

# THE NEW NJDEP MODIFIED LOW LEVEL TO-15 METHOD: A LABORATORY'S EXPERIENCE OF DEVELOPING AND SUPPORTING NJ LOW LEVEL MODIFIED TO-15

## Authors:

Bryce E. Stearns, TestAmerica Laboratories, Inc.  
Chris Anderson, TestAmerica Laboratories, Inc.  
Will Elcoate, TestAmerica Laboratories, Inc.

## INTRODUCTION

In October 2005 NJDEP published their "Vapor Intrusion Guidance" incorporated into the Guidance was VOC analysis by USEPA Method TO-15 "The Determination of Volatile Organic Compounds in Air Collected in Specially-Prepared Canisters and Analyzed by GC/MS". NJDEP required that data submitted met NJDEP Certification requirements.

In the discussion related to the release of the 2005 Guidance NJDEP announced that there would be periodic updates of the Guidance as technology & science advances:

"The current document along with updates to the screening levels and other sections of the document are, or will be, presented on the Department's web site at [www.state.nj.us/dep/srp/guidance/vaporintrusion/](http://www.state.nj.us/dep/srp/guidance/vaporintrusion/). It is recommended that interested parties refer to the NJDEP web site to ensure that they are using the most current information in the evaluation of a site."

In March 2007 the NJDEP announced the first significant change that will directly impact laboratories certified to report VOCs by TO-15 in the State of New Jersey.

## FROM THE WEBPAGE

### Notice: New Low Level Air Analysis Method Required by the NJDEP's Site Remediation and Waste Management Program (SRWM)

The NJDEP Site Remediation Waste Management Program has developed criteria for a Low Level Volatile Organics Method for air sampling and analysis that will be used in place of USEPA Method TO-15. The new method is designated as NJDEP-SRWM Low Level USEPA Method TO-15, March 2007 (NJDEP-LLTO-15-3/2007). The specific details of the new method requirements are given in the following three documents:

1. NJDEP Modified Low Level TO-15 Method (NJDEP-LLTO-15-3/2007)
2. NJDEP Ambient Air Regulatory Data Report Format (Appendix 1)
3. Method NJDEP-LLTO-15-3/2007 Data Reporting Spreadsheet

These documents can be obtained directly from the NJDEP's Office of Quality Assurance website at: <http://www.nj.gov/dep/oqa/bboard.html#new>.

## PURPOSE

NJDEP has developed the low level method to address the needs of the various programs of the department. This Method entitled "NJDEP-SRWM Low Level USEPA Method TO-15 March 2007 (NJDEP-LLTO-15-3/2007)" requires the laboratory to follow the requirements of USEPA Method TO-15 with the incorporation of the NJDEP modifications listed below. If there is a difference between the USEPA method and the NJDEP requirements, the NJDEP requirements override the USEPA method requirements.

### NJDEP Listed Modifications

The modifications to the method include the following:

- Holding times
- Method detection limits
- Reporting limits
- Clean canister certification levels
- GC/MS tuning and instrument performance check requirements
- GC/MS techniques
- Standard type and concentrations
- Initial and continuing calibration standards
- Laboratory control samples
- Limitation regarding the source of make up air

**Story:** Our Burlington Laboratory has a long history of providing chemistry support for NJDEP environmental programs. On the announcement of the new method they reviewed the requirements, submitted a list of questions and comments, and started evaluating the changes that would be needed to support the new method.

Although they were already running lower reporting limits and humidified zero air, the increased QA/QC requirements required significant changes to the standard operation procedures for USEPA Method TO-15. The first major realization was that the current procedures would not support the NJDEP Low Level Method and a completely new standard operating procedure would need to be developed.

Instruments were dedicated and the initial demonstration capability, MDL study and development of compliant protocols were discussed and developed throughout the Volatile Air Group.

