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precision control charting approach will be used. Thus, the required replication is achieved across lots rather than within each lot. During certification, two standard matrix samples are spiked with surrogates at 10X and analyzed on a single day. After one lot has been analyzed, three values will be available: two from certification, and one from the first lot. These three values can then be averaged and the first value of $\bar{X}$ obtained. Similarly, the difference between the highest and lowest will give the first value of R. These values will be the first values plotted on the moving accuracy and precision control charts and will be plotted versus the date of the first actual sample lot analyzed.

Once the second lot is analyzed, a fourth value for percent recovery will be available. This value will be averaged with the values from the second certification value and Lot 1 of actual analysis to obtain the second value for X. The second value for R will be obtained by the difference between the highest and lowest among these three values. These values will then be the second plotted points on the moving average accuracy and precision.

Similarly, after the third lot is analyzed, the percent recovery for this lot is averaged with the individual percent recovery values from the first and second lots to obtain the third value of X; the difference between highest and lowest in this set of three is used to obtain the third plotted point for R. This procedure is continued throughout the project.

After the third point is plotted on the control charts, the analyst will continue calculating the mid-line and control limits and assessing whether laboratory performance is in control. It should be emphasized that the averages plotted on the charts, rather than the individual values, will be used to calculate these limits. The step-by-step procedure for calculating these limits is presented in the 1990 USATHAMA QA Program Plan.

All data will be plotted, whether the lot is in control or not. Each individual value will be tested as an outlier using Dixon's test at the

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98-percent confidence limit. If one of the individual points is an outlier, it will not be used in calculating the 3-point moving average but is excluded from the establishment of control limits after 20 in-control data points.

At this point, the control limits should have stabilized and these limits will be used as the basis for determining whether analysis is in control for the next 20 lots. After 40 points are plotted, all 40 values will be used to recalculate the control limits for the next 20 analysis lots. This procedure will be continued for each set of 20 lots. All values will be included in these calculations unless a systematic error was detected for one of the lots that goes into that average value.

8.1.5.4 Control Spikes and Charts for Non-GC/MS Methods

Three spiked standard matrix samples will be included in each lot. The exact levels used for each analyte will be supplied by USATHAMA and included in the certification package. In general, however, each lot will contain two spikes at the 10X level (where X is the CRL obtained during certification), one spike at approximately 2X for that analyte, and one spike at approximately 5X in a natural matrix per analytical lot.

Two different types of control charting approaches will be used for non-GC/MS methods. The first approach will be used for recovery of the 10X spikes where there is replication within each lot. The second approach will be used for the recovery of the 2X spikes and will be similar to the approach used for the GC/MS methods where no within-lot replication was available.

For the recovery of 10X spikes, an average value (X) will be obtained from the duplicate within each lot, and this value will be plotted versus the date for that lot on an accuracy chart. The difference between this replicate will be obtained and plotted on the precision chart versus the date of analysis for that lot.

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Initial certification did not use replicate spikes for 10X on each day. Rather, individual percent recovery data are available on each of 4 days. These data will be used as follows to begin control charts. The percent recovery from certification Days 1 and 2 will be averaged to get the first value of the control charts. The percent recovery values for Days 3 and 4 will be used to obtain the second points to be plotted. Percent recovery values, from the first lot of actual samples, will be used to obtain X and R values, and these values will be the third plotted points on the control charts.

After the first actual lot of analysis, control limits will be obtained as described in the 1990 USATHAMA QA Program Plan. These values will be updated after each in-control lot for the first 20 lots.

All recoveries will be plotted, whether or not the lot is in control. Each individual value will be tested as an outlier using Dixon's test at the 98-percent confidence level. If the datum is considered an outlier, it will not be used in calculating the control chart limits after 20 in-control data points.

As described in Sec. 8.1.5.3, these control limits should have stabilized at this point and will serve for control purposes for the next 20 lots. Control limits will then be updated after every 20 lots as described previously.

Control charts for the percent recovery data from the 2X spikes will be handled using the same moving average control charting method described for the GC/MS methods. The only difference will be the manner in which the certification data are used to provide the initial data for the charts.

For these four methods, four individual values for percent recovery were obtained for X during certification. The first 3 days will be used to obtain the initial plotted points for moving accuracy and precision control charts. Days 2, 3, and 4 will be used to obtain the second plotted point for moving accuracy and precision control charts. After

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the analysis of the first lot of real samples, the percent recovery for the 2X level spiked sample will be combined with Days 3 and 4 of certification to obtain the third plotted point. Control limits will then be obtained using the step-by-step procedure given in the 1990 USATHAMA QA Program Plan and updated daily until 20 points are plotted. The same approach described previously will be used to update control limits after each new set of 20 lots is analyzed.

In applying the QC requirements presented in Table 8.1-1 to non-GC/MS methods, at least three control samples will be run with each daily lot of samples.

The Project QA Staff may monitor the introduction of the control samples into analytical lot prior to analysis. Subsequent to analysis, the Project QA Staff reviews and approves all control sample data by USATHAMA lots before the results are transmitted to USATHAMA as Level 1 data. Chemical data for each analytical lot which pass QC criteria are automatically entered into the appropriate chemical analysis file for transmission to USATHAMA. The QC results for the QC control samples also are included in the format required by the IR Data Management User's Guide (USATHAMA, 1984).

8.2 OUT-OF-CONTROL SITUATIONS

Failure to pass the instrumental calibration or control sample QC criteria or analyzing any sample or sample extract beyond the holding times listed in Table 3.6-1 represents an out-of-control situation and calls for corrective action as required by the USATHAMA QA Plan, which may require rerunning and/or resampling and rerunning the entire lot samples. Written notification of QC failure is provided to the ESE Project Manager, the Chemistry Supervisor, and Project QA Staff.

8.2.1 ACCURACY AND PRECISION

An out-of-control situation for accuracy and precision control charts may be indicated by the following:

1. A value falls outside the control limits or is classified as an outlier by the Dixon's test,

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2. A series of seven succe sive values fall on the same side of the central line,
3. A series of five successive values lie in the same direction,
4. A cyclical pattern occurs,
5. Two consecutive points fall between the warning and control limits,
6. Values of greater than or equal to 1/3 of the analytes of a multi-analyte method fall outside the control limits, or
7. Values of analytes of a multi-analyte method fall outside the control limits for two consecutive lots.

8.2.2 MOVING ACCURACY AND PRECISION CONTROL CHART CRITERIA

The control and warning limits for the 3-point moving average charts for Class 1 analyses are not intended for method control by themselves but are evaluated in conjunction with results from spikes at the high concentration. Data falling outside control charts limits may indicate quality problems and should be investigated and corrected to achieve the required sensitivity.

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9.0 PERFORMANCE AND SYSTEM AUDITS

Internal and external systems and performance audits are performed for this program. External audits are primarily performed by the USATHAMA Technical Support Division. These audits include:

1. Semiannual laboratory audit visits;
2. Review and approval of method certification;
3. Review and approval of all QC charts and corrective actions (QC charts are submitted weekly with documented actions required);
4. Review of sample receipt and data submittal status for CLASS contract through COLA program;
5. Review and approval of data files sent to IRDMS; and,
6. Audit of analytical Lot folders submitted by CLASS contract through the final Delivery Order report process.

Protocols for the above audits are not required for this QA Plan but have been presented to provide an overview of the entire process.

Two types of audit procedures will be used to assess and document performance of project staff: system audits and performance audits. These are performed at frequent intervals under the direction of the Project QA Supervisor. These audits form one of the bases for corrective action requirements and constitute a permanent record of the conformance of measurement systems to QA requirements.

System audits are inspections of training status, records, QC data, calibrations, and conformance to standard operating procedures without the analysis of check samples. System audits will be performed periodically on laboratory and office operations.

The internal system audit protocol depends heavily on the Lot folder review process. Every lot of analytical data with supporting information is reviewed sequentially by the analyst, department manager, laboratory coordinator, and QA Supervisor prior to data transmittal to the USATHAMA IRDMS system. Items checked during review are:

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a. Copies of parameter and/or laboratory notebooks;
b. Copies of instrument logbooks;
c. Sample log-in, dispensing, and labeling for analysis;
d. Raw data and calculations;
e. Conformance with computer and manual checklists; and,
f. Conformance with document inventory and SOP.

Performance audits will include conductance of field audits and evaluation and analysis of check samples. Field audits will be performed on select projects to assure that sampling procedures are performed according to the QA plan.

ESE will submit to periodic external audits by FDER after notification of and scheduling by the Laboratory Director.

The results of these inter-laboratory studies may be evaluated by the Project QA Supervisor as part of the performance audits.

ESE is participating in the following proficiency programs:

1. National Institute of Occupational Safety and Health (NIOSH) through its Proficiency Analytical Testing Program (PAT),
2. National Institute of Standards and Technology (NIST) proficiency testing program under the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos,
3. EPA Water Pollution and Water Supply proficiency programs,
4. EPA Radiochemistry Intercomparison Study and Blind Performance Samples,
5. State of New York through its Environmental Laboratory Approval Program (ELAP) for public drinking water and environmental samples categories,
6. State of California Department of Health, and
7. U.S. Corps of Engineers.

The licenses, accreditations, and certifications held by the Gainesville analytical laboratory are the following:

1. American Industrial Hygiene Association (AIHA),

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2. National Institute of Standards and Technology for bulk asbestos,
3. State of Florida Department of Health and Rehabilitative Services for environmental and drinking water analysis,
4. New York Department of Health,
5. New Jersey Department of Environmental Protection,
6. South Carolina Department of Health and Environmental Control,
7. EPA CLP--both organics and inorganics,
8. State of Florida Department of Health and Rehabilitative Service for Radiochemistry,
9. State of California Department of Health Services for hazardous waste testing analysis,
10. State of Tennessee Department of Health and Environment for drinking water analysis,
11. U.S. Corps of Engineers, and
12. U.S. Navy.

ESE maintains a compliance program for all toxicity testing and associated chemical and physical analysis performed under the Toxic Substances Control Act and the Federal Insecticide, Fungicide, and Rodenticide Act. Studies are performed as required in full compliance with Good Laboratory Practice (GLP) standards as issued in 40 CFR Part 160 (August 1989) and CFR Part 792 (August 1989). Such studies are routinely audited by the EPA Office of Compliance Monitoring approximately every eighteen months.

The results of these inter-laboratory studies are evaluated periodically by the Project QA Supervisor during the project as part of the performance audits. Results of the internal audits of Lot folders are available for review during the USATHAMA external audits and when delivery order reports are delivered to USATHAMA.

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10.0 PREVENTATIVE MAINTENANCE

The ESE laboratory in Gainesville, Florida has a Preventive Maintenance SOP (SOP 4101-05) which has been presented in Appendix C along with other pertinent general laboratory operations SOP's. The following sections define routine QC procedures that help define whether current preventive maintenance practices are working or whether special manufacturers visits are required.

10.1 METALS SYSTEM CONTROL

10.1.1 QC FOR ATOMIC ABSORPTION ANALYSIS

The following routine QC procedures are required for flame and graphite furnace atomic absorption spectrophotometry (AAS) analysis:

1. Instrument calibration is checked using standard solutions. Instrument response is plotted (using a hand calculator) against concentration. The slope is compared to historical slope data to verify that the performance of the instrument is satisfactory. The control charts are kept in the instrument logbook, which also contains a record of routine maintenance and documentation relating to any downtime due to instrument malfunctions. If readings are excessively low, the analyst will check gas flows, burner or cell alignment, wave length, slit width, photomultiplier voltage, and lamp intensity for problems.
2. Blanks and spiked samples are analyzed with each batch of samples.
3. Strip chart recorder tracings for standard solutions, samples, spikes, and duplicates are all stamped for identification and filed in the instrument room.

10.1.2 QC FOR INDUCTIVELY COUPLED ARGON PLASMA (ICAP)

Analyses run on the ICAP system require specific instrument calibration and maintenance controls. Routine maintenance on the ICAP system by the manufacturers' representatives is performed on an annual basis. In

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addition, a quarterly service contract is maintained on the ICAP system minicomputer.

The analyst will dismantle, clean, and reassemble the torch and nebulizer when response falls below method sensitivity requirements. Calibration with selected standards will be performed daily to ensure that the instrument performance has not deteriorated. The failure to achieve standardization could require cleaning, including changing the tubing of the sample delivery system. Spare parts are available for the system components most likely to experience failure.

Blanks and spiked samples are analyzed with each batch of samples. Hardcopy outputs for standards, samples, and spikes are stamped for identification and filed in the instrument room.

10.2 GC ANALYSIS

GC septa will be replaced on a weekly basis or more frequently as needed when symptoms of septum deterioration are noted. Frequent injections will require replacement on a daily basis. When the supply of gas in the cylinders falls below 100 psi, carrier and detector gases will be changed to prevent contaminants from reaching the detector or columns. Molecular sieves and oxygen traps used in the gas lines will be replaced on a regular basis. GC detectors will be removed and cleaned at least periodically to remove accumulations, which can affect instrument performance.

Instrument calibration curves will be monitored and compared to historical performance criteria. Excessive noise, low response, and poor precision are indicators of a dirty detector and may cause more frequent detector cleaning. Spare columns, packing materials, instrument cables, and personal computer (PC) boards will be available in case of breakage or malfunction to minimize instrument downtime.

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10.3 GC/MS ANALYSIS

Daily instrument control will be practiced to ensure that the instrument is calibrated and in proper working condition. The GC/MS will be tuned, as necesssary, with perfluorotributylamine to calibrate the mass axis and to ensure proper relative abundances. The GC/MS will be tuned and for every 12 hours the instrument is in use with decafluorotriphenylphosphine (DFTPP), these outputs are contained in the data lot folder, for nonvolatiles analysis and bromofluorobenzene (BFB) for volatiles analysis. An instrument tuning log will be maintained to identify any deterioration of instrument performance. The intensity specifications for DFTPP and BFB are contained in Table 10-1. Failure to achieve calibration will require implementation of source cleaning procedures.

In addition, all routine analytical systems controls performed for GC will also be performed for the GC/MS equipment. The ionizing source will be dismantled, thoroughly cleaned, and reassembled when response falls below method sensitivity requirements.

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Table 10-1. Mass Intensity Specifications for DFTPP and BFB

Key Ions	Ion Abundance Criterion
For DFTPP*	
51	30 to 60 per cent of mass 198
68	Less than 2 percent of mass 69
70	Less than 2 percent of mass 69
127	40 to 60 percent of mass 198
197	Less than 1 percent of mass 198
198	Base peak, 100 percent relative abundance
199	5 to 9 percent of mass 198
275	10 to 30 percent of mass 198
365	Greater than 1 percent of mass 198
441	Present but less than mass 443
442	Greater than 40 percent of mass 198
443	17 to 23 percent of mass 442
For BFB*	
50	15 to 40 percent of mass 95
75	30 to 60 percent of mass 95
95	Base peak, 100 percent relative abundance
96	5 to 9 percent of mass 95
173	Less than 2 percent of mass 174
174	Greater than 50 percent of mass 95
175	5 to 9 percent of mass 174 (1 to 12 percent of mass 174)+
176	Greater than 95 percent but less than 101 percent of mass 174
177	5 to 9 percent of mass 176

*Reference: Test Methods for Evaluating Solid Waste, EPA-SW-846, 3rd Edition, November 1986.
+Variance of 1 to 12 percent of mass 174 for ESE, Gainesville, Fl., GC/MS Instrument D.

Source: ESE, 1989

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11.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

11.1 CERTIFIED REPORTING LIMIT (CRL)

Before any analytical system is employed, sufficient spikes and blanks will be run to statistically establish the lowest sample concentration which may be reported. This concentration is the CRL. CRLs shall be determined by using the USATHAMA program with 90-percent confidence limits. This CRL is associated with the entire method and reflects all sample preparation and measurement steps. First, this approach differs from instrumental detection limit (e.g., three times the blank signal to noise ratio); since the method CRL is typically higher than the instrumental detection limit. Second, because the CRL reflects use of the entire method, all steps of all analyses must always be performed in exactly the same way.

The CRL is derived from the following assumptions:

- The relationship between the found concentration and target concentration is linear;
- The variance about the least squares linear regression line is homogeneous over the tested concentration range; and
- Found concentrations for a given target concentration are normally distributed.

Based on these assumptions, the least squares linear regression line is shown in the following equation:

$$Y = Y_o + bX \qquad (1)$$

where: Y = found concentration,
Y_o = Y axis (found concentration) intercept,
b = slope of the line, and
X = target concentration.

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The certification performance data (X, Y paired data) are used to determine the least squares regression line according to the following formula, which assume that errors occur only in the found concentration:

$$\text{slope} = b = \frac{N \sum X_i Y_i - \sum X_i \sum Y_i}{N \sum X_i^2 - (\sum X_i)^2} \qquad (2)$$

where: N = number of data points,
X_i = the i-th target concentration, and
Y_i = the i-th found concentration.

$$\text{Y axis intercept} = Y_o = \frac{\sum Y_i - b \sum X_i}{N} \qquad (3)$$

where: b = slope of the least squares linear regression line, from Equation 2.

The upper confidence limit about the regression line is given by:

$$Y = Y_o + bX + S_{Y.x} t \left[1 + \frac{1}{N} + \frac{(X_i - \bar{X})^2}{\sum (X_i - \bar{X})^2} \right]^{1/2} \qquad (4)$$

The lower confidence limit about the regression line is given by:

$$Y = Y_o + bX - S_{Y.x} t \left[1 + \frac{1}{N} + \frac{(X_i - \bar{X})^2}{\sum (X_i - \bar{X})^2} \right]^{1/2} \qquad (5)$$

where:

$$S_{Y.x} = \left[\frac{\sum \{Y_i - [\bar{Y} + b(X_i - \bar{X})]\}^2}{N - 2} \right]^{1/2}$$

Y_o = calculated Y axis intercept,
t = student's t for 2-tailed P = 0.10 and N - 2 degrees of freedom,
$\bar{X}$ = the average of all target concentrations, and
$\bar{Y}$ = the average of all found concentrations.

