

QUALITY MANAGEMENT REVIEW

FOR

THE HUDSON RIVER FOUNDATION

IN SUPPORT OF THE

CONTAMINATION ASSESSMENT AND REDUCTION PROJECT

DECEMBER 31, 2003

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INTRODUCTION

The Hudson River Foundation (HRF) contracted Booz Allen Hamilton (Booz Allen) to provide quality assurance (QA) support to the Contamination Assessment and Reduction Project (CARP) under the New York/New Jersey Harbor Estuary Program. This Quality Management Review (QMR) provides an overview of Booz Allen activities within the three areas of QA support for this effort: planning and QA document review, field and laboratory on-site technical audits, and validation and usability determination of program analytical data.

CARP is an estuary-wide effort to measure and model the sources and ambient levels of contaminants in the New York/New Jersey Harbor Estuary system. Project components include the quantification of sources (e.g., sewage treatment plants, combined sewer overflows, tributaries, storm water overflows, and atmospheric deposition) of organic and inorganic contaminants and ambient levels of those contaminants in sediment, biota, and other matrices. The primary contaminants of concern for this effort include polychlorinated biphenyls (PCBs), polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDD/PCDF), pesticides, polynuclear aromatic hydrocarbons (PAHs), metals (i.e., arsenic, mercury, cadmium, lead, and silver), and various wet chemistry parameters (i.e., dissolved organic carbon, synthetic organic carbon, particulate organic nitrogen, total suspended solids, fine suspended solids, and total solids). Data collected under this program will be used to make decisions regarding the management of contaminated sediments in the Harbor region and to provide a baseline for future monitoring of these parameters to determine ecosystem health. For more detail about the CARP Program and access to the data collected and analyzed under the Program, see the CARP website (www.carpweb.org).

CARP's data collection goal is to ensure that all CARP environmental data collection activities are scientifically valid, and that the data collected are complete, representative, comparable, and of a known, documented, and suitable quality. Towards this end, HRF tasked Booz Allen to assess the quality of data generation efforts at select field and laboratory sites, determine the usability of CARP data using a combination of automated and manual validation, and provide additional QA support as needed to achieve project objectives. This QMR addresses each area of Booz Allen support and presents information about the methodology used and results achieved, including the list of deliverables provided to HRF under this contract.

1.0 PLANNING SUPPORT

1.1 SCOPE OF ACTIVITIES

A key component to the planning of this effort has been to ensure the acceptability and comparability of data generated by the various entities. At the direction of HRF, Booz Allen collaborated with key program stakeholders and participated in a variety of planning and scoping activities. In addition to HRF, the primary stakeholder groups include New York State Department of Environmental Conservation (NYSDEC), New Jersey Department of Environmental Protection (NJDEP), CARP Model Evaluation Group (MEG), CARP Database Working Group, and CARP Management Committee. Booz Allen senior QA chemists worked in partnership with these stakeholder groups to establish consensus regarding the methodology and approach for each phase of this project. Booz Allen support included the review of technical program documents and data, the investigation and reporting of issues with potential impact on the usability of CARP data, and active participation in various program meetings.

1.1.1 Document Reviews

Senior QA chemists reviewed various program technical documents, as listed in Table 1-1. These chemists reviewed the QA Project Plans and standard operating procedures (SOPs) to assess their technical acceptability and comparability, and as part of preparing for the on-site field and laboratory audits. They also reviewed several other program documents to extract information that may impact the usability of CARP data. For example, they reviewed New Jersey's Toxics Reduction Work Plan (NJTRWP) and identified potential issues that may affect comparability between the NJ and NY programs (e.g., comparability of detection limits).

Table 1-1. Program Documents Reviewed

Date	State Program	Document Reviewed
Various	NY, NJ	Laboratory SOPs
May 2001	NJ	New Jersey Toxic Reduction Work Plan (NJTRWP) Volume 1, Version 2
May 2001	NJ	NJTRWP Volume II, Version 2
May 2001	NJ	NJTRWP SOP-01, Revision 1.0
May 2001	NJ	Stevens Institute of Technology and Rutgers University Project Plan, Quality Assurance Plan, and Standard Operating Procedures for Study IE, Version 1.1
May 2001	NJ	Stevens Institute of Technology and Rutgers University Project Plan, Quality Assurance Plan, and Standard Operating Procedures for Study 1-D, Version 1.1
June 2001	NJ	NJTRWP SOP-03, Version 1.0
June 2001	NJ	QA Project Plan for NJ USGS Head-of-Tide Sampling Study I-C, Version 4.0
July 2001	NJ	QA Project Plan for NJ Monitoring of Loadings from Selected Point Source Discharges Study I-G, Version 1.1
July 2001	CARP Database	SOP-003, Revision 5

Booz Allen reviewed QA Project Plans against the criteria contained in "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations QA/R-5 EPA/240/B-01/003 dated March 2001" with the assumption that CARP is a research level project. They assessed the specified Measurement Quality Objectives (MQOs) for precision, accuracy, representativeness, comparability, completeness, and sensitivity (detection level) in terms of achievability based on existing technology, and reasonableness based on the intended uses of the data (e.g., contaminant fate, transport, and trackdown). They also assessed the level of consistency among the various QA Project Plans regarding what constitutes non-compliance, corrective action protocols, and data qualifiers reported; this review was intended to aid in assessing the comparability among the various data collectors and generators. The chemists reviewed laboratory and field SOPs as contained in the QA Project Plans, identified deviations from cited EPA or other authoritative source methods, and evaluated these deviations to determine potential negative impacts on data quality.

1.1.2 *Ad Hoc* Reviews

At the direction of HRF, Booz Allen senior chemists conducted various *ad hoc* investigations and reviews in support of program planning activities. For example, they reviewed the results and applicability of intercomparison and Performance Evaluation (PE) studies to identify possible sources of systematic bias. In addition, they reviewed subsets of the CARP dataset prior to validation and calculated summary statistics to provide a preliminary assessment of data comparability and possible biases.

In order for data validation activities to be successful, the data qualifiers used by the many laboratories involved in the project must be consistent. Booz Allen compiled a list of the laboratory data qualifiers used by NY, developed a recommended dictionary of qualifiers and definitions (as listed in Table 1-2), and provided these to the CARP Management Committee for review and approval. During the review of data qualifiers used for measurements below "detection limit," it became apparent that the definition of detection limit varied from laboratory to laboratory. NY and NJ requested that each of their participating laboratories clarify how they determined their cited detection limit for incorporation as metadata in the CARP database.

Table 1-2. Laboratory Data Qualifiers

Data Qualifier	Definition
J	Value reported is above the detection limit (MDL, EMDL, SDL, or DL) but below the reporting limit (ML, 3.18EMDL, CRQL, RL, and DL).
C	Value represents the lowest co-eluting congener.
B	Analyte was detected in the laboratory method blank above the detection limit.
V	Value was determined by subtracting laboratory blank results from the measured results. This qualifier was used for metals only.
E	Value exceeds 120% of the upper calibration range of the instrument.
K	Value represents a maximum estimated concentration because it did not meet all qualitative criteria.
D	Value is from a secondary dilution.
I	Value was quantified against the internal standard calibration because the labeled standards were diluted out.
X, Y, Z	Each laboratory was allowed to assign a definition for each of these qualifiers in the case narrative.
*, M	Laboratory duplicate precision criterion was not met.
N	Matrix spike recovery criterion was not met.
+	The Methods of Standard Additions correlation coefficient was less than 0.995.
U	Compound/analyte was analyzed for but not detected.
H	Maximum allowable holding time was exceeded.
T	Preservation temperature criterion was exceeded.
P	Chemical preservation criteria were not met.
NR	Analyte was not reported
S	Ionization suppression or coeluting interference was present.

Example *ad hoc* reviews Booz Allen performed on behalf of HRF and the CARP stakeholder groups are included in Table 1-3, under Section 1.3 and provided in Appendix A.

1.1.3 Meeting Support

Booz Allen provided various aspects of meeting support for this effort. Support activities included active participation in MEG, Database Working Group, and Management Committee meetings, giving presentations (as listed in Table 1-3 under Section 1.3) on technical issues and overall QA status.

The state representatives kept Booz Allen apprised of the ongoing field collection activities via status presentations at the Management Committee meetings. As almost all of the sampling and analytical work was completed by NY prior to the commencement of the Booz Allen QA contract, NJ field activities were selected for auditing and all of the NJ QA Project Plans were reviewed in order to be able to identify and correct data comparability issues with the NY QA Project Plans. At the beginning of the contract, Booz Allen assembled a spreadsheet of field and laboratory participants involved in CARP and their responsibilities, and then disseminated the spreadsheet to the CARP Management Committee for review and prioritization for scheduling field and lab audits.

1.2 OVERVIEW OF RESULTS

Documentation of the NY and NJ sampling and analytical activities was thorough and met EPA requirements. Differences in field sampling techniques between the States for large volume water samples were identified and the impact of these differences assessed through an intercomparison study. The intercomparison study was conducted at two wastewater treatment plants. To be able to assess the performance of the analytical laboratories in the absence of sample collection differences, a NIST sample with a known concentration of PCB congeners was sent to each laboratory. In general, NJ results were higher than NY results due to a combination of factors contributing to a high bias: icing of sample, addition of sodium thiosulfate to prevent oxidation, more vigorous mixing of the sample, and higher laboratory background. Similarly, several conditions at NY contributed to their lower reported values: loss of higher chlorinated congeners by the TOPS XAD resin, loss of congeners from oxidation and volatilization, and incomplete mixing. The complete evaluation of the intercomparison study results is provided in Appendix A as the NY/NJ Side by Side Data Review.

Analytical method and quality control protocols between NY and NJ laboratories, as documented in the QA Project Plans reviewed, were comparable. In some cases, the same analytical method was required for use by both NY and NJ. Most data qualifiers already in use by the laboratories were consistent, but some conflicted with standard EPA practice; in some instances, the definition and application protocols differed between laboratories.

1.3 DELIVERABLES

Booz Allen prepared and submitted to HRF the deliverables listed in Table 1-3.

Table 1-3. Planning Support Deliverables

Submittal Date	Deliverable Title
Various	Agendas, minutes, and brief technical items for meeting support
February 21, 2001	Booz Allen Quality Assurance Team Presentation
May 3, 2001	Workplan and SOP Document Review
August 31, 2001	NY/NJ Side by Side Study Data Review
November 13, 2001	Laboratory Blanks Data Review
November 29, 2001	CARP Sewage Treatment Plant Data Evaluation Presentation
February 26, 2002	Total PCBs, PAHs, Pesticides and Dioxin/Furans in CARP Sewage Treatment Plant Samples Comparison of New York and New Jersey Data
January 18, 2002	CARP Database Issues Affecting Data Validation
March 4, 2002	Total Metals in CARP Sewage Treatment Plant Samples Comparison of New York and New Jersey Data
June 7, 2002	PCB Congeners and Homologues in CARP Sewage Treatment Plants Comparison of New York and New Jersey Data - Update
September 4, 2002	CARP QA Program – Status Update Presentation

2.0 AUDITS

2.1 SCOPE OF ACTIVITIES

As a component of this effort, HRF tasked Booz Allen to audit the technical systems used to generate CARP data. As listed in Table 2-1, Booz Allen senior chemists, who are experienced in conducting field and laboratory audits, performed one on-site field audit and eleven on-site laboratory audits. The purposes of the audits were to assess and verify the acceptability and comparability of each laboratory's analytical methods, quality control (QC) protocols, and data reporting format/contents with the other laboratories providing chemical measurements for CARP. The auditors noted items that were considered pertinent to the CARP project, i.e., those that impacted the acceptability of the data and the comparability with other laboratories participating in CARP.

Table 2-1. CARP Technical Systems Audits

Audit Location	State Program	Audit Scope	Audit Dates
Raritan River, NJ	NY	Sampling/field activities	October 3, 2001
Philip Analytical Services, ONT	NJ	PCDD/PCDF, PCB, Pesticides, PAH	August 15-16, 2001
Battelle-Columbus, OH	NJ	PCDD/PCDF, PCB, Pesticides	September 12, 2001
Wright State University, OH	NY	PCDD/PCDF, PCB, Pesticides, PAH	October 22-23, 2001
Brooks Rand, WA	NY	Metals	November 5, 2001
Frontier Geosciences, WA	NY & NJ	Metals	November 6, 2001
Axys Analytical Services, BC	NY	PCDD/PCDF, PCB, Pesticides, PAH	November 7-8, 2001
Severn Trent – Knoxville, TN	NY & NJ	PCDD/PCDF, PCB, Pesticides, PAH	January 17, 2002
Severn Trent – Sacramento, CA	NY	PCDD/PCDF, PCB, Pesticides, PAH	February 11-12, 2002
USGS-National Water Quality Laboratory, CO	NJ	Wet Chemistry	March 5-6, 2002
EnChem, WI	NY (Biota)	PAH	April 17, 2002
Hale Creek, NY	NY (Biota)	PCDD/PCDF, PCB, Pesticides, PAH	September 12, 2002

2.2 METHODOLOGY

The 12 CARP on-site audits were performed following EPA quality assurance guidelines and industry-accepted practice. The auditors prepared for each audit by reviewing select documents and information, conducted an on-site assessment of the operations being audited, and submitted a report of findings and observations.

Prior to the on-site portion of the audit, each auditor reviewed applicable QA Project Plans and SOPs. For the laboratory audits, the auditors also reviewed PE sample results for the parameters of interest and examined a hard copy data package produced by the laboratory. With this information and based on their experience, each auditor prepared a facility-specific audit checklist, targeting potential areas of weakness and ensuring that all technical areas were assessed.

At the start of each audit, the auditor held a pre-audit conference with the responsible managers from the audited organization to re-iterate the audit purpose and scope, establish the ground rules for conducting the audit, and respond to questions that may arise. The auditor then conducted the audit in accordance with the checklist. The auditors sought out and reviewed objective evidence of compliance and effective implementation through the following activities:

- Review of the required documentation
- Interviews of individuals who perform work relating to the quality of contract-procured items
- Review of operations associated with the audited items including the witnessing of operations to determine adherence to written procedures.

At the end of each audit, the auditor conducted a post audit conference with management and supervision in the areas audited to review the audit findings. The purpose of this review was to confirm the conditions found, resolve any misunderstanding with respect to observed deficiencies, and to establish corrective action commitments.

The results of each audit were documented in a draft report and submitted to HRF for review. Upon completion of all of the audits and review of the draft reports by HRF, Booz Allen compiled the individual audit reports into one document and submitted it to HRF as specified in Table 2-2, under Section 2.4. The compiled audit report is provided in Appendix B.

2.3 OVERVIEW OF RESULTS

In general, the audited organizations were found to possess the requisite equipment, skilled personnel, and quality systems in place to produce usable and valid data. In each instance, the knowledge, technical competence, and conscientiousness of the staff were evident in the record keeping and operations. For the most part, the SOP documentation was comprehensive, well written, and followed by the staff.

Although the auditors did not report any major non-conformances, they did identify and report several minor occurrences as follows:

- Irregularities in source/calculation of AMDL, SPDL, and ML values
- Laboratory blank background impacts
- Misuse of B, E, and K flags
- Ongoing Precision and Recovery (OPR) sample aliases and limits
- Increased method detection limit (MDL) for methoxychlor
- Undocumented temperatures
- Undocumented balance calibration limits
- Undocumented instrument preventive maintenance
- Undocumented electronic data deliverable (EDD) creation, lack of SOP
- Expired QC limits
- Expired MDLs

- Improper error correction on documentation (e.g., white-out, not dated and initialed)

The auditors provided the audited organizations with feedback regarding these non-conformances and recommendations for improvement. As such, these are not expected to adversely impact the quality or usability of CARP data.

2.4 **DELIVERABLES**

Booz Allen prepared and submitted to HRF the deliverables listed in Table 2-2.

Table 2-2. Audit Deliverables

Submittal Date	Deliverable Title
March 2002	Audit Report for Wright State University-Brehm Laboratory, Dayton, Ohio
March 2002	Audit Report for Philip Analytical Services, Burlington, Ontario
March 2002	Audit Report for Axys Analytical Services Ltd., Sidney, B.C
April 2002	Audit Report for USGS National Water Quality laboratory, Denver, Colorado
April 2002	Audit Report for Severn Trent Laboratories, Sacramento, California
April 2002	Audit Report for Battelle, Columbus, Ohio
July 2002	Audit Report for Brooks Rand LTD., Seattle, Washington
July 2002	Audit Report of Sampling Activities at Raritan River, New Jersey
July 2002	Audit Report for Frontier Geosciences Inc., Seattle, Washington
July 2002	Audit Report for EnChem, Madison, Wisconsin
October 2002	Audit Report for Severn Trent Laboratories, Knoxville, Tennessee
January 15, 2003	Technical Systems Audit Activities Report (Compendium of all CARP audit reports)

3.0 DATA VALIDATION

3.1 SCOPE OF ACTIVITIES

The most significant effort in support of the CARP program was the validation and usability determination of the analytical data contained in the CARP database. To help ensure that program data are of a known, documented, and suitable quality, HRF tasked Booz Allen to assess the analytical quality of existing CARP data. Specifically, Booz Allen examined the data against established QC criteria, identified analytical error or bias, and assigned data validation flags and usability qualifiers.

Booz Allen assessed the data and determined which reported analytical values were of known utility based on analytical and field precision and accuracy, and the values' traceability to specific samples and locations. In all, 752,951 records, representing 636,979 field samples and their associated QC samples, were evaluated as part of this effort.

3.2 METHODOLOGY

HRF tasked Booz Allen with assessing the quality and usability of the data in the CARP database using the QC results that were also contained in the CARP database. Discrete subsets of CARP analytical data were contained in Sample Delivery Groups (SDGs), which were assigned by the laboratory, reported to HRF in a single submittal, and loaded into the CARP database. Each SDG contained field collection information and supporting analytical QC data applicable to the reported CARP analyte. The SDGs were provided to Booz Allen as discrete electronic files for validation. To accomplish the validation, Booz Allen developed the CARP Automated Validation and Evaluation System (CAVES). CAVES accepted and read data downloads from the CARP database, executed the data validation screening in accordance with prescribed QC criteria, and then assigned data validation flags based on the results of the validation screen.

A senior chemist with extensive data validation experience and knowledge of CARP program requirements reviewed these results and assigned usability qualifiers and comments, as appropriate. Once the qualifiers and comments were incorporated into the electronic files, they were uploaded to the CARP database so that data users could gauge the quality and usability of CARP data for their particular uses. All data transfers from Booz Allen to HRF were made via the use of an FTP site.

3.2.1 Validation/Business Rules

In conjunction with the CARP stakeholder groups, Booz Allen established data validation decision rules (i.e., business rules) for the following CARP analytes:

- Polychlorinated biphenyls (PCBs)
- Polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDD/PCDF)
- Pesticides

- Polynuclear aromatic hydrocarbons (PAHs)
- Metals: arsenic, mercury, cadmium, lead, and silver
- Wet chemistry parameters: dissolved organic carbon (DOC), synthetic organic carbon (SOC), particulate organic nitrogen (PON), total suspended solids (TSS), fine suspended solids, and total solids.

These business rules, which comply with the intent of existing EPA data validation guidance, were developed based on the QC criteria presented in the individual methods and as agreed to by the stakeholder groups. The business rules were reviewed and approved by representatives for NY, NJ and HRF for use in CAVES. In general, CAVES business rules use EPA or USGS reference method QC sample frequency and limits as acceptance criteria. If the criteria are not met, CAVES produces an alert code for the validator to review during usability assessment.

The business rules define how CAVES assigns data validation flags to analytical results based on compliance with or achievement of the specified QC criteria. For example, the business rules specify that the automated system will verify the compatibility of the units between the results and the sample matrix and qualify any sample result that is less than five times the analyte detected in the associated blanks. The business rules also specify the flag that the system will assign to each analytical result based on which specific blank (i.e., method, field, trip, or equipment blank) had detectable concentrations of the analyte of concern. The complete set of business rules used for this effort is provided in Appendix C.

3.2.2 CAVES

CAVES is a system designed to facilitate the validation of data stored in the CARP database. It facilitates this validation by providing users with the following functionality:

- The ability to import Microsoft Access Database Downloads into the CAVES system for validation.
- The ability to run this downloaded CARP data, by SDG groupings, through an automated validation tool. This tool checks the set of data against the set of predefined business rules developed for the specific analytical method. A failure of a business rule causes the system to add an alert that uniquely identifies the failure. These alerts are stored in the CARP_ALERT field in the database.
- The ability to review the results of the automated tool, to enter comments associated to the data, and to enter a final usability determination for each record.
- The ability to create a final MS Access Export containing final usability decisions.

Booz Allen coordinated with HRF and its database contractor to establish viable format specifications for CARP Database downloads, and for the transfer of validated data from Booz Allen back to the CARP database. These specifications identified data requirements and formatting that were necessary to facilitate and ensure the compatibility between the CARP Database and CAVES. Specifications included items such as the electronic platform and download/upload mechanisms, identification of QC sample data in association with the CARP data, field identifiers, and output formats. Booz Allen tailored CAVES by (1) incorporating the

CARP business rules as outlined under Section 3.2.1, and (2) adapting CAVES to accept CARP database downloads.

Using CAVES, Booz Allen compared the analytical and QC results against the defined acceptance criteria and assigned a validation flag in accordance with the established business rules. These flags identified those data where the QC or field record did not meet specified acceptance criteria. For example, CAVES verified that the extraction/digestion dates did not precede the sample collection dates, and that method and laboratory QC limits were met. CAVES then assigned specified validation flags (as listed in Appendix D) if any of these check items were not met and generated comments in the associated CARP ALERT (i.e., a text field for comments regarding the reason each validation flag was assigned). Once the assessment using CAVES was complete, a senior chemist evaluated the results and assigned usability qualifiers as outlined in Section 3.2.3.

3.2.3 Data Usability Qualifiers

Once the data were processed and validated through CAVES, the Booz Allen chemist reviewed the validation results and assigned one of five usability qualifiers as listed in Table 3-1. In a small number of cases usability could not be determined due either to the lack of associated QC results or the presence of data structure problems; no usability qualifier was assigned in these instances. Usability qualifiers were assigned based upon the information documented on the CARP ALERT as a result of the validation protocol and the information gathered during the verification portion of the study.

Table 3-1. CARP Data Usability Qualifiers

Usability Qualifier	Definition
USE	Associated QC results indicate that data are usable.
UWCH	Associated QC checks indicate that data are usable with caution due to minor QC deviations; QC results also indicate a probable high bias.
UWCL	Associated QC checks indicate that data are usable with caution due to minor QC deviations; QC results also indicate a probable low bias.
UWC	Associated QC checks indicate that data are usable with caution due to minor QC deviations; bias cannot be determined.
NOU	Associated QC results indicate that data are not usable due to extreme exceedance of quality control criteria.

A hard copy log containing each SDG validated, its size, analyte(s) and type(s) of usability qualifiers assigned based on the ALERTS present was kept to refer to during validation to aid in consistent assignment of usability codes. The validator sorted the flagged SDGs by CARP ALERT and then assigned a usability qualifier of “USE” to all clean records (i.e., those with no ALERTS). The range of sample extraction and quality control extraction dates included in the SDG were assessed to determine if a method blank and accuracy/precision checks were present and applicable. Equipment, trip, and field blanks submitted blind to the laboratory were linked to field samples by collection date and/or station as directed by CARP participants. Sample result values less than five times the associated trip, field and equipment blanks were manually

assigned CARP ALERT codes as appropriate to indicate that the sample result may not be significantly different from background.

Field duplicates submitted to the laboratory as field samples were matched to their appropriate field sample by collection date, station and field sample identification (ID). Laboratory duplicates were matched to the submitted field sample by laboratory sample ID root and field sample ID. Relative percent difference (RPD) values were calculated manually if there was not an exact match for field and laboratory duplicate sample IDs as required by the business rule programming.

Flagged data were sorted by parameter to assess the reliability and potential bias of the data in each SDG. In cases where the CARP ALERTS indicated conflicting bias determinations (e.g., one high and one low), the results were designated as usable with caution with undetermined bias (UWC). Illogical values (e.g., negative values) and undetected results, where there was a severely low method bias, were flagged as unusable. For each SDG, the traveler sheet identifies the type of CARP ALERT assigned and provides the rationale for assigning the usability code. A copy of the traveler sheet is provided in Appendix E.

Once a usability qualifier was assigned for every result and the traveler completed, the SDG was logged as complete. Before transmittal of the completed SDGs to the Booz Allen data administrator, 10% of the SDGs were randomly selected and the assigned usability codes checked for consistency with their traveler and previously submitted validated SDGs. Prior to transmittal to the CARP database, each record identified by the Booz Allen data administrator with no usability code assigned was rechecked to verify that it was not a data gap or keystroke error, but data that was not able to be validated.

3.3 OVERVIEW OF RESULTS

Only a fraction of a percent of the data validated was determined to be unusable (NOU). Conditions that resulted in NOU data were a nonsensical negative or zero value reported (e.g., TSS and PON), or an extremely low (< 10 %) recovery of an accuracy QC check sample (e.g., LCS, MS, OPR, labeled recovery standard) associated with an undetected field sample result. Pesticides exhibited the most biased low recoveries that resulted in unusable data.

The majority of data qualified as usable with caution (UWC) was a result of holding time exceedances and minor accuracy and laboratory precision limit deviations. Most of the data qualified as usable with caution, possibly biased high (UWCH) was a result of lab blank contamination. Data qualified as usable with caution, possibly biased low (UWCL) was a result of low accuracy check recovery.

During data validation in CAVES, several data gaps were identified. DOC/SOC/PON and TSS/fine suspended solids/total solids data reported in the CARP Database had no associated precision or accuracy results such as laboratory blanks, check samples or duplicates. Biota samples had no sample collection date recorded, so no check of holding times could be made using CAVES.

The PCB and dioxin isotope dilution analytical methods provide for the addition of a suite of labeled analogues of the target compounds to assess method accuracy. Some laboratories did not add all of these labeled analogues. As part of the completeness check in the business rules, CAVES identified the lack of each analog as a CARP ALERT, and data were not qualified based on this data gap. Sediment OPR sample results could not be assessed as to whether they were of acceptable accuracy and precision, as the acceptance/true values were not known to Booz Allen or established by the CARP Management Committee. Linkage of field duplicates, field blanks, trip blanks and equipment blanks to associated field samples was not always possible because of conflicting or missing sample collection dates and location information.

Figure 3-1 presents a summary of the usability assessment of the entire data set, while Figures 3-2 through 3-4 present the results for CARP biota sample, CARP sediment samples, and all remaining CARP samples, respectively. For those cases where usability could not be assigned, the sample results are categorized as “UNK” for unknown. In summary, 80.4% of all of the data was determined to be usable, 18.2% was usable with caution, and 0.3% was not usable due to extreme violations of QC criteria. The remaining 1.1% could not be validated due to data structure problems or lack of associated QC data.

Figure 3-1. Data Usability Statistics: All CARP Samples Reviewed

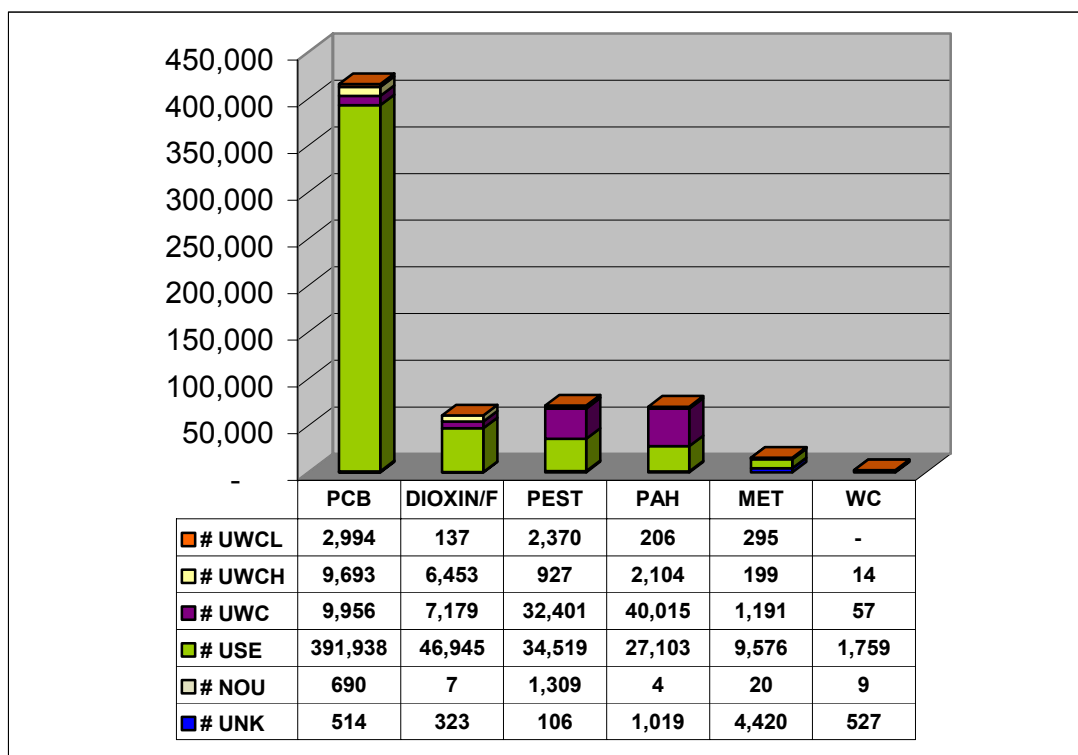


Figure 3-2. Data Usability Statistics: CARP Biota Samples Reviewed

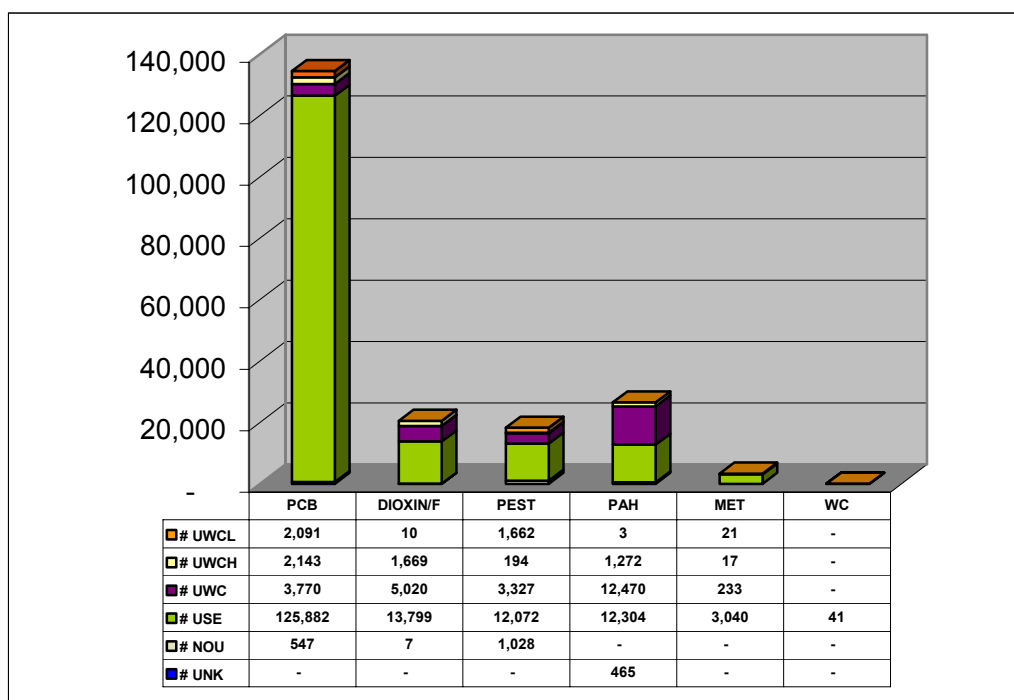


Figure 3-3. Data Usability Statistics: CARP Sediment Samples Reviewed

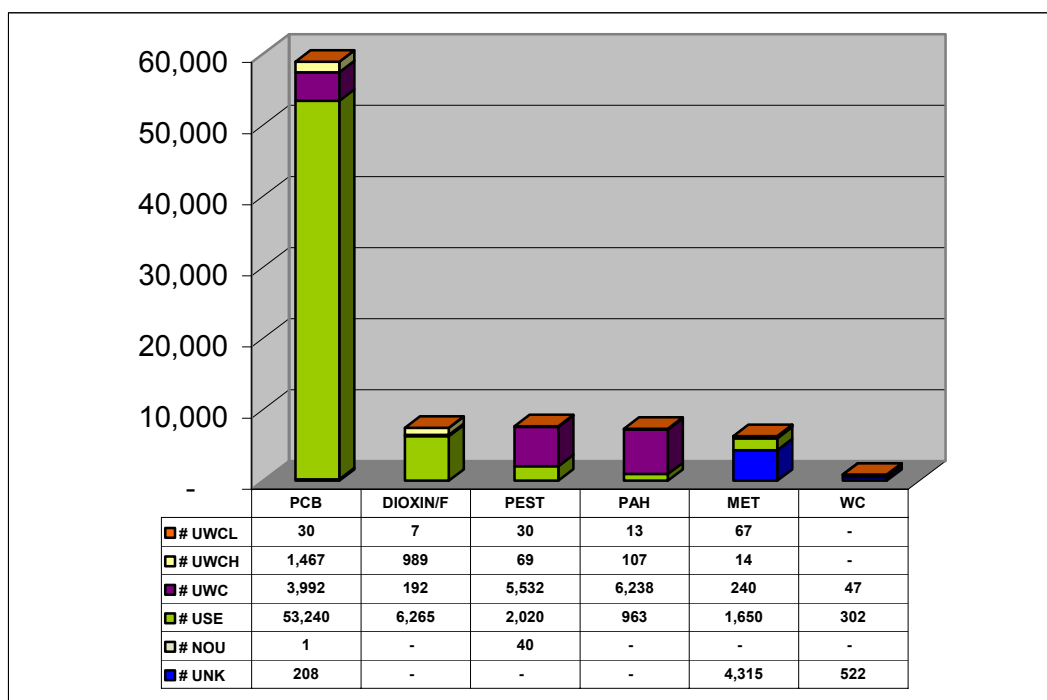


Figure 3-4. Data Usability Statistics: CARP Ambient Water Samples Reviewed

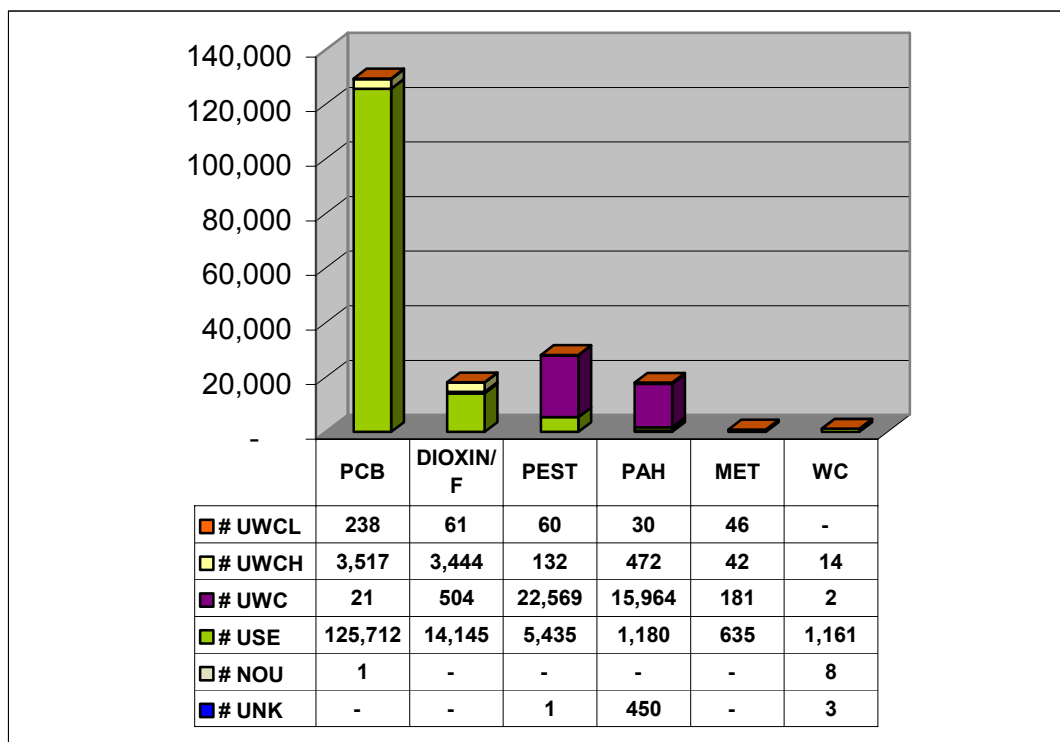


Figure 3-5. Data Usability Statistics: CARP Wastewater Samples Reviewed

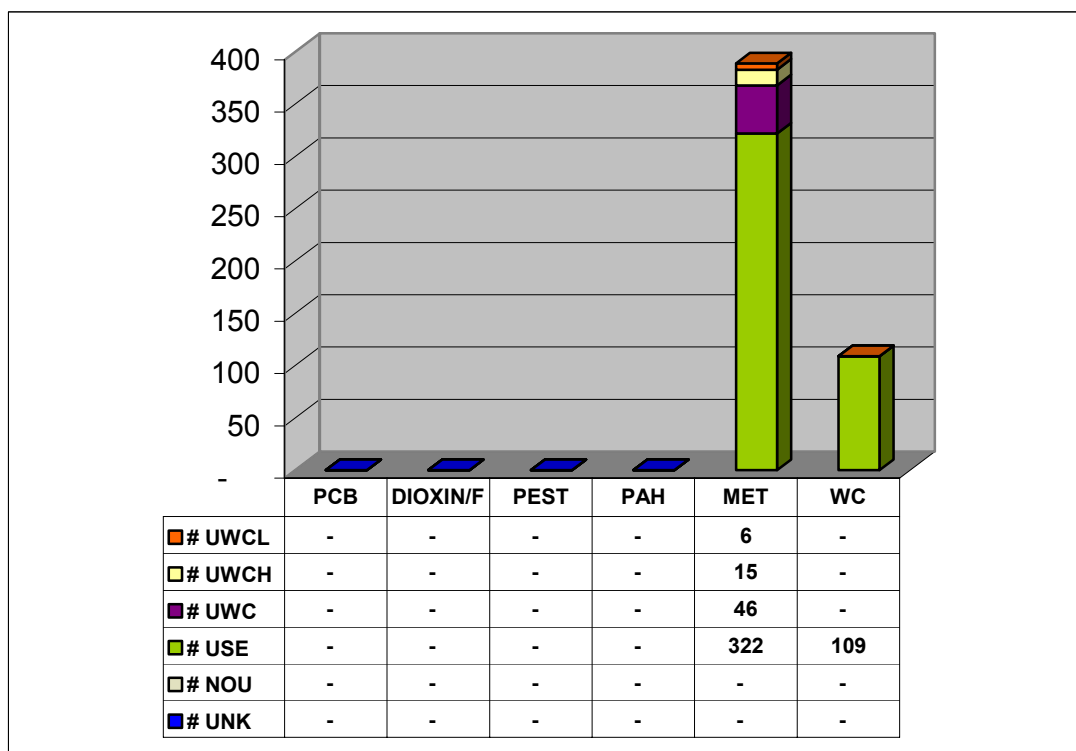
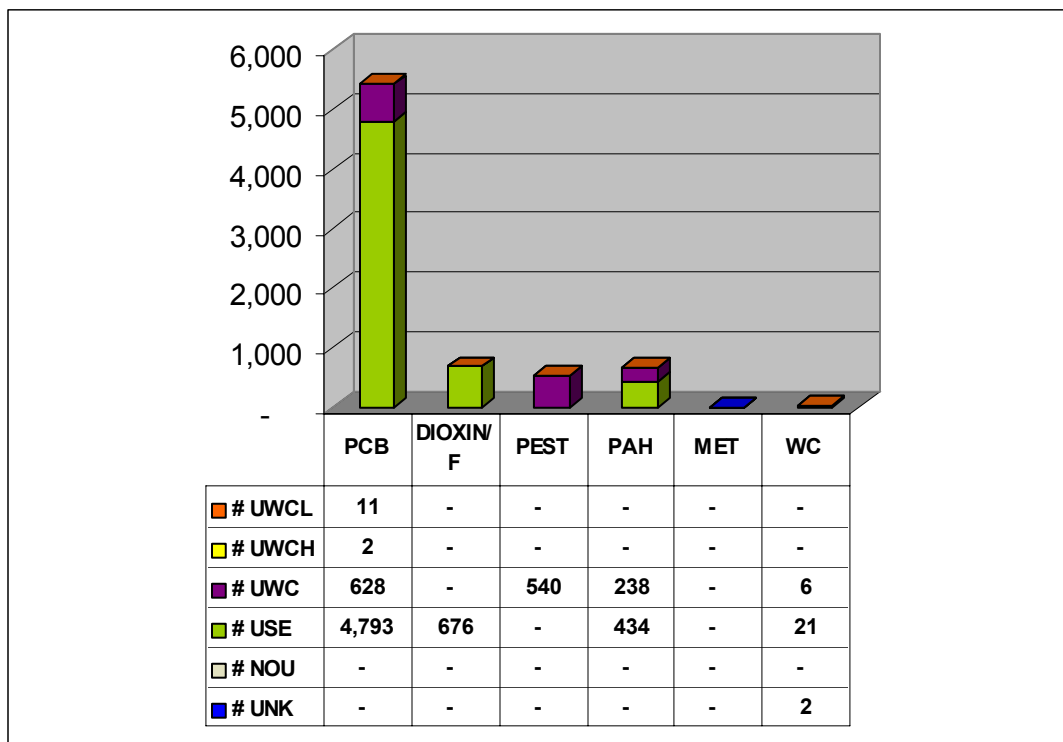


Figure 3-6. Data Usability Statistics: Other CARP Samples Reviewed

3.4 DELIVERABLES

Booz Allen prepared and submitted to HRF the deliverables listed in Table 3-2.

Table 3-2. Data Validation and Usability Determination Deliverables

Submittal Date	Deliverable Title
November 8, 2002	Business Rules for CARP Parameters
Various	Validated CARP Data (electronic deliverables only)
December 22, 2003	Traveler Sheet
December 31, 2003	CARP Quality Management Review

APPENDIX A: *AD HOC* REVIEWS

WORKPLAN and SOP DOCUMENT REVIEW

Date: May 3, 2001

Documents reviewed: New Jersey Toxics Reduction Workplan, Volume I Version 2 dated February 2, 2001
New Jersey Toxics Reduction Workplan, Volume II Version 2
Quality Assurance Project Plan dated September 2000
New Jersey Toxics Reduction Workplan Standard Operating Procedure (NJTRWP-01) Revision 1.0, dated February 16, 2001
Stevens Institute of Technology and Rutgers University Project Plan, Quality Assurance Plan, and Standard Operating Procedures for Study IE, Version 1.1 dated February 23, 2001
Stevens Institute of Technology and Rutgers University Project Plan, Quality Assurance Plan, and Standard Operating Procedures for Study 1-D, Version 1.1 dated April 20, 2001

Reviewed by: Marcia A. Kuehl
Booz Allen & Hamilton

I have reviewed the subject documents as applicable against the criteria contained in "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations QA/R-5 EPA/240/B-01/003 dated March 2001" and offer the following comments on their clarity and completeness. I have also identified potential issues that may affect comparability between the NJ and NY programs.

Comments on New Jersey Toxics Reduction Workplan, Volume I Version 2 dated February 2, 2001

General Comment: I suggest a document control system label on each page similar to that used by EPA for QAPPS that includes title, revision #, date, section and page X of Y.

Section I: p. 4, third ¶ Has the HEP Toxics Work Group updated the chemical list yet? If so, or when it does, how will any additional or deleted analytes get relayed to laboratories and other affected project personnel?

Section I: p. 5, fifth ¶ Due to the fact that past analytical detection limits were not sufficient to detect analytes, a list of detection limit goals should be established for this project for evaluation by the modelers and the laboratories. Section 2, p. 16 indicates that a 5 ppt reporting limit for "dioxin" for the NJHDG study was not low enough to detect any "dioxin". Does CARP need a lower reporting limit?

Table I-1: Have the sediment chemicals of concern been finalized yet by the Toxics Work Group?

Section 2: p. 19 Is any more discussion on the RCRA Permitting and Enforcement available?

Section 2: p. 20 second ¶ typo a998 should be 1998

Section 2: p. 21 and 24 What happened to the Whippany River Comparative Mass balance Study that was included in the July 14, 2000 version of the Workplan?

Section III: p 27-28 last ¶ Was modeling started in 1999 or will it start this year after selection of the contractor? Based on the timing, the modeling contractor will also be evaluating data already collected in addition to the data planned for collection.

Section III: table III-1 No QAPPs have been received for review for Phase One studies I-A, I-B, I-C, I-F and I-G. When can these be expected? Volume II p. 19 indicates that “Quality assurance concerns associated with Study I-B will be addressed independently of this QAPP, under the auspices of the CARP QA Officer and through the operation and management of the NJADN”. However, the BAH Statement of Work indicates that we will not be the primary author of any QAPP or analytical/field SOPs. Therefore a QAPP is needed for this activity and the others listed for review. I am assuming that Phase II, III QAPPs will be developed after data evaluation and that Phase IV QAPP will be submitted once a modeling contractor is selected.

Section III: p. 41 It is not clear if the Study I-A data will be linked to or accessible through the CARP database.

Table III-2: Typo: 2,6-dimethylnaphthalene. During the January CARP QA kick-off meeting it was noted that NY is getting C2 and C3 phenanthrene/anthracenes from Battelle-MA, STL is reporting C2 and C3 naphthalenes and C1, C2 phenanthrene/anthracenes are being reported. Reporting consistency for these PAH analyte groups should be assessed by the modelers and CARP Toxic Workgroup. A list of MDLs needed for each of these analytes should be developed and included in both this Workplan and QAPP and relayed to each laboratory.

Table III-3: It is not clear from the text if the “suspended sediment” will be expressed in units of weight/volume of water sampled or on the traditional dry weight basis used for sediments.

Section III: Study IV-A description should add an evaluation of data already collected and a determination of the sensitivity (i.e. MDLs) needed for the modeling efforts.

Appendix A: Based on the issues with the TOPS sampler, identification of those samples collected using the GFF/XAD only TOPS needs to be done for the database and validation purposes to indicate the biases. Those samples collected with the GFF/AE TOPS assemblies will also need to be identified as there still is a remaining bias, albeit of a lesser magnitude.

Appendix C: A hard copy is needed for review, as no electronic copy is available.

Appendix D: It is not clear if this pilot study’s results will be included in the CARP database.

Comments on New Jersey Toxics Reduction Workplan, Volume II Version 2 Quality Assurance Project Plan dated September 2000

Appendices not received or reviewed: A, B, E and F, which are QAPPs for studies I-A, I-C, I-F and I-G. I would add as an Appendix the SOP NJTRWP-01 which contains the chain-of-custody information and directions.

List of Tables: Required by EPA QA/R-5 but missing is a table of holding times. Although containers and preservatives are listed in each study QAPP, nowhere is there a list of holding times.

Section 1-3: This section indicates that “Quality assurance concerns associated with Study I-B will be addressed independently of this QAPP, under the auspices of the CARP QA Officer and through the operation and management of the NJADN”. However, the BAH Statement of Work indicates that we will not be the primary author of any QAPP or analytical/field SOPs. Therefore a QAPP is needed for this activity and the others listed for review.

Section 1-3: p. 20 Text needs to be added on the North and South surveys and the CSO/SWO sampling events.

Table 3: Typo 2,3,5-trimethylnaphthalene. During the January CARP QA kick-off meeting it was noted that NY is getting C2 and C3 phenanthrene/anthracenes from Battelle-MA, STL is reporting C2 and C3 naphthalenes and C1, C2 phenanthrene/anthracenes are being reported by another lab. Reporting consistency for these PAH analyte groups should be assessed by the modelers and CARP Toxic Workgroup. A list of MDLs needed for each of these analytes should be developed and included in both this Workplan and QAPP and relayed to each laboratory.

Section 1.3.3: b) p. 24 Laboratory Control Samples are not an indication of field contamination, only of lab contamination. c) Equipment blanks were omitted from this section, is this deliberate? I could not find a description of the difference between the equipment and the field blank and how each is collected. This is critical to ensure that each researcher is taking these blanks the same way to assess the same contamination sources. Refer to Table 12 a in this section.

Section 1.4: p. 36 The allowance for a class of chemical to be dropped from monitoring if not “found” necessitates a list of what detection limits are needed to avoid chemicals being “lost” due to inadequate detection limits.

Tables 10, 11: These tables do not appear to be complete as they do not include preservatives nor do they list holding times

Table 12a: This table is not mentioned in the text. Note (a) indicates holding field blanks, yet no mention is made of holding time considerations. Will the field blank collected at one site/event be extrapolated to others?

Section 1.5.1: Text on Northern and Southern surveys needs to be added.

Section 2.1: p. 45 Study I-B is conspicuous in its absence.

Section 2.1: p. 46 How the 25 % will be selected for validation by the NJDEP QAO should be included.

Section 2.1: p. 47 Typo third bullet: CARP. The Principal investigators should also respond to data clarification requests from the NJ Project Manager, CARP QAO and database contractor.

Figure 3: It appears that there is no oversight of the Studies I-A, I-B, I-F, etc. by the Project Manager. Who monitors them and assesses their performance for CARP?

Section 2.2.1: The Statement of Work for the CARP QAO indicates the following tasks:

- Solicit input from CARP participants and draft a Quality Management Plan (QMP)
- Compile a list of CARP data collection activities that should be documented in a QAPP
- Review data collection QAPPs and track status/revisions of such documents.
- Review SRM and PE studies proposed and results.
- Develop list of essential SOP elements to aid in CARP participant SOP preparation.
- Lead DQO process with CARP Management Committee, State Coordinators and modelers.
- Audit record consistency from database through analytical data package and field collection records.
- Audit field collection activities and laboratory analysis.
- Develop SOP and checklist for assessing laboratory data for compliance with the QMP and the ASP Exhibit B Category B deliverables.

Develop a Data Validation Plan and SOP.

Validate laboratory data from a total of 1180 analytical batches.

Section 2.3: p. 64 Has the reporting list and MDLs for organic analytes from STL and Battelle been evaluated for comparability?

Section 2.3: p. 65 The Laboratory Managers should also respond to data clarification requests from the NJ Project Manager, CARP QAO and database contractor.

Section 2.4.1: p. 66 How will “each laboratory that uses the NYSDEC methods...demonstrate the ability to generate acceptable results...”? Will labs submit their method validation statistics, results of PEs, MDL studies to the NJ Project Manager, or what does this demonstration consist of?

Section 3.0: p. 66 In addition to the specification of “tolerable limits”, the DQOs should specify the detection limits needed.

Section 3.0: p. 67 A referral to Section XXX is made. I assume that this section will eventually contain the specific DQOs developed as a result of the DQO process with CARP Management Committee, State Coordinators and modelers. In order to reconcile the DQOs with the analytical capabilities and to audit the laboratories, the “table that specifies the acceptance criteria for QC samples...” for each lab SOP mentioned in the first paragraph of this page is needed by the CARP QAO as soon as possible.

Section 3.0: p. 67 As the objective of this document is to “establish DQOs that are consistent with those of the New York State Toxics Reduction Workplan”, the NY Workplan is also needed for review.

Section 3.0: P. 68 What specifically are the metadata that will collected and/or stored in the database?

Table 19: Add as critical laboratory data MS/MSD and lab duplicate results as recoveries and/or RPD, Laboratory Control Sample recoveries, and lab added surrogate recoveries. Will the lab be privy to the “true” value of the added field surrogates in order to report the percent recoveries? If not, indicate who will provide this calculation so it will be stored with the analytical results for validation.

Table 19: Note a) lists a subset of the WP (Table III-2) and QAPP (Table 3) list of pesticides. Does this mean only these are being analyzed for, or are all those in the Workplan being monitored?

Section 3.2.1: p.70 1) pick a number, based on the complexity of sampling, 80% may be more reasonable. 3) what are the “required metadata”, it is not clear if it is p. 69 1) and 2). 4) add that the 90% are analyzed within holding times. This allows for a 10% rate of lab accidents/expired holding times. 5) 95% is achievable only if you know what the lab’s internal QC limits are based on. I am assuming that the “established QA/QC protocols” cited here are the lab’s own limits and the data rejection is at the lab level (internal verification), not external validation level. If this refers to external validation of all the lab data against the project DQOs/MQOs, 95% is ambitious. 6) I have never seen an objective for data to be “clean” with no qualifiers added at all, and based on my historical experience, it is unlikely that 80 % will be clean. Is it known that data qualified as estimated will not be useful for the modeling efforts?

Section 3.2.2: p. 70 Corrective actions affecting data quality and/or turnaround time should be made in consultation with the NJDEP Project Manager. What inter-laboratory comparison samples will be analyzed, for what analytes, at what frequency and by whom? What tolerance level will be used to assess acceptable performance? The tolerance level should vary based on the analyte concentration’s proximity to the MDL. What statistic will be used to measure accuracy (i.e. % bias from true or % recovery)?

Section 3.2.2: p. 71 Laboratory duplicates are not split between laboratories, but are two aliquots of a single sample analyzed within a single laboratory. Lab duplicate tolerances are also

expressed based on analyte concentration's proximity to the MDL, i.e. $< 50\%$ RPD for analytes $> 5 \times \text{MDL}$, $< 100\%$ RPD for analytes $< 5 \times \text{MDL}$. What level of precision is needed for the model effort will aid in setting these tolerances.

Section 3.2.2: p. 71 "Significantly" contaminated is not a quantitative term that can be consistently applied to all study data. I could not find the DQO for the blank contamination in the QAPP. Is it in the analytical SOP QC limit tables that I am missing?

What data can and cannot be blank corrected should be specifically listed here, along with the data qualifier to be used.

Section 3.2.2: p. 71 I will need the applicable version of NYSDEC Method HRMS-1, 2 and 3 and SOP-Y, Y2, Y3 as referenced. If a laboratory has modified these for their use, the modifications need to be indicated and submitted for review. The "required detection limits and quantitation levels" lists should be included in this QAPP to verify consistency between labs. What increase in these limits can the modelers tolerate, (i.e. an order of magnitude, 2X, 5X) in order for the data to still be useable?

Section 3.2.3: p. 71 Lab duplicates can also be used to assess analytical precision. What statistic (i.e. RPD, range) will be used to measure precision?

Section 3.3.1: p. 71 Representativeness is also assured by controlling lab and field contamination.

Section 3.3.2: p. 72 comparability should also be discussed from the angle of how the CARP study data will be comparable to historical data. Are the past and present analytical methods of similar specificity, sensitivity and quality control measures? What inter-laboratory comparison samples will be analyzed, for what analytes, at what frequency and by whom? What tolerance level will be used to assess acceptable performance? The tolerance level should vary based on the analyte concentration's proximity to the MDL.

Section 4.2: p. 74 The flow of data from the laboratory to NJ and to the database needs to be specified. I have a cryptic note from the January meeting that all data goes to Great Lakes first? A detailed list of what the lab is to submit for hard copy and electronic copy for database entry should be developed. The level of detail should include what QA/QC sample results (lab blank, lab duplicate, MS/MSD, LCS, surrogate) and what statistics (recovery, RPD) should be calculated and submitted.

Section 4.3: p. 74 Baseline adjustment for re-integration should also be noted and explained in the hard copy data package.

Section 4.4: p. 75 refer to NJTRWP-01 here and add discussion on how field and equipment blanks are to be labeled.

Section 5.0 Data Compilation and Analysis is listed in the table of contents, but missing from the

electronic version I have.

**New Jersey Toxics Reduction Workplan Standard Operating Procedure (NJTRWP-01)
Revision 1.0, dated February 16, 2001**

Are separate forms to be developed for Studies I-A, I-B and I-F?

Section 1.2: p. 5 add “possession must be traceable **and documented** from the time...”

Section 1.5: p. 6 What is the difference between EB and FB? In the second ¶, “data validation to ensure” is not correct, data validation does not ensure anything, it identifies the data quality, not fixes it. The third ¶ should indicate what action the lab should take if the MB exceeds the MDL, and what the Researcher might have as wording in their contract with the lab. In the last ¶, COC forms do not “control” they document. The FB and EB XAD-2 resin columns should be from the same lot or preparation batch as the samples and the MB.

Section 3.2.1.1: p. 12 The sentence “Researchers using TOPS to collect large volume ambient water samples for the determination of dissolved PCB congeners and Pesticides.” seems out of place.

Section 3.2.4: p. 14 The sentence “Researchers performing sampling for Metals.” seems out of place. Will the lab prepare trip blanks for mercury?

Section 3.3.1: p. 16, Section 3.3.2 P. 17 Sample Conditions The qualification of data as qualified when the temperature upon receipt is 4-6 °C is not consistent with EPA data validation guidelines. Is this a specific EPA regional requirement?

Section 3.5: p. 18 Add notation that organic samples should be kept in the dark. Note 6 indicates that mercury sample results are to be reported without blank subtraction, yet it is known that frontier is subtracting blanks and flagging the data with “V” for NY and no flag for NJ.

Section 4.1: p. 19 Accomplishment refers to the ML. A definition should be included.

Section 4.3: p. 20 Accomplishment should read “ Results of the FB and FB compared to the laboratory Method blank should indicate little difference, as additional field induced contamination should be minimized”.

Stevens Institute of Technology and Rutgers University Project Plan, Quality Assurance Plan, and Standard Operating Procedures for Study 1-D, Version 1.1 dated April 20, 2001

Table 2: p. 12 Typo 1-methylphenanthrene. During the January CARP QA kick-off meeting it was noted that NY is getting C2 and C3 phenanthrene/anthracenes from Battelle-MA, STL is reporting C2 and C3 naphthalenes and C1, C2 phenanthrene/anthracenes are being reported by another lab. Reporting consistency for these PAH analyte groups should be assessed by the

modelers and CARP Toxic Workgroup. A list of MDLs needed for each of these analytes should be developed and included in this QAPP and relayed to the applicable laboratory.

Section 2.5: p. 14 Add procedures for collection of EB and FB.

Section 3.2: p.17 Has 50 liters been shown to be enough to reach detectable concentrations?

Table 4: p. 19 Will all 4 -500 ml glass bottles be composited into one sample by STL for the PAH analysis, or will 2 be composited and analyzed and two saved in case of QC failure?

Table 6: p. 21 Archiving FB discussion needs to include holding time considerations.

Table 7: p. 22 What is the difference between an EB and FB? A description of the collection procedures should be included.

Section 3.4: p. 23 No mention is made in this section of holding times and shipping considerations to take them into account.

Table 8: p. 29, 30 It appears that no EB or FB are collected from Surveys 1 and 2, yet they are listed as supplies needed in table 9.

Section 7.3: p. 38 Training should be conducted on the collection of EB and FB.

Table 11: p. 40 Chlorophyll is not mentioned as critical data. Is it metadata?

Section 8.2.2: p. 41 Will FB be filtered through the TOPS assembly, or is that an EB? Need definitions of these two types of blanks.

Section 8.3.2: p. 43 “Comparability” between total contaminant levels should be defined (i.e. factor of 2, 10?).

Section 9.2: p. 45 Sediment concentration values are listed here as ng/kg. Is this on a dry weight basis and is it consistent with NY sediment data reporting convention?

Sections 9.2.2, 9.2.3: 1. Will any outlier tests be applied to results prior to the calculation of the geometric mean?

FORM 9: 2. Will the columns be indicated as spiked or unspiked by the lab prior to assembly?

SIT-SOP#3: 3. The lot # of the XAD-2 resin should also be recorded if not cleaned by the lab in “batches”. Will the labs be re-cleaning and re-using resin?

Stevens Institute of Technology and Rutgers University Project Plan, Quality Assurance Plan, and Standard Operating Procedures for Study IE, Version 1.1 dated February 23,

2001

Section 1.3: p. 9 Who alerts lab(s) of sampling event?

Section 2.0: p. 11 Who gets the analytical data?

Table 1: p. 16 Note a) lists a subset of the WP (Table III-2) and QAPP (Table 3) list of pesticides. Does this mean only these are being analyzed for, or are all those in the Workplan being monitored?

P. 17: What will the metadata be for this study?

Section 5.1.2: 2., 3. No allowance for field or lab accidents may be unreasonable.

Section 5.1.2: p. 17 last ¶ Typo Environment. The 40% (RPD?) DQO here is not consistent with no DQO listed for Study I-D.

Section 5.1.2: p. 18 “Significantly” contaminated is not a quantitative term that can be consistently applied to all study data. A definition of Reporting Limit should be included here. Other text in the QAPP does not use the Reporting Limit as the blank action limit. I could not find the DQO for the blank contamination in the QAPP. Is it in the analytical SOP QC limit tables that I am missing? What data can and cannot be blank corrected should be specifically listed here, along with the data qualifier to be used.

Section 5.1.2: p. 18 I will need the applicable version of NYSDEC Method HRMS-2 and 3 as referenced. If a laboratory has modified these for their use, the modifications need to be indicated and submitted for review. The “required detection limits and quantitation levels” lists should be included in this QAPP to verify consistency between labs. What increase in these limits can the modelers tolerate, (i.e. an order of magnitude, 2X, 5X) in order for the data to still be useable?

Section 5.11: p. 26 Add timing and procedures for collection of EB and FB.

SIT-RU-SOP#7: Could not access at URL listed.

SIT-RU-SOP#8: Could not access at URL listed.

SIT-RU-SOP#9: Ensure that this SOP is available on vessel, will need during field audit.

Conclusion:

The usual order of events to assure a quality project are 1) the establishment of the DQOs, 2) the determination of analytical Measurement Quality Objectives (MQOs) that can meet the DQOs, 3) selection of laboratories that can meet the MQOs and 4) monitoring and assessment of the

data generated against the MQOs and DQOs. As events are a bit out of order for CARP and the independent quality assurance function has been initiated after project start-up, it is essential that the following documents be received for review by BAH as soon as possible:

New York State Toxics Reduction Workplan

Laboratory SOPs used for sample analysis, including chlorophyll a

Table of QC criteria for each laboratory SOP

Contract between state and each analytical laboratory

Detection limits needed for the modeling effort or at least what each laboratory is or will report

NJ Toxics Workplan Appendix C hard copy

QAPP Appendices A, B, E and F, which are QAPPs for studies I-A, I-C (received for review 6/20/01), I-F and I-G.

QAPP for Study I-B

NJTRWP-01 Appendix II: I did not receive Forms NJTRWP-1b, 1c, 2a, 3, 5, 6, or 7

NJTRWP-01 Appendix III: I did not receive Form NJTRWP-8

SIT-RU-SOP#7

SIT-RU-SOP#8

if you have any questions regarding these comments, please contact me at 920-469-9113 or at makuehl@aol.com.

NY/NJ SIDE BY SIDE STUDY DATA REVIEW

Date: August 31, 2001

Documents/Data reviewed: Data Report, POTW Event # 3 from Battelle, dated 7/17/01

E-mail dated 7/27/01 "Battelle Intercomparison Data", with Battelle_AxysNISTComparison.xls from Greg Durelle, Battelle to Mick DeGraeve

Memo "Battelle CARP Data" dated 8/14/01 from Greg Durelle, Battelle to Mick DeGraeve

Report "NJTRWP Field Visit Report: Problems Observed and Proposed Corrective Actions", field visit 5/23/01, Study I-G (POTW) dated 5/29/01 from Joel Pecchioli and Floyd Genicola

Report titled "Comparison Between NYSDEC and NJHDG Sample Methods, Axys Data", by Simon Litten, NYSDEC

Axys SDGs WG4533X.xls and WG4491X_WATER.xls

MOE4labsummary.xls by Larry Bailey, NYSDEC

Reviewed by: Marcia A. Kuehl
Booz Allen & Hamilton

I have reviewed the subject documents and data and offer the following comments on the data comparability and biases. A discussion of the field sampling differences represented by the data is included. An evaluation of the analytical methods and quality control results was then made to determine if the biases seen were explained by a difference in the laboratory analyses.

Study Background

Due to concerns between different sample collection methods used by New York and New Jersey for CARP study wastewater samples, a side-by-side collection study was conducted at two wastewater treatment plants on May 21-22, 2001. The Passaic Valley Sewerage Commission (PVSC) and the Edgewater treatment plants, located in New Jersey, were selected as the sampling locations. The New Jersey Harbor Dischargers Group (NJHDG) collected samples by pumping whole (not filtered) water into carboys, and then splitting the carboy into 2.5 L aliquots. The aliquots were then sent to Battelle in Columbus Ohio for analysis for PCB congeners. New York State Department of Environmental Conservation (NYSDEC) also collected samples by pumping whole water into carboys, but then also processed some of the whole water through their Trace Organics Platform Sampler (TOPS). The TOPS assembly has been used by NYSDEC for all of the samples collected for CARP and consists of filtering the whole water through 0.7

micron glass fiber cartridge and pumping the filtrate through a polymeric, hydrophobic resin (XAD) to capture the organic compounds. The remaining whole water carboy collected by NYSDEC was split into 2.5 L aliquots. The whole water aliquots and the TOPS filters and XAD were then sent to Axys in Victoria, British Columbia, for analysis for PCB congeners.

In order to be able to assess the performance of the analytical laboratories in the absence of sample collection differences, a sample with a known concentration of PCB congeners was sent to each laboratory. This sample was the National Institute of Standards and Technology's (NIST) Standard Reference Material (SRM) 1944, which is a sediment from New York Harbor. The SRM was diluted with water to mimic the study samples sent to the labs.

NIST SRM Results Comparison

The diluted NIST SRM was prepared by NYSDEC by spiking 2.5 L of reagent water with 75 mg of NIST SRM 1944 to yield a sample with 30 mg/L TSS. The labs then filtered the sample through a 0.7 micron filter. The filters were Soxhlet extracted. The filtrate was extracted using liquid/liquid extraction. Extracts from each were then combined for cleanup and analysis. Battelle reported more certified congeners that coelute with non-certified congeners (18+30, 28+20+21+33, 52+73+43) than Axys (183+185, 28+20), which would result in possibly higher congener and total PCB results. Results in Battelle_AxysNISTComparison.xls show this bias, with Battelle reporting 107 % and Axys 77 % of the total PCB concentration for NIST certified congeners.

In a recent evaluation of MOE sediment data by NYSDEC, Axys results for 10 certified congeners indicated a mean bias of -10%, which is less than that seen in the diluted SRM. This indicates that some additional analyte loss may be occurring during the laboratory analysis for water samples and filters.

PVSC and Edgewater Sample Result Comparison

Battelle_AxysNISTComparison.xls presents the Battelle whole water homologue results (Battelle), the Axys whole water results (Axys whole), the Axys uncorrected TOPS value (Axys TOPS) and the Axys corrected TOPS value (Axys TOPS-C). To get the Axys TOPS-C values, the Axys TOPS results were multiplied by the recovery of the applicable surrogate spike added during the TOPS processing (see TOPS sampling discussion).

In general, the Axys results are lower than those reported by Battelle, except for the lower chlorinated congeners (mono-tri). The TOPS results are also lower than the whole water results reported by both laboratories. Loss of higher chlorinated PCB congeners is seen with TOPS sample collection.

PVSC total PCB and the dichlorinated congeners exhibit a unique bias due to the large concentration of BZ# 11, which is a dichlorobiphenyl specific to pigment manufacture and not Aroclors. In this case, Axys reported a higher concentration of dichlorinated congeners and

therefore total PCB concentration than Battelle. The source of the under reporting of BZ#11 by Battelle is not readily apparent from the laboratory quality control data reviewed. The diluted SRM results for BZ# 11 reported by Battelle were actually higher than that of Axys.

Field Sampling and Subsampling Comparison

Raw water sampling: PVSC and Edgewater samples were collected by the NYSDEC and NJHDG sampling teams in separate 20 liter glass carboys at the sampling locations. The sampling was done side-by-side and simultaneously to reduce spatial and temporal variability. The carboys were not split from one single sample container. One carboy was brought to PVSC for splitting into 2.5 L aliquots for analysis by Battelle for NJHDG. The other carboy was brought to NYSDEC lab for splitting into 2.5 L aliquots for analysis by Axys for NYSDEC. The NJHDG iced the samples after collection, during transport and during splitting in accordance with their sampling protocols. NYSDEC procedures do not require this icing, only that the samples be kept “cool”. The bias, if any, resulting from this preservation difference would be for the iced sample to retain the more volatile lower chlorinated congeners and thus result in higher reported concentrations.

Raw water subsampling: The splitting of each of the 20 liter samples by NYSDEC and NJHDG into 2.5 L aliquots was done by drawing sample out through a peristaltic pump. During pumping, a magnetic stir bar on the bottom of the sample (NYSDEC) or a top-entering blade mixer (NJHDG) was actively mixing the sample. This difference in mixing may have also contributed to the lower sample result concentrations reported by Axys, with the magnetic stir bar not as effective in suspending particulates throughout the carboy.

Floyd Genicola, New Jersey Toxics Reduction Program, did an inspection of the sample collection procedures used by NJHDG. He noted that during the sample mixing for the Battelle aliquots, the hand held drill with the blade attachment on it “could result in contamination of the sample from oil and metal filings falling off the drill” (5/23/01 Field Visit Report). The carboy opening was then covered to reduce this happening, but since the study samples were collected on the day before, it is assumed that the study sample carboys were not similarly covered. When the carboy was open to the atmosphere, deposition of airborne contaminants could have occurred. The bias, if any, resulting from possible contamination from oil dripping off the drill into the sample or deposition from the atmosphere would be for the Battelle samples to potentially contain higher concentrations of congeners or interfering compounds that could elevate the sample detection limits. No field visit or independent observation of the NYSDEC sample mixing and aliquot procedure was done.

The NJHDG protocol also requires the addition of sodium thiosulfate to the 2.5 L sample aliquots at a final concentration of 80 mg/L to remove residual chlorine. The NYSDEC does not require addition of sodium thiosulfate. Residual chlorine could act as an oxidizer in the NYSDEC study samples, but its effect on PCB congener concentrations in the 29 days between collection and analysis is unknown. If oxidation did occur, this would serve to result in lower reported congener concentrations in the Axys samples.