As the method was developed it became evident that the requirements provided the following challenges:

## HIGHLIGHTS

- Reporting Limits at 0.2 ppbv for most compounds
- 15 day holding time for canister use, 30 day analytical (no change)
- The canister must be prepared and analyzed by the same laboratory
- Ultra pure zero air for all make-up volumes, not nitrogen
- Blank Spike at 0.2 ppbv for most compounds (reporting limit blank spike) in every batch
- Opening and Closing Calibration Verifications
- Only certified gaseous standard material
- Very prescriptive data package and electronic deliverable elements
- Only full scan GC/MS

## CHALLENGES

Lower reporting limits help support risk objectives but place greater demands on the analytical lab from calibration and method detection limit study through to canister cleaning and certification.

Establishing a holding time for canisters in the field provides for better control and greater confidence in viability and quality of the sampling media

Use of zero air requirements provides additional consistency across the analytical system and more truly mimics the "routine" sample matrix of ambient indoor air

Blank spike at the reporting limit - provides increased confidence at low levels

Closing calibration brackets analytical results and better defines system response on a compound by compound basis

Meeting prescriptive data package requirements

## PERFORMANCE

TestAmerica Burlington has an extensive history of performance in providing high quality TO-15 results to programs supporting work in the State of New Jersey that meets or exceeds requirements put forth by NJDEP OQA. This new method represents another opportunity for TestAmerica Burlington to provide quality data. The TestAmerica Burlington Laboratory has already received certification and is supporting a large project in Northern New Jersey.

## CONCLUSION

In the process of developing the method we have changed our operating practices to support the New Low Level Modified TO-15. The requirements exceed the requirements set forth in USEPA Method TO-15 which allows us to support both methods through out the laboratory.

The method provides an increased confidence in the quality of the data.

The additional quality control requirements and reporting of TICs does require an increased level of effort by the laboratory staff.

## REFERENCE

New Jersey Department of Environmental Protection Division of Remediation Management Response Site Remediation & Waste Management Program NJDEP-SRWM Low Level USEPA TO-15 Method (NJDEP-LLTO-15-3/2007) March 2007  
<http://www.state.nj.us/dep/srp/guidance/vaporintrusion/newmethod2007/llto15.pdf>



### New Low Level TO-15 Calibration Summary

Analyte	RRF	% RSD
Dichlorodifluoromethane	4.44373	8.113
1,2-Dichlorotetrafluoroethane	4.20408	6.018
Chloromethane	0.90654	5.673
Vinyl chloride	1.19785	5.443
1,3-Butadiene	0.85138	6.488
Bromomethane	1.25858	5.388
Chloroethane	0.63382	5.005
Vinyl bromide	1.16707	2.469
Trichlorofluoromethane	4.50617	5.799
1,1,2-Trichloro-1,2,2-trifluoroethane	2.65383	3.063
1,1-Dichloroethene	1.10938	4.139
Acetone	1.57959	13.777
Isopropanol	0.93687	22.882
Carbon disulfide	3.10371	5.018
Allyl chloride	1.36658	4.394
Methylene chloride	1.30125	15.618
Tertbutyl alcohol	1.59932	20.882
Methyl tertbutyl ether	3.22016	9.338
1,2-Dichloroethene (trans)	1.88855	4.11
n-Hexane	1.74331	4.167
1,1-Dichloroethane	2.29857	4.549
Methyl ethyl ketone	0.4291	12.049
1,2-Dichloroethene (cis)	1.34289	3.005
Tetrahydrofuran	0.18564	9.941
Chloroform	3.21772	5.076
1,1,1-Trichloroethane	0.74588	5.61
Cyclohexane	0.35565	8.765
Carbon tetrachloride	0.78529	4.789
2,2,4-Trimethylpentane	1.06358	6.03
Benzene	0.69999	5.208
1,2-Dichloroethane	0.47128	4.701

