NEW ENGLAND CERTIFICATION OFFICERS'
CHEMISTRY CHECKLIST

Laboratory Name _____

Laboratory ID _____

Date_____

DETERMINATION OF TURBIDITY BY NEPHELOMETRY. EPA METHOD 180.1, REVISION 2.0, AUGUST 1993.

S = Satisfactory U = Unsatisfactory N = Not Applicable

TURBIDITY - EPA METHOD 180.1	S	U	N	Comments
SAMPLE COLLECTION, PRESERVATION AND STORAGE				
1. Plastic or glass sample bottle rinsed with turbidity free water?				
2. Enough sample collected for replicates?				
3. Samples kept at 4 degree C from time of collection?				
4. Samples analyzed within 48 hours of collection?				
EQUIPMENT AND SUPPLIES				
1. Turbidimeter sensitive enough to measure a difference of 0.002 NTU in waters having turbidities less than 1 unit?				
2. Can the instrument measure 0-40 NTUs?				
3. Tungsten lamp light source operated at a color temperature of 2200-3300 degrees K?				
4. Does the light travel less than 10 cm in the sample tube?				
5. Detector centered to light path at 90 degrees +/- 30 degrees?				
6. Detector (and filter system) spectral peak response between 400 and 600nm?				
7. Colorless glass or plastic sample tubes free of scratches and clean (inside and out)?				
8. Tubes checked, indexed, and read at orientation that gives lowest background blank value?				
9. Analytical balance capable of weighing to nearest 0.0001 gram?				
10. Class A volumetric flasks and pipettes?				
REAGENTS AND STANDARDS				
1. Turbidity free water (passed through 0.45 micron filter)?				
2. Stock Standard Formazin components 1.00 hydrazine sulfate/100 ml reagent water. 10 gr. hexamethylenetetramine/100ml reagent water. Formazin stock standard (mix 5 mls each solution/100 ml flask).				

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3. Is the newly made Formazin stock standard allowed to stand 24 hours at 25 C +/- 3C before being brought to 100 ml mark with reagent water?				
4. Primary formazin calibration standard (40 NTUs) 10 mls stock to 100 mls with reagent water.				
5. Is stock standard prepared monthly?				
6. Are dilute turbidity standards prepared daily?				
7. AMCO-AEPA-1 styrene Divinyl benzene polymer primary standards used?				
8. Secondary standards used as a daily calibration check monitored routinely and replaced when deteriorated?				
CALIBRATION AND STANDARDIZATION				
1. Turbidimeter operated according to manufacturer?				
2. Standards covering range of interest measured?				
3. At least one standard run in each instrument range used?				
4. Are solid standards avoided?				
PROCEDURE				
1. Are samples at room temperature?				
2. Are samples mixed before analysis?				
3. Are air bubbles allowed to dissipate before pouring into the tube?				
4. Is turbidity free water used to dilute samples greater than 40 NTUs?				
DATA ANALYSIS AND CALCULATIONS.				
1. Are samples multiplied by dilution factor where appropriate?				
2. Are results reported as follows: NTU — Record to nearest 0.0-1.0 — 0.05 1-10 — 0.1 10-40 — 1				

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NTU — Record to nearest 40-100 — 5 100-400 — 10 400-1000 — 50 >1000 — 100				
QUALITY CONTROL				
Initial Demonstration Of Performance.				
1. Are QC records on file?				
2. Is the initial Linear Calibration Range (LCR) determined with enough standards to demonstrate curve linearity?				
3. Is the LCR verified with a blank and three standards when instrument response changes and every 6 months?				
4. Is the verification data within +/-10% of the initial data?				
5. Is the QCS run when beginning use of method and quarterly?				
6. Is QCS within +/-10% of stated value?				
Assessing Laboratory Performance.				
1. Laboratory Reagent Blank (LRB) analyzed with each sample batch (20 or fewer)?				
2. Instrument Performance check Solution (IPC) and calibration blank run immediately after daily calibration? After every 10th sample? At end of sample run?				
3. Is the IPC a midrange concentration standard?				
4. Is the IPC within +/-10% of true value?				
5. Are samples reanalyzed if a second IPC measurement is outside of calibration limits. (The problem must be corrected before sample reanalysis).				

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EPA METHOD 200.7, Rev. 4.4, EMMC Version
Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Emission Spectroscopy.