TOPS sampling: The TOPS system was selected by NYSDEC for sampling in CARP as it can easily be modified (by longer pumping time, additional filters/resin) to collect large volumes of water needed to yield detectable results. Handling of large volumes of water in transport and extraction is avoided by use of TOPS, and lower detection limits than from 2.5 L whole water samples are achievable.

For this study, NYSDEC used the same procedure as the rest of the CARP sample collection, except that the pumping of the raw water through the TOPS assembly was done at the NYSDEC lab, not in the field and metered surrogates were added to monitor the XAD collection efficiency. Flow rates through the 0.7 micron filters and XAD resin were the same, but sample collection volume varied. For the study samples, 34.5 L (Edgewater) and 46.7 L (PVSC) was processed through TOPS, but in previous CARP treatment plant collection more volume (~ 400 liters) was passed through the filters in order to capture enough mass, and more volume was sent through to the XAD resin (~ 100 liters).

Recoveries of the five metered surrogates in the Edgewater and PVSC samples indicated that recovery was lower for higher chlorinated surrogates. The XAD resin is not as efficient in sorbing these congeners:

Surrogate IUPAC #	Homologue	ng added	Edgewater ng measured	Edgewater recovery	PVSC ng measured	PVSC recovery
14	di	12.4	13.4	108 %	13.2	106 %
55	tetra	11.1	9.62	87 %	8.74	79 %
104	penta	11.5	6.64	58 %	7.1	62 %
152	hexa	9.2	4.28	46 %	3.71	40 %
204	octa	10.5	1.58	15 %	2.62	25 %

In order to evaluate their TOPS sample result data against the raw water sample data and Battelle results, NYSDEC “corrected” the TOPs reported values using these recoveries. Since there are no metered surrogates available for trichlorinated congeners, an average of the recoveries of di- and tetra- was used. Similarly, there is no metered surrogates available for heptachlorinated congeners, so an average of the recoveries of hexa- and octa- was used for correction. Nonachlorobiphenyls and decachlorobiphenyl values were not corrected against any recovery.

It is apparent from these data that the TOPS sampling procedure is subject to a loss of dissolved phase congeners that pass through the XAD and are not captured.

Laboratory Method Comparison

Filtration: For this study, NYSDEC directed Axys to filter the whole water sample through a 0.7 micron filter and then extract the filters and filtrate separately, in accordance with NJHDG procedures. It is not known if any previously collected CARP whole water samples analyzed by Axys included this filtration step.

Standards: Axys uses, as required by NYSDEC, AccuStandard solutions for their native PCB congener standards. Battelle uses Cambridge Isotope Laboratories as their source. It would be unusual that a possible contributing source of bias in the data may be from a difference in something as basic as the quantitation standards, however there was no data available for review comparing the two standard sources to rule it out.

Sensitivity: The analytical method documentation used by the two laboratories (Battelle SOP ASAT.II-009.00 and NYSDEC Exhibit D (EPA Method 1668A) did not reveal any significant procedural differences, except for the detection limits reported. A direct comparison of laboratory method sensitivity as assessed by reported detection limits was not readily apparent as Battelle reported only Minimum Levels (ML) and not a sample specific performance detection limit (SPDL). Axys reported the data in the CARP database format and as such reported a SPDL and a ML for each analyte in the sample. MLs reported by Battelle ranged from 66.5-1330 pg/sample and were established based on method 1668A EMLs adjusted for a dilution/extract split factor of 1.33. MLs reported by Axys ranged from 4.42-8.84 pg/L in the whole water samples and 22-264 pg/sample in the TOPs samples. The reporting of pg/sample units and the storage of such units in the database without knowledge of the volume collected to calculate a concentration value (i.e. pg/L) will not be useful for direct comparison and loading calculations by the modelers.

Detection Limit Type	Battelle pg/sample	Axys pg/sample TOPS	Axys pg/L whole water	Battelle pg/L
ML	66.5-1330	22-264	4.42-8.84	Not reported
SPDL	Not reported	0.726-5.70	0.134-9.07	Not reported

Quality Control Samples: Method 1668A requires a lab method blank (MB), an ongoing precision and recovery sample (OPR or LCS) and spiking of each sample with labeled internal standards (LIS) to monitor method performance. Axys prepared and analyzed a Laboratory Control Standard (LCS) and a method Blank (MB) with the comparison study samples. Axys did not include an SRM with the sample batch, as one was included as a sample (diluted NIST SRM 1944, above). Battelle set up an LCS, MB, Standard Reference material (SRM), an

MS/MSD (from PVSC) and analyzed an Independent Control Standard (ICS). A field blank was also collected by NJ.

Lab Blanks: The method blanks analyzed with the project samples by both laboratories contained detectable total PCBs. Total PCBs were calculated by summing all of the detected PCB congeners, even those indicated as below the ML or SPDL. The Axys TOPS XAD and glass fiber cartridge blank contained 462.61 pg/sample total PCBs and the Axys water blank contained 192 pg/L total PCBs. The Battelle water blank contained 31,400 pg/sample total PCBs. This higher level of laboratory PCB background is a contributing factor to the generally higher concentrations of PCBs reported in the samples by Battelle.

Field Blank: The NJ field blank contained 10,300 pg/sample total PCBs. The Battelle lab blank was approximately three times the field blank concentration. This is unusual, as field blank concentrations which measure both the contamination from the brief exposure of the blank matrix to the field conditions and the contamination from the laboratory are expected to be higher than the contamination in the laboratory alone as measured by the lab blank.

Lab Control Standards: A comparison of the LCS recoveries between the laboratories did not reveal any significant biases, but did indicate greater variability between the measured Battelle recoveries:

LCS recovery	Axys	Battelle
mean	94.4 %	96.4 %
sd	3.14	11.7
n	26	20
outliers	none	BZ # 105, 5 % recovery
range	86-99.2 %	77-122 %

MS/MSD: An examination of sample matrix effect on recoveries was provided by Battelle on the PVSC sample as they prepared and analyzed a MS/MSD pair:

MS/MSD recovery	PVSC MS	PVSC MSD
mean	123.6 %	121.4 %
sd	18.8	20.8
n	19	19

outliers	BZ # 209, 151 %, BZ# 118, 153%	BZ # 19, 173 %, BZ# 118, 152%
range	75-148 %	69-147 %

The high bias in the recoveries is not unexpected as the contribution of the native PCB concentration to the measured recovery is itself subject to measurement variability.

Labeled Internal Standards: Standards as required by the method were added to the field samples at the laboratory prior to extraction and analysis. Axys reported recoveries for 29 rather than 30 standards as BZ# 156 and BZ# 157 coelute in their system. No bias that would contribute to the consistent differences in the sample results was apparent. Recoveries by both labs were comparable, and no outliers were reported:

LIS recovery	Battelle SRM	AXYS SRM	Battelle Edgewater	AXYS Edgewater	Battelle PVSC	Axys PVSC
mean	81 %	82 %	74 %	85 %	56 %	82 %
sd	16	25	13	14	11	22
n	30	29	30	29	30	29
outliers	none	none	none	none	none	none
range	51-112 %	20-114 %	47-98 %	48-104 %	39-88 %	43- 100 %

Conclusion:

A combination of factors may serve to bias the results reported by NJHDG to be higher than those of NYSDEC: icing of sample, addition of sodium thiosulfate to prevent oxidation, more vigorous mixing of the sample and laboratory background. Similarly, several conditions at NYSDEC may be contributing to their lower reported values: loss of higher chlorinated congeners by the TOPS XAD resin, loss of congeners from oxidation and volatilization, and incomplete mixing. Unless each of these factors is controlled in follow-up studies, the actual source of the biases will not be known. Based on this limited study, no consistent “correction factor” to previously collected data could or should be applied. If a possible 7 % high bias and a -33 % low bias in the total PCBs as exhibited in the known NIST sample is acceptable for use in the CARP models for field samples, then no further study is needed.

However, large relative percent differences between the Battelle and Axys reported values occurred in Edgewater samples and were 95 % for corrected TOPs results vs. Axys whole water and 100 % for uncorrected TOPs results vs. Axys whole water. If the variability in actual field

sample results used in the CARP models can be as large as 95-100 % relative percent difference when the TOPS assembly is used to collect wastewater samples as compared to whole water collection and analysis, then no further study is needed either. The large variability between the results reported by these two methods of sample collection is too great to be due to the sample itself or analytical bias alone.

if you have any questions regarding these comments, please contact me at 920-469-9113 or at makuehl@aol.com.

Attachments:

Battelle_AxysNISTComparison.xls

LABORATORY BLANKS DATA REVIEW

Date: November 13, 2001

Data reviewed: Laboratory blank PCB results in CARP database and from NJ POTW Events# 1-3

Reviewed by: Marcia A. Kuehl
Booz Allen & Hamilton

As requested at the September 25, 2001 CARP Management Committee meeting, I have evaluated the aqueous laboratory blanks analyzed for PCB congeners to determine if the laboratory background might result in unusable sample data for the model loading calculations. I retrieved all of the successfully loaded laboratory blank PCB data (as of 10/5/01) from the Battelle CARP database and calculated a total PCB value (Table 1). The total PCB value I calculated excluded undetected concentrations, but included "J" and "K" qualified results. Results qualified with a "J" are those results that are greater than the MDL but less than the ML and "K" qualified results are considered the maximum estimated concentration as the analyte did not meet all of the identification criteria in the method. I also added the NJ POTW study lab, field and trip blanks to the table, as they are not yet loaded into the database. No NY trip or field blanks are in the database.

Lab Blank Database: All of the aqueous lab blank data in the database currently is from NY/Axys. The volume analyzed was not entered into the database for 64 out of 71 aqueous blanks. These blanks were analyzed with TOPS samples, and it is not likely that they consisted of the same sample volume of laboratory grade water that was pumped through the TOPs assembly for the field samples. The other seven non-TOPs lab blanks analyzed ranged from 1-20 liters. The highest lab blank total PCB concentration reported is from the highest volume, 20 liters.

Recommendations: The volume analyzed is essential in determining the direct applicability of the lab blank to the associated samples. The volume analyzed field should be mandatory not only for field samples, but for lab blanks. The actual procedure used to create lab blanks should be reviewed during the November audit of Axys.

Lab, Trip and Field Blank Relationship: Currently there is only limited field and trip blank data available from NJ POTW events analyzed by Battelle-Columbus. These events all employed sample and blank volumes of 2.5 or 2.6 liters. The lab blank total PCB concentrations (21-41 ng/sample) are higher than the trip blank (9 ng/sample) and field blank (10 ng/sample) concentrations. A "shakedown" trip blank collected in November 2000 was not included in the evaluation, as it was obviously contaminated (82 ng/sample). The field blank PCB pattern reveals more higher chlorinated congeners than the trip blank, indicating that exposure of the blank water source to the sampling atmosphere picks up these congeners. The primary congeners detected in the highest concentrations in all blank types are IUPAC #s 90, 110. Other ubiquitous congeners with lower concentrations are IUPAC #s 61, 83, 86, 118, 129, 132, 147 and 153. These congeners are similar to those seen in other laboratories doing congener analysis and are likely from building materials and ambient conditions.

Battelle indicated that the lab blank would be expected to be higher than the trip and field blanks, as it is filtered through the 0.7 μ filter like the field samples, and the filter extracted separately from the filtrate and the combined extracts analyzed. The trip and field blanks are not filtered. This extra handling and exposure to more laboratory glassware and the filter media likely contributes to the higher PCB level.

Recommendation: All aqueous blanks should be subject to the same laboratory processing as the field samples. Field and trip blanks should also be filtered. In order to assess the contamination from the laboratory glassware/filter without the laboratory grade water contribution, the volume of solvent used in the extraction procedure should be carried through filtration and analysis as a “dry” blank. The results of the “dry” blank can then be used to determine if the water source or the lab apparatus should be targeted for contamination reduction efforts.

Relative Concentrations of Lab Blanks: The three lab blank total PCB concentrations reported by NJ/Battelle-Columbus were 21, 31 and 41 ng/sample. These lab blanks consisted of 2.5 liters of laboratory grade water extracted and analyzed as a sample. When expressed in concentration units, the total PCB values range from 8.4 - 16 ng/L.

The mean of the NY Axys lab blanks in the database (volume unknown) is 1.5 ng/sample total PCBs with a standard deviation of 1.9 ng/sample. This mean concentration is a factor of ten lower than the NJ/Battelle-Columbus lab blanks and well below the 10 ng control used for the Lake Michigan Mass Balance (LMMB) laboratory method sample blanks. The LMMB laboratory method blanks were of two types: one that consisted of unexposed XAD resin and filter extracted like a sample and the other “dry” blank consisted of the solvent placed in the extraction apparatus without any sampling media. It was not practical to process 190-285 liters (open lake samples) or 80 liters (tributary samples) of laboratory grade water in the lab as a lab blank. One high Axys lab blank value of 25 ng was reported for the lab blank analyzed on 1/14/00, which is in the range of the lab blanks reported by NJ/Battelle for the POTW sample events using 2.5 liters of laboratory grade water. Expressing the NY Axys lab blanks in terms of concentration is not possible without the missing blank volume analyzed.

The seven NY Axys lab blanks that had a volume recorded ranged in total PCB concentration from 0.14 - 385 ng/sample, with the highest concentration reported for the 20 L sample. This data indicates that the water source itself is a significant contributor to the total PCB concentration. When expressed in concentration units, the total PCB values range from 0.17 - 19 ng/L.

When compared to measured or expected field sample total PCB concentrations, NJ/Battelle-Columbus laboratory and/or field contamination significantly contribute to the NJ POTW sample concentrations:

Sample Type	NJ Total PCB	NY Total PCB (TOPS)
lab blanks	8.4-16 ng/L	0.463 ng/sample
trip blank	3.5 ng/L	none

field blank	4.1 ng/L	none
“Low” level POTW Edgewater	14.6 ng/L	12.9 ng/sample
“High” level POTW PVSC (no #11)	26.7 ng/L	54.6 ng/sample

Recommendations: The magnitude of the NJ/Battelle-Columbus laboratory contamination needs to be investigated and reduced to provide defensible and representative field sample concentrations for POTW samples. The actual procedure used to create the NY lab blanks should be reviewed during the November audit of Axys to determine their applicability to the sample results reported.

Blank Correction: While laboratory blank subtraction from field sample results has been an accepted technique for low level mercury analysis, it has been sporadically used for trace organics analysis. The LMMB did not utilize blank subtraction, but analytical results associated with contaminated lab, trip and field blanks were qualified as biased high to alert the modelers. NJ has proposed subtracting the greater of the blank concentrations associated with the CARP field samples (lab, trip or field) to provide the most conservative sample result. However, the uncorrected sample result would be stored in the CARP database along with narrative on how best to correct the data for background contamination. NY has not proposed any blank subtraction of data, as their lab blanks are much lower than the reported sample concentrations. Both NY and NJ laboratories have been directed to qualify the sample data with a “B” code indicating that the analyte was detected in the associated lab blank.

Recommendation: All results stored in the CARP database should be uncorrected for blanks, but qualified as necessary (B code) to alert the modelers of the presence of lab background contamination. Correction of data can then be done as needed to suit each users needs, but at least all users will be working from the same dataset which tracks back to the analytical documentation.

If you have any questions regarding this evaluation, please contact Marcia Kuehl at 920-469-9113.

Attachments: Table 1

Table 1

STUDY ID	LAB	LAB_SAMP_ID	QC_CODE	SAMP_WGT_VOL	SAMP_WGT_VOL_UNIT	CLASS	IUPAC	RESULT	UNIT	LAB_SDG	ANALYSIS_DATE
HRL	AAS	WG2330-1	MB	20	L	PCB	total PCB	19.247	NG/L	WG2330	1/12/2000
HRL	AAS	WG2523-101	MB	2	L	PCB	total PCB	68.269	PG/L	WG2523	2/22/2000
HRL	AAS	WG3738-101	MB	1	L	PCB	total PCB	168.396	PG/L	WG3738X	12/22/2000
HRL	AAS	WG3774-101	MB	3	L	PCB	total PCB	69.318	PG/L	WG3774X	1/13/2001
HRL	AAS	WG3930-101	MB	1	L	PCB	total PCB	649.829	PG/L	WG3930X	2/14/2001
HRL	AAS	LB3050-5PB	MB	1000	ML	PCB	total PCB	4982.97	PG/L	3050I	7/24/2000
HRL/NONE	AAS	CL-C-BLK 1644	MB			PCB	total PCB	1699	PG/SAMPLE	WG1492	4/23/1999
NONE	AAS	CL-C-BLK 1644	MB			PCB	total PCB	92	PG/SAMPLE	WG1493	5/15/1999
HRL	AAS	CL-F-BLK 1643 i	MB			PCB	total PCB	330	PG/SAMPLE	WG1491	4/23/1999
HRL	AAS	CL-C-BLK 1679 i2	MB			PCB	total PCB	662	PG/SAMPLE	WG1564	5/16/1999
HRL	AAS	CL-C-BLK 1655	MB			PCB	total PCB	1050	PG/SAMPLE	WG1512	5/18/1999
HRL	AAS	CL-C-BLK 1664	MB			PCB	total PCB	741	PG/SAMPLE	WG1540	5/18/1999
HRL	AAS	CL-F-BLK 1665	MB			PCB	total PCB	1056	PG/SAMPLE	WG1541	5/19/1999
HRL	AAS	CL-F-BLK 1667	MB			PCB	total PCB	1974	PG/SAMPLE	WG1541	5/19/1999
HRL	AAS	CL-F-BLK 1666	MB			PCB	total PCB	1767.63	PG/SAMPLE	WG1542	5/28/1999
HRL	AAS	CL-C-BLK 1670	MB			PCB	total PCB	5770	PG/SAMPLE	WG1553	5/29/1999
HRL	AAS	CL-F-BLK 1677	MB			PCB	total PCB	1380.6	PG/SAMPLE	WG1562	6/1/1999
HRL	AAS	CL-F-BLK 1678	MB			PCB	total PCB	1477.7	PG/SAMPLE	WG1563	6/2/1999
HRL	AAS	CL-C-BLK 1700	MB			PCB	total PCB	1037.3	PG/SAMPLE	WG1623	6/3/1999
HRL	AAS	CL-C-BLK 1705	MB			PCB	total PCB	1651.98	PG/SAMPLE	WG1633	6/4/1999
HRL	AAS	CL-C-BLK 1660	MB			PCB	total PCB	1908.2	PG/SAMPLE	WG1514	6/5/1999
HRL	AAS	CL-F-BLK 1709	MB			PCB	total PCB	1237.59	PG/SAMPLE	WG1643	6/5/1999
HRL	AAS	CL-F-BLK 1701 i	MB			PCB	total PCB	2001.5	PG/SAMPLE	WG1624	7/7/1999
HRL	AAS	CL-C-BLK 1676 i	MB			PCB	total PCB	564	PG/SAMPLE	WG1561	7/17/1999
HRL	AAS	CL-C-BLK 1772	MB			PCB	total PCB	1400	PG/SAMPLE	WG1785	7/24/1999
HRL	AAS	CL-C-BLK 1759 i	MB			PCB	total PCB	830.9	PG/SAMPLE	WG1758	7/26/1999
HRL	AAS	CL-C-BLK 1774	MB			PCB	total PCB	2097.48	PG/SAMPLE	WG1801	7/28/1999
HRL	AAS	CL-C-BLK 1779	MB			PCB	total PCB	1915.2	PG/SAMPLE	WG1804	7/28/1999
HRL	AAS	CL-F-BLK 1798 i	MB			PCB	total PCB	2224.1	PG/SAMPLE	WG1833	9/1/1999
HRL	AAS	CL-EX-BLK 1803	MB			PCB	total PCB	113.9	PG/SAMPLE	WG1839	9/10/1999

STUDY ID	LAB	LAB_SAMP_ID	QC_CODE	SAMP_WGT_VOL	SAMP_WGT_VOL_UNIT	CLASS	IUPAC	RESULT	UNIT	LAB_SDG	ANALYSIS_DATE
HRL	AAS	WG2152-1	MB			PCB	total PCB	9228.7	PG/SAMPLE	WG2152	11/16/1999
HRL	AAS	WG1982-1	MB			PCB	total PCB	4720.5	PG/SAMPLE	WG1982	11/18/1999
HRL	AAS	WG2355-1	MB			PCB	total PCB	25188.24	PG/SAMPLE	WG2355	1/12/2000
HRL	AAS	WG2365-1	MB			PCB	total PCB	245.732	PG/SAMPLE	WG2365	1/14/2000
HRL	AAS	WG2452-1	MB			PCB	total PCB	2057.81	PG/SAMPLE	WG2452	2/10/2000
HRL	AAS	WG2446-1	MB			PCB	total PCB	909.2	PG/SAMPLE	WG2446	2/11/2000
HRL	AAS	WG2451-1	MB			PCB	total PCB	292.88	PG/SAMPLE	WG2451	2/11/2000
HRL	AAS	WG2514-101	MB			PCB	total PCB	1291.88	PG/SAMPLE	WG2514	2/12/2000
HRL	AAS	WG2514-102	MB			PCB	total PCB	838.23	PG/SAMPLE	WG2514	2/12/2000
HRL	AAS	WG2444-4	MB			PCB	total PCB	2249.28	PG/SAMPLE	WG2444	2/16/2000
HRL	AAS	WG2548-101	MB			PCB	total PCB	258.96	PG/SAMPLE	SDG	2/19/2000
HRL	AAS	WG2548-102	MB			PCB	total PCB	9220	PG/SAMPLE	SDG	2/19/2000
HRL	AAS	WG2561-102	MB			PCB	total PCB	1611.787	PG/SAMPLE	WG2561	2/25/2000
HRL	AAS	WG2437-1	MB			PCB	total PCB	705.55	PG/SAMPLE	WG2437	2/29/2000
HRL	AAS	WG2252-1	MB			PCB	total PCB	1876.7	PG/SAMPLE	WG2252	3/3/2000
HRL	AAS	WG2298-1	MB			PCB	total PCB	2981.51	PG/SAMPLE	WG2298	3/7/2000
HRL	AAS	WG2334-1 i2	MB			PCB	total PCB	747.24	PG/SAMPLE	WG2334	3/11/2000
HRL	AAS	WG2347-1 i2	MB			PCB	total PCB	2022.25	PG/SAMPLE	WG2347	3/13/2000
HRL	AAS	WG2384-1 L	MB			PCB	total PCB	1738.27	PG/SAMPLE	WG2384	3/21/2000
HRL	AAS	WG2272-1 i	MB			PCB	total PCB	682.09	PG/SAMPLE	WG2272	3/22/2000
HRL	AAS	WG2676-103	MB			PCB	total PCB	19.49	PG/SAMPLE	WG2676	3/23/2000
HRL	AAS	WG2623-101	MB			PCB	total PCB	211.03	PG/SAMPLE	WG2623	3/24/2000
HRL	AAS	WG2720-101	MB			PCB	total PCB	106.54	PG/SAMPLE	WG2720	3/25/2000
HRL	AAS	WG2746-101	MB			PCB	total PCB	7362.12	PG/SAMPLE	WG2746	3/30/2000
HRL	AAS	WG3298-101	MB			PCB	total PCB	465.156	PG/SAMPLE	WG3298	9/5/2000
HRL	AAS	WG3300-101	MB			PCB	total PCB	1516.247	PG/SAMPLE	WG3300X	9/8/2000
HRL	AAS	WG3305-101	MB			PCB	total PCB	206.443	PG/SAMPLE	WG3305X	9/13/2000
HRL	AAS	WG3431-101	MB			PCB	total PCB	335.63	PG/SAMPLE	WG3431X	10/14/2000
HRL	AAS	WG3431-102 i	MB			PCB	total PCB	215.11	PG/SAMPLE	WG3431X	10/14/2000
HRL	AAS	WG3547-101	MB			PCB	total PCB	343.469	PG/SAMPLE	WG3547X	11/4/2000
HRL	AAS	WG3651-101	MB			PCB	total PCB	505.21	PG/SAMPLE	WG3651X	12/13/2000
HRL	AAS	WG3670-101	MB			PCB	total PCB	498.32	PG/SAMPLE	WG3670	12/22/2000

STUDY ID	LAB	LAB_SAMP_ID	QC_CODE	SAMP_WGT_VOL	SAMP_WGT_VOL_UNIT	CLASS	IUPAC	RESULT	UNIT	LAB_SDG	ANALYSIS_DATE
HRL	AAS	WG4110-101	MB			PCB	total PCB	183.858	PG/SAMPLE	WG4110X	3/20/2001
HRL	AAS	WG4128-101	MB			PCB	total PCB	420.72	PG/SAMPLE	WG4128X	4/5/2001
HRL	AAS	WG4428-101	MB			PCB	total PCB	1165.97	PG/SAMPLE	WG4428	6/19/2001
HRL	AAS	WG4533-101	MB			PCB	total PCB	462.61	PG/SAMPLE	WG4533X	7/7/2001
DOW CARP	AAS	WG1400-1	MB			PCB	total PCB	0	PG/SAMPLE	WG1400	4/30/1999
DOW CARP	AAS	WG1420-1	MB			PCB	total PCB	2958	PG/SAMPLE	WG1420	5/26/1999
DOW CARP	AAS	WG1393-1	MB			PCB	total PCB	65	PG/SAMPLE	WG1393	4/2/1999
DOW CARP	AAS	WG4428-1	MB			PCB	total PCB	1249	PG/SAMPLE	WG4428	6/19/2001
NY/NJ	AAS	WG4491-1	MB	2	L	PCB	total PCB	192	PG/L	WG4491	6/26/2001
NJ 1G	BATC	POTW#1	MB	2.5	L	PCB	total PCB	40724	PG/SAMPLE	POTW#1	1/16/2001
NJ 1G	BATC	POTW#2	MB	2.5	L	PCB	total PCB	20890	PG/SAMPLE	POTW#2	2/5/2001
NJ 1G	BATC	POTW#2	TB	2.6	L	PCB	total PCB	9137	PG/SAMPLE	POTW#2	2/5/2001
NJ 1G	BATC	POTW#3	FB	2.5	L	PCB	total PCB	10280	PG/SAMPLE	POTW#3	5/24/2001
NJ 1G	BATC	POTW#3	MB	2.5	L	PCB	total PCB	31418	PG/SAMPLE	POTW#3	5/24/2001

**TOTAL PCBS, PAHs, PESTICIDES AND DIOXIN/FURANS IN CARP SEWAGE
TREATMENT PLANT SAMPLES
COMPARISON OF NEW YORK AND NEW JERSEY DATA**

Date: February 26, 2002

Data reviewed: New Jersey POTW Events # 1-4 (10/00-8/01)
New York sewage treatment plant total PCB data-(9/98-6/01) obtained from Simon Litten, NYSDEC, November 20, 2001

New York sewage treatment plant data (MEDIUM = WPCF) for PAHs, pesticides, and dioxins/furans retrieved from CARP database 1/26/02

New York sewage treatment plant data (MEDIUM = WPCF) for PCB congeners retrieved from CARP database 2/22/02

Reviewed by: Marcia Kuehl and Renee Morris
Booz Allen Hamilton

I. Background-NY/NJ May 2001 Side-by-Side Sample Collection Study

Due to concerns between different sample collection methods used by New York and New Jersey for CARP study wastewater samples, a side-by-side collection study was conducted at two wastewater treatment plants on May 21-22, 2001. The Passaic Valley Sewerage Commission (PVSC) and the Edgewater treatment plants, located in New Jersey, were selected as the sampling locations. The New Jersey Harbor Dischargers Group (NJHDG) collected samples by pumping whole (not filtered) water into carboys, and then splitting the carboy into 2.5 L aliquots for analysis. New York State Department of Environmental Conservation (NYSDEC) also collected samples at these locations by pumping whole water into carboys, but then also processed some of the whole water through their Trace Organics Platform Sampler (TOPS). The TOPS assembly has been used by NYSDEC for all of the wastewater treatment plant samples collected for Contaminate Assessment and Reduction Program (CARP). The TOPS assembly consists of filtering large volumes of whole water through a 0.7 micron glass fiber cartridge and pumping the filtrate through a polymeric, hydrophobic resin (XAD) to capture the organic compounds. For this side-by-side study New York analyzed the samples only for poly chlorinated biphenyls (PCBs).

In order to be able to assess the performance of the analytical laboratories in the absence of sample collection differences, a sample with a known concentration of PCB congeners was sent

to each laboratory. This sample was the National Institute of Standards and Technology (NIST) Standard Reference Material (SRM) 1944, which is a sediment from New York Harbor. The SRM was diluted with water to mimic the study samples sent to the laboratories. The sample was treated as were the whole water samples by the laboratories for both States. The New Jersey (NJ) laboratory (Battelle-Columbus) recovered 107% and the New York (NY) laboratory (Axys) recovered 77% of the total PCB concentration for NIST certified congeners.

The evaluation of the side-by-side study showed that the Axys/NY data for PCBs were lower than those reported by Battelle/NJ except for the lower chlorinated congeners (mono-tri). It also showed that the TOPS results were lower than the whole water results reported by both laboratories. A higher level of laboratory PCB background at Battelle was a contributing factor to the higher concentration of PCBs reported in the Edgewater sample. This same pattern was not seen in the PVSC sample, as the predominant congener, BZ # 11, was not reported quantitatively by Battelle. For PVSC, the Axys/NY values (both TOPS and whole water) were greater than the Battelle/NJ values by 25-30%. The TOPS results for both samples were lower than the whole water results. Loss of higher chlorinated PCB congeners occurred in the TOPS samples. The data from the side-by-side study are presented in the attached file, Battelle_Axys_side_by_side.xls. The complete report NY/NJ Side-by-Side Study Data Review dated September 10, 2001 contains more information concerning the side-by-side study results and evaluation.

As a result of the biases seen in PCB values in the side-by-side collection study, a further evaluation of the PCB concentrations and the other organic analytes in all the wastewater treatment plants sampled to date for CARP was made to assess if the lower bias using TOPS continues overall for PCBs and for other organic analytes. The results of this assessment are presented below.

II. New York/New Jersey Sewage Treatment Plant Data Comparisons

A. Sewage Treatment Plants Studied

The following New York treatment plants are included in this evaluation: Newtown Creek, North River, Wards Island, Hunts Point, Bowery Bay, Owls Head, Coney Island, Yonkers, Jamaica Bay, 26th Ward, Tallman Island, Red Hook, Port Richmond, Oakwood Beach, Rockaway, Rockland County, Rensselaer and Poughkeepsie(C). New Jersey sewage treatment plant locations include Middlesex County, Bergen County, Joint Meeting, Rahway Valley, Hoboken, Linden-Roselle, West New York, North Bergen-Central, North Bergen-Woodcliff, Seacaucus, Passaic Valley and Edgewater. Both New York and New Jersey sampled Passaic Valley and Edgewater in May, 2001 during the side-by-side study.

B. Data Used

Both New York and New Jersey reported results in mass units. All values used in this assessment were converted to concentration units by division of the mass by the volume collected in the field. No field duplicates or blanks were used in this assessment, only original field samples. Data assessment was done for the detected analytes in the samples.

For three events, New Jersey reported their data as “Combined Filter/Filtrate”, which means that both the dissolved and particulate phases were reported together as one value. The laboratory, after separately extracting the filters and the filtered water resulting from the ~ 2.5 L sample, combined the two extracts and analyzed it. The resultant reported value represents the total of both phases. For the first sampling event, POTW #1, the filters and filtered water were extracted and analyzed separately and the results reported as “Dissolved” and “Suspended”. For this evaluation, these two results were added to get a total in the sample.

New York reported several values for each medium for each sample collected from TOPS for PCBs, pesticides and dioxins/furans. The medium for TOPS samples included glass fiber filter and XAD. The result(s) from the glass fiber filter(s) were reported separately from the result(s) from the XAD resin cartridge(s) or filtered water. The poly aromatic hydrocarbon (PAH) results not collected by TOPS also included a filter water medium and a glass fiber cartridge medium. Therefore, the CARP database contains two or more results from the same sampling date and location for each sample. All values were first converted to concentrations by dividing by the field volume passed through the filters and the field volume collected (for PAHs) or pumped through the XAD. In order to be directly comparable to the New Jersey values, the XAD concentration(s) or filtered water concentration(s) and filter concentration(s) of each sample was summed to get a total concentration value for both phases. As some data is not loaded into the database, only those field samples in the database for TOPS that had at least one filter and one XAD fraction results present were used for this evaluation. For PAHs only those samples that had at least one filter and one filter water fraction results present were used. This was done to avoid using samples that may have a filter, XAD, filtered water result yet to be loaded.

C. Sample Collection methods

New Jersey: All samples were collected by New Jersey in 20 liter glass carboys at the sampling locations and later split into 2.5 L aliquots for analysis. The splitting was done by drawing the sample out through a peristaltic pump. During pumping, a magnetic stir bar on the bottom of the sample actively mixed the sample. Upon receipt at the laboratory, the sample was filtered through a 0.7 micron filter and the filters and filtrate extracted separately. The extracts were then combined and analyzed together to yield a total analyte concentration.

New York: The TOPS system was used by New York for collection of samples for all organic analytes except PAHs, as the XAD resin used in the TOPS assembly has a significant PAH background. Volumes sampled using the TOPS system ranged from 8 to 1094 liters. PAHs were collected and analyzed as a 1 liter filtered sample and glass fiber cartridges from the filtration of 236-523 liters.

In addition to the TOPS samples, New York collected some 1 L whole water samples at some locations. Data from these samples were treated separately and are included in the discussion below.

D. Analytes Compared

Both states reported the same or reasonably equivalent list of PCB congeners. Both states also reported the same list of dioxins and furans. PCB totals were compared for data retrieved from the CARP database for NY (2/22/02), totals by fraction data received from Simon Litten (11/20/01), and data received electronically from NJ (1/22/02). PCB homologue totals were also calculated and evaluated between the NY data retrieved from the CARP database and NJ data to determine if the higher chlorinated congeners are consistently lower in the samples collected from the TOPS assembly when compared to the whole volume NJ samples. Each individual pesticide and dioxin/furan was compared between the NY and NJ data to determine if the higher chlorinated and/or higher molecular weight pesticide and dioxins/furans are lost from the TOPS assembly. A total detected PAH value was calculated for each complete sample data set in the CARP database and each NJ POTW sample location.

New Jersey consistently analyzed all samples for an additional pesticide, delta-BHC, and six additional PAHS: 1-methylnaphthalene, 2-methylnaphthalene, 1-methylphenanthrene, 2,6-dimethylnaphthalene, 2,3,5-trimethylnaphthalene, and C2-Phenanthrenes/Anthracenes. No comparisons were made for these analytes, as New York did not report them for their samples in the CARP database.

E. Statistics Used

The mean, standard deviation and the minimum/maximum values are presented. In all cases the standard deviation was quite large, often larger than the mean, indicating great variability between the sampling locations and over time. No additional statistical treatments such as t tests for significance were done.

III. PCBs

In the calculation of homologue totals and total PCB values, all detected results that were unqualified, qualified as estimated (J), suspect due to all four identification criteria not met (K), and detected in the associated laboratory blank (B) were added. Undetected values were considered as equal to zero and no laboratory blank subtraction or metered surrogate correction for TOPS samples was done. The data presented below in Table 1 indicate that the New Jersey total PCB mean value is approximately 2 times greater than the New York mean value for the total data from Simon Litten and 4 times greater than the data retrieved from the CARP database on 2/22/02. A much smaller number of whole water samples were collected and analyzed by New York, however the mean value for these samples that were not processed through TOPS is more than 2 times the Simon Litten TOPS mean, more than 5 times the database data, and more than 20 % higher than the New Jersey mean.

Table 1 Total PCB Data Comparisons

State	Sample Type	Total PCB Mean (ng/L)	Standard deviation (ng/L)	N	Minimum/location (ng/L)	Maximum/location (ng/L)
New Jersey	~ 2.5 liter whole water	36.4	43.4	34	10.5 Joint Meeting Oct. 2000	202 PVSC May 2001
New Jersey	Laboratory blank corrected	28.6	44.5	31	4.58 Joint Meeting Oct. 2000	190 PVSC May 2001
New York (from Simon Litten)	TOPS XAD + filter(s)	17.9	27.4	55	0.84 North River Jan. 2001	270 PVSC May 2001
New York (from CARP database)	TOPS XAD + filter(s)	8.06	18.4	35	0.034 Yonkers Apr. 1999	111 Jamica Feb. 1999
New York	1 liter whole water	44.7	89.7	10	1.81 Coney Island Oct 2000	274 PVSC May 2001

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A. Laboratory Background

Laboratory blank contamination significantly affected the New Jersey sewage treatment plant data as ~90% of the total PCB values in the samples were less than three times the laboratory blank. The “action limit” of 3 times the laboratory blank is one of the criteria often used by U.S. EPA in the evaluation of laboratory data. While all the laboratories reported detectable PCB background, the source of the higher New Jersey laboratory blank contamination may have been due to the ongoing construction and remediation at the laboratory at that time. Laboratory blanks that are prepared and analyzed using the EPA Method 1668 are rarely free of all 209 PCB congeners and often extraordinary laboratory design, ventilation and laboratory glassware cleaning are needed to reduce the laboratory background below EPA action limits. A subsampling of laboratory blank data from other CARP laboratories was done to determine if the Battelle levels were unusually high and the results are presented in Table 2 below:

Table 2 Laboratory Blanks Total PCBs Values

Laboratory	ng Total PCB in laboratory blanks
Battelle	21-51
Wright State	1.82-5.5
Philip Analytical	2.8-3.2
STL-Sacramento	0.324-3.0
Axys	0.065-0.462

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Since the on-site audit and the concern over the higher laboratory blanks, Battelle has instituted additional clean glassware and laboratory practices to try to lower the laboratory background. The extremely low laboratory backgrounds at Axys and STL-Sacramento is due to their ventilation and segregation of laboratory areas.

The congeners most frequently detected in Battelle laboratory blanks that exhibited mean concentrations that were the same order of magnitude as the mean of the NJ POTW samples are not confined to a few congeners, but are spread throughout the homologue classes. Congeners most frequently detected were BZ # 15, 22, 37, 40, 42, 56, 60, 61, 64, 82, 85, 86, 88, 90, 92, 106, 110, 118, 128, 129, 136, 137, 141, 146, 147, 153, 156, 158, 170, 172, 174, 177 and 190. This list of congeners detected is not unusual and most were also seen in the other laboratory blanks examined. The trip and field blanks collected by NJ also exhibited these same congeners, but were at lower concentrations than the laboratory blank.

The highest Battelle laboratory blank measured, 51 ng/sample, was from the initial POTW #1 event, when separate laboratory blanks were prepared for the filters and filtrate. As a result of the extra handling for this laboratory blank and the samples, the filter extract and filtrate extracts were combined and analyzed together for the remaining three sampling events. The total PCB concentrations in the laboratory blanks from the next three events were 21, 31 and 28 ng/sample.

In order to judge if a blank correction factor would bring the New Jersey mean total PCB concentration closer to the New York mean, the total PCB laboratory blank concentration was subtracted from the sample results. After subtraction of the associated laboratory blank, four samples in the POTW #1 event (Bergen County, Linden-Roselle, Joint Meeting, Rahway) had negative results, indicating that these sampling locations were cleaner than the laboratory blank for this event. Therefore, Table 1 includes the New Jersey results without blank correction for 35 samples and the New Jersey samples blank corrected with a total of 31 samples.

B. Homologue Comparison

A comparison was made of the homologues detected in NJ and NY samples and is presented in the attached file, NJNYPCBhomologues.xls. No decachlorobiphenyl was detected in any of the NJ samples. New York had two different types of samples in the database, those collected by TOPS and those collected as 1 liter samples and noted in the database as “treated wastewater”,

“Unfiltered water” and “Filtered water (AE/GF/F)”. For purposes of this evaluation all of these 1 liter sample types were combined for the calculation of statistics and noted as “1 liter whole water”. A summary of the factor difference between the NY sample means and the NJ sample means are listed in Table 3.

Table 3 PCB Homologue Data Differences

# Chlorines	NY Sample Type	Factor Difference from NJ mean
1	TOPS XAD + filter (s)	+ 3
1	1 liter whole water	+ 8
2	TOPS XAD + filter (s)	- 7
2	1 liter whole water	- 3
3	TOPS XAD + filter (s)	- 4
3	1 liter whole water	- 2
4	TOPS XAD + filter (s)	- 4
4	1 liter whole water	- 2
5	TOPS XAD + filter (s)	- 10
5	1 liter whole water	- 2
6	TOPS XAD + filter (s)	- 10
6	1 liter whole water	- 2
7	TOPS XAD + filter (s)	- 8
7	1 liter whole water	- 4
8	TOPS XAD + filter (s)	- 5
8	1 liter whole water	- 2
9	TOPS XAD + filter (s)	- 15
9	1 liter whole water	- 5

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With the exception of monochlorobiphenyls, both NY whole water sample and TOPS sample means are a factor of 2-15 times lower than the NJ sample mean. Generally, the NY samples not collected by TOPS exhibited closer agreement to the NJ sample mean. Higher chlorinated homologues did exhibit larger factor differences, which is similar to the side-by-side study results. See attached file NJNYPCBHomologues.xls for detailed mean values.

IV. Dioxin/furans

In the calculation of total and individual dioxin and furan values, all detected results that were unqualified, qualified as estimated (J), suspect due to all four identification criteria not met (K), and detected in the associated laboratory blank (B) were added. Undetected values were considered as equal to zero and no laboratory blank subtraction or metered surrogate correction (TOPS) was done.

The New York data presented in Table 4 are separated into two different sampling systems. The whole volume is from 1 liter samples analyzed without filtration through TOPS and TOPS are the samples collected using the TOPS assembly.

Table 4 Total Dioxin/Furan Data Comparisons

State	Sample Type	Total Dioxin/Furan Mean (ng/L)	Standard deviation (ng/L)	N	Minimum/location (ng/L)	Maximum/location (ng/L)
New Jersey	~ 2.5 liter whole	0.041	0.035	17	0.012 Passaic Valley Jan 2001	0.152 Rahway Jan 2001
New York	TOPS	0.025	0.019	9	0.005 Bowery Bay Nov 1998	0.058 Poughkeepsie April 1999
New York	1 liter whole	0.049	0.020	5	0.014 North River Jan 2001	0.064 Yonkers March 2000

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The data for the individual fractions for TOPS (glass fiber filter and XAD) indicated that the majority of the dioxins/furans are associated with the suspended phase and as such are trapped on the filters. The lower New York mean for the TOPS assembly indicates a loss similar to the PCBs (almost a factor of 2). The whole water sample mean was higher than the TOPS mean, which again mimics the results from the PCB analysis above.

A. Laboratory Background

Laboratory blank contamination did not significantly affect either the New Jersey or the New York sewage treatment plant data. No detected dioxin/furans were reported in any New Jersey laboratory blanks, and only low and sporadic detects of OCDD, OCDF, HxCDF and HpCDF were present in New York laboratory blanks.

B. Specific Analyte Comparison

A comparison of detected dioxins and furans was made between New York samples collected using TOPS and the New Jersey samples. The results in Table 5 indicate much lower detected values for all dioxins and furans in TOPS samples when compared to New Jersey samples. The difference is no longer a factor of 2 to 4 like the PCBs, but a factor of 10 or more.

Table 5 Dioxin/Furan Data Differences

Analyte	NJ Mean (pg/L)	NY Mean (pg/L)	NJ Std dev	NY Std dev	NJ n	NY n
2,3,7,8-TCDD	0.356	0.011	0.176	0.006	5	3
1,2,3,7,8-PeCDD	0.420	0.033	0.062	0.023	2	7
1,2,3,4,7,8-HxCDD	Not detected	0.029	Not detected	0.036	0	6
1,2,3,6,7,8-HxCDD	0.874	0.097	0.042	0.103	2	9
1,2,3,7,8,9-HxCDD	0.540	0.040		0.029	1	8
1,2,3,4,6,7,8-HpCDD	3.86	1.37	3.079	1.07	16	9
OCDD	26.1	12.67	15.9	9.87	17	9
2,3,7,8-TCDF	0.729	0.078	0.185	0.053	6	9
1,2,3,7,8-PeCDF	Not detected	0.013	Not detected	0.011	0	6
2,3,4,7,8-PeCDF	0.505	0.025	0.236	0.016	4	7
1,2,3,4,7,8-HxCDF	0.574	0.046	0.436	0.020	7	9
1,2,3,6,7,8-HxCDF	1.09	0.018	0.851	0.017	2	6
1,2,3,7,8,9-HxCDF	0.454	0.007	0.438	0.004	2	3
2,3,4,6,7,8-HxCDF	2.67	0.198	3.60	0.437	3	6
1,2,3,4,6,7,8-HpCDF	3.23	0.699	5.78	0.511	15	9
1,2,3,4,7,8,9-HpCDF	2.49	0.027	2.81	0.022	3	7
OCDF	7.78	0.89	13.6	1.13	16	9

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V. Pesticides

In the calculation of total and individual pesticide values, all detected results that were unqualified, qualified as estimated (J), suspect due to all four identification criteria not met (K), and detected in the associated laboratory blank (B) were added. Undetected values were considered as equal to zero and no laboratory blank subtraction or metered surrogate correction (TOPS) was done.

The total pesticide data presented below indicate that the New Jersey values are approximately 2 times higher than the New York values, which mimics the bias seen in the total PCB results in the side-by-side study and in the other total PCB data above. A much smaller number of whole water samples were collected and analyzed by New York. The mean value for these samples that were not processed through TOPS is more than 40 % above the TOPS mean.

Table 6 Total Pesticide Data Comparisons

State	Sample Type	Total pesticide Mean (ng/L)	Standard deviation (ng/L)	n	Minimum/location n (ng/L)	Maximum/location n (ng/L)
New Jersey	~ 2.5 liter whole	20.4	9.66	49	7.11 Middlesex Oct 2000	46.40 Linden Roselle Dec 2000
New York	TOPS	9.69	5.42	60	2.05 Tallman July 1999	30.5 Poughkeepsie Aug 1999
New York	1-6 L whole	13.7	8.13	8	5.13 26 th Ward Sept 2000	31.8 Poughkeepsie Dec 2000

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A. Laboratory Background

Laboratory blank contamination for pesticides did not significantly affect either the New Jersey or the New York wastewater treatment plant data. Only low levels of detected methoxychlor were reported in New Jersey laboratory blanks. Low and sporadic detects of pesticides, including oxychlordan, endosulfan sulfate, endrin, hexachlorobenzene and mirex were present in New York laboratory blanks at concentrations near the samples. As laboratory background would inflate the reported pesticide values in the NY samples, it does not appear that this background affected the data when compared to NJ values.

B. Specific Analyte Comparison

The highest reported detected pesticide in New York samples was gamma-BHC at 20.7 ng/L in a Poughkeepsie (C) sample. The highest reported detected pesticide in New Jersey samples was also gamma-BHC at 25.5 ng/L in a Rahway Valley sample. The mean and standard deviation for each pesticide in the NJ and NY samples were calculated and are presented in the attached file NJNYpestSTATSfeb2002s.xls. With the exception of gamma-BHC and oxy-chlordane, all NY pesticide mean values were less than or equal to NJ mean values. Similar means were calculated for the BHC compounds (alpha, beta, gamma) and endrin. All other NY means ranged from a factor of 2 to a factor of 10 (trans-nonachlor) less than the NJ mean. The degree of chlorination and molecular weight of each pesticide was examined to see if higher chlorinated and/or higher molecular weight pesticides were lower using NY TOPS collection, as are seen for the PCB congeners. Table 7 below lists the factor by which the NJ value differed from the NY value sorted by the molecular weight (MW).

Table 7 Pesticide Data Differences

# Chlorines	MW	Pesticide	Factor Difference
6	284.78	Hexachlorobenzene	-2
6	290.83	BHC-alpha	None
6	290.83	BHC-beta	None
6	290.83	BHC-gamma	None
4	318.03	2,4'-DDE	-3
4	318.03	4,4'-DDE	-3
4	320.05	2,4'-DDD	-5
4	320.05	4,4'-DDD	-4
3	345.65	Methoxychlor	-5
5	354.49	2,4'-DDT	-4
5	354.49	4,4'-DDT	-3
6	364.91	Aldrin	-5
7	373.32	Heptachlor	-5
6	380.91	Dieldrin	-2
6	380.91	Endrin	None
6	380.91	Endrin aldehyde	-2
6	380.91	Endrin ketone	-2
7	389.32	Heptachlor epoxide	-4
6	406.93	Endosulfan, alpha	Not calculated*
6	406.93	Endosulfan, beta	-5
8	409.78	Chlordane, gamma (trans)	-5
8	409.78	Chlordane, alpha (cis)	-6
8	410.74	Chlordane, oxy-	-3
6	422.93	Endosulfan sulfate	-2
9	444.23	Nonachlor, cis-	-4
9	444.23	Nonachlor, trans-	-10
12	545.55	Mirex	-3

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* Pesticide was not detected in the NJ samples and therefore, the difference was not calculated

No consistent relation between degree of chlorination and analyte loss (higher factor) was apparent. Some indication of higher molecular weight analytes being lost preferentially was present (trans-nonachlor, alpha-chlordane, gamma-chlordane), but was not seen for other higher molecular weight analytes (mirex, cis-nonachlor, endosulfan sulfate, oxy-chlordane). See the attached file NJNYpestSTATSfeb2002.xls for detailed information.

VI. Total PAHs

In the calculation of total PAH values, all detected results that were unqualified, qualified as estimated (J), suspect due to all four identification criteria not met (K), and detected in the associated laboratory blank (B) were added. Undetected values were considered as equal to zero and no laboratory blank subtraction was done. The NY samples were not collected using TOPS, but consisted of a one liter filtered water sample and a larger volume of sample filtered through a glass fiber filter. Each fraction was analyzed and reported separately by the laboratory. For this evaluation the total PAH for each sample was determined by adding the associated fractions. The data presented in Table 8 indicate that the very large standard deviations associated with PAH concentrations makes any conclusion regarding bias difficult.

Table 8 Total PAH Data Comparisons

State	Sample Type	Total PAH Mean (ng/L)	Standard deviation (ng/L)	n	Minimum/location n (ng/L)	Maximum/location n (ng/L)
New Jersey	~ 2.5 liter whole	1398	1598	34	174 Linden Roselle Aug 2001	7,867 Passaic Valley Oct 2000
New York	GFF + 1 L filtered water	2264	5098	35	84.15 North River Jan 2001	26,449 Newtown Creek June 1999

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A total PAH value of 176,000 ng/L from Bergen-Woodcliff (December 2000) was considered an outlier in the New Jersey dataset and was omitted from the calculation of the mean and standard deviation. A spill occurred during that sampling event and the result is not indicative of the WPCF effluent.

A. Laboratory Background

Laboratory blank contamination did not significantly affect either the New Jersey or the New York sewage treatment plant data. The most commonly detected PAHs in laboratory blanks were naphthalene and phenanthrene, but sample concentrations were all well above the laboratory background levels.

B. Specific Analyte Comparison

A specific analyte comparison was not done, as the TOPS assembly was not used for collection of any samples.

VII. Conclusions

PCB, dioxin/furan, and pesticide concentrations in NY sewage treatment plant samples collected by TOPS are consistently lower than NJ sewage treatment plant samples by a factor of 2 or greater.

Higher chlorinated PCB congeners and higher molecular weight pesticides exhibit the greatest differences in concentration.

NJ sewage treatment plant sample PCB concentrations appear to be inflated due to laboratory

background. Blank subtraction of results for four samples resulted in negative total PCB concentrations

Dioxin/furan concentrations between NY and NJ vary by a factor of 10 for most analytes and do not appear to be related to degree of chlorination or molecular weight.

Total PAH concentrations are so variable, no conclusion based on mean concentrations can be drawn.

If you have any questions regarding these comments, please contact me at 920-469-9113 makuehl@aol.com or Renee Morris at 703-412-7687 morris_renee@bah.com.

Attachments:

Battelle_Axys_side_by_side.xls
NJNYpestSTATSfeb2002s.xls
NYNJPCBhomologues.xls

CARP Database Issues Affecting Data Validation

Based on examination of the CARP database by Booz Allen Hamilton data validation staff and data programmers, several issues have been identified that affect our ability to validate the CARP data. We are identifying these issues in order to remediate the existing data and prevent the soon-to-be-loaded New Jersey data from containing the same problems. Resolving these issues now, prior to loading New Jersey data, will enable us to validate all of the CARP project data in a timely fashion in accordance with the terms of our contract with the Hudson River Foundation.

OPR Samples: As the data validation rules for the automated program will be the requirements contained in the source methods for analysis (1631, 1638, 1613, 1668, 8290, HRMS-1, HRMS-2, and HRMS-3), it is imperative that the database contain the specific quality control sample (QC_CODE) results in the associated method. All of these methods, with the exception of HRMS-3 and 8290, require the analysis of an Ongoing Precision and Recovery sample (OPR). Method HRMS-3 requires that a Laboratory Control Standard (LCS) be reported. Most of the methods also require a matrix spike/matrix spike duplicate (MS/MSD). Upon examination of the database, there are no OPR samples included and no QC_CODE choice for the OPR. Laboratories have reported LCS samples. However, in a number of hardcopy data packages that have been examined an OPR was included with the data. Therefore, if the laboratories did in fact analyze an OPR in accordance with the method requirements and only reported it as an LCS because of no code for it, then the QC_CODE of LCS for those that are really OPRs need to be changed to a new QC_CODE for OPRs. Booz Allen data validation staff will be examining the available data sets to determine if the laboratories consistently included MS/MSD data at the method specified frequency.

Field, Equipment, and Trip Blank Samples: As the data validation rules for the automated program will assess the impact of contaminated field, equipment and trip blanks on the project samples, a method of linking the sample results to the field blanks is essential. This may not always be the laboratory's grouping of the samples for extraction and analysis (Sample Delivery Group or SDG), as the samples associated with the blanks may need to be split into different SDGs or combined with other SDGs to maximize laboratory efficiency. NYSDEC will need to identify the samples associated with each of their blanks. New Jersey will also need to do this for their data prior to loading. This field blank information must be captured in the database for retrieval and validation.

The designation of the field sample grouping, FIELD_SDG, appears to be created by the field sampler. The laboratory then assigns their own grouping (SDG) and the two values do not match. If the field SDG is assigned to group "real" samples with the field QC samples such as equipment and trip blanks, this might be a way to link the associated samples across analytical SDGs.

Field Sampling Information Link to Analytical Data: At this time, there are 991 records in the database that are indicated as having no field information. One important component of data validation is to ensure that every analytical result is traceable either to a specific geographic sampling location or to the laboratory SDG for internally created QC samples (method blank

(MB), OPR, and LCS). If the field information for the sample is not known, the analytical data are useless and the data validation cannot be conducted. For example, sample volumes are required to convert the sample data to concentration units in order to proceed with some of the validation checks. All 991 current records will need to be associated with the correct field information and laboratory SDG prior to the start of data validation.

SDGs not Loaded: For various reasons, such as incorrect analyte names (PARAM_CODE), invalid reporting units, unrecognized or missing replicate codes (REP_CODES) and missing qualifiers for diluted sample results (LAB_QUAL), a large number of New York SDGs are not loaded into the database. These SDGs need to be loaded in order to initiate data validation, because they may include field QC applicable to other samples.

Field vs. Lab QC_CODES: Equipment (EB) and field blanks (FB) and some field duplicates (DU) were found in the database that are indicated as such in the FIELD_QC_CODE, but the laboratory entered in the QC_CODE an “SA” which indicates a “real” field sample. Unless the user checks both QC_CODE and the FIELD_QC_CODE entries, there is a danger of interpreting blank results as representative of the sampling location. As the lab may have received the blanks and duplicates as “blinds” in order to not prejudice their analyses, they correctly assumed they were real samples. It is then unclear as to when and who entered the FIELD_QC_CODE. This information will need to be part of the field information that the States will need to provide. However, it is necessary for data validation that the QC_CODE identify the type of QC sample because this is a key field for all other QC.

Final_Qual data type: For our data validation results to be captured in the CARP database we are required to enter into the FINAL_QUAL field one of three data qualifiers: acceptable, usable with caution, or unusable. Currently the FINAL_QUAL field is five characters, which is not large enough to store the required qualifiers. A field, which is 25 characters, would be necessary to store the proper qualifiers.

Database Views: In order to provide the CARP MEG and Management Committee with data on quality assurance issues (e.g., lab blank contamination, POTW results between NJ and NY), Booz Allen Hamilton attempted to query the database and/or request that database views be written to obtain the needed data. The database currently cannot retrieve all the data for a specific QC_CODE (i.e., all PCB data for lab blanks across labs) or all the data for a media (i.e., PCB data for all sewage treatment plants) or even all the data for a specific sampling location over time. These types of retrievals will likely be useful to the modelers and to the States and should be provided by the database in a usable manner.

TOTAL METALS IN CARP SEWAGE TREATMENT PLANT SAMPLES COMPARISON OF NEW YORK AND NEW JERSEY DATA

Date: March 4, 2002

Data Reviewed: New Jersey POTW Events 1-4 (10/00-8/01)

New York sewage treatment plant metals data retrieved from the CARP database 1/26/02

Reviewed by: Marcia Kuehl and Renee Morris
Booz Allen Hamilton

I. Background

At the request of the participants at the March 1, 2002 MEG Data Workshop, the total metals data for sewage treatment plant samples collected for CARP were evaluated. The evaluation was done to assess if the bias seen between New York and New Jersey PCB, dioxin/furan and pesticide values were present in the metals results. New York collected their sewage treatment plants samples analyzed for PCBs, dioxins/furans, and pesticides using the trace organic platform sampling system (TOPS). New Jersey collected their sewage treatment plant samples as grab samples. One possible source for the bias seen in the PCBs, dioxins/furans, and pesticides may be due to differences in the sampling methods. Both laboratories collected samples for metals analyses as grab samples. If the same bias is present, the New York total metals results would be a factor of 2-10 times lower than the New Jersey total metals results. If the metals did exhibit the same bias then the bias may be due to treatment plant differences and/or sample collection period differences and not a result of differences in sample collection methods.

II. Data Evaluated

A limited number of New York sample results were available from the CARP database for this evaluation. As of March 2, 2002, 199 Sample Delivery Groups containing metals data were not loaded into the database due to lab reporting errors. New Jersey data used in this evaluation was obtained as a summary table from GLEC and is not yet in the database.

Both states analyzed sewage treatment plant samples for total cadmium, total mercury and methyl mercury. Only dissolved phase methylmercury results have been loaded in the database for New York samples. New York also analyzed samples for total arsenic and New Jersey analyzed samples for total lead. For the purposes of this evaluation, only data from total mercury and cadmium are presented.

III. Results

Comparison of Total Mercury Results

State	Total Hg mean (ng/L)	Total Hg std dev (ng/L)	Total Hg n	Total Hg minimum	Total Hg maximum
New York	22.5	25.9	42	0.48 Rensselaer 1/99	112 Rockland 4/99
New Jersey	29.0	24.2	34	6.23 MCUA 12/00	114 N. Bergen Central 8/01

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Comparison of Total Cadmium Results

State	Total Cd mean (ng/L)	Total Cd std dev (ng/L)	Total Cd n	Total Cd minimum	Total Cd maximum
New York	142	185	33	17.8 Rockland 3/00	752 Newtown Creek 6/99
New Jersey	134	110	34	27.2 BCUA 8/01	500 PVSC 5/01

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No low bias for New York total metals results when compared to New Jersey total metals results is apparent from the data reviewed. The standard deviations for the New York metals results are larger than the mean values, indicating wide variability in the individual results used in the calculation of the mean.

IV. Conclusion

The low bias seen in New York organics results when compared to New Jersey organic results is not present in total metals results. Therefore treatment plant differences and/or differing sample collection period is not likely the source of the organic biases.

If you have any questions about these results, please contact Marcia Kuehl at 920-469-9113 makuehl@aol.com or Renee Morris at 703-412-7687 renee_morris@bah.com.

PCB CONGENERS AND HOMOLOGUES IN CARP SEWAGE TREATMENT PLANTS COMPARISON OF NEW YORK AND NEW JERSEY DATA-UPDATE

Date: June 7, 2002

Data used: New Jersey POTW Events # 1-4 (10/00-8/01)
Blank subtracted NJ data, received 5/23/02

New York sewage treatment plant data (MEDIUM =
WPCF) for PCB congeners retrieved from CARP database
on January 26, 2002

Reviewed by: Renee Morris
Marcia A. Kuehl
Booz Allen Hamilton

As a result of the biases seen in PCB values in the side-by-side collection study conducted at two sewage treatment plants on May 21-22, 2001, a further evaluation of the historical total PCB concentrations in NY and NJ treatment plants was made and included in a report dated February 1, 2002. At subsequent CARP meetings on March 1 and March 11, 2002, the total PCB data comparability issue was discussed and additional data requested by Joel Baker, Chairman of the MEG. This report contains a summary of the additional data requested. The associated compiled data is attached for review by the CARP Model Evaluation Group. The following data is included:

New Jersey

Congener specific data for all POTW samples,
Total PCB values for all POTW samples, including uncorrected totals, blank subtracted totals (supplied by NJHDG) and blank censored totals,
Total PCB, and total homologues censored for blank contamination (values < 3 X highest associated method, field or trip blank = 0) or subtracted for blank contamination in all POTW samples,
Total PCB and total dichlorobiphenyls without IUPAC # 11 for all POTW samples,
Comparison of May 21-22, 2001 side-by-side collection study data with blank treatments,
Compilation of laboratory, field and trip blank PCB congener results.

New York

Homologue specific data for 35 POTW samples where both the dissolved (XAD) and suspended (GFF) fractions have been loaded into the database,
Homologue data for POTW whole water samples (noted as treated, unfiltered or filtered),

Homologue total data for POTW samples where both the dissolved (XAD) and suspended (GFF) fractions have been loaded into the database,
Total PCB values for POTW samples calculated by summing XAD and GFF results,
Total PCB and total dichlorobiphenyls without IUPAC # 11 for POTW samples,
Compilation of laboratory method and field blank PCB congener results,
Comparison of May 21-22, 2001 side-by-side collection study data.

Congener specific data for all of the samples presented in this memo are available upon request on CD.

I. Data Background and Procedures

A. Sewage Treatment Plants Studied

The following New York treatment plants are included in this update: Wards Island, North River, Hunts Point, Bowery Bay, Owls Head, Coney Island, Yonkers, Jamaica Bay, 26th Ward, Tallman Island, Red Hook, Port Richmond, Oakwood Beach, Rockaway, Rockland County, Rensselaer and Poughkeepsie(C).

New Jersey sewage treatment plant locations include Middlesex County, Bergen County, Joint Meeting, Rahway Valley, Hoboken, Linden-Roselle, West New York, North Bergen-Central, North Bergen-Woodcliff, Seacaucus, Passaic Valley and Edgewater.

Both New York and New Jersey sampled Passaic Valley and Edgewater in May 2001 during the side-by-side study. In addition, a hydrated NIST SRM prepared by NYSDEC by spiking 2.5 L of reagent water with 75 mg of NIST SRM 1944 to yield a sample with 30 mg/L TSS.

No field duplicate samples were included in the data update.

B. Sample Collection Methods

New Jersey: All samples were collected by New Jersey in 20 liter glass carboys at the sampling locations and later split into 2.5 L aliquots for analysis. The splitting was done by drawing sample out through a peristaltic pump. During pumping, a magnetic stir bar on the bottom of the sample actively mixed the sample. Upon receipt at the laboratory, the sample was filtered through a 0.7 micron filter and the filters and filtrate extracted and analyzed separately for samples collected in October 2000 and reported as dissolved and suspended fractions. Total values for the congeners were calculated by Booz Allen by summing the dissolved and suspended results for each sample in this sampling event. Subsequent samples were extracted separately, but the extracts were combined for analysis and reported as "total".

New York: The TOPS system consisting of the dissolved phase collected on XAD resin and the suspended phase collected on glass fiber filters (GFF) was used by New York for collection for the majority of samples. Volumes sampled using the TOPS system ranged from 8 to 1094 liters.

The laboratory extracted, analyzed, and reported the dissolved phase and the suspended phase separately. Total values for the samples were calculated by Booz Allen by summing the dissolved and suspended results for each sample collected on the same day at the same location. For some samples, two XAD columns were collected and analyzed, so the total congener results included the sum of both columns. Booz Allen has assumed that the samples in the CARP database that had at least one XAD column result and at least one GFF result were completely reported. **Some sample results reported in the database included metered surrogate concentrations.**

Some POTWs were sampled by collecting raw unfiltered, filtered or treated wastewater directly in glass carboys alongside a TOPs assembly. The Newtown Creek (filtered wastewater), Poughkeepsie (treated wastewater), and 26th Ward, Coney Island, Hunts Point, North River, Jamaica Bay (unfiltered wastewater) locations were sampled in this way and the data was available in the database. Based on a list of samples collected compiled by Simon Litten, NYSDEC, additional locations were sampled this way, but the database did not contain the data for all of the phases (i.e. XAD, GFF, unfiltered whole water or treated wastewater). These additional locations were therefore not included in this data update.

C. Sample Analysis Methods

Both NY and NJ laboratories have years of experience in the analysis of PCB congeners at trace levels. For the CARP samples, both labs used their own versions of EPA reference method 1668A and NYSDEC HRMS-1 (11/99) tailored to fit their analytical instrumentation operating conditions. Both labs extracted the suspended phase of the sample on the filter(s) separately from the dissolved phase (filtrate or XAD resin). No significant differences in the analytical procedures as documented in the Axys and Battelle Standard Operating Procedures (SOPs) were discovered during the on-site audits. As previously noted, the source of the quantitation standard varies between Battelle and Axys (Cambridge Isotopes and Accustandard). A comparison of these two standards against each other has not been done.

D. Total PCB and Homologue Sum Calculations

New York and New Jersey: In the calculation of total PCB values and homologue sums, all detected results that were unqualified, qualified as estimated (J), suspect due to all four identification criteria not met (K), and detected in the associated lab blank (B) were added. Undetected values (U) were considered as equal to zero.

New York: For some NY TOPS samples, NYSDEC added one of three metered surrogate solutions (CS008, CS009, CS011) bled in as the samples were being pumped through the XAD resin to monitor the recovery efficiency. As the surrogate compounds were not identified as such in the data in the CARP database, the reported detected values for the surrogates used (BZ # 14, 55, 104, 152, 204, depending on the solution used) were removed by Booz Allen from the data prior to the evaluation of homologue and total PCB sums.

New Jersey: For NJ blank corrected data, the data were corrected in two different ways. Originally, NJ proposed to determine the highest associated blank (lab, field, trip) concentration, multiply the concentration by 3 and then censor any sample concentration less than 3 X the highest blank to read zero. This procedure is termed blank “censoring” on the attached data tables. Reported congeners that revert to zero using this procedure are highlighted in orange in the data tables labeled as “before”.

NJ has subsequently proposed a different procedure to correct the data for blank contamination (5/23/02). In this procedure, direct subtraction of the most reasonable associated blank as determined by Battelle and NJHDG was done and the resultant data provided to Booz Allen. This procedure is termed “blank subtraction” in the attached data tables.

II. Laboratory and Field Blank Comparison

New Jersey: The congener specific data for all of the NJ lab, field and trip blanks is presented in the following attached file:

NJblanksPCB.xls.

A discussion of the blank concentrations and their possible sources can be found in the attached file created by Battelle:

NJPOTWPCBBackgroundInformation.doc (dated 5/14/02).

New York:

The blank data retrieved from the database included only method blank data from the laboratory is presented in the following file:

axysmethod blanks_6_8_02.xls

The attached file includes blank data in units of ng/L and ng/sample. The first two worksheets includes homologue data in units of ng/L and ng/sample, the next three list the total PCBs for the method blanks in units of ng/L and ng/sample. The “finals” lists the homologue totals and PCB totals, mean, minimum, maximum, and standard deviation by different units. The last worksheets congener data by different units.

III. Blank Censored and Subtracted Data Comparison

New Jersey: For blank censoring, the following files list the reported data with the associated blanks and the calculation of 3X the highest blank. Values highlighted in orange in these files were those that revert to zero in the blank censoring procedure:

POTW#1_PCB_SuspendedB4.xls

POTW#1PCBDissolvedB4.xls
POTW#2_PCBTotalB4.xls
POTW#3_PCBTotalB4.xls
POTW#4_PCBTotalB4.xls

The substituted zero values are presented in the following attached files:

POTW#1_PCB_SuspendedAFTER.xls
POTW#1PCBDissolvedAFTER.xls
POTW#2_PCBTotalAFTER.xls
POTW#3_PCBTotalAFTER.xls
POTW#4_PCBTotalAFTER.xls

The blank subtracted values as calculated by NJHDG are presented in the following files:

POTW#1_PCB_DissolvedDataIncludingBlankCorrection.xls
POTW#1_PCB_SuspendedDataIncludingBlankCorrection.xls
POTW#1_PCB_CombinedSummaryDataIncludingBlankCorrection.xls
POTW#2_PCB_CombinedSummaryDataIncludingBlankCorrection.xls
POTW#3_PCB_CombinedSummaryDataIncludingBlankCorrection.xls
POTW#4_PCB_CombinedSummaryDataIncludingBlankCorrection.xls
NJPCBCHARTS.xls

The effect of these different treatments on the total PCB value for the NJ POTW samples is presented in:

NJPOTWTOTALPCBCOMPARE.xls

As expected, blank subtraction does not reduce the PCB values as much as censoring at the 3 times the highest blank level.

New York: Blank contributions to NY sample PCB congener results were negligible and no blank censoring or subtraction was requested by the MEG for this data update.

IV. PCB Homologue Totals

New Jersey: Congener specific results, homologue totals and the effect of blank censoring on them are presented in the following files:

POTW#1_PCB_SuspendedAFTERhomologues.xls
POTW#1_PCB_SuspendedB4homologues.xls
POTW#1_PCB_DissolvedAFTERhomologues.xls
POTW#1_PCB_DissolvedB4homologues.xls
POTW#2_homologuesB4.xls

POTW#2_homologuesAFTER.xls
 POTW#3_homologuesB4.xls
 POTW#3_homologuesAFTER.xls
 POTW#4_homologuesB4.xls
 POTW#4_homologuesAFTER.xls

A presentation of the homologue totals and the effect of the exclusion of BZ #11 and blank censoring are found in the following file:

NJPOTWhomologueCOMPARE.xls

The greatest reduction occurred for the pentachlorinated congeners.

