water  
Technical Support Center  
September 24, 2007

Robert J. Joyce  
Dionex Corp.  
1228 Titan Way  
Sunnyvale, CA 94088-3603

Dear Mr. Joyce:

I reviewed your document attached to a September 24, 2007 memo entitled, "EPA Method 300.1 and the Surrogate Requirement." I find the content accurately and adequately address the requirements of EPA Method 300.1. Method 300.1 was released in 1997, and was written to respect advances in column technologies and their corresponding required eluents (see Section 9.4.5). Consistent with this allowance, laboratories may select an alternate surrogate to meet the quality control requirements (see Section 9) once these new column and eluent systems are employed. Careful consideration of potential co-eluting anions must be made, as your document indicates, whenever an alternate surrogate is being considered. Feel free to contact me if you wish to discuss this issue further.

Daniel P. Hautman

A handwritten signature in black ink that reads "Daniel P. Hautman".

Chemist  
USEPA, TSC (MS 140)  
26 W. Martin Luther King Dr.  
Cincinnati, Ohio 45268

## EPA Method 300.1 and the Surrogate Requirement

EPA Method 300.1, entitled *Determination of Inorganic Anions in Drinking Water by Ion Chromatography (Revision 1.0, 1997)*, requires the addition of a surrogate compound to be added to, and quantified in, each sample that is analyzed for regulatory compliance monitoring. The purpose of the surrogate is to help ensure the quality of the resulting analysis. The surrogate is used to confirm that the desired sample volume has been injected and also provides a check on retention time variation. The surrogate is not used as an internal standard and, therefore, is not used to determine the concentration of the analytes quantified by the Method.

Method 300.1 specifies a Dionex AS9-HC IonPac<sup>®</sup> column set and a carbonate eluent. This Method recommends dichloroacetic acid as the surrogate compound to be used. This compound meets the general requirements of a surrogate, which are:

- Commercially available at a defined purity (e.g., 99% pure)
- Stable in solution, when properly stored (e.g., 1 month)
- Eluted and detected during the course the IC method used, but does not coelute with other chromatographed analytes
- Not normally found in the water samples analyzed at a concentration that would defeat the purpose of its use. If there is a chance that the surrogate compound could sometimes be present in the native sample matrix, the surrogate must be added to the sample at a high enough concentration, such that its response will

not be significantly affected by concentration variation of the naturally occurring compound (e.g., < 5% native matrix concentration)

***It should be noted that an alternate surrogate may sometimes be needed to meet the requirements cited above.***

The use of the Dionex IonPac AS19 IonPac column, with a hydroxide eluent, has been judged as a suitable alternate to the AS9-HC column for compliance monitoring, when using Method 300.1. In this case, dichloroacetic acid does not meet the surrogate non-coelution requirement. It has been found that trichloroacetic acid meets all of the surrogate requirements cited above. The use of this compound as a surrogate in 300.1 is described in the AS19 column user's manual.

Another column that is recommended for regulatory compliance monitoring of oxyhalides, using Method 300.1, is the Dionex AS23 IonPac column, in combination with a hydroxide eluent. In this case, malonic acid is the recommended surrogate.

When using Method 300.1 for regulatory compliance monitoring the following should be kept in mind:

- Method 300.1 requires that a surrogate be used
- The choice of surrogate used is optional, but must meet the requirements outlined above
- The analyst is free to select the surrogate most suitable for use and does not need to get a specific EPA approval for the choice. However, the laboratory must maintain data to show that the alternate surrogate used meets the requirements outlined above