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EPA METHOD 200.7	S	U	N	Comments
QUALITY CONTROL				
1. Calibration Blank: Analyzed immediately following daily calibration, after every 10th sample, and at the end of the sample run? Is the calibration blank always < the analyte IDL, but > the lower 3-sigma control limit of the calibration blank?				
2. Calibration Standard (CAL): Are the calibration standards prepared fresh every two weeks? Is the Instrument calibrated daily with a minimum of a calibration blank and a high calibration standard?				
3. Instrument Detection limit (IDL): Is the IDL the concentration equivalent to the analyte signal which is equal to 3 times the standard deviation of a series of 10 replicate measurements of the calibration blank signal at the same wavelength?				
4. Method Detection limit (MDL): Is the MDL determined annually, for all wavelengths utilized, using reagent water fortified at a concentration of 2 to 3 times the estimated IDL?				
5. Laboratory Duplicates (LD1,LD2): Are a minimum of 10% of the samples analyzed as duplicates?				
6. Laboratory Fortified Blank (LFB): Is at least one LFB analyzed with each batch of samples? Is the % recovery between 85-115%?				
7. Laboratory Fortified Sample Matrix (LFM): Are a minimum of 10% of samples analyzed as LFMs? Do the LFMs have a % recovery between 70-130%?				
8. Laboratory Reagent Blank (LRB): Is at least one LRB analyzed with each batch of 20 or fewer samples? Are fresh aliquots of samples prepared if contamination is shown by a LRB value that is 10% or more of the analyte level determined for a sample or is 2.2 times the analyte MDL?				
9. Linear Dynamic Range (LDR): Is the LDR verified annually? Are sample analyte concentrations that are greater than 90%				

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EPA METHOD 200.7	S	U	N	Comments
of the upper LDR limit diluted and reanalyzed or determined by another approved method?				
10. Quality Control Sample (QCS): Are QCSs analyzed quarterly, when beginning the use of a method, and after preparation of stock or calibration standard solutions? Are the calibration standards verified by analyzing the QCS 3 times with the mean within +/- 5% of the stated values, otherwise is the problem identified and corrected?				
11. Stock Standard Solution: Are stock standards replaced when succeeding dilutions for the preparation of calibration standards cannot be verified?				
12. Digestion Procedure: Does the lab digest samples and the LRB, LFB, LFM, and LD unless the sample is being analyzed for dissolved analytes, "direct analysis", or has a turbidity < 1 NTU?				
13. Instrument Performance Check Solution (IPC): Is the IPC analyzed immediately following daily calibration, after every 10th sample, and at the end of the sample run? Does the analysis of the IPC immediately following calibration verify that the instrument is within +/- 5% of calibration with a relative standard deviation <3% from replicate integrations > or equal to 4? Are subsequent analyses of the IPC within +/- 10 % of calibration?				
14. Rinse Blank: Is the instrument flushed with the rinse blank between the standards, check solution, and samples to reduce memory effects? Are rinse times at least 60 sec between samples and standards or shown to be long enough to reduce analyte signals to within a factor or two of the method detection limit?				
SAMPLE COLLECTION, PRESERVATION, AND STORAGE				
1. Is the pH of all aqueous samples tested immediately prior to aliquoting for processing or "direct analysis" to ensure that the sample was properly preserved?				
2. If a dissolved element determination is made, is the filtering apparatus made of glass or plastic?				
3. Are samples to be analyzed for total recoverable elements acidified on site, or, if preserved in the laboratory is the sample acidified, mixed, held for 16 hours and then verified to be at pH < 2?				
INITIAL DEMONSTRATION OF PERFORMANCE				

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1. Is the upper limit of the LDR established and on file for each wavelength utilized for each analyte by determining succeedingly higher standard concentrations of the analyte until the observed analyte concentration is no more than 10% below the stated concentration of the standard?				
2. Are MDLs determined using seven replicate aliquots of fortified reagent water and processed through the entire analytical method? MDL= 3.14 X Standard Deviation of the replicate analyses.				
3. Are MDLs on file sufficient to detect analytes at the required regulatory levels?				
PROCEDURE				
1. Analyte Addition Test: Is an analyte standard added to a sample recovered within 85%-115% of the known value? If the analyte addition is <20% of the sample analyte concentration, is the dilution test utilized?				
2. Does the analyte concentration that is sufficiently high after a 1+4 dilution agree within +/- 10% of the original determination? If not, is the data flagged,or the method of standard additions, or the internal standard method utilized? Are the MSA or internal standard method used if LFM recovery is out of range?				
3. Are internal standards within range?				
4. Is a variable speed peristaltic pump used to deliver samples and standards to the nebulizer?				
5. Method of Standard Additions: Is the analytical curve linear when the method of standard additions is utilized?				
6. When the method of standard additions is used, does the chemical form of the analyte added respond in the same manner as the analyte in the sample?				
7. When the method of standard additions is used, is the interference effect constant over the working range of concern?				
8. When the method of standard additions is used, is the signal corrected for any additive interference?				
9. Is the instrument optimized using a plasma solution?				
10. For total recoverable analytes, when a 100 ml aliquot is used to produce a 50 ml final solution are analyte concentrations				