New York TOPS: The spreadsheet containing the NY homologue totals consists of five worksheets:

Homologues_6_09_02.xls

The first, “totals no 11” lists the TOPS sample (XAD + GFF) homologue totals for each of the 34 samples collected using TOPS without inclusion of BZ# 11. The second, “totals”, presents the homologue totals with BZ# 11. The third, “homologues” reports the 34 samples separated by homologues, the fourth, “Finals”, presents the mean, standard deviation, minimum and maximum of each homologue, total PCB, dichlorobiphenyl without BZ #11 and total PCB without BZ# 11 over all 34 samples, and the fifth worksheet, “homologues no 11”, lists the dichlorobiphenyl homologue total for all 34 samples without BZ # 11 included.

New York Whole water: The homologue totals for the NY whole water samples were segregated into the three different sample media types listed in the database: filtered water, unfiltered water and treated wastewater. The spreadsheet containing the NY homologue totals consists of eight worksheets:

NYwholewaterhomologues.xls

The first worksheet, “all”, lists the congener specific data for the three sample media (unfiltered, filtered, treated) as retrieved from the database. The second, ”finals”, indicates the homologue totals, mean, minimum, maximum, and standard deviation by media. The sixth, seventh and eight worksheets contain the congener data, homologue sum and mean, minimum, maximum, and standard deviation for each media. Due to the small number of these types of samples loaded in the database, no conclusions were drawn.

V. Impact of BZ #11 on Total PCB and Dichlorobiphenyl Homologue Totals

New Jersey: Data for PVSC indicates significant concentrations of BZ #11. As the MEG has

not decided whether or not to include this congener that is not considered associated with PCB formulations used as Aroclors in its modeling efforts, it was excluded from the calculation of total PCB and dichlorobiphenyl homologue totals. The effect of the exclusion of BZ #11 on the total PCB value for the NJ POTW samples is presented in:

NJPOTWTOTALPCBCOMPARE.xls

New York TOPS: Data for Oakwood Beach, Port Richmond and Rensselaer indicate significant concentrations of BZ #11. The worksheet containing the NY homologue totals with and without BZ # 11 is found in the spreadsheet:

Homologues_6_09_02.xls

The third worksheet, “finals”, presents the dichlorobiphenyl homologue total, mean, minimum, maximum and standard deviation without BZ # 11. The final worksheet, “homologues no 11” lists the dichlorobiphenyl homologue total for all 34 samples without BZ # 11 included.

New York Whole water: The dichlorobiphenyl homologue totals for the NY whole water samples were segregated into the three different sample media types listed in the database: filtered water, unfiltered water and treated wastewater. The spreadsheet containing the NY homologue totals consists of eight worksheets:

NYwholewaterhomologues.xls

The third, fourth and fifth worksheets, list the dichlorobiphenyl homologue totals without BZ # 11 by sample media. None of the whole water sample locations appear to contain significant concentrations of BZ # 11.

VI. May 2001 Side-by-Side Study Revisited

The results of the May 2001 side-by-side study were re-tabulated adding the results of the blank correction, blank subtraction treatment and are presented in the spreadsheet:

NJNYsidebysiderevisited.xls

PVSC results between the two states are most comparable for total PCB with BZ # 11 if the NJ total PCB value is compared to the TOPS total PCB value. For PVSC without BZ #11, the NJ value is most comparable to the NY whole water sample. The most comparable Edgewater total PCB with or without BZ# 11 results are the NJ value after blank subtraction and the NY TOPS value. The NJ SRM results corrected by blank subtraction or blank censoring are closer to the NY SRM results than the uncorrected total PCB value.

VII. Summary Comparison

Summary tables of the data presented in this memo and/or done by NJHDG (blank subtraction) are presented in the following table:

NYNJhomologueCOMPARE.xls

The only homologue class that is higher in NY TOPS samples are the monochlorobiphenyls. As the degree of chlorination increases, the gap between the mean values for NY and NJ increases, culminating in a factor of 30 difference for nonachlorobiphenyls.

If you have any questions regarding these spreadsheets, please contact Marcia Kuehl at 920-469-9113, makuehl@aol.com or Renee Morris at 703-412-7687, morris_renee@bah.com.

Attachments:

NJPOTWPCBBackgroundInformation.doc (dated 5/14/02)

NJPCBCHARTS.xls

POTW#1_PCB_DissolvedDataIncludingBlankCorrection.xls

POTW#1_PCB_SuspendedDataIncludingBlankCorrection.xls

POTW#1_PCB_CombinedSummaryDataIncludingBlankCorrection.xls

POTW#2_PCB_CombinedSummaryDataIncludingBlankCorrection.xls

POTW#3_PCB_CombinedSummaryDataIncludingBlankCorrection.xls

POTW#4_PCB_CombinedSummaryDataIncludingBlankCorrection.xls

NJblanksPCB.xls.

Axysmethod blanks_6_8_02.xls

POTW#1_PCB_SuspendedB4.xls

POTW#1PCBDissolvedB4.xls

POTW#2_PCBTotalB4.xls

POTW#3_PCBTotalB4.xls

POTW#4_PCBTotalB4.xls

POTW#1_PCB_SuspendedAFTER.xls

POTW#1PCBDissolvedAFTER.xls

POTW#2_PCBTotalAFTER.xls

POTW#3_PCBTotalAFTER.xls

POTW#4_PCBTotalAFTER.xls

NJPOTWTOTALPCBCOMPARE.xls

POTW#1_PCB_SuspendedAFTERhomologues.xls

POTW#1_PCB_SuspendedB4homologues.xls

POTW#1_PCB_DissolvedAFTERhomologues.xls

POTW#1_PCB_DissolvedB4homologues.xls

POTW#2_homologuesB4.xls

POTW#2_homologuesAFTER.xls

POTW#3_homologuesB4.xls

POTW#3_homologuesAFTER.xls

POTW#4_homologuesB4.xls

POTW#4_homologuesAFTER.xls
NJPOTWhomologueCOMPARE.xls
Homologues_06_09_02.xls
NYwholewaterhomologues.xls
POTW#1homologueCOMPARE.xls
POTW#2homologueCOMPARE.xls
POTW#3homologueCOMPARE.xls
POTW#4homologueCOMPARE.xls
NJNYsidebysiderevisited.xls
NYNJhomologueCOMPARE.xls

APPENDIX B: TECHNICAL SYSTEMS AUDIT ACTIVITIES REPORT

**TECHNICAL SYSTEMS AUDIT
ACTIVITIES REPORT**

**FOR
THE HUDSON RIVER FOUNDATION**

**IN SUPPORT OF THE
CONTAMINATION ASSESSMENT AND REDUCTION PROJECT**

JANUARY 15, 2003

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INTRODUCTION

The Hudson River Foundation (HRF) contracted Booz Allen Hamilton (Booz Allen) to provide quality assurance (QA) support to the Contamination Assessment and Reduction Project (CARP). As a component of this effort, HRF tasked Booz Allen to audit the technical systems used to generate CARP data. Specifically, Booz Allen conducted one on-site field audit and eleven on-site laboratory audits, the results of which are presented in this report.

The purposes of the audits activities reported herein were to assess and verify compliance with the governing QA documents, each of which are identified within the individual audit reports. Specific to the laboratory audits, the audits were not intended to determine compliance with contractual requirements but rather to assess comparability of each laboratory's analytical methods, quality control (QC) protocols, and data reporting format/contents with the other laboratories providing chemical measurements for CARP.

It is noted that observations listed are those items pertinent to the CARP project that are documented for comparability with other laboratories participating in CARP and do not require any corrective action by the laboratory. Findings are items that may negatively impact the quality, integrity, or utility of the CARP analytical data. Recommendations for corrective action to address these findings are listed at the end of each individual audit report.

1.0 FIELD AUDIT: RARITAN RIVER

Audit Location: Raritan River, New Jersey	Audit Date: October 3, 2001
Auditor: Renee Morris	
Analytes: Organic compounds, metals, TSS, DOC, and POC	
Data Set used for Data Audit: N/A	

1.1 AUDIT RESULT SUMMARY

1.1.1 SCOPE

The purpose of the audit was to review compliance by the samplers with the following source documents: *Sources and Loadings of Toxic Substances to New York Harbor Workplan*, dated 1/28/98; *Sediment Sample Collection and Analysis New York Harbor and Hudson River Technical Program Quality Assurance Project Plan*, dated September 3, 1998; *Final Quality Assurance Project Plan for Analytical Support for the New Jersey Toxics Reduction Program*, Version 1, dated 10/4/00; *New Jersey Toxics Reduction Workplan*, Volume I, dated July 14, 2000; and *New Jersey Toxics Reduction Workplan*, Volume II, Version 2, dated September 2000.

1.1.2 AUDIT PREPARATION

Joel Peccholi, NJTRWP, Office of Coastal Planning and Program Coordination, was consulted to arrange an audit date. The current sampling standard operating procedures (SOPs) and workplans were reviewed in preparation for the audit.

1.1.3 AUDIT FINDINGS AND OBSERVATIONS

Raritan River Head of Tide Sampling

The US Geological Survey (USGS) Team set-up sampling at the river-stage gauging stations located near the head-of-tide on the Raritan River. The site was equipped with a Trace Organic Platform Sampler (TOPS) and two ISCO automatic samplers. The ISCO samplers collected interval samples to be analyzed for the dissolved and suspended sediments, total suspended solids (TSS), particulate organic carbon (POC), and dissolved organic carbon (DOC).

Observations: The sampling team conducted the requisite field testing and documented the required information as it was obtained. The temperature was checked every hour and systems both for the TOPS and ISCO systems were continuously monitored to ensure no problems developed or any that did could be corrected immediately. The sample collection source was checked regularly. No problems occurred with the TOPS or ISCO systems during the audit. Sufficient ice was available and specified sampling procedures were followed.

Findings: None.

Raritan River Downstream

Sampling was conducted upstream from the Rutgers University boathouse. The site was equipped with a TOPS unit. Grab samples were also collected at the site to be analyzed for TSS, POC, DOC, polynuclear aromatic hydrocarbons (PAHs), and metals. A site upstream from the boathouse was chosen due to the previous problems with the sampling on May 15, 2001 that was conducted close to the boathouse.

Observations: The sampling team conducted the requisite field testing and documented the required information as it was obtained. The temperature was checked every hour and the TOPS system was continuously monitored to ensure no problems developed or any that did could be corrected immediately. The sample collections source was checked regularly. No problems occurred with the TOPS system during the audit.

Findings: Sufficient ice was not available for all the coolers and NJTRWP auditors (Gary Buchanan and Floyd Genicola) had to insist that additional ice be obtained immediately. The sampling team was not keeping the TSS samples in the coolers because they said there was not room. Also the distilled water used for rinsing was not covered for more than a half hour after the last use until the NJTRWP auditors pointed this out to the sample collection team.

1.1.4 CONCLUSIONS

The sampling staffs at both sites were helpful and well prepared. The knowledge, technical competence, and conscientiousness of the staff were evident in the record keeping and sampling operations. It is clear that both teams were committed to collecting samples that were fully compliant and usable for the CARP project.

1.2. RECOMMENDATIONS

Sufficient ice should be available prior to the start and set-up of sampling that day.

The sampling team should keep the TSS samples in the coolers as required.

The distilled water used for rinsing should be covered immediately after every use.

2.0 LAB AUDIT: PHILIP ANALYTICAL SERVICES

Audit Location: Philip Analytical Services, Burlington, Ontario	Audit Dates: August 15-16, 2001
Auditor: Marcia A. Kuehl	
Analytes: PAH by LRMS, organochlorine pesticides, PCB congeners, and PCDD/PCDF by HRMS	
Data Set used for Data Audit: SDG 10311	

2.1 AUDIT RESULT SUMMARY

2.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the following source documents: *Sources and Loadings of Toxic Substances to New York Harbor Workplan*, dated 1/28/98; *Sediment Sample Collection and Analysis New York Harbor and Hudson River Technical Program Quality Assurance Project Plan*, dated September 3, 1998; *CARP Reporting and Data Flagging Requirements for NYSDEC Samples*, revised for use effective 4/2/01; *Battelle Duxbury Operations Standard Operating Procedure for CARP Program Electronic Data Interchange Standards for Analytical Laboratories*, CARP SOP No. 003, Revision No. 05, Effective Date June 2001; NYSDEC methods HRGCMS-2 (dated 11/99) and HRGCMS-3 (dated 11/99); and EPA reference methods 1668 and 1613B.

An evaluation of the laboratory systems in place for the analysis of CARP samples for polychlorinated biphenyl (PCB) congeners, organochlorine pesticides (OCPs), PAHs, and polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDD/PCDF) was conducted through a review of the laboratory, standard operating procedures (SOPs), QA manual, laboratory tour, interviews with the analysts and the laboratory management staff, and a review of data and supporting documentation for sample delivery group (SDG) 10311. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, XAD resin preparation and cleaning, GC/MS calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

2.1.2 AUDIT PREPARATION

Larry Bailey, NYSDEC Bureau of Watershed Assessment and Research, Analytical Services Section, was consulted to arrange an audit date with Philip Analytical Services (PSC). The current NYSDEC Analytical Agreement, data reporting SOPs and applicable analytical methods were received and used to develop the audit checklist. Also in preparation for the audit, representative SDGs (06183, 03041, 02121, 03041, 03181, 04081 and 08272) were received from Jim Swart, NYSDEC or retrieved from the Battelle database for review by the auditor to become familiar with the PSC quantitation software and internal reporting forms. Case narratives for these SDGs were discussed during the pre-audit briefing to determine corrective action taken for the sample analysis problems noted in them.

PSC results from the following blind Performance Evaluation (PE) samples were also evaluated prior to the audit to target analytical problem areas: MOE sediment sample analyzed in January 2001 (data compiled by Larry Bailey, NYSDEC), and the NIST SRM 1944 sediment sample analyzed in November 1999 (data compiled by Dr. Richard Bopp, Rensselaer Polytechnic Institute, March 2001).

PSC Organic Test Methods SOPs for PCBs, OCP, PAH and PCDD/PCDF were reviewed during the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely affecting data quality or comparability with other CARP laboratories. The checklist covered the specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, HRGC/HRMS operation and analysis, and general QC results. The checklist also included notation of method and QC non-compliance for the selected SDG used for the data audit. This SDG was tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and extracts to assess if the systems were operational and in compliance with laboratory SOPs.

Portions of the laboratory audit checklist were completed during the pre-audit briefing and SOP/QA Manual review with Dr. Ronald McLeod (General Manager), Gerry Bengert (Quality Assurance Manager), Ada Blythe (Customer Service Manager), and Mary-Anne Johnson (Project Manager). During the laboratory audit and SDG tracking, Kelly Carcuro (Sample Reception Manager), Owen Crosby (HRMS Team Leader), and Tara Latoski (CARP Data Specialist) were interviewed.

2.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

PSC SOPs are revised and/or updated as needed to address the areas of data reporting and handling. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# QA 106, dated 1/24/01: Preparation of U.S. Data Package Deliverables
- SOP# QA 201, dated 2/14/00: Laboratory and Data Security
- SOP# QA 305, dated 5/31/01: Procedures for Assuring Ethics and Data Integrity
- SOP# QA 504, dated 7/4/01: Review and Validation of Data
- SOP# QA 506, dated 2/17/00: Software Validation and Control

Observations: CARP data are carried through the PSC internal operations with more significant figures than are defensible, but the final reported data are reduced and consistently reported in the electronic data deliverable (EDD) with the appropriate number of significant figures by the CARP Data Specialist. Currently, PSC is reporting the minimum level (ML) as the detection limit (DL) and the lowest calibration standard as the ML. A macro is used for the assignment of J, B, and U qualifiers. The CARP Data Specialist checks random rows of data in the EDD against the laboratory spreadsheet for accuracy after the data manipulation. The K flag

indicating results not meeting all method positive identification criteria are assigned manually by the analyst prior to receipt of the data by the CARP Data Specialist.

Finding: The procedures used to transform PSC instrument and laboratory created spreadsheets into the CARP EDD format are not documented. Currently only one person knows this procedure, the CARP Data Specialist.

Finding: Several SDGs have not been able to be loaded into the Battelle database due to lack of a code for the cleanup method (CLEANUP_METH). Rather than creating new codes to reflect the PSC cleanup protocols, Battelle indicated that PSC should simply use the code for the first cleanup method in their series. However, GPC is used for the first step in all of their cleanup routines: GPC, 3660, 3620 for OCP; GPC, 3610 for PAH; GPC, 3660, silica layer, 3620 for PCB; and GPC, silica layer, alumina for PCDD/PCDF. The use of GPC as the CLEANUP_METH code would be misleading, as it would then appear that GPC alone was used for the cleanup, which is not enough for CARP sample matrices.

Finding: Although PSC is reporting the DL and ML field in accordance with NYSDEC and Battelle procedures, end users of the data should be cautioned when comparing the reported analytical result against these fields. It is possible to have an undetected concentration below the value reported in the DL or ML field due to the fact that the sample specific detection limit used to report the U qualified value is based on the signal to noise ratio (S/N) for the analyte, and adjusted for sample volume, splitting of extract, dilution and concentration factors and recovery of the isotopically labeled analyte. The value reported in the DL or ML field is the concentration in the lowest quantitation standard analyzed in the initial calibration routine.

Sample Receipt, Storage and Custody Documentation

PSC SOPs are revised and/or updated as needed to address the areas of sample receipt, storage, and custody documentation. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# QA 102, dated 2/18/01: Receipt, Handling and Disposal of Hazardous Waste
- SOP# QA 104, dated 7/4/01: Analysis of Legal Samples
- SOP# QA 105, dated 10/10/00: Sample Reception
- SOP# QA 201, dated 2/14/00: Laboratory and Data Security
- SOP# QA 401, dated 7/11/01: Monitoring of Refrigerators, Freezers, Incubators and Ovens
- SOP# QA 405, dated 7/4/01: Monthly Monitoring of Laboratory Fume Hoods

Observations: Certified clean sample containers are obtained from ICHEM for CARP. Certificates of Analysis from ICHEM are retained. Each lot of XAD resin prepared is analyzed for PCBs and PAHs. Occasionally no tags are present on CARP samples, and no Contract Laboratory Sample Information Sheet (CLISIS) forms are sent so the completed SDG case file does not contain them. PSC internal chain of custody documentation is initiated at sample pickup in the U.S. regardless of the presence or absence of sample tags or CLISIS forms.

Findings: None.

Standards/Reagents Documentation

PSC SOPs are revised and/or updated as needed to address the area of standards and reagent documentation. In addition, each analytical SOP contains specific reagent/standard details in Section 6.0. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# QA 101, dated 2/22/00: Preparation, Storage and Disposal of Reagents/Standards
- SOP# QA 401, dated 7/11/01: Monitoring of Refrigerators, Freezers, Incubators and Ovens
- SOP# QA 403, dated 10/10/00: Daily Monitoring and Calibration of Balances
- SOP# QA 404, dated 7/4/01: Monitoring the Accuracy and Precision of Eppendorf Type Pipettors
- SOP# QA 405, dated 7/4/01: Monthly Monitoring of Laboratory Fume Hoods

Observations: An SOP containing the criteria for purchasing standards/reagents was not available at the time of the audit. In accordance with the NYSDEC contract, AccuStandard is the vendor used by PSC for all native analytes reported. Labeled standard sources are not specified by NYSDEC, but are documented in each analytical SOP. All original vendor Certificates of Analysis are retained and cross-referenced to the working standards. Independent “snap and shoot” ampoule standards are used as independent verification of purchased standards.

Findings: None.

General Laboratory Documentation

PSC SOPs are revised and/or updated as needed to address the area of general laboratory documentation. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# QA 201, dated 2/14/00: Laboratory and Data Security
- SOP# QA 202, dated 2/16/00: General Glassware Washing
- SOP# QA 301, dated 5/25/01: Performance of a Method Audit
- SOP# QA 302, dated 7/4/01: Performance of a Sample Audit
- SOP# QA 303, dated 2/15/00: Document Control
- SOP# QA 304, dated 2/15/00: Creation of a Standard Operating Procedure
- SOP# QA 401, dated 7/11/01: Monitoring of Refrigerators, Freezers, Incubators and Ovens
- SOP# QA 402, dated 6/21/01: Preparation of Control Charts
- SOP# QA 403, dated 10/10/00: Daily Monitoring and Calibration of Balances
- SOP# QA 405, dated 7/4/01: Monthly Monitoring of Laboratory Fume Hoods
- SOP# QA 502, dated 2/27/01: Staff Technical Training
- SOP# QA 503, dated 2/13/01: Corrective Action Responses
- SOP# QA 504, dated 7/4/01: Review and Validation of Data
- SOP# QA 505, dated 7/4/01: Method Development, Revision & Validation

- SOP# QA 506, dated 2/17/00: Software Validation and Control

Observations: QA and Organic Test Method SOPs contain a revision history that lists those changes made to the method and the effective date. PSC is a NELAC and CAEAL accredited laboratory. The audit report for NELAC (audit 12/6/99, report received July 2000) was reviewed and no significant findings that would adversely affect CARP data reported were found. PSC was one of the first laboratories audited for NELAC accreditation by the State of New York. The PSC QA Manager conducts 22 method audits and 6 sample audits each year, using the checklist contained in SOP# QA 301 and 302. The QA Manager reports to the corporate QA Manager and is independent of the PSC General Manager.

Findings: None.

HRGC/HRMS and HRGC/LRMS Operation and Analysis

PSC SOPs are revised and/or updated as needed to address the areas of MS operation and analysis. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# ORG 203 dated 7/6/01: Polynuclear Aromatic Hydrocarbons (PAHs) in Solids, water and Air by SIM GC/MS
- SOP# ORG 307 dated 4/6/01: CB Congeners/Homologues in Liquid/Solid/Air by hi-Res GC/MS (EPA 1668)
- SOP# ORG 310 dated 6/5/01: PCDDs/DFs in Liquid and Solid Samples by Isotope Dilution HiRes GC/MS (EPA 1613)
- NYSDEC SOP# HRMS-2, dated 11/99: Analytical Procedures for Organochlorine Pesticides by Isotope Dilution HRGC/HRMS

Observations: Five active VG HRMS systems and at least two LRMS systems were available for analysis of CARP samples at the time of the audit. Documentation of manual determination of percent valley for resolution checks was present in the calibration folders at the bench. A macro for calculation of S/N ratios was developed by PSC, as the pre-programmed algorithm in the quantitation software was not specific enough to the retention time window of each analyte.

Findings: None.

General QC Results

PSC SOPs are revised and/or updated as needed to address the areas of QC results and limits for each analysis. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# ORG 203 dated 7/6/01: Polynuclear Aromatic Hydrocarbons (PAHs) in Solids, water and Air by SIM GC/MS
- SOP# ORG 307 dated 4/6/01: CB Congeners/Homologues in Liquid/Solid/Air by hi-Res GC/MS (EPA 1668)

- SOP# ORG 310 dated 6/5/01: PCDDs/DFs in Liquid and Solid Samples by Isotope Dilution HiRes GC/MS (EPA 1613)
- NYSDEC SOP# HRMS-2, dated 11/99: Analytical Procedures for Organochlorine Pesticides by Isotope Dilution HRGC/HRMS
- SOP# QA 304, dated 2/15/00: Creation of a Standard Operating Procedure
- SOP# QA 402, dated 6/21/01: Preparation of Control Charts
- SOP# QA 503, dated 2/13/01: Corrective Action Responses
- SOP # QA 504, dated 7/4/01: Review and Validation of Data
- SOP# QA 505, dated 7/4/01: Method Development, Revision & Validation

Observations: Control charts are posted in the laboratories and are up-to-date with directions for recognizing trends. Detection of BZ# 209 in the laboratory blank resulted in an out of limit value reported for the MOE sediment. This laboratory blank contamination was noted in the case narrative and was higher than the reported sample concentration. In accordance with PSC corrective action protocols, the sample would have been re-extracted and re-analyzed, but insufficient volume (less than 10 grams) remained after the original analysis.

Findings: Methoxychlor detection limits and recoveries reported in CARP samples have been elevated due to interference with the secondary ion, m/z 228.1106 (M+2).

2.1.4 AUDIT FOLLOW-UP

Gerry Bengert at PSC was contacted on 8/20/01 to obtain a listing of the laboratory analytical and QA operations SOPs to reference in this audit report and to clarify the methoxychlor quantitation ions. This information was received on 8/21/01.

2.1.5 CONCLUSIONS

The staff at PSC was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff were evident in the record-keeping and laboratory operations. The SOP documentation was comprehensive, well written, and followed by the staff. It is clear that PSC is committed to producing usable data for the CARP project and have dedicated a Data Specialist for loading the data into the CARP database.

2.2 DATA AUDIT

Sample 065588 (1JMS00178) in CARP SDG 10311 was tracked through the laboratory from sample log-in through to the final report posted for loading to the CARP database. Laboratory records for sample and standard preparation, extraction and analysis were examined and the sample storage location found.

2.2.1 STRENGTHS

The log in and laboratory extraction and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including current detection limit studies from the QA records. SOPs were present at the bench and were being followed. The identification of samples, blanks, MS/MSD, OPR and analytical standards from preparation through extraction/spiking and instrumental analysis was consistent and traceable. Lot numbers of reagents currently in use were posted in the extraction laboratory to minimize recording errors and evidence of supervisory review (e.g., initials or signatures) was present on the reported data.

2.2.2 WEAKNESSES

The BZ# 209 contamination could not be proven to be an anomaly due to insufficient sample volume for re-extraction, but if the method blank in the next analytical batch extracted did not contain it, this could have been noted in the case narrative to aid the user in evaluating associated sample result reported. In addition, the data reported to NYSDEC did not include a "B" qualifier to indicate this blank contamination. Accurate and consistent uses of data qualifier codes such as B are essential in the data validation process.

2.2.3 DATA AUDIT SUMMARY

Traceability of field documentation (custody form) and laboratory log-in, internal chain-of-custody and LIMS system entry was accurate and complete. The holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Standard Logbooks, and traceability to the stock was documented through numbered Certificates of Analysis. The standards used for native and isotopically labeled standards, cleanup standards, internal standards, and OPR, LCS, LCD and MS solutions were recorded and traceable to this log. GC/MS PFK lock mass, initial and daily calibration data was present. Instrument maintenance was recorded in the applicable MS logbooks. The appropriate frequency of method QC samples was met and results for the OPR entered on the control chart. Cleanup standard and MS/MSD recoveries were all acceptable, as were RPD values. Blank contamination did not adversely affect sample concentrations except for BZ# 209. Mass spectra of identified analytes met the EPA criteria. No false positives or negatives were apparent in the raw data reviewed. The correct units and number of significant figures were reported in the spreadsheet and final hard copy report for the samples. No documentation was missing from the data package on the CD-ROM.

Method and QC Requirements Compliance

Compliance of the analysis of sample 065588 (1JMS00178) against the listed PSC Organic Test Method SOPs was done and no deviations were noted:

- SOP# ORG 203 dated 7/6/01: Polynuclear Aromatic Hydrocarbons (PAHs) in Solids, water and Air by SIM GC/MS
- SOP# ORG 303 dated 11/27/01: Clean up of extracts for PCDD/DF Analysis
- SOP# ORG 307 dated 4/6/01: CB Congeners/Homologues in Liquid/Solid/Air by hi-Res GC/MS (EPA 1668)
- SOP# ORG 308 dated 3/10/99: Extraction of Liquid and Solid Samples for PCDDs and PCDFs

- SOP# ORG 309 dated 4/11/01: Extraction and Clean Up of Chlorinated Biphenyls from Liquid, Solid and Air samples (EPA 1668)
- SOP# ORG 310 dated 6/5/01: PCDDs/DFs in Liquid and Solid Samples by Isotope Dilution HiRes GC/MS (EPA 1613)
- NYSDEC SOP# HRMS-2, dated 11/99: Analytical Procedures for Organochlorine Pesticides by Isotope Dilution HRGC/HRMS
- SOP# ORG 500 dated 9/22/97: Cleanup of Sample Extracts Using Gel Permeation Chromatography (EPA 1640A)
- SOP# ORG 501 dated 12/10/97: Soxhlet Extraction of Semivolatiles/Non Volatiles from Solid Samples (EPA 3540C)
- SOP# ORG 505 dated 6/22/99: Silica Gel Cleanup of OC Pesticide/PCB Sample Extracts (EPA 3630C)
- SOP# ORG 506 dated 6/22/99: Cleanup of Sulphur from OC Pesticide Extracts using Copper Powder (EPA 3660B)

2.3 RECOMMENDATIONS

CARP EDD SOP: PSC should document the process of transforming the PSC data into the CARP format in an SOP so that if the Data Specialist is not available, data can still be formatted and sent to NYSDEC. They should also revise the SOP as new CARP reporting codes or formats are created.

EDD Codes: OSC should create specific CLEANUP_METH codes for PSC cleanup protocols for OCP (GPC, 3660, 3620), PAH (GPC, 3610), PCB (GPC, 3660, silica layer, 3620) and PCDD/PCDF (GPC, silica layer, alumina).

Detection Limits: PSC should alert data users of the discrepancy between undetected sample values qualified with a U code and the values listed in the ML/MDL fields. Instead of reporting ML as the DET_LIMIT, they should use SPDL (Sample Specific Performance Limit) to give the user a sense of how far above this limit the detected concentration is.

Methoxychlor quantitation: PSC should allow for option in the NYSDEC HRMS-2 method of quantifying methoxychlor based on the primary mass alone (m/z 227.1072) due to interferences with the secondary ion.

3.0 LAB AUDIT: BATTELLE-COLUMBUS

Audit Location: Battelle-Columbus, Columbus, OH	Audit Dates: September 12, 2001
Auditor: Marcia A. Kuehl	
Analytes: Organochlorine pesticides, PCB congeners, and PCDD/PCDF by HRMS	
Data Set used for Data Audit: POTW Event #3	

3.1 AUDIT RESULT SUMMARY

3.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the following source documents: *Final Quality Assurance Project Plan for Analytical Support for the New Jersey Toxics Reduction Program*, Version 1, dated 10/4/00; *New Jersey Toxics Reduction Workplan*, Volume I, dated July 14, 2000; *New Jersey Toxics Reduction Workplan*, Volume II, Version 2, dated September 2000; NYSDEC methods HRGCMS-2, dated 11/99; and EPA reference methods 1668A and 1613B.

An evaluation of the laboratory systems in place for the analysis of CARP samples for PCB congeners, OCPs, and PCDD/PCDFs was conducted through a laboratory tour, interviews with the analysts and the laboratory management staff, and a review of data and supporting documentation for POTW Event #3. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, GC/MS calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

3.1.2 AUDIT PREPARATION

Floyd Genicola, New Jersey Department of Environmental Protection, arranged an audit date with Battelle-Columbus to coincide with the analysis of project samples. The current QAPP and applicable Battelle analytical SOPs were received and used to develop the checklist. Also in preparation for the audit, results from sediment PE samples (sediment X and NIST SRM 1944) analyzed by Battelle and the Chemistry Data Report for POTW Event # 3 were received for review by the auditor to become familiar with the Battelle reporting forms.

Battelle SOPs for PCBs, OCPs, and PCDD/PCDFs were reviewed prior to the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely affecting data quality or comparability with other CARP laboratories. The audit checklist covered the specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, HRGC/HRMS operation and analysis, and general QC results. The audit checklist also included notation of method and QC non-compliance for the selected samples used for the data audit. The samples were tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and extract to assess if the systems were operational and in compliance with laboratory SOPs.

Portions of the laboratory audit checklist were completed during the pre-audit briefing with Mary Schrock (Battelle Project Manager), Charles Lawrie (Quality Assurance Manager), and Zachary Willenberg (Quality Assurance Specialist). Joe Tabor (Master Research Technician) was also interviewed during the laboratory audit.

3.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

Battelle SOPs are revised and/or updated as needed to address the areas of data reporting and handling. Laboratory operations were audited for compliance with these SOPs (ASAT.II-010-00 PCDD/PCDF Data Review, ASAT.II-002-00 Logbooks and Equipment) and no deviations were noted. The SOP is also applicable to pesticide and PCB data reporting and handling. The contents of the final data package sent to New Jersey (NJ) for routine sample SDGs is being negotiated. For those SDGs selected for validation by NJ, Battelle will report a complete data package.

Observations: CARP data are carried through the Battelle internal operations with more significant figures than are defensible, but the final reported data are reduced and entered into the electronic data deliverable (EDD) with the appropriate number of significant figures by the Project Manager. Currently, Battelle is reporting the minimum level (ML) as the detection limit and the lowest calibration standard as the ML. Macros for assignment of J, B, and U qualifiers are checked in the EDD against the laboratory spreadsheet for accuracy after the data manipulation by the Project Manager. The K flag indicating results not meeting all method positive identification criteria, the exceeded holding time (H flag), exceeded temperature (T flag), inadequate chemical preservation (P flag), and the F flag indicating that the result is from a secondary column/method are assigned manually by the analyst or sample custodian prior to receipt of the data by the Project Manager.

Finding: The procedures used to transform Battelle instrument and laboratory created spreadsheets into the CARP EDD format are not documented. Currently only one person knows this procedure, the CARP Project Manager.

Finding: No SDGs have been posted as being loaded into the Battelle database. The reason for this was not determined during the audit.

Finding: Based on the last draft of the CARP SOP No. 003, Revision No. 05, and *Battelle Duxbury Operations Standard Operating Procedure for CARP Program Electronic Data Interchange Standards for Analytical Laboratories* no code exists for relative percent difference, so the code PCT_DIFF (percent difference) was used to report the variability between the MS/MSD recoveries. Also, no LAB_QUAL codes for T (preservation temperature exceeded), P (chemical preservation not in compliance) and H (holding time exceeded), are present, and may need to be loaded into Battelle's data.

Finding: Battelle reported an "E" qualified value for IUPAC # 11 in sample 1GL00073 and did not perform a dilution to render the result within the linear calibration range. As a result, the reported result is an estimate.

Sample Receipt, Storage and Custody Documentation

Battelle SOPs are revised and/or updated as needed to address the areas of sample receipt, storage, and custody documentation. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# ASAT.II-004-00: Sample Container Preparation and Shipment
- SOP# ASAT.II-007-00: Chain of Custody
- SOP# ASAT.II-012-00: Monitoring of Refrigerators and Freezers
- SOP# ASAT.II-013-00: Glass Thermometers

Observations: Certified clean sample containers are obtained from ESS for CARP. Certificates of Analysis from ESS are retained. Battelle includes very detailed sampling and shipping instructions with the sample containers to avoid flushing out of the sodium thiosulfate chemical preservative used for effluent sample preservation.

Finding: POTW # 3 samples for PCB and pesticide analysis were received with no teflon tape seals. Contact of sample with non-inert surfaces should be avoided.

Standards/Reagents Documentation

Battelle SOPs are revised and/or updated as needed to addresses the areas of standards and reagents preparation (ASAT.II-006-00), and desiccating agent and adsorbent preparation (ASAT.II-005-00). Each analytical SOP contains specific reagent/standard details. Laboratory operations were audited for compliance with these SOPs and no deviations were noted.

Observations: Original vendor Certificates of Analysis are retained and cross-referenced to the working standards. Independent “snap and shoot” ampule standards are used as independent verification of purchased standards. Weighed standards are verified by an independent analyst for accuracy. Balances are verified daily for accuracy using NIST traceable weights in the range of the objects weighed.

Findings: None.

General Laboratory Documentation

Battelle SOPs are revised and/or updated as needed to address the area of general laboratory documentation. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# ASAT.II-001-00: Standard Operating Procedures
- SOP# ASAT.II-010-00: PCDD/PCDF Data Review
- SOP# ASAT.II-002-00: Logbooks and Equipment
- SOP# ASAT.II-012-00: Monitoring of Refrigerators and Freezers

Observations: SOPs contain a revision history that lists those changes made to the method and the effective date. The QA Manager conducts system audits annually. The QA Manager reports to the Atmospheric Science and Applied Technology Department Manager and is independent of the Laboratory Manager. A spike witness program is in place, and the Project Manager routinely reviews and signs the laboratory notebooks.

Findings: None.

HRGC/HRMS Operation and Analysis

Battelle SOPs are revised and/or updated as needed to address the areas of PCB, pesticide, and PCDD/PCDF analysis. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP# ASAT.II-001-01: Standard Operating Procedure for the Analysis of PCDD/PCDF Using HRCG/HRMS Using Modified Method 8290
- SOP# ASAT.II-009-00: Standard Operating Procedure for PCB Analysis Using Modified Method 1668, Revision A
- SOP# ASAT.II-002-01: Standard Operating Procedure for PCDD/PCDF Sample Preparation Using Modified Methods 8290 and 1613
- SOP# ASAT.II-008-01: Standard Operating Procedure for Organochlorine Pesticides PCDD/PCDF Using HRCG/HRMS

Observations: Two active VG HRMS systems were available for analysis of CARP samples at the time of the audit. Documentation of manual determination of percent valley for resolution checks and the S/N ratios was present in the calibration folders at the bench.

Findings: None.

General QC Results

Limits and frequencies for internal QC samples are included in each Battelle SOP that are revised and/or updated as needed. Laboratory operations and the pesticide data package were audited for compliance.

Observations: Pesticide data package was well organized and contained sample container and shipping instructions, custody and log in documentation, pages from applicable laboratory record books (LRBs), internal chain of custody forms, Certificates of Analysis for standards and the standard reference material (SRM), Sample Split and Transfer Log, HRGC/HRMS instrument conditions, initial and continuing calibration and endrin/DDT breakdown check results.

Finding: Methoxychlor detection limits and recoveries reported for CARP samples have been elevated due to interference with the secondary ion, m/z 228.1106 (M+2). The EMPC for the method blank sample was reported as 680 pg/sample.

Finding: The PCB laboratory blank for the POTW #3 contained 31,400 pg/sample total PCBs. Several congeners in the POTW samples were lower than those in this laboratory blank.

3.1.4 AUDIT FOLLOW-UP

Mary Schrock at Battelle was contacted on 9/19/01 about possible sources of PCBs in the laboratory blank. She responded on 9/20/01 and indicated that Battelle is investigating if its starting position in the analytical train (i.e., first through filtering, extraction, and clean up) is contributing to the high background along with the additional handling it undergoes when compared to the less contaminated field blank (filtration, fractions split and recombined).

3.1.5 CONCLUSIONS

The staff at Battelle was helpful and well prepared for the audit, considering the events of the day. The knowledge, technical competence, and conscientiousness of the staff were evident in the record-keeping and laboratory operations. The QA and laboratory SOP documentation was comprehensive, very well written, and followed by the staff. It is clear that Battelle is committed to producing usable data for the CARP project.

3.2 DATA AUDIT

Sample 1GLC00073 was tracked through the laboratory from sample login through to the final report posted for loading to the Battelle database. Laboratory records for sample and standard preparation, extraction and analysis were examined and the sample storage location found.

3.2.1 STRENGTHS

The log in and laboratory extraction and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including Certificates of Analysis for the standards used. SOPs were present at the bench and were being followed. The identification of samples, blanks, MS/MSD, OPR, and analytical standards from preparation through extraction/spiking and instrumental analysis was consistent and traceable. Lot numbers of reagents were recorded and evidence of supervisory review (i.e. initials, signatures) was present on the reported data.

3.2.2 WEAKNESSES

The PCB contamination sources in the laboratory blank have not been identified or controlled. This will be of particular concern when ambient and tributary samples are analyzed, as their PCB concentrations will be lower than those in treatment plant effluents. In addition, the data reported to NJ included an "E" qualifier to indicate that the calibration range was exceeded for IUPAC 11 and the value reported is an estimate. Reporting known estimated values in the database without reanalyzing a dilution weakens the utility of the data for calculating defensible PCB loads.

3.2.3 DATA AUDIT SUMMARY

Compliance of the analysis of sample 1GLC00073 against the Battelle SOPs was confirmed, no deviations were noted. Traceability of field documentation (custody form) and laboratory log-in, internal chain-of-custody and data reporting spreadsheet entry was accurate and complete. Holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Standard Logbooks, and traceability to the stock was documented through numbered Certificates of Analysis. Standards used for native and isotopically labeled standards, cleanup standards, internal standards, and OPR, LCS, LCD and MS solutions were recorded and traceable to this log. GC/MS PFK lock mass, initial and daily calibration data was present. Instrument maintenance was recorded in the applicable MS logbooks. Appropriate frequency of method QC samples was met. Blank contamination did not adversely affect sample concentrations except for PCB and methoxychlor. Mass spectra of identified analytes met the EPA criteria. No false positives or negatives were apparent in the raw data. Correct units and number of significant figures were reported in the spreadsheet and final hard copy report.

3.3 RECOMMENDATIONS

CARP EDD SOP: Document the process of transforming the Battelle data into the CARP format in an SOP so that if the Project Manager is not available, data can still be formatted and sent to NJ. Revise the SOP as new CARP reporting codes or formats are created.

Database loading: No SDGs have been posted as being loaded into the Battelle database. A test run should be done as soon as possible to verify the format and the process.

CARP Codes needed: Codes for relative percent difference, T (preservation temperature exceeded), P (chemical preservation not in compliance) and H (holding time exceeded), are present, should be added to the database.

“E” qualified data: All E qualified results should trigger a dilution and reanalysis to yield quantitative values.

EDD Codes: Create specific CLEANUP_METH codes for PSC cleanup protocols for OCP (GPC, 3660, 3620), PAH (GPC, 3610), PCB (GPC, 3660, silica layer, 3620) and PCDD/PCDF (GPC, silica layer, alumina).

Sample Containers: Samples for PCB and pesticide analysis should be sealed with teflon tape.

Methoxychlor quantitation: Allow for option in the NYSDEC HRMS-2 method of quantifying methoxychlor based on the primary mass alone (m/z 227.1072) due to interferences with the secondary ion.

PCB background: The sources of PCBs as exhibited in the laboratory blanks should be investigated, identified and reduced.

4.0 LAB AUDIT: WRIGHT STATE UNIVERSITY-BREHM

Audit Location: Wright State University-Brehm Laboratory, Dayton, OH	Audit Dates: October 22-23, 2001
Auditor: Marcia A. Kuehl	
Analytes: PAH by LRMS, organochlorine pesticides, PCB congeners, and PCDD/PCDF by HRMS	
Data Set used for Data Audit: SDG 10311	

4.1 AUDIT RESULT SUMMARY

4.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the source documents *Sources and Loadings of Toxic Substances to New York Harbor Workplan*, dated 1/28/98, *Sediment Sample Collection and Analysis New York Harbor and Hudson River Technical Program Quality Assurance Project Plan*, dated September 3, 1998, NYSDEC methods HRGCMS-1, HRGCMS-2 and HRGCMS-3 (dated 11/99), and EPA reference methods 1668 and 1613B.

An evaluation of the laboratory systems in place for the analysis of CARP samples for PCB congeners, OCPs, PAHs, and PCDD/PCDFs was conducted through a laboratory tour, interviews with the analysts and the laboratory management staff, and a review of data and supporting documentation for SDG 10311. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, GC/MS calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

4.1.2 AUDIT PREPARATION

Larry Bailey, NYSDEC Bureau of Watershed Assessment and Research, Analytical Services Section, was consulted to arrange an audit date with Wright State University-Brehm Laboratory (WSU). The current NYSDEC Analytical Agreement and applicable analytical methods were received and used to develop the audit checklist. Also in preparation for the audit, representative SDGs were received from Jim Swart, NYSDEC (SDG 10311, 7051, 6131 and 11071) for review by the auditor to become familiar with the WSU quantitation software and internal reporting forms.

WSU results from the following blind Performance Evaluation (PE) samples were also evaluated prior to the audit to target analytical problem areas: MOE sediment sample analyzed in January 2001 (data compiled by Larry Bailey, NYSDEC), and the NIST SRM 1944 sediment sample analyzed in November 1999 (data compiled by Dr. Richard Bopp, Rensselaer Polytechnic Institute, March 2001). WSU had been audited the week of October 15-19, 2001 by the EPA for their latest dioxin/furan contract, but had not yet received an audit report.

WSU SOPs for PCBs, OCPs, PAHs, and PCDD/PCDFs were reviewed during the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely affecting

data quality or comparability with other CARP laboratories. The checklist covered the specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, HRGC/HRMS operation and analysis, and general QC results. The checklist also included notation of method and QC non-compliance for the selected SDG used for the data audit. This SDG was tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and extracts to assess if the systems were operational and in compliance with laboratory SOPs.

Portions of the Laboratory Audit Checklist were completed during the pre-audit briefing with Dr. Thomas Tiernan, Director of Brehm Research. During the laboratory audit and SDG tracking, Garrett VanEss (Sample Custodian), Joseph Solch (HRMS Team Leader/QA Manager), and John Garrett (HRMS Analyst/CARP Data Specialist) were interviewed.

4.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

WSU has SOPs that are revised and/or updated as needed that address the areas of data reporting and handling. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- Revision #3, 10/17/01: Documentation Policy and Procedures
- Revision #3, 10/17/01: Data Management Procedures
- Revision #6, 10/17/01: Data Reduction Procedures
- Revision #2, 10/17/01: Data Transfer and Entry
- Revision #3, 10/17/01: Data Validation/Self Inspection

Observations: Currently, WSU is reporting a sample specific performance detection limit (SPDL) for each result reported and is in the process of establishing method detection limits (MDLs) using the CS1 standard concentration in accordance with 40 CFR Part 136 and NYSDEC guidance. A macro is used for assignment of J, B and U qualifiers. The CARP Data Specialist using a dummy dataset tests the calculation of the SPDL. The analyst reviewing the data assigns the K flag indicating results not meeting all method positive identification criteria manually. Very little data or sample information is manually entered into the CARP reporting format, which reduces the chances of entry errors. Both tape and CD media are used for data backups, and backups also contain a copy of the program used to generate the data on it. No WSU data loading problem memos have been generated by Battelle since BAH was put on the memo distribution list in July 2001.

Findings: None.

Sample Receipt, Storage and Custody Documentation

WSU has SOPs that are revised and/or updated as needed that address the areas of sample receipt, storage and custody documentation. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- Revision #3, 10/17/01: Refrigerator and Freezer Calibration
- Revision #3, 10/17/01: Sample Receipt, Handling and Storage
- Revision #2, 10/17/01: Chain-of-Custody and Document Control

Observations: “Certified” clean sample containers are obtained for CARP sample collection and Certificates of Analysis are retained. WSU internal chain of custody documentation is initiated at sample log in and a memo generated that cross references the Sample Log Notebook number and lists the samples received, their condition and analyses requested. Sample storage areas are locked and storage temperatures are monitored by a data logger every 2 seconds, and the temperature saved every 2 hours as a record. Alarms are triggered when the acceptable temperature range is exceeded.

Findings: Insufficient macroinvertebrate sample volume (0.5 grams) has been received and was not enough to conduct all of the requested analyses.

Standards/Reagents Documentation

WSU has SOPs that are revised and/or updated as needed that addresses the areas of standards and reagent documentation. In addition, each analytical SOP contains specific reagent/standard details. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- Revision #3, 10/17/01: Analytical Standards
- Revision #3, 10/17/01: Refrigerator and Freezer Calibration

Observations: In accordance with the NYSDEC contract, AccuStandard is the vendor used by WSU for all native analytes reported. Labeled standard sources are not specified by NYSDEC. WSU purchases labeled standards from Wellington and Cambridge Isotope Laboratories. All original vendor “Certificates of Analysis” are retained and cross-referenced to the working standards. Standards used for spiking are listed on the Sample Tracking Form and signatures on the Intra-laboratory Sample Tracking Batch Summary Form indicate compliance with the analytical method spike requirements. During the EPA audit, it was requested that WSU add the lot numbers of the solvents, silica, alumina, celite/carbon and florisil used for any cleanup on the Batch Summary form.

Findings: None were noted, but concur with EPA suggestion to add lot numbers to Batch Summary Form.

General Laboratory Documentation

WSU has SOPs that are revised and/or updated as needed that address the areas of general laboratory documentation. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- Revision #3, 10/17/01: Laboratory Equipment Calibration
- Revision #3, 10/17/01: Glassware Cleaning

Observations: Laboratory SOPs had very recently been updated in anticipation of the EPA's audit. In house custom software is used to access the peak file data from the Kratos systems and is tested using a dummy set and changing sample weights. Reusable glassware is not numbered to check contamination sources due to the small size of the laboratory and staff, but glassware is segregated into trace and ultra trace (biota) usage. The latest SOPs are available in hard copy and on-line in a read only format. Older versions of SOPs are archived on line in a separate directory. During the EPA audit, the lack of a paper trail to track corrective action was cited and WSU is in the process of developing documentation to track corrective actions.

Findings: SOPs do not have a section listing what changes were made from the previous version. While not required as an SOP element, a revision history highlighting the changes from version to version would be helpful in tracking changes.

WSU-specific SOPs for PCBs, pesticides and PAHs were not reviewed at the time of the audit. SOPs seen on line were the NYSDEC contract appendices (methods HRGCMS-1, -2 and -3) and were not tailored to the instrument and operations at WSU. Dr. Tiernan indicated that he would send a copy of these SOPs.

HRGC/HRMS Operation and Analysis

WSU has SOPs that are revised and/or updated as needed that address the areas of HRMS operation and analysis. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- Revision #6, 10/17/01: GC/MS Analyses
- Revision #3, 10/17/01: GC/MS Maintenance

Observations: Three active Kratos HRMS systems were available for analysis of CARP samples at the time of the audit. No service contract was in place, as staff and the WSU electronics shop do all work in-house. Software smoothing factors are used to reduce background electronic noise and aid in peak identification. The Kratos algorithm is used without modification to determine the % valley for resolution checks. The calculation of S/N ratios is also done by the in house program and takes into account the dead zone in the ion monitored, the mean noise height and a minimum area count. Even though the method criteria calls for maximization of the m/z signals within ± 2 seconds, the HRMS analyst examines each window and may override the window to ± 4 seconds depending on the interferences present and the peak shape. The SPB-Octyl column did not provide adequate resolution for the PCB congeners, so a 60-meter RTX5-SilMS column is used. During the EPA audit, the lack of column headers in the GC/MS Injection Log was cited as a deficiency.

Findings: None.

General QC Results

WSU has a Quality Assurance Manual that is revised and/or updated as needed that address the areas of QC results and limits for each analysis. Laboratory operations were audited for compliance with the Quality Assurance Manual, Revision 7, dated 10/17/01 no deviations were noted.

Observations: The Laboratory Director is the final reviewer of all of the CARP data. The HRGC/MS Team Leader/QA Manager does the review of the quality control results, which are entered into on-line spreadsheets for the examination of trends and outliers. The QA Manager does data audits on 10 % of the CARP data generated. OCDD has been sporadically present in detectable levels in the laboratory blanks. Isotope labeled recovery limits are dynamic and are updated by importing data from the batch files. WSU includes an SRM with each batch and participates in round robin studies. An EPA audit recommendation was to also include a solvent blank in the batch every time a new lot number is used.

Findings: For NYSDEC contract compliance, a source of quarterly QC check samples should be found and analyzed. Data entry error rates have not been calculated.

4.1.4 CONCLUSIONS

The staff at WSU was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff was evident in the record-keeping and laboratory operations. The QA Manual and SOP documentation was comprehensive, and followed the NYSDEC contract requirements. It is clear that WSU is committed to producing quality data for the CARP project.

4.2 DATA AUDIT

Sample NN10-119CD, PE, PA, PB (1JMS00179) in CARP SDG 10311 was tracked through the laboratory from sample log-in through to the final report posted for loading to the WSU database. Laboratory records for sample and standard preparation, extraction and analysis were examined and the sample storage location found.

4.2.1 STRENGTHS

The log-in and laboratory extraction and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including historical QC recoveries. SOPs were present at the bench and were being followed. The identification of samples, blanks, SRM, OPR and analytical standards from preparation through extraction/spiking and instrumental analysis was consistent and traceable. Evidence of supervisory review (i.e. initials, signatures) was present on the reported data. Total PCBs in the laboratory blank was very low, at ~2 ng.

4.2.2 WEAKNESSES

The BZ# 1 and naphthalene contamination was present in the laboratory blank and biased the reported sample results. However, WSU did qualify the results associated with this contaminated laboratory blank with a B code, indicating that the concentration reported is less than 5 X the laboratory blank. WSU will now be flagging any result associated with a contaminated laboratory blank with a B flag, regardless of magnitude to comply with their recent EPA audit. CARP database users should be aware of this change, as more recent data will have more B flags assigned to it due to this flagging rule change.

4.2.3 DATA AUDIT SUMMARY

Traceability of field documentation (CLISIS) and laboratory log-in, internal chain-of-custody and LIMS system entry was accurate and complete. The holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Standard Logbooks, and traceability to the stock was documented through numbered Certificates of Analysis. The standards used for native and isotopically labeled standards, cleanup standards, internal standards, and OPR, SRM and MS solutions were recorded and traceable to this log. GC/MS PFK lock mass, initial and daily calibration data was present and instrument maintenance was recorded in the applicable MS logbooks. The appropriate frequency of method QC samples was met and results for the OPR entered in the spreadsheet. Cleanup standard and SRM recoveries were all acceptable. Blank contamination did adversely affect reported BZ # 1 and naphthalene concentrations. Mass spectra of identified analytes met the EPA criteria. No false positives or negatives were apparent in the raw data reviewed. The correct units and number of significant figures were reported in the spreadsheet and final hard copy report for the samples. No documentation was missing from the data package reviewed.

Method and QC Requirements Compliance

Compliance of the analysis of sample NN10-119CD, PE, PA, PB (1JMS00179) against the listed WSU and NYSDEC SOPs was done and no deviations were noted:

- NYSDEC HRMS-1 dated 11/99 for PCBs
- NYSDEC HRMS-2 dated 11/99 for pesticides
- NYSDEC HRMS-3 dated 11/99 for PAHs
- WSU SOP Sample Preparation, Revision 4, 10/17/01
- WSU SOP Sample Preparation-Solids Tetra- Through Octa-Chlorinated Dioxins and Furans, Revision 4, 10/17/01
- WSU SOP Sample Preparation-Aqueous Tetra- Through Octa-Chlorinated Dioxins and Furans, Revision 4, 10/17/01
- WSU SOP Sample Preparation-Biologicals Tetra- Through Octa-Chlorinated Dioxins and Furans, Revision 4, 10/17/01
- Revision #6, 10/17/01: GC/MS Analyses

4.3 RECOMMENDATIONS

Sample Volume: Insufficient macroinvertebrate sample volume (0.5 grams) has been received from NYSDEC. If small sample volumes are sent, NYSDEC should prioritize which analyses should be done.

Reagent Lot Numbers: Lot numbers should be added to the Batch Summary Form to allow for tracking down contamination.

SOP Revision History: SOPs do not have a section listing what changes were made from the previous version. While not required as an SOP element, a revision history highlighting the changes from version to version would be helpful in tracking changes.

Laboratory Specific SOPs: WSU-specific SOPs for PCBs, pesticides and PAHs were not reviewed at the time of the audit. SOPs seen on line were the NYSDEC contract appendices (methods HRGCMS-1, -2 and -3) and were not tailored to the instrument and operations at WSU. Dr. Tiernan indicated that he would send a copy of these SOPs.

Quarterly QC Check Sample: For NYSDEC contract compliance, a source of quarterly QC check samples should be found and analyzed.

Data Entry Error rates: Data entry error rates should be calculated in accordance with the NYSDEC contract to assess ongoing performance.

5.0 LAB AUDIT: BROOKS RAND LTD

Audit Location: Brooks Rand LTD., Seattle, WA	Audit Dates: November 5, 2001
Auditor: Renee Morris	
Analytes: Arsenic and Mercury	
Data Set used for Data Audit: No specific data sets were available	

5.1 AUDIT RESULT SUMMARY

5.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the source documents *Sources and Loadings of Toxic Substances to New York Harbor Workplan*, dated 1/28/98, *Sediment Sample Collection and Analysis New York Harbor and Hudson River Technical Program Quality Assurance Project Plan*, dated September 3, 1998, *CARP Reporting and Data Flagging Requirements for NYSDEC Samples*, Revised for use effective 4/2/01, *Battelle Duxbury Operations Standard Operating Procedure for CARP Program Electronic Data Interchange Standards for Analytical laboratories*, CARP SOP No. 003, Revision No. 05, effective date June 2001, *NYSDEC Analytical Services Protocol for Ultra-Trace Metals Analyses*, dated 12/97, and EPA reference methods 1630, 1631, and 1632.

An evaluation of the laboratory systems in place for the analysis of CARP samples for arsenic, mercury, and methyl mercury was conducted through a review of the laboratory SOPs and QA Manual, laboratory tour, interviews with the analysts and the laboratory management staff. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample preparation, concentration and clean-up, instrument calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

5.1.2 AUDIT PREPARATION

Larry Bailey, NYSDEC Bureau of Watershed Assessment and Research, Analytical Services Section, was consulted to arrange an audit date with Brooks Rand LTD., (Brooks Rand). The current NYSDEC Analytical Agreement and applicable analytical methods were received and used to develop the audit checklist.

Brooks Rand SOPs for the analysis of arsenic, mercury, and methyl mercury were reviewed during the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely affecting data quality or comparability with other CARP laboratories. The checklist covered the specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, instrument operation and analysis, and general QC results. Samples were tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and digests to assess if the systems were operational and in compliance with laboratory SOPs.

The laboratory audit checklist was completed during the laboratory tour and analyst interviews with Rebecca Wood (Project Manager), Frank Mcfarland (QA Manager), Will Hagan and Justin Burke (Laboratory Analysts), and Rick Manson (Laboratory Manager).

5.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

Brooks Rand has SOPs and a QA Plan that are revised and/or updated as needed that address the areas of data reporting and handling. Laboratory operations were audited for compliance with the following SOPs and QA Plan and no deviations were noted:

- Brooks Rand Comprehensive Quality Assurance Plan, Revision 013, dated June 2000
- SOP #BR-1302, Revision 001, Data Flow and Handling, dated 11/19/97
- SOP #BR-1401, Revision 000, Records of Client Sample Results, dated 2/22/93

Observations: Brooks Rand provided hardcopy MDL studies for each analyte. The MDL is based on the annually determined Estimated Detection Limit (EDL) adjusted for sample volume. The QA Manager does a full final review of all data reports including checking supporting documentation. All data reports are filed in file cabinets in the offices and are retained by Brooks Rand for at least five years.

Findings: None.

Sample Receipt, Storage and Custody Documentation

Brooks Rand has SOPs and a QA Plan that are revised and/or updated as needed that address the areas of sample receipt, storage, and custody documentation. Laboratory operations were audited for compliance with the following SOPs and QA Plan and no deviations (findings) were noted:

- BRL Comprehensive Quality Assurance Plan, dated 6/21/00
- SOP #BR-0300, Revision 004, Receipt of Samples, dated 5/24/00
- SOP #BR-0301, Revision 003, Sample Custody Maintenance and Tracking, dated 11/19/97
- SOP #BR-0303, Revision 003, Sample Storage and Disposal, dated 3/26/98

Observations: The laboratory analysis and log-in buildings are locked and access can only be gained using a key. A book recording who enters the building and the time is kept at the front entrance. A separate key is needed to obtain access to any location where samples are, and samples were observed to be kept in line of sight or in a locked room.

Sample identity and field information is entered into the BRL "Tracking" database upon sample receipt. The temperature of the cooler the water samples are received in is checked by placing a thermometer inside the cooler or in a temperature blank if provided. All sample bottles are engraved with a bottle ID number that can be used for sample identification.

Finding: None

Standards/Reagents Documentation

Brooks Rand has SOPs and QA Plan that are revised and/or updated as needed that address the areas of standards and reagent documentation. Each analytical SOP contains specific reagent/standard details in Section 5.0. Laboratory operations were audited for compliance with the following SOPs and QA Plan and no deviations were noted:

BRL Comprehensive Quality Assurance Plan, dated 6/21/00
SOP #BR-0002, Revision 005, Determination of Total Mercury in Solids by Cold Vapor Atomic Fluorescence Spectrophotometry (CVAFS), dated 5/24/00
SOP #BR-0006, Revision 000, Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry, dated 5/30/00
SOP #BR-0011, Revision 006, Determination of Methylmercury by Aqueous Phase Ethylation, Trapping Pre-Collection, Isothermal GC Separation, and CVAFE Detection, dated 5/23/00

Observations: In accordance with the QA Plan standards are obtained from chemical suppliers and are of high purity and concentration. The standards are checked by the laboratory for traceability to National Research Council of Canada or the National Institute of Standards and Technology reference materials. Preparations of all standards are recorded in logbooks. The analysis bench sheets include all calibration information.

Finding: None

General Laboratory Documentation

Brooks Rand has SOPs that are revised and/or updated as needed that address the areas of general laboratory documentation. Laboratory operations were audited for compliance with the following SOPs and some deviations (findings) were noted:

- BRL Comprehensive Quality Assurance Plan, dated 6/21/00
- SOP #BR-0304 Revision 002, Sample Processing, dated 11/19/97
- SOP #BR-1202, Revision 001, Precision and Accuracy, dated 3/4/99
- SOP #BR-1203, Revision 000, Identifying Systematic Errors, dated 2/19/93
- SOP #BR-1204, Revision 000, Analytical Non-Conformance and Resolution, dated 5/6/96
- SOP #BR-1300, Revision 001, Raw Data Review, dated 5/6/96
- SOP #BR-1301, Revision 001, Final Data Review, dated 11/18/96
- SOP #BR-1302, Revision 001, Data Flow and Handling, dated 11/19/97
- SOP #BR-1401, Revision 000, Records of Client Sample Results, dated 2/22/93

Observations: The Quality Manager reports to the Operations Manager and is independent of the Laboratory Manager. Training records were selected at random for audit and were

acceptable. Most instruments had logbooks for recording maintenance and the SOPs were available in most laboratories in a hard copy form.

Findings: The instrument log for one of the CVAFS instruments was missing and SOPs were not kept in the Atomic Absorption (AA) laboratory.

Sample Preparation, and Analysis

Brooks Rand has SOPs that are revised and/or updated as needed that address the areas of sample preparation and analysis. Laboratory operations were audited for compliance with the following SOPs and some deviations (findings) were noted:

- BRL Comprehensive Quality Assurance Plan, dated 6/21/00
- SOP #BR-0002, Revision 005, Determination of Total Mercury in Solids by Cold Vapor Atomic Fluorescence Spectrophotometry (CVAFS), dated 5/24/00
- SOP #BR-0006, Revision 000, Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry, dated 5/30/00
- SOP #BR-0011, Revision 006, Determination of Methylmercury by Aqueous Phase Ethylation, Trapping Pre-Collection, Isothermal GC Separation, and CVAFE Detection, dated 5/23/00

Observations: Each sample is assigned a batch number following log-in procedures and a sample processing form is generated. Following analysis, the analyst signs the sample processing form and attaches all raw instrument printouts, the analyst bench sheets, and preparation notes. The QA manager performs a final review of the data and supporting documents.

Findings: No logs were available for the oven or the pipettes. In addition, the thermometer had not been checked within the last year to a certified NIST grade thermometer.

General QC Results

Brooks Rand has a QA Plan and SOPs that are revised and/or updated as needed that address the areas of QC results and limits for each analysis. Additional client specific QC requirements are conducted as necessary. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- BRL Comprehensive Quality Assurance Plan, dated 6/21/00
- SOP #BR-0002, Revision 005, Determination of Total Mercury in Solids by Cold Vapor Atomic Fluorescence Spectrophotometry (CVAFS), dated 5/24/00
- SOP #BR-0006, Revision 000, Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry, dated 5/30/00
- SOP #BR-0011, Revision 006, Determination of Methylmercury by Aqueous Phase Ethylation, Trapping Pre-Collection, Isothermal GC Separation, and CVAFE Detection, dated 5/23/

Observations: SOPs exist for analyses and are followed by the staff. The latest SOPs and QA Plan are available for the staff. Nonconformances are documented and tracked.

Findings: None.

5.1.4 CONCLUSIONS

The staff at Brooks Rand was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff was evident in the record-keeping and laboratory operations. The QA Plan and laboratory SOP documentation was comprehensive, very well written, and better yet, followed by the staff. It is clear that Brooks Rand is committed to producing quality data for the CARP project. Additional effort is necessary to ensure the data can be loaded in the CARP database.

5.2 DATA AUDIT

5.2.1 STRENGTHS

The log-in and laboratory preparation and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including training records from the QA records. Most SOPs were present at the bench and were being followed. The identification of samples, blanks, MS/MSD, OPR and analytical standards from preparation through instrumental analysis was consistent and traceable.

5.2.2 WEAKNESSES

Other than the minor deficiencies previously cited which do not have an adverse impact on data quality, no system weaknesses were found.

5.2.3 DATA AUDIT SUMMARY

Traceability of field documentation (custody form) and laboratory log-in, internal chain-of-custody and LIMS system entry was accurate and complete. The holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Standard Logbooks, and traceability to the stock was documented. Instrument maintenance was recorded in the applicable logbooks for most of the instruments. The appropriate frequency of method QC samples was met and results were examined by bench and QA staff.

5.3 RECOMMENDATIONS

The instrument log should be found for the CVAFS instrument and SOPs should be placed in the AA laboratory.

Logbooks should be kept for the oven or the pipettes. In addition, the thermometer should be checked with a certified NIST grade thermometer.

6.0 LAB AUDIT: FRONTIER GEOSCIENCES INCORPORATED

Audit Location: Frontier Geosciences Inc., Seattle, WA	Audit Dates: November 6, 2001
Auditor: Renee Morris	
Analytes: Cadmium, Lead, Mercury, Methyl Mercury, and Silver	
Data Sets used for Data Audit: SDG S03211, SDG F08081, and SDG FF26102	

6.1 AUDIT RESULT SUMMARY

6.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the source documents *Sources and Loadings of Toxic Substances to New York Harbor Workplan*, dated 1/28/98, *Sediment Sample Collection and Analysis New York Harbor and Hudson River Technical Program Quality Assurance Project Plan*, dated September 3, 1998, *CARP Reporting and Data Flagging Requirements for NYSDEC Samples*, revised for use effective 4/2/01, *Battelle Duxbury Operations Standard Operating Procedure for CARP Program Electronic Data Interchange Standards for Analytical laboratories*, CARP SOP No. 003, Revision No. 05, effective date June 2001, *Final Quality Assurance Project Plan for Analytical Support for the New Jersey Toxics Reduction Program*, Version 1, dated 10/4/00, *New Jersey Toxics Reduction Workplan*, Volume I, dated July 14, 2000, *New Jersey Toxics Reduction Workplan*, Volume II, Version 2, dated September 2000, *NYSDEC Analytical Services Protocol for Ultra-Trace Metals Analyses*, dated 12/97, and EPA reference methods 1638, 1630, and 1631.

An evaluation of the laboratory systems in place for the analysis of CARP samples for cadmium, lead, mercury, methyl mercury, and silver was conducted through a review of the laboratory SOPs and QA Manual, laboratory tour, interviews with the analysts and the laboratory management staff, and a review of data and supporting documentation for SDGs S03211, F08081, and F26102. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample preparation, concentration and clean-up, instrument calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

6.1.2 AUDIT PREPARATION

Larry Bailey, NYSDEC Bureau of Watershed Assessment and Research, Analytical Services Section, was consulted to arrange an audit date with Frontier Geosciences Inc., (Frontier). The audit checklist was drafted by Renee Morris and reviewed by Marcia Kuehl. The current NYSDEC Analytical Agreement and applicable analytical methods were received and used to develop the checklist. Also in preparation for the audit, a representative data package F04041 was used for review by the auditor to become familiar with the quantitation software and internal reporting forms.

Frontier SOPs for the analysis of cadmium, lead, mercury, methyl mercury, and silver were reviewed during the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely affecting data quality or comparability with other CARP laboratories. The

checklist covered the specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, instrument operation and analysis, and general QC results. These SDGs were tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and digests to assess if the systems were operational and in compliance with laboratory SOPs.

The laboratory audit checklist was completed during the laboratory tour and interviews with Michelle Gauthier (Laboratory Manager/Temporary QA Manager), John Mitchel (QA Manager in training), Anne Fowler (Project Manager), MaLaika Lafferty (Shipping and Receiving and Bottle Washing Group Leader), Amber Steward (Mercury Group Leader), and Amara Vandervort (Trace Metals Group Leader).

6.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

Frontier has SOPs that are revised and/or updated as needed that address the areas of data reporting and handling. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- Frontier Geosciences Quality Assurance Plan, Revised dated October 19, 2000
- FGS-038.3, Data Review and Validation, dated 10/22/01
- FGS-080.2, Generation of Electronic Data Deliverables (EDDs), dated 3/1/01

Observations: Frontier provided the instrument detection limits (IDL) and the Initial Precision and Recovery (IPR) data for each analyte in the Quality Assurance Plan. The estimated method detection limit (EMDL) is reported in the CARP electronic deliverable for each result reported. The EMDL is calculated by the standard deviation of the preparation blanks, multiplied by 3, and the dilution factor.

Findings: None.

Sample Receipt, Storage and Custody Documentation

Frontier has SOPs that are revised and/or updated as needed that address the areas of sample receipt, storage and custody documentation. Laboratory operations were audited for compliance with the following SOPs and some deviations (findings) were noted:

- Frontier Geosciences Quality Assurance Plan, Revised, dated October 19, 2000
- FGS-005.4, Sample Receipt, Chain of Custody, Tracking and Disposal, dated 3/24/01

Observations: The laboratory analysis and log-in rooms are part of a secured facility and access can only be gained using a key. The mail carrier delivering the samples is identified via an intercom system and personally let into the building by a staff member and escorted to the sample receiving area. Hardcopy recording of who enters the building and the time entered is conducted.

Sample identity and field information is entered into one of two active in-use sample receipts logbooks kept at the sample receiving desk. The logbook also records the client, date and time received, sample matrix, custody seal condition, cooler temperature estimate, condition of the samples, and any unusual observations. Sample containers are rinsed on the outside to remove any possible contamination. Project sheets are then created that list all of the necessary actions that a set of samples requires. Samples bottles that contained high level metals (based on laboratory analysis) receive additional cleaning treatment to ensure they are acceptable for future use in sample collection of trace metals samples.

Finding: The extra cleaning that is involved for sample bottles that once contained high metals concentration should be recorded and bottles tracked to show the additional cleaning steps were successful.