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The calculated reporting limit, X_d, is the value of X corresponding to a point on the lower confidence limit curve where the value of Y equals the value of Y on the upper confidence limit curve at X = 0.

The calculated reporting limit will be reported as the CRL of the method, provided that at least one of the tested concentrations is at or below the calculated reporting limit. Otherwise, the lowest tested concentration is the minimum level that can be reported as the CRL. The CRL shall not be less than the lowest tested concentration. The CRL for Class 1 and Class 1B is reported to three significant figures. However, the CRL for Class 1A only may be reported to two significant figures.

11.2 METHOD CERTIFICATION ACCURACY

The slope, b, of the least squares linear regression line of a plot of found versus target concentration is a measure of the accuracy of the method. A slope (accuracy) of "plus one" (1.00) indicates 100-percent recovery over the complete analytical method and tested range. Failure to consider the intercept, if it is appreciably different from zero, could result in an erroneous estimate of the accuracy. Experimental values may deviate from this expected value. The certification data will provide an optimistic estimate of the method accuracy because interferences found in natural samples will be absent. The accuracy estimate for the complete certification data set is incorporated into the USATHAMA IRDMS. The slope for the complete data set shall be used as the accuracy, even if the CRL was obtained from a truncated data set.

11.3 METHOD CERTIFICATION STANDARD DEVIATION

For Class 1, Class 1A, and Class 1B certification, the standard deviation, S, will be calculated at each target concentration according to:

$$\text{standard deviation} = S = \left[\frac{\Sigma Y_i^2 - \frac{(\Sigma Y_i)^2}{N}}{N - 1} \right]^{1/2} \qquad (6)$$

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where: Y_i = the found concentration, and

N = total number of Y values at each target concentration.

This calculation is performed by the USATHAMA software.

11.4 METHOD CERTIFICATION PERCENT INACCURACY

For Class 1, Class 1A, and Class 1B certification, the percent inaccuracy will be calculated at each target concentration according to:

$$\text{percent inaccuracy} = \frac{\bar{Y} - X}{X} (100) \qquad (7)$$

where: X = target concentration, and

$\bar{Y}$ = average found concentration at the target concentration.

This calculation is performed by the USATHAMA software.

11.5 METHOD CERTIFICATION PERCENT IMPRECISION

For Class 1, Class 1A, and Class 1B certification, the percent imprecision will be calculated at each target concentration according to:

$$\text{percent imprecision} = \frac{S}{\bar{Y}} (100) \qquad (8)$$

where: S = standard deviation, and

$\bar{Y}$ = average found concentration at the particular target concentration.

This calculation is performed by the USATHAMA software.

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11.6 DATA ACCURACY AND PRECISION

Accuracy and precision will be assessed using data from the duplicate spiked QC samples in each lot. Percent recovery is calculated as follows:

$$\text{Percent recovery} = \frac{\text{Found Concentration}}{\text{Spiked Concentration}} \times 100$$

Control charts will be maintained for the duplicate spiked QC samples. To prepare control charts, the analyst should have access to the following data:

1. Percent recovery of each analyte in the two high-concentration spiked QC samples (Class 1),
2. Average ($\bar{X}$) percent recovery for the two spiked QC samples (Class 1) in each lot, and
3. Difference (R) between the percent recoveries for the two spiked QC samples (Class 1) in each lot.

The initial control chart will be prepared using the 4 days of certification data closest to the spiking concentration used during analyses. The average $\bar{X}$ ($\bar{X}$), average range (R), and control limits for $\bar{X}$ and R will be updated after each in-control lot for the first 20 lots. Limits established after Lot 20 will be used for the next 20 lots. Control charts will be updated after each 20 lots thereafter using the most recent 40 points. In updating the control charts, the new data must be combined with the individual values of previous average percent recoveries and not the mean of all previous data. Only lots evaluated as in-control are applicable to the 20- and 40-lot requirements for establishing and updating control limits. Out-of-control or outlier points should be plotted; however, such lots are not used in lot number requirements or control limit calculations.

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$$\text{Average} = \bar{X} = \frac{\Sigma X}{K}$$

$$\text{Range} = R = \frac{\Sigma R}{K}$$

where: X = between-group average of the average recovery of the pairs (within group),

$\bar{X}$ = average within-group recovery for data pairs,

R = within-group difference between recoveries for data pairs, and

K = cumulative number of pairs in the database.

R = range

UWL on Average: $UWL_{\bar{X}} = \bar{X} + 1.25\ R$

UCL on Average: $UCL_{\bar{X}} = \bar{X} + 1.88\ R$

LWL on Average: $LWL_{\bar{X}} = \bar{X} + 1.25\ R$

LCL on Average: $LCL_{\bar{X}} = \bar{X} + 1.88\ R$

UWL on Range: $UWL_R = 2.511\ R$

UCL on Range: $UCL_R = 3.267\ R$

LWL on Range: $LWL_R = 0$

LCL on Range: $LCL_R = 0$

All recoveries will be plotted, whether or not the lot is in control. Plotted points represent averaged instrument measurements and not the individual measurement values. Each individual measurement value will be tested as an outlier using Dixon's test at the 98-percent confidence level (App. K, 1990 USATHAMA QA Program Plan). If the datum is not classified as an outlier by the test, the point will be included in updating the control chart limits. If the datum is classified as an outlier, it will not be used in updating the control chart limits. Method control will be judged according to the criteria in Sec. 8.0.

After the first 20 in-control sample lots, control limits will be recalculated using only in-control data points. The control limits will then be drawn backward to encompass all previous points. Any points falling outside of the control limits (UCL or LCL) will be dropped and the control limits recalculated using only points between the UCL and

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LCL. Charts will then be updated with the newly calculated control limits and all points plotted. Lots associated with points outside of the new control limits may require resampling and/or reanalysis as determined by the USATHAMA Project Officer on a case-by-case basis. These limits will then be used to control analysis of the next 20 lots. The control charts are now the outlier test, although individual measurements continue to be tested as outliers if they appear not to be representative of the data set. Once 60 or more lots are analyzed by a particular method, control limits are recalculated based on the 40 most recent lots, i.e., control limits for the 60th lot are based on Lots 21 through 60 (40-point slide).

11.7 DATA MOVING-AVERAGE ACCURACY AND PRECISION

Moving-average control charts will be maintained for each control analyte spiked in the single low-concentration spiked QC sample (Class 1), single high-concentration spiked QC sample (Class 1B), or the surrogate spiked standard matrix sample (Class 1A). The X - R 3-point moving-average control chart will be constructed for each control analyte as follows:

1. Use percent recovery to allow for minor variations in spiking concentration;
2. The first plotted point is the average of the first three recoveries (from certification, at concentrations nearest the spiking level);
3. Subsequent points are obtained by averaging the three most recent individual recovery values (outliers excluded from calculation but not from plot);
4. The range for each point is the difference between the highest and lowest value for each group of three values; and
5. The central line, UWL, UCL, LWL, and LCL for the control charts are calculated using the following formulas:

$$\text{Average} = \bar{X} = \frac{\Sigma X}{K}$$

$$\text{Range} = R = \frac{\Sigma R}{K}$$

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where: X = between-group average of the average recovery of the three points (within group),

X = average within-group recovery for the three points,

R = within-group difference between recoveries for data pairs, and

K = cumulative number of pairs in the database.

R = range

UWL on Average: $UWL_{\bar{X}} = \bar{X} + 0.682\ R$

UCL on Average: $UCL_{\bar{X}} = \bar{X} + 1.023\ R$

LWL on Average: $LWL_{\bar{X}} = \bar{X} + 0.682\ R$

LCL on Average: $LCL_{\bar{X}} = \bar{X} + 1.023\ R$

UWL on Range: $UWL_R = 2.050\ R$

UCL on Range: $UCL_R = 2.575\ R$

LWL on Range: $LWL_R = 0$

LCL on Range: $LCL_R = 0$

All data will be plotted, whether or not the lot is in control. Plotted points represent averaged instrument measurements and not the individual measurement values. Each individual measurement value will be tested as an outlier using Dixon's test at the 98-percent confidence level (App. K, 1985 USATHAMA QA Program Plan). If the datum is not classified as an outlier by the test, the point will be included in updating the control chart limits. If one of the individual measurements is an outlier, it will not be used in calculating the 3-point moving average for plotting only, but the measurement is then excluded from calculations that are based on the three most recent acceptable individual points and the control chart limits determined accordingly. Method control will be judged according to the criteria in Sec. 8.0.

After the first control chart points, control limits will be recalculated using only in-control data points. Any points falling outside of the control limits (UCL or LCL) will be dropped from the calculations (but left on the charts) and the control limits recalculated using only points between the UCL and LCL. Charts will then be updated with the newly calculated control limits and all points plotted. Lots associated with points outside of the new control limits

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may require resampling and/or reanalysis as determined by the USATHAMA Project Officer on a case-by-case basis. These limits will then be used to control analysis of the next 20 lots. The control charts are now the outlier test, although individual measurements continue to be tested as outliers if they appear not to be representative of the data set. A maximum of the 40 most recent lots will be used to recalculate control limits for 60 or more lots (40-point slide).

If values do not meet criteria as specified in Sec. 2.0, results reported in all samples processed as part of the same set must be labeled as suspect, and the sample may need to be repeated. The Project QA Supervisor will be notified and the necessary corrective action implemented.

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12.0 CORRECTIVE ACTION

Rapid, effective, and thorough means of implementing the correction of QA problems and for noncomplying items, as well as followup reports, are essential to the implementation of a QA program. The two major types of corrective actions, immediate and long term, both require appropriate documentation. Problems requiring immediate resolution such as instrument malfunction or unexpected field conditions are documented fully in field data books or instrument logs and are covered under normal operating procedures for all disciplines.

Corrective action may also be required to correct noncomplying items or systematic errors. Management must apply a systematic corrective action to eliminate such long-term problems. The QA Staff will assist the Chemistry Program Manager in implementing the process of scheduling, performing, documenting, and ensuring the effectiveness of the action. Such action may consist of personnel retraining or removal from a project, reanalysis of questionable data, instrument replacement, or improved sampling procedures. The QA Staff, after consultation with the Chemistry Program Manager, has stop work authority for project activities that are judged out of control and can require resampling or analysis to bring data items into compliance.

12.1 PROBLEM IDENTIFICATION

Weekly control chart submissions to the USATHAMA Technical Support Division requires continual monitoring of the analytical processes and identification of any corrective actions. Explanations of out of control situations or trends must be sufficient enough for USATHAMA to accept the analyses performed. Corrective actions are required to ensure that problems are resolved.

Upon notification of a problem or when a potential problem is identified through any auditing procedure, the QA Staff then notifies the Chemistry Program Manager. Together, the Chemistry Program Manager and QA Staff perform a brief, but thorough, investigation of the reported problem

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immediately to determine if a corrective action request is required and should be filed.

Review of the Field Trip Plan, for example, may identify a potential problem to which an immediate solution may be applied, thereby alleviating the necessity for a formal corrective action request.

Corrective actions may be initiated for each measurement system (individual disciplines) by Task Managers or other responsible individuals such as the Department Manager. The QA Staff, along with the Program Manager, will be responsible for approving the corrective action in the same manner as if it had been initiated as a project QA function.

12.2 FOLLOWUP PROCEDURES

Adequate followup procedures are provided for either type of corrective action since these actions are not considered complete until the problem has been effectively and permanently solved.

An example of a corrective action request form that can be used to document long-term corrective actions is shown in Fig. 12.2-1. The form may be initiated by any individual who observes a problem on a specific noncomplying item. Each form is limited to a single problem. If more than one problem is involved, each problem should be documented on a separate corrective action request form. Copies of the form are given to the responsible administrative personnel and the QA Staff. The Project Director, Project QA Supervisor, and Chemical Analysis Supervisor discuss the problem jointly to:

1. Determine that specific corrective action is needed to eliminate the problem and assign responsibility for investigating, implementing, and documenting the situation;
2. Determine when the system became out of control;
3. Set a time schedule for determining the required action;
4. Assign responsibility and time schedule to implement the required action;

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5. Establish desired effectiveness of the corrective action and implement the correction; and
6. Verify and document that the corrective action has eliminated the problem.

Project-specific corrective actions will be documented to the Task Manager. The Project QA Supervisor will assist the Task Manager to define responsibilities for scheduling, performing, documenting, and ensuring the effectiveness of the required actions.

QA may issue a corrective action for circumstances other than audit nonconformances. If, in the opinion of the QA Staff, for example, members of the project team other than the individual disciplines (i.e., project management) have been negligent and/or nonresponsive to information need requests, a need for corrective action may result. As in the case of audit nonconformance, the corrective action is not complete until a satisfactory resolution is achieved.

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QUALITY ASSURANCE CORRECTIVE ACTION REQUEST
AND ROUTING FORM

1. Identification of a Problem: CA#_____

Originator: _____ Date: _____

Nature of Problem: _____

2. Determination of Required Action:

Responsibility Assigned to: _____ Due Date: _____

Recommended Action: _____

3. Implementation of Required Action:

Responsibility Assigned to: _____ Due Date: _____

4. Assuring Effectiveness of Action:

Responsibility Assigned to: _____ Due Date: _____

Procedure to Assure Effectiveness: _____

Fig. 12.2-4.
QUALITY ASSURANCE CORRECTIVE ACTION REQUEST AND ROUTING FORM

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13.0 QA/QC REPORTS

The QA Staff will be responsible for submitting several QC reports to USATHAMA. The precertification and certification QC checklists (Figs. 13.0-1 and 13.0-2) will be included in the Performance Data Package submitted during Precertification/Certification (Sec. 6.0). The USATHAMA Data Review Checklist (Fig. 7.3-1) and Summary Audit Reports (Sec. 9.0) will be completed and kept on file with the QA Staff for auditing by USATHAMA. All QC charts (Sec. 8.0) will be submitted to the USATHAMA Technology Division with the cover letter copied to the USATHAMA Project Officer approximately 5 working days after analyses for a week are completed. Points that may indicate an out-of-control situation will be evaluated and explained. Any corrective measures will be fully explained and documented in the QC chart submittal. The QC checklist (Fig. 13.0-3) will be included with each control chart submission.

The format and organization of Delivery Order reports are presented in USATHAMA specific SOP's presented in Appendix B

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PRECERTIFICATION PERFORMANCE DATA PACKAGE CHECKLIST
(ONE FOR EACH METHOD)

Contract/Task No._____ Installation _____

The following items are included in this Precertification Performance Data Package for _____ in _____.
Analyte(s) Matrix

☐ Method written up in USATHAMA format.

Calibration:

☐ Calibration data and curves (plot of raw data).

☐ Documentation for Lack of Fit and Zero Intercept Tests.

_____ _____
Contractor QAC Date

Figure 13.0-1
PRECERTIFICATION PERFORMANCE DATA PACKAGE CHECKLIST

SOURCE: USATHAMA, 1985.

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

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CERTIFICATION PERFORMANCE DATA PACKAGE CHECKLIST
(ONE FOR EACH METHOD)

Contract/Task No. _____ Installation _____

The following items are included in this Certification Performance Data Package for _____ in _____.
Analyte(s) Matrix

- ☐ Method written up in USATHAMA format.

Calibration:

- ☐ Calibration curves from days of certification (plot of raw data).
- ☐ Documentation for Lack of Fit and Zero Intercept Tests.

Certification:

- ☐ Data summary -- target versus found.
- ☐ Reporting limit, precision and action calculations.
- ☐ Reporting limit plot.
- ☐ Data summary -- statistics.
- ☐ Lack of Fit and Zero Intercept Tests.
- ☐ Chromatograms from each of the four days of certification analyses for the highest tested concentration and for the tested concentration closest to calculated reporting limit.
- ☐ Spectra for all target analytes (if applicable).
- ☐ Identity and purity determinations for off-the-shelf reference materials, either purchased by the Contractor or supplied by the Central QA Laboratory.

_____ _____
Contractor QAC Date

Figure 13.0-2
CERTIFICATION PERFORMANCE DATA PACKAGE CHECKLIST

SOURCE: USATHAMA, 1985.

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

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Contract/Task No. _____ Installation _____

1. The following items are included in this weekly control chart package covering method(s) _____.

2. ☐ Summary

3. ☐ $\bar{X}$ - R Control Charts for duplicate, high concentration spiked QA samples, including plotted points for blind performance samples and Outlier Tests.

4. ☐ $\bar{X}$ - R Three-Point Moving Average Control Charts for action level spikes, and Outlier Tests.

5. ☐ Observations on each chart.

   a. ☐ Trend analysis.

   b. ☐ Out-of-control analysis.

   c. ☐ Actions taken.

   d. ☐ Demonstration of resumption of control.

6. ☐ Recommendations

_____ _____
Contractor QAC Date

Figure 13.0-3
CONTROL CHART CHECKLIST

SOURCE: USATHAMA, 1985.

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

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American Society for Testing and Materials (ASTM). 1981. Laboratory Determination of Water (Moisture) Content for Soil/Rock/Soil-Aggregate Mixtures (D2216-71). In: Annual Book of ASTM Standards: Part 19, Natural Bedding Stones; Soil and Rock; Peats, Mosses, and Humus. Philadelphia, PA.

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U.S. Environmental Protection Agency (EPA). 1979. Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations; Correction. Federal Register 44(244):75050-75052.

