PAMSGRAM

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*The **PAMSGRAM** is a FAXED notice for State and Local air pollution control agencies which highlights issues meriting attention by PAMS monitoring staff.*

Changes to the Target List for 98 PAMS

The recommended PAMS target list for the 1998 season is given in Table 1. One minor change has been made to the list: the removal of 2-methyl-1-pentene. The retention time and calibration cylinders distributed to PAMS for FY97 and FY98 reflect this change and also include the addition of 1-hexene and dodecane as retention time markers only. These compounds are not additions to the target list; however, these compounds may be quantitated at the discretion of the PAMS states and regions. Some background information regarding the history of the target list and rationale for the changes made to date is included below.

For the purposes of PAMS, the term VOC refers to gaseous aliphatic and aromatic nonmethane organic compounds that have a vapor pressure greater than 0.14 mm Hg at 25°C, and generally have a carbon number in the range of C_2 through C_{12}. Many of these compounds play a role in the photochemical formation of ozone in the atmosphere. Table 1 presents the recommended target VOCs measured to satisfy the requirements of 40 CFR Part 58, Subpart E. Users should consider these target compounds in development of the measurement and monitoring approach for PAMS and initially report these compounds to the AIRS-AQS. These VOCs were selected primarily based on their abundance in urban atmospheres and their potential role in the formation of ozone. Polar compounds are not included due to their surface absorption characteristics and potential difficulties experienced when measuring these compounds using the methodology described in the Technical Assistance Document (TAD) for Sampling and Analysis of Ozone Precursors, EPA600/8-91-215. The methodology in the TAD is designed to measure the more abundant nonpolar hydrocarbons or VOCs.

It is important to note that the target list is not definitive or all encompassing, but should be used as a guide for implementation of PAMS to evolve as the program matures and develops. As experience is gained in the collection of data regarding the abundance of specific VOCs at each site, target compounds may be deleted or added depending on the frequency of occurrence. If additional compounds are identified and occur at high frequency, they may be added to the target list. When new compounds are added to the list, it is important to verify the compound identification and retention time using gaseous calibration standards. PAMS agencies should report any such changes to their list of target compounds to the appropriate regional office.

The initial PAMS target list recommended for program implementation was originally based on the pollutant list used during the U.S. EPA sponsored 1990 Atlanta field study.[1,2,3] The primary objectives of the Atlanta study were to address the measurement of ozone and ozone precursors and obtain a comprehensive, quality assured data base for nonmethane organic species, nitrogen oxides, ozone and meteorological variables. One of the criteria used to select the target list for the Atlanta study was the reactivity of the compound in the formation of ozone.

The PAMS target list was revised in 1994 based on recommendations from the U.S. EPA, Office of Research and Development (ORD). ORD recommended the replacement of six less abundant olefins with six more abundant aromatic compounds. This recommendation was based on the typical atmospheric abundance of paraffins, olefins, and aromatics in the atmosphere. This change was made for the 1995 PAMS season.

In 1997, a recommendation was made by a PAMS regional contact to remove 2-methyl-1-pentene from the target list due to the instability of this compound in the retention time cylinders. This instability was also noted in 1994 during PAMS cylinder verification analyses by ORD. This recommendation also included the suggestion to add 1-hexene as a retention time replacement for those users who operate automated GC systems with a Dean's® switch in order to verify its operation. Late in 1997, the PAMS Measurements Work Group of technical experts agreed to remove 2-methyl-1-pentene from the recommended target list and to add both 1-hexene and dodecane for retention time purposes only. The decision was based on the instability of the compound in the retention time cylinders and the inherent difficulty of measuring this compound in ambient air using the PAMS measurement methodology. Dodecane was added as a means to allow users to verify the recovery of C_{12} compounds from their systems. The recovery of C_{12} compounds is important for total NMOC determination. Both 1-hexene and dodecane are not part of the PAMS recommended target list but may be quantitated at the discretion of the user.

[1] Holdren, M.W.; Smith, D.L. "Performance of Automated Gas Chromatographs Used in the 1990 Atlanta Study"; in Proceedings of the 1991 U.S. EPA/A&WMA International Symposium on Measurement of Toxic and Related Air Pollutants; Air and Waste Management Association, Pittsburgh, 1991.

[2] Lonneman, W.A.; Seila, R.L; Daughtridge, J.V.; Richter, H.G. "Results from the Canister Sampling Program Conducted During the 1990 Atlanta Precursor Study"; in Proceedings of the 84th Air & Waste Management Association Annual meeting, Vancouver, BC, Canada, 1991; Paper No. 91-68-2.

[3] Shreffler, J.H. "Comparison of Non-Methane Organic Compound Concentration Data Collected by Two Methods in Atlanta," *J. Air & Waste Manage. Assoc.* 1993, 43, 1576.

Table 1. PAMS Target Volatile Organic Compounds

AIRS Parameter Code	Target Compound Name	AIRS Parameter Code	Target Compound Name
43203	Ethylene	43249	3-Methylhexane
43206	Acetylene	43250	2,2,4-Trimethylpentane (Isooctane)
43202	Ethane	43232	*n*-Heptane
43205	Propylene	43261	Methylcyclohexane
43204	Propane	43252	2,3,4-Trimethylpentane
43214	Isobutane	45202	Toluene
43280	1-Butene	43960	2-Methylheptane
43212	*n*-Butane	43253	3-Methylheptane
43216	*trans*-2-Butene	43233	*n*-Octane
43217	*cis*-2-Butene	45203	Ethylbenzene
43221	Isopentane	45109	*m/p*-Xylene
43224	1-Pentene	45220	Styrene
43220	*n*-Pentane	45204	*o*-Xylene
43243	Isoprene (2-Methyl-1,3-Butadiene)	43235	*n*-Nonane
43226	*trans*-2-Pentene	45210	Isopropylbenzene
43227	*cis*-2-Pentene	45209	*n*-Propylbenzene
43244	2,2-Dimethylbutane	45212	*m*-Ethyltoluene (1-Ethyl-3-Methylbenzene)
43242	Cyclopentane	45213	*p*-Ethyltoluene (1-Ethyl-4-Methylbenzene)
43284	2,3-Dimethylbutane	45207	1,3,5-Trimethylbenzene
43285	2-Methylpentane	45211	*o*-Ethyltoluene (1-Ethyl-2-Methylbenzene)
43230	3-Methylpentane	45208	1,2,4-Trimethylbenzene
43245	**1-Hexene***	43238	*n*-Decane
43231	*n*-Hexane	45225	1,2,3-Trimethylbenzene
43262	Methylcyclopentane	45218	*m*-Diethylbenzene
43247	2,4-Dimethylpentane	45219	*p*-Diethylbenzene
45201	Benzene	43954	*n*-Undecane
43248	Cylcohexane	43141	***n*-Dodecane***
43263	2-Methylhexane	43102	TNMOC
43291	2,3-Dimethylpentane	43000	PAMHC

***** These compounds have been added as calibration and retention time standards primarily for the purpose of retention time verification. They can be quantitated at the discretion of the user.