Standards/Reagents Documentation

Frontier has SOPs and QA Plan that are revised and/or updated as needed that address the areas of standards and reagent documentation. Each analytical SOP contains specific reagent/standard details in Section 6.0. Laboratory operations were audited for compliance with the following SOPs and QA Plan and no deviations were noted:

- Frontier Geosciences Quality Assurance Plan, Revised dated October 19, 2000
- FGS-010.2, KOH/Methanol Digestion of Solids for Methyl Mercury, dated 1/3/00
- FGS-011.2, Digestion of Tissues for Total Mercury Using Nitric and Sulfuric Acids (70:30), dated 1/3/00
- FGS-012.3, Oxidation of Aqueous Samples for Total Mercury Analysis, dated 4/3/01
- FGS-013.3, Distillation of Aqueous Samples for Methyl Mercury Analysis, dated 4/3/01
- FGS-017.2, Methyl Mercury Distillation of Low Level Solids, dated 1/3/00
- FGS-32.3, Extraction of Cadmium, Copper, Lead, Nickel, and Silver from Waters by Extraction with Co-APDC, dated 3/10/01
- FGS-045.2, Preparation of Sediments by Acidic KBr Extraction Into Methylene Chloride for Determination of Methyl Mercury, dated 1/3/00
- FGS-052.3, Total Recoverable Metals Digestion by Oven Heating, dated 2/15/01
- FGS-053.2, Total Metals in Sediments, Soils and Rocks via HF/HNO₃, dated 1/3/00
- FGS-054.4, Determination of Trace Elements by Inductively Coupled Plasma-Mass Spectrometry, dated 2/26/01
- FGS-058.2, Total Metals Digestion for Animal or Plant Tissues, dated 1/3/00
- FGS-066.3, Preparation of Solids Samples for Total Mercury by Cold Aqua-Regia Digestion, dated 1/3/00
- FGS-069.2, Total Mercury Analysis by Cold Vapor-Atomic Fluorescence Spectrometry (CV-AFS), dated 6/8/01
- FGS-070.2, Methyl Mercury Calibration and Analysis, dated 5/2/01
- FGS-084.1, Total Recoverable Metals in Sediments and Soils via an Aqua Regia Oven Bomb Digestion, dated 1/3/00
- FGS-103.1, Determination of Hexavalent Chromium in Waters by Ion Chromatography-Inductively Coupled Plasma Mass Spectrometry, dated 3/20/01

Observations: In accordance with the QA Plan and SOPs, standards are obtained from chemical suppliers and are of high purity and concentration. Calibration verification standards must have a second source of all elements being determined. Preparations of all standards are done every two weeks, as needed recorded in logbooks. The analysis bench sheets include all calibration information.

Finding: Pipettes were checked according to the staff but it was not documented in a logbook.

General Laboratory Documentation

Frontier has SOPs that are revised and/or updated as needed that address the areas of general laboratory documentation. Laboratory operations were audited for compliance with the following SOPs and some deviations (findings) were noted:

Frontier Geosciences Quality Assurance Plan, Revised dated October 19, 2000
FGS-038.3, Data Review and Validation, dated 10/22/01
FGS-080.2, Generation of Electronic Data Deliverables (EDDs), dated 3/1/01
FGS-105.1, Control Charting, dated 10/23/01

Observations: The Quality Manager reports to the Operations Manager and is independent of the Laboratory Manager. Training records were selected at random for audit. All instruments had logbooks for recording maintenance and the SOPs were available in all laboratories in a hardcopy and/or electronic form.

Findings: Training records were not updated in all records reviewed during the audit.

Sample Preparation, Instrument Operation and Analysis

Frontier has SOPs that are revised and/or updated as needed that address the areas of sample preparation and analysis. Laboratory operations were audited for compliance with the following SOPs and some deviations (findings) were noted:

- Frontier Geosciences Quality Assurance Plan, Revised dated October 19, 2000
- FGS-010.2, KOH/Methanol Digestion of Solids for Methyl Mercury, dated 1/3/00
- FGS-011.2, Digestion of Tissues for Total Mercury Using Nitric and Sulfuric Acids (70:30), dated 1/3/00
- FGS-012.3, Oxidation of Aqueous Samples for Total Mercury Analysis, dated 4/3/01
- FGS-013.3, Distillation of Aqueous Samples for Methyl Mercury Analysis, dated 4/3/01
- FGS-017.2, Methyl Mercury Distillation of Low Level Solids, dated 1/3/00
- FGS-32.3, Extraction of Cadmium, Copper, Lead, Nickel, and Silver from Waters by Extraction with Co-APDC, dated 3/10/01
- FGS-045.2, Preparation of Sediments by Acidic KBr Extraction Into Methylene Chloride for Determination of Methyl Mercury, dated 1/3/00
- FGS-052.3, Total Recoverable Metals Digestion by Oven Heating, dated 2/15/01
- FGS-053.2, Total Metals in Sediments, Soils and Rocks via HF/HNO₃, dated 1/3/00

- FGS-054.4, Determination of Trace Elements by Inductively Coupled Plasma-Mass Spectrometry, dated 2/26/01
- FGS-058.2, Total Metals Digestion for Animal or Plant Tissues, dated 1/3/00
- FGS-066.3, Preparation of Solids Samples for Total Mercury by Cold Aqua-Regia Digestion, dated 1/3/00
- FGS-069.2, Total Mercury Analysis by Cold Vapor-Atomic Fluorescence Spectrometry (CV-AFS), dated 6/8/01
- FGS-070.2, Methyl Mercury Calibration and Analysis, dated 5/2/01
- FGS-084.1, Total Recoverable Metals in Sediments and Soils via an Aqua Regia Oven Bomb Digestion, dated 1/3/00
- FGS-103.1, Determination of Hexavalent Chromium in Waters by Ion Chromatography-Inductively Coupled Plasma Mass Spectrometry, dated 3/20/01

Observations: Each sample is assigned a Project Sheet following log-in procedures. The analyst checks the result of QC samples during analysis to ensure analysis is in control. After the analysis is complete, a Technical Data Specialist or another analyst reviews the data.

Findings: Floor stick mats did not always catch both feet as staff entered the laboratory.

General QC Results

Frontier has a QA/QC Manual and SOPs that are revised and/or updated as needed that address the areas of QC results and limits for each analysis. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- Frontier Geosciences Quality Assurance Plan, Revised dated October 19, 2000
- FGS-038.3, Data Review and Validation, dated 10/22/01
- FGS-080.2, Generation of Electronic Data Deliverables (EDDs), dated 3/1/01
- FGS-105.1, Control Charting, dated 10/23/01

Observations: SOPs exist for analyses and are followed by the staff. The latest SOPs and QA Plan are available for the staff. Nonconformances are documented and tracked.

Findings: None.

6.1.4 CONCLUSIONS

The staff at Frontier was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff were evident in the record-keeping and laboratory operations. The QA Plan and laboratory SOP documentation was comprehensive, very well written and followed by the staff. It is clear that Frontier is committed to producing quality data for the CARP project.

6.2 DATA AUDIT

6.2.1 STRENGTHS

The log in and laboratory extraction and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including current instrument detection limit studies from the QA records. SOPs were present at the bench and were being followed. The identification of samples, blanks, MS/MSD, OPR and analytical standards from preparation through spiking and instrumental analysis was consistent and traceable.

6.2.2 WEAKNESSES

Other than the minor deficiencies previously cited, no system weaknesses were found.

6.2.3 DATA AUDIT SUMMARY

Traceability of field documentation (custody form) and laboratory log-in was accurate and complete. The holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Logbooks. The standards used for internal standards, and OPR, LCS, LCD and MS solutions were recorded and traceable to the log. The correct units and number of significant figures were reported in the spreadsheet and final hard copy report for the samples.

6.3 RECOMMENDATIONS

The extra cleaning that is involved for sample bottles that once contained high metals concentration should be recorded and bottles tracked to show the additional steps were successful.

Pipets should be checked and the results documented in a logbook

Training records need to be updated.

Floor stick mats should be positioned to catch both feet of staff they enter the laboratory.

7.0 LAB AUDIT: AXYS ANALYTICAL SERVICES LTD

Audit Location: Axys Analytical Services Ltd., Sidney, B.C	Audit Dates: November 7-8, 2001
Auditors: Renee Morris (Lead) and Marcia A. Kuehl	
Analytes: PAH, Organochlorine Pesticides, PCB Congeners, and PCDD/PCDF by HRMS	
Data Set used for Data Audit: HRQ00 SDG 10311 (MOE sediment)	

7.1 AUDIT RESULT SUMMARY

7.1.1 SCOPE

The purpose of the audit was to assess the laboratory's compliance with the source documents *Sources and Loadings of Toxic Substances to New York Harbor Workplan*, dated 1/28/98, *Sediment Sample Collection and Analysis New York Harbor and Hudson River Technical Program Quality Assurance Project Plan*, dated September 3, 1998, *CARP Reporting and Data Flagging Requirements for NYSDEC Samples*, revised for use effective 4/2/01, *Battelle Duxbury Operations Standard Operating Procedure for CARP Program Electronic Data Interchange Standards for Analytical laboratories*, CARP SOP No. 003, Revision No. 05, effective date June 2001, NYSDEC methods HRGCMS-2 (dated 11/99) and HRGCMS-3 (dated 11/99), and EPA reference methods 1668 and 1613B.

An evaluation of the laboratory systems in place for the analysis of CARP samples for PCB congeners, OCPs, PAHs, and PCDD/PCDF was conducted through a review of the laboratory SOPs and QA Manual, laboratory tour, interviews with the analysts and the laboratory management staff, and a review of data and supporting documentation for SDG 10311. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, XAD preparation, GC/MS calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

7.1.2 AUDIT PREPARATION

Larry Bailey, NYSDEC Bureau of Watershed Assessment and Research, Analytical Services Section, was consulted to arrange an audit date with Axys Analytical Services (Axys). The current NYSDEC Analytical Agreement and applicable analytical methods were received and used to develop the checklist. Also in preparation for the audit, a representative data package (HRA98 SDG 11071) was received from Jim Swart, NYSDEC for review by the auditors to become familiar with the Axys quantitation software and internal reporting forms.

Axys' results from the following blind PE samples were also evaluated prior to the audit to target analytical problem areas: MOE sediment sample analyzed in January 2001 (data compiled by Larry Bailey, NYSDEC), and the NIST SRM 1944 sediment sample analyzed in November 1999 (data compiled by Dr. Richard Bopp, Rensselaer Polytechnic Institute, March 2001).

Axys SOPs for the analysis of PCBs, OCP, PAH and PCDD/PCDF were reviewed during the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely

affecting data quality or comparability with other CARP laboratories. The checklist covered the specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, HRGC/HRMS operation and analysis, and general QC results. The checklist also included notation of method and QC non-compliance for the selected SDG used for the data audit. This SDG was tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and extracts to assess if the systems were operational and in compliance with laboratory SOPs.

Input for the audit was obtained via the on-site laboratory tour and interviews with the following individuals: Laurie Phillips (Client Services); Dale Hooves (Quality Manager); Ravin Ramjuttun (QC Specialist); Sharon Simon (Assistant Project Chemist-Sample Receipt); Vicki Reesor (Data Coding); Barb Carr, Ruth Edgar and Nicole Yusep (Data Reporting); Tracy Trautman and Kim Fiege (Data Packaging); Debbie Fyles (Document Control); Martin Piper (HRMS/LRMS Operator); Louis Haviland (HRMS Operator for 1613, 1668 analyses); Todd Fisher (Instrument and Coding Group Supervisor); Kathie Coffee (MS Coordinator); Val Scott (VP-Extraction Laboratory); Shea Hewage (VP-Production); Alastair Blythe (Laboratory Services Supervisor); Mona Bosire (PAH Analyst); Tim Isaak (Pesticide/PCB Extraction); Mark Scheible (Dioxin Prep); Dawn Caird (PCB and XAD Prep); and Lauren Peever (Glassware Cleaning Laboratory Aide).

7.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

Axys has SOPs that are revised and/or updated as needed that address the areas of data reporting and handling. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP # ADMIN-23, Revision No. 3, dated 5/29/01 Data Package Preparation
- SOP # ADMIN-24, Revision No. 1, dated 3/30/01 Computer Network Management and Security

Observations: Axys enters the Sample Specific Performance Detection Limit (SPDL) values in the CARP electronic deliverable for each result reported. The SPDL is based on the annually determined Estimated Detection Limit (EDL) adjusted for sample volume and isotope dilution recovery. Percent moisture of sediment samples are one of the few manually entered values in the LIMS. A listing was obtained prior to the audit from Battelle that detailed any data loading issues that had occurred that prevented data from being loaded into the CARP database. The majority of issues related to reporting of values resulting from dilutions without the "D" qualifier, re-extractions without the "X" qualifier and obsolete parameter codes. The Data Reporting Group is responsible for clearing these loading errors and issuing resubmittals. Progress on clearing these errors is tracked and resubmittals approved by the Data Management Supervisor. Four copies of every data package are "burned" onto CDs. Two copies are sent to NYSDEC, one is kept off site and one is archived on-site.

Findings: None.

Sample Receipt, Storage and Custody Documentation

Axys has SOPs that are revised and/or updated as needed that address the areas of sample receipt, storage and custody documentation. Laboratory operations were audited for compliance with the following SOPs and some deviations (findings) were noted:

- SOP # ADMIN-4, Revision No. 5, dated 5/29/01 Chain-of-Custody Procedures
- SOP # ADMIN-13, Revision No. 4, dated 8/26/97 Shipping of Samples and Sample Containers
- SOP # ADMIN-14, Revision No. 4, dated 9/6/01 Sample Disposal
- SOP # LAB-3, Revision No. 9, dated 5/31/01 Logging in Samples
- SOP # LAB-4, Revision No. 4, dated 3/29/01 Sample Control Procedures
- SOP # LAB-19, Revision No. 2, dated 3/29/01 Solvent Proofs
- SOP # LAB-22, Revision No. 2 dated 11/8/00 Use of Drying Ovens and Muffle Furnace
- SOP # LAB-26, Revision No. 5 dated 7/19/01 Monitoring Temperatures of Freezers, Cooler and Refrigerators.

Observations: The laboratory analysis and log-in buildings are locked and access can only be gained using a key card. Electronic recording of who enters the building and the time entered is being added to the security system. A separate key is needed to obtain access to any location where samples are, and samples were observed to be kept in line of sight or in a locked room.

Sample identity and field information is entered into the Axys LIMS system upon sample receipt. The Axys LIMS system also keeps a record of archived sample extracts. An SOP is being written for labeling of microvials to ensure accurate sample identification in the archives. Certified clean sample containers are obtained for CARP. Certificates of Analysis are retained. Each lot of XAD resin prepared is analyzed for PCBs and PAHs. Occasionally no tags are present on CARP samples, and no CLSIS (Contract Laboratory Sample Information Sheet) forms are sent so the completed SDG case file does not contain them. No CARP case file purges have been requested yet from NYSDEC.

Finding: The initial temperatures on sample receiving coolers were not recorded for 11/5/01 and 11/6/01.

Standards/Reagents Documentation

Axys has SOPs that are revised and/or updated as needed that address the areas of standards and reagent documentation. In addition, each analytical SOP contains specific reagent/standard details in Section 6.0. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- SOP # ADMIN-6, Revision No. 1, dated 6/30/95 Purchasing of Goods and Services
- SOP # LAB-02, Revision No. 3, dated 5/5/99 Glassware and Laboratory Equipment Proofs
- SOP # LAB-09, Revision No. 4, dated 3/29/01 Preparation of Standards
- SOP # LAB-41, Revision No. 3, dated 3/30/01 Reagent Preparation

- SOP # LAB-44, Revision No. 1, dated 6/16/98 Activation of Copper Turnings
- SOP # QAQC-3, Revision No. 2, dated 5/30/01 Standard Solution Verification
- SOP # QAQC-9, Revision No. 4, dated 3/29/01 Storage and Control of Standards
- SOP # CHROM-1, Revision No. 3, dated 5/5/99 Activation/Deactivation Procedures
- SOP # CHROM-2, Revision No. 1, dated 6/30/95 Column Packing Procedures
- SOP # CHROM-3, Revision No. 3, dated 5/5/99 Column Cutpoint Determination Procedures
- SOP # CHROM-4, Revision No. 2, dated 11/13/97 Layered Silica Gel Chromatography Procedure
- SOP # CHROM-6, Revision No. 1, dated 6/30/95 Preparation and Maintenance of Biobead Columns

Observations: In accordance with the NYSDEC contract, AccuStandard is the vendor used by Axys for all native analytes reported. Labeled standard sources are not specified by NYSDEC, but are documented in each analytical SOP. All original vendor "Certificates of Analysis" are retained and cross-referenced to the working standards. Independent "snap and shoot" ampoule standards are used as independent verification of purchased standards. The Supervisor checks all calculations of dilutions/weights prior to the analyst making any standard.

Finding: Acceptable limits for balance calibration checks were not included in all balance books and when staffs were interviewed, they were not always aware of the acceptance limits.

General Laboratory Documentation

Axys has SOPs that are revised and/or updated as needed that address the areas of general laboratory documentation. Laboratory operations were audited for compliance with the following SOPs and some deviations (findings) were noted:

- QA/QC Policies and Procedures Manual, Revision No. 6 dated 9/27/01
- SOP # CODE-01, Revision No. 1 dated 6/30/95 Visual Inspection of Chromatograms
- SOP # CODE-2, Revision No. 1 dated 6/30/95 Determination of Area Reject
- SOP # CODE-4, Revision No. 1 dated 6/30/95 Determination of Carryover
- SOP # CODE-9, Revision No. 1 dated 6/30/95 Hand Calculation of Relative Response Factors, Concentrations and Detection Limits of Target Analytes
- SOP # CODE-11, Revision No. 1 dated 6/30/95 Code a Chromatogram
- SOP # CODE-14, Revision No. 1 dated 6/30/95 Training a Data Interpretation Chemist
- SOP # CODE-18, Revision No. 1 dated 3/30/01 Training a Data Reporter
- SOP # LAB-01, Revision No. 4 dated 12/6/00 Cleaning Procedures for Laboratory Items
- SOP # LAB-18, Revision No. 1 dated 6/30/95 Solvent Rinsing of Glassware for Organic Analyses
- SOP # LAB-17, Revision No. 3 dated 5/14/99 Spiking Procedures
- SOP # LAB-27, Revision No. 3 dated 3/29/01 Completing a Worksheet
- SOP # LAB-32, Revision No. 4 dated 3/29/01 Training a Laboratory Analyst
- SOP # INST-HR-15, Revision No. 1 dated 3/29/01 Training Procedures for an Instrumental Analytical Chemist
- SOP # LAB-33, Revision No. 2 dated 4/17/97 Assigning Analytical Batches

- SOP # CODE-18, Revision No. 1 dated 3/30/01 Training a Data Reporter
- SOP # QAQC-19, Revision No. 3 dated 4/27/01 General Documentation Policies
- SOP # QAQC-6, Revision No. 1 dated 6/30/95 Method Revisions
- SOP # QAQC-4, Revision No. 3 dated 7/16/01 Document Control Procedures
- SOP # QAQC-1, Revision No. 4 dated 5/1/01 Final Data Checking
- SOP # QAQC-2, Revision No. 3 dated 3/29/01 Method Validation Procedures
- SOP # QAQC-5, Revision No. 2 dated 8/27/96 Documentation of New Methods

Observations: SOPs and the QA/QC Manual contain a Revision History that lists those changes made and the effective date. The Quality Manager reports to the President and Technical Director and is independent of the Production and Extraction groups. Training records for Colleen Delanty were selected at random for audit and were acceptable. All instruments had logbooks for recording maintenance and the QA/QC Manual and SOPs were available in each laboratory in a hard copy form and able to be accessed on-line as a read-only version.

Axys is a CAEAL accredited laboratory. The deficiencies cited in the last CAEAL audit were minor: the uncertainty of every result is to be reported in accordance with ISO 1725 within two years, method validation, MDL and IDC records should be separated by method and analyte, an SOP for labeling microvials is needed (in progress), and the service person conducting the annual service done on Axys' balances was not on the Standards Council of Canada (SCC) accredited list.

Findings: Records of time in and time out of the muffle furnace were not always completed.

Initial temperatures of the sample receiving coolers were not completed on 11/5/01 and 11/6/01.

Data entry error rates should be calculated in accordance with the NYSDEC contract to assess ongoing performance.

The person doing the maintenance did not initial some entries in the GC/MS preventive maintenance logs. As several analysts use the same instrument, this is necessary to track who did the work.

Sample Preparation, Extraction, HRGC/HRMS Operation and Analysis

Axys has SOPs that are revised and/or updated as needed that address the areas of MS operation, laboratory sample preparation/extraction and analysis. Laboratory operations were audited for compliance with the following SOPs and some deviations (findings) were noted:

- SOP # LAB-05, Revision No. 2 dated 12/7/00 Rotary Evaporation Concentration Technique
- SOP # LAB-06, Revision No. 2 dated 12/11/00 Nitrogen Blowdown Concentration Technique
- SOP # LAB-07, Revision No. 2 dated 11/7/00 Kuderna-Danish Concentration Technique

- SOP # LAB-08, Revision No. 2 dated 4/14/97 Preparing Extracts for Instrumental Analysis
- SOP # LAB-45, Revision No. 1 dated 6/16/98 Removal of Sulphur from Extracts Using Activated Copper
- SOP # LAB-33, Revision No. 2 dated 4/17/97 Assigning Analytical Batches
- SOP # INST-HR-10, Revision No. 1 dated 3/29/01 Creating a Sample List
- SOP # CODE-17, Revision No. 1 dated 3/30/01 Quantification of PCDDs and PCDFs (EPA method 1613B)
- SOP # CL/NYSDEC, Revision No. 8 dated 10/30/01 Determination of Organochlorine Pesticides in Sediment, Tissues, XAD Columns, Filters, Water and Hexane Extracts
- SOP # CL/01, Revision No. 5 dated 10/24/01 Analytical Method for the Determination of Aroclors, Total PCB, Chlorinated Pesticides, PCB Congeners, Coplanar PCBs, Toxaphene and Chlorobenzenes
- SOP # CL-1668A, Revision No. 3 dated 5/7/01 Analytical Method for the Determination of 209 PCB Congeners by EPA Method 1668A
- SOP # DX-1613B, Revision No. 7 dated 5/7/01 Analytical Method for the Determination of PCDDs and PCDFs by EPA Method 1613B
- SOP # PH-01, Revision No. 4 dated 6/26/01 Analytical Method for the Determination of PAHs, Alkylated Polycyclic Aromatic Hydrocarbons and Alkanes

Observations: Laboratory blank records were examined to verify the extremely low total PCB concentrations. The separation of the extraction laboratory from the instrument laboratory and the new construction of the extraction laboratory have resulted in the low PCB concentrations in the blanks. Records from two VG HRMS, two Ultima systems used for CARP sample analysis were audited. The signal to noise ratio used for positive analyte identification is 3.0 and is not done by the software (Enviroquant), but by the Data Coding Group. Lock masses varying by more than 20 % over the retention time window results in the data being coded with an "X" code to alert NYSDEC.

Findings: Some entries in the GC/MS preventive maintenance logs were not initialed by the person doing the maintenance. As several analysts use the same instrument, this is necessary to track who did the work.

General QC Results

Axys has a QA/QC Manual and SOPs that are revised and/or updated as needed that address the areas of QC results and limits for each analysis. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- QA/QC Policies and Procedures Manual, Revision No. 6 dated 9/27/01
- SOP # QAQC-7, Revision No. 3 dated 9/4/96 Control Chart Procedures
- SOP # QAQC-8, Revision No. 3 dated 3/30/01 Quality Audit Procedures
- SOP # QAQC-18, Revision No. 2 dated 4/19/01 Internal Quality Review of PCDD Data for EPA Method 1613 B

Observations: Axys has purchased and is implementing use of QPULSE software for training documentation, tracking non-conformances, scheduling MDL and other PE studies and eventually capture data entry errors as measured by re-submittals. Axys participates in both CAEAL and NYSDOH PE studies (twice annually). Quality control results were present at the bench for immediate feedback and the Data Coding Group, along with the QA/QC Group requests re-extractions and re-analyses as appropriate.

Findings: None.

7.1.4 AUDIT FOLLOW-UP

As requested in the audit debriefing, a complete set of Axys SOPs and an electronic version of the QA/QC manual were received on November 18, 2001 to reference in this audit report and to clarify the findings.

7.1.5 CONCLUSIONS

The staff at Axys was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff were evident in the record-keeping and laboratory operations. The QA/QC Manual and laboratory SOP documentation was comprehensive and followed by the staff. It is clear that Axys is committed to producing quality data for the CARP project. The structure of the Data Coding and Data Reporting Groups has resulted in an efficient system that decreases the turnaround time for loading the data into the Battelle database.

7.2 DATA AUDIT

Sample L2921-1 (1JMS00177) in CARP SDG 10311 was tracked through the laboratory from sample log-in through to the final report posted for loading to the Battelle database. Laboratory records for sample and standard preparation, extraction and analysis were examined and the sample storage location found.

7.2.1 STRENGTHS

The log in and laboratory extraction and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including current detection limit studies from the QA records. SOPs were present at the bench and were being followed. The identification of samples, blanks, MS/MSD, OPR and analytical standards from preparation through extraction/spiking and instrumental analysis was consistent and traceable. Lot numbers of reagents were included in all laboratory records and evidence of supervisory review (i.e. initials, signatures) was present on the raw and reported data.

7.2.2 WEAKNESSES

Other than the minor deficiencies previously cited or those identified by the CAEAL auditor that do not have an adverse impact on data quality, no system weaknesses were found.

7.2.3 DATA AUDIT SUMMARY

Traceability of field documentation (custody form) and laboratory log-in, internal chain-of-custody and LIMS system entry was accurate and complete. The holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Standard Logbooks, and traceability to the stock was documented through numbered Certificates of Analysis. The standards used for native and isotopically labeled standards, cleanup standards, internal standards, and OPR, LCS, LCD and MS solutions were recorded and traceable to this log. GC/MS PFK lock mass, initial and daily calibration data was present. Instrument maintenance was recorded in the applicable MS logbooks. The appropriate frequency of method QC samples was met and results for the OPR examined by bench and QA staff. Cleanup standard and MS/MSD recoveries were all acceptable, as were RPD values. The very minor laboratory blank contamination did not adversely affect sample concentrations. Mass spectra of identified analytes met the EPA criteria. No false positives or negatives were apparent in the raw data reviewed. The correct units and number of significant figures were reported in the spreadsheet and final hard copy report for the samples. No documentation was missing from the data package on CD-ROM.

Method and QC Requirements Compliance

Compliance of the analysis of sample L2921-1 (1JMS00177) against the listed Axys SOPs was done and no deviations were noted:

- SOP # LAB-05, Revision No. 2 dated 12/7/00 Rotary Evaporation Concentration Technique
- SOP # LAB-06, Revision No. 2 dated 12/11/00 Nitrogen Blowdown Concentration Technique
- SOP # LAB-07, Revision No. 2 dated 11/7/00 Kuderna-Danish Concentration Technique
- SOP # LAB-08, Revision No. 2 dated 4/14/97 Preparing Extracts for Instrumental Analysis
- SOP # LAB-45, Revision No. 1 dated 6/16/98 Removal of Sulphur from Extracts Using Activated Copper
- SOP # LAB-33, Revision No. 2 dated 4/17/97 Assigning Analytical Batches
- SOP # INST-HR-10, Revision No. 1 dated 3/29/01 Creating a Sample List
- SOP # CODE-17, Revision No. 1 dated 3/30/01 Quantification of PCDDs and PCDFs (EPA method 1613B)
- SOP # CL/NYSDEC, Revision No. 8 dated 10/30/01 Determination of Organochlorine Pesticides in Sediment, Tissues, XAD Columns, Filters, Water and Hexane Extracts
- SOP # CL/01, Revision No. 5 dated 10/24/01 Analytical Method for the Determination of Aroclors, Total PCB, Chlorinated Pesticides, PCB Congeners, Coplanar PCBs, Toxaphene and Chlorobenzenes
- SOP # CL-1668A, Revision No. 3 dated 5/7/01 Analytical Method for the Determination of 209 PCB Congeners by EPA Method 1668A

- SOP # DX-1613B, Revision No. 7 dated 5/7/01 Analytical Method for the Determination of PCDDs and PCDFs by EPA Method 1613B
- SOP # PH-01, Revision No. 4 dated 6/26/01 Analytical Method for the Determination of PAHs, Alkylated Polycyclic Aromatic Hydrocarbons and Alkanes

7.3 RECOMMENDATIONS

Documentation lapses: Time in and time out of the muffle furnace, initial temperatures of the sample receiving coolers and initials of the person making entries in the GC/MS preventive maintenance logs should be entered consistently.

NYSDEC Contract compliance: Data entry error rates should be calculated to assess ongoing performance.

8.0 LAB AUDIT: SEVERN TRENT LABORATORIES - KNOXVILLE

Audit Location: Severn Trent Laboratories – Knoxville, Knoxville, TN	Audit Dates: January 17, 2002
Auditor: David Greer	
Analytes: PAH by LRMS-SIM, Organochlorine Pesticides, PCB congeners, and PCDD/PCDF by HRMS	
Data Set used for Data Audit: None	

8.1 AUDIT RESULT SUMMARY

8.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the NYSDEC methods; Organochlorine Pesticides by Isotope Dilution HRGC/HRMS (HRMS-2, 11/99), and Polynuclear Aromatic Hydrocarbons by Isotope Dilution HRGC/MS (HRMS-3, 11/99), and the EPA reference methods; Method 1668, Revision A: Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by HRGC/HRMS and Method 1613: Tetra- Through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS (Revision B, 1994).

An evaluation of the laboratory systems in place for the analysis of CARP samples for PCB congeners, OCPs, PAHs and PCDD/PCDF was conducted through a laboratory tour, interviews with the analysts and the laboratory management staff. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, GC/MS calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

8.1.2 AUDIT PREPARATION

Larry Bailey, NYSDEC Bureau of Watershed Assessment and Research, Analytical Services Section, was consulted to arrange an audit date with Severn Trent Laboratories – Knoxville (STL-Knoxville). The current applicable analytical methods were used to develop the checklist.

STL-Knoxville SOPs for PCBs, OCP, PAH and PCDD/PCDF were reviewed prior to the audit for compliance with the EPA or NYSDEC reference methods. The checklist covered the following specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, HRGC/HRMS operation and analysis, and general QC results.

Portions of the Laboratory Audit Checklist were completed during the audit briefing with Dr. Christopher Rigell (Manager, Quality Assurance), and David Thal (Specialty Organics Manager). During the laboratory audit the sample custodian, sample preparation analyst and data specialist were interviewed.

8.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

STL-Knoxville has SOPs that are revised and/or updated as needed that address the areas of data reporting and handling (see Laboratory Quality Manual). Laboratory operations were evaluated for compliance with the SOPs and no deviations were noted.

Observations: Currently, STL-Knoxville is reporting a reporting limit for each result reported and has established estimated detection limits (EDLs) based upon the signal to noise level of the isotopically labeled analogue compared to the target analyte. The EDL is being reported in place of the method detection limit (MDL) for isotope dilution data.

The qualifier for maximum estimated concentration is a “Q” rather than a “K”. Very little data or sample information is manually entered into the CARP reporting format, which reduces the chances of entry errors. Electronic media are used for data backups.

Findings: None.

Sample Receipt, Storage and Custody Documentation

STL-Knoxville has SOPs that are revised and/or updated as needed that address the areas of sample receipt, storage and custody documentation. Laboratory operations were evaluated for compliance with the following SOPs and no deviations were noted:

- KNOX-SC-0003, Revision No. 5, 10/19/01, Receipt and Log In of Commercial Samples
- KNOX-SC-0004, Revision No. 3, 10/23/01, Internal Chain of Custody

Observations: STL-Knoxville internal chain of custody documentation is initiated at sample log in. The sample analysis information is generated by the project managers in the computer system’s “QuantIMS” and is checked by sample receipt personnel. Sample storage area temperatures are monitored daily.

Findings: None.

Standards/Reagents Documentation

STL-Knoxville has SOPs that are revised and/or updated as needed that address the areas of standards and reagent documentation. In addition, each analytical SOP contains specific reagent/standard details. The following SOP was evaluated for compliance with the method and no major deviations were noted:

- KNOX-ID-0011, Revision No. 0, 11/5/97, Preparation of Dioxin/Furan Standards

Observations: AccuStandard is the vendor used by STL-Knoxville for most native analytes reported. STL-Knoxville purchases labeled standards from Wellington and Cambridge Isotope

Laboratories. All original vendor "Certificates of Analysis" are retained and cross-referenced to the working standards.

Findings: None.

General Laboratory Documentation

STL-Knoxville has SOPs that are revised and/or updated as needed that address the areas of general laboratory documentation.

Observations: The latest SOPs are available in hard copy and on-line in a read only format. Older versions of SOPs are archived. Laboratory personnel each have a file, which has training records included. In addition, the laboratory also has each persons training records stored in a computer file, which allows an easy review of the persons training by year and type of training requirement. The laboratory provided a copy of their National Environmental Laboratory Accreditation Conference (NELAC) certification (State of Florida), which covers a multitude of methods, but none of the methods are used for the CARP study. The laboratory utilizes QA personnel from other STL laboratories to perform internal audits and a copy of the most recent internal audit was also reviewed.

Findings: Some SOPs do not have a section listing what changes were made from the previous version. While not required as an SOP element, a revision history highlighting the changes from version to version would be helpful in tracking changes.

HRGC/HRMS Operation and Analysis

STL-Knoxville has test method SOPs that are revised and/or updated as needed that address the areas of high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS) operation and analysis. Specific SOPs for dioxin/furans, PCBs and pesticides were reviewed prior to the audit. Additionally, STL-Knoxville used a selected ion monitoring, low resolution, mass spectrometer method for the analysis of PAHs.

Observations: Three active HRGC/HRMS systems were available for analysis of samples at the time of the audit. No problems were noted during the audit.

Findings: None.

General QC Results

STL-Knoxville has a Laboratory Quality Manual that is revised and/or updated as needed that addresses the areas of QC results and limits for each analysis. Laboratory operations were audited for compliance with the Laboratory Quality Manual, Revision 0, dated March 26, 2001 and no deviations were noted.

Observations: The Specialty Organics Manager is the final reviewer of all of the CARP data. The HRGC/HRMS analyst does a review of the quality control results, which are automatically

entered into on-line spreadsheets for the examination of trends and outliers. The QA Manager performed data audits on 10 % of the CARP data generated.

Findings: For CARP contract compliance, a source of quarterly QC check samples should be found and analyzed. Although NIST standards were analyzed with each batch of samples generated, data error rates have not been calculated.

8.1.4 CONCLUSIONS

The staff at STL-Knoxville was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff was evident in the record-keeping and laboratory operations. The Laboratory Quality Manual and SOP documentation was comprehensive, and followed the CARP contract requirements. It is clear that STL-Knoxville is committed to producing quality data for the CARP project.

8.2 DATA AUDIT

The only data received by Booz Allen staff were several PAH chromatograms sent by Floyd Genicola, QA NJTRWP, for which he had several questions. The questions were answered by STL's Quality Assurance Officer, Chris Rigell, and reviewed by Booz Allen to ascertain whether the questions had been answered appropriately. Booz Allen wrote a memorandum of Data Review dated October 14, 2001. No additional CARP laboratory data was received by Booz Allen staff from the STL-Knoxville laboratory, or from New York or New Jersey, therefore no formal data audit was performed.

8.2.1 STRENGTHS

The laboratories login, extraction and instrumental analysis operations were well organized. The historical and personnel documentation requested was easily retrieved and organized. SOPs were present either at the bench or on personal computers and were being followed. Identification of samples, blanks, spikes and analytical standards from preparation through instrumental analysis was consistent and traceable. Evidence of supervisory review was present on the reported data and in the computer system where nonconformance tracking and follow-up was documented.

8.2.2 WEAKNESSES

A source of quarterly QC check samples should be found and analyzed, as this is a requirement of CARP. NIST sample analysis with each batch of samples is not acceptable, as the data error rates have not been established for these QC samples. Although some SOPs have been revised to include a revision history, not all SOPs have this section. All SOPs should be revised as soon as possible to keep them up to date.

8.2.3 DATA AUDIT SUMMARY

The ability to trace field documentation at laboratory log-in, internal chain-of-custody and LIMS system entry was accurate and complete. Holding times are routinely met and acknowledged in

the LIMS system. Standard preparation data was entered into the Standards Logbooks and the prepared standards were stored at the appropriate temperatures, separate from samples. Initial and daily calibration data was present and instrument maintenance was recorded in applicable logbooks. The frequency of method quality control samples was met. Several early PAH blank samples for the CARP study were apparently affected by the quartz sand used which contained Naphthalene, 2-Methylnaphthalene and 2,6-Dimethylnaphthalene above the target detection limit. This was corrected in late 2001 and no blank contamination has been noted for any analytes since this problem was corrected.

8.3 RECOMMENDATIONS

SOPs do not have a section listing what changes were made from the previous version. While not required as an SOP element, a revision history highlighting the changes from version to version would be helpful in tracking changes.

STL-Knoxville specific SOPs for dioxin/furans, PCBs, pesticides and PAHs were reviewed prior to the time of the audit. The SOPs were reviewed against the HRF CARP contract methods (EPA Method 1613B, EPA Method 1668, NYCDEC Methods HRMS -2 and -3).

For CARP contract compliance, a source of quarterly QC check samples should be found and analyzed.

9.0 LAB AUDIT: SEVERN TRENT LABORATORIES - SACRAMENTO

Audit Location: STL-Sacramento, Sacramento, CA	Audit Dates: February 11-12, 2002
Auditor: Marcia A. Kuehl	
Analytes: PAH, organochlorine pesticides, PCB congeners, and PCDD/PCDF by HRMS	
Data Set used for Data Audit: SDG G1C150259	

9.1 AUDIT RESULT SUMMARY

9.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the source documents *Sources and Loadings of Toxic Substances to New York Harbor Workplan*, dated 1/28/98, *Sediment Sample Collection and Analysis New York Harbor and Hudson River Technical Program Quality Assurance Project Plan*, dated September 3, 1998, NYSDEC methods HRGCMS-1, HRGCMS-2 and HRGCMS-3 (dated 11/99), and EPA reference methods 1668 and 1613B.

An evaluation of the laboratory systems in place for the analysis of CARP samples for PCB congeners, OCPs, PAHs, and PCDD/PCDF was conducted through a laboratory tour, interviews with the analysts and the laboratory management staff, and a review of data and supporting documentation for SDG G1C150259. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, GC/MS calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

9.1.2 AUDIT PREPARATION

Larry Bailey, NYSDEC Bureau of Watershed Assessment and Research, Analytical Services Section, was consulted to arrange an audit date with Severn Trent Laboratories – Sacramento (STL-Sacramento). The current NYSDEC Analytical Agreement and applicable analytical methods were received and used to develop the checklist. In addition, in preparation for the audit, the SDG was downloaded from the CARP database. Data from PE sample analysis was also received from Jim Swart, NYSDEC (SDGs G0K040129 (MOE) and G9K160225 (NIST)) for review by the auditor to become familiar with the STL-Sacramento quantitation software and internal reporting forms.

STL-Sacramento results from the following blind PE samples were also evaluated prior to the audit to target analytical problem areas: MOE sediment sample analyzed in January 2001 (data compiled by Larry Bailey, NYSDEC), and the NIST SRM 1944 sediment sample analyzed in November 1999 (data compiled by Dr. Richard Bopp, Rensselaer Polytechnic Institute, March 2001).

STL-Sacramento SOPs for PCBs, OCP, PAH and PCDD/PCDF were reviewed during the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely affecting data quality or comparability with other CARP laboratories. The checklist covered the

specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, HRGC/HRMS operation and analysis, and general QC results. The checklist also included notation of method and QC non-compliance for the selected SDG used for the data audit. This SDG was tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and extracts to assess if the systems were operational and in compliance with laboratory SOPs.

Portions of the laboratory audit checklist were completed during the pre-audit briefing with Patrick Rainey, Technical Director, and Pamela Schemmer (QA Manager). During the laboratory audit and SDG tracking, Vicki Herd (EDD Preparation), Megan Burvant (Sample Administrator), Brian Thompson (Principal Analyst-Extractions), Lisa Stafford (QA Scientist), Boyd Harling (Senior Analyst-Prep Laboratory), Kevin Sanchez (Chemist-Prep Laboratory), Keith Sturgeon (HRMS analyst), Saleh Arnestaine (Principal Scientist-HRMS Maintenance), and Teri Stone (Data Analysis Area Leader) were interviewed. Present during the debriefing were: Eric Redman (Laboratory Manager), Patrick Rainey (Technical Director), and Pamela Schemmer (QA Manager).

9.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

STL-Sacramento has SOPs that are revised and/or updated as needed that address the areas of data reporting and handling. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- QA-004, Revision # 1, 6/1/98: Rounding and Significant Figures
- QA-005, Revision # 3, 5/1/99: Determination of Method Detection Limits for Chemical Tests
- QA-008-SAC, Revision # 3, 7/24/01: Data Recording Requirements
- QA-010, Revision # 2, 7/15/98: Maintaining Time Integrity
- QA-017, Revision # 0, 7/7/99: Electronic Reporting
- CORP-IT-0001, Revision # 0, 7/27/97: Software and Hardware Change Management
- CORP-IT-0007, Revision # 0, 6/13/97: Software Testing, Validation and Verification
- CORP-IT-0008, Revision # 0, 1/17/00: Tracking and Management of Client Deliverables
- CORP-IT-013, Revision # 0, 6/27/97: Software Quality Assurance
- CORP-IT-014, Revision # 0, 7/21/97: Software and Hardware Licensing, Security and Backup
- S-Q-001, Revision # 1, 8/1/00: Official Document Control and Archive

Observations: At the time of the audit, the SDG selected for the data audit was the only one used as a trial reported to the CARP database. It could not be loaded due to several reporting and formatting issues that were discussed with STL-Sacramento staff in a conference call prior to the audit. This report will not discuss the erroneous reporting codes and formats, as STL-Sacramento was aware of these at the audit. An additional 12 SDGs were being held until the

loading issues were cleared up. As of the date of this audit report, the trial SDG has not been loaded into the database.

STL-Sacramento is reporting an AMDL for each result. The AMDL is the MDL established in accordance with 40 CFR Part 136 and NYSDEC guidance adjusted for sample volume, dilution, percent solids and internal standard recovery. MDL studies were available for PCBs and PCDD/PCDF. The MDLs cited in the EPA or NYSDEC reference method are used as defaults for PAHs and OCP. A macro for assignment of J qualifiers is used and flags results that met all of the identification criteria and are greater than the AMDL but less than the PQL. The PQL is the one cited in the EPA or NYSDEC reference method for PCBs, OCP and PAHs, but is established for each PCDD/PCDF. The analyst reviewing the data manually assigns the K flag, indicating results not meeting all method positive identification criteria. A consistent number of significant figures are reported.

Findings: None.

Sample Receipt, Storage and Custody Documentation

STL-Sacramento has SOPs that are revised and/or updated as needed that address the areas of sample receipt, storage and custody documentation. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- CORP-IT-0005, Revision # 0, 7/22/97: LIMS
- SAC-QA-0001, Revision # 6, 6/04/01: Building Security
- SAC-QA-0003, Revision # 7, 3/14/00: Sample Receipt and Procedures
- SAC-QA-0005, Revision # 3.0, 6/27/01: Temperature Monitoring and Corrective Actions for Refrigerators and Freezers
- SAC-QA-0007, Revision # 5.1, 9/16/98: Bottles and Cooler Preparation
- SAC-QA-0016, Revision # 1, 6/26/98: Equipment Monitoring & Thermometer Calibration

Observations: A "Lot Receipt Checklist" is initiated upon receipt and signed by a witness. Sample labeling and shipping problems are then resolved with NYSDEC and documented. Empty coolers are shipped back to NYSDEC. The CARPtrac forms have been received for all samples to date. Ultimate disposition of the samples is noted on the forms and in LIMS (i.e. DIT= Destroyed In Testing). Temperature is monitored three ways: thermometer in liquid in the refrigerator, a strip chart recorder and a computerized system.

Findings: None.

Standards/Reagents Documentation

STL-Sacramento has SOPs that are revised and/or updated as needed that addresses the areas of standards and reagent documentation. In addition, each analytical SOP contains specific reagent/standard details. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- STL/PG-002, Revision # 2, 9/21/00: Vendor Performance & Compliance
- STL/PG-003, Revision # 2.0, 9/12/00: Vendor Acceptance Application
- S-T-001, Revision # 1, 7/26/01: Testing of Solvents and Acids
- SAC-ID-0012, Revision # 1, 9/14/98: Responsibilities of a Spike Witness
- SAC-QA-0004, Revision # 2, 8/21/98: Maintenance & Calibration Check of Fixed and Adjustable Volume Autopipettors
- SAC-QA-0014, Revision # 0, 12/11/97: Monitoring of Reagent-Grade Laboratory Water
- SAC-QA-0017, Revision # 0, 9/8/98: Standards & Reagent Preparation & Quality Control Check Procedures

Observations: In accordance with the NYSDEC contract, AccuStandard is the vendor used by STL for all native analytes reported. Vendors to STL must meet ISO standards. All original vendor "Certificates of Analysis" are retained and cross-referenced to the working standards. Standards used for spiking are listed, as are the lot numbers of the solvents, silica, alumina, celite/carbon and florisil used in sample and standard preparation. New standards are checked against old with a tolerance of $\pm 10\%$.

Findings: None.

General Laboratory Documentation

STL-Sacramento has SOPs and a QA Manual that are revised and/or updated as needed that address the areas of general laboratory documentation. Laboratory operations were audited for compliance with the following SOPs and QA Manual and no deviations were noted:

- LQM, Revision # 0, 11/01/00: Laboratory Quality Manual for Sacramento
- QA-008-SAC, Revision # 3, 7/24/01: Data Recording Requirements
- QA-010, Revision # 2, 7/15/98: Maintaining Time Integrity
- S-Q-001, Revision # 1, 8/1/00: Official Document Control and Archive
- S-Q-004, Revision # 1, 10/31/01: Acceptable Manual Integration Practices
- SAC-MS-0004, Revision # 1, 9/15/98: Preventative Maintenance for VG-70 GC/MS Systems
- SAC-OP-0011, Revision # 1.0, 6/27/01: Cleaning of Glassware (Organics)
- SAC-QA-0012, Revision # 2.0, 11/13/00: Significant Audit Findings
- SAC-QA-0021, Revision # 1.0, 1/9/01: Preparation and Maintenance of Standard Operating Procedures
- SAC-QA-0022, Revision # 1.0, 11/9/01: Employee Orientation and Training
- SAC-QA-0023, Revision # 1.0, 6/25/01: Nonconformance and Corrective Action System
- SAC-QA-0041, Revision # 2.0, 8/20/98: Calibration & Calibration Check of Balances

Observations: Laboratory SOPs are on an update schedule. Changes occurring in between scheduled rewrites are documented on a Change Form. SOPs exist for all CARP analyses except for OCP, which is in process (SAC-ID-0014). Reusable glassware is limited to Soxhlet extractors and they are numbered to check contamination sources. The latest SOPs and QA Manual are available in hard copy and on-line in a read only format. A revision history and

effective date is included in each SOP. Nonconformances are documented and tracked via the Closeau® software program.

Findings: None.

HRGC/HRMS Operation and Analysis

STL-Sacramento has SOPs that are revised and/or updated as needed that address the areas of HRMS operation and analysis. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- P-T-001, Revision # 1, 8/1/00: Selection of Calibration Points
- SAC-MS-0004, Revision # 1, 9/15/98: Preventative Maintenance for VG-70 GC/MS Systems

Observations: Six active VG 70 or 70S HRMS systems were available for analysis of CARP samples at the time of the audit. No service contract was in place, as all work is done in-house by staff. A Daily HRMS checklist is completed each day samples are analyzed, and another HRMS analyst does a peer review. The OPUSQUAN algorithm is used without modification to determine the % valley for resolution checks and the calculation of S/N ratios.

Findings: None.

General QC Results

STL-Sacramento has a Quality Manual that is revised and/or updated as needed that addresses the areas of QC results and limits for each analysis. Laboratory operations were audited for compliance with the Laboratory Quality Manual, Revision # 0, dated 11/1/00 and the following SOPs and no deviations were noted:

- QA-012-SAC, Revision # 2, 7/24/01: Technical Data Review Requirements
- S-Q-002, Revision # 1.0, 5/19/01: Systems Audits
- SAC-QA-0024, Revision # 1, 6/8/01: Independent QA Review

Observations: Nonconformance memos are used and follow-up is tracked with the Closeau® program. The SRM used for CARP is obtained from Cambridge Isotopes. STL is a NELAC laboratory and their most recent NELAC audits were done in May-June 2000 October 2000 for HRMS pesticides and PAHs. STL participates in the NIST/NOAA intercalibration study, the UK round robin sludge study, the Japan MOE round robin, the Umëa Sweden round robin, and the Folkhuser meat/milk/blood/fat study for PCDD/PCDF and PCBs. STL uses an OPR in its analyses according to the method, but reported it as an LCS due to a lack of a code for OPR.

Findings: The OPR limits for the 1613b PCDD/PCDF analytes are not updated. The submitted SDG should be remapped to indicate the analysis of an OPR rather than an LCS.

9.1.4 CONCLUSIONS

The staff at STL-Sacramento was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff were evident in the record-keeping and laboratory operations. The QA Manual and SOP documentation was comprehensive and followed the NYSDEC contract requirements. It is clear that STL is committed to producing quality data for the CARP project.

9.2 DATA AUDIT

Samples 1GRW04948 (water) and 1GRW04953 (soil) in CARP SDG G1C150259 were tracked through the laboratory from sample log-in through to the final report posted for loading to the CARP database. Laboratory records for sample and standard preparation, extraction and analysis were examined and the sample storage location found.

9.2.1 STRENGTHS

The log in and laboratory extraction and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including historical QC recoveries. SOPs were present at the bench and were being followed. The identification of samples, blanks, SRM, OPR and analytical standards from preparation through extraction/spiking and instrumental analysis was consistent and traceable. Evidence of supervisory review (i.e. initials, signatures) was present on the reported data. Total PCBs in the laboratory blank was very low, at ~ 2 ng. Nonconformance tracking was structured and follow up is done and documented.

9.2.2 WEAKNESSES

The use of data qualifiers not in the CARP list resulted in the inability of the trial SDG to be loaded. As this trial SDG is still not resubmitted and the reporting errors cleared up, STL should concentrate on getting the data into an acceptable template so that results can be loaded.

9.2.3 DATA AUDIT SUMMARY

Traceability of field documentation and laboratory log-in, internal chain-of-custody and LIMS system entry was accurate and complete. The holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Standard Logbooks, and traceability to the stock was documented through numbered Certificates of Analysis. The standards used for native and isotopically labeled standards, cleanup standards, internal standards, and OPR, SRM and MS solutions were recorded and traceable to this log. GC/MS PFK lock mass, initial and daily calibration data was present and instrument maintenance was recorded in the applicable MS logbooks. The appropriate frequency of method QC samples was met and results for the OPR entered in the spreadsheet. Cleanup standard and SRM recoveries were all acceptable. Blank contamination did adversely affect reported OCDD and naphthalene concentrations. Mass spectra of identified analytes met the EPA criteria. No false positives or negatives were apparent in the raw data reviewed. The correct units and number of significant figures were reported in the spreadsheet and final hard copy report for the samples. No documentation was missing from the data package reviewed.

Method and QC Requirements Compliance

Compliance of the analysis of samples 1GRW04948 (water) and 1GRW04953 (soil) against the listed STL and NYSDEC SOPs was done and no deviations adversely affecting data quality were noted:

- NYSDEC HRMS-1 dated 11/99 for PCBs
- NYSDEC HRMS-2 dated 11/99 for pesticides
- NYSDEC HRMS-3 dated 11/99 for PAHs
- SAC-ID-0013, Revision # 1.0, 8/27/01: PCB Analysis by HRGC/HRMS
- SAC-ID-0015, Revision # 2.0, 10/20/00: Determination of PAH by HRGC/HRMS
- LM-CAL-3066CF3-9, 7/10/00: Original Method 1613-Tetra- through Octa- Chlorinated Dioxins and Furans by Isotope Dilution HRGC/MS

No internal STL SOP for OCP was available at the time of the audit, but was in progress (SAC-ID-0014).

9.3 RECOMMENDATIONS

PCDD/PCDF OPR Limits: The OPR limits for the 1613b PCDD/PCDF analytes need to be updated.

Resubmittal of trial SDG: The submitted SDG should be remapped and resubmitted to indicate the analysis of an OPR rather than an LCS and use the accepted list of CARP codes.

Pesticide SOP: Complete STL SOP for OCP and submit to NYSDEC.

10.0 LAB AUDIT: USGS NATIONAL WATER QUALITY LABORATORY

Audit Location: USGS National Water Quality Laboratory, Denver, CO	Audit Dates: March 5-6, 2002
Auditor: Marcia A. Kuehl	
Analytes: Chlorophyll a, TPN, POC, SOC	
Data Set used for Data Audit: Stevens Institute 3SIT05067SA, USGS 02038002	

10.1 AUDIT RESULT SUMMARY

10.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the source documents *Final Quality Assurance Project Plan for Analytical Support for the New Jersey Toxics Reduction Program*, Version 1, dated 10/4/00, *New Jersey Toxics Reduction Workplan*, Volume I, dated July 14, 2000, *New Jersey Toxics Reduction Workplan*, Volume II, Version 2, dated September 2000, and *Stevens Institute of Technology and Rutgers University Project Plan, Quality Assurance Plan, and Standard Operating Procedures for Study IE*, Version 1.1 dated February 23, 2001, *Stevens Institute of Technology and Rutgers University Project Plan, Quality Assurance Plan, and Standard Operating Procedures for Study I-D*, Version 1.1 dated April 20, 2001, *New Jersey U.S. Geological Survey Project Plan, Quality Assurance Project Plan, and Standard Operating Procedures for New Jersey Toxic Reduction Workplan for the NY-NJ Harbor Head-of-Tide Sampling Study IC*, Version 4 dated May 7, 2001, *New Jersey DEP/Great Lakes Environmental Center, Quality Assurance Project Plan for Monitoring of Loadings from Selected Point Source Discharges Study IG*, Version 1.1 dated March 9, 2001 and *Battelle Final Quality Assurance Project Plan for Analytical Support for the New Jersey Toxics Reduction Program*, Contract #: CP043607, Version 1, dated October 4, 2000.

An evaluation of the laboratory systems in place for the analysis of CARP samples for suspended organic carbon (SOC), particulate organic carbon (POC) and chlorophyll a was conducted through a laboratory tour, interviews with the analysts and the laboratory management staff, and a review of data and supporting documentation for the USGS and Stevens Institute samples. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, organic carbon analyzer and fluorometer calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

10.1.2 AUDIT PREPARATION

Tim Wilson, USGS and Larry Bailey, NYSDEC arranged an audit date with USGS-National Water Quality Laboratory (NWQL). The current QAPPs and applicable NWQL Standard Operating Procedures (SOPs) were received and used to develop the checklist.

NWQL SOPs for POC, SOC, and chlorophyll a were reviewed prior to the audit for compliance with EPA reference methods and for deviations adversely affecting data quality or comparability with other CARP laboratories. The checklist covered the specific laboratory operational areas

used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, instrument operation and analysis, and general QC results. The checklist also included notation of method and QC non-compliance for the selected samples used for the data audit. The samples were tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and extract to assess if the systems were operational and in compliance with laboratory SOPs.

The laboratory audit checklist was completed during the laboratory tour and data audit inspection with Jim Kammer (Physical Science Technician), Janece Koleis (Chemist), Laura Coffey (Chemist), and Kathy Bryant (QA Specialist). Present during the debriefing were the interviewed staff and Tom Maloney (Chief, Quality Management Program) and Dr. Mark Burkhardt (Chief, Analytical Services).

10.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

Observations: No hard copy data is reported to USGS or Stevens Institute. Project data, including raw and QC data, are available to USGS online. NWQL reported “E” codes in the data to reflect the receipt of less than two filters for POC. Qualifiers for the CARP database such as J, U, or BU are not added by NWQL, but by USGS-NJ staff. Greater than values (>, R coded) are reported when the SOC CO₂ peak area is greater than the highest standard and no dilution is possible due to the sample being used up. Data reporting requirements specific to each method are in each analytical SOP in Section 8.0.

Findings: None.

Sample Receipt, Storage, and Custody Documentation

NWQL has SOPs that are revised and/or updated as needed that address the areas of sample receipt, storage, and custody documentation. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- TX0030.1, 12/01: Laboratory Chain of Custody
- TX0076.1, 9/01: Login Unit of the NWQL
- QX0097.0, 9/97: Acceptance Testing of Inorganic Chemistry’s bottles, filters, and preservatives by Ocala

Observations: Filters are received folded in tinfoil in whirlpak bags, not in Petri dishes as noted in the USGS QAPPs. Dry ice is no longer used in the shipment of chlorophyll filters, but filters are shipped at 4 °C. All NJ samples are kept in the locked “Custody Room” and internal chain-of-custody records are kept. Bottles and preservatives are supplied by the USGS laboratory in Ocala, California. As many samples are received in a shipment from USGS, a system of also labeling the bottle caps for easy log-in was devised.

Findings: Confusing notation of field volume filtered for POC is occasionally recorded on the Analytical Services Form by USGS field personnel (i.e. “Conc” volume = 1000, subsample volume = 100 ml for a single sample).

Standards/Reagents Documentation

NWQL has SOPs that are revised and/or updated as needed that addresses the areas of standards and reagents preparation. In addition, each analytical SOP contains specific reagent/standard details in Section 6.0. Laboratory operations were audited for compliance with these SOPs and no deviations were noted:

- QX0029.2, 7/99: Guidelines for calibrating, operating, and maintaining balances
- QX0326.0, 4/00: Calibration of volumetric devices in the Quality Assurance Unit
- QX0356.0, 11/01: Guidelines for Calibration Verification of Mechanical Volumetric Dispensing Devices at the National Water Quality Laboratory

Observations: NWQL routinely checks the volumetric glassware and pipette calibrations and corrects for temperature and pressure. Old and new chlorophyll standard sources are compared and must agree to within 20 %. Certificates of Analysis are filed and available in the laboratories for the stock standards, SRMs, and CCV solutions. The acetanilide stock has been verified against a primary NIST standard. Chlorophyll SSS is stored in the dark in a freezer for less than a month.

Findings: None.

General Laboratory Documentation

NWQL has an SOP that is revised and/or updated as needed that addresses the areas of documentation of analytical SOPs and other operational SOPs: QX0001.2, 6/01: Writing, reviewing, revising, updating and approving SOPs at the NWQL. Each analytical SOP contains glassware cleaning procedures, corrective action procedures and procedures for software manipulation. Laboratory documentation was audited for compliance with the SOP and no deviations were noted. An update to the 1995 QA Manual is in production as a result of the recent NELAC audit.

Observations: All SOPs contain a “Deviations from source method and rationale” section that lists those changes made to the reference method. None of the deviations noted were significant or adversely affected CARP project data quality. A revision History section is present in each SOP. SOPs are available online to the analysts and updates are sent via email notification. A checklist of the method including QC for each sample batch is copied and pasted into the project logbook, as is the instrument run sheet and raw data. The Quality Management Chief reports to the Branch Chief and is independent of the Laboratory Manager. A spike witness program is in place, and the Project Manager routinely reviews and signs the laboratory notebooks.

Findings: None.

Instrument Operation and Analysis

Observations: Instrumental analysis is included in each analytical SOP in Section 8.5. No on-site additional CHN analyzers or fluorometers are available, but other USGS laboratories provide backup as needed. Labtronics is the software used to generate the 3rd order least squares regression for SOC. Injection logs are kept and pasted into the logbook. Sufficient warm up time is employed for the instruments before analysis.

Finding: Some entries in the Exeter CHN analyzer instrument log were not initialed by the analyst.

General QC Results

Limits and frequencies for internal QC samples are included in each NWQL SOP and they are revised and/or updated as needed. NWQL has SOPs that are revised and/or updated as needed that address the areas of internal quality control and audits. Laboratory operations were audited for compliance with the following SOPs and no deviations were noted:

- QX0084.1, 12/01: Conducting internal audits of current laboratory activities at the NWQL
- QX0106.1, 11/01: Data review of inorganic samples at the NWQL

Observations: IDL and IPR records are attached to each analytical SOP. Control charts of SOC LFBs and third party checks are kept and are up to date. The frequency of QC samples is listed on the method checklists along with the current limits.

Findings: None.

10.1.4 CONCLUSIONS

The staff at NWQL was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff were evident in the record-keeping and laboratory operations. It is clear that NWQL is committed to producing quality data for the CARP project.

10.2 DATA AUDIT

Samples 3SIT05067SA and 02038002 were tracked through the laboratory from sample log-in through to the final report posted to USGS-NJ for loading to the CARP database. Laboratory records for sample and standard preparation, extraction and analysis were examined, and the sample storage location found.

10.2.1 STRENGTHS

The log in and laboratory extraction and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including Certificates of Analysis for the standards used. SOPs were present at the bench and were being followed. The identification of samples, blanks, MS/MSD, LFB, and analytical standards from preparation through

extraction/spiking and instrumental analysis was consistent and traceable. Lot numbers of reagents were recorded and evidence of supervisory review (i.e. initials, signatures) was present on the reported data. The logbook contained reduced copies of all pertinent checklists, injection logs, and raw data.

10.2.2 WEAKNESSES

The NWQL is not aware of the CARP database qualifiers and is reliant on USGS-NJ and/or Stevens Institute to translate their codes to the correct CARP code. Educating the NWQL staff on the CARP codes would help eliminate the guesswork translation from a third party not involved in the actual data generation.

10.2.3 DATA AUDIT SUMMARY

Compliance of the analysis of samples 3SIT05067SA and 02038002 against the following NWQL SOPs was done and no deviations were noted:

- USGS Method # O-7100-83, 11/98: Suspended Organic Carbon
- OS0336.0, 6/1/00: Analysis of Total Particulate Carbon, Particulate Inorganic Carbon, Particulate Organic Carbon, and Total Particulate Nitrogen
- OX0337.1, 2/5/02: Analysis of Chlorophyll a and Pheophytin a in Phytoplankton and Periphyton by Fluorometry

Traceability of field documentation (Analytical Services Request form) and laboratory log-in, internal chain-of-custody and data reporting spreadsheet entry was accurate and complete. The holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Standard Logbooks and traceability to the stock was documented through numbered Certificates of Analysis. Instrument maintenance was recorded in the applicable logbooks. The appropriate frequency of method QC samples was met. Blank contamination did not adversely affect sample concentrations. The correct units and number of significant figures were reported in the spreadsheet and final hard copy report for the samples.

10.3 RECOMMENDATIONS

Instrument Log: All entries made in the Exeter CHN analyzer should be initialed.

11.0 LAB AUDIT: ENCHEM

Audit Location: EnChem, Madison, WI	Audit Dates: April 17, 2002
Auditor: Marcia A. Kuehl	
Analytes: Polynuclear Aromatics by GC/MS	
Data Set used for Data Audit: SDG 911787 (resubmission # 2)	

11.1 AUDIT RESULT SUMMARY

11.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the source document *Chemical Contaminants in New York-New Jersey Biota: Fish and Crustaceans*, last revision date August 28, 1998, and EPA reference Methods 8310 and 8270.

An evaluation of the laboratory systems in place for the analysis of CARP samples for PAHs was conducted through a laboratory tour, an interview with the analyst and the laboratory management staff, and a review of data and supporting documentation for SDG 911787. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, GC/MS calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

11.1.2 AUDIT PREPARATION

Dawn McReynolds, NYSDEC Project Leader, was consulted to arrange an audit date with EnChem. The current EnChem SOPs for the extraction (SVO-66, Revision # 0, April 2001) and analysis of NYSDEC samples for PAHs (SVO-63, Revision # 2, December 2000) were received and reviewed. Also in preparation for the audit, the SDG was downloaded from the CARP database. Data from biota PE sample analysis in 2001 was also received from Dawn McReynolds and reviewed.

EnChem's SOPs were reviewed during the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely affecting data quality or comparability with other CARP laboratories. The review covered the specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, MS operation and analysis, and general QC results. The data audit of SDG 911787 included notation of method and QC non-compliances. This SDG was tracked through the laboratory from receipt to electronic reporting and storage of remaining sample and extracts to assess if the systems were operational and in compliance with laboratory SOPs.

The pre-audit briefing was done with Tod Noltemeyer (Project Manager), Julie Trivedi (Quality Assurance Director), and Kurt Schinke (PAH Chemist). During the laboratory audit and SDG tracking, Kurt Schinke (PAH Chemist) and Chris Lovelace (Extraction Supervisor) were

interviewed. Present during the debriefing were: Tod Noltemeyer (Project Manager), Julie Trivedi (Quality Assurance Director), and Kurt Schinke (PAH Chemist).

11.1.3 AUDIT FINDINGS AND OBSERVATIONS

Data Reporting and Handling

EnChem follows the NYSDEC *CARP Reporting and Data Flagging Requirements for NYSDEC Samples*, Revision # 4, dated April 2, 2001 and *Standard Operating Procedure for CARP Program Electronic Data Interchange Standards for Analytical Laboratories*, CARP SOP No. 003, Revision No. 05, effective June 2001. A hard copy data package is sent to Dawn McReynolds and the electronic data is sent to Battelle for loading into the CARP database. Laboratory operations were audited for compliance with these SOPs and no deviations were noted. All SDGs that were noted by Battelle as needing format repair have been re-submitted.

The SDG selected for the data audit was one that went through two resubmissions. It originally could not be loaded due to several reporting and formatting issues that were discussed with EnChem via email. Currently a total of 14 EnChem SDGs are listed as “open” in the CARP database.

EnChem is reporting a method detection limit (MDL) for each result. The MDL is established in accordance with 40 CFR Part 136 and NYSDEC guidance adjusted for sample volume, dilution and percent solids. MDL studies were available for PAHs and are listed in the EnChem SOP. A macro for assignment of J qualifiers is used and flags results that met all of the identification criteria and are greater than the MDL but less than the minimum level. The minimum level is the lowest calibration standard analyzed adjusted for the sample volume analyzed. A consistent number of significant figures (two) are reported.

Findings: None.

Sample Receipt, Storage and Custody Documentation

EnChem follows its internal SOP to ensure that chain-of-custody is documented for all CARP samples. Sample receipt and log into the Conifer LIMS system follows EnChem SOPs. CARP samples have been received shipped in dry ice and no temperature exceedances have been noted. Sample storage temperature is monitored and recorded. The CARPtrac forms have been received for all samples to date, and were present for the ~ 200 clam samples recently received. As minimal sample volume is sometimes received by EnChem for PAH analysis, minute volume is left for an archive sample.

Findings: None.

Standards/Reagents Documentation

Accustandard is EnChem’s vendor for the primary quantitation standard, Restek for the internal standards and Supelco is used for the second source for the Laboratory Control Standard (LCS). All original vendor “Certificates of Analysis” are retained and cross-referenced to the working

standards. Standards used for spiking are listed as are the lot numbers of the solvents and silica gel used in sample extraction and/or standard preparation. Starkist tuna packed in spring water is used as the method blank matrix, as it has been shown to be free from PAHs.

Findings: None.

General Laboratory Documentation

SOPs exist for the CARP analyses and are being followed by the staff. The latest SOPs and EnChem QA Manual are available in hard copy and on-line in a read only format. Nonconformances are documented and tracked.

Findings: None.

GC/MS Operation and Analysis

One HP 6890 system with an XTI-5 column is used for sample analysis. As requested by NYSDEC, a daily (day = 24 hours) minimum of three point initial calibration is analyzed. EnChem analyzes a six point curve at concentrations ranging from 0.05-2.5 ug/mL. The curve is acceptable if the $rsd < 15\%$ or the non-linear calibration curve fit correlation coefficient is > 0.990 . Every 15 samples a 0.50 ug/mL continuing calibration standard is analyzed and must be within 20 % of the initial calibration.

Findings: None.

General QC Results

EnChem has a Quality Manual that is revised and/or updated as needed that addresses the areas of QC results and limits for each analysis. In addition, the EnChem SOPs contain the recovery limits for the surrogate, LCS, and matrix spike samples. In accordance with the protocol requested by Dawn McReynolds, a method blank, LCS, and matrix spike and laboratory duplicate (if enough sample volume available) are prepared and analyzed for every 15 CARP samples. The usual EnChem procedure is to set up these QC samples for every 20 samples, but the staff are aware of this different requirement for the CARP analyses.

EnChem is a NELAP laboratory that was accredited by NYDOH in the fall of 2000 and currently holds a low concentration organics contract (OLC03.2) for the EPA Contract Laboratory Program. In the PE samples analyzed by four laboratories in 2001, EnChem reported the highest lipid content and accordingly, the highest pesticide and PCB content of the participating laboratories. During the investigation of the high lipid bias, EnChem split extracts with Axys, which also got higher lipids than the other two laboratories. The methylene chloride used for extraction of the lipids by EnChem and Axys may yield more rigorous extraction than other solvents used by other laboratories.

11.1.4 CONCLUSIONS

The staff at EnChem was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff was evident in the record-keeping and laboratory operations. The QA Manual and SOP documentation was comprehensive and followed the NYSDEC Project Leader's requirements. It is clear that EnChem is committed to producing quality data for the CARP project.

11.2 DATA AUDIT

Sample 2DMR01569 in CARP SDG 91178701 resubmission # 2 was tracked through the laboratory from sample log-in through to the final report posted for loading to the CARP database. Laboratory records for sample and standard preparation, extraction and analysis were examined and the hard copy final report compared against the CARP database contents for accuracy.

11.2.1 STRENGTHS

The log in and laboratory extraction and instrumental analysis operations were well organized. Documentation requested was easily retrieved, including the whole case file. SOPs were present at the bench and were being followed. The identification of samples, blanks, MS, LCS, and analytical standards from preparation through extraction/spiking and instrumental analysis was consistent and traceable. Evidence of supervisory review (i.e. initials, signatures) was present on the reported data. No PAHs were present in the tuna method blank. The nonconformance (sample was lost during extraction) was documented and re-extraction done promptly, with all the required QC. Recovery of PAHs in the MS of 2DMR01569 and RPD values for the laboratory duplicate of 2DMR01569 were acceptable.