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APPENDIX A

Certified Method Summary Tables

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A.7 Current USATHAMA Methods Table

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A.1

List of Methods and References

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UN08	607	NITROSAMINES IN WATER BY GC
UO02	601/602	VOLATILE ORGANICS IN WATER BY GC
UT02		IMPA,MPA, AND FLUOROACETIC ACID IN WATER BY IC
UW14	609	NITROAROMATICS IN WATER BY HPLC
UW17		NITROGUANIDINE IN WATER BY HPLC
UW18	3510/8040	PHENOLS IN WATER BY HPLC
UW19		PETN/NITROGLYCERIN IN WATER
UW22		THIODIGLYCOL IN WATER BY HPLC

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LIST OF CLASS METHODS

ARMY METHOD No.	REFERENCE METHOD No.	METHOD NAME
AAA9		IMPA,MPA, AND FLUOROACETIC ACID IN SOIL BY IC
H2	420	TOTAL PHENOLS IN WATER BY COLORIMETRY
J2	7196	HEXAVALENT CHROMIUM IN WATER BY COLORIMETRY
JB01	7471	MERCURY IN SOIL BY CVAA
JD15	7740	SELENIUM IN SOIL BY GFAA
JD16	7911	VANADIUM IN SOIL BY GFAA
JD17	7421	LEAD IN SOIL BY GFAA
JD18	7761	SILVER IN SOIL BY GFAA
JD19	7060	ARSENIC IN SOIL BY GFAA
JS11	6010	METALS IN SOIL BY ICAP
JY02		HEXAVALENT CHROMIUM IN SOIL BY COLORIMETRY
KF10	300.0	NITRATE/NITRITE IN SOIL BY AUTOANALYZER
KF14	365.1	PHOSPHATES IN SOIL BY AUTOANALYZER
KT05	300.0	ANIONS IN SOIL BY IC
KY01	335.2	CYANIDE IN SOIL BY TECHNICON
KY10	365.1	ORTHOPHOSPHORUS IN SOIL BY AUTOANALYZER
LF03		NITROCELLULOSE IN SOIL BY TECHNICON
LH10	8080	ORGANOCHLORINE PESTICIDES IN SOIL BY GC-EC
LH11	8150	HERBICIDES IN SOIL BY GC-EC
LH16	8080	PCBs IN SOIL BY GC-EC
LL03		ORGANOSULFUR PESTICIDES IN SOIL BY
LM18	8270	EXTRACTABLE ORGANICS IN SOIL BY GC/MS
LM19	8240	VOLATILE ORGANICS IN SOIL BY GC/MS
LN01		NITROSAMINES IN SOIL BY GC
LN05	8140	ORGANONITROGEN/ORGANOPHOSPHORUS PESTICIDES IN SOIL
LO02	8010/8020	VOLATILE ORGANICS IN SOIL BY GC
LW12	8090	NITROAROMATICS IN SOIL BY HPLC
LW15		NITROGUANIDINE IN SOIL BY HPLC
LW18		THIODIGLYCOL IN SOIL BY HPLC
LW24	8040	PHENOLS IN SOIL
SB01	245.1	MERCURY IN WATER BY CVAA
SD19	200.7	VANADIUM IN WATER BY GFAA
SD20	239.2	LEAD IN WATER BY GFAA
SD21	270.2	SELENIUM IN WATER BY GFAA
SD22	206.2	ARSENIC IN WATER BY GFAA
SD23	272.2	SILVER IN WATER BY GFAA
SS10	200.7	METALS IN WATER BY ICAP
TF18	335.2	CYANIDE IN WATER
TF21	365.1	ORTHOPHOSPHORUS IN WATER BY AUTOANALYZER
TF22	300.0	NITRATE/NITRITE IN WATER BY AUTOANALYZER
TF25	350.1	AMMONIA IN WATER BY AUTOANALYZER
TF26	351.2	TKN IN WATER BY AUTOANALYZER
TF27	365.1	TOTAL PHOSPHATE IN WATER BY AUTOANALYZER
TT10	300.0	ANIONS IN WATER BY IC
TY10	376.2	SULFIDE IN WATER BY AUTOANALYZER
UF03		NITROCELLULOSE IN WATER BY AUTOANALYZER
UH02	608	PCBs IN WATER BY GC
UH13	608	ORGANOCHLORINE PESTICIDES IN WATER BY GC
UH14	615	HERBICIDES IN WATER BY HPLC
UL04		ORGANOSULFUR PESTICIDES IN WATER BY GC-FPD
UM18	625	EXTRACTABLE ORGANICS IN WATER BY GC/MS
UM20	624	VOLATILE ORGANICS IN WATER BY GC/MS
UN07	622	ORGANONITROGEN/ORGANOPHOSPHORUS IN WATER

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DEFINITIONS FOR ABBREVIATIONS USED IN THE FOLLOWING TABLES

NOTE: ALL CONTROL LIMITS ARE SUBJECT TO CHANGE AS PER THE USATHAMA QA PLAN CONTROL CHART PROTOCOL

CRL	CERTIFIED REPORTING LIMIT (microgram per gram)
UCR	UPPER CERTIFIED RANGE (micrograms per gram)
SLOPE	REPRESENTS AVERAGE ACCURACY OVER THE CERTIFIED RANGE
MAA	MOVING AVERAGE ACCURACY (percent recovery)
LCL	LOWER CONTROL LIMIT OF THE ACCURACY
UCL	UPPER CONTROL LIMIT OF THE ACCURACY
MAP	MOVING AVERAGE PRECISION
PREC	PRECISION OF THE REPLICATE HIGH SPIKE
ACCU	ACCURACY OF THE REPLICATE HIGH SPIKE

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A.2

Method CRLs, UCRs, and Slopes

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AAA9
IMPA, MPA IN SOIL BY IC

SHORT NAME	STORET	LONG NAME	CRL	UCR	SLOPE
FC2A	97381	FLUOROACETIC ACID	2.0	40.0	0.929
IMPA	97382	ISOPROPYLMETHYL PHOSPHONIC ACID	2.11	40.0	0.929
MPA	97383	METHYLPHOSPHONIC ACID	2.0	40.0	0.866

No EPA Method Number is available at this time.

H2
PHENOLS IN WATER BY COLORMETRY

SHORT NAME	STORET	LONG NAME	CRL	UCR	SLOPE
PHENLC	32730	PHENOLS (NON-SPECIFIC)	7.12	50.00	0.878

There is no EPA Number available for this method.

J2
HEXAVALENT CHROMIUM IN WATER BY TECHNICON

SHORT NAME	STORET	LONG NAME	CRL	UCR	SLOPE
CRHEX	1032	HEXAVALENT CHROMIUM	2.5	50.00	0.994

There is no EPA Number available for this method.

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HSL METALS IN SOIL

SHORT NAME	METHOD	STORET	LONG NAME	USATHAMA CRL	USATHAMA UCR	USATHAMA SLOPE	CLP* CRL
AL	JS16	1108	ALUMINUM	2.35	50000	1.008	40
SB	(6010)	1098	ANTIMONY	2.42	5000	0.878	12
BA		1008	BARIUM	5.18	2500	0.947	40
BE		1013	BERYLLIUM	0.5	1000	0.956	1
CA		917	CALCIUM	100.0	50000	0.965	1000
CD		1028	CADMIUM	0.7	1000	0.92	1
CR		99584	CHROMIUM	4.05	5000	0.876	2
CO		1038	COBALT	1.42	1000	0.906	10
CU		1043	COPPER	0.965	2500	0.958	5
FE		1170	IRON	3.68	50000	0.97	20
MG		924	MAGNESIUM	100.0	50000	0.94	1000
MN		1053	MANGANESE	2.05	5000	0.899	3
NI		1068	NICKEL	1.71	5000	0.87	8
K		938	POTASSIUM	100.0	50000	0.968	1000
NA		934	SODIUM	100.0	50000	0.972	1000
TL		34480	THALLLIUM	6.623	5000	0.857	2
ZN		1093	ZINC	8.03	5000	0.888	40
PB	JD17 (7421)	1052	LEAD	0.177	10	0.890	1
AG	JD18 (7761)	1078	SILVER	0.025	1.0	0.882	2
V	JD16 (7911)	1088	VANADIUM	0.775	20.0	0.833	10
AS	JD19 (7060)	1003	ARSENIC	0.250	10.0	0.842	2
SE	JD15 (7740)	1148	SELENIUM	0.25	10.0	0.757	1
HG	JB01 (7471)	71921	MERCURY	0.05	1.0	1.02	0.04

* These CRLs have been calculated assuming 100% solids, 1.0 gram solid sample and 200 mL final volume.
Numbers in () are the EPA Method Numbers.

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KF10 (353.2)
NITRATE IN SOIL BY TECHNICON

SHORT NAME	STORET	LONG NAME	CRL	UCR	SLOPE
NIT	633	NITRITE, NITRATE (TOTAL)	0.60	12	1.080

Number in () is the EPA Method Number.

KT05 (300.0)
ANIONS IN SOIL BY IC

SHORT NAME	STORET	LONG NAME	CRL	UCR	SLOPE
BR	97939	BROMIDE	5.0	200	0.957
CL	99120	CHLORIDE	6.05	204	0.994
F	949	FLUORIDE	3.62	51.2	0.871
SO4	81612	SULFATE	90.4	512	0.904

Number in () is the EPA Method Number.

CYANIDE IN SOIL

SHORT NAME	METHOD	STORET	LONG NAME	USATHAMA CRL	USATHAMA UCR	USATHAMA SLOPE	CLP* CRL
CYN	KY01 (335.2)	721	CYANIDE	0.92	10.0	0.924	2

* This CRL was calculated assuming 100% solids, 1.0 gram solid sample and 200 mL final volume.
Number in () is the EPA Method Number.

LF03
NITROCELLULOSE IN SOIL BY TECHNICON

SHORT NAME	STORET	LONG NAME	CRL	UCR	SLOPE
NC	99809	NITROCELLULOSE	10.4	125	0.533

There is no EPA Number available for this method.

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PESTICIDES/PCBs IN SOIL

SHORT NAME	METHOD	STORET	LONG NAME	USATHAMA CRL	USATHAMA UCR	USATHAMA SLOPE	CLP CRDL
ABHC	LH10	98357	BHC, A	0.00907	0.027	0.919	0.008
AENSLF	(8080)	98366	ENDOSULFAN, A	0.00601	0.0244	1.030	0.008
ALDRN		98356	ALDRIN	0.00729	0.0257	0.988	0.008
BBHC		98358	BHC, B	0.00257	0.0254	0.975	0.008
BENSLF		98367	ENDOSULFAN, B	0.00663	0.0244	1.10	0.016
DBHC		98359	BHC, D	0.00555	0.0252	1.280	0.008
DLDRN		98365	DIELDRIN	0.00629	0.0254	1.040	0.016
ENDRN		98369	ENDRIN	0.00657	0.0252	1.090	0.016
ENDRNA		98370	ENDRIN ALDEHYDE	0.0240	0.0302	0.871	--
ESFSO4		98368	ENDOSULFAN SULFATE	0.00763	0.0286	1.060	0.016
HPCL		98371	HEPTACHLOR	0.00618	0.0262	1.040	0.008
HPCLE		98372	HEPTACHLOR EPOXIDE	0.0062	0.026	1.404	0.008
LIN		98360	LINDANE	0.00638	0.0262	1.030	0.008
MEXCLR		97818	METHOXYCHLOR	0.0711	0.249	1.20	0.080
PPDDD		98362	DDD-PP	0.00826	0.0246	1.11	0.016
PPDDE		98363	DDE-PP	0.00765	0.0286	1.060	0.016
PPDDT		98364	DDT-PP	0.00707	0.0281	1.010	0.016
TXPHEN		98373	TOXAPHENE	0.444	1.12	1.350	0.160
ISODR		98649	ISODRIN	0.00461	0.0412	0.941	--
CLDAN		98361	CHLORDANE+	0.0177	0.1970	0.839	--
PCB016	LH16	98140	PCB 1016	0.0666	0.367	1.18	0.080
PCB221*	(8080)	98351	PCB 1221	0.0666	0.367	1.18	0.080
PCB232*		98352	PCB 1232	0.0666	0.367	1.18	0.080
PCB242*		98353	PCB 1242	0.0804	0.407	1.06	0.160
PCB248*		98802	PCB 1248	0.0804	0.407	1.06	0.160
PCB254*		98354	PCB 1254	0.0804	0.407	1.06	0.160
PCB260		98139	PCB 1260	0.0804	0.407	1.06	0.160
KEND@			ENDRIN KETONE				0.016

* The detection limits for these analytes are uncertified.
\+ The CLP Target Compound List has both alpha, and gamma-Chlordane listed separately, the method above is only certified for total Chlordane.
@ This analyte is done with method LM18 (extractable organics by GC/MS)
Numbers in () are the EPA Method Numbers.

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B2EHP	99460	BIS(2-EHTYLHEXYL) PHTHALATE	Y	Y	0.62	13	0.974	0.3
BAANTR	99453	BENZO [A] ANTHRACENE	Y	Y	0.17	13	1.06	0.3
BAPYR	99456	BENZO [A] PYRENE	Y	Y	0.25	13	0.840	0.3
BBFANT	99454	BENZO [B] FLUORANTHENE	Y	Y	0.21	3.3	0.785	0.3
BBZP	99463	BUTYLBENZYL PHTHALATE	Y	Y	0.17	6.7	0.963	0.3
BENZOA		BENZOIC ACID	N	Y				2
BGHIPY	99691	BENZO [G,H,I] PERYLENE	Y	Y	0.25	3.3	1.020	0.3
BKFANT	99454	BENZO [K] FLUORANTHENE	Y	Y	0.066	0.67	0.964	0.3
BZALC	97731	BENZYL ALCOHOL	N	Y	0.19	13	0.963	0.3
CHRY	99690	CHRYSENE	Y	Y	0.12	6.7	0.816	0.3
CL6BZ	99478	HEXACHLOROBENZENE	Y	Y	0.033	6.7	0.907	0.3
CL6CP	98647	HEXACHLOROCYCLOPENTADIENE	Y	Y	6.2	13	0.131	0.3
CL6ET	99480	HEXACHLOROETHANE	Y	Y	0.15	13	0.716	0.3
DBAHA	99466	DIBENZ [A,H] ANTHRACENE	Y	Y	0.21	13	0.999	0.3
DBZFUR	97727	DIBENZOFURAN	N	Y	0.035	6.7	0.901	0.3
DEP	99472	DIETHYL PHTHALATE	Y	Y	0.24	6.7	0.927	0.3
DMP	99473	DIMETHYL PHTHALATE	Y	Y	0.17	13	0.890	0.3
DNBP	99467	DI-N-BUTYL PHTHALATE	Y	Y	0.061	3.3	0.935	0.3
FANT	99689	FLUORANTHENE	Y	Y	0.068	13	0.863	0.3
FLRENE	99692	FLUORENE	Y	Y	0.033	13	0.856	0.3
HCBD	99479	HEXACHLOROBUTADIENE	Y	Y	0.23	13	0.747	0.3
ICDPYR	99482	INDENO [1,2,3-CD] PYRENE	Y	Y	0.29	13	0.948	0.3
ISOPHR	99483	ISOPHORONE	Y	Y	0.033	13	0.833	0.3
NAP	99696	NAPHTHALENE	Y	Y	0.037	3.3	0.858	0.3
NB	99485	NITROBENZENE	Y	Y	0.045	13	0.840	0.3
NNDNPA	99487	N-NITROSO, DI-N-PROPYLAMINE	Y	Y	0.2	13	0.849	0.3
NNDPA	99488	N-NITROSODIPHENYLAMINE	Y	Y	0.19	13	0.848	0.3
PCP	99682	PENTACHLOROPHENOL	Y	Y	1.3	6.7	0.790	2
PHANTR	99489	PHENANTHRENE	Y	Y	0.033	13	0.969	0.3
PHENOL	99685	PHENOL	Y	Y	0.11	3.3	0.811	0.3
PYR	99490	PYRENE	Y	Y	0.033	3.3	0.845	0.3
246TCP	99684	2,4,6-TRICHLOROPHENOL	Y	Y	0.17	13	0.948	0.3
26DNT	9947	2,6-DINITROTOLUENE	Y	Y	0.085	13	0.954	0.3
4CANiL	97726	4-CHLOROANILINE	N	Y	0.81	3.3	0.517	0.3
DNOP	99476	DI-N-OCTYL PHTHALATE	Y	Y	0.19	6.7	0.712	0.3

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NON-CERTIFIED ANALYTES

MEXCLR	97569	METHOXYCHLOR	N	Y	0.33	5
CLDANA	97767	CHLORDANE, ALPHA	Y	Y	0.33	5
CLDANG	97768	CHLORDANE, GAMMA	Y	Y	0.33	5
ALDRN	98356	ALDRIN	Y	Y	0.33	0.5
ABHC	98357	BHC, A	Y	Y	0.27	0.5
BBHC	98358	BHC, B	Y	Y	0.27	0.5
DBHC	98359	BHC, D	Y	Y	0.27	0.5
PPDDD	98362	DDD, PP	Y	Y	0.3	1.0
PPDDE	98363	DDE, PP	Y	Y	0.31	1.0
PPDDT	98364	DDT, PP	Y	Y	0.31	1.0
DLDRN	98365	DIELDRIN	Y	Y	0.31	1.0
AENSLF	98366	ENDOSULFAN A	Y	Y	0.62	0.5
BENSLF	98367	ENDOSULFAN B	Y	Y	0.62	1.0
ESFSO4	98368	ENDOSULFAN SULFATE	Y	Y	0.62	1.0
ENDRIN	98369	ENDRIN	Y	Y	0.45	1.0
HPCL	98371	HEPTACHLOR	Y	Y	0.13	0.5
HPCLE	98372	HEPTACHLOR EPOXIDE	Y	Y	0.33	0.5
GBHC	98360	BHC, G (LINDANE)	Y	Y	0.27	0.5
PCB016	98140	PCB - 1016	Y	Y	1.4	5
PCB221	98351	PCB - 1221	Y	Y	1.4	5
PCB232	98352	PCB - 1232	Y	Y	1.4	5
PCB242	98353	PCB - 1242	Y	Y	1.4	5
PCB248	98436	PCB - 1248	Y	Y	2.0	5
PCB254	98354	PCB - 1254	Y	Y	2.3	10
PCB260	98139	PCB - 1260	Y	Y	2.6	10
TXPHEN	98373	TOXAPHENE	Y	Y	2.6	10
BENZID	99457	BENZIDINE	Y	N	0.85	
ENDRNA	98370	ENDRIN ALDEHYDE	Y	N	0.53	
NNDMEA	99486	N-NITROSODIMETHYLAMINE	Y	N	0.14	
KEND	97720	ENDRIN KETONE	N	Y	0.53	1.0
12DPH	99477	1,2-DIPHENYL HYDRAZINE	Y	N	0.14	