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multiplied by a dilution factor of 0.5?				
INTERFERENCES				
1. Is mercury determined only when it is determined the sample is able to be processed by "direct analysis"?				
2. Is the argon gas supply a high purity grade 99.99%?				
3. Are all acids of ultra high purity grade?				
4. Is the water used in this analysis ASTM Type I water?				
5. Are barium samples analyzed as soon as possible after digestion?				
6. Are silver samples digested due to possible chloride interference?				
7. When using a recommended wavelength from Table 1 of the method does the analyst determine and document the effect of the known interferences from Table 2 of the method and utilize an automatic computer correction for all analyses?				
8. Does the analyst determine the appropriate location for off-line background correction by scanning the area on either side adjacent to the wavelength and recording the apparent emission intensity from all other method analytes?				
9. If a wavelength other than a recommended wavelength is used, has the analyst determined and documented both on-line and off-line spectral interferences for all method analytes, and is the analyst utilizing an automatic correction routine?				
10. Are interferring elements tested on a daily basis if the correction factors (positive or negative) when multiplied by 10 (to calculate apparent analyte concentrations) exceed the determined anlayte IDL or fall below the lower 3-sigma control limit of the calibration blank.				
11. Is the complete interelement spectral interference routine verified annually and portions of the routine verified daily?				
12. When interelement corrections are not used are (SIC) Spectral Interference Check solutions or a computer program used to detect an interferant at a concentration that will produce either an apparent false positive concentration, > the analyte IDL, or a false negative analyte concentration, < the 99% lower control limit of the calibration blank. Is another wavelength or method used when the interference accounts for 10% or more of the analyte concentration?				

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EPA METHOD 524.2, Rev. 4.0
Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry.

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EPA METHOD 524.2	S	U	N	Comments
SAMPLE COLLECTION, PRESERVATION, & STORAGE				
1. Samples are collected in duplicate.				
2. Samples are preserved with ascorbic acid if the sample is chlorinated. Sodium thiosulfate may be used if gases are not to be determined.				
3. Samples are immediately preserved with 2 drops 1:1 HCl/40 mL and vigorously shaken for one minute.				
4. Samples are iced or refrigerated at 4°C until run.				
5. Standards and samples are kept in separate refrigerators.				
6. Sample holding time does not exceed 14 days.				
7. 25 mL volume is purged. (5 mL may be used if there is adequate sensitivity to reach the required MDL).				
INSTRUMENTATION				
1. GC column type:_____				
2. Trap packing:_____ _				
3. Helium purge gas flow rate is 40 mL/min.				
4. Sample purged for 11 min.				
5. Trap desorbed for 4-5 min.				
6. Trap is baked first thing in the morning (Recommended).				
7. MS ion scan range:_____				
STANDARDS				
1. A standards tracking log is kept.				