11.2.2 WEAKNESSES

No weaknesses that were under the control of EnChem were identified. Unfortunately, due to limited sample volume, the target MDL requested by NYSDEC (1 ug/kg) cannot always be met for the samples.

11.2.3 DATA AUDIT SUMMARY

Compliance of the analysis of sample 2DMR01569 against the EnChem SOPs SVO-66, Revision # 0, April 2001 and SVO-63, Revision # 2, December 2000 was done and no deviations adversely affecting data quality were noted. Traceability of field documentation and laboratory log-in, internal chain-of-custody and LIMS system entry was accurate and complete. The holding times were met, as documented by the laboratory records. Standard preparation data was entered into the Standard Logbooks, and traceability to the stock was documented through numbered Certificates of Analysis. The standards used for native standards, surrogates, internal standards, LCS, and MS solutions were recorded and traceable to this log. GC/MS DFTPP tuning, initial and daily calibration data was present and instrument maintenance was recorded in the MS logbook. The appropriate frequency of method QC samples was met and results entered in the spreadsheet. No blank contamination was present. Mass spectra of identified analytes met the EPA criteria. No false positives or negatives were apparent in the raw data reviewed. The correct units and number of significant figures were reported in the spreadsheet and final hard

copy report for the samples. No documentation was missing from the data package reviewed and no data entry errors between the hard copy and the CARP database were found.

11.3 RECOMMENDATIONS

There are no recommendations to improve CARP sample analysis or data reporting.

12.0 LAB AUDIT: HALE CREEK

Audit Location: NYSDEC Hale Creek Field Station, Gloversville, New York	Audit Dates: September 12, 2002
Auditor: David H. Greer, Jr.	
Analytes: OCPs, PCB Aroclors, PCB Congeners, and Metals in Tissue	
Data Set used for Data Audit: None	

12.1 AUDIT RESULT SUMMARY

12.1.1 SCOPE

The purpose of the audit was to review compliance by the laboratory with the source document *Chemical Contaminants in New York-New Jersey Harbor Biota: Fish and Crustaceans*.

An evaluation of the laboratory systems in place for the analysis of CARP samples for PCB Aroclors and congeners, OCPs, and metals (cadmium and mercury) was conducted through a laboratory tour, interviews with the laboratory management staff and the QA Officer, and a review of the Methods and Quality Control information presented by the laboratory management. The specific laboratory operations audited were: sample log-in, custody and storage, calibration standard preparation, standard storage and traceability, sample extraction, concentration and clean-up, GC/MS calibration and analysis, metals calibration and analysis, data handling, electronic reporting, data storage, data custody and integrity, and QA system.

12.1.2 AUDIT PREPARATION

Ms Dawn McReynolds, NYSDEC Bureau of Watershed Assessment and Research, Analytical Services Section, was consulted to arrange an audit date with the Hale Creek Field Station.

The Hale Creek Field Station Laboratory (Hale Creek) SOPs for PCBs, OCPs, and metals were reviewed during the audit for compliance with the NYSDEC or EPA reference methods and for deviations adversely affecting data quality. The checklist covered the specific laboratory operational areas used for the analyses: data reporting and handling, sample receipt, storage and custody documentation, standards/reagents documentation, general laboratory documentation, and general QC results.

During the laboratory audit Mr. Anthony Gudlewski (Laboratory Manager) and Mr. Robert Bauer (Quality Assurance Officer) were interviewed. In addition, Mr. Brian Buanno (Laboratory Technician) also provided information on laboratory issues and concerns during the audit.

12.1.3 AUDIT FINDINGS AND OBSERVATIONS

Hale Creek is only involved with the analysis of tissues and has a limited staff of chemists that provide data for all aspects of the laboratory. Although the laboratory is small, the staff is well trained and all personnel must meet the State of New York criteria as chemists.

Sample Receipt, Storage and Custody Documentation

Hale Creek has an SOP that discusses Sample Receipt, Sample Logging, Sample Dissection, Homogenization, and Freeze Drying after samples are received from the field. In addition to the SOP, the laboratory has Chain-of-Custody forms for the receipt of samples.

Hale Creek stores samples, prior to processing, in a freezer which is maintained at a temperature of less than -20°C . The temperature is monitored by an electronic thermometer, which can be tracked on the computers in the laboratory.

Observations: A Chain-of-Custody is initiated upon sample receipt and signed by the individual receiving the samples. Sample labeling is then performed and documented, and the samples are stored in a freezer until processing occurs. Ultimate disposition of the samples is noted on the forms and in the LIMS.

Findings: The SOP for sample receipt and login is not numbered, nor is the date of the SOP noted. There is an e-mail note from NYSDEC asking for additional documentation on the zooplankton filtering procedure that was provided. The filtering procedure should be incorporated into a SOP. An NIST calibrated thermometer was not noted as being available for checking the temperature recorded by the electronic thermometer in the freezer.

Standards/Reagents Documentation

Hale Creek has documentation that focuses on the areas of standards preparation and reagents. The concentration of the standards for organic compounds is reported in a standards preparation logbook that documents the preparation of standards from stock solutions. In addition, each metals analytical SOP contains specific details on preparation of calibration standards (i.e., standard concentrations).

Observations: All original vendor standard information is cross-referenced to the working standards in laboratory logbooks (i.e., standard vendor, lot number, and date of standard preparation). Standards used for spiking and calibrations are listed in the logbooks separately. Standards used for PCB congener analysis are received from AccuStandard.

Findings: Standards used for the metals analysis are listed in the SOPs. Standards concentrations for the analysis of organics are not listed in SOPs, but are listed in the laboratory standard logbook and analysis instrument (either GC or GC/MS) method. The SOPs discuss the preparation of standards from either primary solutions or certified standard solutions but do not give the concentrations of the standards.

Data Reporting and Handling

Hale Creek has procedures that address the areas of data reporting and handling. These procedures explain how data is entered into the computer LIMS. In addition to data reporting, the LIMS is used to enter data from the extraction and cleanup of samples as well as the data generated by GC, GC/MS, ICP and the mercury analyzer.

Observations: At the time of the audit no CARP SDGs had been submitted to Booz Allen for review, therefore no review of CARP data was made during the audit. However, it was noted that some of the data reports generated by Hale Creek for the tissue samples from the NY/NJ CARP Project have been submitted and entered into the CARP database.

Hale Creek reports organic results as either the result found in the sample or as a method limit (ML) that is calculated as a factor of the instrument noise (either 4x noise for 6 % fraction or 8x noise for 20 % fraction for organics). For metals, the concentration is reported as either less than the method detection limit (< MDL) or a value equal to or above this value (please see comments concerning the MDL in the General QC Results section). The MDL studies for metals analytical data were current and derived from NIST or DORM tissue samples, however there were no MDL studies for organic analytes. Reporting limits for the organic analytes were derived from the instrument detection limits (defined in atomic units (AU) as peak area), the lowest standard concentration analyzed (in parts per billion), and an average fish multiplier (defined in grams wet weight and average percent lipid).

Findings: None.

General Laboratory Documentation

Hale Creek has procedures and SOPs that address the areas of general laboratory documentation. Due to the laboratory's analysis of tissue samples and their relatively small size, some aspects of the laboratory do not have SOPs written that address all of the procedures. All of the laboratory's operations are documented and known by the analysts working in each area. Mr. Gudlewski observes each phase of the laboratory's operation and ensures that all personnel are fully trained in the aspects of the operation prior to being allowed to conduct the analyses on their own.

Observations: Laboratory SOPs have been generated for some laboratory operations. However, the SOPs are generally not reviewed or updated on an annual basis. The SOPs are also usually not numbered such that the method or laboratory designated section (e.g., metals or organics) is noted. Analytical SOPs for metals are based upon *Guidance for Assessing Chemical Contamination Data for Use in Fish Advisories, Volume I: Fish Sampling and Analysis*. Second Edition (EPA, 1995).

Findings: The laboratory should generate SOPs for each analytical procedure performed, including general laboratory management actions.

GC and GC/MS Operation and Analysis

The laboratories GC and GC/MS were not currently under operation due to the transfer of the GC/MS chemist to a new position.

Observations: One GC/MS (Agilent 6890, MSD) and one GC system with an electron capture detector (HP 5890 Series II, ECD) was available for analysis of samples at the time of the audit. The GC/MS is used for the analysis of the PCB congeners, the 6% fraction extracts for certain pesticides and PCB Aroclors, while the 20 % fraction extracts are analyzed on the GC/ECD for

pesticides. There were SOPs for the extraction of the organics parameters based upon the Food and Drug Administration Pesticide Analytical Manual, Vol. I. However, there were no written SOPs for the analysis provided. The instrumental methods used during analysis were made available. The instrumental analysis methods stated what the analytes were for each method (both GC/MS and GC) and what the concentrations were for each analyte, but did not include any calibration requirements for the analysis. There were written procedures for the sample cleanups and using Microsoft Access, but these procedures did not have SOP assignments associated with them. Additionally, the GC/MS instrument method also gave the masses of each analyte used during analysis for confirmation of the selected ion monitoring (SIM) method used during the analysis.

Findings: Although some actions are written the laboratory should generate SOPs for the analyses and any specific procedures that the laboratory has generated to facilitate the quantitation of the results. The SOPs should list EPA or other reference methods that are used or cited which may give additional information.

General QC Results

Hale Creek provided a written Quality Assurance Program for the Toxic Substances Monitoring Laboratory and the Trace Metals Laboratory. This document addresses the areas of Laboratory Personnel, Sample Custody, Analytical Procedures, Calibration, Internal Quality Control, Data Validation and Reporting as well as Performance Audits. While this document discusses the issues involved in the quality assurance program, it does not provide written instructions for dealing with problems in the program (e.g., what to do if the calibration variation is outside the 20 % requirement of the QAP).

Observations: Hale Creek participates in NIST (SRM 1566a for Cadmium and SRM 1577b for Lead) and DORM-2 (Mercury) reference material studies. The method detection limit (MDL) studies for metals are also based upon these reference materials and conducted using these materials. One of these reference materials is included with each batch of metals samples analyzed depending on whether it is a cadmium or mercury batch. Additionally, there are laboratory duplicates, sample matrix spikes (and matrix spike duplicates), check standards, laboratory blanks, and blank spikes that are also run with all metals samples. There was no information concerning any NIST reference material analysis for the organics analyses. The laboratory did offer information concerning duplicates, matrix spikes, and C13-labeled surrogates (for three labeled PCB congeners only). The QC results are based upon the recommended control limits listed in *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1, Fish Sampling and Analysis*, Second Edition" (EPA, 1995). The QC parameters were generally in control for all analysis noted.

Findings: The method detection limit (MDL) results, for organics, reported by the laboratory appeared to be based upon average peak areas of the lowest standard analyzed. The MDL, as specified in 40 CFR 136, Appendix B, is based upon the analysis of at least 7 replicate spikes of each analyte. The reporting limit defined by Hale Creek Laboratory is acceptable, but should not be referred to as an MDL because it does not actually calculate the statistical examination of the results of repeated analyses of the same standard as stipulated in the Code of Federal Regulations (CFR).

The generation of MDLs for tissue samples is difficult and time consuming and could be jeopardized by the presence of contaminants in the tissue samples used for the MDL study. Additionally, MDLs would need to be established for each tissue type analyzed by the laboratory.

12.1.4 CONCLUSIONS

The staff at Hale Creek was helpful and well prepared for the audit. The knowledge, technical competence, and conscientiousness of the staff were evident in the laboratory operations and discussions with the members of the staff. The members of the staff were well trained and versed in the analyses they were completing. The loss of the organics staff affects the ability of the laboratory to complete the CARP project analyses.

12.2 DATA AUDIT

Samples were tracked through the laboratory from sample log-in through to the final report posted for loading to the CARP database. Laboratory records for sample and standard preparation, extraction and analysis were examined and the sample extract storage location was found.

12.2.1 STRENGTHS

The laboratory metals instrumental analysis operations were well organized. Documentation requested was easily retrieved. SOPs for the determination of metals were present and were being followed. The identification of samples, blanks, SRM, and analytical standards from preparation through extraction/spiking and instrumental analysis was consistent and traceable. Evidence of supervisory review (i.e. initials, signatures) was present on the reported data.

12.2.2 WEAKNESSES

The SOPs generated by Hale Creek should follow the example provided in Figure 8.1 of the *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories*, Volume 1. Additionally, SOPs should be reviewed and updated annually. The Quality Assurance Program should be revised to include all important aspects of the laboratory operations including; data quality assessment, corrective actions, and quality assurance reports. It should also contain information concerning the precision and accuracy generated by the laboratory for the various quality control samples that are processed and analyzed by the laboratory. Even though the laboratory has adequate temperature measurement in the cold room or freezer where unprocessed samples are stored, the refrigerators in the laboratories containing standards and samples do not have thermometers. The thermometers should also be calibrated using a certified temperature measurement device (NIST certified thermometer) on a routine timetable.

12.2.3 DATA AUDIT SUMMARY

Traceability of field documentation and laboratory log-in, internal chain-of-custody and LIMS system entry was accurate and complete. Standard preparation data was entered into the Standard Logbooks, and traceability to the stock was documented through Certificates of

Analysis. Standards used for native and isotopically labeled standards, cleanup standards, internal standards, and SRM and MS solutions were recorded and traceable to this log. Initial and daily calibration data was present and instrument maintenance was recorded in the applicable logbooks. Appropriate frequency of method QC samples was met and results for the QC samples were entered in a spreadsheet. SRM recoveries were acceptable. Blank contamination did not adversely affect reported concentrations.

12.3 RECOMMENDATIONS

SOPs and QAP: The standard operating procedures and quality assurance plan should be either written or revised to reflect all aspects of the laboratory operations. SOPs for the organic analyses should be written and reviewed by an organic chemist. SOPs and the QAP should be dated and assigned numbers including the revision number to ensure their review and update on a timely basis.

Temperature Monitoring: Thermometers should be purchased for all refrigerators that contain samples, sample extracts, or standards for organic analysis. The temperature in any refrigerator or freezer should be monitored daily. The thermometers should be calibrated routinely with an NIST certified thermometer.

Organic Analysis: Additional personnel should be added to the laboratory to help perform the GC and GC/MS analysis since the chemist who worked in this area has moved to another facility.

APPENDIX C: CAVES BUSINESS RULES

ANALYTE GROUP: DIOXINS/FURANS

INTRODUCTION

Booz Allen proposes to incorporate these data validation decision rules (i.e., business rules) for dioxins and furans into our automated data validation program for analytical data collected for the Hudson River Foundation (HRF) Contaminant Assessment Reduction Program (CARP). The majority of the limits cited are based on SW846 methods 1613 and 8290. Limits in the business rules for laboratory duplicates, Standard Reference Materials (SRM), and the qualification for sample results based on blank contamination have been taken either from existing CARP Quality Assurance Project Plans (QAPPs) or EPA data validation guidance. A summary table of all of the conditions assigned by the program (CARP_ALERTs) and the possible resultant usability code is attached (dioxinalerts.xls). The table should not be considered an exhaustive one, as all possible combinations of conditions are not listed, and the final usability code determinations will be subject to the data validator's review and professional judgment.

In summary, the program assesses the following analytical quality control checks against the cited limits:

- Holding times from collection to extraction and extraction to analysis (1613 limits)
- Method, trip, field, and equipment blank concentration (EPA guidance limits: sample results < 5 X highest associated blank qualified)
- Lab Control or Ongoing Precision and Recovery Standard recovery (1613 limits)
- SRM percent difference from certified value (NJ Study 1G QAPP 30 % difference limits)
- Matrix spike recovery (NJ Study 1G QAPP limits)
- Recovery standard recovery (1613 limits)
- Clean up standard recovery (1613 limits)
- Independent Control Standard recovery (NJ Study 1G QAPP limits)
- Lab duplicate precision (100 % RPD limit used by EPA in LMMB)

An additional rule for field duplicates is pending. No field duplicate precision goals were present in any QAPPs, so a reasonable limit has to be developed.

As we developed these rules based on selected SDGs culled from the Battelle database, if you are aware of issues with these rules and the bulk of your data, please contact Yvonne Fernandez at 703-917-2230 or Fernandez_Yvonne@bah.com.

DIOXINS/FURANS 1.0 UNDETECTED DUE TO ASSOCIATED BLANK CONCENTRATION RULE

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: U5HM, U5HT, U5HF, U5HE (Undetected, less than 5 X highest associated Blank where last letter denotes M= method blank, T = trip blank, F = Field blank, E = Equipment blank)

PARAM_CODE: ALL

APPLIES TO QC_CODE: DU, SA

MEDIA: ALL

Find EB, TB, FB associated with each QC_CODEs SA and DU. The FB, EB and TB will have the same SURVEY_ID, or same START_DATE and STATION_ID. If UNITS for EB, FB, TB and the UNITS for the MB RESULTS in the same SDG or SDGs as the DU and SA are all the same (but not PCT_REC), then apply this rule.

Multiply the MB, FB, EB, and TB RESULTS for each PARAM_CODE by 5 and record as 5HM, 5HF, 5HE and 5HT, respectively. For each DU and SA associated with the MB, FB, EB and TB, identify the highest of the 5HM, 5HF, 5HE and 5HT levels. If SA or DU RESULT is less than the highest level, qualify the SA or DU RESULT for that PARAM_CODE with the following:

U5HM = result considered undetected, is less than 5 X associated method blank concentration

U5HT = result considered undetected, is less than 5 X associated trip blank concentration

U5HF = result considered undetected, is less than 5 X associated field blank concentration

U5HE = result considered undetected, is less than 5 X associated equipment blank concentration

DIOXINS/FURANS 2.0 EXCEEDED HOLDING TIME RULE

ANALYSIS_METH: 1613, BATC-ASATII-001

CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction)

PARAM_CODE: ALL

APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM,
TB

MEDIA: ALL

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following, add the CARP_ALERT code listed:

FHTE1 = > 365 days but ≤ 438 days

FHTE2 = > 438 days but ≤ 511 days

FHTE3 = > 511 days

ANALYSIS_METH: 1613, BATC-ASATII-001

CARP_ALERT CODE: FHTA1, FHTA2, FHTA3 (Failed holding time from extraction to analysis)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM,
TB

MEDIA: ALL

If the number of days elapsed from EXTRACT_DATE to ANALYSIS_DATE exceeds the following, add the CARP_ALERT code listed:

FHTA1 = > 365 days but ≤ 438 days

FHTA2 = > 438 days but ≤ 511 days

FHTA3 = > 511 days

ANALYSIS_METH: 8290

CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction)

PARAM_CODE: ALL

APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM,
TB

MEDIA: ALL

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following, add the CARP_ALERT code listed:

FHTE1 = > 30 days but ≤ 36 days

FHTE2 = > 36 days but ≤ 42 days

FHTE3 = > 42 days

ANALYSIS_METH: 8290

CARP_ALERT CODE: FHTA1, FHTA2, FHTA3 (Failed holding time from extraction to analysis)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM,
TB

MEDIA: ALL

If the number of days elapsed from EXTRACT_DATE to ANALYSIS_DATE exceeds the following, add the CARP_ALERT code listed:

FHTA1 = > 40 days but ≤ 48 days

FHTA2 = > 48 days but ≤ 56 days

FHTA3 = > 56 days

DIOXINS/FURANS 3.0 METHOD BLANK FREQUENCY RULE

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001
CARP_ALERT CODE: FMBF0 (Failed Method Blank Frequency)
PARAM_CODE: ALL
APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MS, MSD, OPR, OPRD,
QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = MB is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FMBF0.

DIOXINS/FURANS 4.0 MATRIX SPIKE RECOVERY RULES

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001
CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)
PARAM_CODE: 1746-01-6, 40321-76-4, 39227-28-6, 57653-85-7, 19408-74-3, 35822-46-9, 3268-87-9, 51207-31-9, 57117-41-6, 57117-31-4, 70648-26-9, 57117-44-9, 72918-21-9, 60851-34-5, 67562-39-4, 55673-89-7, 39001-02-0
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, OPRD, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 50 but ≥ 40
FMSL2 = < 40 but ≥ 30
FMSL3 = < 30

FMSH1 = > 120 but ≤ 144
FMSH2 = > 144 but ≤ 168
FMSH3 = > 168

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001
CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: CARP 037, CARP038, CARP039, CARP040, CARP041, CARP042, CARP043, CARP044, CARP045, CARP046, CARP047, CARP048, CARP049, CARP050, CARP051

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, OPRD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

PARAM_CODE	FMSL1	FMSL2	FMSL3	FMSH1	FMSH2	FMSH3
CARP037	< 25 but ≥ 20	< 20 but ≥ 15	< 15	> 164 but ≤ 197	> 197 but ≤ 230	> 230
CARP043	< 24 but ≥ 19.2	< 19.2 but ≥ 14.4	< 14.4	> 169 but ≤ 203	> 203 but ≤ 237	> 237
CARP038	< 25 but ≥ 20	< 20 but ≥ 15	< 15	> 181 but ≤ 217	> 217 but ≤ 253	> 253
CARP044	< 24 but ≥ 19.2	< 19.2 but ≥ 14.4	< 14.4	> 185 but ≤ 222	> 222 but ≤ 259	> 259
CARP045	< 21 but ≥ 16.8	< 16.8 but ≥ 12.6	< 12.6	> 178 but ≤ 214	> 214 but ≤ 249	> 249
CARP039	< 32 but ≥ 25.6	< 25.6 but ≥ 19.2	< 19.26	> 141 but ≤ 169	> 169 but ≤ 197	> 197
CARP040	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 130 but ≤ 156	> 156 but ≤ 182	> 182
CARP046	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 152 but ≤ 182	> 182 but ≤ 213	> 213
CARP047	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 123 but ≤ 148	> 148 but ≤ 172	> 172
CARP048	< 29 but ≥ 23.2	< 23.2 but ≥ 17.4	< 17.4	> 147 but ≤ 176	> 176 but ≤ 206	> 206
CARP049	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 136 but ≤ 163	> 163 but ≤ 190	> 190
CARP041	< 23 but ≥ 18.4	< 18.4 but ≥ 13.8	< 13.8	> 140 but ≤ 168	> 168 but ≤ 196	> 196
CARP050	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 143 but ≤ 172	> 172 but ≤ 200	> 200
CARP051	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 138 but ≤ 166	> 166 but ≤ 193	> 193
CARP042	< 17 but ≥ 13.6	< 13.6 but ≥ 10.2	< 10.2	> 157 but ≤ 188	> 188 but ≤ 220	> 220

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: CARP052
APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MB, MS, MSD, OPR, OPRD,
QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 35 but ≥ 28

FMSL2 = < 28 but ≥ 21

FMSL3 = < 21

FMSH1 = > 197 but ≤ 236

FMSH2 = > 236 but ≤ 292

FMSH3 = > 292

DIOXINS/FURANS 5.0 LAB DUPLICATE PRECISION RULE

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001
CARP_ALERT CODE: FLDP1, FLDP2, FLDP3 (Failed Lab Duplicate Precision)
PARAM_CODE: ALL
APPLIES TO QC_CODE: SA and QADU with same LAB_SAMP_ID
MEDIA: ALL

If QCID = QADU is not found in an SDG, do not apply this rule. If QADU is present in an SDG, and an SA with same LAB_SAMP_ID and same UNIT (not PCT_DIFF, or PCT_REC) is also present in the same SDG, apply this rule. Calculate the Relative Percent Difference (RPD) for the QADU/SA pair as the difference between the QADU and SA RESULTS divided by the mean of the QADU and SA RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE in the QADU and SA and all samples in the same SDG as the QADU and SA:

FLDP1 = > 100 but ≤ 120

FLDP2 = > 120 but ≤ 140

FLDP3 = > 140

DIOXINS/FURANS 6.0 SRM RULE

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FSRM1, FSRM2, FSRM3 (Failed SRM percent difference limits)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, OPRD,
QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = SRM is not found in an SDG, do not apply this rule.

If QCID = SRM and UNIT reported is PCT_DIFF, then apply this rule. If the PCT_DIFF exceeds the following in the SRM, add the CARP_ALERT code listed to that PARAM_CODE in the SRM and to that PARAM_CODE in all samples in the same SDG as the SRM:

FSRM1 = > 30 but ≤ 36

FSRM2 = > 36 but ≤ 42

FSRM3 = > 42

DIOXINS/FURANS 7.0 LCS or OPR RULES

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FCSF0 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Frequency)

PARAM_CODE: ALL

APPLIES TO QC_CODE: DU, EB, FB, MB, MS, MSD, SA, TB, QADU, QATP

MEDIA: ALL

If QCID = LCS or OPR or OPRD is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FCSF0.

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: 1746-01-6, 40321-76-4, 39227-28-6, 57653-85-7, 19408-74-3, 35822-46-9, 3268-87-9, 51207-31-9, 57117-41-6, 57117-31-4, 70648-26-9, 57117-44-9, 72918-21-9, 60851-34-5, 67562-39-4, 55673-89-7, 39001-02-0

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, OPRD,
QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = LCS or OPR or OPRD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR or

OPRD, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS or OPR or OPRD:

FCSL1 = < 50 but ≥ 40
 FCSL2 = < 40 but ≥ 30
 FCSL3 = < 30

FCSH1 = > 120 but ≤ 144
 FCSH2 = > 144 but ≤ 168
 FCSH3 = > 168

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: CARP 037, CARP038, CARP039, CARP040, CARP041, CARP042, CARP043, CARP044, CARP045, CARP046, CARP047, CARP048, CARP049, CARP050, CARP051

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, OPRD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID =LCS or OPR or OPRD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR or OPRD, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR or OPRD and to that PARAM_CODE in all samples in the same SDG as the LCS or OPR or OPRD:

PARAM_CODE	FCSL1	FCSL2	FCSL3	FCSH1	FCSH2	FCSH3
CARP037	< 25 but ≥ 20	< 20 but ≥ 15	< 15	> 164 but ≤ 197	> 197 but ≤ 230	> 230
CARP043	< 24 but ≥ 19.2	< 19.2 but ≥ 14.4	< 14.4	> 169 but ≤ 203	> 203 but ≤ 237	> 237
CARP038	< 25 but ≥ 20	< 20 but ≥ 15	< 15	> 181 but ≤ 217	> 217 but ≤ 253	> 253
CARP044	< 24 but ≥ 19.2	< 19.2 but ≥ 14.4	< 14.4	> 185 but ≤ 222	> 222 but ≤ 259	> 259
CARP045	< 21 but ≥ 16.8	< 16.8 but ≥ 12.6	< 12.6	> 178 but ≤ 214	> 214 but ≤ 249	> 249
CARP039	< 32 but ≥ 25.6	< 25.6 but ≥ 19.2	< 19.26	> 141 but ≤ 169	> 169 but ≤ 197	> 197
CARP040	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 130 but ≤ 156	> 156 but ≤ 182	> 182
CARP046	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 152 but ≤ 182	> 182 but ≤ 213	> 213
CARP047	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 123 but ≤ 148	> 148 but ≤ 172	> 172
CARP048	< 29 but ≥ 23.2	< 23.2 but ≥ 17.4	< 17.4	> 147 but ≤ 176	> 176 but ≤ 206	> 206
CARP049	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 136 but ≤ 163	> 163 but ≤ 190	> 190

CARP041	< 23 but ≥ 18.4	< 18.4 but ≥ 13.8	< 13.8	> 140 but ≤ 168	> 168 but ≤ 196	> 196
CARP050	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 143 but ≤ 172	> 172 but ≤ 200	> 200
CARP051	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 138 but ≤ 166	> 166 but ≤ 193	> 193
CARP042	< 17 but ≥ 13.6	< 13.6 but ≥ 10.2	< 10.2	> 157 but ≤ 188	> 188 but ≤ 220	> 220

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: CARP052

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MB, MS, MSD, OPR, OPRD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR or OPRD, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR or OPRD and to that PARAM_CODE in all samples in the same SDG as the LCS or OPR or OPRD:

FCSL1 = < 35 but ≥ 28

FCSL2 = < 28 but ≥ 21

FCSL3 = < 21

FCSH1 = > 197 but ≤ 236

FCSH2 = > 236 but ≤ 292

FCSH3 = > 292

DIOXINS/FURANS 8.0 LABELED AND CLEAN UP SPIKE RECOVERY RULES

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FLCF0 (Failed Labeled Compound Spiking Frequency)

PARAM_CODE: CARP 037, CARP038, CARP039, CARP040, CARP041, CARP042, CARP043, CARP044, CARP045, CARP046, CARP047, CARP048, CARP049, CARP050, CARP051

APPLIES TO QC_CODE: ALL

MEDIA: ALL

If a PARAM_CODE listed above is not present for the LAB_SAMP_ID with the QC_CODE listed and/or UNIT = PCT_REC field is empty for the LAB_SAMP_ID with the QC_CODE listed, then apply this rule. Add the CARP_ALERT code of FLCF0 to the associated PARAM_CODE as listed in the table below:

Labeled Compound PARAM_CODEs (CARPXXX) and Associated PARAM_CODE:

CARP037	1746-01-6
CARP038	40321-76-4
CARP039	39227-28-6
CARP040	57653-85-7
CARP041	35822-46-9
CARP042	3268-87-9
CARP043	51207-31-9
CARP044	57117-41-6
CARP045	57117-31-4
CARP046	70648-26-9
CARP047	57117-44-9
CARP048	72918-21-9
CARP049	60851-34-5
CARP050	67562-39-4
CARP051	55673-89-7

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001
CARP_ALERT CODE: FCUF0 (Failed Clean Up Compound Frequency)
PARAM_CODE: CARP052
APPLIES TO QC_CODE: ALL
MEDIA: ALL

If a PARAM_CODE = CARP052 is not present for the LAB_SAMP_ID with the QC_CODE listed and/or UNIT = PCT_REC field is empty for the LAB_SAMP_ID with the QC_CODE listed, then apply this rule. Add the CARP_ALERT code of FCUF0 to CARP052 and the associated PARAM_CODE of 1746-01-6.

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001
CARP_ALERT CODE: FLCL1, FLCL2, FLCL3, FLCH1, FLCH2, FLCH3 (Failed Labeled Compound Recovery)
PARAM_CODE: CARP 037, CARP038, CARP039, CARP040, CARP041, CARP042, CARP043, CARP044, CARP045, CARP046, CARP047, CARP048, CARP049, CARP050, CARP051

APPLIES TO QC_CODE: ALL
MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE and the associated PARAM_CODE as listed in the table below:

FLCL1 = < 25 but \geq 20
FLCL2 = < 20 but \geq 15
FLCL3 = < 15
FLCH1 = > 150 but \leq 180
FLCH2 = > 180 but \leq 210
FLCH3 = > 210

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001
CARP_ALERT CODE: FCUL1, FCUL2, FCUL3, FCUH1, FCUH2, FCUH3 (Failed Clean Up Compound Recovery)
PARAM_CODE: CARP052
APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MB, MS, MSD, OPR, OPRD, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If PARAM_CODE is CARP052 and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following, add the CARP_ALERT code listed to CARP052 and the associated PARAM_CODE of 1746-01-6 as listed in the table below:

FCUL1 = < 35 but \geq 28
FCUL2 = < 28 but \geq 21
FCUL3 = < 21

FCUH1 = > 197 but \leq 236
FCUH2 = > 236 but \leq 292
FCUH3 = > 292

DIOXINS/FURANS 9.0 INDEPENDENT CONTROL STANDARD RECOVERY RULES

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001
CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)
PARAM_CODE: 1746-01-6, 40321-76-4, 39227-28-6, 57653-85-7, 19408-74-3, 35822-46-9, 3268-87-9, 51207-31-9, 57117-41-6, 57117-31-4, 70648-26-9, 57117-44-9, 72918-21-9, 60851-34-5, 67562-39-4, 55673-89-7, 39001-02-0

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, OPRD,
 QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = ICS is not found in an SDG, do not apply this rule.

If QCID = ICS and PARAM_CODE is one of those listed above and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

FICL1 = < 70 but ≥ 56

FICL2 = < 56 but ≥ 42

FICL3 = < 42

FICH1 = > 130 but ≤ 156

FICH2 = > 156 but ≤ 182

FICH3 = > 182

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: CARP037, CARP038, CARP039, CARP040, CARP041, CARP042, CARP043, CARP044, CARP045, CARP046, CARP047, CARP048, CARP049, CARP050, CARP051

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, OPRD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = ICS and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

PARAM_CODE	FICL1	FICL2	FICL3	FICH1	FICH2	FICH3
CARP037	< 25 but ≥ 20	< 20 but ≥ 15	< 15	> 164 but ≤ 197	> 197 but ≤ 230	> 230
CARP043	< 24 but ≥ 19.2	< 19.2 but ≥ 14.4	< 14.4	> 169 but ≤ 203	> 203 but ≤ 237	> 237
CARP038	< 25 but ≥ 20	< 20 but ≥ 15	< 15	> 181 but ≤ 217	> 217 but ≤ 253	> 253
CARP044	< 24 but ≥ 19.2	< 19.2 but ≥ 14.4	< 14.4	> 185 but ≤ 222	> 222 but ≤ 259	> 259
CARP045	< 21 but ≥ 16.8	< 16.8 but ≥ 12.6	< 12.6	> 178 but ≤ 214	> 214 but ≤ 249	> 249
CARP039	< 32 but ≥	< 25.6 but ≥	< 19.26	> 141 but ≤	> 169 but ≤	> 197

	25.6	19.2		169	197	
CARP040	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 130 but ≤ 156	> 156 but ≤ 182	> 182
CARP046	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 152 but ≤ 182	> 182 but ≤ 213	> 213
CARP047	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 123 but ≤ 148	> 148 but ≤ 172	> 172
CARP048	< 29 but ≥ 23.2	< 23.2 but ≥ 17.4	< 17.4	> 147 but ≤ 176	> 176 but ≤ 206	> 206
CARP049	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 136 but ≤ 163	> 163 but ≤ 190	> 190
CARP041	< 23 but ≥ 18.4	< 18.4 but ≥ 13.8	< 13.8	> 140 but ≤ 168	> 168 but ≤ 196	> 196
CARP050	< 28 but ≥ 22.4	< 22.4 but ≥ 16.8	< 16.8	> 143 but ≤ 172	> 172 but ≤ 200	> 200
CARP051	< 26 but ≥ 20.8	< 20.8 but ≥ 15.6	< 15.6	> 138 but ≤ 166	> 166 but ≤ 193	> 193
CARP042	< 17 but ≥ 13.6	< 13.6 but ≥ 10.2	< 10.2	> 157 but ≤ 188	> 188 but ≤ 220	> 220

ANALYSIS_METH: 1613, 8290, BATC-ASATII-001

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: CARP052

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

FICL1 = < 35 but ≥ 28

FICL2 = < 28 but ≥ 21

FICL3 = < 21

FICH1 = > 197 but ≤ 236

FICH2 = > 236 but ≤ 292

FICH3 = > 292

END

ANALYTE GROUP: METALS

INTRODUCTION

Booz Allen proposes to incorporate these data validation decision rules (i.e., business rules) for metals into our automated data validation program for analytical data collected for the Hudson River Foundation (HRF) Contaminant Assessment Reduction Program (CARP). The majority of the limits cited in the attached rules are based on EPA methods 200.7, 200.9, 245.6, 1630, 1631, 1638 and 1640 and the SRM certified values. The qualification for sample results based on blank contamination has been taken directly from EPA data validation guidance. A summary table of all of the conditions assigned by the program (CARP_ALERTs) and the possible resultant usability code is attached (Metalsalerts.xls). The table should not be considered an exhaustive one, as all possible combinations of conditions are not listed, and the final usability code determinations will all be subject to the data validator's review and professional judgment.

In summary, the program assesses the following analytical quality control checks against the cited limits:

- Holding times from collection to extraction and extraction to analysis (method specific)
- Method, trip, field, and equipment blank concentration (EPA guidance limits: sample results < 5 X highest associated blank qualified)
- Lab Control, Blank Spike or Ongoing Precision and Recovery Standard recovery (method specific limits)
- SRM percent difference or percent recovery from certified value (SRM certificates)
- Matrix spike recovery (method specific limits)
- Lab duplicate and MS/MSD precision (method specific limits)

An additional rule for field duplicates is pending. No field duplicate precision goals were present in any QAPPs, so a reasonable limit has to be developed.

As we developed these rules based on selected SDGs culled from the Battelle database, if you are aware of issues with these rules and the bulk of your data, please contact Yvonne Fernandez at 703-917-2230 or Fernandez_Yvonne@bah.com.

METALS 1.0 UNDETECTED DUE TO ASSOCIATED BLANK CONCENTRATION RULE

ANALYSIS_METH: BR0002, 1631, 245.6, 1640, 1640MOD, 1638, 1638MOD, 1630, 1630CALC, 200.7, BR011, HGAFS, AAS-CD, EPA_200.9

CARP_ALERT CODE: U5HM, U5HT, U5HF, U5HE (Undetected, less than 5 X highest associated Blank where last letter denotes M= method blank, T = trip blank, F = Field blank, E = Equipment blank)

PARAM_CODE: ALL

APPLIES TO QC_CODE: DU, SA

MEDIA: ALL

Find EB, TB, FB associated with each QC_CODEs SA and DU. Find the MB in the same SDG as the SA and/or DU. The FB, EB and TB will have the same SURVEY_ID, or same START_DATE and STATION_ID. If UNITS for EB, FB, TB, and MB are all the same (but not PCT_REC), and match the UNITS for the SA and/or DU, then apply this rule.

Multiply the MB, FB, EB, and TB RESULTS (only if no U present in the LAB_QUAL field) for each PARAM_CODE by 5 and record as 5HM, 5HF, 5HE and 5HT, respectively. For each DU and SA associated with the MB, FB, EB and TB, identify the highest of the 5HM, 5HF, 5HE and 5HT levels. If SA or DU RESULT is less than the highest level, qualify the SA or DU RESULT for that PARAM_CODE with the following:

U5HM = result considered undetected, is less than 5 X associated method blank concentration

U5HT = result considered undetected, is less than 5 X associated trip blank concentration

U5HF = result considered undetected, is less than 5 X associated field blank concentration

U5HE = result considered undetected, is less than 5 X associated equipment blank concentration

METALS 2.0 EXCEEDED HOLDING TIME RULE

ANALYSIS_METH: 1640, 1640MOD, 1638, 1638MOD, 1630, 1630CALC, 200.7, BR011, HGAFS, AAS-CD, EPA_200.9

CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction or digestion)

PARAM_CODE: ALL

APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, LCS, LCSD, LCD, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following, add the CARP_ALERT code listed:

FHTE1 = > 180 days but ≤ 216 days

FHTE2 = > 216 days but ≤ 252 days

FHTE3 = > 252 days

ANALYSIS_METH: BR0002, 1631, 245.6

CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction or digestion)

PARAM_CODE: ALL
APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, LCS, LCSD, LCD, MB, MS, MSD, QADU,
QATP, SA, SRM, TB
MEDIA: ALL

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following,
add the CARP_ALERT code listed:

FHTE1 = > 28 days but ≤ 34 days
FHTE2 = > 34 days but ≤ 40 days
FHTE3 = > 40 days

METALS 3.0 METHOD BLANK FREQUENCY RULE

ANALYSIS_METH: BR0002, 1631, 245.6, 1640, 1640MOD, 1638, 1638MOD, 1630,
1630CALC, 200.7, BR011, HGAFS, AAS-CD, EPA_200.9

CARP_ALERT CODE: FMBF0 (Failed Method Blank Frequency)
PARAM_CODE: ALL
APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, LCSD, MS, MSD, QADU,
QATP, SA, SRM, TB
MEDIA: ALL

If QCID = MB is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FMBF0.

METALS 4.0 MATRIX SPIKE RECOVERY RULES

ANALYSIS_METH: 1631, 1631MOD, BR0002
CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix
Spike Recovery)
PARAM_CODE: 7439-97-6
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU,
QATP, SA, SRM, TB
MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is 7439-97-6 and UNIT reported is PCT_REC,
then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the
CARP_ALERT code listed to 7439-97-6 in the MS and/or MSD and to 7439-97-6 in all samples
in the same SDG as the MS and/or MSD:

FMSL1 = < 71 but ≥ 57
FMSL2 = < 57 but ≥ 43
FMSL3 = < 43

FMSH1 = > 125 but ≤ 150
FMSH2 = > 150 but ≤ 175
FMSH3 = > 175

ANALYSIS_METH: 1630, 1630CALC, BR0011
CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)
PARAM_CODE: CARP010
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is CARP010 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to CARP010 in the MS and/or MSD and to CARP010 in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 65 but ≥ 52
FMSL2 = < 52 but ≥ 39
FMSL3 = < 39

FMSH1 = > 135 but ≤ 160
FMSH2 = > 160 but ≤ 189
FMSH3 = > 189

ANALYSIS_METH: 200.7, EPA_200.9, 245.6REV2.3, AAS-CD, HGAFS
CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)
PARAM_CODE: ALL
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 75 but ≥ 60

FMSL2 = < 60 but ≥ 45

FMSL3 = < 45

FMSH1 = > 125 but ≤ 150

FMSH2 = > 150 but ≤ 1175

FMSH3 = > 175

ANALYSIS_METH: 1638, 1638MOD

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: 7440-43-9

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE = 7440-43-9 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to 7440-43-9 in the MS and/or MSD and to 7440-43-9 in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 84 but ≥ 67

FMSL2 = < 67 but ≥ 40

FMSL3 = < 40

FMSH1 = > 113 but ≤ 136

FMSH2 = > 136 but ≤ 190

FMSH3 = > 190

ANALYSIS_METH: 1640, 1640MOD

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: 7440-43-9

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE = 7440-43-9 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the

CARP_ALERT code listed to 7440-43-9 in the MS and/or MSD and to 7440-43-9 in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 73 but ≥ 58

FMSL2 = < 58 but ≥ 44

FMSL3 = < 44

FMSH1 = > 123 but ≤ 148

FMSH2 = > 148 but ≤ 207

FMSH3 = > 207

ANALYSIS_METH: 1640, 1640MOD

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: 7439-92-1

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE = 7439-92-1 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to 7439-92-1 in the MS and/or MSD and to 7439-92-1 in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 52 but ≥ 42

FMSL2 = < 42 but ≥ 31

FMSL3 = < 31

FMSH1 = > 144 but ≤ 173

FMSH2 = > 173 but ≤ 202

FMSH3 = > 202

METALS 5.0 LAB DUPLICATE and MS/MSD PRECISION RULES

ANALYSIS_METH: 200.7, EPA_200.9, 245.6REV2.3, 1630, 1630CALC, 1631, 1631MOD, 1638, 1638MOD, 1640, 1640MOD, AAS-CD, BR-0002, BR-0011, HGAFS

CARP_ALERT CODE: FLDP1, FLDP2, FLDP3 (Failed Lab Duplicate Precision)

PARAM_CODE: ALL

APPLIES TO QC_CODE: SA and QADU with same LAB_SAMP_ID

MEDIA: ALL

If QCID = QADU is not found in an SDG, do not apply this rule. If QADU is present in an SDG, and an SA with same LAB_SAMP_ID and same UNIT (not PCT_DIFF, or PCT_REC or concentration units) is also present in the same SDG, apply this rule. Calculate the Relative Percent Difference (RPD) for the QADU/SA pair as the difference between the QADU and SA RESULTS divided by the mean of the QADU and SA RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE in the QADU and SA and all samples in the same SDG as the QADU and SA:

FLDP1 = > 20 but ≤ 24

FLDP2 = > 24 but ≤ 28

FLDP3 = > 28

ANALYSIS_METH: 200.7, EPA_200.9, 245.6REV2.3, 1638, 1638MOD, 1640, 1640MOD, AAS-CD, BR-0002, BR-0011, HGAFS

CARP_ALERT CODE: FMSP1, FMSP2, FMSP3 (Failed Matrix Spike Precision)

PARAM_CODE: ALL

APPLIES TO QC_CODE: MS and MSD with same LAB_SAMP_ID in same SDG

MEDIA: ALL

If QCID = MS and MSD are not both found in an SDG, do not apply this rule. If MS and MSD are present in an SDG, with same LAB_SAMP_ID and same UNIT of PCT_REC, apply this rule. Calculate the Relative Percent Difference (RPD) for the MS/MSD pair as the difference between the MS and MSD RESULTS divided by the mean of the MS and MSD RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE in the MS and MSD and all samples in the same SDG as the MS and MSD:

FMSP1 = > 20 but ≤ 24

FMSP2 = > 24 but ≤ 28

FMSP3 = > 28

ANALYSIS_METH: 1630, 1630MOD

CARP_ALERT CODE: FMSP1, FMSP2, FMSP3 (Failed Matrix Spike Precision)

PARAM_CODE: CARP010

APPLIES TO QC_CODE: MS and MSD with same LAB_SAMP_ID in same SDG

MEDIA: ALL

If QCID = MS and MSD are not both found in an SDG, do not apply this rule. If MS and MSD are present in an SDG, with same LAB_SAMP_ID and same UNIT of PCT_REC, apply this rule. Calculate the Relative Percent Difference (RPD) for the MS/MSD pair as the difference between the MS and MSD RESULTS divided by the mean of the MS and MSD RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to CARP010 in the MS and MSD and all samples in the same SDG as the MS and MSD:

FMSP1 = > 35 but ≤ 42

FMSP2 = > 42 but ≤ 49

FMSP3 = > 49

ANALYSIS_METH: 1631, 1631MOD

CARP_ALERT CODE: FMSP1, FMSP2, FMSP3 (Failed Matrix Spike Precision)

PARAM_CODE: 7439-97-6

APPLIES TO QC_CODE: MS and MSD with same LAB_SAMP_ID in same SDG

MEDIA: ALL

If QCID = MS and MSD are not both found in an SDG, do not apply this rule. If MS and MSD are present in an SDG, with same LAB_SAMP_ID and same UNIT of PCT_REC, apply this rule. Calculate the Relative Percent Difference (RPD) for the MS/MSD pair as the difference between the MS and MSD RESULTS divided by the mean of the MS and MSD RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to 7439-97-6 in the MS and MSD and all samples in the same SDG as the MS and MSD:

FMSP1 = > 24 but ≤ 29

FMSP2 = > 29 but ≤ 34

FMSP3 = > 34

METALS 6.0 SRM RULES

ANALYSIS_METH: BR0002, 1631, 245.6, 1640, 1640MOD, 1638, 1638MOD, 1630, 1630CALC, 200.7, BR011, HGAFS, AAS-CD, EPA_200.9

CARP_ALERT CODE: FSRM1, FSRM2, FSRM3 (Failed SRM percent difference limits)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = SRM is not found in an SDG, do not apply this rule.

If QCID = SRM and SAMP_ID is one of those listed below and UNIT reported is PCT_DIFF, then apply this rule. If the PCT_DIFF exceeds the following in the SRM, add the CARP_ALERT code listed to that PARAM_CODE in the SRM and to that PARAM_CODE in all samples in the same SDG as the SRM:

SAMP_ID	PARAM_CODE	PCT_DIFF	CARP_ALERT
CASS-4	7440-38-2	> 14 but ≤ 17	FSRM1
CASS-4	7440-38-2	> 17 but ≤ 20	FSRM2
CASS-4	7440-38-2	> 20	FSRM3
CASS-4	7440-43-9	> 12 but ≤ 14	FSRM1
CASS-4	7440-43-9	> 14 but ≤ 17	FSRM2
CASS-4	7440-43-9	> 17	FSRM3
CASS-4	7439-92-1	> 37 but ≤ 44	FSRM1
CASS-4	7439-92-1	> 44 but ≤ 52	FSRM2
CASS-4	7439-92-1	> 52	FSRM3
DORM-2	7440-38-2	> 18 but ≤ 22	FSRM1
DORM-2	7440-38-2	> 22 but ≤ 25	FSRM2
DORM-2	7440-38-2	> 25	FSRM3
DORM-2	7440-43-9	> 19 but ≤ 23	FSRM1
DORM-2	7440-43-9	> 23 but ≤ 31	FSRM2
DORM-2	7440-43-9	> 31	FSRM3
DORM-2	7439-92-1	> 11 but ≤ 13	FSRM1
DORM-2	7439-92-1	> 13 but ≤ 15	FSRM2
DORM-2	7439-92-1	> 15	FSRM3
DORM-2	7439-97-6	> 6 but ≤ 7.2	FSRM1
DORM-2	7439-97-6	> 7.2 but ≤ 8.4	FSRM2
DORM-2	7439-97-6	> 8.4	FSRM3
DORM-2	CARP010	> 7 but ≤ 8.4	FSRM1
DORM-2	CARP010	> 8.4 but ≤ 9.8	FSRM2
DORM-2	CARP010	> 9.8	FSRM3
NRC_MESS-3	7440-38-2	> 5 but ≤ 6	FSRM1
NRC_MESS-3	7440-38-2	> 6 but ≤ 7	FSRM2
NRC_MESS-3	7440-38-2	> 7	FSRM3
NRC_MESS-3	7440-43-9	> 4 but ≤ 4.8	FSRM1
NRC_MESS-3	7440-43-9	> 4.8 but ≤ 5.6	FSRM2
NRC_MESS-3	7440-43-9	> 5.6	FSRM3
NRC_MESS-3	7439-92-1	> 3 but ≤ 3.6	FSRM1
NRC_MESS-3	7439-92-1	> 3.6 but ≤ 4.2	FSRM2
NRC_MESS-3	7439-92-1	> 4.2	FSRM3
NRC_MESS-3	7439-97-6	> 10 but ≤ 12	FSRM1
NRC_MESS-3	7439-97-6	> 12 but ≤ 14	FSRM2
NRC_MESS-3	7439-97-6	> 14	FSRM3
BCR_CRM_580	7439-97-6	> 2 but ≤ 2.4	FSRM1
BCR_CRM_580	7439-97-6	> 2.4 but ≤ 2.8	FSRM2
BCR_CRM_580	7439-97-6	> 2.8	FSRM3
BCR_CRM_580	CARP010	> 5 but ≤ 6	FSRM1
BCR_CRM_580	CARP010	> 6 but ≤ 7	FSRM2
BCR_CRM_580	CARP010	> 7	FSRM3
NIST 2976	7440-38-2	> 14 but ≤ 17	FSRM1
NIST 2976	7440-38-2	> 17 but ≤ 20	FSRM2
NIST 2976	7440-38-2	> 20	FSRM3
NIST 2976	7440-43-9	> 19 but ≤ 23	FSRM1
NIST 2976	7440-43-9	> 23 but ≤ 31	FSRM2
NIST 2976	7440-43-9	> 31	FSRM3
NIST 2976	7439-92-1	> 15 but ≤ 18	FSRM1
NIST 2976	7439-92-1	> 18 but ≤ 21	FSRM2
NIST 2976	7439-92-1	> 21	FSRM3
NIST 2976	CARP010	> 4 but ≤ 4.8	FSRM1

SAMP_ID	PARAM_CODE	PCT_DIFF	CARP_ALERT
NIST 2976	CARP010	> 4.8 but ≤ 6.7	FSRM2
NIST 2976	CARP010	> 6.7	FSRM3
NIST 2976	7439-97-6	> 3 but ≤ 3.6	FSRM1
NIST 2976	7439-97-6	> 3.6 but ≤ 4.2	FSRM2
NIST 2976	7439-97-6	> 4.2	FSRM3
NIST 2709	7440-38-2	> 4 but ≤ 4.8	FSRM1
NIST 2709	7440-38-2	> 4.8 but ≤ 6.7	FSRM2
NIST 2709	7440-38-2	> 6.7	FSRM3
NIST 2709	7440-43-9	> 4 but ≤ 4.8	FSRM1
NIST 2709	7440-43-9	> 4.8 but ≤ 5.6	FSRM2
NIST 2709	7440-43-9	> 5.6	FSRM3
NIST 2709	7439-92-1	> 3 but ≤ 3.6	FSRM1
NIST 2709	7439-92-1	> 3.6 but ≤ 4.2	FSRM2
NIST 2709	7439-92-1	> 4.2	FSRM3
NIST 2709	7439-97-6	> 6 but ≤ 7.2	FSRM1
NIST 2709	7439-97-6	> 7.2 but ≤ 8.4	FSRM2
NIST 2709	7439-97-6	> 8.4	FSRM3
NIST 1643d	7440-38-2	> 1.3 but ≤ 1.6	FSRM1
NIST 1643d	7440-38-2	> 1.6 but ≤ 1.8	FSRM2
NIST 1643d	7440-38-2	> 1.8	FSRM3
NIST 1643d	7440-43-9	> 6 but ≤ 7.2	FSRM1
NIST 1643d	7440-43-9	> 7.2 but ≤ 8.4	FSRM2
NIST 1643d	7440-43-9	> 8.4	FSRM3
NIST 1643d	7439-92-1	> 4 but ≤ 4.8	FSRM1
NIST 1643d	7440-43-9	> 4.8 but ≤ 5.6	FSRM2
NIST 1643d	7439-92-1	> 5.6	FSRM3

ANALYSIS_METH: BR0002, 1631, 245.6, 1640, 1640MOD, 1638, 1638MOD, 1630, 1630CALC, 200.7, BR011, HGAFS, AAS-CD, EPA_200.9

CARP_ALERT CODE: FSRL1, FSRL2, FSRL3, FSRH1, FSRH2, FSRH3 (Failed SRM recovery limits)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = SRM is not found in an SDG, do not apply this rule.

If QCID = SRM and SAMP_ID is one of those listed below and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the SRM, add the CARP_ALERT code listed to that PARAM_CODE in the SRM and to that PARAM_CODE in all samples in the same SDG as the SRM:

SAMP_ID	PARAM_CODE	FSRL1	FSRL2	FSRL3	FSRH1	FSRH2	FSRH3
NIST 1643d	7440-38-2	< 99 but ≥ 79	< 79 but ≥ 59	< 59	> 101 but ≤ 121	> 121 but ≤ 141	> 141
NIST 1643d	7440-43-9	< 94 but ≥ 75	< 75 but ≥ 56	< 56	> 106 but ≤ 127	> 127 but ≤ 148	> 148

SAMP_ID	PARAM_CODE	FSRL1	FSRL2	FSRL3	FSRH1	FSRH2	FSRH3
NIST 1643d	7439-92-1	< 96 but ≥ 77	< 77 but ≥ 58	< 58	> 104 but ≤ 125	> 125 but ≤ 146	> 146
NIST 2709	7440-38-2	< 95 but ≥ 76	< 76 but ≥ 57	< 57	> 103 but ≤ 124	> 124 but ≤ 144	> 144
NIST 2709	7440-43-9	< 97 but ≥ 78	< 78 but ≥ 58	< 58	> 103 but ≤ 124	> 124 but ≤ 144	> 144
NIST 2709	7439-92-1	< 97 but ≥ 78	< 78 but ≥ 58	< 58	> 103 but ≤ 124	> 124 but ≤ 144	> 144
NIST 2709	7439-97-6	< 94 but ≥ 75	< 75 but ≥ 56	< 56	> 106 but ≤ 127	> 127 but ≤ 148	> 148
NIST 2976	7440-38-2	< 86 but ≥ 69	< 69 but ≥ 52	< 52	> 113 but ≤ 136	> 136 but ≤ 158	> 158
NIST 2976	7440-43-9	< 80 but ≥ 64	< 64 but ≥ 48	< 48	> 119 but ≤ 143	> 143 but ≤ 167	> 167
NIST 2976	7439-92-1	< 85 but ≥ 68	< 68 but ≥ 51	< 51	> 115 but ≤ 138	> 138 but ≤ 161	> 161
NIST 2976	7439-97-6	< 94 but ≥ 75	< 75 but ≥ 56	< 56	> 106 but ≤ 127	> 127 but ≤ 148	> 148
NIST 2976	CARP010	< 96 but ≥ 77	< 77 but ≥ 58	< 58	> 104 but ≤ 125	> 125 but ≤ 146	> 146
BCR_CRM_580	7439-97-6	< 98 but ≥ 78	< 78 but ≥ 59	< 59	> 102 but ≤ 122	> 122 but ≤ 143	> 143
BCR_CRM_580	CARP010	< 95 but ≥ 76	< 76 but ≥ 57	< 57	> 105 but ≤ 126	> 126 but ≤ 147	> 147
NRC_MESS-3	7440-38-2	< 95 but ≥ 76	< 76 but ≥ 57	< 57	> 105 but ≤ 126	> 126 but ≤ 147	> 147
NRC_MESS-3	7440-43-9	< 96 but ≥ 77	< 77 but ≥ 58	< 58	> 104 but ≤ 125	> 125 but ≤ 146	> 146
NRC_MESS-3	7439-92-1	< 97 but ≥ 78	< 78 but ≥ 58	< 58	> 103 but ≤ 124	> 124 but ≤ 144	> 144
NRC_MESS-3	7439-97-6	< 90 but ≥ 72	< 72 but ≥ 54	< 54	> 110 but ≤ 132	> 132 but ≤ 154	> 154
DORM-2	7440-38-2	< 94 but ≥ 75	< 75 but ≥ 56	< 56	> 106 but ≤ 127	> 127 but ≤ 148	> 148
DORM-2	7440-43-9	< 81 but ≥ 65	< 65 but ≥ 49	< 49	> 119 but ≤ 143	> 143 but ≤ 167	> 167
DORM-2	7439-92-1	< 89 but ≥ 71	< 71 but ≥ 53	< 53	> 111 but ≤ 133	> 133 but ≤ 155	> 155
DORM-2	7439-97-6	< 94 but ≥ 75	< 75 but ≥ 56	< 56	> 106 but ≤ 127	> 127 but ≤ 148	> 148
DORM-2	CARP010	< 93 but ≥ 74	< 74 but ≥ 56	< 56	> 107 but ≤ 128	> 128 but ≤ 150	> 150

METALS 7.0 BS, LCS or OPR RULES

ANALYSIS_METH: BR0002, 1631, 245.6, 1640, 1640MOD, 1638, 1638MOD, 1630, 1630CALC, 200.7, BR011, HGAFS, AAS-CD, EPA_200.9

CARP_ALERT CODE: FCSF0 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Frequency)

PARAM_CODE: ALL

APPLIES TO QC_CODE: DU, EB, FB, MB, MS, MSD, SA, TB, QADU, QATP
MEDIA: ALL

If QCID = BS, LCS, LCD, LCSD or OPR is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FCSF0.

ANALYSIS_METH: 1631, 1631MOD, BR0002, 245.6REV3.2
CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Blank Spike, Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)
PARAM_CODE: 7439-97-6
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = BS, LCS, LCD, LCSD or OPR is not found in the SDG, do not apply this rule.

If QCID = BS, LCS, LCD, LCSD or OPR and PARAM_CODE is 7439-97-6 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the BS, LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to 7439-97-6 in the BS, LCS, LCSD, LCD or OPR and to 7439-97-6 in all samples in the same SDG as the BS, LCS, LCSD, LCD or OPR:

FCSL1 = < 77 but \geq 62
FCSL2 = < 62 but \geq 47
FCSL3 = < 47

FCSH1 = > 123 but \leq 148
FCSH2 = > 148 but \leq 173
FCSH3 = > 173

ANALYSIS_METH: 200.7, EPA_200.9, HGAFS, AAS-CD
CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Blank Spike, Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)
PARAM_CODE: ALL
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = BS, LCS, LCD, LCSD or OPR is not found in the SDG, do not apply this rule.

If QCID = BS, LCS, LCD, LCSD or OPR and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the BS, LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the BS, LCS, LCSD, LCD or OPR and to that PARAM_CODE in all samples in the same SDG as the BS, LCS, LCSD, LCD or OPR:

FCSL1 = < 80 but \geq 96

FCSL2 = < 96 but ≥ 48
FCSL3 = < 48

FCSH1 = > 120 but ≤ 144
FCSH2 = > 144 but ≤ 168
FCSH3 = > 168

ANALYSIS_METH: 1630, 1630MOD, 1630CALC, BR0011
CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Blank Spike, Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)
PARAM_CODE: CARP010
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = BS, LCS, LCD, LCSD or OPR is not found in the SDG, do not apply this rule.

If QCID = BS, LCS, LCD, LCSD or OPR and PARAM_CODE is CARP010 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the BS, LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to CARP010 in the BS, LCS, LCSD, LCD or OPR and to CARP010 in all samples in the same SDG as the BS, LCS, LCSD, LCD or OPR:

FCSL1 = < 67 but ≥ 54
FCSL2 = < 54 but ≥ 40
FCSL3 = < 40

FCSH1 = > 133 but ≤ 160
FCSH2 = > 160 but ≤ 187
FCSH3 = > 187

ANALYSIS_METH: 1638, 1638MOD
CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Blank Spike, Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)
PARAM_CODE: 7440-43-9
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = BS, LCS, LCD, LCSD or OPR is not found in the SDG, do not apply this rule.

If QCID = BS, LCS, LCD, LCSD or OPR and PARAM_CODE is 7440-43-9 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the BS, LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to 7440-43-9 in the BS, LCS, LCSD, LCD or OPR and to 7440-43-9 in all samples in the same SDG as the BS, LCS, LCSD, LCD or OPR:

FCSL1 = < 84 but ≥ 67
FCSL2 = < 67 but ≥ 40
FCSL3 = < 40

FCSH1 = > 113 but ≤ 136
FCSH2 = > 136 but ≤ 190
FCSH3 = > 190

ANALYSIS_METH: 1640, 1640MOD

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Blank Spike, Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: 7440-43-9

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, OPR,
QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = BS, LCS, LCD, LCSD or OPR is not found in the SDG, do not apply this rule.

If QCID = BS, LCS, LCD, LCSD or OPR and PARAM_CODE is 7440-43-9 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the BS, LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to 7440-43-9 in the BS, LCS, LCSD, LCD or OPR and to 7440-43-9 in all samples in the same SDG as the BS, LCS, LCSD, LCD or OPR:

FCSL1 = < 73 but ≥ 58
FCSL2 = < 58 but ≥ 44
FCSL3 = < 44

FCSH1 = > 123 but ≤ 148
FCSH2 = > 148 but ≤ 207
FCSH3 = > 207

ANALYSIS_METH: 1640, 1640MOD

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Blank Spike, Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: 74439-92-1

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, OPR,
QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = BS, LCS, LCD, LCSD or OPR is not found in the SDG, do not apply this rule.

If QCID = BS, LCS, LCD, LCSD or OPR and PARAM_CODE is 7439-92-1 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the BS, LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to 7439-92-1 in the BS, LCS, LCSD, LCD or OPR and to 7439-92-1 in all samples in the same SDG as the BS, LCS, LCSD, LCD or OPR:

FCSL1 = < 52 but ≥ 42

FCSL2 = < 42 but ≥ 31

FCSL3 = < 31

FCSH1 = > 144 but ≤ 173

FCSH2 = > 173 but ≤ 202

FCSH3 = > 202

END

ANALYTE GROUP: PAHs

INTRODUCTION

Booz Allen proposes to incorporate these data validation decision rules (i.e., business rules) for polyaromatic hydrocarbons (PAHs) into our automated data validation program for analytical data collected for the Hudson River Foundation (HRF) Contaminant Assessment Reduction Program (CARP). The majority of the limits cited are based on method NYSDECHRMS-3, method NYSDECLRMS-3, and SW846 method 8270C. Limits in the business rules for lab duplicates, Standard Reference Materials, and the qualification for sample results based on blank contamination have been taken either from existing CARP Quality Assurance Project Plans (QAPPs) or EPA data validation guidance. A summary table of all of the conditions assigned by the program (CARP_ALERTs) and the possible resultant usability code is attached (PAHalerts.xls). The table should not be considered an exhaustive one, as all possible combinations of conditions are not listed, and the final usability code determinations will be subject to the data validator's review and professional judgment.

In summary, the program assesses the following analytical quality control checks against the cited limits:

- Holding times from collection to extraction and extraction to analysis (NYSDECHRMS-3 and 8270C limits)
- Method, trip, field, and equipment blank concentration (EPA guidance limits: sample results < 5 X highest associated blank qualified)
- Lab Control or Ongoing Precision and Recovery Standard recovery (NYSDECHRMS-3 limits)
- SRM percent difference from certified value (NJ Study 1G QAPP 30 % difference limits)
- Matrix spike recovery (NJ Study 1G QAPP limits)
- Recovery standard recovery (NJ Study 1G QAPP limits)
- Independent Control Standard recovery (NJ Study 1G QAPP limits)
- Lab duplicate precision (100 % RPD limit used by EPA in LMMB)

An additional rule for field duplicates is pending. No field duplicate precision goals were present in any QAPPs, so a reasonable limit has to be developed.

As we developed these rules based on selected SDGs culled from the Battelle database, if you are aware of issues with these rules and the bulk of your data, please contact Yvonne Fernandez at 703-917-2230 or Fernandez_Yvonne@bah.com.

PAH 1.0 UNDETECTED DUE TO ASSOCIATED BLANK CONCENTRATION RULE

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: U5HM, U5HT, U5HF, U5HE (Undetected, less than 5 X highest associated Blank where last letter denotes M= method blank, T = trip blank, F = Field blank, E = Equipment blank)

PARAM_CODE: ALL

APPLIES TO QC_CODE: DU, SA

MEDIA: ALL

Find EB, TB, FB associated with each QC_CODEs SA and DU. The FB, EB and TB will have the same SURVEY_ID, or same START_DATE and STATION_ID. If UNITS for EB, FB, TB and the UNITS for the MB RESULTS in the same SDG or SDGs as the DU and SA are all the same (but not PCT_REC), then apply this rule.

Multiply the MB, FB, EB, and TB RESULTS for each PARAM_CODE by 5 and record as 5HM, 5HF, 5HE and 5HT, respectively. For each DU and SA associated with the MB, FB, EB and TB, identify the highest of the 5HM, 5HF, 5HE and 5HT levels. If SA or DU RESULT is less than the highest level, qualify the SA or DU RESULT for that PARAM_CODE with the following:

U5HM = result considered undetected, is less than 5 X associated method blank concentration

U5HT = result considered undetected, is less than 5 X associated trip blank concentration

U5HF = result considered undetected, is less than 5 X associated field blank concentration

U5HE = result considered undetected, is less than 5 X associated equipment blank concentration

PAH 2.0 EXCEEDED HOLDING TIME RULE

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction)

PARAM_CODE: ALL

APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, LCS, LCSD, LCD, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL except BRACKISH SURF. WATER, FILTERED WATER, FILTERED WATER (AE, GF/F), FILTERED WATER (GF/B), FILTERED WATER ACROCAP, FILTERED WATER, POST XAD, FRESH, SURF., F, FRESH, SURF., FILTERED, FRESHWATER, LANDFILL LEACHATE, REAGENT WATER, TREATED WASTEWA, TREATED

WASTEWATER, UNFILTERED WATE, UNFILTERED WATER,
WASTEWATER, UNTREATED, WESTEWATER, UNTREATED

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following,
add the CARP_ALERT code listed:

FHTE1 = > 14 days but ≤ 17 days

FHTE2 = > 17 days but ≤ 20 days

FHTE3 = > 20 days

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction)

PARAM_CODE: ALL

APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, LCS, LCSD, LCD, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: BRACKISH SURF. WATER, FILTERED WATER, FILTERED WATER (AE, GF/F), FILTERED WATER (GF/B), FILTERED WATER ACROCAP, FILTERED WATER, POST XAD, FRESH, SURF., F, FRESH, SURF., FILTERED, FRESHWATER, LANDFILL LEACHATE, REAGENT WATER, TREATED WASTEWA, TREATED WASTEWATER, UNFILTERED WATE, UNFILTERED WATER, WASTEWATER, UNTREATED, WESTEWATER, UNTREATED

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following,
add the CARP_ALERT code listed:

FHTE1 = > 7 days but ≤ 8 days

FHTE2 = > 8 days but ≤ 10 days

FHTE3 = > 10 days

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FHTA1, FHTA2, FHTA3 (Failed holding time from extraction to analysis)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCS, LCSD, LCD, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If the number of days elapsed from EXTRACT_DATE to ANALYSIS_DATE exceeds the following, add the CARP_ALERT code listed:

FHTA1 = > 40 days but ≤ 48 days

FHTA2 = > 48 days but ≤ 56 days
FHTA3 = > 56 days

PAH 3.0 METHOD BLANK FREQUENCY RULE

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMBF0 (Failed Method Blank Frequency)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, LCSD, MS, MSD, QADU,
QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MB is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FMBF0.

PAH 4.0 MATRIX SPIKE RECOVERY RULES

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: ALL except CARP002, CARP003, CARP004, CARP082, CARP120, CARP121, CARP080, CARP079, CARP085, CARP119, 1146-65-2, 1517-22-2, 1718-52-1, 1719-03-5, 63466-71-7, 1520-96-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU,
QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 50 but ≥ 40

FMSL2 = < 40 but ≥ 30

FMSL3 = < 30

FMSH1 = > 150 but ≤ 180

FMSH2 = > 180 but ≤ 210

FMSH3 = > 210

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: CARP002, CARP003, CARP082, CARP120, CARP121, CARP080, CARP079, CARP085, CARP119, 1517-22-2, 1718-52-1, 1719-03-5, 63466-71-7, 1520-96-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 30 but ≥ 24

FMSL2 = < 24 but ≥ 18

FMSL3 = < 18

FMSH1 = > 120 but ≤ 144

FMSH2 = > 144 but ≤ 168

FMSH3 = > 168

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: CARP004

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE = CARP004 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 20 but ≥ 16

FMSL2 = < 16 but ≥ 12

FMSL3 = < 12

FMSH1 = > 120 but ≤ 144

FMSH2 = > 144 but ≤ 168

FMSH3 = > 168

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: 1146-65-2

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE = 1146-65-2 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 15 but ≥ 12

FMSL2 = < 12 but ≥ 9

FMSL3 = < 9

FMSH1 = > 120 but ≤ 144

FMSH2 = > 144 but ≤ 168

FMSH3 = > 168

PAH 5.0 LAB DUPLICATE PRECISION RULE

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FLDP1, FLDP2, FLDP3 (Failed Lab Duplicate Precision)

PARAM_CODE: ALL

APPLIES TO QC_CODE: SA and QADU with same LAB_SAMP_ID

MEDIA: ALL

If QCID = QADU is not found in an SDG, do not apply this rule. If QADU is present in an SDG, and an SA with same LAB_SAMP_ID and same UNIT (not PCT_DIFF, or PCT_REC or concentration units) is also present in the same SDG, apply this rule. Calculate the Relative Percent Difference (RPD) for the QADU/SA pair as the difference between the QADU and SA RESULTS divided by the mean of the QADU and SA RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE in the QADU and SA and all samples in the same SDG as the QADU and SA:

FLDP1 = > 100 but ≤ 120

FLDP2 = > 120 but ≤ 140

FLDP3 = > 140

PAH 6.0 SRM RULE

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FSRM1, FSRM2, FSRM3 (Failed SRM percent difference limits)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = SRM is not found in an SDG, do not apply this rule.