Analyte	RRF	% RSD
n-Heptane	0.414	6.244
Trichloroethene	0.37743	6.515
Methyl methacrylate	0.18655	22.783
1,2-Dichloropropane	0.23539	5.135
1,4-Dioxane	0.07091	31.749
Bromodichloromethane	0.67921	3.869
1,3-Dichloropropene (cis)	0.41146	8.449
Methyl isobutyl ketone	0.39718	17.069
Toluene	0.55107	4.551
1,3-Dichloropropene (trans)	0.45286	9.552
1,1,2-Trichloroethane	0.25115	6.201
Tetrachloroethene	0.60914	3.325
Dibromochloromethane	0.68916	2.914
1,2-Dibromoethane	0.51199	4.816
Chlorobenzene	0.85299	3.108
Ethylbenzene	1.27594	3.016
Xylene (m,p)	0.49411	6.139
Xylene (o)	0.48393	3.225
Styrene	0.73944	11.364
Bromoform	0.66519	7.031
1,1,2,2-Tetrachloroethane	0.60042	5.391
4-Ethyltoluene	1.34403	20.663
1,3,5-Trimethylbenzene	1.24352	5.85
2-Chlorotoluene	1.19832	4.493
1,2,4-Trimethylbenzene	1.07735	17.251
1,3-Dichlorobenzene	0.85288	10.398
1,4-Dichlorobenzene	0.85573	9.019
1,2-Dichlorobenzene	0.78749	10.788
1,2,4-Trichlorobenzene	0.44392	16.705
1,3-Hexachlorobutadiene	0.44211	14.646

### New Low Level TO-15 Method Reporting and Detection Limits

ANALYTE	RL ppbv	vMDL ppbv
Dichlorodifluoromethane	0.50	0.021
1,2-Dichlorotetrafluoroethane	0.20	0.024
Chloromethane	0.50	0.029
Vinyl chloride	0.20	0.025
1,3-Butadiene	0.20	0.052
Bromomethane	0.20	0.029
Chloroethane	0.50	0.023
Vinyl bromide	0.20	0.026
Trichlorofluoromethane	0.20	0.023
Acetone	5.0	0.38
1,1,2-Trichloro-1,2,2-trifluoroethane	0.20	0.025
1,1-Dichloroethene	0.20	0.039
Isopropanol	5.0	0.10
Carbon disulfide	0.50	0.11
Allyl chloride	0.20	0.035
Methylene chloride	0.50	0.020
Tert-butyl alcohol	5.0	0.034
Methyl tert-butyl ether	0.20	0.035
1,2-Dichloroethene (trans)	0.20	0.035
n-Hexane	0.20	0.027
1,1-Dichloroethane	0.20	0.022
Methyl ethyl ketone	0.50	0.055
1,2-Dichloroethene (cis)	0.20	0.020
Tetrahydrofuran	5.0	0.15
Chloroform	0.20	0.028
1,1,1-Trichloroethane	0.20	0.023
Cyclohexane	0.20	0.024
Carbon tetrachloride	0.20	0.023
2,2,4-Trimethylpentane	0.20	0.020
Benzene	0.20	0.035
1,2-Dichloroethane	0.20	0.023

ANALYTE	RL ppbv	vMDL ppbv
n-Heptane	0.20	0.026
Trichloroethene	0.20	0.025
Methyl methacrylate	0.50	0.034
1,2-Dichloropropane	0.20	0.042
1,4-Dioxane	5.0	0.031
Bromodichloromethane	0.20	0.030
1,3-Dichloropropene (cis)	0.20	0.041
Methyl isobutyl ketone	0.50	0.033
Toluene	0.20	0.021
1,3-Dichloropropene (trans)	0.20	0.048
1,1,2-Trichloroethane	0.20	0.030
Tetrachloroethene	0.20	0.018
Dibromochloromethane	0.20	0.026
1,2-Dibromoethane	0.20	0.030
Chlorobenzene	0.20	0.022
Ethylbenzene	0.20	0.021
Xylene (m,p)	0.50	0.062
Xylene (o)	0.20	0.029
Styrene	0.20	0.036
Bromoform	0.20	0.025
1,1,2,2-Tetrachloroethane	0.20	0.031
4-Ethyltoluene	0.20	0.045
1,3,5-Trimethylbenzene	0.20	0.057
2-Chlorotoluene	0.20	0.025
1,2,4-Trimethylbenzene	0.20	0.042
1,3-Dichlorobenzene	0.20	0.036
1,4-Dichlorobenzene	0.20	0.040
1,2-Dichlorobenzene	0.20	0.045
1,2,4-Trichlorobenzene	0.50	0.10
1,3-Hexachlorobutadiene	0.20	0.11