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SURROGATES

246TBP	97448	2,4,6-TRIBROMOPHENOL	0.38	13	0.910
2FBP	98814	2-FLUOROBIPHENYL	0.021	6.7	0.903
2FP	98325	2-FLUOROPHENOL			
NBD5	97022	NITROBENZENE-D5	0.025	6.7	0.858
TRPD14	97449	TERPHENYL-D14	0.34	6.7	1.070
PHEND6	97023	PHENOL-D6	0.23	13	0.824

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METHOD LM19 (8240); VOLATILE ORGANICS IN SOIL BY GC/MS FOR BOTH PRIORITY POLLUTANTS AND HAZARDOUS SUBSTANCE LIST COMPOUNDS

SHORT NAME	STORET	LONG NAME	PRIORITY POLL.	HAZARDOUS SUBST. LIST	USATHAMA CRL	UCR	SLOPE	CLP CRDL
111TCE	98692	1,1,1-TRICHLOROETHANE	Y	Y	4.4	200	1.200	5
112TCE	98693	1,1,2-TRICHLOROETHANE	Y	Y	5.4	200	1.100	5
11DCE	98789	1,1-DICHLOROETHENE	Y	Y	3.9	100	1.070	5
11DCLE	98683	1,1-DICHLOROETHANE	Y	Y	2.3	200	1.030	5
12DCE	97721	1,2-DICHLOROETHENE			3.0	100	0.986	5
12DCLE	98684	1,2-DICHLOROETHANE	Y	Y	1.7	200	1.020	5
12DCLP	98790	1,2-DICHLOROPROPANE	Y	Y	2.9	200	1.100	5
ACET	97020	ACETONE	N	Y	17.0	100	0.970	10
BRDCLM	98783	BROMODICHLOROMETHANE	Y	Y	2.9	200	1.180	5
C13DCP	98791	CIS-1,3-DICHLOROPROPENE	Y	Y	3.2	248	1.130	5
C2AVE	97723	VINYL ACETATE	N	Y	3.2	100	1.370	10
C2H3CL	98795	VINYL CHLORIDE	Y	Y	6.2	200	1.090	10
C2H5CL	98786	CHLOROETHANE	Y	Y	12.0	200	1.050	10
C6H6	98699	BENZENE	Y	Y	1.5	200	1.020	5
CCL3F	98794	TRICHLOROFLUOROMETHANE	Y	N	5.9	100	1.170	
CCL4	98680	CARBON TETRACHLORIDE	Y	Y	7.0	200	1.270	5
CH2CL2	98689	METHYLENE CHLORIDE	Y	Y	12.0	200	0.988	5
CH3BR	98785	BROMOMETHANE	Y	Y	5.7	200	0.891	10
CH3CL	98787	CHLOROMETHANE	Y	Y	8.8	100	0.882	10
CHBR3	98784	BROMOFORM	Y	Y	6.9	200	1.330	5
CHCL3	98682	CHLOROFORM	Y	Y	0.87	200	1.030	5
CLC6H5	98681	CHLOROBENZENE	Y	Y	0.86	200	1.070	5
CS2	97472	CARBON DISULFIDE	N	Y	4.4	100	0.993	5
DBRCLM	98788	DIBROMOCHLOROMETHANE	N	Y	3.1	200	1.230	5
ETC6H5	98688	ETHYLBENZENE	Y	Y	1.7	200	1.030	5
MEC6H5	98691	TOLUENE	Y	Y	0.78	200	1.020	5
MEK	98801	METHYL ETHYL KETONE	N	Y	70.0	200	1.140	10
MIBK	98696	METHYL ISOBUTYL KETONE	N	Y	27.0	100	1.300	10
MNBK	97722	METHYL-N-BUTYL KETONE	N	Y	32.0	100	1.240	10

STYR	97734	STYRENE	N	Y	2.6	200	1.030	5
T13DCP	98792	TRANS-1,3-DICHLOROPROPENE	N	Y	2.8	152	1.150	5
TCLEA	98793	1,1,2,2-TETRACHLOROETHANE	Y	Y	2.4	200	1.130	5
TCLEE	98690	TETRACHLOROETHENE	Y	Y	0.81	200	1.030	5
TRCLE	98694	TRICHLOROETHENE	Y	Y	2.8	200	1.160	5
XYLEN	97724	XYLENE	N	Y	1.5	200	1.010	5
	NON-CERTIFIED ANALYTES							
CL2BC	98803	DICHLOROBENZENE (TOTAL)						
ACROLN	97028	ACROLEIN						
ACRYLO	97029	ACRYLONITRILE						
2CLEVE	98796	2-CHLOROETHYLVINYL ETHER						
	SURROGATES							
12DCD4		1,2-DICHLOROETHANE-D4			3.2	200	0.995	
4BFB		4-BROMOFLUOROBENZENE			2.9	200	1.100	
MEC6D8		TOLUENE-D8			1.5	200	0.999	

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All concentrations are in ug/kg

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METHOD UM18 (625); EXTRACTABLE ORGANICS IN WATER BY GC/MS FOR BOTH PRIORITY POLLUTANTS AND HAZARDOUS SUBSTANCE LIST COMPOUNDS

SHORT NAME	STORET	LONG NAME	PRIORITY POLL.	HAZARDOUS SUBST. LIST	USATHAMA CRL	USATHAMA UCR	USATHAMA SLOPE	CLP CRDL
124TCB	34551	1,2,4-TRICHLOROBENZENE	Y	Y	1.8	50	0.824	10
12DCLB	34536	1,2-DICHLOROBENZENE	Y	Y	1.7	50	0.856	10
13DCLB	34566	1,3-DICHLOROBENZENE	Y	Y	1.7	200	0.790	10
14DCLB	34571	1,4-DICHLOROBENZENE	Y	Y	1.7	200	0.786	10
245TCP	77687	2,4,5-TRICHLOROPHENOL	N	Y	5.2	200	1.060	50
24DCLP	34601	2,4-DICHLOROPHENOL	Y	Y	2.9	200	0.930	10
24DMPN	34606	2,4-DIMETHYLPHENOL	Y	Y	5.8	100	0.938	10
24DNP	34616	2,4-DINITROPHENOL	Y	Y	21.0	100	1.370	50
24DNT	34611	2,4-DINITROTOLUENE	Y	Y	4.5	200	0.954	10
2CLP	34586	2-CHLOROPHENOL	Y	Y	0.99	200	0.967	10
2CNAP	34581	2-CHLORONAPHTHALENE	Y	Y	0.5	200	0.880	10
2MNAP	77416	2-METHYLNAPHTHALENE	N	Y	1.7	50	0.919	10
2MP	99073	2-METHYLPHENOL	N	Y	3.9	200	0.967	10
2NANIL	99077	2-NITROANILINE	N	Y	4.3	100	0.958	50
2NP	34591	2-NITROPHENOL	Y	Y	3.7	100	0.986	10
33DCBD	34631	3,3-DICHLOROBENZIDINE	Y	Y	12.0	100	1.530	20
3NANIL	99078	3-NITROANILINE	N	Y	4.9	100	0.965	50
46DN2C	34657	2-METHYL-4,6-DINITROPHENOL	Y	Y	17.0	100	1.220	50
4BRPPE	34636	4-BROMOPHENYLPHENYL ETHER	Y	Y	4.2	100	0.902	10
4CL3C	34452	3-METHYL-4-CHLOROPHENOL	Y	Y	4.0	200	0.989	10
4CLPPE	34641	4-CHLOROPHENYLPHENYL ETHER	Y	Y	5.1	100	0.856	10
4MP	99074	4-METHYLPHENOL	N	Y	0.52	200	0.848	10
4NANIL	99079	4-NITROANILINE	N	Y	5.2	100	1.010	50
4NP	34646	4-NITROPHENOL	Y	Y	12.0	100	0.662	50
ANAPNE	34205	ACENAPHTHENE	Y	Y	1.7	50	0.946	10
ANAPYL	34200	ACENAPHTHYLENE	Y	Y	0.5	50	0.966	10
ANTRC	34220	ANTHRACENE	Y	Y	0.5	100	0.974	10
B2CEXM	34278	BIS(2-CHLOROETHOXY) METHANE	Y	Y	1.5	50	0.928	10
B2CIPE	34283	BIS(2-CHLOROISOPROPYL) ETHER	Y	Y	5.3	200	0.834	10
B2CLEE	34273	BIS(2-CHLOROETHYL) ETHER	Y	Y	1.9	50	0.943	10

B2EHP	39100	BIS(2-EHTYLHEXYL) PHTHALATE	Y	Y	4.8	100	1.100	10
BAANTR	34526	BENZO [A] ANTHRACENE	Y	Y	1.6	100	0.996	10
BAPYR	34247	BENZO [A] PYRENE	Y	Y	4.7	100	1.120	10
BBFANT	34230	BENZO [B] FLUORANTHENE	Y	Y	5.4	50	1.050	10
BBZP	34292	BUTYLBENZYL PHTHALATE	Y	Y	3.4	100	1.060	10
BENZOA	77247	BENZOIC ACID	N	Y	13.0	100	0.646	50
BGHIPY	34521	BENZO [G,H,I] PERYLENE	Y	Y	6.1	50	1.300	10
BKFANT	34242	BENZO [K] FLUORANTHENE	Y	Y	0.87	100	1.020	10
BZALC	77147	BENZYL ALCOHOL	N	Y	0.72	100	0.861	10
CHRY	34320	CHRYSENE	Y	Y	2.40	100	0.967	10
CL6BZ	39700	HEXACHLOROBENZENE	Y	Y	1.6	100	0.949	10
CL6CP	34386	HEXACHLOROCYCLOPENTADIENE	Y	Y	8.6	100	0.707	10
CL6ET	34396	HEXACHLOROETHANE	Y	Y	1.5	50	0.818	10
DBAHA	34556	DIBENZ [A,H] ANTHRACENE	Y	Y	6.5	50	1.160	10
DBZFUR	81302	DIBENZOFURAN	N	Y	1.7	50	0.941	10
DEP	34336	DIETHYL PHTHALATE	Y	Y	2.0	200	0.863	10
DMP	34341	DIMETHYL PHTHALATE	Y	Y	1.5	100	0.807	10
DNBP	39110	DI-N-BUTYL PHTHALATE	Y	Y	3.7	200	1.100	10
FANT	34376	FLUORANTHENE	Y	Y	3.3	100	0.996	10
FLRENE	34381	FLUORENE	Y	Y	3.7	50	0.960	10
HCBD	34391	HEXACHLOROBUTADIENE	Y	Y	3.4	100	0.731	10
ICDPYR	34403	INDENO [1,2,3-CD] PYRENE	Y	Y	8.6	100	1.170	10
ISOPHR	34408	ISOPHORONE	Y	Y	4.8	50	0.971	10
NAP	34696	NAPHTHALENE	Y	Y	0.5	20	1.150	10
NB	34447	NITROBENZENE	Y	Y	0.5	50	0.887	10
NNDNPA	34428	N-NITROSO, DI-N-PROPYLAMINE	Y	Y	4.4	50	0.987	10
NNDPA	34433	N-NITROSODIPHENYLAMINE	Y	Y	3.0	200	0.956	10
PCP	39032	PENTACHLOROPHENOL	Y	Y	18.0	100	1.260	50
PHANTR	34461	PHENANTHRENE	Y	Y	0.5	100	1.000	10
PHENOL	34694	PHENOL	Y	Y	9.2	200	0.542	10
PYR	34469	PYRENE	Y	Y	2.8	100	0.995	10
246TCP	34621	2,4,6-TRICHLOROPHENOL	Y	Y	4.2	100	1.02	10
26DNT	34626	2,6-DINITROTOLUENE	Y	Y	0.79	200	1.09	10
4CANIL	99075	4-CHLOROANILINE	N	Y	7.3	100	0.872	10
DNOP	34596	DI-N-OCTYL PHTHALATE	Y	Y	15.0	100	1.28	10

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MEXCLR	39480	METHOXYCHLOR	N	Y	5.1	0.5
CLDANA	39348	CHLORDANE, ALPHA	Y	Y	5.1	0.5
CLDANG	39810	CHLORDANE, GAMMA	Y	Y	5.1	0.5
ALDRN	39330	ALDRIN	Y	Y	4.7	0.05
ABHC	39337	BHC, A	Y	Y	4.0	0.05
BBHC	39338	BHC, B	Y	Y	4.0	0.05
DBHC	34259	BHC, D	Y	Y	4.0	0.05
PPDDD	39310	DDD, PP	Y	Y	4.0	0.10
PPDDE	39320	DDE, PP	Y	Y	4.7	0.10
PPDDT	39300	DDT, PP	Y	Y	9.2	0.10
DLDRN	39380	DIELDRIN	Y	Y	4.7	0.10
AENSLF	34361	ENDOSULFAN A	Y	Y	9.2	0.05
BENSLF	34356	ENDOSULFAN B	Y	Y	9.2	0.10
ESFSO4	34351	ENDOSULFAN SULFATE	Y	Y	9.2	0.10
ENDRIN	39390	ENDRIN	Y	Y	7.6	0.10
HPCL	39410	HEPTACHLOR	Y	Y	2.0	0.05
HPCLE	39420	HEPTACHLOR EPOXIDE	Y	Y	5.0	0.05
GBHC	39340	BHC, G (LINDANE)	Y	Y	4.0	0.05
PCB016	34671	PCB - 1016	Y	Y	21.0	0.5
PCB221	39488	PCB - 1221	Y	Y	21.0	0.5
PCB232	39492	PCB - 1232	Y	Y	21.0	0.5
PCB242	39496	PCB - 1242	Y	Y	30.0	0.5
PCB248	39500	PCB - 1248	Y	Y	30.0	0.5
PCB254	39504	PCB - 1254	Y	Y	36.0	1.0
PCB260	39508	PCB - 1260	Y	Y	36.0	1.0
TXPHEN	39400	TOXAPHENE	Y	Y	36.0	1.0
BENZID	39120	BENZIDINE	Y	N	10.0	
ENDRNA	34366	ENDRIN ALDEHYDE	Y	N	8.0	
NNDMEA	34438	N-NITROSODIMETHYLAMINE	Y	N	2.0	
KEND	78008	ENDRIN KETONE	N	Y	8.0	0.10
12DPH	34346	1,2-DIPHENYL HYDRAZINE	Y	N	2.0	

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						LCL	UCL	MAP
	SURROGATES							
246TBP		2,4,6-TRIBROMOPHENOL	13.0	200	1.260	64.3	107.6	54.5
2FBP	98321	2-FLUOROBIPHENYL	12.0	100	0.891	65.8	100.8	44.0
2FP	98316	2-FLUOROPHENOL	17.0	200	0.657	50.6	87.1	46.0
NBD5	98318	NITROBENZENE-D5	11.0	100	0.845	66.5	102.0	44.6
TRPD14	97447	TERPHENYL-D14	14.0	100	0.878	78.0	112.0	42.8
PHEND6	98317	PHENOL-D6	36.0	200	0.50	38.8	63.3	30.9

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METHOD UM20 (624); VOLATILE ORGANICS IN WATER BY GC/MS FOR BOTH PRIORITY POLLUTANTS AND HAZARDOUS SUBSTANCE LIST COMPOUNDS

SHORT NAME	STORET	LONG NAME	PRIORITY POLL.	HAZARDOUS SUBST. LIST	USATHAMA CRL	UCR	SLOPE	CLP CRDL
111TCE	34506	1,1,1-TRICHLOROETHANE	Y	Y	0.5	200	1.01	5
112TCE	34511	1,1,2-TRICHLOROETHANE	Y	Y	1.2	200	0.943	5
11DCE	34501	1,1-DICHLOROETHENE	Y	Y	0.50	200	1.06	5
11DCLE	34496	1,1-DICHLOROETHANE	Y	Y	0.68	200	0.881	5
12DCLE	34531	1,2-DICHLOROETHANE	Y	Y	0.50	50	0.995	5
12DCLP	34541	1,2-DICHLOROPROPANE	Y	Y	0.50	200	1.02	5
2CLEVE	34576	2-CHLOROETHYLVINYL ETHER	Y	N	0.71	200	1.01	
BRDCLM	32101	BROMODICHLOROMETHANE	Y	Y	0.59	200	1.02	5
C13DCP	34704	CIS-1,3-DICHLOROPROPENE	Y	Y	0.58	230	1.02	5
C2H3CL	39175	VINYL CHLORIDE	Y	Y	2.6	200	0.964	10
C2H5CL	34311	CHLOROETHANE	Y	Y	1.9	200	0.980	10
C6H6	34030	BENZENE	Y	Y	0.50	200	1.01	5
CCL3F	34488	TRICHLOROFLUOROMETHANE	Y	N	1.4	50	0.998	
CCL4	32102	CARBON TETRACHLORIDE	Y	Y	0.58	200	1.05	5
CH2CL2	34423	METHYLENE CHLORIDE	Y	Y	2.3	100	1.06	5
CH3BR	34413	BROMOMETHANE	Y	Y	5.8	100	1.01	10
CH3CL	34418	CHLOROMETHANE	Y	Y	3.2	200	0.952	10
CHBR3	32104	BROMOFORM	Y	Y	2.60	200	1.05	5
CHCL3	32106	CHLOROFORM	Y	Y	0.5	200	0975	5
CLC6H5	34301	CHLOROBENZENE	Y	Y	0.5	200	1.04	5
DBRCLM	32105	DIBROMOCHLOROMETHANE	N	Y	0.67	100	0.981	5
ETC6H5	34371	ETHYLBENZENE	Y	Y	0.5	200	1.05	5
MEC6H5	34010	TOLUENE	Y	Y	0.5	200	1.02	5
T13DCP	34699	TRANS-1,3-DICHLOROPROPENE	N	Y	0.70	280	0.964	5
TCLEA	34516	1,1,2,2-TETRACHLOROETHANE	Y	Y	0.51	200	1.03	5
TCLEE	34475	TETRACHLOROETHENE	Y	Y	1.6	200	0.984	5
TRCLE	39180	TRICHLOROETHENE	Y	Y	0.50	200	1.05	5
XYLEN	99649	XYLENE	N	Y	0.84	200	1.06	5
ACET	81552	ACETONE	N	Y	13.0	200	1.02	10

CS2	77041	CARBONDISULFIDE	N	Y	0.5	200	0.882	5			
12DCE	99642	1,2-DICHLOROETHENE (TOTAL)			0.5	200	1.03	5			
MEK	81595	2-BUTANONE	N	Y	6.4	200	0.992				
C2AVE	77057	VINYL ACETATE	N	Y	8.3	50	0.984	10			
MIBK	81596	4-METHYL-2-PENTANONE	N	Y	3.0	200	0.918	10			
MNBK	77103	2-HEXANONE	N	Y	3.6	200	0.917	10			
STYR	77128	STYRENE	N	Y	0.5	200	1.10	5			
	NON-CERTIFIED ANALYTES										
CL2BZ	81524	DICHLOROBENZENE									
ACROLN	34210	ACROLEIN									
ACRYLO	34215	ACRYLONITRILE									
	SURROGATES								LCL	UCL	MAP
12DCD4	98812	1,2-DICHLOROETHANE-D4			23.0	200	0.881		86.2	102.8	20.9
4BFB		4-BROMOFLUOROBENZENE			6.5	200	1.110		92.2	107.2	19.3
MEC6D8	98810	TOLUENE-D8			0.5	200	1.060		92.0	110.0	22.7

Number in () is the EPA Method Number.