If QCID = SRM and PARAM_CODE is one of those listed below and UNIT reported is PCT_DIFF, then apply this rule. If the PCT_DIFF exceeds the following in the SRM, add the CARP_ALERT code listed to that PARAM_CODE in the SRM and to that PARAM_CODE in all samples in the same SDG as the SRM:

FSRM1 = > 30 but ≤ 36

FSRM2 = > 36 but ≤ 42

FSRM3 = > 42

PAH 7.0 LCS or OPR RULES

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FCSF0 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Frequency)

PARAM_CODE: ALL

APPLIES TO QC_CODE: DU, EB, FB, MB, MS, MSD, SA, TB, QADU, QATP

MEDIA: ALL

If QCID = LCS, LCD, LCSD or OPR is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FCSF0.

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: ALL except CARP002, CARP003, CARP004, CARP082, CARP120, CARP121, CARP080, CARP079, CARP085, CARP119, 1146-65-2, 1517-22-2, 1718-52-1, 1719-03-5, 63466-71-7, 1520-96-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = LCS, LCD, LCSD or OPR and PARAM_CODE is one of those listed below and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS, LCSD, LCD or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS, LCSD, LCD or OPR:

FCSL1 = < 50 but \geq 40

FCSL2 = < 40 but \geq 30

FCSL3 = < 30

FCSH1 = > 150 but \leq 180

FCSH2 = > 180 but \leq 210

FCSH3 = > 210

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: CARP002, CARP003, CARP082, CARP120, CARP121, CARP080, CARP079, CARP085, CARP119, 1517-22-2, 1718-52-1, 1719-03-5, 63466-71-7, 1520-96-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = LCS, LCD, LCSD or OPR and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS, LCSD, LCD or OPR:

FCSL1 = < 30 but \geq 24

FCSL2 = < 24 but \geq 18

FCSL3 = < 18

FCSH1 = > 120 but ≤ 144

FCSH2 = > 144 but ≤ 168

FCSH3 = > 168

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: CARP004

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = LCS, LCD, LCSD or OPR is not found in an SDG, do not apply this rule.

If QCID = LCS, LCD, LCSD or OPR and PARAM_CODE = CARP004 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS, LCD, LCSD or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS, LCD, LCSD or OPR:

FCSL1 = < 20 but ≥ 16

FCSL2 = < 16 but ≥ 12

FCSL3 = < 12

FCSH1 = > 120 but ≤ 144

FCSH2 = > 144 but ≤ 168

FCSH3 = > 168

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: 1146-65-2

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = LCS, LCD, LCSD or OPR is not found in an SDG, do not apply this rule.

If QCID = LCS, LCD, LCSD or OPR and PARAM_CODE = 1146-65-2 and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS, LCD, LCSD or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS, LCD,

LCSD or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS, LCD, LCSD or OPR:

FCSL1 = < 15 but \geq 12

FCSL2 = < 12 but \geq 9

FCSL3 = < 9

FCSH1 = > 120 but \leq 144

FCSH2 = > 144 but \leq 168

FCSH3 = > 168

PAH 8.0 LABELED SPIKE RECOVERY RULE

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FLCF0 (Failed Labeled Compound Spiking Frequency)

PARAM_CODE: CARP002, CARP003, CARP004, CARP082, CARP120, CARP121, CARP080, CARP079, CARP085, CARP119, 1146-65-2, 1517-22-2, 1718-52-1, 1719-03-5, 63466-71-7, 1520-96-3

APPLIES TO QC_CODE: ALL

MEDIA: ALL

If a PARAM_CODE listed above is not present for the LAB_SAMP_ID with the QC_CODE listed and/or UNIT = PCT_REC field is empty for the LAB_SAMP_ID with the QC_CODE listed, then apply this rule. Add the CARP_ALERT code of FLCF0 to the associated PARAM_CODE as listed in the table below:

Labeled Compound PARAM_CODEs and Associated PARAM_CODE:

CARP002	53-70-3
CARP003	191-24-2
CARP004	92-52-4, 91-57-6, 90-12-0
CARP082	193-39-5
CARP120	205-99-2
CARP121	207-08-9
CARP080	56-55-3
CARP079	206-44-0
CARP085	581-42-0, 2245-38-7, 1576-67-6
CARP119	208-96-8, 83-32-9
1146-65-2	91-20-3
1517-22-2	86-73-7, 85-01-8, 2531-84-2, 120-12-7, 832-69-9
1718-52-1	129-00-0
1719-03-5	218-01-9

63466-71-7	50-32-8, 192-97-2
1520-96-3	198-55-0

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FLCL1, FLCL2, FLCL3, FLCH1, FLCH2, FLCH3 (Failed Labeled Compound Recovery)

PARAM_CODE: CARP002, CARP003, CARP082, CARP120, CARP121, CARP080, CARP079, CARP085, CARP119, 1517-22-2, 1718-52-1, 1719-03-5, 63466-71-7, 1520-96-3
 CARP004

APPLIES TO QC_CODE: ALL

MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE and the associated PARAM_CODE as listed in the table above:

FLCL1 = < 30 but ≥ 24

FLCL2 = < 24 but ≥ 18

FLCL3 = < 18

FLCH1 = > 120 but ≤ 144

FLCH2 = > 144 but ≤ 168

FLCH3 = > 168

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: CARP004

APPLIES TO QC_CODE: ALL

MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE and the associated PARAM_CODE as listed in the table above:

FLCL1 = < 20 but ≥ 16

FLCL2 = < 16 but ≥ 12

FLCL3 = < 12

FLCH1 = > 120 but ≤ 144

FLCH2 = > 144 but ≤ 168

FLCH3 = > 168

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: 1146-65-2

APPLIES TO QC_CODE: ALL

MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE and the associated PARAM_CODE as listed in the table above:

FLCL1 = < 15 but \geq 12

FLCL2 = < 12 but \geq 9

FLCL3 = < 9

FLCH1 = > 120 but \leq 144

FLCH2 = > 144 but \leq 168

FLCH3 = > 168

PAH 9.0 INDEPENDENT CONTROL STANDARD RECOVERY RULES

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: ALL except CARP002, CARP003, CARP004, CARP082, CARP120, CARP121, CARP080, CARP079, CARP085, CARP119, 1146-65-2, 1517-22-2, 1718-52-1, 1719-03-5, 63466-71-7, 1520-96-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, LCSD, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = ICS is not found in an SDG, do not apply this rule.

If QCID = ICS and PARAM_CODE is one of those listed below and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

FICL1 = < 70 but \geq 56

FICL2 = < 56 but \geq 42

FICL3 = < 42

FICH1 = > 130 but ≤ 156

FICH2 = > 156 but ≤ 182

FICH3 = > 182

ANALYSIS_METH: NYSDECHRMS3, NYSDECLRMS3, SW846_8270C_MOD, BATD5-157

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: CARP002, CARP003, CARP082, CARP120, CARP121, CARP080, CARP079, CARP085, CARP119, 1517-22-2, 1718-52-1, 1719-03-5, 63466-71-7, 1520-96-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = ICS and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

FLCL1 = < 30 but ≥ 24

FLCL2 = < 24 but ≥ 18

FLCL3 = < 18

FLCH1 = > 120 but ≤ 144

FLCH2 = > 144 but ≤ 168

FLCH3 = > 168

END

ANALYTE GROUP: PCBs

INTRODUCTION

Booz Allen proposes to incorporate these data validation decision rules (i.e., business rules) for polychlorinated biphenyls (PCBs) into our automated data validation program for analytical data collected for the Hudson River Foundation (HRF) Contaminant Assessment Reduction Program (CARP). The basis of the majority of the limits cited in the attached rules is SW846 method 1668A. Limits in the business rules for laboratory duplicates, Standard Reference Materials (SRM), and the qualification for sample results based on blank contamination have been taken either from existing CARP Quality Assurance Project Plans (QAPPs) or EPA data validation guidance. A summary table of all of the conditions assigned by the program (CARP_ALERTs) and the possible resultant usability code is attached (PCBalerts.xls). The table should not be considered an exhaustive one, as all possible combinations of conditions are not listed, and the final usability code determinations will be subject to the data validator's review and professional judgment.

In summary, the program assesses the following analytical quality control checks against the cited limits:

- Holding times from collection to extraction and extraction to analysis (1668A limits)
- Method, trip, field, and equipment blank concentration (EPA guidance limits: sample results < 5 X highest associated blank qualified)
- Lab Control or Ongoing Precision and Recovery Standard recovery (1668A limits)
- SRM percent difference from certified value (NJ Study 1G QAPP 30 % difference limits)
- Matrix spike recovery (NJ Study 1G QAPP limits)
- Recovery standard recovery (1668A limits)
- Clean up standard recovery (1668A limits)
- Independent Control Standard recovery (1668A limits)
- Lab duplicate precision (100 % RPD limit used by EPA in LMMB)

An additional rule for field duplicates is pending. No field duplicate precision goals were present in any QAPPs, so a reasonable limit has to be developed.

As we developed these rules based on selected SDGs culled from the Battelle database, if you are aware of issues with these rules and the bulk of your data, please contact Yvonne Fernandez at 703-917-2230 or Fernandez_Yvonne@bah.com.

PCBS 1.0 UNDETECTED DUE TO ASSOCIATED BLANK CONCENTRATION RULE

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB, NYSDECLRMS1, HCFS-PCB/OC
CARP_ALERT CODE: U5HM, U5HT, U5HF, U5HE (Undetected, less than 5 X highest associated Blank where last letter denotes M = method blank, T = trip blank, F = Field blank, E = Equipment blank)
PARAM_CODE: ALL
APPLIES TO QC_CODE: DU, SA
MEDIA: ALL

Find EB, TB, FB associated with each QC_CODEs SA and DU. The FB, EB and TB will have the same SURVEY_ID, or same START_DATE and STATION_ID. If UNITS for EB, FB, TB and the UNITS for the MB RESULTS in the same SDG or SDGs as the DU and SA are all the same (but not PCT_REC), then apply this rule.

Multiply the MB, FB, EB, and TB RESULTS for each PARAM_CODE by 5 and record as 5HM, 5HF, 5HE and 5HT, respectively. For each DU and SA associated with the MB, FB, EB and TB, identify the highest of the 5HM, 5HF, 5HE and 5HT levels. If SA or DU RESULT is less than the highest level, qualify the SA or DU RESULT for that PARAM_CODE with the following:

U5HM = result considered undetected, is less than 5 X associated method blank concentration
U5HT = result considered undetected, is less than 5 X associated trip blank concentration
U5HF = result considered undetected, is less than 5 X associated field blank concentration
U5HE = result considered undetected, is less than 5 X associated equipment blank concentration

PCBS 2.0 EXCEEDED HOLDING TIME RULE

ANALYSIS_METH: 1668 A, (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB, NYSDECLRMS1, HCFS-PCB/OC
CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction)
PARAM_CODE: ALL
APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following, add the CARP_ALERT code listed:

FHTE1 = > 365 days but ≤ 438 days

FHTE2 = > 438 days but ≤ 511 days

FHTE3 = > 511 days

ANALYSIS_METH: 1668 A, (PCBs) 1668extended, AXYSHRMSPCB_COP,
AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB,
NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FHTA1, FHTA2, FHTA3 (Failed holding time from extraction to analysis)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM,
TB

MEDIA: ALL

If the number of days elapsed from EXTRACT_DATE to ANALYSIS_DATE exceeds the following, add the CARP_ALERT code listed:

FHTA1 = > 365 days but ≤ 438 days

FHTA2 = > 438 days but ≤ 511 days

FHTA3 = > 511 days

PCBS 3.0 METHOD BLANK FREQUENCY RULE

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP,
AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB,
NYSDECLRMS1

CARP_ALERT CODE: FMBF0 (Failed Method Blank Frequency)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MS, MSD, QADU, QATP, SA,
SRM, TB

MEDIA: ALL

If QCID = MB is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FMBF0.

PCBS 4.0 MATRIX SPIKE RECOVERY RULES

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP,
AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB,
NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: 2051-60-7, 2051-62-9, 13029-08-8, 2050-68-2, 38444-73-4, 38444-90-5, 15968-05-5, 32598-13-3, 70362-50-4, 56558-16-8, 32598-14-4, 74472-37-0, 31508-00-6, 65510-

44-3, 57465-28-8, 33979-03-2, 38380-08-4, 69782-90-7, 52663-72-6, 32774-16-6, 74487-85-7, 39635-31-9, 2136-99-4, 74472-53-0, 40186-72-9, 52663-77-1, 2051-24-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 50 but \geq 40

FMSL2 = < 40 but \geq 30

FMSL3 = < 30

FMSH1 = > 150 but \leq 180

FMSH2 = > 180 but \leq 210

FMSH3 = > 210

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRM1, 1613_COP_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: CARP108, CARP011, CARP109, CARP013, CARP110, CARP105, CARP112, CARP015, CARP016, CARP113, CARP017, CARP054, CARP019, CARP055, CARP020, CARP114, CARP021, CARP022, CARP023, CARP024, CARP115, CARP026, CARP116, CARP117, CARP057, CARP122, CARP029

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 30 but \geq 24

FMSL2 = < 24 but \geq 18
FMSL3 = < 18

FMSH1 = > 140 but \leq 168
FMSH2 = > 168 but \leq 196
FMSH3 = > 196

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP,
AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB,
NYSDECLRMS1, HCFS-PCB/OC
CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix
Spike Recovery)
PARAM_CODE: CARP014, CARP018, CARP074
APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MB, MS, MSD, QADU, QATP,
SA, SRM, TB
MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is
PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD,
add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that
PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 40 but \geq 32
FMSL2 = < 32 but \geq 24
FMSL3 = < 24

FMSH1 = > 125 but \leq 150
FMSH2 = > 150 but \leq 175
FMSH3 = > 175

PCBS 5.0 LAB DUPLICATE PRECISION RULE

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP,
AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB,
NYSDECLRMS1, HCFS-PCB/OC
CARP_ALERT CODE: FLDP1, FLDP2, FLDP3 (Failed Lab Duplicate Precision)
PARAM_CODE: ALL
APPLIES TO QC_CODE: SA and QADU with same LAB_SAMP_ID
MEDIA: ALL

If QCID = QADU is not found in an SDG, do not apply this rule. If QADU is present in an SDG, and an SA with same LAB_SAMP_ID and same UNIT (not PCT_DIFF, or PCT_REC or concentration units) is also present in the same SDG, apply this rule. Calculate the Relative Percent Difference (RPD) for the QADU/SA pair as the difference between the QADU and SA RESULTS divided by the mean of the QADU and SA RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE in the QADU and SA and all samples in the same SDG as the QADU and SA:

FLDP1 = > 100 but ≤ 120

FLDP2 = > 120 but ≤ 140

FLDP3 = > 140

PCBS 6.0 SRM RULE

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FSRM1, FSRM2, FSRM3 (Failed SRM percent difference limits)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = SRM is not found in an SDG, do not apply this rule.

If QCID = SRM and PARAM_CODE is one of those listed below and UNIT reported is PCT_DIFF, then apply this rule. If the PCT_DIFF exceeds the following in the SRM, add the CARP_ALERT code listed to that PARAM_CODE in the SRM and to that PARAM_CODE in all samples in the same SDG as the SRM:

FSRM1 = > 30 but ≤ 36

FSRM2 = > 36 but ≤ 42

FSRM3 = > 42

PCBS 7.0 LCS or OPR RULES

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FCSF0 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Frequency)

PARAM_CODE: ALL

APPLIES TO QC_CODE: DU, EB, FB, MB, MS, MSD, SA, TB, QADU, QATP

MEDIA: ALL

If QCID = LCS or OPR is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FCSF0.

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: 2051-60-7, 2051-62-9, 13029-08-8, 2050-68-2, 38444-73-4, 38444-90-5, 15968-05-5, 32598-13-3, 70362-50-4, 56558-16-8, 32598-14-4, 74472-37-0, 31508-00-6, 65510-44-3, 57465-28-8, 33979-03-2, 38380-08-4, 69782-90-7, 52663-72-6, 32774-16-6, 74487-85-7, 39635-31-9, 2136-99-4, 74472-53-0, 40186-72-9, 52663-77-1, 2051-24-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = LCS or OPR and PARAM_CODE is one of those listed below and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS or OPR:

FCSL1 = < 50 but \geq 40

FCSL2 = < 40 but \geq 30

FCSL3 = < 30

FCSH1 = > 150 but \leq 180

FCSH2 = > 180 but \leq 210

FCSH3 = > 210

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_CCS, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_CCS_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: CARP108, CARP011, CARP109, CARP013, CARP110, CARP105, CARP112, CARP015, CARP016, CARP113, CARP017, CARP054, CARP019, CARP055, CARP020, CARP114, CARP021, CARP022, CARP023, CARP024, CARP115, CARP026, CARP116, CARP117, CARP057, CARP122, CARP029

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = LCS or OPR and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS or OPR:

FCSL1 = < 30 but \geq 24

FCSL2 = < 24 but \geq 18

FCSL3 = < 18

FCSH1 = > 140 but \leq 168

FCSH2 = > 168 but \leq 196

FCSH3 = > 196

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_CCS, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_CCS_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Control Standard or Ongoing Precision and Recovery Standard Recovery)

PARAM_CODE: CARP014, CARP018, CARP074

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS or OPR:

FCSL1 = < 40 but \geq 32

FCSL2 = < 32 but \geq 24

FCSL3 = < 24

FCSH1 = > 125 but \leq 150

FCSH2 = > 150 but \leq 175

FCSH3 = > 175

PCBS 8.0 LABELED AND CLEAN UP SPIKE RECOVERY RULES

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FLCF0 (Failed Labeled Compound Spiking Frequency)

PARAM_CODE: CARP108, CARP011, CARP109, CARP013, CARP110, CARP105, CARP112, CARP015, CARP016, CARP113, CARP017, CARP054, CARP019, CARP055,

CARP020, CARP114, CARP021, CARP022, CARP023, CARP024, CARP115, CARP026,
 CARP116, CARP117, CARP057, CARP122, CARP029, CARP014, CARP018, CARP074

APPLIES TO QC_CODE: ALL
 MEDIA: ALL

If a PARAM_CODE listed above is not present for the LAB_SAMP_ID with the QC_CODE listed and/or UNIT = PCT_REC field is empty for the LAB_SAMP_ID with the QC_CODE listed, then apply this rule. Add the CARP_ALERT code of FLCF0 to the associated PARAM_CODE as listed in the table below:

Labeled Compound PARAM_CODES (CARPXXX) and Associated PARAM_CODE:

CARP108	2051-60-7
CARP011	2051-62-9
CARP109	13029-08-8
CARP013	2050-68-2
CARP110	38444-73-4
CARP105	38444-90-5
CARP112	15968-05-5
CARP015	32598-13-3
CARP016	70362-50-4
CARP113	56558-16-8
CARP017	32598-14-4
CARP054	74472-37-0
CARP019	31508-00-6
CARP055	65510-44-3
CARP020	57465-28-8
CARP114	33979-03-2
CARP021	38380-08-4
CARP022	69782-90-7
CARP023	52663-72-6
CARP024	32774-16-6
CARP115	74487-85-7
CARP026	39635-31-9
CARP116	2136-99-4
CARP117	74472-53-0
CARP057	40186-72-9
CARP122	52663-77-1
CARP029	2051-24-3

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP,
 AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB,
 NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FCUF0 (Failed Clean Up Compound Frequency)
PARAM_CODE: CARP014, CARP018, CARP074
APPLIES TO QC_CODE: ALL
MEDIA: ALL

If a PARAM_CODE listed above is not present for the LAB_SAMP_ID with the QC_CODE listed and/or UNIT = PCT_REC field is empty for the LAB_SAMP_ID with the QC_CODE

listed, then apply this rule. Add the CARP_ALERT code of FCUF0 to the associated PARAM_CODE as listed in the table below:

Cleanup Standard PARAM_CODEs (CARPXXX) and Associated PARAM_CODE:

CARP014	7012-37-5
CARP018	39635-32-0
CARP074	52663-67-9

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB, NYSDECLRMS1HCFS-PCB/OC
CARP_ALERT CODE: FLCL1, FLCL2, FLCL3, FLCH1, FLCH2, FLCH3 (Failed Labeled Compound Recovery)
PARAM_CODE: CARP108, CARP011, CARP109, CARP013, CARP110, CARP105, CARP112, CARP015, CARP016, CARP113, CARP017, CARP054, CARP019, CARP055, CARP020, CARP114, CARP021, CARP022, CARP023, CARP024, CARP115, CARP026, CARP116, CARP117, CARP057, CARP122, CARP029

APPLIES TO QC_CODE: ALL
MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE and the associated PARAM_CODE as listed in the table below:

FLCL1 = < 25 but ≥ 20
FLCL2 = < 20 but ≥ 15
FLCL3 = < 15
FLCH1 = > 150 but ≤ 180
FLCH2 = > 180 but ≤ 210
FLCH3 = > 210

Labeled Compound PARAM_CODE (CARPXXX) and Associated PARAM_CODE:

CARP108	2051-60-7
CARP011	2051-62-9
CARP109	13029-08-8

CARP013	2050-68-2
CARP110	38444-73-4
CARP105	38444-90-5
CARP112	15968-05-5
CARP015	32598-13-3
CARP016	70362-50-4
CARP113	56558-16-8
CARP017	32598-14-4
CARP054	74472-37-0
CARP019	31508-00-6
CARP055	65510-44-3
CARP020	57465-28-8
CARP114	33979-03-2
CARP021	38380-08-4
CARP022	69782-90-7
CARP023	52663-72-6
CARP024	32774-16-6
CARP115	74487-85-7
CARP026	39635-31-9
CARP116	2136-99-4
CARP117	74472-53-0
CARP057	40186-72-9
CARP122	52663-77-1
CARP029	2051-24-3

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP,
 AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB,
 NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FCUL1, FCUL2, FCUL3, FCUH1, FCUH2, FCUH3 (Failed Clean Up
 Compound Recovery)

PARAM_CODE: CARP014, CARP018, CARP074

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MB, MS, MSD, QADU, QATP,
 SA, SRM, TB

MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If
 the PCT_REC exceeds the following, add the CARP_ALERT code listed to that
 PARAM_CODE and the associated PARAM_CODE as listed in the table below:

FCUL1 = < 30 but ≥ 24

FCUL2 = < 24 but ≥ 18

FCUL3 = < 18

FCUH1 = > 135 but ≤ 162

FCUH2 = > 162 but ≤ 189

FCUH3 = > 189

Cleanup Standard Parameter Codes (CARPXXX) and Associated PARAM_CODE:

CARP014	7012-37-5
CARP018	39635-32-0
CARP074	52663-67-9

PCBS 9.0 INDEPENDENT CONTROL STANDARD RECOVERY RULES

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_COP, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_COP_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: 2051-60-7, 2051-62-9, 13029-08-8, 2050-68-2, 38444-73-4, 38444-90-5, 15968-05-5, 32598-13-3, 70362-50-4, 56558-16-8, 32598-14-4, 74472-37-0, 31508-00-6, 65510-44-3, 57465-28-8, 33979-03-2, 38380-08-4, 69782-90-7, 52663-72-6, 32774-16-6, 74487-85-7, 39635-31-9, 2136-99-4, 74472-53-0, 40186-72-9, 52663-77-1, 2051-24-3

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = ICS is not found in an SDG, do not apply this rule.

If QCID = ICS and PARAM_CODE is one of those listed below and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

FICL1 = < 70 but \geq 56

FICL2 = < 56 but \geq 42

FICL3 = < 42

FICH1 = > 130 but \leq 156

FICH2 = > 156 but \leq 182

FICH3 = > 182

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_CCS, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_CCS_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: CARP108, CARP011, CARP109, CARP013, CARP110, CARP105, CARP112, CARP015, CARP016, CARP113, CARP017, CARP054, CARP019, CARP055, CARP020, CARP114, CARP021, CARP022, CARP023, CARP024, CARP115, CARP026, CARP116, CARP117, CARP057, CARP122, CARP029

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = ICS and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

FICL1 = < 50 but \geq 40
FICL2 = < 40 but \geq 30
FICL3 = < 30

FICH1 = > 150 but \leq 180
FICH2 = > 180 but \leq 210
FICH3 = > 210

ANALYSIS_METH: 1668 A (PCBs) 1668extended, AXYSHRMSPCB_CCS, AXYSHRMSPCB_PEST, BATC-ASATII-009, NYSDECHRMS1, 1613_CCS_PCB, NYSDECLRMS1, HCFS-PCB/OC

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: CARP014, CARP018, CARP074

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

FICL1 = < 60 but \geq 48
FICL2 = < 48 but \geq 36
FICL3 = < 36

FICH1 = > 130 but \leq 156
FICH2 = > 156 but \leq 182
FICH3 = > 182

ANALYTE GROUP: Pesticides

INTRODUCTION

Booz Allen proposes to incorporate these data validation decision rules (i.e., business rules) for pesticides into our automated data validation program for analytical data collected for the Hudson River Foundation (HRF) Contaminant Assessment Reduction Program (CARP). The basis of the majority of the limits cited in the attached rules is method NYSDECHRMS-2. Limits in the business rules for laboratory duplicates, Standard Reference Materials (SRM), and the qualification for sample results based on blank contamination have been taken either from existing CARP Quality Assurance Project Plans (QAPPs) or EPA data validation guidance. A summary table of all of the conditions assigned by the program (CARP_ALERTs) and the possible resultant usability code is attached (Pesticidealerts.xls). The table should not be considered an exhaustive one, as all possible combinations of conditions are not listed, and the final usability code determinations will be subject to the data validator's review and professional judgment.

In summary, the program assesses the following analytical quality control checks against the cited limits:

- Holding times from collection to extraction and extraction to analysis (NYSDECHRMS-2 limits)
- Method, trip, field, and equipment blank concentration (EPA guidance limits: sample results < 5 X highest associated blank qualified)
- Lab Control or Ongoing Precision and Recovery Standard recovery (NYSDECHRMS-2 limits)
- SRM percent difference from certified value (NJ Study 1G QAPP 30 % difference limits)
- Matrix spike recovery (NJ Study 1G QAPP limits)
- Recovery standard recovery (NYSDECHRMS-2 limits)
- Independent Control Standard recovery (NJ Study 1G QAPP limits)
- Lab duplicate precision (100 % RPD limit used by EPA in LMMB)

An additional rule for field duplicates is pending. No field duplicate precision goals were present in any QAPPs, so a reasonable limit has to be developed.

As we developed these rules based on selected SDGs culled from the Battelle database, if you are aware of issues with these rules and the bulk of your data, please contact Yvonne Fernandez at 703-917-2230 or Fernandez_Yvonne@bah.com.

PESTICIDES 1.0 UNDETECTED DUE TO ASSOCIATED BLANK CONCENTRATION RULE

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC
CARP_ALERT CODE: U5HM, U5HT, U5HF, U5HE (Undetected, less than 5 X highest associated Blank where last letter denotes M= method blank, T = trip blank, F = Field blank, E = Equipment blank)
PARAM_CODE: ALL
APPLIES TO QC_CODE: DU, SA
MEDIA: ALL

Find EB, TB, FB associated with each QC_CODEs SA and DU. The FB, EB and TB will have the same SURVEY_ID, or same START_DATE and STATION_ID. If UNITS for EB, FB, TB and the UNITS for the MB RESULTS in the same SDG or SDGs as the DU and SA are all the same (but not PCT_REC), then apply this rule.

Multiply the MB, FB, EB, and TB RESULTS for each PARAM_CODE by 5 and record as 5HM, 5HF, 5HE and 5HT, respectively. For each DU and SA associated with the MB, FB, EB and TB, identify the highest of the 5HM, 5HF, 5HE and 5HT levels. If SA or DU RESULT is less than the highest level, qualify the SA or DU RESULT for that PARAM_CODE with the following:

U5HM = result considered undetected, is less than 5 X associated method blank concentration
U5HT = result considered undetected, is less than 5 X associated trip blank concentration
U5HF = result considered undetected, is less than 5 X associated field blank concentration
U5HE = result considered undetected, is less than 5 X associated equipment blank concentration

PESTICIDES 2.0 EXCEEDED HOLDING TIME RULE

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC
CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction)
PARAM_CODE: ALL
APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM, TB
MEDIA: ALL except BRACKISH SURF. WATER, FILTERED WATER, FILTERED WATER (AE,GF/F), FILTERED WATER (GF/B), FILTERED WATER ACROCAP, FILTERED WATER, POST XAD, FRESH, SURF., F, FRESH, SURF., FILTERED, FRESHWATER, LANDFILL LEACHATE, REAGENT WATER, TREATED WASTEWATER, TREATED WASTEWATER, UNFILTERED WASTE, UNFILTERED WATER, WASTEWATER, UNTREATED, WESTEWATER, UNTREATED

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following, add the CARP_ALERT code listed:

FHTE1 = > 30 days but ≤ 36 days

FHTE2 = > 36 days but ≤ 42 days

FHTE3 = > 42 days

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC

CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from collection to extraction)

PARAM_CODE: ALL

APPLIES TO QC_CODES: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: BRACKISH SURF. WATER, FILTERED WATER, FILTERED WATER (AE,GF/F), FILTERED WATER (GF/B), FILTERED WATER ACROCAP, FILTERED WATER, POST XAD, FRESH, SURF., F, FRESH, SURF., FILTERED, FRESHWATER, LANDFILL LEACHATE, REAGENT WATER, TREATED WASTEWATER, TREATED WASTEWATER, UNFILTERED WASTE, UNFILTERED WATER, WASTEWATER, UNTREATED, WESTEWATER, UNTREATED

If the number of days elapsed from START_DATE to EXTRACT_DATE exceeds the following, add the CARP_ALERT code listed:

FHTE1 = > 7 days but ≤ 8 days

FHTE2 = > 8 days but ≤ 10 days

FHTE3 = > 10 days

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC

CARP_ALERT CODE: FHTE1, FHTE2, FHTE3 (Failed holding time from extraction to analysis)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If the number of days elapsed from EXTRACT_DATE to ANALYSIS_DATE exceeds the following, add the CARP_ALERT code listed:

FHTA1 = > 365 days but ≤ 438 days

FHTA2 = > 438 days but ≤ 511 days

FHTA3 = > 511 days

PESTICIDES 3.0 METHOD BLANK FREQUENCY RULE

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC

CARP_ALERT CODE: FMBF0 (Failed Method Blank Frequency)

PARAM_CODE: ALL

APPLIES TO QC_CODE: BS, DU, EB, FB, ICS, LCD, LCS, MS, MSD, QADU, QATP, SA,
SRM, TB

MEDIA: ALL

If QCID = MB is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FMBF0.

PESTICIDES 4.0 MATRIX SPIKE RECOVERY RULES

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: ALL except CARPXXX

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP,
SA, SRM, TB

MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 40 but \geq 32

FMSL2 = < 32 but \geq 24

FMSL3 = < 24

FMSH1 = > 160 but \leq 192

FMSH2 = > 192 but \leq 224

FMSH3 = > 224

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC

CARP_ALERT CODE: FMSL1, FMSL2, FMSL3, FMSH1, FMSH2, FMSH3 (Failed Matrix Spike Recovery)

PARAM_CODE: CARP030, CARP031, CARP032, CARP033, CARP034, CARP035,
CARP036, CARP086, CARP087, CARP088, CARP089, CARP090, CARP091, CARP092,
CARP093, CARP094, CARP095, CARP097, CARP098, CARP099, CARP100, CARP101,
CARP102, CARP103

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID = MS or MSD is not found in an SDG, do not apply this rule.

If QCID = MS or MSD and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the MS and/or MSD, add the CARP_ALERT code listed to that PARAM_CODE in the MS and/or MSD and to that PARAM_CODE in all samples in the same SDG as the MS and/or MSD:

FMSL1 = < 20 but ≥ 16

FMSL2 = < 16 but ≥ 12

FMSL3 = < 12

FMSH1 = > 180 but ≤ 216

FMSH2 = > 216 but ≤ 252

FMSH3 = > 252

PESTICIDES 5.0 LAB DUPLICATE PRECISION RULE

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC
CARP_ALERT CODE: FLDP1, FLDP2, FLDP3 (Failed Lab Duplicate Precision)
PARAM_CODE: ALL
APPLIES TO QC_CODE: SA and QADU with same LAB_SAMP_ID
MEDIA: ALL

If QCID = QADU is not found in an SDG, do not apply this rule. If QADU is present in an SDG, and an SA with same LAB_SAMP_ID and same UNIT (not PCT_DIFF, or PCT_REC or concentration units) is also present in the same SDG, apply this rule. Calculate the Relative Percent Difference (RPD) for the QADU/SA pair as the difference between the QADU and SA RESULTS divided by the mean of the QADU and SA RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE in the QADU and SA and all samples in the same SDG as the QADU and SA:

FLDP1 = > 100 but ≤ 120

FLDP2 = > 120 but ≤ 140

FLDP3 = > 140

PESTICIDES 6.0 SRM RULE

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC

CARP_ALERT CODE: FSRM1, FSRM2, FSRM3 (Failed SRM percent difference limits)
PARAM_CODE: ALL
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP,
SA, SRM, TB
MEDIA: ALL

If QCID = SRM is not found in an SDG, do not apply this rule.

If QCID = SRM and PARAM_CODE is one of those listed below and UNIT reported is PCT_DIFF, then apply this rule. If the PCT_DIFF exceeds the following in the SRM, add the CARP_ALERT code listed to that PARAM_CODE in the SRM and to that PARAM_CODE in all samples in the same SDG as the SRM:

FSRM1 = > 30 but ≤ 36
FSRM2 = > 36 but ≤ 42
FSRM3 = > 42

PESTICIDES 7.0 LCS or OPR RULES

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC
CARP_ALERT CODE: FCSF0 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Frequency)
PARAM_CODE: ALL
APPLIES TO QC_CODE: DU, EB, FB, MB, MS, MSD, SA, TB, QADU, QATP
MEDIA: ALL

If QCID = LCS or OPR is not found in an SDG, flag all LAB_SAMP_IDs in the SDG with FCSF0.

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC
CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)
PARAM_CODE: ALL except CARPXXX
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, QADU,
QATP, SA, SRM, TB
MEDIA: ALL

If QCID = LCS or OPR and PARAM_CODE is one of those listed below and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS or OPR:

FCSL1 = < 40 but ≥ 32

FCSL2 = < 32 but \geq 24
FCSL3 = < 24

FCSH1 = > 160 but \leq 192
FCSH2 = > 192 but \leq 224
FCSH3 = > 224

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC
CARP_ALERT CODE: FCSL1, FCSL2, FCSL3, FCSH1, FCSH2, FCSH3 (Failed Lab Control Standard or Ongoing Precision and Recovery Standard Recovery)
PARAM_CODE: CARP030, CARP031, CARP032, CARP033, CARP034, CARP035, CARP036, CARP086, CARP087, CARP088, CARP089, CARP090, CARP091, CARP092, CARP093, CARP094, CARP095, CARP097, CARP098, CARP099, CARP100, CARP101, CARP102, CARP103
APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, OPR, QADU, QATP, SA, SRM, TB
MEDIA: ALL

If QCID =LCS or OPR and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the LCS or OPR, add the CARP_ALERT code listed to that PARAM_CODE in the LCS or OPR and to that PARAM_CODE in all samples in the same SDG as the LCS or OPR:

FCSL1 = < 20 but \geq 16
FCSL2 = < 16 but \geq 12
FCSL3 = < 12

FCSH1 = > 180 but \leq 216
FCSH2 = > 216 but \leq 252
FCSH3 = > 252

PESTICIDES 8.0 LABELED SPIKE RECOVERY RULE

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC
CARP_ALERT CODE: FLCF0 (Failed Labeled Compound Spiking Frequency)
PARAM_CODE: CARP030, CARP031, CARP032, CARP033, CARP034, CARP035, CARP036, CARP086, CARP087, CARP088, CARP089, CARP090, CARP091, CARP092, CARP093, CARP094, CARP095, CARP097, CARP098, CARP099, CARP100, CARP101, CARP102, CARP103
APPLIES TO QC_CODE: ALL
MEDIA: ALL

If a PARAM_CODE listed above is not present for the LAB_SAMP_ID with the QC_CODE listed and/or UNIT = PCT_REC field is empty for the LAB_SAMP_ID with the QC_CODE listed, then apply this rule. Add the CARP_ALERT code of FLCF0 to the associated PARAM_CODE as listed in the table below:

Labeled Compound PARAM_CODEs (CARPXXX) and Associated PARAM_CODE:

CARP030	118-74-1
CARP031	58-89-9
CARP032	72-55-9
CARP033	50-29-3
CARP034	2385-85-5
CARP035	309-00-2, 5103-71-9, 5103-74-2, 27304-13-8, 53-19-0, 72-54-8, 76-44-8, 2385-85-5, 39765-80-5, 5103-73-1
CARP036	959-98-8
CARP086	309-00-2
CARP087	319-84-6
CARP088	319-85-7
CARP089	60-57-1
CARP090	60-57-1
CARP091	72-20-8
CARP092	72-54-8
CARP093	3424-82-6
CARP094	789-02-6
CARP095	33213-65-9
CARP097	76-44-8
CARP098	76-44-8
CARP099	1024-57-3
CARP100	72-43-5
CARP101	39765-80-5
CARP102	27304-13-8
CARP103	309-00-2

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC
 CARP_ALERT CODE: FLCL1, FLCL2, FLCL3, FLCH1, FLCH2, FLCH3 (Failed Labeled Compound Recovery)
 PARAM_CODE: CARP030, CARP031, CARP032, CARP033, CARP034, CARP035, CARP036, CARP086, CARP087, CARP088, CARP089, CARP090, CARP091, CARP092, CARP093, CARP094, CARP095, CARP097, CARP098, CARP099, CARP100, CARP101, CARP102, CARP103
 APPLIES TO QC_CODE: ALL
 MEDIA: ALL

If PARAM_CODE is one of those listed above and UNIT = PCT_REC, then apply this rule. If the PCT_REC exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE and the associated PARAM_CODE as listed in the table above:

FLCL1 = < 20 but \geq 16

FLCL2 = < 16 but \geq 12

FLCL3 = < 12

FLCH1 = > 180 but \leq 216

FLCH2 = > 216 but \leq 252

FLCH3 = > 252

PESTICIDES 9.0 INDEPENDENT CONTROL STANDARD RECOVERY RULES

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: ALL except CARPXXX

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP, SA, SRM, TB

MEDIA: ALL

If QCID = ICS is not found in an SDG, do not apply this rule.

If QCID = ICS and PARAM_CODE is one of those listed below and UNIT reported is PCT_REC, then apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same SDG as the ICS:

FICL1 = < 70 but \geq 56

FICL2 = < 56 but \geq 42

FICL3 = < 42

FICH1 = > 130 but \leq 156

FICH2 = > 156 but \leq 182

FICH3 = > 182

ANALYSIS_METH: NYSDECHRMS2, BAT_HRMS_PEST, HCFS-PCB/OC

CARP_ALERT CODE: FICL1, FICL2, FICL3, FICH1, FICH2, FICH3 (Failed Independent Control Standard Recovery)

PARAM_CODE: CARP030, CARP031, CARP032, CARP033, CARP034, CARP035, CARP036, CARP086, CARP087, CARP088, CARP089, CARP090, CARP091, CARP092,

CARP093, CARP094, CARP095, CARP097, CARP098, CARP099, CARP100, CARP101,
CARP102, CARP103

APPLIES TO QC_CODE: BS, DU, ICS, LCD, LCS, EB, FB, MB, MS, MSD, QADU, QATP,
SA, SRM, TB

MEDIA: ALL

If QCID = ICS and PARAM_CODE is one of those listed and UNIT reported is PCT_REC, then
apply this rule. If the PCT_REC exceeds the following in the ICS, add the CARP_ALERT code
listed to that PARAM_CODE in the ICS and to that PARAM_CODE in all samples in the same
SDG as the ICS:

FLCL1 = < 20 but \geq 16

FLCL2 = < 16 but \geq 12

FLCL3 = < 12

FLCH1 = > 180 but \leq 216

FLCH2 = > 216 but \leq 252

FLCH3 = > 252

END

ANALYTE GROUP: Wet Chemistry

INTRODUCTION

Booz Allen proposes to incorporate these data validation decision rules (i.e., business rules) for wet chemistry parameters (DOC, TSS, and TOC) into our automated data validation program for analytical data collected for the Hudson River Foundation (HRF) Contaminant Assessment Reduction Program (CARP). The majority of the limits cited in the attached rules are based on EPA methods 9060, 160.2, 160.4 and ASTM method D2216-80. The qualification for sample results based on blank contamination has been taken directly from EPA data validation guidance. A summary table of all of the conditions assigned by the program (CARP_ALERTs) and the possible resultant usability code is attached (Wetchemalerts.xls). The table should not be considered an exhaustive one, as all possible combinations of conditions are not listed, and the final usability code determinations will all be subject to the data validator's review and professional judgment.

In summary, the program assesses the following analytical quality control checks against the cited limits:

- Holding times from collection to analysis (method specific, 7 days for TSS, volatile solids, % solids and 28 days for DOC and TOC)
- Method, field, and equipment blank concentration (EPA guidance limits: sample results < 5 X highest associated blank qualified)
- Lab duplicate precision (no method specific limits, used 20 % RPD)

An additional rule for field duplicates is pending. No field duplicate precision goals were present in any QAPPs, so a reasonable limit has to be developed.

As we developed these rules based on selected SDGs culled from the Battelle database, if you are aware of issues with these rules and the bulk of your data, please contact Yvonne Fernandez at 703-917-2230 or Fernandez_Yvonne@bah.com.

WET CHEM 1.0 UNDETECTED DUE TO ASSOCIATED BLANK CONCENTRATION RULE

ANALYSIS_METH: TSS, D2216_80, 2540B, 160.4, DOC, 9060_LK, Wal_BlK
CARP_ALERT CODE: U5HM, U5HT, U5HF, U5HE (Undetected, less than 5 X highest associated Blank where last letter denotes M= method blank, F = Field blank, E = Equipment blank)
PARAM_CODE: ALL
APPLIES TO QC_CODE: DU, SA
MEDIA: ALL

Find EB, FB associated with each QC_CODEs SA and DU. Find the MB in the same SDG as the SA and/or DU. The FB and EB will have the same SURVEY_ID, or same START_DATE and STATION_ID. If UNITS for EB, FB, and MB are all the same (but not PCT_REC), and match the UNITS for the SA and/or DU, then apply this rule.

Multiply the MB, FB and EB RESULTS (only if no U present in the LAB_QUAL field) for each PARAM_CODE by 5 and record as 5HM, 5HF and 5HE, respectively. For each DU and SA associated with the MB, FB and EB, identify the highest of the 5HM, 5HF and 5HE levels. If SA or DU RESULT is less than the highest level, qualify the SA or DU RESULT for that PARAM_CODE with the following:

U5HM = result considered undetected, is less than 5 X associated method blank concentration

U5HF = result considered undetected, is less than 5 X associated field blank concentration

U5HE = result considered undetected, is less than 5 X associated equipment blank concentration

WET CHEM 2.0 EXCEEDED HOLDING TIME RULE

ANALYSIS_METH: TSS, D2216_80, 2540B, 160.4

CARP_ALERT CODE: FHTA1, FHTA2, FHTA3 (Failed holding time from collection to analysis)

PARAM_CODE: TS, SOLIDS, VOL_SOLIDS, CARP395, TSS

APPLIES TO QC_CODES: DU, EB, FB, MB, QADU, QATP, SA,

MEDIA: ALL

If the number of days elapsed from START_DATE to ANALYSIS_DATE exceeds the following, add the CARP_ALERT code listed:

FHTA1 = > 7 days but ≤ 8 days

FHTA2 = > 8.4 days but ≤ 9 days

FHTA3 = > 9 days

ANALYSIS_METH: DOC, 9060_LK, Wal_BlK

CARP_ALERT CODE: FHTA1, FHTA2, FHTA3 (Failed holding time from collection to analysis)

PARAM_CODE: TOC, DOC, CARP060

APPLIES TO QC_CODES: DU, EB, FB, MB, QADU, QATP, SA,

MEDIA: ALL

If the number of days elapsed from START_DATE to ANALYSIS_DATE exceeds the following, add the CARP_ALERT code listed:

FHTA1 = > 28 days but ≤ 34 days

FHTA2 = > 34 days but ≤ 39 days

FHTA3 = > 39 days

WET CHEM 3.0 LAB DUPLICATE PRECISION RULE

ANALYSIS_METH: TSS, D2216_80, 2540B, 160.4, DOC, 9060_LK, Wal_Blk
CARP_ALERT CODE: FLDP1, FLDP2, FLDP3 (Failed Lab Duplicate Precision)
PARAM_CODE: ALL
APPLIES TO QC_CODE: SA and QADU with same LAB_SAMP_ID
MEDIA: ALL

If QCID = QADU is not found in an SDG, do not apply this rule. If QADU is present in an SDG, and an SA with same LAB_SAMP_ID and same UNIT (not PCT_DIFF, or PCT_REC or concentration units) is also present in the same SDG, apply this rule. Calculate the Relative Percent Difference (RPD) for the QADU/SA pair as the difference between the QADU and SA RESULTS divided by the mean of the QADU and SA RESULTS multiplied by 100.

If the RPD exceeds the following, add the CARP_ALERT code listed to that PARAM_CODE in the QADU and SA and all samples in the same SDG as the QADU and SA:

FLDP1 = > 20 but ≤ 24
FLDP2 = > 24 but ≤ 28
FLDP3 = > 28

END

APPENDIX D: CARP DATA VALIDATION FLAGS

CARP Data Validation Flags

CARP_ALERT Data Validation Flag	Limit Exceeded By	Description
FAMM1		analysis method does not measure the parameter class reported
FAMP1		analysis method does not measure the parameter reported
FCSF0		no control standard or OPR in SDG
FCSH1	$\leq 20 \%$	control standard, BS or OPR upper recovery limit exceeded
FCSH2	>20 but $\leq 40 \%$	control standard, BS or OPR upper recovery limit exceeded
FCSH3	$> 40 \%$	control standard, BS or OPR upper recovery limit exceeded
FCSL1	$\leq 20 \%$	control standard, BS or OPR lower recovery limit exceeded
FCSL2	>20 but $\leq 40 \%$	control standard, BS or OPR lower recovery limit exceeded
FCSL3	$> 40 \%$	control standard, BS or OPR lower recovery limit exceeded
FCUF0		clean up standard analyte not reported
FCUH1	$\leq 20 \%$	clean up standard upper recovery limit exceeded
FCUH2	>20 but $\leq 40 \%$	clean up standard upper recovery limit exceeded
FCUH3	$> 40 \%$	clean up standard upper recovery limit exceeded
FCUL1	$\leq 20 \%$	clean up standard lower recovery limit exceeded
FCUL2	>20 but $\leq 40 \%$	clean up standard lower recovery limit exceeded
FCUL3	$> 40 \%$	clean up standard lower recovery limit exceeded
FDAE4		analysis date is before extract date
FDAS4		analysis date is before sample collection date
FDES4		extract date is before sample collection date
FDUM0		lab duplicate (QADU) sample ID does not have an exact matching SA record
FHTA1	$\leq 20 \%$	holding time from extraction to analysis exceeded
FHTA2	>20 but $\leq 40 \%$	holding time from extraction to analysis exceeded
FHTA3	$> 40 \%$	holding time from extraction to analysis exceeded
FHTE1	$\leq 20 \%$	holding time from collection to extraction exceeded
FHTE2	>20 but $\leq 40 \%$	holding time from collection to extraction exceeded
FHTE3	$> 40 \%$	holding time from collection to extraction exceeded
FICH1	$\leq 20 \%$	independent standard upper recovery limit exceeded
FICH2	>20 but $\leq 40 \%$	independent standard upper recovery limit exceeded
FICH3	$> 40 \%$	independent standard upper recovery limit exceeded
FICL1	$\leq 20 \%$	independent standard lower recovery limit exceeded
FICL2	>20 but $\leq 40 \%$	independent standard lower recovery limit exceeded
FICL3	$> 40 \%$	independent standard lower recovery limit exceeded
FLCF0		recovery standard analyte not reported
FLCH1	$\leq 20 \%$	recovery standard upper recovery limit exceeded
FLCH2	>20 but $\leq 40 \%$	recovery standard upper recovery limit exceeded
FLCH3	$> 40 \%$	recovery standard upper recovery limit exceeded
FLCL1	$\leq 20 \%$	recovery standard lower recovery limit exceeded
FLCL2	>20 but $\leq 40 \%$	recovery standard lower recovery limit exceeded
FLCL3	$> 40 \%$	recovery standard lower recovery limit exceeded
FLDP1	$\leq 20 \%$	lab duplicate RPD limit exceeded
FLDP2	>20 but $\leq 40 \%$	lab duplicate RPD limit exceeded
FLDP3	$> 40 \%$	lab duplicate RPD limit exceeded
FMBF0		no method blank in SDG
FMSH1	$\leq 20 \%$	matrix spike upper recovery limit exceeded
FMSH2	>20 but $\leq 40 \%$	matrix spike upper recovery limit exceeded
FMSH3	$> 40 \%$	matrix spike upper recovery limit exceeded
FMSL1	$\leq 20 \%$	matrix spike lower recovery limit exceeded

CARP Data Validation Flags

FMSL2	>20 but \leq 40 %	matrix spike lower recovery limit exceeded
FMSL3	> 40 %	matrix spike lower recovery limit exceeded
FMSP1	\leq 20 %	MS/MSD RPD limit exceeded
FMSP2	>20 but \leq 40 %	MS/MSD RPD limit exceeded
FMSP3	> 40 %	MS/MSD RPD limit exceeded
FPUM1		unit reported for the parameter is not reasonable
FQCM0		FIELD_QC CODE does not match the LAB_QC CODE
FSRH1	\leq 20 %	SRM percent recovery limit exceeded
FSRH2	>20 but \leq 40 %	SRM percent recovery limit exceeded
FSRH3	> 40 %	SRM percent recovery limit exceeded
FSRL1	\leq 20 %	SRM percent recovery limit exceeded
FSRL2	>20 but \leq 40 %	SRM percent recovery limit exceeded
FSRL3	> 40 %	SRM percent recovery limit exceeded
FSRM1	\leq 20 %	SRM percent difference limit exceeded
FSRM2	>20 but \leq 40 %	SRM percent difference limit exceeded
FSRM3	> 40 %	SRM percent difference limit exceeded
FSRM3	> 40 %	SRM percent difference limit exceeded
FUN11		unit reported for the media is not reasonable
U5HE		< 5 X highest associated blank (equipment)
U5HF		< 5 X highest associated blank (field)
U5HM		< 5 X highest associated blank (method)
U5HT		< 5 X highest associated blank (trip)

APPENDIX E: LIST OF CARP SDGs REVIEWED

LIST OF CARP SDGS REVIEWED

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
00-437	Some PAH recovery stds not added/reported. FB and TB blind to lab, no collect date, no U5HF or U5HT assigned. MB detects = U5HM = UWCH.	616			605		11	
00-438	Some PAH recovery stds not added/reported. No collect date for FB, no U5HF assigned. MB detects = U5HM=UWCH.	528			497		31	
00-557	Some PAH recovery stds not added/reported. No collect date for FB and field dup blind to lab, no U5HF assigned, field precision not evaluated. Mb detects = U5HM = UWCH. FSRM1,3 no action, other QC in. FLCH1 = UWCH.	836			811		25	
01101	Lab dup (QADU) of 1SPL00206 Cd results variable = UWC. As SA results corrected for MB, U5HM code not equate to UWCH. FSRL1 not = UWCL, as BS, MS recoveries in.	30			29	1		
01103	SDG has one TSS result, no lab QC reported. Assume USE.	1			1			
01-228	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. FB blind to lab, no collect date, no U5HF assigned. FSRM2,3 no action, other QC in.	748			717		31	
01311	SDG contains one TSS result, no lab QC. Assume USE.	1			1			
01312	SDG contains one DOC result, no lab QC. Assume USE.	1			1			
01313	Lab dup (QADU) of 1SPL00331 precision reasonable. FHTE3 for mercury in 1SPL00331MD = UWC. Metals reported as corrected for MB, so U5HM not result in UWCH qualifier. FSRL1 offset by BS recovery OK = USE.	31			30	1		
01319	Lab dup QADU (1SPL00330MD) precision reasonable. Low me Hg recovery MS 1SPL00330 = UWCL. Metals reported corrected for MB, so U5HM = USE except 1SPL00330.	26			24			2
01-414	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Field dup no collect date, precision not evaluated. FB no collect date, U5HF not assigned. FSRM3 no action, other QC in.	836			797		39	
02071	SDG contains DOC, no lab QC except for DU. Identity of matching SA to DU not apparent, lab precision not evaluated.	7			7			
02072	SDG has TSS results, no lab QC except DU. Apparent matches for SA to DU yield reasonable lab precision = USE.	8			8			
02073	SDG contains two TSS results, no lab QC. Assume = USE.	2			2			
02142	Lab dup QADU of 1SPL00379 precision reasonable. Low MS and SRM recovery Cd = UWCL. Low SRM recovery Hg offset by MS recovery = USE. Me Hg "M" from high bias MS, BS recovery, but in validation limits = USE.	42			27			15

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
02282	One FB blind to lab. Results < 5X FB = U5HF assigned. Two field dups blind to lab, RPD not evaluated. FSRL1 not = UWCL as MS, BS in limit. U5HF/FSRH2 conflict bias = UWC. Lab dups precision reasonable.	81			57	17	7	
03041	Hold time exceedances FHTE1,2,3 = UWC. U5HM = UWCH, conflict with FHTE = UWC. FLCL1 = UWCL. FHTE3 and FLCH1, FLCL1 conflict = UWC.	9845			8156	1571	114	4
03051	TSS, DOC data, no lab QC. Assume = USE.	6			6			
03071	TSS data, no lab QC. Assume = USE.	6			6			
03073	DOC data, no lab QC. Assume = USE.	7			7			
03076	FB, EB not linked to SA, added U5HE = UWCH. Field dups blind to lab, matching SA not apparent. Lab dup 1SPL00491 precision reasonable. FSRL1 = USE as BS, MS in.	70			66		4	
03121	SDG with one DOC, TSS result, no lab QC. Assume = USE.	2			2			
03142	Metals data corrected for MB, no U5HM applicable. Lab QADU precision reasonable. Field dup blind to lab, precision reasonable. Me Hg FSRM3 not echoed by BS, MS = USE. Cd BS low, SRM variable = UWC.	56			36	20		
03181	PEND1 03181 SDG has repeat of PAH MS data only, no other samples or QC (MB, LCS). NOT VALIDATED	1911	31		1643	173	56	8
031900 -	SDG has TSS and DOC results, no lab QC. Assume = USE.	4			4			
03201	Lab dup QADU 1SPL00602 precision reasonable. Me Hg FSRL1 low bias not seen in BS, other SRMs = USE.	49			49			
03212	No START DATE or STATION for FB linkage, not used for U5HF rule. No other DOC lab QC, assume = USE.	27			27			
04021	TSS, DOC data, no lab QC. Assume = USE.	5			5			
04041	Tss data, no lab QC. Assume = USE.	19			19			
04091	TSS and DOC data, no lab QC. Assume = USE.	6			6			
04101	EB blind to lab, results < 5 X = U5HE. MB for Cd not match SA EXTRACT date. Field dups blind to lab, linked SA not apparent, precision evaluation not done. FSRL1 = USE as BS, MS in.	69			67		2	
04161	DOC and TSS data, no lab QC. Assume = USE.	2			2			
04301	TSS, DOC data, no lab QC. Assume = USE.	9			9			
050700	DOC data, no lab QC. Assume = USE.	5			5			
05071	TSS, DOC data, no lab QC. Assume = USE.	4			4			
05162	DOC data with one lab dup, precision reasonable. Assume = USE. Lab coded 1SPL00877 as "Uncertain", meaning not known = UWC.	8			7	1		
05163	TSS data, no QC. Assume = USE.	10			10			
05281	Includes two TSS FB with no START DATE, not linked to samples. No lab QC. Assume = USE.	8			8			
06111	DOC and TSS FB no collection date, not linked to samples. No lab QC. Assume = USE.	10			10			
06181	PEND 1 SDG has PEST SA data + this QC. FHTE1,2,3 = UWC. NOU to results reported as zero, and when FLCL3 at < 10 % recovery and sample ND. MB= U5HM = UWCH. Cd FCSL2 no action, other QC in.	4146	550	19	2517	872	152	36

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
06182	PAH, Pest hold time exceedances FHTE/A/E3 = UWC. MB detects = U5HM = UWCH. Anthracene FHTE/A, FMSL2, FCSL1 = UWC. FCSH3 with FHTE/A = UWC. FMSL1 with FHTE/A = UWC. Aldrin = NOU in 033962 00 FLCL3, FMSL3 < 10 %. Orphan PCB results 033975 not validated.	3195	238	3	1259	1592	101	2
06183	EB collect date not match, no U5HE assigned. FHTE3/A3 = UWC. MB detects = U5HM = UWCH, with FHTE/A = UWC. Lab dup FLDP2,3 = UWC. FLCL1,2,3 FMSL1= UWCL, with FHTE/A = UWC. FMSH1,3, FCSH1, FLCH1,2,3= UWCH to detects. NOU when FLCL3 < 10 % + ND.	11062		8	8854	1940	223	37
06184	PAH and Pest FHTE/A3 = UWC. FLCH1 = UWCH. MB detects = U5HM = UWCH if not with FHTE/A. Anthracene results heavily flagged, no consistent bias = UWC. FLCL3 < 10 % = NOU anthracene, aldrin, methoxychlor, 4,4'-DDT, heptachlor. FLDP1,3 = UWC.	3973		44	2032	1750	116	31
06185	Some recovery stds not added/reported. No OPR or LCS for pests, no MS either, all data = UWC. hold time exceedances FHTE3 = UWC. MB = U5HM with other flags = UWC.	1658			870	756	31	1
06251	FB for TSS, DOC no collection date, not linked to samples. No lab QC. Assume = USE.	15			15			
07041	Some recovery and cleanup stds not added/reported. FHTE3 = UWC. FCSH2, FCSL2,3 with FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. No LCS/OPR or MS for some PCBs and dioxins, assume = USE.	4878			3871	949	45	13
07111	Some recovery and cleanup stds not added/reported. FHTE3 = UWC. No LCS, OPR or MS for PCBs and dioxin, assume = USE. MB detects = U5HM = UWCH. FCSL3 = UWCL.	2201			1781	365	48	7
07112	One FB for DOC matches one SA, precision reasonable. No lab QC. Assume = USE.	59			59			
07113	TSS data, no lab QC. Assume = USE.	14			14			
07181	Some PCB recovery stds not added/reported.	540			540			
07184	DOC data only, no lab QC. Assume = USE.	9			9			
07251	DOC data only, no lab QC. Assume = USE.	13			13			
08011	TSS FB no collection data, not linked to samples. No lab QC. Assume = USE.	8			8			
08051	TSS lab dups not match sample IDs. No other lab QC. Assume = USE.	9			9			
08061	No collection dates for TSS EB, DOC FB. No lab QC. Assume = USE.	6			6			
08081	TSS data, no lab QC. Assume = USE.	9			9			
08082	DOC data, no lab QC. Assume = USE.	21			21			
08083	TSS and DOC data, no lab QC. Assume = USE.	14			14			
08121	TSS data only, no lab QC. Assume = USE.	4			4			
08151	TSS data only, no lab QC. Assume = USE.	5			5			
08152	DOC data only, no lab QC. Assume = USE.	21			21			
08153	DOC, TSS data only, no lab QC. Assume = USE.	14			14			
08201	TSS and DOC data, no lab QC. Assume = USE.	4			4			
08221	TSS and DOC data, no lab QC. Assume = USE.	11			11			
08222	TSS and DOC data, no lab QC. Assume = USE.	10			10			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
08271	Some PAH recovery stds not added/reported. FHTE3/A1,3 = UWC. FLCL, FLCH, FCSH with FHTE3 = UWC. FLCH1, FCSH1 = UWCH.Hg, Cd FMSH3 = UWCH to sample and MS. Metals lab dup precision reasonable.	2198			1289	840	62	7
08272	Some recovery stds not added/reported.FHTE3 = UWC.MB detects = U5HM = UWCH. FLCH1, FLCL3 with FHTE3 = UWC.Metals FMSH1,3 = UWCH to spl + MS. NOU to FLCL3 recovery < 10 % & sample ND.	1920		2	895	942	77	4
08291	DOC data only, no QC. Assume = USE.	7			7			
08292	DOC and TSS data, no lab QC. Assume = USE.	8			8			
09031	TSS and DOC data, no lab QC. Assume = USE.	5			5			
09171	DOC and TSS data, no lab QC. Assume = USE.	3			3			
09191	DOC and TSS data, no lab QC. Lab noted "Uncertain" code for 1SPL01451, 1SPL01450, meaning unknown. Assume = USE.	16			16			
09241	DOC and TSS data, no lab QC. Assume = USE.	2			2			
09261	TSS and DOC data, no lab QC. FBs no collection date to link to samples. Assume = USE.	22			22			
10011	DOC and TSS data, no lab QC. Assume = USE.	4			4			
10031	DOC and TSS data, no lab QC. Assume = USE.	9			9			
10101	DOC and TSS data, no lab QC. Assume = USE.	16			16			
10148	One TSS result, no lab QC. Assume = USE.	1			1			
10151	Some recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH. FMSL1, FMSL2 = UWCL.FMSH3 to sample + MS. FMSL3 = UWCL to sample + MS. FMSH2 + FCSH1 = UWCH. Lab dup precision FLDP3=UWC. FMSL1 + FSRL2 = UWCL. Me HG low bias = UWCL.	6079			4697	1209	104	69
10171	DOC and TSS data, no lab QC. Assume = USE.	17			17			
10220	Lab QC code + DU, yet field QC code = SA. Precision not evaluated. No other lab QC. Assume = USE.	3			3			
10241	DOC and TSS data, no lab QC. Assume = USE.	8			8			
10281	FHTE/A3,1 = UWC.Some pest samples have no MB extracted with them = UWC.PAH MB extracted 7 months B4 samples, all results=UWC. MB detects = U5HM = UWCH.Lab dup FLDP1,FLDP3 = UWC. NOU to metals = 0 and FLCL3 < 10 %. Some metals no MB reported, assume = USE.	8616		17	7240	1237	103	19
10282	Continuation of SDG 10281? FHTE1 = UWC. MB detects = U5HM = UWCH. PCB, dioxin, PAH MB results missing. Metals results with no QC not validated. Cd FSRL2 = USE, other QC in. FLDP3 = UWC.	4256	189		3659	361	45	2
102900	DOC data, no lab QC. Assume = USE.	3			3			
10298	One TSS result, no lab QC. Assume = USE.	1			1			
10311	Some recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH. FCSH3, FMSH1,3= UWCH. FLCL3, FMSL1 = UWCL. DOC and TSS data, no lab QC. Assume DOC, TSS = USE.	2006	817	2	1098	47	31	11
11068	TSS data, no lab QC. Assume = USE.	2			2			
11071	Some recovery stds not added/reported. FHTE3/A3 = UWC.FLCL1 = UWCL. FCSL3 = UWCL.MB detects = U5HM = UWCH.	752			597	143	8	4

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
11111	Some recovery stds not added/reported. FHTE1,3 = UWC. Lab dup precision FLDP1,2,3 = UWC to SA/QADU. NOU to 0% recovery MS. MB detects = U5HM = UWCH. FCSH3, FLCH1 = UWCH. FMSL3 to MS, sample. Metals have no MB, assume = USE, NOU to 0 % MS.	11786		13	10103	752	835	83
11112	Some recovery stds not added/reported. MB detects = U5HM = UWCH, with FHTE/A = UWC. FHTE/A = UWC. FMSH3 = UWCH to sample, MS. FLCL3 = NOU if rec < 10 % and SA = ND. Lab dup FLDP1,2,3= UWC to SA and QADU only. Metals no MB, assume = USE. FCUH3 = UWCH.	10434		1	6648	3260	503	22
11113	Some recovery stds not added/reported. FHTE2,3 = UWC. Lab dup FLDP2, 3 = UWC. FLCL1,2,3 = UWCL, if rec < 10 % and ND = NOU. FMSH1 + FLCH1 = UWCL. Metals field sample data only, no QC, not validated. FSRL1 + FCSL2 = UWCL.	3478	147	3	2590	593	115	30
11113b	Metals FHTE3 = UWC. Lab dup precision reasonable, no match for methyl Hg lab duplicate, assume = USE.	32			29	3		
11168	DOC data, no lab QC. Assume = USE.	4			4			
11208	TSS data, no lab QC. Assume = USE.	2			2			
12121	Two negative TSS results (1SPL01801, 1SPL01834) = NOU. No lab QC, assume rest of TSS data = USE.	17		2	15			
12122	DOC data, no lab QC. Assume = USE.	20			20			
12138	One TSS result, no lab QC. Assume = USE.	1			1			
12158	TSS data, no lab QC. Assume = USE.	2			2			
12178	TSS field dup 1SPL00044 53 % RPD = UWC.	2			1	1		
122400	TSS and DOC data, no lab QC. Assume = USE.	9			9			
12272	Hg, me Hg SRM low (FSRL1), but BS, MS in = USE. Cd SRM high (FSRH1), but BS, MS in = USE. Lab QADU (1SPL00138) precision reasonable.	112			112			
3025A	Dioxin SRM FSRM1, 2, 3 = UWC. FLCL1 = UWCL. Two different 2378-TCDF results reported.	157			138	18		1
3025B	Some PCB recovery and cleanup stds not added/reported. MB extracted day after sample, U5HM = UWCH. FSRM1, 2, 3 = UWC. FCSL1, FLCL1 = UWCL.	552			482	55	4	11
3025C	Some PAH recovery stds not added/reported. FHTE3/FHTA3 = UWC. MB extracted day after sample. FLCL1, FCSH1, FLCH2, FLCH3 with FHTA3 = UWC. Some high recoveries in SRM.	127				126		1
3025D	Some pest recovery stds not added/reported. FHTE3 = UWC. FSRM3 = UWC. SDG has "QC reference sample" results, true/acceptance limits not known/evaluated. FLCL1 with FHTE3 = UWC. FCSL3 = UWCL.	101			65	32		4
3038A	No LCS or OPR in this biota SDG, assume = USE. Dioxin hold time exceedances FHTA1 = UWC. Lab dup NEAO-8/8B precision reasonable. Two 2378 TCDF results reported for samples.	440			432	8		
3038B	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NEAO-17/17B precision reasonable, except OCDD, total HpCDD = FLDP3 = UWC.	472			468	4		
3038C	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NEAO-29/29B precision reasonable.	472			472			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
3038D	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NEAO-35/35B precision reasonable. FMSH1 = UWCH to detected analyte only. two 2378-TCDF results reported for samples. FLCL1 = UWCL for HxCDF in NEAO-18. FHTA1= UWC.	475			430	42	1	2
3041	OCDD results FLCH1, FLCH2, FCSH1 = UWCH. U5HM = UWCH.	1485			1418		67	
3041G	Method blank detects OCDD, OCDF U5HM = UWCH.	206			198		8	
3044E	Dioxin SDG has no LCS or OPR, assume = USE. FHTA1 = UWC. Lab dup NEBO-36 precision reasonable. Two results for 2378-TCDF reported for samples.	480			472	8		
3044F	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NEBO-46/46B precision reasonable. Two 2378-TCDF results reported for samples. MB detect 1,2,3,4,7,8-HxCDD = U5HM = UWCH.	482			471	10	1	
3044G	No LCS or OPR in this dioxin SDG, assume = USE. Lab duplicate NEBO-56/56B precision reasonable. Two 2378-TCDF results reported for samples.	479			479			
3044H	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NEBO-63/63B precision reasonable. Two 2378-TCDF values reported for samples.	480			480			
3044I	No LCS or OPR in this dioxin SDG. Lab dup NEBO-75/75B precision reasonable. Two 2378-TCDF results reported for samples.	481			481			
3046A	Field dup blind to lab. Field precision RPD not evaluated, different sample volumes. FCSH1 = UWCH if analyte detected in sample.	406			398		8	
3046B	Some PCB recovery and cleanup stds not added/reported. Field dup blind to lab. FLCL1, FLCL2 = UWCL. MB detects = U5HM = UWCH. FCCL1 = UWCL to LCS.	2116			2076		28	12
3046C	Field dup NNCO-23PE blind to lab. Field precision as RPD not evaluated, different sample volumes collected. FHTE3 = UWC. FCSH1 beta endosulfan no effect, ND in samples.	526			61	464	1	
3046D	Field dup NNCO-23PA blind to lab, precision not evaluated, different sample volumes collected. Two identical results for NNCO-30PA filters. Conflicted alerts U5HM/FHTE3/FHTA3/FCCL1/FCCL3 = UWC.	382			68	310		4
3046E	NNCO-24PA field dup blind to lab, dup of NNCO-25PA? Field precision not evaluated. Two identical results for NNCO-24PA, 25PA and 27PA. Conflicted alerts U5HM/FHTE3/FCCL1 = UWC.	320			66	250		4
3046F	SDG contains sediment OPRs submitted as SA. OPR "true" value not known/validated. Two identical results reported for NNCO-18PA, NNCO-31PA. FHTE3 = UWC. Fluorene, acenaphthene in MB = U5HM.	196			114	61	17	4
3046G	Contains sediment dioxin OPR samples and no field samples, "true" or acceptable values not known/validated. 1,2,3,4,6,7,8-HpCDD LCS high = UWCH.	210			204		6	
3046H	Some PCB recovery and cleanup stds not added/reported. SDG has sediment OPR results, true/acceptance limits not known/evaluated. FCCL1 = UWCL to LCS.	733			731			2