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EPA METHOD 524.2	**S**	**U**	**N**	**Comments**
2. A record of preparation of standards is kept.				
3. Gaseous standards are prepared by using [ ] gas stock or [ ] liquid stock.				
4. Fluorobenzene (internal std.)				
5. 1,2-Dichlorobenzene-d4 and Bromofluorobenzene (BFB) (surrogates).				
6. The ISTD is included in each standard calibration solution at the same concentration. (Recommend 5 µg/L for 5 mL sample; 1 µg/L for 25 mL sample).				
Calibration File:				
1. File contains all of the 524.2 compounds listed on the final report. Chloroform, Bromodichloromethane, Chlorodibromomethane, Bromoform, t-1,2,Dichloroethylene, Chlorobenzene, 1,3-Dichlorobenzene, Dichloromethane, c1,2-Dichloroethylene, 1,2-Dichlorobenzene, Dibromomethane, 1,1-Dichloropropene, Tetrachloroethylene, Toluene, p-Xylene, o-Xylene, m-Xylene, 1,1-Dichloroethane, 1,2-Dichloropropane, 1,1,2,2-Tetrachloroethane, Ethylbenzene, 1,3-Dichloropropane, Styrene, Chloromethane, Bromomethane, 1,2,3-Trichloropropane, 1,1,1,2-Tetrachloroethane, Chloroethane, 1,1,2-Trichloroethane, 2,2-Dichloropropane, o-Chlorotoluene, p-Chlorotoluene, Bromobenzene, 1,3-Dichloropropene, Benzene, Carbon Tetrachloride, 1,4-Dichlorobenzene, 1,2-Dichloroethane, 1,1-Dichloroethylene, 1,1,1-Trichloroethane, Trichloroethylene and Vinyl Chloride.				
2. Benzene, Carbon Tetrachloride, 1,4-Dichlorobenzene, 1,2-Dichloroethane, 1,1-Dichloroethylene, 1,1,1-Trichloroethane, Trichloroethylene, Vinyl Chloride, Chlorobenzene, 1,2-Dichlorobenzene, c-1,2-Dichloroethylene, t-1,2-Dichloroethylene, 1,2-Dichloropropane, Ethylbenzene, Styrene and Toluene have calculated MDLs at 0.5 µg/L or less.				
3. The calibration file also includes the unregulated compounds that are monitored by some New England states: Bromochloromethane, m-butylbenzene, Dichlorodifluoromethane, Fluorotrichloromethane, Hexachlorobutadiene, Isopropylbenzene, p-isopropyltoluene, Naphthalene, n-Propylbenzene, sec-Butylbenzene, tert-Butylbenzene, 1,2,3-Trichlorobenzene, 1,2,4-Trichlorobenzene, 1,2,4-Trimethylbenzene and 1,3,5-Trimethylbenzene.				
CALIBRATION				
1. The reporting range is _____; a ____ point calibration is run. (3 point min for a range factor of 20 in concentration. 4 point for a factor of 50 and a 5 point for a factor of 100).				
2. One calibration standard contains each analyte of concern and each surrogate at a concentration of 2-10				

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times the MDL.				
3. The response factor (RF) is calculated for each analyte, surrogate and isomer pair for each calibration solution, using the internal standard fluorobenzene.				
4. The mean response factor, standard deviation and relative standard deviation are calculated over the range for each analyte in the calibration file.				
5. If the relative standard deviation exceeds 20%, another aliquot is run.				
Daily Check				
1. The BFB tune is checked with 25 ng BFB at the beginning of each work shift but no less than every 12 hours.				
2. A continuing calibration check is run at the beginning of each work shift but no less than every 12 hours.				
3. Good chromatograms are obtained. The peaks are symmetrical and there is minimum tailing.				
4. The RF for each analyte and surrogate of the daily calibration check is calculated.				
5. If the RF is not within 30 % of the mean value measured in the initial calibration, remedial action is taken which may include recalibration or analyzing a new QC standard. (Can give some latitude for odd ball analytes that are rarely detected).				
6. Raw areas of internal standards and surrogates are monitored. No more than 30 % decrease from last calibration check or no more than 50 % decrease from initial calibration.				
7. Analytes are identified by the comparison of spectra obtained with those of reference spectra in the user-created data base.				
QUALITY ASSURANCE/QUALITY CONTROL				
(Check that date sample run matches date of these: 1. A BFB tune report is kept with the data package.				
2. A surrogate % recovery report is kept.				
3. If a water sample is contaminated with an analyte, field reagent blanks are analyzed and reported.				

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4. Control charts or tabulations of precision & accuracy of analytes and surrogates vs. time are maintained.				
5. A quality control sample from an external source is analyzed at least quarterly.				
6. Documentation of initial demonstration of capability. Mean accuracy for each analyte is 80-120% Precision of the recovery is less than 20%.				
7. MDLs are determined at least annually.				
8. A written SOP is available.				
REPORTING				
1. Numbers reported are bracketed by the calibration range.				
2. If the calibration range is exceeded, [ ] the sample is diluted so as to bring the concentration into range or [ ] a single point standard at about the same level is run. (There is the danger of exceeding linearity).				
3. If the lower reporting limit is less than the concentration of lowest standard in the multipoint, [ ] a standard at the lower reporting limit is analyzed at least once a week, or [ ] the data is flagged with the explanation that the value determined is less than the lowest standard.				
4. Samples having bubbles or that lack preservation are [ ] rejected or [ ] the test report is qualified.				