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A.3

Current Control Limits

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ARMY METHODS TABLE FOR METALS ANALYZED BY WATER ICAP METHOD - CURRENT STANDARD MATRIX SPIKE CONTROL LIMITS 17:02:19 22 SEP 1990

METH	TST NM	STORET	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY	OCT	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
SS10	AG	1077	UGL	4.600000	2500.0000	0.98900	N								
SS10	AL	1105	UGL	141.000000	45000.0000	0.89100	N								
SS10	B	1022	UGL	50.000000	50000.0000	0.88000	N								
SS10	BA	1007	UGL	5.000000	10000.0000	1.08000	Y	89.24	95.66	108.48	121.31	127.72	18.80	38.55	48.43
SS10	BE	1012	UGL	5.000000	1000.0000	0.89300	N	71.65	75.55	83.35	91.14	95.04	11.43	23.43	29.44
SS10	BI		UGL	109.000000	25000.0000	1.02000	N								
SS10	CA	82032	UGL	500.000000	20000.0000	0.97400	Y	82.88	90.68	106.27	121.86	129.65	22.86	46.86	58.86
SS10	CD	1027	UGL	4.010000	5000.0000	1.00000	Y	86.43	90.63	99.04	107.44	111.64	12.32	25.25	31.72
SS10	CO	1037	UGL	25.000000	50000.0000	0.87900	Y	89.76	93.00	99.50	106.00	109.24	9.52	19.52	24.52
SS10	CR	1034	UGL	6.020000	5000.0000	1.01000	Y	79.56	87.65	103.83	120.01	128.10	23.72	48.63	61.09
SS10	CU	1042	UGL	8.090000	10000.0000	0.98500	Y	74.82	84.41	103.60	122.78	132.38	28.13	57.67	72.44
SS10	FE	1045	UGL	42.700000	500000.0000	0.90700	N								
SS10	K	82034	UGL	375.000000	12500.0000	0.88100	N								
SS10	MG	82033	UGL	500.000000	20000.0000	0.98800	Y	90.95	94.84	102.60	110.37	114.25	11.38	23.33	29.31
SS10	MN	1055	UGL	2.750000	2000.0000	0.93400	Y	81.78	88.46	101.83	115.19	121.87	19.59	40.16	50.45
SS10	MO	1062	UGL	15.300000	8000.0000	0.88300	N								
SS10	NA	82035	UGL	500.000000	50000.0000	0.95400	Y	90.41	96.23	107.87	119.52	125.34	17.07	34.99	43.96
SS10	NI	1067	UGL	34.300000	15000.0000	0.86000	Y	78.30	84.47	96.82	109.16	115.33	18.10	37.10	46.60
SS10	PB	1051	UGL	18.600000	5000.0000	0.94500	N								
SS10	SB	1097	UGL	38.000000	6000.0000	0.84400	N	56.89	65.95	84.08	102.21	111.28	26.58	54.49	68.45
SS10	SE	1147	UGL	71.100000	75000.0000	0.92800	N								
SS10	SN		UGL	47.100000	200.0000	1.00000	N								
SS10	TE		UGL	103.000000	2000.0000	0.99400	N								
SS10	TL	1059	UGL	81.400000	40000.0000	0.85700	N								
SS10	V	1087	UGL	11.000000	1000.0000	0.95800	N								
SS10	ZN	1092	UGL	21.100000	20000.0000	0.94900	Y	90.44	97.39	111.30	125.21	132.16	20.39	41.80	52.50

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMITS PREC MEAN	PREC UWL	PREC UCL
SS10	AG	1077	UGL								
SS10	AL	1105	UGL								
SS10	B	1022	UGL								
SS10	BA	1007	UGL	94.45	95.55	97.75	99.95	101.04	1.75	4.40	5.72
SS10	BE	1012	UGL	93.44	94.13	95.51	96.89	97.58	1.10	2.76	3.59
SS10	CA	82032	UGL	95.56	97.27	100.69	104.11	105.82	2.73	6.85	8.91
SS10	CD	1027	UGL	92.61	93.90	96.49	99.07	100.36	2.06	5.17	6.73
SS10	CO	1037	UGL	91.07	92.17	94.38	96.59	97.69	1.76	4.42	5.74
SS10	CR	1034	UGL	94.72	95.88	98.21	100.54	101.70	1.85	4.66	6.06
SS10	CU	1042	UGL	93.39	94.39	96.40	98.40	99.41	1.60	4.02	5.23
SS10	FE	1045	UGL								
SS10	K	82034	UGL								
SS10	MG	82033	UGL	94.20	95.78	98.93	102.08	103.66	2.51	6.31	8.21
SS10	MN	1055	UGL	94.35	95.22	96.97	98.71	99.59	1.39	3.49	4.54
SS10	MO	1062	UGL								
SS10	NA	82035	UGL	89.70	91.81	96.05	100.29	102.40	3.38	8.48	11.04
SS10	NI	1067	UGL	90.89	91.85	93.78	95.71	96.67	1.53	3.86	5.02
SS10	PB	1051	UGL								
SS10	SB	1097	UGL	86.97	88.74	92.30	95.85	97.62	2.83	7.11	9.25
SS10	SE	1147	UGL								
SS10	SN		UGL								
SS10	TL	1059	UGL								
SS10	V	1087	UGL								
SS10	ZN	1092	UGL	93.46	94.70	97.18	99.65	100.89	1.97	4.95	6.44

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS FOR THE VOA AND SVOA GCMS METHODS IN WATER AND SOIL

PREPARED: 17:41:06 22 SEP 1990

								HIGH SPIKE 3 DAY MOVING AVERAGE ACCURACY					PRECISION LIMITS		
METH	TST NM	STORET	PARAMETER NAME	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY OCT	MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	MAP MEAN	MAP UWL	MAP UCL
M18	246TBP	97770	2,4,6-TRIBROMOPHENOL	UCG	.380000	13.0000	0.91000 Y	78.14	83.65	94.66	105.68	111.19	16.15	33.11	41.59
M18	2FBP	98814	FLUORBIPHENYL	UCG	.021000	6.7000	0.90300 Y	71.71	76.43	85.87	95.30	100.02	13.83	28.36	35.63
M18	2FP	97024	2-FLUOROPHENOL	UCG	.170000	13.0000	0.74400 Y	62.23	66.62	75.42	84.21	88.61	12.89	26.43	33.20
M18	NBD5	97022	NITROBENZENE-D(5)	UCG	.025000	6.7000	0.85800 Y	71.28	76.14	85.86	95.59	100.45	14.25	29.22	36.70
M18	PHEND6	97023	PHENOL-D(5)	UCG	.230000	13.0000	0.82400 Y	67.81	72.73	82.57	92.41	97.33	14.42	29.57	37.15
M18	TRPD14	98808	TERPHENYL-D(14)	UCG	.340000	6.7000	1.07000 Y	82.47	87.44	97.39	107.33	112.30	14.57	29.88	37.53
M19	12DCD4	98677	1,2-DICHLOROETHENE -D4	UCG	.003200	.2000	0.99500 Y	89.53	91.72	96.09	100.46	102.65	6.41	13.14	16.51
M19	4BFB	98402	4-BROMOFLUOROBENZE,T	UCG	.002900	.2000	0.92400 Y	93.25	95.51	100.04	104.56	106.82	6.62	13.58	17.06
M19	MEC6D8	98811	TOLUENE-D(8)	UCG	.001500	.2000	0.99900 Y	92.67	94.98	99.61	104.23	106.54	6.78	13.89	17.45
M18	246TBP	97446	2,4,6-TRIBROMOPHENOL	UCL	13.000000	200.0000	1.26000 Y	71.51	77.51	89.50	101.49	107.48	17.58	36.04	45.27
M18	2FBP	98321	2-FLUORBIPHENYL	UCL	12.000000	100.0000	0.89100 Y	67.98	72.91	82.77	92.64	97.57	14.45	29.64	37.23
M18	2FP	98316	2-FLUOROPHENOL	UCL	17.000000	200.0000	0.65700 Y	52.44	56.99	66.10	75.20	79.75	13.34	27.35	34.36
M18	NBD5	98318	NITROBENZENE-D(5)	UCL	11.000000	100.0000	0.84500 Y	67.76	73.00	83.49	93.98	99.22	15.37	31.52	39.59
M18	PHEND6	98317	PHENOL-D(5)	UCL	36.000000	200.0000	0.50000 Y	40.05	43.36	49.98	56.60	59.91	9.70	19.89	24.99
M18	TRPD14	97447	TERPHENYL-(D14)	UCL	14.000000	100.0000	0.87800 Y	76.82	82.45	93.71	104.98	110.61	16.51	33.86	42.53
M20	12DCD4	98053	1,2-DICHLOROETHANE-D4	UCL	23.000000	200.0000	0.88100 Y	88.05	90.68	95.95	'01.23	103.86	7.72	15.84	19.90
M20	4BFB	97735	4-BROMOFLUOROBENZENE	UCL	6.500000	200.0000	1.11000 Y	90.54	93.58	99.66	105.74	108.78	8.91	18.27	22.95
M20	MEC6D8	98810	TOLUENE-D(8)	UCL	.500000	200.0000	1.06000 Y	90.60	93.68	99.84	106.00	109.08	9.03	18.52	23.26

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS FOR MERCURY AND GFAA METALS METHODS IN WATER AND SOIL 17:02:19 22 SEP 1990

METH	TST NM	STORET	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY OCT	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
JB01	HG	71921	UGG	.050000	1.0000	1.02000 Y	69.79	77.92	94.19	110.46	118.59	23.85	48.90	61.42
JD15	SE	1148	UGG	.250000	10.0000	0.75700 Y	50.94	60.91	80.85	100.79	110.76	29.23	59.93	75.28
JD16	V	1088	UGG	.775000	20.0000	0.83300 Y	64.03	73.67	92.94	112.22	121.85	28.26	57.93	72.77
JD17	PB	1052	UGG	.177000	10.0000	0.89000 Y	74.12	81.91	97.49	113.07	120.86	22.84	46.83	58.82
JD18	AG	1078	UGG	.025000	1.0000	0.88200 Y	73.94	79.61	90.95	102.29	107.96	16.63	34.09	42.82
JD19	AS	1003	UGG	.250000	10.0000	0.84200 Y	80.56	86.23	97.58	108.92	114.59	16.63	34.10	42.83

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMITS PREC MEAN	PREC UWL	PREC UCL
JB01	HG	71921	UGG	89.32	91.83	96.86	101.88	104.39	4.00	10.06	13.09
JD15	SE	1148	UGG	66.03	68.82	74.41	80.00	82.79	4.46	11.20	14.57
JD16	V	1088	UGG	88.55	90.79	95.27	99.75	101.99	3.57	8.97	11.67
JD17	PB	1052	UGG	85.35	87.51	91.81	96.12	98.27	3.43	8.62	11.22
JD18	AG	1078	UGG	89.43	90.54	92.78	95.01	96.12	1.78	4.47	5.81
JD19	AS	1003	UGG	88.13	90.57	95.46	100.34	102.79	3.89	9.78	12.73

METH	TST NM	STORET	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY OCT	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
SB01	HG	71900	UGL	.243000	10.0000	1.03000 Y	76.39	83.32	97.19	111.05	117.98	20.33	41.67	52.34
SD09	SB	1097	UGL	23.000000	300.0000	1.30000 Y								
SD09	TL	1059	UGL	6.990000	25.0000	0.90500 Y	86.03	91.75	103.18	114.61	120.32	16.76	34.35	43.15
SD19	V	1087	UGL	3.820000	200.0000	0.90900 Y	71.93	78.94	92.98	107.01	114.03	20.57	42.18	52.98
SD20	PB	1051	UGL	1.260000	100.0000	0.92200 Y	46.06	59.09	85.16	111.22	124.25	38.22	78.35	98.41
SD21	SE	1147	UGL	3.020000	100.0000	0.93900 Y	76.05	82.39	95.06	107.73	114.07	18.58	38.09	47.84
SD22	AS	1002	UGL	2.540000	100.0000	0.93800 Y	71.03	78.95	94.80	110.64	118.56	23.23	47.62	59.82
SD23	AG	1077	UGL	.250000	10.0000	1.06000 Y	85.99	90.31	98.95	107.60	111.92	12.67	25.98	32.63

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMITS PREC MEAN	PREC UWL	PREC UCL
SB01	HG	71900	UGL	90.83	94.57	102.07	109.56	113.30	5.97	15.01	19.52
SD09	SB	1097	UGL								
SD09	TL	1059	UGL	89.60	92.63	98.69	104.75	107.78	4.83	12.14	15.79
SD19	V	1087	UGL	92.33	94.57	99.05	103.54	105.78	3.57	8.98	11.68
SD20	PB	1051	UGL	93.56	95.16	98.36	101.55	103.15	2.55	6.40	8.33
SD21	SE	1147	UGL	91.26	92.90	96.19	99.47	101.11	2.62	6.57	8.55
SD22	AS	1002	UGL	89.84	91.31	94.23	97.16	98.62	2.33	5.86	7.62
SD23	AG	1077	UGL	93.43	95.41	99.36	103.32	105.29	3.15	7.92	10.30

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ARMY METHODS TABLE FOR METALS ANALYZED BY SOIL ICAP METHOD - CURRENT STANDARD MATRIX SPIKE CONTROL LIMITS 17:02:19 22 SEP 1990

METH	TST NM	STORET	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY	OCT	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
JS11	AG	1078	UGG	2.500000	50.0000	0.96500	Y	80.98	84.56	91.71	98.86	102.44	10.48	21.49	27.00
JS11	AL	1108	UGG	14.100000	5000.0000	1.00000	N								
JS11	B	99222	UGG	32.700000	200.0000	0.60200	Y								
JS11	BA	1008	UGG	29.600000	200.0000	0.62900	Y								
JS11	BE	1013	UGG	1.860000	20.0000	0.73900	Y	91.91	94.28	99.04	103.79	106.17	6.97	14.28	17.94
JS11	BI		UGG	31.500000	5000.0000	0.72500	Y								
JS11	CA	917	UGG	59.000000	5000.0000	0.61500	Y								
JS11	CD	1028	UGG	3.050000	20.0000	0.82600	Y	87.42	89.68	94.22	98.76	101.02	6.65	13.63	17.12
JS11	CO	1038	UGG	15.000000	5000.0000	0.60800	Y								
JS11	CR	1029	UGG	12.700000	5000.0000	0.61300	Y	88.12	91.40	97.96	104.53	107.81	9.62	19.72	24.77
JS11	CU	1043	UGG	58.600000	5000.0000	0.67500	Y	89.91	92.49	97.66	102.82	105.40	7.57	15.52	19.49
JS11	FE	1170	UGG	50.000000	5000.0000	1.04000	N								
JS11	K	938	UGG	37.500000	5000.0000	0.73300	N								
JS11	MG	924	UGG	50.000000	5000.0000	0.66000	N								
JS11	MN	1053	UGG	.275000	5000.0000	0.64200	N								
JS11	MO	99224	UGG	1.150000	5000.0000	0.65000	Y								
JS11	NA	934	UGG	150.000000	5000.0000	0.70300	Y								
JS11	NI	1068	UGG	12.600000	5000.0000	0.59300	Y	82.29	86.66	95.40	104.14	108.51	12.81	26.27	32.99
JS11	PB	1052	UGG	6.620000	50.0000	1.05000	Y								
JS11	SB	1098	UGG	3.800000	5000.0000	0.58100	N								
JS11	SE	1148	UGG	9.530000	5000.0000	0.60000	Y								
JS11	TE		UGG	54.200000	5000.0000	0.62800	Y								
JS11	TL	34480	UGG	31.300000	5000.0000	0.58000	Y	79.83	83.82	91.81	99.79	103.79	11.70	24.00	30.14
JS11	V	1088	UGG	13.000000	5000.0000	0.65000	Y								
JS11	ZN	1093	UGG	30.200000	5000.0000	0.57300	Y	85.18	89.59	98.41	107.24	111.65	12.93	26.52	33.31