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
3046I	Contains sediment OPR samples, acceptance or true values not known/validated. FHTE3 = UWC. beta endosulfan, endrin ketone LCS high = UWCH.	178			112	54	12	
3050A	Two identical results reported for FB, FB blind to lab. Field dups blind to lab and matching SA not apparent from SDG, precision not evaluated. OCDD, HpCDD, HpCDF, PeCDF in MB = U5HM = UWCH. HxCDD FCSH1 = UWCH.	478			427		51	
3050B	Lab added "B" to OCDF, HpCDD samples reported in pg/L, yet no MB reported. Assume = USE.	206			206			
3050C	Two identical results reported for FBs, FBs blind to lab, U5HF = UWCH. Field dups blind to lab, sample volumes not match, field precision not evaluated. FLCH1, FCSH1 = UWCH. FLCL1 = UWCL.	444			328		112	4
3050D	Field dup NNDO-47PA blind to lab, MEDIA not match NND0-48PA, field precision not evaluated. Two identical results reported for NND0-34PA, 35PA, 47PA, 48PA. Combo of U5HM and FCSL1 or FCSL2 = UWC.	320			142	24	142	12
3050E	Low acenaphthene-d10 and phenanthrene-d10 recovery = UWCL. Conflict FLCL1 and U5HM = UWC. FCSL1 + FLCL1 = UWCL.	196			59	14	82	41
3050F	Some PCB recovery and cleanup stds not added/reported. FBs and field dup blind to lab. Results < 5 X FB = U5HF = UWCH. MB detects = U5HM = UWCH. FLCL1, FLCL2 = UWCL.	1653			1558		89	6
3050G	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. FLCL1 = UWCL, with U5HM = UWC. PAH C2 phenanthrenes/anthracenes % rec reported with PCB results.	733			693	1	38	1
3050H	Two FB blind to lab, U5HF and/or U5HM = UWCH. Two field dup blind to lab, different collection volumes, field precision not evaluated. FLCL1 = UWC. Cleanup std not reported = FCUF0. FLCL1 = UWCL.	1659			1449		206	4
3050I	Field dup NNDO-45PB filtered water post-XAD blind to lab, field precision not evaluated. U5HM = UWCH. FHTE2, FHTE3 = UWC. FLCL1, FLCL2, FLCL3 = UWCL. FCSL2 = UWCL to LCS only.	1428			1156	6	238	28
3050J	Two field blanks blind to lab, results double reported, U5HF = UWCH. Two field dups blind to lab, field precision not evaluated. Beta endosulfan FCSH1 = USE, no sample detects.	410			398		12	
3050K	beta-endosulfan LCS high = UWCH, ND in samples = USE.	178			177		1	
3050L	two field blanks blind to lab. Two field dups blind to lab, field precision not evaluated. Hexachlorobenzene FCSL2 = UWCL. Oxychlorane FCSH2 = UWCH to detects.	410			387		9	14
3050M	Hold time exceedance FHTE3 = UWC. Field dup blind to lab, field precision not evaluated. Two values reported for NNDO-45PE, 43PE, 44PE, 32PE, 33PE from different sample collection volumes.	352			236	116		
3050N	SDG has OPR sample only (NNDO-53PA), no field samples. True/acceptable values not evaluated. Same results reported twice. Low LCS values (FCSL1, FCSL2, FCSL3) = UWCL.	134			94			40

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
3050O	SDG has OPR sample only (NND0-53CD), no field samples. Same values reported twice. Acceptable/known values not evaluated.	142			142			
3050P	SDG contains sediment OPRs, no field samples. Two identical results reported for NNDO-53PE. LCS cis nonachlor high (FCSH1) = UWCH.	120			116		4	
3050Q	Some PCB recovery and cleanup stds not added/reported. SDG has sed OPR results, true/acceptance limits not known/reported. C2 phen/anthracene % rec reported.	503			503			
3055A	EB blind to lab, results reported twice, link to NNF0-75CD, NNF0-90CD. U5HE added. U5HE, U5HM = UWCH.	544			528		16	
3055B	Two identical results reported for field samples. Lab blank OCDD, OCDF, HpCDF, PeCDF = U5HM = UWCH. LCS C13-HpCDF, HpCDD = FCSH1 = UWCH to LCS.	536			516		20	
3055C	Two identical results reported for field samples. MB detects HpCDF = U5HM.	338			334		4	
3055D	SDG contains sediment OPR samples, no field samples. Acceptable/true values not known/evaluated. LCS HxCDD FCSH1 = UWCH.	142			138		4	
3055E	Two EB blind to lab, results reported twice, U5HE assigned. FHTE1, FHTE3 = UWC. U5HM = UWCH. U5HE/FHTE1,3 = UWC. FLCH1 = UWCH.	506			128	366	12	
3055F	SDG has two identical results reported for field samples. FLCL1, FLCL2 conflict with U5HM, FHTE3 = UWC. U5HM = UWCH, conflict with FHTE3 = UWC. FCSL2 conflict with FHTE3/U5HM = UWC. FCSH1 = UWCH.	444			68	360	14	2
3055G	Two identical results reported for field samples. FHTE3, FHTE3 = UWC. U5HM and FHTE3/FHTE3 conflict = UWC. FLCL1, FLCL2 and FHTE3 = UWC.	320				320		
3055HB	SDG contains sediment OPRs, two identical results reported. Acceptable/true values not known or evaluated. FLCL1 = UWCL, FLCH1 = UWCH. FCSL2 = UWCL to LCS only.	134			121		9	4
3055I	SDG contains EB and lab QC only, no field samples. Not validated.	630	630					
3055J	Two EB blind to lab, reported twice. U5HE to hexachlorobenzene = UWCH. FCSH2 endrin aldehyde = UWCH, ND in samples = USE.	468			466		2	
3055K	SDG has two EB, blind to lab, results reported twice, all ND. FHTE2 = UWC.	468			294	174		
3055L	SDG has sediment OPR and lab QC only, no field samples.	120			120			
3055M	Results reported twice for all samples. FHTE1, FHTE3 = UWC.	468			62	406		
3055N	Sample results reported twice. FHTE3 = UWC.	294			62	232		
3055O	Some PCB recovery and cleanup stds not added/reported. EBs blind to lab, no results < 5 X EB.FCSL3 = UWCL to LCS. FLCL1,FLCL2, FLCL3 = UWCL. MB detects = U5HM = UWCH.FCSH1 = UWCH.C2 phen/anthracenes reported.	1883			1777		95	11
3055P	PCB recovery and cleanup stds not added/reported.FCSL3 = UWCL to LCS. FLCL1, FLCL3 = UWCL. MB detects = U5HM = UWCH, with FLCL = UWC.EB blind to lab, collect date not match any samples.	1889			1727	5	130	27

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
3055Q	PCB recovery and cleanup stds not added/reported.SDG has sed OPR results, true/acceptance limits not known/evaluated.	503			503			
3055R	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH.FLCL2 = UWCL. FCSL1 = UWCL.	1883			1720		160	3
3055S	Some PCB recovery and cleanup stds not added/reported. FCSL1,2,3 = UWCL to LCS.FLCL1,FLCL2, FLCL3 = UWCL.MB detects = U5HM = UWCH.	1193			1153		1	39
3067A	No LCS or OPR in this dioxin SDG, assume = USE. MB detect OCDD, PeCDF= U5HM = UWCH. Lab dup NECO-89/89B precision reasonable. Two 2378-TCDF results reported for samples. Hold time FHTA1 = UWC.	494			476	10	8	
3067B	No LCS or OPR in this dioxin SDG, assume = USE. Hold time FHTA1 = UWC. Lab dup NECO-91/91B precision reasonable. FMSH1 for OCDF ok, samples ND. two 2378-TCDF results reported for samples.	451			432	19		
3067C	No LCS or OPR in thsi dioxin SDG, assume = USE. Lab dup NECO-104/104B precision reasonable. hold time FHTA1 = UWC. MB detect OCDD = U5HM = UWCH. FMSH1 HpCDD= UWCH if detected. Two results reported for QADU Total PeCDD, 2378-TCDF all samples.	492			477	8	7	
3067D	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NECO-117/117B precision reasonable. MB detect OCDD, PeCDF = U5HM = UWCH. FMSH1 HpCDD, PeCDD = UWCH if detected. Two 2378-TCDF results reported for samples.	493			480		13	
3067E	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NECO-108/108B precision reasonable. Hold time FHTA1 = UWC. MB detect HxCDF = U5HM = UWCH.	242			236	4	2	
3074A	PAH hold time exceedances FHTE3 = UWC. FSRM1, FSRM2 = USE if LCS in limit. Many SRM precision limits exceeded. FLCH2, FCSH1, FCSH2 = UWCH.	135			85	43	7	
3074B	SRM precision HxCDF FSRM3 = UWC. FLCL1 2378-TCDD = UWCL. FCSH1 = UWCH in NNIO-119CD. FCSH1 and FLCL1 conflict = UWC.	157			149	5	2	1
3074C	PCB hold time exceedances FHTE1, FHTE3 = UWC. MB detects 2-CB, 4-CB = U5HM with FHTE = UWC. FSRM1, FSRM3 = UWC, > 200 % diff for BZ # 170. FCUL2 BZ# 28 = UWCL.	593			333	255		5
3074EPES	Pest hold time exceedances FHTE3 = UWC. FSRM3 = UWC endosulfan sulfate.	101			67	34		
3078ACDD	No LCS or OPR in this dioxin SDG, assume = USE. FMSH1 = UWCH if detected. hold time FHTA1 = UWC. FSRM3 OCDD = UWC. MB detects = U5HM = UWCH.	505			429	60	16	
3078BCDD	No OPR or LCS in thsi dioxin SDG, assume = USE. FMSH1 = UWCH to detects. FSRM2 = UWC. Hold time FHTA1 = UWC. two 2378-TCDF results reported for samples.	505			475	22	8	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
3078CCDD	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NEDO-142/142B precision reasonable, except total PeCDF, HxCDF. Hold time FHTA1, FHTA2 = UWC. MB detects with FHTA = UWC. Two 2378-TCDF results reported for samples.	482			10	471	1	
3078DCDD	No LCS or OPR in this dioxin SDG, assume = USE. Hold time FHTA1, FHTA2 = UWC. Lab dup NEDO-154/154B precision reasonable except total PeCDF. MB detects = U5HM, with FHTA = UWC. two 2378-TCDF results reported for samples.	481				481		
3078ECDD	No LCS or OPR in this dioxin SDG. Hold time FHTA1, FHTA2 = UWC. Lab dup NEDO-163/163B precision reasonable. MB detect OCDD = U5HM, with FHTA = UWC.	521				521		
3078FCDD	No LCS or OPR in this dioxin SDG, assume = USE. MB detect OCDF = U5HM = UWCH. FSRM1 HxCDD = UWC. Two 2378-TCDF results reported for samples.	423			411	11	1	
3078GCDD	No LCS or OPR in this dioxin SDG, assume = USE. FSRM1, FSRM3 = UWC. MB detect OCDF = U5HM = UWCH.	380			349	30	1	
3079APES	SDG contains pest PE results. FSRM3 endosulfan sulfate, 4,4'-DDT and HCB = UWC.	101			89	12		
3096A	No LCS or OPR in this dioxin SDG, assume = USE. MB detect PeCDD, PeCDF, HxCDD, HxCDF, HpCDD, HpCDF, OCDD, OCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples. FHTA3 with FMSH1 = UWC. FMSH1 = UWCH to detects.	465			387	9	69	
3096B	No LCS or OPR in this dioxin SDG, assume = USE. MB detects HxCDD, HxCDF, HpCDD, HpCDF, OCDD, OCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples. FHTA3 = UWC.	465			422	9	34	
3096C	No OPR or LCS in this dioxin SDG, assume = USE. Lab duplicate NEE1-205/205B precision reasonable. FHTA3 = UWC. Two 2378-TCDF results reported for samples. MB detects HpCDF = U5HM = UWCH.	481			465	9	7	
3096D	No LCS or OPR in this dioxin SDG, assume = USE. Lab dup NEE1-212/212-B precision reasonable. MB detects PeCDD, PeCDF, HxCDD, HxCDF, HpCDD, HpCDF, OCDD, OCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples. FHTA3 = UWC.	482			418	10	54	
3096E	No OPR or LCS in this dioxin SDG, assume = USE. MB detects PeCDD, PeCDF, HxCDD, HxCDF, OCDF, OCDD, HpCDD, HpCDF, = U5HM = UWCH. two 2378-TCDF results reported for samples. FMSH2 fillet affects only MS = UWCH. FHTA2 = UWC.	465			404	1	60	
3096F	No OPR or LCS in this dioxin SDG, assume = USE. Lab dup NEE1-234/234B precision reasonable. MB detects HxCDD, HxCDF, HpCDD, HpCDF, OCDD, OCDF, PeCDD, PeCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples. FMSH1 = UWCH to MS only.	482			437		45	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
3096G	No OPR or LCS in this dioxin SDG, assume = USE. Lab dup NEE1-221/221B precision reasonable, except total TCDF = FLDP3 = UWC. MB detects = U5HM = UWCH. Two 2378-TCDF results reported for samples. FHTA1 = UWC. FMSH1 = UWCH to fillets only.	482			423	12	47	
3096H	No OPR or LCS in this dioxin SDG, assume = USE. MB detects OCDD, HpCDD, HpCDF, PeCDF, HxCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples. FHTA1 = UWC. FMSH1 = UWCH to MS only.	465			430	9	26	
3096I	No OPR or LCS in this dioxin SDG, assume = USE. Lab dup NEE1-263/263B precision reasonable. MB detects = U5HM = UWCH. Two 2378-TCDF results reported for samples. FHTA1 = UWC. FMSH1 = UWCH to MS only.	482			428	11	43	
3096J	No OPR or LCS in this dioxin SDG, assume = USE. Lab dup NEE1-273/273B precision reasonable. MB detects PeCDF, OCDD, HpCDD, HpCDF, OCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples.	482			447		35	
3096K	No OPR or LCS in this dioxin SDG, assume = USE. Lab dup NEE1-275/275B precision reasonable. MB detects = U5HM = UWCH. FMSH1 = UWCH to MS only. Two 2378-TCDF results reported for samples.	482			441		41	
3096L	No OPR or LCS in this dioxin SDG, assume = USE. Lab dup NEE1-242/242B precision reasonable. MB detects = U5HM = UWCH. Two 2378-TCDF results reported for samples.	277			264		13	
3181	FHTE3, FHTA3 = UWC. U5HM = UWCH. U5HM/FHTE3 = UWC. FMSL1, FMSL3, FMSL2, FMSH1, FMSH2 = UWCL or UWCH to MS/MSD only (1JMS00027).	790			525	234	24	7
4029A	Dioxin SDG no LCS/OPR, used MS. Lab dup NEH2-304/304B [2DMR00472] precision OK. MB detects = U5HM = UWCH. FLCL1, FLCL3 = UWCL. U5HM with FLCL3 = UWC. Two different 2378-TCDF results. FHTA3 = UWC. NOU to FLCL3 < 10 % rec.	482		7	422	12	18	23
4029B	Dioxin SDG has no LCS/OPR, used MS. Some recovery stds not added/reported. FHTA3 = UWC. MB detects = U5HM = UWCH. Lab dup NEH2-317 total TCDD FLDP3 = UWC. Two diff 2378-TCDF results reported. FMSH1 = UWCH, with FHTA3 = UWC.	482			439	12	31	
4029C	Dioxin SDG has no LCS/OPR, used MS. Some recovery stds not added/reported. FHTA3 = UWC. MB detects = U5HM = UWCH. Two diff 2378-TCDF results reported. Lab dup NEH2-322 precision reasonable.	482			454	10	18	
4029D	Dioxin SDG has no LCS/OPR, used MS. FHTA3 = UWC. Two 2378-TCDF results reported. Some recovery stds not added/reported. Lab dup NEH2-337 precision reasonable. MB detects = U5HM = UWCH.	482			469	10	3	
4029E	Dioxin SDG has no LCS/OPR, used MS. Lab dup NEH2-398 FLDP3 = UWC. Two 2378-TCDF results reported. FHTA3 = UWC. MB detects = U5HM = UWCH. FMSH1 = UWCH to detects, with FHTA3 = UWC.	441			409	13	19	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
4029F	Dioxin SDG has no LCS/OPR, used MS. Some recovery stds not added/reported. Two 2378-TCDF results reported. Lab dup NEH2-348 precision reasonable. MB detects = U5HM = UWCH.FHTA3 = UWC.	482			447	9	26	
4029G	Dioxin SDG has no LCS/OPR, used MS. FHTA3 = UWC. Some recovery stds not added/reported. Lab dup NEH2-350 precision reasonable.MB detects = U5HM = UWCH.Two 2378-TCDF results reported.	482			451	10	21	
4029H	Dioxin SDG has no LCS/OPR, used MS. Some recovery stds not added/reported. FHTA3 = UWC. Two diff 2378-TCDF results reported. Lab dup NEH2-367 precision reasonable. MB detects = U5hm = UWCH. FMSH1 = UWCH to MS.	482			457	10	15	
4029I	Dioxin SDG has no LCS/OPR, used MS. FHTA3 = UWC. Lab dup NEH2-376 precision reasonable. Two diff 2378-TCDF results reported. FMSH1 = UWCH to MS.	482			442	10	30	
4029J	Dioxin SDG has no LCS/OPR, used MS. FHTA3 = UWC. Some recovery stds not added/reported. Lab dup NEH2-385 precision reasonable. Two diff 2378-TCDF results reported.MB detects = U5HM = UWCH.	482			462	10	10	
4029K	Dioxin SDG has no LCS/OPR, used MS. FHTA3, FHTA1 = UWC.Some recovery stds not added/reported. Two diff 2378-TCDF results reported. Lab dup NEH2-396 precision reasonable. MB detects = U5HM = UWCH, with FHTA3 = UWC.	441			312	121	8	
4029L	Some dioxin recovery stds not added/reported. Lab dup NEH-407 precision FLDP3 = UWC. No OPR/LCS, used MS. MB detects = U5HM = UWCH. Two diff 2378-TCDF results reported for each sample.FHTA3 = UWC. FMSH1 = UWCH to MS.	482			437	12	33	
4029M	Some dioxin recovery stds not added/reported.Lab dup NEH2-408/B [2DMR01676] precision reasonable. SDG has no LCS/OPR, used MS.MB extracted day before some samples, detects = U5HM = UWCH. FHTA3 = UWC. Two diff 2378-TCDF results reported.	482			440	10	32	
4029N	Some dioxin recovery stds not added/reported.Lab dup NEH2-421 [2DMR00322] precision reasonable. No LCS/OPR in SDG, used MS. Two diff 2378-TCDF results reported.MB detects = U5HM = UWCH. FHTA3 = UWC.	482			447	10	25	
4029O	Some dioxin recovery stds not added/reported. No LCS/OPR, used MS. Two diff 2378-TCDF results reported. FHTA3 = UWC. Lab dup NEH2-433 [2DMR00582] precision reasonable. MB detects = U5HM = UWCH, with FHTA3 = UWC.	482				482		
4029P	Some dioxin recovery stds not added/reported. No LCS/OPR, used MS. Two 2378-TCDF results reported for samples. Lab dup NEH2-440 [2DMR00581] precision reasonable. FHTA3 = UWC. MB detects = U5HM, with FHTA3 = UWC.	482				482		
4029Q	Dioxin lab dup NEH2-446 [2DMR00577] precision reasonable. FHTA3 = UWC. MB detects = U5HM, with FHTA3 = UWC.FMSH1 with FHTA3 = UWC.	472				472		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
4029R	Some dioxin recovery stds not added/reported. MB detects = U5HM, with FHTA3 = UWC. FHTA3 = UWC. No LCS/OPR, used MS. Lab dup NEH2-455 [2DMR01127] precision FLDP3 = UWC. Two diff 2378-TCDF results reported.	482				482		
4029S	Some dioxin recovery stds not added/reported. FHTA3 = UWC. MB detects = U5HM, with FHTA3 = UWC. No LCS/OPR, used MS. Two diff 2378-TCDF results reported for samples. Lab dup NEH2-469 [2DMR00299] precision reasonable.	482				482		
4029T	Some dioxin recovery stds not added/reported. Lab dup NEH2-476 [2DMR00510] precision reasonable. No LCS/OPR, used MS. FHTA3 = UWC. MB detects = U5HM, with FHTA3 = UWC. FMSH1 with FHTA3 = UWC. Two different 2378-TCDF result reported.	482				482		
4029U	Some dioxin recovery stds not added/reported. FHTA3 = UWC. MB detects = U5HM, with FHTA3 = UWC. Lab dup NEH2-488 precision [2DMR01699] reasonable. No LCS/OPR, used MS. Two diff 2378-TCDF results reported.	482				482		
4053A	Some dioxin recovery stds not added/reported. Two diff 2378-TCDF results reported. MB detects = U5HM, with FHTA3 = UWC. FHTA3 = UWC. Lab dup NEI2-497 [2DMR00917] precision reasonable.	482				482		
4053B	Some dioxin recovery stds not added/reported. Lab dup NEI2-508 [2DMR00766] precision reasonable. FHTA3 = UWC. MB detects = U5HM, with FHTA3 = UWC. No LCS/OPR, used MS. Two diff 2378-TCDF results reported.	482				482		
4053C	Some dioxin stds not added/reported. FHTA3 = UWC. Lab dup NEI2-517 [2DMR01003] precision FLDP3 = UWC. Two diff 2378-TCDF results reported. No LCS/OPR, used MS. MB detect= U5HM = UWCH.	482			461	20	1	
4053D	Some dioxin recovery stds not added/reported. FHTA1, FHTA3 = UWC. MB detects = U5HM, with FHTA1 = UWC. Lab dup NEI2-526 [2DMR01008] precision FLDP3 = UWC. Two diff 2378-TCDF results reported.	482				482		
4053E	Some dioxin recovery stds not added/reported. No LCS/OPR, used MS. Lab dup NEI2-535 [2DMR00971] precision reasonable. FHTA3 = UWC. MB detects = U5HM, with FHTA3 = UWC. Two diff 2378-TCDF results reported. FLCL1 with FHTA3 = UWC.	481				481		
4053F	Some dioxin recovery stds not added/reported. FHTA3 = UWC. Lab dup NEI2-539 [2DMR01020] precision FLDP3 = UWC. No LCS/OPR, used MS. Two diff 2378-TCDF results reported for samples. MB detects = U5HM, with FHTA3 = UWC.	478				478		
4053G	Some dioxin recovery stds not added/reported. FHTA3 = UWC. No LCS/OPR, used MS. Two diff 2378-TCDF results reported. Lab dup NEI2-551 [2DMR01142] precision reasonable. MB detects = U5HM, with FHTA3 = UWC.	481				481		
4081	FHTE3 = UWC. FCSH3 d12-perylene = UWCH in affected SA only. U5HM = UWCH. FLCH1 = UWCH for detected analytes. PAH LCS recovery variable. B endosulfan, endrin aldehyde, g chlordane ,trans nonachlor low.	5266			4195	638	327	106

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
48616-03	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH. Blind FB coded as DU not match. FLCL1,2,3 = UWCL, NOU when rec < 10 %. FLCL1 with U5HM = UWC. FSRM1,3 with U5HM, FLCL2 = UWC. FSRM1,3 = USE when other QC in. FMSL1 = UWCL.	480		10	371	16	55	28
48616-05	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH. No dates recorded for TB and FB, so not assign U5HT, U5HF. FLCL1,FLCL2 = UWCL. FICL3 no action, no value reported. FMSL1 = UWCL. FICL1 = UWCL. NOU to FLCL3 where % rec < 10 %.	560		4	419	8	63	66
48616-13	Dioxin MB detects = U5HM = UWCH. Field blank coded by lab as DU, no collect date, no U5HF assigned. MB detects = 5HM = UWCH.	396			363		33	
48616-15	Dioxin FMSL1, FMSL2, FMSL3 = UWCL to MS. MB detects = U5HM = UWCH. FB coded as DU at lab, no collect date, no U5HF assigned.	462			394		25	43
48616-21	PCB MB detects = U5HM = UWCH. Field blank coded as DU at lab, no collect date, no U5HF assigned. FSRM1, 2, 3 = UWC. FLCL1, FLCL2 = UWCL.	2016			1540	84	381	11
48616-23	No collect date for TB, FB, no U5HF, U5HT assigned. PCB MB detects = U5HM = UWCH, MB extract date matches three samples (1/4/01). No MB for 10/25/00 samples. FLCL1,FLCL2 = UWCL. FCSL3 = UWCL. FLCL3 = UWCL, NOU if rec < 10 %.	2352		6	2008	5	279	54
48616-53	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH. No collect date for TB, no U5HT assigned. FLCL1,2 = UWCL. Assume FICL3 = USE, no value reported. FSRM1,3, FCSH2 = USE, all other QC in. FMSL2, FCSL2 + FICL1 = UWCL.	760			614	24	77	45
48616-65	No collect date for PCB TB, no U5HT assigned. MB detects = U5HM = UWCH. FMSL3 no action, MSD in. FICH1, FCSH1, FSRM1,2,3 no action, other QC in.	3344			2648	8	687	1
48616-79	Dioxin FSRM1, FSRM2 no action as ICS, MS, MSD in limit. Field dup (ST008) blind to lab. TB detects less than MB, no U5HT assigned. MB detects = U5HM = UWCH.	627			581		46	
48903-02	NJ comp study data for PCBs. FB, MB detects = U5HF, U5HM = UWCH. FSRM1, FSRM2 = UWC. FMSH1, FICH1 no effect, other QC in, or = UWCH. Some QC results reported twice. E results exceeded cal range = UWC. FMSL1 = UWCL to MS, MSD.	3872			3404	24	438	6
48903-10	PCB FB detects = U5HF = UWCH. MB detects = U5HM = UWCH. FSRM1, FSRM2 no action, other QC in. FSRM3 = UWC. FMSL1 = UWCL to MS. FLCL1, FLCL2 = UWCL.	2816			2206	16	581	13
48904-01	Some pest recovery stds not added/reported. FB detects = U5HF = UWCH. MB detects = U5HM = UWCH. FSRM1, FSRM3 no action, other QC in. FCSH1, FICH3 = UWCH to detects. FICL1, FICL3 no action, other QC in. FICL2 heptachlor = UWCL.	560			508		38	14
48904-11	Some pest recovery stds not added/reported. MSD extracted a day after MB, other samples. FB detects = U5HF = UWCH. MB detects = U5HM = UWCH. FICL1, FICL3, FMSH1, FSRM1, FSRM2, FSRM3 no action, other QC in. FLCL1, FLCL2 = UWCL.	720			609		105	6

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
49023-01	Dioxin FB detects = U5HF = UWCH. MB detects = U5HM = UWCH. FSRM3 no action as other QC in.	396			377		19	
6181	PAH FHTE1, FHTE3 = UWC. FLCH with FHTE/A = UWC. MB detects = U5HM, with FHTE/A = UWC. Some PCB recovery stds not added/reported.FLCL1,FLCL2 = UWCL. FLCH2,FLCH3 = UWCH.4 diff extract dates in SDG.	6825			5769	1019	27	10
6182	PCB FLCL BZ# 1,3,4= UWCL. MB detects BZ# 141,170 = U5HM = UWCH. Some PCB recovery stds not added/reported.Metals lab dup precision reasonable. Hg FHTE1,2 = UWC. Cd, me Hg FMSH1, FCCL2 = USE, other QC in.	6261			6230	23	2	6
6183	Metals EB blind to lab, reported in aqueous units, samples are sediment. FCCL2, FMSL1, FMSL3 no action, other QC in. FHTE1 = UWC. lab duplicate precision reasonable. MB detects U5HM = UWCH.	109			96	12	1	
6184	PCB MB detects = U5HM = UWCH. Lab dup precision reasonable. No LCS recovery value reported for BZ# 114 in lcs080900.	5195			4779		416	
6185	PCB or PAH MB detects = U5HM = UWCH, with FHTE = UWC. Cleanup standard analyte recovery not reported for some samples. FHTE3=UWC. Three different extract dates in SDG.FHTE1 with FLCH1,2,3 , FLCL1= UWC.	5913			5348	544	21	
7181	SDG has dioxin, pest and PAH results.FHTE/E 2,3 = UWC. Some PAH recovery stds not added/reported. FCCL1 = UWCH, with FHTE/A = UWC. FLCH1 = UWCH. FLCL3 = UWCL.	386			247	121	7	11
8271	Some PAH PCB recovery and cleanup stds not added/reported. FHTE1, FHTE3 = UWC. FCCL1,2,3 = UWCH to LCS. SDG has 3 diff extract dates, a year apart! MB detects = U5HM, w FHTE = UWC.FCCL3 = UWCL. NOU to ND results when FLCL3 < 10 % recovery.	7528		10	3448	4041	16	13
8272	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup 1JMS00148 precision reasonable.FLCH1 with U5HM = UWCH.	3168			3102		66	
900785	Some PAH recovery stds not added/reported. 3 diff extract dates in SDG.Lab dup 900785-021/900785-005 [2DMR00218] precision reasonable.	684			683		1	
900786	Some PAH recovery stds not added/reported.SDG has 3 diff extract dates/MBs.Lab dup 900786-014/003 [2DMR00243] DL factor of 10 different, lab dup about half of field sample concentration = UWC. MB detect = U5HM = UWCH.	767			729	34	4	
901688	Some PAH recovery stds not added/reported. Lab dup [2DMR00414] precision reasonable.	646			646			
901689	Some PAH recovery stds not added/reported.Lab dup [2DMR00435] precision reasonable.	646			646			
901690A	PAH SDG has sample results only, no QC. NOT VALIDATED.	510	510					
903322	PAH recovery stds not reported for some analytes, assume = USE. Lab dup 903322-017/015 precision reasonable.	646			646			
903323	Some PAH recovery stds not added/reported.Lab dup 903323-017/001 precision reasonable. FCCL1, FCCL2 =USE as MS w/same extract date (11/2/00) in limit.	850			824			26

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
903324	No MB, LCS or OPR in this PAH SDG, all = UWC. Some recovery stds not added/reported.	272				272		
904684A	Some PAH recovery stds not added/reported. Lab dup 904684-062/003 precision reasonable.	646			646			
904684B	Some PAH recovery stds not added/reported. Lab dup 904684-066/020 precision reasonable. MS reported in mass units, not recovery.	646			646			
904684C	Some PAH recovery stds not added/reported. Lab dup 904684-070/032 precision reasonable. MB detects = U5HM = UWCH. MS reported in mass units.	646			620		26	
904684D	Some PAH recovery stds not added/reported. Lab dup 904684-074/046 precision reasonable. FLCL1 = UWCL (lab F flag?).	612			609			3
911782	Some PAH recovery stds not added/reported. Lab dup [2DMR01388] precision reasonable. FCCL2 = UWCL to LCS only, MS in limit. FMSH3 = UWCH to MS only, sample ND. FMSH3/FCCL3 combo = UWC.	646			585	52	5	4
911783	Some PAH recovery stds not added/reported. Lab dup [2DMR01449] precision reasonable. FMSH3/FCCL1 combo = UWC. FCCL3 no action, MS in limit.	646			605	34	2	5
911784	Some PAH recovery stds not added/reported. Lab dup 911784-016/001 precision reasonable.	646			646			
911785	Some PAH recovery stds not added/reported. Lab dup 911785-016/001 precision reasonable.	646			646			
911786	Some PAH recovery stds not added/reported. Lab dup 911786-016/002 precision reasonable.	714			714			
911787	Some PAH recovery stds not added/reported. Lab dup 911787-016/001, precision reasonable but 001 had more detects.	714			714			
911788	Some PAH recovery stds not added/reported. Lab dup 911788-015/001 precision reasonable.	578			578			
9201	Metals hold time exceedances FHTE1,3 = UWC. Lab dup precision reasonable. FCCL1, FCCL2 no action, other QC in.	86			49	37		
920918A	Some PAH recovery stds not added/reported. SDG has no LCS/OPR, MS, BS reported in mass units, no accuracy check, assume = UWC. Lab dup 1DMR00329 values "X" = FLDP3 = UWC.	646				646		
920918B	Some PAH recovery stds not added/reported. Lab dup 2DMR00908 precision reasonable, except "X" values = FLDP3=UWC. No LCS/OPR, MS and BS reported in mass units, no accuracy check, assume = UWC.	646				646		
920919	Some PAH recovery stds not added/reported. No LCS/OPR in SDG, BS and MS reported in mass units, no accuracy check, assume = UWC. Lab dup 2DMR00325 precision reasonable.	646				646		
920920	Some PAH recovery stds not added/reported. Lab dup 2DMR00486 precision reasonable, except "" values = FLDP3 = UWC.. No LCS/OPR in SDG, BS and MS in mass units, no accuracy check, assume = UWC.	646				646		
920921A	Some PAH recovery stds not added/reported. SDG has no MB, LCS/OPR; MS reported in mass units, so no accuracy check, assume = UWC. Lab dup 2DMR00500 precision reasonable.	578				578		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
920921B	Some PAH recovery stds not added/reported. No LCS/OPR in SDG, BS in mass units, MS used. Lab dup 2DMR00555 precision reasonable. FLCH1, FMSH1, 2, 3 = UWCH.	646			608		38	
920922	Some PAH recovery stds not added/reported. MS, two SA extract dates not = MB. No LCS/OPR, MS and BS in mass units, no accuracy check, assume = UWC. Lab duplicate 2DMR00566 precision reasonable.	646				646		
920923	Some PAH recovery stds not added/reported. Lab dup 2DMR00581 precision reasonable except X=FLDP3 = UWC. LCS and MS in mass units, no accuracy check, assume = UWC. One sample extract date not = MB.	646				646		
920924A	Some PAH recovery stds not added/reported. Two samples not = MB extract date. Lab dup precision 1DMR01295 FLDP3 = UWC. MS, LCS reported in mass, no accuracy check, assume = UWC.	646				646		
920924B	Some PAH recovery stds not added/reported. MS, BS reported in mass units, no accuracy check in SDG, assume = UWC. Lab dup 2DMR01131 precision FLDP3 = UWC.	646				646		
920925	Some PAH recovery stds not added/reported. 3 extract dates in SDG. LCS, LCD, BS in mass units, no accuracy check, assume = UWC. Lab dup 2DMR01660 precision reasonable. E = UWC.	850				850		
920926	Some PAH recovery stds not added/reported. Two samples ext date not = MB. MS, BS in mass units, no accuracy check, assume = UWC. Lab dup 2DMR01675 X=FLDP3 = UWC.	646				646		
920927	Some PAH recovery stds not added/reported. MS and BS reported in mass units, no accuracy check, assume = UWC. Lab dup 2DMR01701 precision X=FLDP3 = UWC.	408				408		
922084A	Some PAH recovery stds not added/reported. Lab dup 2DMR00764 precision reasonable. LCS and MS reported in mass units, no accuracy check, assume = UWC.	646				646		
922084B	Some PAH recovery stds not added/reported. Lab dup 2DMR00798 precision reasonable. LCS and MS reported in mass units, no accuracy check, assume = UWC. FCSH1 = UWCH to LCS only. FLCH1 = UWCH.	646				642	4	
922085	Some PAH recovery stds not added/reported. MS and LCS reported in mass units, no accuracy check, assume = UWC.	646				646		
922086	Some PAH recovery stds not added/reported. Lab dup 2DMR00927 precision reasonable. Two MB extt dates in SDG. LCS, LCD, MS in mass units, no accuracy check, assume = UWC.	748				748		
922087A	Some PAH recovery stds not added/reported. Lab dup 2DMR00961 precision reasonable. LCS and MS reported in mass units, no accuracy check, assume = UWC.	612				612		
922087B	Some PAH recovery stds not added/reported. MS, LCS in mass units, no accuracy check, assume = UWC. Lab dup 2DMR0100 precision X=FLDP3 = UWC.	646				646		
922088	Some PAH recovery stds not added/reported. LCS and MS reported in mass units, no accuracy check, assume = UWC. Lab dup 2DMR01167 precision reasonable.	646				646		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
922089	Some PAH recovery stds not added/reported. MS, LCS reported in mass units, no accuracy check, assume = UWC. Lab dup 2DMR01265 precision reasonable. Field dup no sample ID match.	646				646		
922090	Some PAH recovery stds not added/reported. LCS and MS reported in mass units, no accuracy check, assume = UWC. Lab dup 2DMR01353 precision reasonable. Field dup no match for sample ID.	374				374		
BBF32101	Metals lab dup 2DMR00552 precision reasonable. FSRL1 not = UWCL, as BS in limit.	57			57			
BBF32102	Methyl mercury lab dup 2DMR00482 precision reasonable. FCSL1 not = UWCL as SRM in limit. Calculated total mercury lab dup precision FLDP3 = UWC.	54			52	2		
BBF32301	Lead and cadmium lab triplicates 2DMR00296 precision reasonable. Cd FCSL3 one SRM and BS low recovery, but other SRM and MS in limit= USE.	36			36			
BBH33301	Lead/cadmium lab dup 2DMR00508 precision reasonable. Mercury 2DMR01694 precision reasonable.	78			78			
BBH33302	Metals lab dup 2DMR00309 precision reasonable.	72			72			
BBH33303	Metals lab dup 2DMR00324 precision reasonable.	75			75			
BBH33304	Metals lab dup 2DMR00481 precision reasonable.	72			72			
BBH33305	Metals lab dup 2DMR00473 precision reasonable. FMSH1 no action, BS, SRM in limit.	75			75			
BBH33306	Metals lab dup 2DMR01701 precision reasonable. FMSL1 no action, BS, SRM in limit.	78			78			
BBH33307	Metals lab dup 2DMR00571 precision reasonable. FCSH1 no action as MS, MSD, SRM in limit.	72			72			
BBH33308	Metals lab dup 2DMR01664 precision reasonable.	75			75			
BBH33309	Metals lab dup 2DMR01686 precision reasonable.	69			69			
BBH33310	Metals lab dup 2DMR01656 precision reasonable.	78			78			
BF48201	Metals results indicated as "V" corrected for lab blank, yet MsB have no detects. Lab dup 2DMR01819 precision reasonable. SDG has no LCS/OPR, has MS, SRM.	12			12			
BH49201C	SRM recovery Cd low FCSL2, no action, BS, MS, MSD recoveries in limit. Lab dup 2DMR01809 precision reasonable.	21			21			
BH49201H	Metals lab dup 2DMR01809 precision reasonable.	21			21			
BH49202C	Cadmium lab dup 2DMR01806 precision FLDP2 = UWC.	24				24		
BH49202H	Metals lab dup 2DMR01806 precision reasonable.	24			24			
BH49203C	Metals SDG has no alerts = USE. Lab dup 2DMR01816 precision reasonable.	24			24			
BH49203H	Metals lab dup 2DMR01816 precision reasonable.	24			24			
BH49204C	Metals lab dup precision reasonable.	16			16			
BH49204H	Metals lab dup 2DMR01768 precision reasonable.	16			16			
C-DOWN	Metals FHTE3 = UWC. Me Hg FCSL1 no action, SRM, MS in limit. Lab dup 2DMR00148, 2DMR00130, 2DMR00143 precision reasonable.	107			72	34		1
C-EGGS	Metals FHTE1, 2,3 = UWC. Lab dup 1precision reasonable, except Cd FLDP3 in 1DMR00001 = UWC. FSRL1 no action, MS in limit.	127			35	92		
CF42111	Metals lab dup 2DMR00860 precision reasonable.	44			44			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
CF42112	Metals lab dup 2DMR00981 precision reasonable. FSRL1 no action, MS, MSD, BS in limit.	58			58			
CF42310	Metals lab triplicates 2DMR01341 precision reasonable.	38			38			
C-FEAT	Metals FHTE3 = UWC. Lab dup precision reasonable.	112			77	35		
CH21201	Mercury , cadmium lab dup precision reasonable.	48			48			
CH44311C	Metals lab dup 2DMR00920 precision reasonable.	46			46			
CH44312	Metals lab dup 2DMR00900 precision reasonable.	26			26			
CH44312C	Metals lab dup 2DMR00900 precision = FLDP3 = UWC.	42			38	4		
CH44313C	Pb, Cd lab dup precision FLDP3 = UWC. FCSH1 no action, MS, MSD, SRM in limit.	48			43	4	1	
CH44313H	Mercury lab dup 2DMR01003 precision reasonable.	24			24			
CH44314C	Metals lab dup 2DMR01020 precision reasonable.	50			50			
CH44314H	Mercury lab dup 2DMR01020 precision reasonable.	25			25			
CH44315C	Pb lab dup 2DMR01168 precision FLDP3 = UWC. Cd FMSL1, FCSL2 = UWCL.	52			24	2		26
CH44315H	Hg lab dup 2DMR01168 FLDP2 = UWC.	26			24	2		
CH44316C	Pb, Cd lab dup 2DMR01233 FLDP3 = UWC. FMSL1 no action as MS, MSD, SRM in limit. MB detect = U5HM = UWCH.	52			46	4	2	
CH44316H	Metals lab dup 2DMR01233 precision reasonable.	26			26			
CH44317C	Metals field up blind to lab 2DMR01281/2DMR01282 [2DMR01279]. Lab dup FLDP3 = UWC. FMSL1, FMSL2 no action, as BS, SRM in limit.	50			48	2		
CH44317H	Mercury lab dup 2DMR01282 precision reasonable.	25			25			
CH44318C	Pb lab dup 2DMR01353 FLDP3 = UWC. Blind field dup not match any sample ID.	50			48	2		
CH44318H	Blind field dup not match any sample ID. Hg lab dup 2DMR01353 FLDP3 = UWC.	25			23	2		
CNAD	SDG has POC and PON data, no lab QC. Two blind FB, collection date not match samples, no U5HF assigned. Assume = USE.	128			128			
CNAQ2	SDG has POC and PON data, no lab QC. Assume = USE.	40			40			
CNAR2	SDG has POC and PON data, no lab QC. Assume = USE.	8			8			
CNAX	SDG has POC and PON data, blind FB. Negative PON data in FB = NOU. FB collection dates not link to any field samples, no U5HF assigned. No lab QC data, assume = USE.	168		5	163			
CNBN	SDG has POC, PON data, no lab QC. FB blind to lab, assigned U5HF = UWCH to samples collected on same day (6/15/00) used highest FB. Assume rest of data = USE.	88			74		14	
CNBO	POC, PON data, no lab QC. Assume = USE. One blind FB, no samples collected on same date, no U5HF assigned. PON in FB reported as 0 = NOU.	74		1	73			
CNBQ	POC, PON data, no lab QC. Assume = USE.	60			60			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
CNSBL1	POC-PON data, no lab QC. Assume = USE. FBs blind to lab, multiple FB collected for each day, linkage to field samples unknown, no U5HF assigned.	90			90			
CNSCK	POC-PON data, no lab QC. Assume = USE.	8			8			
COL98		546	546					
C-WHBL	Metals FHTE3 = UWC. Lab dup 2DMR00020 precision reasonable.	114			76	38		
D07229	Metals and % solids lab dup precision reasonable. FHTE3 = UWC. FSRL1, FSRH1 no action, BS, MS in limit.	76			63	13		
D08309	Metals lab dup source not apparent. Two identical sample results reported for cadmium. FCSL2 no action, SRM in limit. MB detect=U5HM =UWCH. FHTE3 = UWC.	50			43	5	2	
F01070	Lead in MB, but results already reported as blank subtracted. Blind field dup to lab precision reasonable. FB blind to lab = U5HF for lead, mercury. FSRL1/U5HF conflict = UWC. U5HF + U5HM = UWCH.	46			21	22	3	
F01173	Metals lab dup precision reasonable. FHTE3 = UWC.	16			9	7		
F01201	Hg lab dup precision reasonable.	14			14			
F02011	Metals lab dup precision reasonable. FSRH1 no action as SRM in limit.	29			29			
F02131	Metals lab dup precision reasonable. FSRL1 no action as other accuracy checks in limit. Me Hg MB detect = U5HM = UWCH.	55			54		1	
F02170	FB, QADU blind to lab. QADU precision reasonable. U5HM for metals no effect, results reported as blank corrected.	52			52			
F03010	lead SRM % diff FSRM2, me Hg FSRM3 = UWC. Lab dup precision reasonable for 1GRW02957, 2958. Matching sample for QADU = 1SPL01922MD, 2029MD not known. Cd FMSH1 = UWCH.	66			15	29	22	
F03081	Metals lab dup precision reasonable. Meaning of lab qual code "=" for Ag MB not known.	56			56			
F03220	Metals field blank blind to lab, no U5HF needed. Pb FSRM3, Hg FSRM1 = UWC. Hg FCSH1 not = UWCH, MS in limit. Cd, me Hg U5HM not = UWCH, results corrected for MB.	76			45	31		
F03241	Metals lab dup precision reasonable where a sample ID match was present. FSRH1 no action, as BS and MS in limit.	61			61			
F04041	Metals lab dup precision reasonable. Blind field dup not match any sample ID. FSRH1 no action, as MS and BS in limit. Cd MB detect = U5HM = UWCH.	77			76		1	
F04070	FSRM3 for lead = UWC. Lab dup QADU RPD reasonable. Metals reported already corrected for MB, U5HM = no effect.	42			32	10		
F04181	Metals lab dup precision reasonable.	106			106			
F04299	Blind field dup to lab, precision not evaluated. Me Hg MS recovery low + FSRM3 = UWC. U5HM no effect, samples corrected for lab blank conc. Arsenic FSRM3 = UWC.	81			48	33		
F05041	Metals lab dup precision reasonable.	46			46			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
F05189	Field dups blind to lab, precision not evaluated. Lab dup Cd RPD high, FSRM3 = UWC. Me Hg FSRM3 = UWC.	36			13	23		
F05301	Metals lab dup precision reasonable.	47			47			
F06090	Metals QADU 1SPL04047 for Pb no matching sample. Pb FSRM2 = UWC. me HG FSRM3 = UWC.	78			42	36		
F06189	Lab dup QADU preision reasonable. Low SRM recovery FSRL1, FSRL2 = UWCL.	32			12			20
F06191	Metals lab dup (1SPL02804) precision reasonable.	51			51			
F06280	Metals lab dup precision reasonable. Lead FSRH1 and Cd FMSH1 no action, BS, BSD not biased high. Me Hg low SRM recovery no action, other QC in.	67			67			
F07029	Metals lab dup precision reasonable. Hg FSRL1 no effect, other QC in.	27			27			
F07051	Metals lab dup precision reasonable = USE.	46			46			
F07122	Mercury lab dup precision reasonable.	13			13			
F07219	Metals lab dup precision reasonable. FSRL1, FSRH1 not refelcted in other batch QC = USE.	37			37			
F07311	Metals lab dup precision reasonable. Hg FCSH1 not = UWCH as SRM, MS not high.	43			43			
F08129	Metals lab dup precision reasonable. Hg FSRL1 not = UWCL, other QC in. Cd FSRH1 not = UWCH, other QC in. me Hg FMSL1 = UWCL in 1SPL00726.	31			29			2
F08131	Metals lab dup precision reasonable. not = UWCH as results reported as lab blank corrected. FSRH1 not = UWCH, other QC in.	43			43			
F08140	Metals lab dup precision reasonable. FSRM3 = USE, other QC in. FSRM3 = UWC, FMSL1 = UWCL to sample 1SPL01751.	42			31	7	2	2
F08269	Metals field dup blind to lab. Hg FSRL1 not = UWCL, other QC in. FHTE3 = UWC. Conflict FMSL1 FSRH1 = UWC. FMSL2 me Hg = UWCL to 1SPL000729.	65			37	26		2
F09011	Metals lab dup precision reasonable.	39			39			
F09070	mercury QADU precision 1SPL01391 139 % RPD = FLDP3 = UWC. FSRM1, FSRM3 = UWC.	36			17	19		
F09169	Metals lab duplicate precision reasonable. FSRL1 = USE, as other QC in. U5HM not = UWCH as results are reported as blank corrected.	43			43			
F09230	Metals lab duplicate precision reasonable. U5HM not = UWCH, as results are reported blank corrected.	36			36			
F09271	Metals lab duplicate precision reasonable.	56			56			
F092999	Metals lab duplicate precision resaonable. FSRM3 = UWC for mercury.	32			21	11		
F10050	Metals lab duplicate precision reasonable. me Hg FSRM3 = UWC.	37			29	8		
F10149	Pb lab dup no matching field sample in SDG. Hg, Cd, me Hg lab dup okay. FSRH1 = UWCH to detects. U5HM = no action as results reported corrected for blank (V).	54			47		7	
F10279	Metals EB blind to lab, Hg U5HE = UWCH. FSRM1 = UWC. Lab dup precision reasonable. U5HM not = UWCH, result corrected for MB.	70			50	15	5	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
F11129	Metals lab duplicate precision reasonable. FSRM3 = UWC.	36			19	17		
F12010	Metals lab duplicate precision reasonable. Field dup blind to lab, precision not evaluated. U5HM not = UWCH as results reported as blank corrected. FHTE3 = UWC. Pb FSRH1 = UWCH as other QC high.	65			48	2	14	1
F12019	Metals QADU = 1GRW02301MD Pb no matching sample. Hg FSRM2 = UWC.	36			27	9		
F12179	Metals lab duplicate precision reasonable. FSRH1 = UWCH for Pb. FSRL1 not = UWCL as other QC in. not = UWCH as results reported blank corrected. me Hg FSRL1 not = UWCL, other QC in.	35			26		9	
F1221A	Metals lab duplicate precision reasonable. FSRL1 = UWCL for me Hg.	32			23			9
FF03101	Me Hg lab dup precision reasonable.	38			38			
FF03102	Me Hg lab dup precision reasonable.	37			37			
FF03200	Hg lab dup not match a field sample in SDG. Cd lab dup precision reasonable. FHTE3 = UWC. FSRL1 not = UWCL, as BS, MS, other SRM not low.	25			22	2		1
FF08101	Me Hg FSRH1 = UWCH to detects as MS, MSD high. Lab dup precision reasonable. FCSF0 = no LCS or OPR, but SDG does have SRM, MS, MSD.	22			14		8	
FF08120	Metals SDG has no LCS or OPR = FCSF0, but has MS, MSD, SRM. FSRH1 = UWCH to detects as MS, MSD also high. Lab dup precision reasonable.	36			21		15	
FF08140	Metals SDG has no LCS or OPR = FCSF0, but has MS, MSD, SRM. Lab dup precision reasonable.	36			36			
FF08200	No Cd OPR or LCS = FCSF0, but has MS, MSD, SRM. Lab duplicate precision reasonable.	14			14			
FF14101	No LCS or OPR in metals SDG = FCSF0, but has MS, MSD, SRM. Lab dup precision reasonable.	38			38			
FF14120	No LCS or OPR in metals SDG = FCSF0, but has MS, MSD, SRM. Lab dup precision reasonable. FSRL1 not = UWCL as MS, MSD not biased low.	36			35			1
FF14201	Cadmium lab dup (< 0.7 ng/g vs. 410 ng/g) precision off = FLDP3 = UWC.	15			13	2		
FF20101	Lab dup precision reasonable. Cd FSRL1 no action to sample results, MS sample native conc > 4 X spike.	50			49			1
FF20201	Cd lab dup precision reasonable. 2DMR01060MS-MD not match field sample's MS or MD results = UWC. FMSL1 = UWCL to sample used for MS.	21			18	1		2
FF26101	SDG has no LCS or OPR = FCSF0, but has MS, MSD, SRM. Lab dup precision reasonable.	48			48			
FF26102	Metals SDG has no LCS or OPR = FCSF0, but has MS, MSD, SRM. Lab duplicate precision reasonable.	54			54			
FF26141	Metals SDG has no LCS or OPR = FCSF0, but has MS, MSD, SRM. Lab dup precision reasonable.	36			36			
FF26201	Cadmium SDG has no LCS or OPR = FCSF0, has MS, SRM. Lab dup precision reasonable. FCSF0, has MS, SRM. Lab dup precision reasonable	25			25			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
FH04110	No LCS/OPR = FCSF0, has MS, ICS extr day later, used MS, as ICS in mass units. FMSL1, FMSL2, FMSL3 = UWCL. FMSH1, 2, 3 = UWCH to detects. MB detects = U5HM = UWCH. Lab dup FLDP2, FLDP3 = UWC. FMSL3 = NOU as recovery 0 % BZ#86, heptachlor.	3864		32	3613	32	123	64
FH04121	3 extract dates in SDG, some SA not have QC extr on same day. FCSF0, but have MS/ICS to evaluate. FMSL3 = NOU for ND endo SO4, heptachlor, BZ# 13. FLDP2,3 = UWC, with FMSL2 + FMSL3 = UWCL. FMSL1, FMSL2 = UWCL. FLCH1, U5HM = UWCH. FMSH3 = UWCH to detects.	5800		66	5286	24	82	342
FH04122	Some PCB recovery stds not added/reported. No LCS or OPR = FCSF0, used MS. SDG extracted over 3 days. NOU to ND endo SO4, endrin aldehyde, heptachlor, BZ# 13 = FMSL3 rec < 10 %. FMSL1,2,3 = UWCL. FLDP1,2 = UWC. FLCH1, FLCH2 = UWCH. U5HM = UWCH.	5074		82	4816	42	48	86
FH04131	SDG covers 3 days extraction, no LCS/OPR, used MS (ICS in mass). MB U5HM = UWCH. Lab dup precision reasonable. FMSL1,2,3 = UWCL. Some pest MS recoveries reported as " XX U" % assume = XX %. FLDP3 BZ# 62,63,197, 78,174, 147,135, 151, 157, 181 = UWC.	5567			5222	22	22	301
FH04132	FMSL3 on coeluted congeners = USE. Some recovery stds not added/reported. No LCS/OPR, used MS. SDG covers two days. NOU when FMSL3, FLCL3 recovery < 10% and result ND. MB detects = U5HM = UWCH. FMSL2,3 = UWCL. FMSH1,2 = UWCH.	4352		111	4072		115	54
FH04140	SDG has no MB, LCS/OPR for PCB or pest, used MS. ICS in mass units. All detects suspect = UWC, as no MB. FMSL1,2,3 = UWCL. FMSL3 on coeluted congeners = USE. Some recovery stds not added/reported.	2875			1433	1346		96
FH04201	Metals SDG has no LCS, has SRM, MS, assume = USE. lab dup precision reasonable.	50			50			
FH04203	Metals lab dup precision reasonable. FCSL2 no action, MS, MSD, BS in limit.	52			52			
FH04204	Mercury and cadmium lab dup precision reasonable.	48			48			
FH04210	Metals SDG has no LCS, but has MS, MSD, SRM. Lab duplicate precision reasonable.	50			50			
FH11110	No LCS/OPR = FCSF0, no accuracy check, assume = UWC. Lab dup 2DMR00331 6% precision reasonable. MB detects over 2 extract dates = U5HM = UWCH. Some PCB recovery stds not added/reported.	2421				2396	25	
FH11121	No LCS/OPR = FCSF0, ICS in mass, use MS as PCB accuracy check, none for pest, Aroclors assume = UWC. One MB for 6/22-6/27/00. Lab dup 2DMR00353 6% FLDP1,2,3 = UWC to SA + QADU. FMSL3 no action if coeluted. FLCH1, FMSH1 = UWCH, no action to ND SA.	5529			4813	678	38	
FH11122	No LCS/OPR = FCSF0, ICS in mass, used MS. MB extract 9/26, SA 9/29, 10/5/00. 2DMR00374 6% FLDP2,3 = UWC to SA, QADU. FMSL1,2,3 = UWCL, no action if coeluted, NOU if < 10 % and SA = U. FMSH13 or FLCH1,3 = UWCH, no act if SA = U.	5800		208	5140	20	42	390

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
FH11123	No LCS/OPR=FCSF0, ICS in mass, used MS. MB extracted 10/12/00, spls 9/29, 10/5, 10/13/00, detects=U5HM=UWCH. 2DMR00394 6% FLDP1,2,3 = UWC to SA, QADU 2DMR. FMSL1,2,3 = no act if coeluted, =UWCL, =NOU if < 10 % and SA = U.FLCH1 = UWCH, no act if SA = U.	5316		272	4442	41	33	528
FH11141	No LCS/OPR=FCSF0, used MS. MB 11/28/00; SA on 11/28, 29, 10/13, 12/4/00, detects=U5HM=UWCH. 2DMR00432-2 FLDP1,2,3=UWC to SA, QADU. FMSL1,2,3=UWCL, USE if coelute, =NOU if < 10 % and SA=U.FMSH1,2,3=UWCH to detects. XX "U" % rec assumed to be XX.	5595			5219	25	120	231
FH11142	No LCS/OPR=FCSF0, ICS mass, used MS. MB covers 3 ext dates 12/5-7/00, detects=U5HM=UWCH. FMSL1,2,3=UWCL, =NOU if < 10 % and SA=U, =USE if coelute. FMSH1=UWCH to detects. FLDP1,2,3=UWC 2DMR00453. XX "U" rec assumed = XX.	5804			5421	2	71	310
FH11143	No LCS/OPR=FCSF0, ICS mass, used MS. MB extracted 12/13/00, some SA on 12/8/00. FMSL1,2,3 no act if coeluted,=UWCL, NOU if < 10 % recovery ans SA=U. Lab dup 2DMR00469 6% FLDP1 = UWC to SA and QADU.FLCH1 = UWCH if detect.	4106		175	3183	2	20	726
FH11201	Metals lab dups precision reasonable. FCCL2 not = UWCL, as SRM and other QC in limit.	53			53			
FH11221	Metals lab dups precision reasonable.	51			51			
FH11222	Cd, Hg lab dup precision reasonable. MS/MSD Cd low=FMSL1, but BS, SRM in = USE.	53			51			2
FH11223	Metals lab dups precision reaonable. FCCL2 not = UWCL as MS, BS, SRM in limit.	49			49			
FH11241	Metals lab dups precision reasonable.	52			52			
FH11242	Metals lab dups precision reasonable.	52			52			
FH11250	Metals lab dups precision reasonable.	46			46			
FH15101	No LCS/OPR=FCSF0, ICS mass, used MS, assume MS rec "XX U" =XX. MB ext 7/16/00, SA 7/13,16,17/00, BZ# 78 U5HM=UWCH. Lab dup 2DMR00609 precision reasonable. FICL1,3 =UWCL to ICS only.FMSL1,2,3=UWCL, USE if coelute, NOU if < 10 % rec and SA=U.	6050		49	5833		14	154
FH15102	No LCS/OPR=FCSF0, ICS mass, used MS. FMSL3=UWCL, USE if coelute, NOU if < 10 % rec and SA=U.MB extracted 7/19/01, SA on 7/18-20/01, detects = U5HM = UWCH.FMSH3 = UWCH to detects. 2DMR00626 FLDP1,2,3=UWC to SA and QADU.	5800		120	5597	20	39	24
FH15122	No LCS/OPR = FCSF0, ICS in mass, used MS. FMSL1,2,3=USE if coelute, UWCL, NOU if < 10 % recovery and SA=U. MB extracted 7/24/01, SA 7/23-25/01, detects=U5HM=UWCH. 2DMR00696 FLDP1,2,3 =UWC.FLCH1, FMSH1,2,3=UWCH to detects.	5800		96	5486	26	144	48
FH15123	No LCS/OPR=FCSF0, ICS in mass, used MS. FMSL3 = UWCL, USE if coelute, NOU if recovery < 10 % and SA=U. 2DMR00703 FLDP2,3 = UWC to SA, QADU. MB extract on 7/27/01; SA on 7/26,27,30/01, MB detects=U5HM=UWCH.FMSH1,3=UWCH to detects.	5800		96	5345	14	201	144

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
FH15151	No LCS/OPR, ICS in mass, used MS. FMSL3 = UWCL, USE if coelute, NOU if MS or FLCL3 recovery < 10 % and SA=U. MB extracted on 8/1/01 SA on 7/31,8/1/01, detects=U5HM = UWCH. 2DMR00633 FLDP1,2,3=UWC to SA, QADU. FMSH1,2=UWCH to detects.	4381		63	4193	10	95	20
FH15152	No LCS/OPR=FCSF0, ICS in mass, used MS. No MS or other accuracy check for pest, all = UWC.FMSL3=UWCL, USE if coelute, NOU if recovery < 10 % and SA=U. FMSH1,3=UWCH if detect.FLCH1=UWCL.	2387		10	2082	270	17	8
FH15201	Metals lab dups precision reasonable.	52			52			
FH15202	Metals lab dups precision reasonable.	52			52			
FH15222	Metals lab dups precision reasonable.	52			52			
FH15223	Cadmium lab dup 2DMR00703/703D 46 % RPD=FLDP3 = UWC.	52			50	2		
FH15251	Metals lab dups precision reasonable.	42			42			
FH15252	Metals lab dups precision reasonable.	40			40			
FH21120	No LCS/OPR, ICS in mass, used MS. MS as XX "U" assumed = XX.FMSL1,3=UWCL, USE if coelute. MB extracted on 6/20/01,SA on 6/20 and 6/25, detects = U5HM=UWCH.FMSH2=UWCH to detects.	4114			4012		34	68
FH21141	No LCS/OPR, ICS in mass, used MS. MS as XX "U" assumed to = XX. FMSL1,2,3 = UWCL, USE if coelute, NOU if rec < 10 % and SA=U. MB extracted on 6/27/01, SA 6/26-28/01, detects=U5HM=UWCH. FMSH1=UWCH to detects. 2DMR01064 FLDP2=UWC to QADU and SA.	6050		25	5807	2	38	178
FH21142	No LCS/OPR=FCSF0, ICS mass, used MS. MS as XX "U" assume = XX. FMSL1,2,3=UWCL, USE if coelute, NOU if rec < 10 % + SA=U. MB extracted 7/6/01, SA on 7/5-6,12/01, detects=U5HM=UWCH. Lab dup 2DMR01095 precision reasonable.	6046		46	5785	1	35	179
FH21201	Metals lab dups precision reasonable.	52			52			
FH21241	Metals lab dups reasonable. FCSL2 for CD not = UWCL, as other QC (MS, BS, SRM) in limit.	54			54			
FH21242	Metals lab dups precision reasonable.	52			52			
FH27141	No LCS/OPR, ICS in mass, use MS. FMSL1,3=UWCL, USE if coelute, NOU if rec < 10% and SA=U. MB extracted 9/6/01, SA 9/1,6-7/01 MBdetects=U5HM=UWCH. 2DMR01434 FLDP1,2,3=UWC to QADU and SA. FMSH3=UWCH if detect.	5800		72	5537	35	60	96
FH27142	No LCS/OPR, ICS in mass, used MS. FMSL2,3=UWCL, USE if coelute, NOU if rec < 10 % and SA=U. MB extract 9/19/01 SA 9/19-21/01, detects=U5HM=UWCH.FMSH1=UWCH if detect. 2DMR01476 FLDP1,3=UWC to QADU + SA.	5800		71	5563	6	112	48
FH27143	No LCS/OPR, ICS mass, used MS. FMSL1,2,3=UWCL, USE if coelute, NOU if rec < 10 % + SA=U. MB extracted on 9/24/01, SA 9/24-26. MB detects=U5HM=UWCH. 2DMR01522 FLDP3=UWC to SA + QADU.FMSH1=UWCH if detect.	5800		72	5544	5	83	96

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
FH27144	No LCS/OPR, ICS mass, used MS. FMSL1,3=UWCL, USE if coelute, NOU if rec < 10 % and SA=U. 2DMR01532 FLDP1,2,3=UWC. MB extracted on 10/2/01 SA on 10/2,3,5/01, detects=U5HM=UWCH. FMSH2=UWCH to detects.	4832		80	4580	12	60	100
FH27151	No LCS/OPR, ICS in mass, used MS. FMSL1,3 = UWCL, USE if coelute, NOU if rec < 10 % and SA=U. MB extracted on 10/16/01, SA on 10/12,15,16/01, detects=U5HM=UWCH. 2DMR01598 FLDP1,3=UWC. FLCH1, FMSH1,3=UWCH to detects.	5558		69	5367	8	68	46
FH27152	No LCS/OPR, ICS in mass, used MS. FMSL2,3=UWCL, USE if coelutes, NOU if rec < 10 % and SA=U. Mb extracted on 11/8/01, SA on 11/8, 9, 13/01, detects=U5HM=UWCH. 2DMR01588 FLDP1,3=UWC. FMSH1,2=UWCH to detects.	5800		48	5620	6	54	72
FH27153	No LCS/OPR=FCSF0, ICS in mass, used MS. FMSL1,2,3=UWCL, USE if coelute, NOU if rec < 10% and SA=U. MB extracted on 12/10/01, SA on 11/19-20, 12/19/01, detects=U5HM=UWCH. 2DMR01617 FLDP1,2=UWC.	5558		69	5279	19	30	161
FH27201	Metals lab dups precision reasonable.	52			52			
FH27202	Mercury (39 % RPD) and cadmium (9% RPD) lab dup 2DMR01359D precision reasonable for biota =USE.	38			38			
FH27221	Metals lab dups precision reasonable.	52			52			
FH27222	Metals lab dups precision reasonable.	52			52			
FH27241	Metals lab dups precision reasonable.	52			52			
FH27242	Metals lab dups precision reasonable.	52			52			
FH27243	Metals lab dups precision reasonable.	52			52			
FH27244	Metals lab dups precision reasonable.	44			44			
FH27251	Metals lab dups precision reasonable.	52			52			
FH27252	Metals lab dups precision reasonable.	52			52			
FH27253	Mercury lab dup 2DMR01545 RPD = FLDP3 = UWC.	50			48	2		
FHO4202	No LCS in metals SDG, but has MS, MSD, SRM. Lab dups precision reasonable.	51			51			
NONE	DOC and TSS data only, no lab QC. Field dup blind to lab. Field dup blind to lab, precision not evaluated. Assume = USE.	53			53			
RECRA00		3458	3458					
RECRA01		50	50					
RECRA99		442	442					
S01173	Mercury FHTE3 = UWC, samples collected in 1999 and 2000, digested and analyzed in 2003. Lab duplicate 1SPL03055 precision reasonable.	10			7	3		
S03100	FSRM3 for lead and me Hg = UWC. Metals lab duplicate precision reasonable.	38			20	18		
S03200	Metals QADU precision reasonable. U5HM not = UWCH, results reported as blank corrected. me Hg FSRM1 = UWC.	31			22	9		
S04070	One MS for lead 11.2 % recovery = UWC as other QC not low. Lab duplicate precision reasonable.	68			47	21		
S04220	Metals lab duplicate precision reaonable.	40			40			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
S04299	Field dups blind to lab, precision not evaluated. Lab dup precision reasonable. U5HM not = UWCH as results are blank corrected. Cd FSRM3 = UWC. me Hg MS 1SPL00808 low = UWCL to sample.	41			12	26		3
S05041	Metals lab duplicate 1SPL02818 precision reasonable. Sample results reported corrected for lab blank concentration.	40			40			
S05050	Metals QADU precision reasonable. FSRM2, FSRM3 = UWC.	61			17	44		
S05150	Metals lab duplicate precision reasonable. FSRH1 = UWCH.	39			12		27	
S05229	Mercury field dups blind to lab, precision not evaluated. Lab duplicate precision reasonable. U5HM not = UWCH as results are blank corrected.	11			11			
S05299	Metals lab duplicate precision reasonable. Field dup blind to lab, precision not evaluated. FSRM3 = UWC.	21				21		
S06080	Metals lab duplicate precision reasonable. U5HM not = UWCH as results are blank corrected. FSRL1 = UWCL.	57			46			11
S07010	Metals lab duplicate precision reasonable. FSRH1 = UWCH.	44			25		19	
S07099	Metals lab duplicate precision reasonable. FHTE1 = UWC. Field dup blind to lab, precision not evaluated. U5HM not = UWCH as results blank corrected. FSRM3 = UWC for me Hg. FMSL1, FCSL1 for Cd = UWCL.	63			21	17		25
S07239	Metals lab duplicate precision reasonable. Hg, me Hg FSRM3 = UWC. Cd FSRM3 + FMSL1 = UWC.	38				38		
S08319	Metals lab duplicate precision reasonable, except me Hg = UWC. Hg FSRL1 = UWC as other QC not biased low. Cd FSRL1 = UWCL as other QC low. Me Hg FMSL1 = UWC as other QC not biased low.	47				29		18
S09159	metals FSRM2, FSRM3 = UWC. Lab dup precision reasonable.	28			8	20		
S09201	Metals lab duplicate precision reasonable. U5HM not = UWCH as results reported as blank corrected.	48			48			
S10020	Metals lab duplicate precision reasonable. Cd FSRL1 = UWC as other QC not biased low. me Hg FSRL1 = UWCL as other QC low. Lead lab dup not match other sample IDs, lab assigned "***" qualifier. Pb FSRH1 = UWCH.	40			11	11	10	8
S10101	Metals lab duplicate precision reasonable.	41			41			
S10219	Metals lab duplicate precision reasonable. U5HM not = UWCH as results are reported blank corrected.	38			27	11		
S10240	Metals lab duplicate precision reasonable. me Hg FSRH1 = UWCH.	47			39		8	
S10270	Metals lab duplicate precision reasonable, except Ag and me Hg = UWC. FSRM3 = UWC. Field dup blind to lab, precision not evaluated. U5HM not = UWCH as results reported as blank corrected.	59			29	30		
S11059	Metals lab duplicate precision reasonable. Cd FARL1 + FSRL1 + FSRM3 + FCSL1 = UWCL. me Hg FSRM3 = UWC.	38			19	8		11
SDG	Field duplicate blind to lab, precision not evaluated.	732			732			
UNK		366	366					