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMITS PREC MEAN	PREC UWL	PREC UCL
JS11	AG	1078	UGG	86.35	87.58	90.05	92.51	93.74	1.96	4.93	6.41
JS11	AL	1108	UGG								
JS11	B	99222	UGG								
JS11	BA	1008	UGG								
JS11	BE	1013	UGG	93.11	94.20	96.37	98.54	99.63	1.73	4.35	5.66
JS11	CA	917	UGG								
JS11	CD	1028	UGG	90.16	91.12	93.05	94.98	95.95	1.54	3.86	5.03
JS11	CO	1038	UGG								
JS11	CR	1029	UGG	92.95	93.71	95.25	96.78	97.54	1.22	3.07	3.99
JS11	CU	1043	UGG	92.77	93.65	95.41	97.16	98.04	1.40	3.52	4.58
JS11	FE	1170	UGG								
JS11	K	938	UGG								
JS11	MG	924	UGG								
JS11	MN	1053	UGG								
JS11	MO	99224	UGG								
JS11	NA	934	UGG								
JS11	NI	1068	UGG	88.81	89.56	91.08	92.59	93.35	1.20	3.03	3.94
JS11	PB	1052	UGG								
JS11	SB	1098	UGG								
JS11	SE	1148	UGG								
JS11	TL	34480	UGG	86.26	87.43	89.77	92.10	93.27	1.86	4.68	6.09
JS11	V	1088	UGG								
JS11	ZN	1093	UGG	91.45	92.17	93.60	95.04	95.76	1.14	2.88	3.74

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS FOR VARIOUS INORGANIC METHODS IN WATER AND SOIL

PREPARED: 17:41:06 22 SEP 1990

METH	TST NM	STORET	PARAMETER NAME	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY QCT	MAA LCL	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
H2	PHENLC	32730	PHENOLS,TOTAL	UGL	7.120000	50.0000	0.87800 Y	77.06	83.53	96.47	109.41	115.88	18.97	38.89	48.86
J2	CRHEX	1032	CHROMIUM,(+6)	UGL	2.500000	50.0000	0.99400 Y								
KE10	NIT	633	NITROG,NO2+NO3,SED	UGG	.600000	12.0000	1.08000 Y	62.56	72.07	91.10	110.12	119.63	27.89	57.18	71.82
KE14	TPO4	668	PHOSPHORUS	UGG	7.490000	100.0000	0.95300 Y								
KT05	BR	97939	BROMIDE	UGG	5.000000	200.0000	0.95700 Y								
KT05	CL	99120	CHLORIDE,SED	UGG	6.050000	204.0000	0.99400 Y	76.63	83.09	96.01	108.94	115.40	18.95	38.84	48.79
KT05	F	949	FLUORIDE,SED	UGG	3.620000	51.2000	0.87100 Y								
KT05	SO4	81612	SULFATE,SED,	UGG	90.400000	512.0000	0.90400 Y	90.04	93.34	99.95	106.56	109.87	9.69	19.86	24.95
KY01	CYN	721	CYANIDE	UGG	.920000	10.0000	0.92400 Y	86.13	91.59	102.52	113.45	118.91	16.02	32.84	41.25
TF18	CYN	99315	CYANIDE	UGL	2.500000	50.0000	1.00000 Y	88.77	92.12	98.84	105.55	108.91	9.84	20.18	25.35
TF21	PO4ORT	96161	PHOSPHORUS, DISS-ORTHO	UGL	11.000000	500.0000	1.00000 Y	91.94	94.96	101.00	107.04	110.06	8.85	18.15	22.80
TF22	NIT	98582	NITROGEN,N02+NO3	UGL	10.000000	200.0000	0.99900 Y	93.50	95.25	98.76	102.27	104.03	5.14	10.54	13.24
TF25	NH3	96159	NITROGEN, NH3+NH4	UGL	60.000000	1000.0000	1.10000 Y	120.90	122.27	125.00	127.72	129.09	4.00	8.20	10.30
TF26	N2KJEL	96158	NITROGEN, TKN	UGL	183.000000	5000.0000	1.05000 Y								
TF27	PO4	96157	PHOSPHORUS, TOTAL	UGL	13.300000	500.0000	1.01000 Y								
TT10	BR	71870	BROMIDE	UGL	1000.000000	25000.0000	1.03000 Y	74.78	78.45	85.81	93.17	96.84	10.78	22.11	27.77
TT10	CL	98555	CHLORIDE	UGL	2120.000000	30000.0000	0.91100 Y	78.62	83.36	92.85	102.33	107.08	13.91	28.51	35.81
TT10	F	98556	FLUORIDE	UGL	1230.000000	10000.0000	1.03000 Y	79.75	85.17	95.99	106.81	112.22	15.86	32.52	40.85
TT10	SO4	98581	SULFATE	UGL	10000.000000	300000.0000	1.00000 Y	89.66	91.48	95.11	98.73	100.55	5.32	10.90	13.69
TT10	SULFID			UGL	32.027000	750.0000	1.00000 N								

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMTS PREC MEAN	PREC UWL	PREC UCL
H2	PHENLC	32730	UGL	93.47	94.57	96.77	98.97	100.07	1.75	4.40	5.73
J2	CRHEX	1032	UGL								
KE10	NIT	633	UGG	83.59	87.22	94.46	101.70	105.33	5.78	14.51	18.88
KE14	TPO4	668	UGG								
KT05	BR	97939	UGG								
KT05	CL	99120	UGG	87.67	89.25	92.40	95.56	97.13	2.51	6.32	8.22
KT05	F	949	UGG								
KT05	SO4	81612	UGG	89.83	90.70	92.44	94.18	95.05	1.38	3.48	4.53
KY01	CYN	721	UGG	96.40	97.53	99.79	102.05	103.19	1.80	4.53	5.89
TF18	CYN	99315	UGL	92.98	94.31	96.96	99.62	100.94	2.11	5.31	6.91
TF21	PO4ORT	96161	UGL	98.85	99.53	100.88	102.24	102.92	1.08	2.71	3.53
TF22	NIT	98582	UGL	98.10	98.72	99.95	101.17	101.79	.98	2.46	3.20
TF25	NH3	96159	UGL	96.77	98.60	102.26	105.91	107.74	2.92	7.33	9.53
TF26	N2KJEL	96158	UGL								
TF27	PO4	96157	UGL								
TT10	BR	71870	UGL	100.68	101.62	103.50	105.38	106.32	1.50	3.76	4.90
TT10	CL	98555	UGL	94.93	96.46	99.52	102.58	104.11	2.44	6.12	7.97
TT10	F	98556	UGL	89.94	91.59	94.89	98.19	99.84	2.63	6.61	8.60
TT10	SO4	98581	UGL	99.56	99.78	100.22	100.66	100.88	.35	.87	1.14

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS FOR GC VOA METHODS IN WATER

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METH	TST NM	STORET	PARAMETER NAME	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY	OCT	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS: MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS: MAP MEAN	MAP UWL	MAP UCL
U002	111TCE	34506	1,1,1-TRICHL'ETHANE	UGL	2.900000	50.0000	1.08000	Y	85.29	90.95	102.28	113.60	119.27	16.60	34.04	42.75
U002	112TCE	34511	1,1,2-TRICHLOROETHANE	UGL	.332000	49.0000	1.10000	N								
U002	11DCE	34501	1,1-DICHLOROETHYLENE	UGL	.393000	51.0000	1.06000	Y	81.46	85.49	93.55	101.61	105.64	11.82	24.23	30.43
U002	11DCLE	34496	1,1-DICHLOROETHANE	UGL	.334000	49.5000	1.03000	N								
U002	12DCLE	34531	1,2-DICHLOROETHANE	UGL	2.950000	49.0000	1.08000	N								
U002	12DCLP	34541	1,2-DICHLOROPROPANE	UGL	3.160000	49.0000	1.09000	N								
U002	13DCLB	34566	1,3,DICHLOROBENZENE	UGL	1.340000	50.0000	0.92100	Y								
U002	13DMB	98553	M-XYLENE	UGL	1.560000	49.5000	1.00000	Y								
U002	2CLEVE	34576	2-CHLOROETHYLVINYL ETHER	UGL	22.100000	49.5000	1.11000	N								
U002	BRDCLM	32101	BROMODICHLOROMETHANE	UGL	3.060000	50.5000	1.11000	N								
U002	C13DCP	34704	CIS-1,3-DICHLORO PROPENE	UGL	3.230000	48.5000	1.08000	N								
U002	C2H3CL	39175	VINYL CHLORIDE	UGL	2.070000	50.0000	1.16000	Y								
U002	C2H5CL	34311	CHLOROETHANE	UGL	1.600000	50.0000	1.24000	N								
U002	C6H6	34030	BENZENE	UGL	.651000	49.0000	1.07000	Y	82.75	86.47	93.91	101.35	105.07	10.91	22.36	28.09
U002	CCL2F2	34668	DICHLORODIFLUORO METHANE	UGL	2.040000	50.0000	1.25000	Y								
U002	CCL3F	34488	TRICHL'FLUOROMETHANE	UGL	.503000	51.5000	1.06000	Y								
U002	CCL4	32102	CARBON TETRACHLORIDE	UGL	2.810000	49.0000	1.03000	Y								
U002	CH2CL2	34423	METHYLENE CHLORIDE	UGL	3.100000	49.0000	1.05000	N								
U002	CH3BR	34413	BROMOMETHANE	UGL	2.680000	50.0000	1.20000	Y								
U002	CH3CL	34418	CHLOROMETHANE	UGL	1.980000	50.0000	1.04000	Y								
U002	CHBR3	32104	BROMOFORM	UGL	4.030000	52.0000	1.06000	Y								
U002	CHCL3	32106	CHLOROFORM	UGL	1.260000	50.0000	1.05000	N	74.63	80.26	91.53	102.80	108.43	16.52	33.86	42.53
U002	CL2BZ	97630	O,P-DICHLOROBENZENE	UGL	6.220000	111.0000	0.99400	N								
U002	CLC6H5	34301	CHLOROBENZENE	UGL	.582000	50.5000	0.98800	Y	86.29	89.04	94.55	100.06	102.81	8.07	16.55	20.79
U002	DBRCLM	32105	DIBROMOCHLOROMETHANE	UGL	.352000	51.5000	1.10000	N								
U002	ETC6H5	34371	ETHYLBENZENE	UGL	.857000	49.5000	0.99900	Y	88.17	91.62	98.52	105.42	108.87	10.11	20.73	26.04
U002	MEC6H5	34010	TOLUENE	UGL	.716000	49.5000	1.04000	N	88.97	92.14	98.48	104.83	108.00	9.30	19.06	23.94
U002	T12DCE	34546	T-1,2-DICHLOROETHENE	UGL	.427000	49.0000	1.04000	N								
U002	T13DCP	34699	TRANS-1,3-DICHLORO PROPENE	UGL	.326000	49.5000	1.10000	Y								
U002	TCLEA	34516	1,1,2,2-TETRACHLORO ETHANE	UGL	1.090000	52.0000	0.95300	N								
U002	TCLEE	34475	TETRACHLOROETHENE	UGL	.677000	51.0000	0.99600	Y	83.13	87.44	96.05	104.66	108.97	12.63	25.89	32.52
U002	TRCLE	39180	TRICHLOROETHENE	UGL	3.590000	50.0000	1.05000	Y	74.57	81.17	94.37	107.57	114.17	19.35	39.67	49.83
U002	XYLEN	98554	O-AND/OR-P XYLENE	UGL	1.730000	102.0000	0.99500	Y								

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS: ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMTS: PREC MEAN	PREC UWL	PREC UCL
U002	111TCE	34506	UGL	85.19	90.04	99.75	109.45	114.31	7.74	19.45	25.30
U002	11DCE	34501	UGL	80.32	84.63	93.27	101.91	106.22	6.89	17.30	22.50
U002	C6H6	34030	UGL	85.76	88.67	94.50	100.33	103.24	4.65	11.67	15.19
U002	CHCL3	32106	UGL	80.73	84.77	92.84	100.92	104.96	6.44	16.18	21.05
U002	CLC6H5	34301	UGL	89.04	90.98	94.87	98.75	100.69	3.10	7.78	10.12
U002	ETC6H5	34371	UGL	95.05	96.69	99.96	103.24	104.88	2.61	6.56	8.54
U002	MEC6H5	34010	UGL	91.53	93.76	98.22	102.68	104.91	3.56	8.94	11.63
U002	TCLEE	34475	UGL	88.57	91.09	96.13	101.18	103.70	4.02	10.10	13.14
U002	TRCLE	39180	UGL	82.16	85.22	91.35	97.48	100.54	4.89	12.28	15.97

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS GC VOA METHODS IN SOIL

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METH	TST NM	STORET	PARAMETER NAME	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY OCT		LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
1002	111TCE	98692	1,1,1-TRICHLOROETHANE	UGG	.040000	5.0000	0.98800	Y	86.21	88.82	94.03	99.24	101.85	7.64	15.66	19.67
1002	112TCE	98693	1,1,2-TRICHLOROETHANE	UGG	.081000	5.0000	0.95700	Y								
1002	11DCE	98789	1,1-DICHLOROETHENE	UGG	.051000	5.0000	0.94100	Y	80.52	82.61	86.78	90.96	93.05	6.12	12.55	15.77
1002	11DCLE	98683	1,1-DICHLOROETHANE	UGG	.055000	5.0000	0.94800	Y								
1002	12DCLE	98684	1,2-DICHLOROETHANE	UGG	.071000	5.0000	0.90700	Y								
1002	12DCLP	98790	1,2-DICHLOROPROPANE	UGG	.043000	5.0000	1.00000	Y								
1002	13DCLB	99468	1,3-DICHLOROBENZENE	UGG	.032000	5.0000	1.01000	Y								
1002	13DMB	98799	M-XYLENE	UGG	.056000	5.0000	1.01000	Y								
1002	2CLLVE	98796	2-CHLOROETHYLVINYLETHER	UGG	.075000	5.0000	0.79900	Y								
1002	BRDCLM	98783	BROMODICHLOROMETHANE	UGG	.047000	5.0000	0.92100	Y								
1002	C13DCP	98791	CIS-1,3-DICHLOROPROPENE	UGG	.062000	5.0000	0.86000	Y								
1002	C2H3CL	98795	VINYL CHLORIDE	UGG	.031000	5.0000	0.92100	Y								
1002	C2H5CL	98786	CHLOROETHANE	UGG	.029000	5.0000	0.96100	Y								
1002	C6H6	98699	BENZENE	UGG	.085000	5.0000	0.95200	Y	81.68	85.14	92.06	98.98	102.44	10.14	20.79	26.2
1002	CCL2F2	97015	DICHLORODIFLUOROMETHANE,S,UG/G-	UGG	.032000	5.0000	0.92100	N								
1002	CCL3F	98794	TRICHLOROFLUOROMETHANE	UGG	.037000	5.0000	0.92900	N								
1002	CCL4	98680	CARBON TETRACHLORIDE	UGG	.044000	5.0000	0.96500	Y								
1002	CH2CL2	98689	METHYLENE CHLORIDE	UGG	.083000	5.0000	0.95600	Y								
1002	CH3BR	98785	BROMOMETHANE	UGG	.031000	5.0000	0.89900	Y								
1002	CH3CL	98787	CHLOROMETHANE	UGG	.180000	5.0000	0.93300	Y								
1002	CHBR3	98784	BROMOFORM	UGG	.031000	5.0000	0.85600	Y								
1002	CHCL3	98682	CHLOROFORM	UGG	.038000	5.0000	0.96900	Y	69.15	72.09	77.98	83.87	86.81	8.63	17.69	22.2
1002	CL2BZ	96032	O,P-DICHLOROBENZENE	UGG	.060000	10.0000	0.99000	Y								
1002	CLC6H5	98681	CHLOROBENZENE	UGG	.026000	5.0000	0.92500	Y	87.30	89.80	94.79	99.78	102.28	7.32	15.00	18.84
1002	DBRCLM	98788	DIBROMOCHLOROMETHANE	UGG	.081000	5.0000	0.95700	Y								
1002	ETC6H5	98688	ETHYLBENZENE	UGG	.062000	5.0000	1.03000	Y	91.77	95.08	101.69	108.30	111.61	9.69	19.87	24.96
1002	MEC6H5	98691	TOLUENE	UGG	.028000	5.0000	0.97000	Y	89.68	91.70	95.74	99.79	101.81	5.92	12.14	15.26
1002	T12DCE	98687	TRANS-1,2-DICHLOROETHENE	UGG	.063000	5.0000	0.94800	N								
1002	T13DCP	98792	TRANS-1,3-DICHLOROPROPENE	UGG	.081000	5.0000	0.95700	Y								
1002	TCLEA	98793	1,1,2,2-TETRACHLOROETHANE	UGG	.045000	5.0000	0.90600	Y								
1002	TCLEE	98690	TETRACHLOROETHENE	UGG	.045000	5.0000	0.90600	Y	81.92	84.82	90.62	96.42	99.32	8.50	17.42	21.88
1002	TRCLE	98694	TRICHLOROETHENE	UGG	.049000	5.0000	0.97200	Y	80.61	82.90	87.49	92.07	94.37	6.72	13.78	17.31
1002	XYLEN	98800	O,P-XYLENE	UGG	.086000	10.0000	1.01000	Y								

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMTS PREC MEAN	PREC UWL	PREC UCL
1002	111TCE	98692	UGG	88.27	91.02	96.50	101.98	104.72	4.37	10.98	14.29
1002	11DCE	98789	UGG	78.79	82.18	88.95	95.71	99.10	5.40	13.56	17.64
1002	C6H6	98699	UGG	85.89	88.16	92.70	97.24	99.50	3.62	9.09	11.82
1002	CHCL3	98682	UGG	79.99	82.96	88.91	94.85	97.82	4.74	11.90	15.48
1002	CLC6H5	98681	UGG	90.07	92.99	98.83	104.67	107.59	4.66	11.70	15.22
1002	ETC6H5	98688	UGG	103.98	106.03	110.14	114.25	116.31	3.27	8.23	10.71
1002	MEC6H5	98691	UGG	96.15	97.91	101.43	104.95	106.71	2.80	7.05	9.17
1002	TCLEE	98690	UGG	83.10	86.85	94.34	101.83	105.57	5.97	15.01	19.52
1002	TRCLE	98694	UGG	83.82	86.74	92.58	98.42	101.34	4.65	11.69	15.21

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS FOR EXPLOSIVES METHODS IN WATER

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METH	TST NM	STORET	PARAMETER NAME	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY OCT	MAA LCL	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
UW04	BRMCIL	82198	BROMACIL	UGL	3.830000	61.5000	0.96100 Y	86.85	91.13	99.70	108.27	112.56	12.56	25.75	32.35
UW14	135TNB	99735	1,3,5-TRINITROBENZENE	UGL	.626000	42.1000	0.81700 Y	70.20	74.00	81.61	89.22	93.03	11.15	22.87	28.73
UW14	13DNB	99724	1,3-DINITROBENZENE	UGL	.519000	40.1000	0.83200 N								
UW14	246TNT	81360	2,4,6-TRINITROTOLUENE,T	UGL	.588000	40.2000	0.85500 Y	70.56	75.24	84.60	93.96	98.64	13.72	28.13	35.34
UW14	24DNT	34611	2,4-DINITROTOLUENE	UGL	.612000	40.2000	0.83500 Y	72.95	76.82	84.55	92.28	96.15	11.33	23.23	29.18
UW14	26DNT	34626	2,6-DINITROTOLUENE	UGL	1.150000	52.4000	0.76700 N	74.10	79.33	89.79	100.24	105.47	15.33	31.43	39.48
UW14	HMX	99431	HMX	UGL	1.650000	28.9000	0.93200 N								
UW14	NB	34447	NITROBENZENE	UGL	1.070000	54.9000	0.79500 Y	71.18	75.15	83.08	91.02	94.98	11.63	23.84	29.95
UW14	RDX	81364	RDX	UGL	2.110000	43.9000	0.85100 Y	71.07	78.06	92.05	106.03	113.02	20.50	42.02	52.79
UW14	TETRYL	99733	TETRYL,TOTAL	UGL	.556000	44.5000	0.74900 N								
UW17	NQ			UGL	30.900000	620.0000	0.95600 Y								
UW19	NG	99808	NITROGLYCERIN(TOTAL	UGL	10.000000	200.0000	1.04000 Y	74.16	80.33	92.68	105.03	111.20	18.10	37.12	46.62
UW19	PETN	99620	PETN	UGL	20.000000	400.0000	1.05000 Y								
UF03	NC	99770	NITROCELLULOSE,TOTAL	UGL	553.000000	6000.0000	0.82600 Y	53.49	71.00	106.03	141.06	158.57	51.36	105.28	132.25

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMTS PREC MEAN	PREC UWL	PREC UCL
UW04	BRMCIL	82198	UGL	91.10	93.81	99.24	104.67	107.38	4.33	10.87	14.14
UW14	135TNB	99735	UGL	72.60	75.80	82.21	88.62	91.82	5.11	12.84	16.70
UW14	13DNB	99724	UGL								
UW14	246TNT	81360	UGL	74.15	77.64	84.62	91.60	95.09	5.57	13.98	18.19
UW14	24DNT	34611	UGL	72.90	76.52	83.75	90.99	94.60	5.77	14.49	18.85
UW14	26DNT	34626	UGL	79.95	83.99	92.09	100.19	104.24	6.46	16.22	21.10
UW14	HMX	99431	UGL								
UW14	NB	34447	UGL	71.33	75.05	82.48	89.90	93.62	5.92	14.88	19.36
UW14	RDX	81364	UGL	78.27	82.01	89.47	96.94	100.68	5.95	14.96	19.46
UW14	TETRYL	99733	UGL								
UW17	NQ		UGL								
UW19	NG	99808	UGL	80.15	84.22	92.38	100.54	104.61	6.50	16.34	21.26
UW19	PETN	99620	UGL								
UF03	NC	99770	UGL	79.61	83.15	90.24	97.33	100.87	5.65	14.20	18.47

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS FOR EXPLOSIVES METHODS IN SOIL 17:41:06 22 SEP 1990

METH	TST NM	STORET	PARAMETER NAME	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY OCT	MAA LCL	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
W03	BRMCIL	97349	BROMACIL, SOIL	UGG	.970000	20.7000	0.65000 Y								
W12	135TNB	98576	1,3,5-TNB,SOIL	UGG	.488000	24.4000	0.99100 Y	75.55	79.79	88.26	96.74	100.98	12.42	25.47	31.99
W12	13DNB	98577	1,3-DINITROBENZENE	UGG	.496000	24.8000	0.95200 Y								
W12	246TNT	98574	2,4,6-TNT,SOIL	UGG	.456000	22.8000	1.01000 Y	83.35	89.28	101.16	113.03	118.97	17.41	35.69	44.83
W12	24DNT	98575	2,4-DNT,SOIL	UGG	.424000	21.2000	0.93800 Y	75.99	79.03	85.11	91.19	94.23	8.91	18.27	22.96
W12	26DNT	98573	2,6-DNT,SOIL	UGG	.524000	26.2000	0.97700 Y								
W12	HMX	99817	HMX,SOIL	UGG	.666000	33.3000	1.00000 Y								
W12	NB	98774	NITROBENZENE,SOIL	UGG	2.410000	27.4000	0.79300 Y	76.06	79.77	87.20	94.63	98.34	10.88	22.32	28.03
W12	NG	99809	NITROGLYCERIN,SOIL	UGG	4.000000	200.0000	0.93100 Y	68.73	75.31	88.48	101.65	108.23	19.30	39.58	49.71
W12	PETN	99621	PETN,SOIL	UGG	4.000000	80.0000	0.96900 Y	73.07	78.64	89.79	100.93	106.50	16.34	33.49	42.07
W12	RDX	99795	RDX,SOIL	UGG	.587000	21.9000	0.92900 Y	72.44	76.85	85.67	94.49	98.90	12.93	26.51	33.30
W12	TETRYL	98165	TETRYL,SED	UGG	.731000	20.2000	1.13000 Y								
W15	NQ	97795	NITROGUANIDINE	UGG	.475000	9.5000	0.90100 Y								
F03	NC	99574	NITROCELLULOSE,SOIL	UGG	10.400000	125.0000	0.53300 Y	33.57	39.05	50.01	60.97	66.45	16.07	32.94	41.38

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMTS PREC MEAN	PREC UWL	PREC UCL
W03	BRMCIL	97349	UGG								
W12	135TNB	98576	UGG	90.14	91.64	94.63	97.62	99.12	2.38	5.99	7.79
W12	13DNB	98577	UGG								
W12	246TNT	98574	UGG	100.68	102.22	105.29	108.36	109.90	2.45	6.15	8.00
W12	24DNT	98575	UGG	85.90	87.44	90.53	93.61	95.15	2.46	6.17	8.03
W12	26DNT	98573	UGG								
W12	HMX	99817	UGG								
W12	NB	98774	UGG	91.74	93.54	97.13	100.73	102.53	2.87	7.21	9.38
W12	NG	99809	UGG	85.77	88.34	93.48	98.63	101.20	4.10	10.30	13.40
W12	PETN	99621	UGG	80.40	82.47	86.61	90.74	92.81	3.30	8.28	10.78
W12	RDX	99795	UGG	85.58	87.31	90.76	94.22	95.95	2.75	6.92	9.01
W12	TETRYL	98165	UGG								
W15	NQ	97795	UGG								
F03	NC	99574	UGG	38.03	41.17	47.45	53.73	56.87	5.01	12.58	16.37

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METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS OF METHODS FOR AGENT BREAKDOWN PRODUCTS IN WATER AND SOIL 17:41:06 22 SEP 1990

METH	TST NM	STORET	PARAMETER NAME	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY QCT	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	PRECISION LIMITS MAP MEAN	MAP UWL	MAP UCL
W22	TDGCL	99797	THIODIGLYCOL	UGL	187.000000	4880.0000	0.68800 Y	61.76	69.87	86.08	102.28	110.39	23.76	48.71	61.19
W22	TDGCLA			UGL	52.700000	1780.0000	0.93000 Y								
W18	CLC2A	97285	CHLOROACETIC ACID	UGG	18.000000	302.0000	0.83700 Y								
W18	TDGCL	99798	THIODIGLYCOL	UGG	3.940000	102.0000	1.07000 Y	74.81	82.90	99.08	115.26	123.35	23.72	48.63	61.09
9	DIMP	98551	DIMP	UGL	10.500000	210.0000	0.91200 Y	83.31	87.43	95.67	103.91	108.03	12.08	24.76	31.11
8	DMMP	98552	DMMP	UGL	15.200000	305.0000	0.96800 Y	74.48	79.39	89.20	99.02	103.93	14.39	29.50	37.06
AA9	FC2A	97381	FLUOROACETIC ACID	UGG	2.000000	40.0000	0.92900 Y	65.88	73.72	89.39	105.06	112.90	22.98	47.10	59.17
AA9	IMPA	97382	IMPA	UGG	2.110000	40.0000	0.92900 Y	82.57	85.10	90.16	95.23	97.76	7.42	15.21	19.11
AA9	MPA	97383	MPA	UGG	2.000000	40.0000	0.86600 Y	65.96	72.23	84.77	97.31	103.58	18.38	37.69	47.34
W2	FC2A	97381	FLUOROACETIC ACID	UGL	2.000000	40.0000	0.92900 Y	65.88	73.72	89.39	105.06	112.90	22.98	47.10	59.17
	IMPA	97382	IMPA	UGL	2.110000	40.0000	0.92900 Y	82.57	85.10	90.16	95.23	97.76	7.42	15.21	19.11
	MPA	97383	MPA	UGL	2.000000	40.0000	0.86600 Y	65.96	72.23	84.77	97.31	103.58	18.38	37.69	47.34

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMTS PREC MEAN	PREC UWL	PREC UCL
AA9	FC2A	97381	UGG	86.15	90.11	98.03	105.94	109.90	6.31	15.85	20.63
AA9	IMPA	97382	UGG	91.07	93.11	97.18	101.24	103.28	3.24	8.14	10.60
AA9	MPA	97383	UGG	82.83	84.35	87.38	90.40	91.92	2.41	6.06	7.88
W22	TDGCL	99797	UGL	75.97	78.82	84.51	90.21	93.06	4.54	11.41	14.84
W22	TDGCLA		UGL								
W18	CLC2A	97285	UGG								
W18	TDGCL	99798	UGG	62.32	71.60	90.15	108.69	117.97	14.80	37.16	48.35
9	DIMP	98551	UGL	86.28	89.50	95.94	102.38	105.60	5.13	12.90	16.78
8	DMMP	98552	UGL	78.02	83.24	93.68	104.13	109.35	8.33	20.92	27.22
T9	DIMP	98645	UGG	83.63	86.11	91.06	96.01	98.48	3.95	9.92	12.90
T9	DMMP	98657	UGG	65.94	74.06	90.29	106.52	114.64	12.95	32.52	42.30

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS OF METHODS FOR OCP'S, PCB'S, HERBICIDES, SULFUR COMPOUNDS IN WATER

17:41:06 22 SEP 1990

METH	TST NM	STORET PARAMETER NAME	UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY OCT	MAA LCL	LOW SPIKE 3 DAY MOVING ACCURACY LIMITS MAA LWL	MAA MEAN	MAA UWL	MAA UCL	MAP MEAN	PRECISION LIMITS MAP UWL	MAP UCL
UH02	PCB016	34671 PCB-1016	UGL	.160000	6.4000	0.82600 Y								
UH02	PCB260	39508 PCB-1260	UGL	.190000	6.3000	0.92500 Y	78.04	83.96	95.81	107.66	113.58	17.37	35.60	44.72
UH13	ABHC	39337 BHC,A	UGL	.038500	.6380	0.94100 N								
UH13	AENSLF	34361 ENDOSULFAN,A	UGL	.023000	.5750	1.02000 N	72.90	79.90	93.89	107.88	114.88	20.51	42.05	52.82
UH13	ALDRN	39330 ALDRIN	UGL	.091800	.6060	0.75600 Y	61.56	70.91	89.60	108.29	117.64	27.41	56.19	70.58
UH13	BBHC	39338 BHC,B	UGL	.024000	.6000	0.89100 N								
UH13	BENSLF	34356 ENDOSULFAN,B	UGL	.023000	.5750	1.16000 N	62.69	73.95	96.49	119.03	130.30	33.04	67.74	85.09
UH13	CLDAN	39350 CHLORDANE	UGL	.265000	5.3000	0.96200 N								
UH13	DBHC	34259 BHC,D	UGL	.029300	.5940	1.15000 N								
UH13	DLDRN	39380 DIELDRIN	UGL	.024000	.6000	1.04000 Y	79.08	86.86	102.44	118.01	125.80	22.83	46.81	58.80
UH13	ENDRN	39390 ENDRIN	UGL	.023800	.5940	1.32000 Y	75.18	82.91	98.37	113.82	121.55	22.66	46.46	58.36
UH13	ENDRNA	34366 ENDRIN ALDEHYDE	UGL	.028500	.7130	1.00000 N								
UH13	ESFSO4	34351 ENDOSULFAN SULFATE	UGL	.079600	.6750	0.96100 N								
UH13	HPCL	39410 HEPTACHLOR	UGL	.042300	.6190	0.84900 N	69.48	73.83	82.53	91.23	95.58	12.75	26.14	32.84
UH13	HPCLE	39420 HEPTACHLOR EPOXIDE	UGL	.024500	.6130	1.01000 N								
UH13	ISODR	39430 ISODRIN	UGL	.056200	1.1000	0.91000 N	76.38	79.50	85.75	91.99	95.11	9.15	18.75	23.56
UH13	LIN	39340 BHC,G(LINDANE)	UGL	.050700	.6190	0.96400 Y	79.79	86.65	100.39	114.12	120.98	20.13	41.27	51.84
UH13	MEXCLR		UGL	.057000	1.1600	1.26000 Y	60.94	74.52	101.68	128.84	142.42	39.82	81.64	102.54
UH13	PCB016		UGL	.486000	8.2500	1.02000 Y								
UH13	PCB260		UGL	.636000	5.8800	1.06000 Y								
UH13	PPDDD	39310 DDD,PP'	UGL	.023300	.5810	1.17000 N								
UH13	PPDDE	39320 DDE,PP'	UGL	.027000	.6750	0.99900 N								
UH13	PPDDT	39300 DDT,PP'	UGL	.034000	.6630	0.94900 Y	63.81	74.25	95.13	116.01	126.45	30.61	62.76	78.83
UH13	TXPHEN	39400 TOXAPHENE	UGL	1.350000	11.6000	1.00000 N								
UH14	245TP	39760 2,4,5-TP/SILVEX	UGL	.181000	1.3600	0.93100 Y								
UH14	24D	39730 2,4-D, TOTAL	UGL	.802000	2.5200	0.64600 Y								
UL04	BTZ	81512 BENZOTHIAZOLE	UGL	2.110000	42.2000	0.92700 N								
UL04	CPMS	98562 P-CLPHENYLMETHYLSUL-FIDE	UGL	1.260000	25.3000	0.82400 N	60.96	69.29	85.95	102.61	110.95	24.43	50.08	62.91
UL04	CPMSO	98561 P-CLPHENYLMETHYLSUL-FOXID	UGL	4.230000	106.0000	0.74300 Y	82.07	86.55	95.51	104.47	108.95	13.13	26.93	33.83
UL04	CPMSO2	98560 P-CLPHENYLMETHYLSUL-FONE	UGL	4.720000	106.0000	0.86600 Y								
UL04	DITH	98563 1,4-DITHIANE	UGL	1.110000	22.2000	0.83100 Y	75.58	81.82	94.31	106.80	113.04	18.30	37.53	47.14
UL04	DMDS	81580 DIMETHYLDISULFIDE	UGL	1.140000	22.8000	0.80100 Y	73.33	77.02	84.38	91.75	95.43	10.80	22.14	27.81
UL04	OXAT	98564 1,4-OXATHIANE	UGL	1.980000	39.5000	0.82900 Y	76.07	80.81	90.29	99.77	104.51	13.90	28.49	35.79
UN07	ATZ		UGL	.512000	5.0000	1.04000 Y	92.30	95.66	102.38	109.10	112.45	9.85	20.19	25.36
UN07	DDVP		UGL	.250000	5.0000	0.88400 Y	91.19	92.98	96.56	100.14	101.93	5.25	10.76	13.51
UN07	MLTHN		UGL	.250000	5.0000	0.99900 Y	98.09	100.58	105.56	110.54	113.03	7.30	14.96	18.79
UN07	PRTHN	39540 PARATHION	UGL	.250000	5.0000	0.98300 Y	75.43	84.44	102.46	120.48	129.49	26.42	54.16	68.04
UN07	SUPONA		UGL	.250000	4.7000	1.00000 Y	98.11	101.35	107.83	114.31	117.55	9.50	19.47	24.46

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PRECISION LIMTS PREC MEAN	PREC UWL	PREC UCL
UL04	CPMS	98562	UGL	68.99	71.31	75.95	80.58	82.90	3.70	9.29	12.08
UL04	CPMSO	98561	UGL	97.99	100.50	105.53	110.56	113.08	4.01	10.07	13.10
UL04	DITH	98563	UGL	84.96	86.53	89.68	92.83	94.40	2.51	6.30	8.20
UL04	DMDS	81580	UGL	75.16	76.87	80.30	83.73	85.44	2.73	6.87	8.93
UL04	OXAT	98564	UGL	85.03	86.46	89.30	92.15	93.58	2.27	5.70	7.42
UN07	ATZ		UGL	89.60	94.71	104.92	115.13	120.24	8.15	20.46	26.62
UN07	DDVP		UGL	54.91	66.10	88.47	110.84	122.03	17.85	44.82	58.31
UN07	MLTHN		UGL	90.19	93.17	99.12	105.07	108.05	4.75	11.92	15.51
UN07	PRTHN	39540	UGL	90.01	93.36	100.07	106.78	110.14	5.35	13.44	17.48
UN07	SUPONA		UGL	88.14	92.19	100.27	108.35	112.40	6.45	16.19	21.07

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ARMY METHODS TABLE SUMMARIZING CURRENT CONTROL LIMITS OF METHODS FOR OCP'S, PCB'S, HERBICIDES, SULFUR COMPOUNDS IN SOIL 17:41:06 22 SEP 1990

METH	TST NM	STORET	PARAMETER NAME		UNIT	CERTREPLIM	MAXIMUM CON	ACCURACY OCT	MAA LCL	MAA LWL	MAA MEAN	MAA UWL	MAA UCL	MAP MEAN	MAP UWL	MAP UCL
									LOW SPIKE 3 DAY MOVING ACCURACY LIMITS					PRECISION LIMITS		
LH10	ABHC	98357	BHC,A		UGG	.009070	.0270	0.91900 N								
LH10	AENSLF	98366	ENDOSULFAN,A		UGG	.006020	.0244	1.03000 N	70.04	76.84	90.45	104.05	110.85	19.94	40.88	51.35
LH10	ALDRN	98356	ALDRIN,SED		UGG	.007290	.0257	0.98800 Y	64.64	73.26	90.51	107.76	116.38	25.29	51.84	65.12
LH10	BBHC	98358	BHC,B,SED		UGG	.002570	.0254	0.97500 N								
LH10	BENSLF	98367	ENDOSULFAN,B		UGG	.006630	.0244	1.10000 N	68.43	76.08	91.40	106.71	114.37	22.45	46.03	57.82
LH10	CLDAN	98361	CHLORDANE,SED		UGG	.017700	.1970	0.83900 Y								
LH10	DBHC	98359	BHC,D,SED		UGG	.005550	.0252	1.28000 N								
LH10	DLDRN	98365	DIELDRIN		UGG	.006290	.0254	1.04000 Y	74.77	82.16	96.94	111.72	119.11	21.67	44.43	55.81
LH10	ENDRN	98369	ENDRIN		UGG	.006570	.0252	1.09000 Y	69.92	79.24	97.90	116.55	125.87	27.35	56.06	70.42
LH10	ENDRNA	98370	ENDRIN ALDEHYDE		UGG	.024000	.0302	0.87100 N								
LH10	ESFSO4	98368	ENDOSULFAN SULFATE		UGG	.007630	.0286	1.06000 N								
LH10	HPCL	98371	HEPTACHLOR		UGG	.006180	.0262	1.04000 N	72.40	81.01	98.23	115.44	124.05	25.24	51.75	65.00
LH10	HPCLE	98372	HEPTACHLOR EPOXIDE		UGG	.006200	.0260	1.04000 N								
LH10	ISODR	98649	ISODRIN		UGG	.004610	.0412	0.94100 Y	74.95	81.32	94.07	106.81	113.19	18.69	38.31	48.12
LH10	LIN	98360	BHC,G		UGG	.006380	.0262	1.03000 Y	87.68	94.50	108.14	121.78	128.60	20.00	41.00	51.50
LH10	MEXCLR	97818	METHOXYCHLOR		UGG	.071100	.2490	1.20000 Y	76.59	86.74	107.06	127.38	137.54	29.79	61.06	76.70
LH10	PPDDD	98362	DDD,PP'		UGG	.008260	.0246	1.11000 N								
LH10	PPDDE	98363	DDE,PP'		UGG	.007650	.0286	1.06000 N								
LH10	PPDDT	98364	DDT,PP'		UGG	.007070	.0281	1.01000 Y								
LH10	TXPHEN	98373	TOXAPHENE		UGG	.444000	1.1200	1.35000 N								
LH11	245TP	97438			UGG	.008500	.1090	0.90700 Y	45.23	55.95	77.37	98.80	109.51	31.41	64.40	80.89
LH11	24D	99237			UGG	.017700	.2020	1.08000 Y	40.12	53.85	81.31	108.78	122.51	40.27	82.55	103.69
LH16	PCB016	98140	PCB 1016		UGG	.066600	.3670	1.18000 Y	77.77	86.57	104.19	121.81	130.61	25.83	52.95	66.51
LH16	PCB260	98139	PCB 1260		UGG	.080400	.4070	1.06000 Y	73.84	83.07	101.54	120.01	129.25	27.08	55.51	69.73
LL03	BTZ	97302	BENZOTHIAZOLE		UGG	1.080000	13.2000	0.78800 N	84.05	88.83	98.37	107.92	112.70	14.00	28.70	36.05
LL03	CPMS	98653	P-CLPHENYLMETHY-	SULFIDE	UGG	1.080000	21.6000	0.99900 N	78.22	83.43	93.86	104.28	109.49	15.28	31.32	39.34
LL03	CPMSO	98654	P-CLPHENYLMETHY-	SULFOXIDE	UGG	2.250000	45.0000	1.02000 Y	69.01	77.64	94.91	112.18	120.81	25.32	51.90	65.19
LL03	CPMSO2	98703	P-CLPHENYLMETHY-	SULFONE	UGG	2.370000	47.4000	0.79000 Y	50.88	61.62	83.10	104.58	115.33	31.50	64.57	81.11
LL03	DITH	98650	1,4 DITHIANE		UGG	1.470000	11.4000	0.91600 Y	85.67	90.29	99.54	108.79	113.41	13.56	27.79	34.91
LL03	DMDS	98697	DMDS		UGG	.692000	13.8000	0.94600 Y	60.29	68.68	85.48	102.27	110.66	24.62	50.47	63.39
LL03	OXAT	98644	1,4 OXATHIANE		UGG	.856000	17.1000	0.93000 Y	82.70	87.13	95.99	104.86	109.29	13.00	26.65	33.47
LN05	ATZ	98655	ATRAZINE		UGG	.250000	2.0000	1.12000 Y	97.68	100.41	105.86	111.32	114.05	8.00	16.40	20.60
LN05	DDVP	98646	VAPONA		UGG	.452000	5.0000	1.02000 Y	74.06	86.80	112.28	137.75	150.49	37.36	76.58	96.20
LN05	MLTHN	98648	MALATHION		UGG	.580000	5.0000	1.17000 Y	86.19	90.81	100.06	109.31	113.93	13.56	27.79	34.91
LN05	PRTHN	98658	PARATHION		UGG	.733000	5.0000	1.23000 Y	87.09	91.87	101.42	110.96	115.74	14.00	28.70	36.05
LN05	SUPONA	98656	SUPONA		UGG	.250000	5.0000	1.28000 Y	89.17	98.07	115.89	133.70	142.61	26.12	53.54	67.25

METH	TST NM	STORET	UNIT	REPLICATE HIGH SPIKE ACCURACY LIMITS					PRECISION LIMTS		
				ACC LCL	ACC LWL	ACC MEAN	ACC UWL	ACC UCL	PREC MEAN	PREC UWL	PREC UCL
LL03	BTZ	97302	UGG	78.83	81.35	86.39	91.42	93.94	4.02	10.09	13.13
LL03	CPMS	98653	UGG	89.68	91.39	94.81	98.22	99.93	2.72	6.84	8.90
LL03	CPMSO	98654	UGG	81.59	85.03	91.90	98.76	102.20	5.48	13.76	17.90
LL03	CPMSO2	98703	UGG	77.62	80.15	85.22	90.28	92.81	4.04	10.14	13.19
LL03	DITH	98650	UGG	82.67	84.62	88.54	92.45	94.40	3.12	7.83	10.19
LL03	DMDS	98697	UGG	82.81	84.89	89.06	93.22	95.30	3.32	8.33	10.84
LL03	OXAT	98644	UGG	83.97	86.22	90.71	95.19	97.44	3.58	8.99	11.69
LN05	ATZ	98655	UGG	97.64	101.52	109.30	117.07	120.95	6.20	15.57	20.25
LN05	DDVP	98646	UGG	97.11	100.08	106.03	111.97	114.94	4.74	11.90	15.48
LN05	MLTHN	98648	UGG	98.66	102.38	109.83	117.27	120.99	5.94	14.91	19.40
LN05	PRTHN	98658	UGG	106.90	110.02	116.26	122.49	125.61	4.97	12.49	16.25
LN05	SUPONA	98656	UGG	103.12	107.70	116.85	125.99	130.57	7.30	18.33	23.84

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A.4

Inorganic Method Comparison

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USATHAMA & EPA
INORGANIC METHOD COMPARISON

1. Sample Preparation
   a. GFAA water - same as CLP.
   b. ICP water - same as CLP.
   c. GFAA soil - same as CLP with one exception, the digestate's final volume is 100 mLs. CLP digestates have a final volume of 200 mLs.
   d. ICP soil - same as CLP with one exception, the digestate's final volume is 100 mLs. CLP digestates have a final volume of 200 mLs.
   e. Mercury water - same as CLP.
   f. Mercury soil - same as CLP with one exception, CLP uses 0.2 g while USATHAMA requires 1 g.
   g. Cyanide - same as CLP with one exception, CLP requires 1-5 g while USATHAMA requires 10 g.
   h. Other inorganic methods certified or used by USATHAMA such as phenols, COD, TOC, TOX, TP, CrIV, etc. follow expected EPA methods.

2. Detection Limits
   Tables in Appendix A.2 present comparisons of reporting limits.

3. Analysis Comparison
   CLP requires matrix spike and matrix duplicates and quarterly detection limit studies to evaluate method performance. USATHAMA requires method certification and daily control spikes to evaluate method performance and validity of certification. Daily control spikes and QC charting include a single low level (2 times the CRL) control spike and replicate high level (80% of upper certified range). Therefore, matrix spikes are not required except when requested as additional samples to evaluate applicability of the matrix to the certified method.

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Organic Method Comparison

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USATHAMA & EPA
ORGANIC METHOD COMPARISON

1. Sample Preparation

   a. BNA in water - in the extraction by USATHAMA certified method UM18, the base fraction is combined with the acid fraction extract before passing through the drying column and both fractions are concentrated in the same K-d. This should improve the detection limit sensitivity.

   b. BNA in soil - The EPA-CLP method utilizes the sonication technique for soil extraction. USATHAMA certified method LM18 prepares BNA's using the continuous sohxlet extraction technique. The techniques are basically equivalent. The continuous (16 to 24 hr) sohxlet extraction is possibly more efficient than a 1-2 minute sonication.

   c. VOA's in water and soil - USATHAMA certified methods UM20 and LM19 follow equivalent sample preparation procedures as EPA-CLP methods. Method LM19 is the low level heated purge and trap method using up to 5 grams of soil.

2. Detection Limits

   Tables in Appendix A.2 compare USATHAMA CRL's and EPA CLP reporting limits.

3. Analysis Comparison

   a. EPA-CLP requires instrument tuning with DFTPP or BFB every 12 hours (no end run standard is required, therefore if an analytical run is less than 12 hours no calibration confirmation is required). USATHAMA requires tuning with DFTPP or BFB every 12 hours and an end of run calibration standard is, therefore, not required. Analytical runs cannot be longer than 24 hours.

   b. EPA-CLP controls on Continuing Calibration Check (C.C.C.) compounds run at the beginning of a batch and the 12 hour standards (if the run is longer than 12 hours). Current criteria is ± 25% difference from initial calibration compared to the average response factors (RF). USATHAMA also controls on the beginning C.C.C. with a ± 25% difference from initial calibration but compares to the RF from the midpoint. Both EPA-CLP and USATHAMA require initial calibrations at five concentration levels with ± 30% RSD.

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A.6

Summary of Spike Protocols

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Table 1. Summary of 'Control Limits' for Sample Matrix Spikes and Sample Surrogate Spikes to be performed at JAAP.
(page 1 of 2)

Metals Methods: Sample Matrix Spike criteria will closely follow CLP SOW390 for Inorganics

ICP Methods: Sample Matrix spikes at a frequency of 5% of the environmental water and soil samples will be spiked for the control analytes and recoveries should be within 100 +/- 25%. Control Analytes are:

Soils (Method JS11): Ba, Be, Cd, Cr, Cu, Ni, Tl, and Zn

Waters (Method SS10): Ba, Be, Ca, Cd, Co, Cr, Cu, Mg, Nn, Na, Ni, Zn

GFAA Methods: Sample Matrix spikes at a frequency of 5% of the environmental water and soil samples will be spiked and recoveries should be within 100 +/- 25%.

Post Digestion spikes at a frequency of 5% of the environmental water and soil digestates will be spiked and recoveries should be within 100 +/- 15% as long as the background concentration is low enough.

Soils (Methods JD15, 18, 19): Se, Ag, As

Water (Methods SD09, 20, 21, 22, 23, 28): Tl, Pb, Se, As, Ag, Sb

Hg Methods: Sample Matrix spikes at a frequency of 5% of the environmental water and soil samples will be spiked and recoveries should be within 100 +/- 25%.

Inorganics/TRPH (Nitrate, Sulfate, Total Phosphate):

Sample Matrix spikes at a frequency of 5% of the environmental water and soil samples will be spiked and recoveries should be within 100 +/- 25% for TRPH and 100 +/- 15% for nitrate.

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Table 1. Summary of 'Control Limits' for Sample Matrix Spikes and Sample Surrogate Spikes to be performed at JAAP.
(page 2 of 2)

GCMS Methods: Surrogates will be spiked for every sample and criteria for sample surrogates will closely follow CLP SOW--- for Organics.

VOA Methods (UM20, LM19):

Surrogate	Water Limits	Soil Limits
12DCD4	76-114	70-121
4BFB	86-115	74-121
MEC6D8	88-110	81-117

BNA Methods (UM18, LM18):

Surrogate	Water Limits	Soil Limits
2FP	21-100	25-121
PHEND6	10-94	24-113
246TBP	10-123	19-122
NBD5	35-114	23-120
2FBP	43-116	30-115
TRPD14	33-141	18-137

Pesticide/PCB Methods:

The surrogate decachlorobiphenyl (DCBP) will be spiked on the samples analyzed for Pesticides and PCB's. The EPA CLP advisory limits of 60 to 150% will be used as guidelines for flagging data for matrix effects.

Explosives Methods:

Sample Matrix spikes at a frequency of 5% of the environmental water and soil samples will be spiked with the control analytes and recoveries should be within +/- 25% of the mean recovery for daily control spikes. Current mean recoveries for control analytes are:

Compound	Water Mean %	Soil Mean %
24DNT	82	87
NB	86	94
RDX	85	94
135TNB	85	96
246TNT	85	97

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Table 2. Summary of Matrix Spike and Surrogate Spike Protocols (page 1 of 3)

	WATERS				SOILS				
USATHAMA Method	Spike Solution Conc. ug/mL	Volume Spike Solution Used mL	Sample Volume mL	Matrix Spike Conc. ug/L	USATHAMA Method	Spike Solution Conc. ug/mL	Volume Spike Solution Used mL	Sample Weight g	Matrix Spike Conc. ug/g
ICP Metals Matrix Spikes									
SS10					JS11				
Al	20.0	5.0	50.0	2000	Be	3.0	5.0	1.0	15
Ba	20.0			2000	Cd	3.0			15
Be	0.5			50					
Cd	0.5			50	Cr	50.0	40.0	1.0	2000
Cr	2.0			200	Cu	50.0			2000
Co	5.0			500	Ni	50.0			2000
Cu	2.5			250	Tl	50.0			2000
Fe	10.0			1000	Zn	50.0			2000
Pb	5.0			500					
Mn	5.0			500					
Ni	5.0			500					
V	5.0			500					
Zn	5.0			500					
Ca	100.0			10000					
Mg	100.0			10000					
Na	100.0			10000					
K	100.0			10000					
GFAA Metals Matrix Spikes									
SD09 Tl	2.0	0.50	100	10.0	JD15 Se	7.50	0.50	1.0	3.75
SD20 Pb	8.0			40.0	JD19 As	8.00			4.0
SD21 Se	7.50			37.5					
SD22 As	7.50			37.5	JD18 Ag	0.20	2.0	1.0	0.40
SD23 Ag	0.80			4.0					
SD28 Sb	1.0	8.0	100	80.0					
CVAA Metals Matrix Spikes									
SB01 Hg	0.10	5.0	100	5.0	JB01 Hg	0.10	5.0	1.0	0.50

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Table 2. Summary of Matrix Spike and Surrogate Spike Protocols (page 2 of 3)

WATERS					SOILS				
USATHAMA Method	Spike Solution Conc. ug/mL	Volume Spike Solution Used mL	Sample Volume mL	Matrix Spike Conc. ug/L	USATHAMA Method	Spike Solution Conc. ug/mL	Volume Spike Solution Used mL	Sample Weight g	Matrix Spike Conc. ug/g
Inorganics Matrix Spikes									
TRPH	8500	0.50	1000	4250	TRPH	8500	2.0	15	1133
TF22 NO3-	0.15	1.0	1.0	75	KF10 NO3-	100	0.20	2.0	10
TT10 SO4	250	1.0	1.0	125000	KT05 SO4	400	2.0	2.0	400
TF27 TP	10	1.0	25.0	400	KF14 TP	1000	0.10	0.15	667
Explosives Matrix Spikes									
UW32					LW12				
RDX	12.5	1	500	25	RDX	24	0.4	1	10
135TNB	10			20	135TNB	22			9
NB	10			20	NB	60			24
TNT	10			20	TNT	20			8
24DNT	2.5			5	24DNT	24			10
2NT	5			10	2NT	260	0.1	1	26

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Table 2. Summary of Matrix Spike and Surrogate Spike Protocols (page 3 of 3)

WATERS					SOILS				
USATHAMA Method	Spike Solution Conc. ug/mL	Volume Spike Solution Used mL	Sample Volume mL	Matrix Spike Conc. ug/L	USATHAMA Method	Spike Solution Conc. ug/mL	Volume Spike Solution Used mL	Sample Weight g	Matrix Spike Conc. ug/g
GCMS Surrogates									
UM20 VOAs	10	0.025	5	50	LM19 VOAs	10	0.025	5	0.05
Surrogates = 4BFB 12DCD4 MEC6D8									
UM18 SVOAs					LM18 SVOAs				
B/N	100	0.5	1000	50	B/N	50	1	15	3.33
Acids	200	0.5		100	Acids	100			6.67
Surrogates in separate mixed solutions:									
Acids = 2FP PHEND6 246TBP									
Base/Nuetrals = NBD5 2FBP TRPD14									
Pesticides/PCBs Surrogates									
UH13/UH02					LH10/LH16				
DCBP	1	1	800	1.25	DCBP	1	1	15	0.067
TCMX	1			1.25	TCMX	1			0.067

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