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
UNKNOWN	DOC, TSS data, no lab QC. Some lab QC codes = UK. DOC FB < 5 X all samples. Assume = USE.	46			46			
USGS	POC, PON data only, no QC results. Assume = USE.	25			25			
WG1085	Identical PAH results reported for sample L1228-2 i2 and -1 i2. U5HM fluoranthene, naohthalene, acenaphthene = UWCH.	172			162		10	
WG1087	Dioxin lab dup L1230-1A/1B precision reasonable. FCSH1 for 1,2,3,4,6,7,8-HpCDF= UWCH. MB detect 1,2,3,7,8,9-HxCDF = U5HM = UWCH.	410			397		13	
WG1088	Spme PAH recovery standard analytes not added/reported. FLCL1 = UWCL.	130			128			2
WG1089	Dioxin lab dup precision L1230-9A L2/9B L2 reasonable. two different results reported for field samples for 2378-TCDF. MB detects 2378-TCDF = U5HM = UWCH.	411			396		15	
WG1090	Lab dup L1230-3AW/3B W precision reasonable. Some PCB recovery/clean up standards not added/reported, assume = USE.	2088			2088			
WG1091A	Some pest recovery stds not added/reported. Lab duplicate L1230-7Bi/L1230-7Ai [6JMS00021] precision reasonable, except for 2,4'-DDT = FLDP3 = UWC.	240			238	2		
WG1091B	Pest recovery standards not added/reported for some analytes, assume = USE. Lab dup L1230-7A i/7B i precision reasonable. FCCL1 methoxychlor = UWCL.	108			98			10
WG1100	Some PCB recovery and cleanup stds not added/reported. Assume = USE. Lab dup L1230 - 9A W/9B W precision reasonable.	2081			2081			
WG1101A	Pest lab duplicate L1230-10A/10B precision reasonable, except for 2,4'-DDT (78 % RPD), heptachlor (106 % RPD)= FLDP3=UWC. Some recovery standard analytes not added/reported. Assume = USE.	248			244	4		
WG1101B	Some pest recovery standards not added/reported. Assume = USE. Lab dup L1230-10A i/10B i precision reasonable.	108			108			
WG1102	Some PAH recovery standards not added/reported. Assume = USE. Lab dup L1230-6A i2/6B i2 precision reasonable.	327			327			
WG1104	PAH lab dup L1230-16A i2/16B i2 precision reasonable. Some recovery standards not added/reported. Assume = USE.	288			288			
WG1107A	Some pest recovery stds not added/reported, assume = USE. Lab dup L1230-16A Wi3/16B Wi3 precision reasonable, except for heptachlor = UWC. MB detect HCB = U5HM = UWCH. FCCL1 oxychlorane = UWCL.	248			234	2	2	10
WG1111	Dioxin MB detects HxCDD, HxCDF, OCDF, 2,3,7,8-TCDF, PeCDF= U5HM = UWCH.	368			330		38	
WG1124	PAH holding time exceedances = FHTE3 = UWC. Lab dup L1230-7AR/7BR precision reasonable.	294			96	198		
WG1165	FHTE3 = UWC. U5HM+ FHTE3 = UWC. Two identical PAH results reported for L1285-1 i2.	118			62	54		2
WG1195	Two identical PAH results reported for L1332-2, L1332-1, L1332-17, L1332-18. FHTE2, FHTE3 = UWC. U5HM + FHTE = UWC.	334			64	270		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG1239B	Pest hold time exceedances = FHTE3 = UWC. Some recovery standard analytes not added/reported. Assume = USE. Lab dup L1230-18RA i2/RB i2 precision reasonable. endo sulfate FCSH2 = UWCH LCS detect only.	86			28	55	1	2
WG1293	PAH hold times exceeded: FHTE3 = UWC. U5HM + FHTE3 = UWC. U5HM = UWCH. Two identical results reported for L1420-1 i2, L1420-2 i2, L1375-1 i2.	226			90	128	8	
WG1312	PAH FHTE3 = UWC.	388			64	324		
WG1332	PAH holding times exceeded: FHTE3, FHTE3 + U5HM = UWC. Identical results reported twice for L1463-1, -2, -3, -4, -5, -6. Field dup blind to lab, not evaluated. FCSL1 = UWCL to sample.	420			146	272		2
WG1340	U5HM = UWCH. OCDD FCSH1 = UWCH.	482			434		48	
WG1349	Many PAH hold time exceedances FHTE3, FHTE3 = UWC. Anthracene U5HM = UWC (with FHTE, FHTE).	712			64	648		
WG1362	OCDD, OCDF, HpCDD, HpCDF, HxCDF in MB = U5HM = UWCH. FHTE2 = UWC.	746			699	2	45	
WG1365	Dioxin MB detects 2378-TCDD, 2378-TCDF, HxCDD, HxCDF, HpCDD, total PeCDF, PeCDD = U5HM = UWCH. FHTE1 = UWC.	891			826	4	61	
WG1379	Many PAH hold time exceedances FHTE3, FHTE2 = UWC. Lab dup precision L1520-3Ai7/Bi7 reasonable. Two identical results reported for some samples. Acenaphthene, naphthalene U5HM = UWC as combined with FHTE.	258				258		
WG1393	PCB clean-up standard or recovery standards not reported for many analytes. Assume = USE.	3031			3031			
WG1394A	Pest hold time exceedances FHTE3 = UWC. MB detects HCB = U5HM = UWC with FHTE3.	538			46	492		
WG1394B	Pest hold time exceedances FHTE3 = UWC. MB detects endosulfan sulfate/aldehyde = U5HM = UWC with FHTE3.	248			20	228		
WG1400	PCB clean up and recovery standards not reported for many analytes. Assume = USE.	2604			2604			
WG1401A	Pest hold time exceedances = FHTE3 = UWC. HCB in MB = U5HM with FHTE3 = UWC.	456			46	410		
WG1401B	Pest holding time exceedances = FHTE3 = UWC.	210			20	190		
WG1403A	Pest hold time exceedances = FHTE3= UWC.	292			46	246		
WG1403B	Pest hold time exceedances = FHTE3 = UWC. Endosulfan sulfate in MB = U5HM, with FHTE3 = UWC.	134			20	114		
WG1411	MB detects HxCDD, OCDD, OCDF, HpCDD, HpCDF, total PeCDD = U5HM= UWCH. OCDF LCS = FCSH1 = UWCH.	755			623		132	
WG1414	Dioxin MB detects 2378 TCDD, 2378-TCDF, PeCDF, OCDD, HxCDD, HpCDD, HpCDF, PeCDD, OCDF= U5HM = UWCH. U5HM + FLCL3 conflict = UWC. FLCL3, FLCL2 OCDD in two samples = UWCL. OCDF FCSH1 = UWCH.	823			679	1	139	4
WG1420	PCB clean up and recovery standards not reported. MB detects 2-CB, 4-CB, 2,2'-DCB, 2,4'-DCB, 4,4'-DCB, 2,4',5-TCB, 2,3,3',4,4'-PCB, HxCB, OCB + others = U5HM = UWCH.	2837			2754		83	
WG1421A	Pest holding time exceedances FHTE3 = UWC. MB detect for HCB = U5HM, U5HM with FHTE3 = UWC.	497			46	451		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG1421B	Pest holding time exceedances = FHTE3 = UWC. MB detect endosulfan sulfate = U5HM, with FHTE3 = UWC.	210			20	190		
WG1452	PAH hold times exceeded = FHTE2, FHTE3 = UWC. Field dup blind to lab, precision not evaluated. Two identical results reported for samples. FCSL2= UWCL. U5HM naphthalene = UWCH, with FHTE = UWC.	334			164	162	4	4
WG1491	Field dups blind to lab, precision not evaluated. MB detect U5HM = UWCH. PCB clean up and recovery standard not reported for some analytes.	2801			2799		2	
WG1492	Field dup blind to lab, precision not evaluated. PCB clean up and recovery std not reported for some analytes. MB detects = U5HM = UWCH.	2371			2300		71	
WG1493	Field dup blind to lab, precision not evaluated. Clean up and recovery standards not included for some analytes. MB detects = U5HM = UWCH.	2371			2367		4	
WG1511A	Pest hold time exceedances = FHTE1, FHTE2, FHTE3 = UWC. Field dup blind to lab, precision not evaluated. MB detect HCB, g chlordane = U5HM = UWCH.	497			126	363	8	
WG1511B	Field dup blind to lab, precision not evaluated. pest hold time exceedances FHTE1, FHTE2, FHTE3 = UWC.	229			28	201		
WG1512	PCB clean up and recovery standards not reported for some analytes.	2371			2371			
WG1513A	Pest holding time exceedances = FHTE3 = UWC. Field dup blind to lab, precision not evaluated. MB detects HCB, aldrin = U5HM = UWCH, conflict w FHTE3 = UWC.	415			26	389		
WG1513B	Pest holding time exceedances FHTE3 = UWC. Field dup blind to lab, precision not evaluated. Endrin ketone, aldehyde in MB = U5HM, with FHTE3 = UWC.	191			20	171		
WG1514	PCB recovery and clean up standards not reported for some analytes. MB detect DCB, 2-CB, tetraCB, pentaCB, hexaCB, heptaCB, octaCB = U5HM = UWCH.	2604			2545		59	
WG1518A	Pest holding time exceedances = FHTE3 = UWC. MB detect HCB = U5HM with FHTE3 = UWC.	374			46	328		
WG1518B	Pest holding time exceedances = FHTE3 = UWC. MB detects beta endosulfan, endrin ketone, aldehyde, endrin = U5HM = UWC with FHTE3.	191			17	174		
WG1527A	Field dup blind to lab, precision not evaluated. Pest holding time exceedances = FHTE3 = UWC. MB detects HCB, mirex, aldrin, cis-nonachlor = U5HM = UWCH, with FHTE3 = UWC.	415			46	369		
WG1527B	Pest field dup blind to lab, precision not evaluated. Pest hold time exceedances = FHTE3 = UWC. MB detects endrin ketone, aldehyde = U5HM = UWC with FHTE3.	191			20	171		
WG1528A	Pest hold time exceedance = FHTE3 = UWC. MB detects HCB, mirex, trans-nonachlor = U5HM, with FHTE3 = UWC.	456	1		46	409		
WG1528B	Pest hold time exceedances = FHTE3 = UWC. MB detects for endosulfan sulfate, endrin ketone, aldehyde = U5HM = UWC with FHTE3.	210			20	190		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG1538	PAH hold time exceedances FHTE/FHTA3 = UWC. Field dup blind to lab, precision not evaluated. FLCH/ FLCL1 = UWC with FHTE/FHTA3. MB detects acenaphthene, fluorene, naphthalene, biphenyl = U5HM = UWC with FHTE/FHTA.	658				658		
WG1539A	Pest hold time exceedances FHTE1, 2,3= UWC. MB detects HCB = U5HM with FHTE = UWC.	497			46	451		
WG1539B	Pest hold time exceedances FHTE1,2,3 = UWC.	191			20	171		
WG1540	PCB clean up recovery standards not reported for some analytes. MB detect 2,3,3',4,4',6 hexaCB = U5HM = UWCH.	1672			1670		2	
WG1541	PCB recovery and clean up standards not reported for some analytes. MB detects = U5HM = UWCH.	2571			2566		5	
WG1542	PCB field blank blind to lab, collect date not match any samples. MB detect 2-CB = U5HM = UWCH. FLCL1, FLCL2, FLCL3, FCUL2, FCUL3 = UWCL. Overall low recovery of 13C standards in these samples.	2319			2005		11	303
WG1551	PAH hold time exceedances FHTA3 = UWC. lab duplicate precision reasonable. Two identical results reported for each sample. FCSL1 and FHTA3 combo = UWC. MB detect naphthalene = U5HM= UWCH, or UWC with FHTA3.	474			180	289	5	
WG1553	PCB recovery and clean up standards not reported for some analytes. MB detects = U5HM = UWCH.	2138			2094		44	
WG1558A	Pest hold time exceedances FHTE1, FHTE3 = UWC. HCB in MB = U5HM = UWCH, UWC with FHTE1.	292			167	123	2	
WG1558B	Pest hold time exceedances = FHTE1, FHTE3, FHTA3 = UWC.	134			67	67		
WG1559A	Pest hold time exceedance FHTE3 = UWC. HCB, oxychlordane, aldrin, heptachlor, gamma BHC detects in MB = U5HM, with FHTE3 = UWC.	415			46	369		
WG1559B	pest holding time exceedance = FHTE3 = UWC. MB detects of endosulfan sulfate, = U5HM with FHTE3 = UWC.	191			20	171		
WG1561	PCB field blank blind to lab, collection date matches L1614-2i. FB detects BZ # 8, 12, 25, 26, 85, 105, 109, 129, 146, 156, 158, 167,170, 180, 183, 194, 198 = U5HF = UWCH.	2137			2118		19	
WG1562	PCB MB detects BZ # 1, 3, 73, 170, 175, 189 = U5HM = UWCH.	1651			1645		6	
WG1562BD	PBDE data, no lab QC. Not CARP program analyte, no business rules developed, NOT VALIDATED.	47	47					
WG1563	PCB Field blank blind to lab, matches collection date of L1614-14. Field dup blind to lab, does not match collection date of any sample. FB detects BZ # 1, 3 = U5HF = UWCH.	1651			1634		17	
WG1564	PCB MB detects BZ # 128, 132 = U5HM = UWCH.	1206			1204		2	
WG1570	SDG contains PAH sediment OPR results, true/acceptable limits not known. Acenaphthene in MB = U5HM = UWCH.	118			113		2	3
WG1571A	Pest holding time exceedances FHTE1, FHTE2, FHTE3 = UWC. Field blank blind to lab, collect date not match any samples. MB reported twice, detects HCB, alpha, beta BHC = U5HM, with FHTE = UWC.	415			46	369		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG1571B	Pest holding time exceedances FHTE1, FHTE2, FHTE3 = UWC. Field blank reported twice, blind to lab, collect date not match any samples. MB detects endo sulfate, = U5HM, with FHTE = UWC.	191			20	171		
WG1580A	Pest MB detects HCB = U5HM = UWCH.	374			369		5	
WG1580B	Pest MB detects heptachlor epoxide, endo sulfate, beta endosulfan = U5HM = UWCH.	172			166		6	
WG1581	PAH hold time = FHTE3 = UWC. Field dup blind to lab, collect date not match any samples. d8 naphthalene, naphthalene, 2-me nap, biphenyl FLCL1, FLCL2 with FHTE3 = UWC. sample results reported twice. MB detects Naphthalene = U5HM= UWC with FHTE3.	550			63	486		1
WG1583	Lab dup L1230-17RAi/17RBi precision reasonable, except BZ #190, 195=FLDP3= UWC. FCSH1 BZ#15, 118L, 114L= UWCH if detect.	2842			2822	4	16	
WG1584	Dioxin field dups blind to lab, matching SA not known. MB detects 2378 TCDD, TCDF, HxCDD, PeCDF, PeCDD, HpCDD, HpCDF, OCDD = U5HM = UWCH.	686			506		180	
WG1590A	Pest hold time exceedances FHTE3, FHTE1 = UWC. MB detects HCB, 4,4' DDT, 4,4' DDD = U5HM with FHTE = UWC.	256			46	210		
WG1590B	Pest hold time exceedances FHTE3, FHTE1 = UWC.	116			20	96		
WG1593A	Pest field blank blind to lab, reported twice, collect date matches L1614-2, no U5HF needed. Holding time exceedances FHTE3, FHTE2 = UWC. MB detects HCB = U5HM = UWC with other flags.	338			46	292		
WG1593B	Pest hold time exceedances FHTE1, FHTE2, FHTE3 = UWC. Field blank blind to lab, no detects.	144			58	86		
WG1598	PAH hold time exceedances FHTE3 = UWC. FLCH1/FHTE3 combo = UWC. MB detects fluorene, naphthalene = U5HM, with FHTE3 = UWC.	582			96	486		
WG1599A	Pest hold time exceedances FHTE3 = UWC. MB detects HCB = U5HM with FHTE3 = UWC.	210			44	166		
WG1599B	Pest hold time exceedances FHTE3 = UWC.	96			20	76		
WG1601	2378 TCDD, 2378-TCDF, PeCDD, HxCDD, HpCDD, HpCDF, PeCDF, HpCDF, OCDD, OCDF MB detects = U5HM = UWCH. FLCL1 OCDD= UWCL, with U5HM = UWC.	553			409	1	141	2
WG1603	PAH hold time exceedances = FHTE3 = UWC. FB blind to lab, collection date, STATION not match any field samples. FCSL1 = UWCL for LCS only. MB detects naphthalene = U5HM with FHTE3 = UWC.	550			63	486		1
WG1611	PAH hold time exceedances FHTE3 = UWC. FB blind to lab, two identical results reported, matches L1614-25R, naphthalene U5HF. Sample results reported twice. FLCL1 = UWCL.	582			62	518		2
WG1616	PAH hold time exceedances FHTE3 = UWC. MB detects naphthalene, biphenyl = U5HM with FHTE3 = UWC.	376			96	280		
WG1618A	Field blank, field dup blind to lab. FB matches L1614-14, reported twice. FB detects HCB = U5HF, with other codes = UWC. Field dup has no collection date match. U5HM + U5HF = UWCH.	292			46	245	1	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG1618B	Pest hold time exceedances = FHTE3, FHTE2 = UWC. Field blank, field dup blind to lab. FB matches L1416-14, no match for field dup. MB detects U5HM with FHTE3 = UWC.	134			20	114		
WG1623	PCB MB detect BZ# 194 = U5HM = UWCH. No 156L, 157 L, 156, 157 reported.	1671			1669		2	
WG1624	PCB SDG, has some recovery and clean up standard analytes not reported.	2340			2340			
WG1629	PAH field blank, dup blind to lab. FB matches L1614-14 LN, results reported twice, no detects. No match for field dup. Hold time exceedances FHTE3 = UWC. FCSL1 = UWCL, with FHTE3 = UWC. FCSH1 + FLCH1 = UWCH to LCS only.	388			61	324	1	2
WG1641	SDG has dioxin sediment OPR results, known/acceptance ranges not known/evaluated. FDES4 samples extracted before collected = UWC.	210			142	68		
WG1643	Some PCB recovery and clean up standards not reported.	2571			2571			
WG1644A	Pest hold time exceedances FHTE1, FHTE3 = UWC. MB detect NCB = U5HM with FHTE = UWC.	184			69	115		
WG1644B	Pest hold time exceedances FHTE1, FHTE3 = UWC. MB detects endrin aldehyde = U5HM with FHTE = UWC.	80			30	50		
WG1647	SDG contains sediment OPR sample results for PCBs, known/acceptance range not known. No field samples.	733			733			
WG1648B	Pest holding time exceedances = FHTE2 = UWC. SDG contains sediment OPR and lab dup (QADU) of OPR L1696-18. Known/acceptance range not known. Lab dup precision reasonable. Some sample results reported twice.	71			51	20		
WG1653A	Pest hold time exceedances FHTE1, FHTE3 = UWC.	333			169	164		
WG1653B	Pest hold time exceedances FHTE1, FHTE3 = UWC. MB detect endosulfan sulfate with FHTE = UWC.	153			77	76		
WG1664A	Pest hold time exceedances FHTE1, FHTE3 = UWC. MB detect HCB = U5HM, with FHTE = UWC.	456			169	287		
WG1664B	Pest hold time exceedances FHTE3, FHTE1 = UWC.	210			77	133		
WG1669	SDG contains dioxin sediment OPR L1696-18 results, reported twice. Known/acceptance range not known. FCSH1 OCDF, Hx CDD, PeCDF = UWCH to LCS and OPRs.	142			133		9	
WG1684A	Pest hold time exceedances FHTE3 = UWC.	253			46	207		
WG1684B	Pest hold time exceedances FHTE3 = UWC. MB detect endosulfan sulfate, endrin aldehyde = U5HM, with FHTE = UWC.	100			20	80		
WG1685	PAH hold time exceedances FHTE3 = UWC. MB detects acenaphthylene, acenaphthene, biphenyl, benzo (b/k)fluoranthene = U5HM, with FHTE = UWC.	160			64	96		
WG1686	PAH hold time exceedance FHTE3 = UWC. FCSL1+ FLCL1, FLCL2 = UWCL. MB detects naphthalene, anthracene, biphenyl = U5HM with FHTE = UWC.	636			83	542		11

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG1693	Dioxin MB detects 2378 TCDD, HxCDD, PeCDF, HpCDD, OCDD, OCDF= U5HM = UWCH. U5HM with FLCL = UWC. FLCL2 = UWCL.	494			298	2	190	4
WG1694	Dioxin MB detects = U5HM = UWCH. FLCL1, FLCL2, FLCL3 = UWCL, conflict with U5HM = UWC.	550			394	7	130	19
WG1715	PAH hold time exceedances FHTE3, FHTE2, FHTE2, FHTE1 = UWC. FLCH1, FLCH2 with FHTE/FHTE = UWC. FCSH1 with FHTE/FHTE = UWC.	352				352		
WG1717	Dioxin MB detects 2378-TCDF, 2370-TCDD, PeCDD, PeCDF, HxCDF, HxCDD, HpCDF, HpCDD, OCDF, OCDD, HpCDD = U5HF = UWCH.	347			274		73	
WG1723	Dioxin MB detects 2378 TCDF, OCDD, OCDF, HxCDF, HxCDD, HpCDD, PeCDF, HpCDF, = U5HM = UWCH. OCDD FLCL2 = UWCL. FLCL with U5HM = UWC.	551			504	1	44	2
WG1726	OCDF FCSH1 = UWCH. FLCL1 OCDD = UWCL.	452			440		10	2
WG1727	OCDD, HpCDD FLCL1, 2, FLCL3 = UWCL. OCDF LCS FCSH1 = UWCH (if detected). MB detect HpCDF = U5HM = UWCH.	471			446		12	13
WG1727BD	SDG contains brominated dioxin data. Not CARP analyte, no business rules written, NOT VALIDATED.	40	40					
WG1739B	Pest hold time exceedances FHTE2 = UWC. SDG contains sediment OPR samples only, true/acceptance range not known. Methoxychlor LCS low FCSL1 = UWCL, UWC with FHTE2. MB detect endrin aldehyde = U5HM, with FHTE2 = UWC.	40			18	20		2
WG1740B	Pest hold time exceedances = FHTE3 = UWC. Some recovery standards not added/reported, assume = USE.	40			20	20		
WG1747	PAH hold time exceedances FHTE3 = UWC. Field blank blind to lab, matches L1764-28 i2, naphthalene U5HF with FHTE3 =UWC.Lab dup L1764-24Bi2 precision reasonable. Results reported twice. FCSL1 = UWCL to LCS.	473			87	376	2	8
WG1758	PCB field dup blind to lab, field sample match not apparent. MB detects BZ #1, 18, 110, 153, 136, 141,118, 135, 88, 129, 86, 90 = U5HM = UWCH.	1475			1445		30	
WG1771	PAH hold time exceedances FHTE3 = UWC. SDG contains sediment OPRs only, true/acceptance range not known. FHTE3/FLCL1 or FLCH1 = UWC.	118			84	32	1	1
WG1779B	Pest hold time exceedances FHTE3 = UWC. Field dup L1764-1 blind to lab, matches L1764-3. precision reasonable.	115			20	95		
WG1785	PCB field blank and field dup blind to lab. FB not match any sample collection date, field dup not match to a SA sample. MB detects BZ #209, 3, 118, many others = U5HM = UWCH.	1905			1854		51	
WG1787	PAH hold time exceedances FHTE3, FHTE3 = UWC. SDG contains sediment OPRs, no field samples. Lab dup match to sample not apparent. FLCH2, FLCH1 with FHTE3 = UWC.	162				162		
WG1801	Some PCB recovery and cleanup stds not added/reported. PCB "DU" sample not a field dup, but second XAD column.MB detects = U5HM = UWCH.	2670			2604		66	
WG1804	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH.	2670			2634		36	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG1807A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects HCB, beta-BHC, 4,4'-DDD = U5HM = UWCH, with FHTE3 = UWC.FB not match SA dates.FAMM1 PCB analyte used as pest surrogate.DU are second XAD columns, not field duplicates.	333			46	287		
WG1807B	Some pest recovery stds not added/reported. FHTE3 = UWC.FB collect date not match samples.	153			20	133		
WG1812B	Some pest recovery stds not added/reported. "DU" samples L1850-10, L1850-11 collected with different GEAR TYPE than samples, precision not evaluated.	210			210			
WG1813A	Some pest recovery stds not added/reported. FAMM1 due to PCB 101L used as pest surrogate. FHTE3 = UWC. MB detects HCB, DDT=U5HM = UWCH, with FHTE3 = UWC.	456			359	82	15	
WG1813B	Some pest recovery stds not added/reported. FHTE3 = UWC.	210			172	38		
WG1829	Dioxin SDG has only OPR and MB data, and solids. True/acceptance limits for OPR not known/evaluated, assume = USE. 2378-TCDF recovery std not added.	144			144			
WG1833	Some PCB recovery and cleanup stds not added/reported. MB detects (used highest blank on same extraction day as samples)= U5HM = UWCH. DU samples collected with diff GEAR TYPE and volume.	1881			1865		16	
WG1839	Some PCB recovery and cleanup stds not added/reported. SDG has MB and LCS data and only one field sample L1614-5RX for BZ # 11. No LCS for BZ# 11.	281			281			
WG1843	Some dioxin recovery stds not added/reported. MB detects HxCDF = U5HM = UWCH. Two 2378-TCDF values reported for samples. FCSH1 OCDF = UWCH.	754			748		6	
WG1854A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. FAMM1 for PCB 101L used as pest surr.DU samples different volume, GEAR TYPE than SA.	379			92	287		
WG1854B	Some pest recovery stds not added/reported.FHTE3 = UWC.MB detects = U5HM = UWCH, with FHTE3 = UWC.DU samples collected with different GEAR and volumes.	173			40	133		
WG1855	Some PAH recovery stds not added/reported. FHTE3, FHTE3= UWC.DU samples collected with different GEAR, volume.	506			128	378		
WG1877	Some PCB recovery and cleanup stds not added/reported. SDG has sediment OPRdata only, no field samples. OPR true/acceptance limit not known/evaluated. FAMM1 for % solids.	502			502			
WG1896	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC.Lab dup L1881-1A/1B precision reasonable. Two results reported for some samples.FLCH1 with FHTE3 = UWC.	582			96	486		
WG1898A	Some pest recovery stds not added/reported.FHTE3 = UWC. FAMM1 from PCB 101L as pest surr. DU samples collected with different GEAR and sample volume than field samples.	379			92	287		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG1911	PAH recovery stds not added/reported.FHTE3 = UWC. Sediment OPR, true/acceptance limit not known/evaluated.Two identical values for L1879-4.lab dup of OPR precision reaonable.MB detects = U5HM, with FHTE3 = UWC.FCSSL2 = UWCL.	152			96	55		1
WG1917	Some PAH recovery stds not added/reported. FHTE3 = UWC.MB detects = U5HM = UWCH, with FHTE3 = UWC. DU sample collected with different GEAR and volume.FLCL2, FLCL3 with FHTE3 = UWCL.	442			64	372		6
WG1932	SDG has dioxin sediment OPR results, results reported twice. True/acceptance limits not known/evaluated.	210			210			
WG1945	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Some sample results reported twice.Lab dup WG1945-3/L1968-1 [1SPL01092] precision reasonable. FCSSL1 = UWCL to LCS.	582			95	486		1
WG1980	Some PAH recpvery stds not added/reported. FHTE3, FHTA3 = UWC. MB detects = U5HM, with FHTE3/E3 = UWC. FCSSL1, FLCL1,FLCL2 with FHTE3/FHTE3 = UWC.	496				495		1
WG1982	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated.	1878			1876		2	
WG1983	Some PCB recovery and cleanup stds not added/reported. SDG contains sediment OPR data, true/acceptance limits not known/evaluated.	1195			1195			
WG2019	Some PAH recovery stds not added/reported. FHTE3 = UWC. Some sample results reported twice.	226			64	162		
WG2024	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, UWC with FHTE3. FLCL2 with U5HM = UWC. FDES4 = sample extracted before collected. SDG has sediment OPR data, true/acceptance limits not known/evaluated.	207			39	164	3	1
WG2047	Dioxin SDG has sediment OPR results, true/acceptance limits not known/evaluated.	212			211		1	
WG2050	Some PAH recovery stds not added/reported. FHTE3, FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3, etc = UWC. FCSSL1, FLCL1 with FHTE3/E = UWC. Field dup blind to lab, precision not evaluated.	334				334		
WG2087	Some PAH recovery stds not added/reported. FHTE2,FHTE3, FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE/A = UWC. Some sample results reported twice. FLCL1, FCSSL1 with other alerts = UWC. Lab duplicate precision reasonable.	528				528		
WG2088	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated.Two different 2378-TCDF results reported for samples.	622			614		8	
WG2117	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Field dup blind to lab, precision, not evaluated.	551			493		58	
WG2132	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. FCSH1 = UWCH to LCS. Two different 2378-TCDF results reported for samples.	619			572		47	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2132BD	SDG has brominated dioxin data, not a CARP analyte. No business rules written, NOT VALIDATED.	40	40					
WG2139A	Some pest recovery stds not added/reported. FHTE3 = UWC. SDG has sediment OPR data and lab dup of OPR, true/acceptance limits not known/evaluated.	196			70	126		
WG2139B	Some pest recovery stds not added/reported. FHTE3 = UWC. NOU to alpha endosulfan, FLCL3 (UWCL) < 10 % in MB.	39		1	18	19		1
WG2142	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. FLCL1, FLCL2, FCSL2, FCSH1 with FHTE3 = UWC. Some sample results reported twice. Field dup blind to lab, precision not evaluated.	334			60	270	1	3
WG2148	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Sample results reported twice. Field dup blind to lab, precision not evaluated. Two different 2378-TCDF results reported for samples.	415			331		84	
WG2152	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated. FLCL1 = UWCL.	961			958		1	2
WG2153A	Some pest recovery stds not added/reported. FHTE3 = UWC. FCSH1, FCSH2 with FHTE3 = UWC. Some sample results reported twice. FCSH1, FCSH2 = UWCH to LCS.	128			30	83	15	
WG2153B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Some sample results reported twice. FCHS3 = UWCH to LCS.	58			16	38	4	
WG2155	Dioxin MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated. Some sample results reported twice. Two different 2378-TCDF results reported for samples. FCSH1 = UWCH to LCS.	482			465		17	
WG2156	Some dioxin stds not added/reported. FMBF0 = no method blank for some analytes due to reported as MB2 (?). Added U5HM manually, = UWCH.	481			426		55	
WG2163	Dioxin SDG with sediment OPR data reported in PG/SAMPLE units, reported twice. True/acceptance limits not known/evaluated, assume = USE.	142			142			
WG2181	Some PAH recovery stds not added/reported. FHTE3, FHTE3 = UWC. MB detects with FHTE3 = UWC. Some sample results reported twice. Lab dup of OPR precision reasonable. Naphthalene = NOU in MB, FLCL3 recovery < 10 %.	207		1		206		
WG2182	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. FLCL1 = UWCL. Field dup blind to lab, precision not evaluated. FCHS1 = UWCH. Two different 2378-TCDF results reported for samples.	618			610		6	2
WG2214	Some PCB recovery and cleanup stds not added/reported. FLCL1 = UWCL. FCSL1 = UWCL to LCS.	1881			1878			3
WG2214BD	SDG has PBDPE results, not a CARP analyte. No business rules written, NOT VALIDATED.	94	94					

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2222	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated. Some sample results reported twice. Two different 2378-TCDF results reported for samples.	687			660		27	
WG2225A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr.	292			46	246		
WG2225B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Field dup blind to lab, precision not evaluated.	153			20	133		
WG2226A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr.	230			46	184		
WG2226B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Two sample results reported for some samples.	235			20	215		
WG2227A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated. FAMM1 from PCB surr used as pest surr. Sample results reported twice.	333			46	287		
WG2227B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Field dup blind to lab, precision not evaluated.	153			20	133		
WG2230	Some PAH recovery stds not added/reported. FHTE3, FHTE3 = UWC. Field dup blind to lab, precision not evaluated.	496				496		
WG2252	Some PCB recovery and clean up stds not added/reported. Field dup blind to lab, precision not evaluated. MB detects = U5HM = UWCH.	1880			1851		29	
WG2252BD	SDG contains PBDPE data, not a CARP analyte. No business rules written, NOT VALIDATED.	94	94					
WG2256A	Some pest recovery standards not added/reported, assume = USE.	70			70			
WG2256B	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH.	30			28		2	
WG2268A	Some pest recovery stds not added/reported. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. mB detects = U5HM = UWCH, with FHTE3 = UWC. Field dup blind to lab, precision not evaluated.	374			46	328		
WG2268B	Some pest recovery stds not added/reported. FHTE3 = UWC. Field dup blind to lab, precision not evaluated. Sample results reported twice for L1968-13i. MB detects = U5HM = UWCH, with FHTE3 = UWC.	172			20	152		
WG2272	Some PCB recovery and cleanup stds not added/reported. FCCL3, FLCL3 = UWCL to LCS. Field dup blind to lab, precision not evaluated.	2341			2340			1
WG2273A	Some pest recovery stds not added/reported. FHTE3 = UWC. Field dup blind to lab, precision not evaluated. MB detect = U5HM = UWCH, with FHTE3 = UWC.	415			46	369		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2273B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Field dup blind to lab, precision not evaluated.	191			20	171		
WG2280	Some PAH recovery stds not added/reported. FHTE3, FHATA3 = UWC. Field dup blind to lab, precision not evaluated. MB detects = U5HM = UWCH, with FHTE3 = UWC. FCSL1 with FHATA3 = UWC. FLCL1 with FHATA3 = UWC.	550				550		
WG2281	PAH hold time exceedances = FHTE3, FHATA3 = UWC. FCSL1 with FHTE/FHATA = UWC.	97				97		
WG2283	Some PAH recovery stds not added/reported. FHTE3, FHATA3 = UWC. MB detects = U5HM, with FHTE3, FHATA3 = UWC. Field blank blind to lab, collect date not match samples. FCSL2 with FHTE3, FHATA3 = UWC. Sample results reported twice.	388				388		
WG2284	Dioxin MB detects = U5HM = UWCH. Two different 2378-TCDF results reported for samples.	158			152		6	
WG2290	Dioxin OCDD, OCDF FCSH1 = UWCH to detects. SDG contains sediment OPR data, results reported twice. True/acceptance limits not known/evaluated. FCSH1 = UWCH.	260			241		19	
WG2298	Some PCB reecover and clean up stds not added/reported. Field blank blind to lab, collect date not match any field samples. MB detects = U5HM = UWCH. FCSL2, FLCL1 = UWCL.	1651			1620		30	1
WG2299A	Some pest recovery stds not added/reported. FHTE3 = UWC. FHTE3 = UWC. FB blind to lab, collect date not match any field samples. MB detects = U5HM, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. Some sample results reported twice.	292			46	246		
WG2299B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FB blind to lab, collect date not match any field samples. Some sample results reported twice.	134			20	114		
WG2319	Some PAH recovery stds not added/reported. FHATA3, FHTE3 = UWC. MB detects = U5HM, with FHATA/E = UWC. Lab dup WG2319-3i/L2145-4i [1SPL01624] precision reasonable. FCSL1, FCSH1, FLCL2, FLCL1, with FHTE/A = UWC. Some sample results reported twice.	344				344		
WG2330	Some PCB recovery and cleanup stds not added/reported. EB blind to lab, 12/14/99 sample detects = U5HE = UWCH. Field dup blind to lab, precision not evaluated. MB detects = U5HM = UWCH. FCSL2, FLCL1 = UWCL.	1651			1379		271	1
WG2334	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. FLCL1 = UWCL.	2111			2088		21	2
WG2347	Some PCB recovery and clean up stds not added/reported. MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated. FLCL1, FLCL2 = UWCL. FCSL1, FCSL3 = UWCL to LCS. NOU to BZ # 3 in MB, FLCL3 < 10 % recovery.	2431		1	2395		22	13
WG2355	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. Field dups blind to lab, precision not evaluated. FLCL1, FLCL2 = UWCL. FCSL2 = UWCL to LCS.	2138			2078		56	4

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2356	SDG consists of several dioxin FBs blind to lab. MB detects = U5HM = UWCH.FCSH1 = UWCH.	211			117		94	
WG2359A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. Some sample results reported twice.	374			46	328		
WG2359B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Some sample results reported twice.	172			20	152		
WG2360	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. FB blind to lab, not match collection date of any samples in SDG. FLCL1,FLCL2, FLCL3 = UWCL. FCSL1 = UWCL to LCS.	482			425		45	12
WG2363A	Some pest recovery stds not added/reported. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. Two MB and two LCS extracted with this SDG.	138			92	46		
WG2363B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FLCL1 = UWCL, with FHTE3 = UWC.	108			36	68		4
WG2365	Some PCB recovery and cleanup stds nto added/reported. Field dup blind to lab, precision not evaluated.	2107			2107			
WG2376	Some PAH recovery stds not added/reported. FHTE2, FHTE3 = UWC. MB detects = U5HM, with FHTE = UWC. SDG contains all field blanks, blind to lab, no associated field samples.	172			64	108		
WG2380	Dioxin SDG has sediment OPR data, results reported twice, true/acceptance limits not known/evaluated. FCSH1 = UWCH.	143			139		4	
WG2382	Dioxin lab dup WG2382-4L/L2030 (1DMR00005) precision reasonable.Two 2378-TCDF results reported for samples. MB detect HpCDF, HxCDF = U5HM = UWCH.	503			498		5	
WG2383A	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH. SDG consists of field blanks, all blind to lab. FLCL1= UWCL, with U5HM = UWC. FAMM1 from PCB surr used as pest surr.	256			239	2	11	4
WG2383B	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH. SDG consists of field blanks blind to lab, no field samples.	116			109		7	
WG2384	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated.	2192			2146		46	
WG2385	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Field dup blind to lab, precision not evaluated.	452			295		157	
WG2391	Some PAH recovery stds not added/reported. FHTE3 = UWC.MB detects = U5HM, with FHTE3 = UWC. Lab dup WG2391-3/L2238-10i [1SPL01717] precision reasonable.Sample results reported twice. FCSH1 = UWCH, with FHTE3 = UWC.	258			94	162	2	
WG2396	Some PAH recovery stds not added/reported. FHTE1 = UWC. MB detects = U5HM, with FHTE1 = UWC.Lab dup precision (OPR) reasonable. SDG contains sediment OPR, results reported twice.	152			97	55		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2409	Dioxin SDG has FB blind to lab, collect date not match any field samples. FCSH1,FCSH2 = UWCH to LCS.FLCL3, FCSL1 = UWCL.	482			478		2	2
WG2410	Dioxin MB detects = U5HM = UWCH. Two 2378-TCDF results reported for each sample.	452			436		16	
WG2414A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. Some sample results reported twice. Field dup blind to lab, precision not evaluated.	415			46	369		
WG2414B	Some pest recovery stds not added/reported. FHTE3 = UWC. Field dup blind to lab, results reported twice, precision not evaluated.	191			20	171		
WG2428A	Pest SDG has no QC, no MB or LCS, only L1881-21L [1SPL00963] sample results, assume = UWC due to FHTE3.	41				41		
WG2428B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Lab dup WG2428-6/L1881-32 precision reasonable. SDG has some sediment OPR results reported twice, true/acceptance limits not known/evaluated.	163			47	114	2	
WG2429	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. SDG has sediment OPR results. FCSL1 = UWCL to LCS. FLCL3 = UWCL.	733			728		2	3
WG2430	Dioxin MB detects = U5HM = UWCH. Field blank blind to lab, collect date not match any field samples. Two 2378-TCDF results reported for each sample.	452			432		20	
WG2437	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH.	1463			1444		19	
WG2444	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. FLCL1 = UWCL.	992			982		8	2
WG2446	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH.FB blind to lab, collect date not match any field samples. FCSH1, with U5HM = UWCH.	1650			1641		9	
WG2447A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects HCB = U5HM, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. Sample results reported twice.	251			46	205		
WG2447B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detect endrin aldehyde = U5HM = UWCH, with FHTE3 = UWC. Some sample results reported twice.	115			20	95		
WG2451	Some PCB recovery and cleanup stds not added/reported.EB blind to lab, sample detects < 5 X EB = U5HE=UWCH. MB detects = U5HM = UWCH.	1191			1167		24	
WG2452	Some PCB recovery and cleanup stds not added/reported. field dup and FB blind to lab.FB collect date not match any samples. Field dup ID not match any sample.MB detects = U5HM = UWCH.	1475			1426		49	
WG2455	FLCL1, FLCL2 OCDD = UWCL. MB detects total TCDD, TCDF, PeCDF, HpCDF, HxCDF, OCDF = U5HM = UWCH. FCSH1 OCDF = UWCH. Two 2378-TCDF results reported for samples.	333			272		55	6
WG2457	Dioxin MB detects = U5HM = UWCH.	327			215		112	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2472	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FCSL1 = UWCL to LCS, with FHTE3 = UWC.	210			62	147		1
WG2474A	Some pest recovery stds not added/reported. FB blind to lab, collect date not match any field samples. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. MB detects = U5HM = UWCH.	292			167	123	2	
WG2474B	Some pest recovery stds not added/reported. FB blind to lab, collect date not match any field samples. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC.	134			77	57		
WG2475A	Some pest recovery stds not added/reported. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr.	169			46	123		
WG2475B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FLCH1 with FHTE3 = UWC.	77			20	57		
WG2495A	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH. FB blind to lab, collect date not match any samples, results reported twice. MB extract date different than samples. DU not have matching SAMP_ID.	251			251			
WG2495B	Some pest recovery stds not added/reported. FB blind to lab, collect date not match any field samples, results reported twice. Field dup blind to lab, SAMP_ID not match any field samples.	115			115			
WG2503	Dioxin lab dup 1DMR00020 (WG2503-4/L2030-20) precision reasonable. MB detects TCDF, PeCDF, HxCDD, HxCDF, HpCDD, OCDD, OCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples.	453			367		86	
WG2504	Dioxin MB detects HxCDD, PeCDF, HxCDD, HxCDF, HpCDD, HpCDF, OCDF, = U5HM = UWCH. two 2378-TCDF results reported for samples.	462			389		73	
WG2505	Dioxin lab dup WG2505-4i/L2030-35 i2 (1DMR00035) precision reasonable. Two 2378-TCDF results reported for samples. MB detect HpCDF = U5HM = UWCH.	537			536		1	
WG2514	Some PCB recovery and cleanup stds not added/reported. SDG has blind field blank results only. FLCL1, FLCL3 = UWCL.	1421			1411			10
WG2518	FB blind to lab, matches L1614-14RXi, detects = U5HF = UWCH. Blind field dup not match any field sample collection date. MB detects = U5HM = UWCH.	326			267		59	
WG2523	Some PCB recovery and cleanup stds not added/reported. FB blind to lab, matches collect dates of all samples in SDG, detects = U5HF = UWCH. MB detects = U5HM = UWCH. FCSL2 = UWCL to LCS. FLCL2 = UWCL.	1421			1327		88	6
WG2561	PCB SDG has no accuracy check. Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH. MB extract datae not match some samples in SDG. FLCL3 recovery < 10 % = NOU to BZ# 3 in L2066-4RX.	1398		1	1373		23	1
WG2562	Dioxin SDG has FB blind to lab, collect date matches L1614-2RX only, detects < 5 X FB = U5HF = UWCH. MB detects = U5HM = UWCH. Two different 2378-TCDF results reported.	409			286		123	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2583	Some PCB recovery and cleanup stds not added/reported. SDG has OPR results, true/acceptance limits not known/evaluated, assume = USE.	502			502			
WG2605A	Some pest recovery stds not added/reported. FAMM1 from PCB surr used as pest surr. Field dup blind to lab, precision not evaluated.	456			456			
WG2609	Dioxin FHTA1, FHTE1 = UWC. FDAE4 = sample analyzed before extracted.MB detects = U5HM = UWCH, with FHTA1 = UWC. Field dup blind to lab, collect date not match any samples in SDG, precision not evaluated.	536			3	533		
WG2619	Dioxin MB detects = U5HM = UWCH. A dioxin recovery std not added/reported.	116			115		1	
WG2623	Some PCB recovery and cleanup stds not added/reported. Field dup blind to lab, collection date/location matches two field samples, precision not evaluated. FLCL1, FLCL2 , FLCL3= UWCL. MB detects = U5HM = UWCH.	3387			3363		16	8
WG2649A	Some pest recovery stds not added/reported. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. Field dup blind to lab, precision not evaluated. MB detects = U5HM, with FHTE3 = UWC.	538			46	492		
WG2649B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Field dup blind to lab, date/station matches more than one field sample, precision not evaluated.	150			20	130		
WG2656	Some PCB recovery and clean up stds not added/reported. MB detects = U5HM = UWCH. FLCL2, FLCL3 = UWCL, with U5HM = UWC. NOU to BZ#3 as recovery FLCL3 < 10 %: L2030-44, L2030-51, L2030-43.	2858		3	2568	2	254	31
WG2656A	Some pest recovery stds not added/reported.FHTE3 = UWC.MB detects beta BHC, HCB, DDD, DDT = U5HM, with other flags = UWC. FLCL3 for HCB = UWCL when recovery < 10 % in detected samples.	263			43	215		5
WG2656AR	No OPR or LCS in this Aroclor SDG, assume = USE.	40			40			
WG2656B	Pest hold time exceednaces FHTE3 = UWC. Some recovery stds not added/reported. MB detect methoxychlor = U5HM with FHTE = UWC.	121			22	99		
WG2657B	Some pest recovery stds not added/reported. Hold time FHTE3 = UWC. FCSH1 beta endosulfan = UWC with FHTE3.	55			20	34	1	
WG2662	Some PAH recovery stds not added/reported. FHTE3= UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Lab dup WG2662-103/L1989-7 [1SPL01349] precision reasonable.FCSL1 = UWCL to LCS.	416			95	320		1
WG2664B	Some pest recovery stds not added/reported. FHTE3 = UWC.	30			20	10		
WG2667A	Some pest recovery stds not added/reported. Sample results reported twice. FHTE1 = UWC. FAMM1 from PCB surr used as pest surr. MB and LCS extract date not match samples in SDG. Field dup blind to lab, precision not evaluated.	169			46	123		
WG2667B	Some pest recovery stds not added/reported. FHTE1 = UWC. Field dup blind to lab, precision not evaluated. Sample results reported twice.	77			20	57		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2668	Some PCB recovery and cleanup standards not added/reported, assume = USE. FLCL1 = UWCL. Field dup L1968-15RX/L1968-14RX precision reasonable.	2612			2606			6
WG2676	Some PCB recovery and cleanup stds not added/reported. SDG has only one field sample result reported, BZ # 11 for L2066-RX.	272			272			
WG2677	Dioxin SDG MB and LCS extract date not same as samples, assume = USE.	142			142			
WG2677BD	SDG has brominated dioxin data, not a CARP analyte. No business rules written, NOT VALIDATED.	54	54					
WG2678	Some PAH recovery stds not added/reported. FHTE3, FHTA3 = UWC. Field dup blind to lab, precision not evaluated. Sample results reported twice. FLCL1 = UWCL, with FHTA3 = UWC. FCSL2 = UWCL, with FHTA3 = UWC to LCS.	458				458		
WG2720	Some PCB recovery and cleanup stds not added/reported.	758			758			
WG2726	Some PAH recovery stds not added/reported. FHTE3, FHTA3 = UWC. One MB and LCS extract date not match field samples in SDG. FCSL1, FLCL2, FLCL3, FCSL3 with FHTA3 = UWC.	129				129		
WG2736	Dioxin lab dup WG2736-104L/L2373-4 L (A) (2DMR00156) precision reasonable. MB detects OCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples.	376			374		2	
WG2739A	Some pest recovery stds not added/reported. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. Field dup blind to lab, precision not evaluated. FLCL1,2,3 = UWCL. L1950-11RX not extracted with MB, LCS. MB detects = U5HM = UWCH, with FHTE3 = UWC.	415			27	369		19
WG2739B	Some pest recovery stds not added/reported. FHTE3 = UWC. Field dup blind to lab, precision not evaluated. Sample results reported twice.	172			20	152		
WG2741	Dioxin lab dup WG2741-104i/L2373-20i(A) [2DMR00172] precision reasonable. Two 2378-TCDF results reported for samples.	376			376			
WG2746	Some PCB recovery and cleanup stds not added/reported. SDG has two field dups, but no original field samples, field precision not evaluated.	731			731			
WG2749	Dioxin lab dup L2373-23L (A)/WG2749-104L [2DMR00196] precision reasonable. MB detects OCDD, OCDF, HxCDF, HpCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples.	341			324		17	
WG2800	Some PCB recovery & cleanup stds not added/reported. Lab dup L2030-22R/WG2800-104 (DUP.L2 [1DMR00022] precision reasonable, except BZ# 45, 58, 82, 93, 164= FLDP3= UWC. MB detects BZ#42, 18, 17, 34, 82, 84, 132, 179= U5HM = UWCH.	1938			1914	10	14	
WG2800A	Pest hold time exceedances FHTE3 = UWC. MB detects trans-nonachlor, alpha/gamma chlordane, 2,4'-DDE, 2,4'-DDD, 4,4'-DDD, 2,4'-DDT = U5HM = UWCH, with FHTE3 = UWC.	167			47	120		
WG2800AR	Arcolor SDG has no LCS or OPR, assume = USE.	24			24			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2800B	Pest hold time exceedances FHTE3 = UWC. lab dup L2030-22R (A)/WG2800-104 (DUP L203 [1DMR00022] precision reasonable. MB detect endrin aldehyde = U5HM, with FHTE3 = UWC.	77			33	44		
WG2821	Some PCB recovery/clean up stds not added or reported. Lab dup WG2821-104/L2030-2(A) [1DMR00002] precision reasonable except BZ# 43,77,56,79 = FLDP3 = UWC. MB detects = U5HM = UWCH. FLCL1 = UWCL.	2567			2547	6	12	2
WG2821A	Some pest recovery stds not added/reported. Hold time FHTE3 = UWC.Lab dup WG2821-104/L2030-2(A) precision reasonable.	287			71	216		
WG2821AR	Aroclor SDG with no LCS or MS, assume = USE.Lab dup L2030-2 W (A)/WG2821-104W [1DMR00002] precision reasonable.	44			44			
WG2822	Some PCB recovery,cleanup stds not added/reported.Lab dup WG2822-104/L2030-13(A) [1DMR00013] precision reasonable.Lab blank detects BZ# 3, 31, 40 = U5HM = UWCH.	2571			2565		6	
WG2822A	Some pest recovery stds not added/reported. Hold time FHTE3 = UWC.Lab duplicate WG2822-104/L2030-13 (A) [1DMR00013] precision reasonable.	287			71	216		
WG2822AR	Aroclor SDG has no LCS or MS, assume = USE.Lab dup WG2822-104/L2030-13 W [1dmr00013] precision reasonable.	44			44			
WG2822B	Some pest recovery stds not added/reported.Hold time FHTE3 = UWC. Lab dup WG2822-104/L2030-13(A) [1DMR00013] precision reasonable.MB detect endo sulfate, endrin ketone, endrin aldehyde = U5HM, with FHTE3 = UWC.FCSL1 with FHTE3 = UWC.	132			31	99		2
WG2823	Some PCB recovery/cleanup stds not added.reported. Lab dup WG2823-104/L2030-25 (A) [1DMR00025] precision reasonable.MB detects BZ# 1, 3, 16, 45, 46, 96, 152 = U5HM = UWCH.	2339			2312		27	
WG2823A	Some pest recovery stds not added/reported.Hold time FHTE3 = UWC. MB detects g BHC = U5HM, with FHTE = UWC.Lab dup WG2383-104/L2030-25 [1DMR00025] precision reasonable.	263			71	192		
WG2823AR	Aroclor SDG with no LCS or MS, assume = USE. Lab dup WG2383-104W/L2030-25W(A) [1DMR00025] precision reasonable.	40			40			
WG2823B	Some pest recovery stds not added/reported. Hold time FHTE3 = UWC.MB detects = U5HM, with FHTE3 = UWC.Lab dup WG2383-104/L203025(A) [1DMR00025] precision reasonable.	121			33	88		
WG2824A	Some pest recovery stds not added/reported. Lab dup WG2824-104/L2030-35(A) [1DMR00035] precision reasonable. Hold time FHTE3 = UWC. MB detects trans-nonachlor, 2,4'-DDD, 4,4'-DDD, 2,4'-DDT = U5HM, with FHTE3 = UWC.	287			71	216		
WG2824AR	Aroclor SDG with no LCS or MS, assume = USE. Lab dup WG2824-104 W/L2030-35(A) [1DMR00035] precision reasonable.	44			44			
WG2824X	Some PCB recovery and cleanup stds not added/reported. Lab dup WG2824-104/L2030-35(A) [1DMR00035] precision reasonable, except BZ# 126 = FLDP3 = UWC. FLCL1 BZ#3 = UWCL. MB detects BZ #40, 42 = U5HM = UWCH.	2571			2562	2	5	2
WG2845	Some PCB recovery and cleanup stds not added/reported.	800			800			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2845A	Some pest recovery stds not added/reported.	172			172			
WG2845AR	Aroclor SDG, has MB and LCS, all = USE.	41			41			
WG2845C	PCB MB detect BZ# 169 = U5HM = UWCH. SDG has PCB congener data for BZ # 77, 169, 126 only.	48			47		1	
WG2849	Some dioxin recovery stds not added/reported. Lab dup WG2849-103/L2373-8Ri(A) [2DMR00160] precision reasonable. MB detects BZ# = U5HM = UWCH. Two 2378-TCDF results reported for samples.	376			331		45	
WG2852	Some dioxin recovery stds not added/reported. MB detect OCDD = U5HM = UWCH. Lab dup WG2852-103/L2373-36(A) [2DMR00252] precision reasonable. Two 2378-TCDF results reported for samples.	131			130		1	
WG2862	Some dioxin recovery stds not added/reported. MB detect 2378-TCDF, HpCDF = U5HM = UWCH.	96			93		3	
WG2862C	PCB SDG has BZ# 77, 126, 169 data only.	18			18			
WG2949	Some dioxin recovery stds not added/reported. FHTA1 = UWC. Lab dup WG2949-103L/L2504-5 Li(A) [2DMR00333] precision reasonable. MB detects OCDD, HpCDD = U5HM = UWCH. Two 2378-TCDF results reported for samples.	410			381	9	20	
WG2959	Some dioxin recovery stds not added/reported. FHTA1 = UWC. MB detects = U5HM = UWCH. Lab dup WG2959-103 L2/L2506-4 L2(A) [2DMR00377] precision reasonable. Two 2378-TCDF results reported for samples.	411			374	11	26	
WG2963	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. FHTA1 = UWC. Lab dup WG2963-103L [2DMR00394] no matching SAMP_ID for SA.FLCL1 = UWCL. U5HM with FCSH1 = UWC.	270			232	11	25	2
WG2972A	Pest lab dup WG2972-103 i2/L2508-2(A) i2 [2DMR00440] precision reasonable.	167			167			
WG2972AR	SDG has Aroclor data. Lab dup WG2972-103Wi/L2508-2(A) [2DMR 00440] precision reasonable.	21			21			
WG2972B	Pest lab dup WG2972-103 Wi2/ L2508-2i [2DMR00440] precision reasonable.	88			88			
WG2972C	SDG has BZ# 77, 126, 169 data only.	24			24			
WG2972X	PCB lab dup WG2972-103 Wi2/L2508-2 (A)i2 [2DMR00440] precision reasonable.	800			800			
WG2973	Some dioxin recovery stds not added/reported. FHTA1, FHTA3 = UWC. Lab dup precision reasonable. MB detect OCDD = U5HM = UWCH. Two 2378-TCDF results reported for samples. OCDD FLCL2 = UWCL.	201			192	5	2	2
WG2973C	PCB SDG has BZ # 77, 126, 169 data only. Lab dup WG2973-103/L2508-2(A) precision reasonable.	36			36			
WG2978	Dioxin SDG MB detects 2378-TCDD, PeCDF, PeCDD, total TCDD, 2378-TCDF, OCDD, OCDF, HxCDF, HxCDD, HpCDD, HpCDF = U5HM = UWCH. Two 2378-TCDF results reported for samples.	405			346		59	
WG2978A	Some pest recovery stds not added, assume = USE. MB detect HCB = U5HM = UWCH. FHTE3 = UWC. FLCL with FHTE = UWC.	263			46	216		1

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG2978AR	Aroclor SDG with no LCS or MS, assume = USE. MB detect Aroclor 1242 = U5HM = UWCH.	36			34		2	
WG2978B	Some pest recovery stds not added/reported. FHTE3 = UWC.FCSH3 endrin no effect, samples ND.	121			20	100	1	
WG2978X	Some PCB recovery and cleanup stds not added. MB detects = U5HM = UWCH.FCSL1, FLCL1, FLCL2 BZ# 3 = UWCL.	2111			1828		265	18
WG3020	Dioxin MB detects = U5HM = UWCH, with FHTE1 = UWC. FHTE1 = UWC.	446			302	41	103	
WG3020A	Some pest recovery stds not added/reported. FHTE3 = UWC.MB detects = U5HM, with FHTE3 = UWC.FLCL1 = UWCL. FHTE3 with FCSL2 = UWC.	263			50	210		3
WG3020AR	Aroclor SDG has no LCS, assume = USE. FHTE1 = UWC.	36			32	4		
WG3020B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects methoxychlor, endosulfan sulfate = U5HM = UWCH, with FHTE3 = UWC.	121			22	99		
WG3020X	Some PCB recovery and cleanup stds not added/reported. FHTE1 = UWC.MB detects BZ# 1, 4, 8, 16, 17, 18, 21, 22, 32, 37, 45, 56, 77, 84, 123, 136, 179 = U5HM = UWCH. U5HM with FHTE1 = UWC. FLCL1, 2, 3 = UWCL for BZ# 3, 3L. FLCL with FHTE = UWC.	2111			1779	222	95	15
WG3021	Dioxin MB detects 2378-TCDD, 2378-TCDF, PeCDF, HxCDD, HxCDF, HpCDD, HpCDF, OCDF, OCDD= U5HM = UWCH.Two 2378-TCDF results reported for samples.	451			325		126	
WG3021A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects with FHTE = UWC. FHTE with FLCL1 = UWC.	263			47	216		
WG3021AR	Aroclor SDG with no LCS or MS, assume = USE.	40			40			
WG3021B	Some pest recovery stds not added/reported. FHTE3 = UWC.	121			22	99		
WG3021X	Some PCB recovery and cleanup stds not added/reported.MB detects BZ# 1, 3, 11, 18, 21, 22, 37, 56, 77, 132= U5HM = UWCH. FLCL1, FCSL1 BZ# 3, 3L= UWCL.	2341			2262		64	15
WG3022	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Lab duplicate WG3022-104/L2030-44 (A) precision [2DMR00031]	456			120	336		
WG3023	Some PAH recovery stds not added/reported. MB detects U5HM with FHTE = UWC.Lab dup WG3023-104/L2030-8(A) [1DMR00008] precision reasonable. FLCL1 with FHTE3 = UWC. FCSH1, FLCH2, FLCH3, FCSL1 with FHTE3 = UWC.	415			110	299	4	2
WG3024	Some PAH recovery stds not added/reported.MB detects = U5HM = UWCH. Lab dup WG3024-103/L2373-10 [2DMR00162] precision reasonable. FCSH1 = UWCH, FLCH2 = UWCL.	500			392		107	1
WG3036	Some dioxin recovery stds not added/reported.MB detects OCDD, OCDF, HpCDD, HxCDF, HpCDF = U5HM = UWCH.	166			154		12	
WG3056	Some PAH recovery stds not added/reported. Lab dup WG3056-103/L2373-16(A) [2DMR00168] precision reasonable. MB detects = U5HM = UWCH.	458			374		84	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG3060	Some PAH recovery stds not added/reported. FHTE3 = UWC. Lab dup WG3060-104/L2030-16 [1DMR00016] precision reasonable. MB detects = U5HM = UWCH, with FHTE3 = UWC. FCSH1, FCSH2, FLCH1 = UWCH, with other flags = UWC.	498			119	378	1	
WG3063	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3063-104/L2373-18 [2DMR00170] precision reasonable.	500			381		119	
WG3064	Some PAH recovery stds not added/recovered. Lab dup WG3064-104 [2DMR00333] not match any field sample ID in SDG. MB detects = U5HM = UWCH.	374			353		21	
WG3070B	Some pest recovery stds not added/reported. FHTE3 = UWC. Lab dup precision WG3037-104/L2030-2Ri(A) [1DMR00002] reasonable.	132			33	99		
WG3072	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH, with FHTE3 = UWC. FHTE3 = UWC. Lab dup WG3072-104/L2030-25(A) [1DMR00022] precision reasonable. FLCL with FHTE3 = UWC. FCSH1 = UWCH. FCSL1 = UWCL.	498			116	378	2	2
WG3073	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Lab dup WG3073-104/L2030-34 [1DMR00034] precision reasonable. FLCL1, FLCL2 with FHTE3 = UWC.	536			158	378		
WG3074	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Lab dup WG3074-104/L2030-35 [1DMR00035] precision reasonable. BAP-d12 recovery all = 100 % in all samples odd. FCSH1 = UWCH.	457			117	336	3	1
WG3079B	Some pest recovery stds not added/reported. FHTE3 = UWC. Lab dup WG3079-104/L2030-40R (A) [1DMR00040] precision reasonable.	132			33	99		
WG3085	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3085-103/L2505-7R(A) [2DMR00357] precision reasonable. Two 2378-TCDF results reported for samples.	411			404		7	
WG3092	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3092-104/L2504-4(A) [2DMR00332] precision reasonable.	500			314		186	
WG3093	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3093-104i/L2505-12i [1DMR00366] precision reasonable. FLCL1 = UWCL.	500			478		16	6
WG3094	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3094-104/L2506-9 [2DMR00388] precision reasonable.	500			431		69	
WG3165A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects HCB = U5HM = UWCH. Lab dup WG3165-103/L2030-22R2(A) [1DMR00022] precision reasonable.	119			71	48		
WG3165AR	Aroclor SDG with no LCS or MS, assume = USE. Lab dup WG3165-103/L2030-22R2 [1DMR00022] precision reasonable. FHTE1 = UWC.	16			8	8		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG3165X	Some PCB recovery and cleanup stds not added/reported. FHTE1 = UWC. Lab dup WG3165-103/L2030-22R2 [1DMR00022] precision reasonable. Not all congeners reported for field samples in this SDG.	463			361	102		
WG3174	Some PAH recovery stds not added/reported. MB detect naphthalene = U5HM = UWCH. Contains "SA2" results.	416			414		2	
WG3199A	Pest SDG has one field sample, MB and LCS.	70			70			
WG3199AR	Aroclor SDG with MB, LCS and one sample L2507-2RW.	15			15			
WG3199X	PCB SDG has MB and one sample, L2507-2Ri, no LCS, MS or OPR, assume = USE.	280			280			
WG3231	Some PAH recovery stds not added/reported. FHTE3 = UWC. FCSH1 = UWCH, with FHTE3 = UWC.	121			73	42	6	
WG3238	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Lab dup WG3238-104/L2030-67(A) [2DMR00094] precision reasonable. FLCL1, FLCL2 = UWCL. Not all analytes reported for lab dups.	221			98	115		8
WG3243	Dioxin hold time exceedances FHTE1 = UWC. C13-OCDD FLCL3 = UWCL. MB detects = U5HM = UWCH, with FHTE = UWC.	115			74	39		2
WG3243AR	Aroclor SDG with no LCS or MS, assume = USE. FHTE1 = UWC. MB detect Aroclor 1242 with FHTE1 = UWC.	12			4	8		
WG3243X	Some PCB recovery and cleanup stds not added/reported. FHTE1 = UWC. MB detects = U5HM, with FHTE1 = UWC. FLCL1, FLCL2, FCSL1, FCSL3 = UWCL, with FHTE = UWC.	731			262	460		9
WG3298	PCB EB and field dup blind to lab. EB collect date not match any samples. Field dup not match any samples. MB detects = U5HM = UWCH. FCSL3, FCUL3 = UWCL to LCS.	1045			990		44	11
WG3299A	Some pest recovery stds not added/reported. FAMM1 from PCB surr used as pest surr. EB and field dup blind to lab, EB collect date not match samples. Field dup precision not evaluated. MB detects = U5HM = UWCH.	169			167		2	
WG3299B	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH. EB blind to lab, not match field sample collect date. Field dup blind to lab, precision not evaluated.	77			72		5	
WG3300X	Some PCB recovery stds not added/reported. EB and field dup blind to lab. EB collect date not match samples. Field precision not evaluated. MB detects = U5HM = UWCH.	1013			961		52	
WG3301A	Some pest recovery stds not added/reported. FAMM1 from PCB surr used as pest surr. MB detects = U5HM = UWCH. EB blind to lab, collect date not match samples. Field dup blind to lab, precision not evaluated.	169			166		3	
WG3301B	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH. EB blind to lab, collect date not match samples. Field dup blind to lab, precision not evaluated.	116			106		10	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG3304A	Some pest recovery stds not added/reported. SDG has only equipment blank results. EBs blind to lab, results reported twice for L2680-11. Field dup blind to lab. FAMM1 from PCB surr used as pest surr. MB detects = U5HM = UWCH.	87			83		4	
WG3305X	Some PCB recovery stds not added/reported. SDG contains PISCES hexane extracts. MB detects = U5HM = UWCH. FCSL3, FCUL3 for LCS 28 L = UWCL.	1968			1955		2	11
WG3315	Some PAH recovery stds not added/reported. FHTE1 = UWC. SDG contains sediment OPR data, results reported twice, true/acceptance limits not known/evaluated.	150			80	70		
WG3316X	PCB SDG has sediment OPR data, true/acceptance limits not known/evaluated. LCS recoveries low FCSL3, FLCL3, FCUL3 = UWCL. FCSL1 = UWCL.	535			521			14
WG3317A	Some pest recovery stds not added/reported. SDG has sediment OPR data only, true/acceptance limits not known/evaluated. MB detects = U5HM = UWCH.	88			86		2	
WG3317B	Some pest recovery stds not added/reported. SDG has sediment OPR data, results reported twice. OPR true/acceptance limits not known/evaluated. MB detects = U5HM = UWCH.	39			33		6	
WG3321	Dioxin SDG has sediment OPR results, identical results reported twice. True/acceptance limits not known/evaluated, assume = USE.	143			143			
WG3334	EB blind to lab, collect date not match sample. Field dup blind to lab, SAMP_ID not match any. MB detects = U5HM = UWCH.	276			266		10	
WG3337	Dioxin SDG had two equipment blanks only, no field samples. MB detects = U5HM = UWCH.	142			126		16	
WG3388	Some PAH recovery stds not added/reported. FHTE3 = UWC. Results reported twice. EB collect date not match any field samples. DU SAMP_IDs not match. MB detects = U5HM, with FHTE = UWC. FCSH1 with FLCL2 = UWC. FLCL1, FLCL2 = UWCL.	238			69	159	1	9
WG3406	Some PAH recovery stds not added/reported. FHTE3 = UWC. EB collect date not match any samples. Field dup SAMP_ID not match any samples. MB detects = U5HM, with FHTE3 = UWC.	290			80	210		
WG3425	Dioxin SDG has sediment OPR data, true/acceptance limits not known/evaluated, assume = USE.	143			143			
WG3428	Some PAH recovery stds not added/reported. Field DU sample ID not match. Sample results reported twice. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FCSL2 = UWCL.	79			26	52		1
WG3431X	Some PCB recovery stds not added/reported. Two MBs extracted on same day, highest MB detects = U5HM = UWCH. FLCL1 = UWCL.	1575			1565		8	2
WG3440	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3440-104/L2760-5(A) [2DMR00712] precision reasonable. two 2378-TCDF results reported for samples.	410			375		35	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG3444X	Some PCB recovery stds not added/reported. EB collect date not match any samples. MB detects = U5HM = UWCH. FLCL1, FLCL2 = UWCL to SA, MB, with U5HM = UWC. FCSSL1, FCSSL2 = UWCL to LCS.	1969			1863	2	89	15
WG3447	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC.	220			80	140		
WG3448	Dioxin MB detects = U5HM = UWCH. Two 2378-TCDF results reported for samples.	210			195		15	
WG3451	Some PAH recovery stds not added/reported. FHTE3 = UWC. Field dup SAMP_ID not match. FLCL1 = UWCL to MB, SA, with FHTE3 = UWC. FCSSL3 = UWCL.	360			78	280		2
WG3452	Some PAH recovery stds not added/reported. FHTE2 = UWC. SDG has sediment OPR data, results reported twice. Lab dup of OPR precision reasonable. FLCL1, FLCL2 = UWCL, with FHTE2 = UWC. FCSSL1, FCSSL2 = UWCL to LCS.	193			112	70		11
WG3453A	Some pest recovery stds not added/reported. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. MB detects = U5HM = UWCH, with FHTE3 = UWC.	256			171	82	3	
WG3453B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC.	116			77	38	1	
WG3459A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. Sample results reported twice.	128			46	82		
WG3459B	Some pest recovery stds not added/reported. FHTE3 = UWC. Sample results reported twice.	58			20	38		
WG3473	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3473-104/L2760-10 [2DMR00696] precision reasonable. Two 2378-TCDF results reported for samples.	410			368		42	
WG3474	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3474-104/L2761-2i [2DMR00701] precision reasonable. two 2378-TCDF results reported for samples.	410			377		33	
WG3478	PCB SDG has no LCS, MS or OPR, contains mass of field and metered surrogates added, % recovery not known/calculated. Assume = USE. MB detects = U5HM = UWCH.	30			29		1	
WG3479	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC.	366			64	302		
WG3481	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3481-104/L2508-1R2(A) [2DMR00434] precision reasonable.	458			382		76	
WG3512	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3512-103/L2763-2L (A) [2DMR00629] precision reasonable. Two 2378-TCDF results reported for samples.	236			233		3	
WG3512C	SDG has BZ# 77, 126, 169 data only. PCB lab dup WG3512-103/L2763-2 [2DMR00629] precision reasonable. MB BZ# 169 = U5HM = UWCH.	42			41		1	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG3520A	Pest lab dup WG3520-104/L2763-2(A) [2DMR00629] precision reasonable.	215			215			
WG3520AR	Aroclor lab dup WG3520-104/L2763-2(A) [2DMR00629] precision reasonable.	45			45			
WG3520B	Pest lab dup WG3520-104/L2763-2 (A) [2DMR00629] precision reasonable.	100			100			
WG3520C	PCB BZ# 77, 126, 169 data only.	24			24			
WG3520X	PCB lab dup WG3520-104/L2763-2(A) [2DMR00629] precision reasonable.	1069			1069			
WG3522	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3522-104/L2760-5(A) [2DMR00712] precision reasonable.	500			495		5	
WG3547X	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH. Field dup collect date and samp id not match any field sample in SDG.	801			792		9	
WG3566	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Lab dup WG3566-104/L2030-51R [2DMR00038] precision reasonable.FCSH1 = UWCH, with U5HM, FHTE3 = UWC.	457			118	336	3	
WG3567	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Lab dup WG3567-104i/L2030-73Ri(A) [2DMR00100] precision reasonable.FCSH1 = UWCH, with U5HM, FHTE3 = UWC.	457			118	336	3	
WG3591X	Detect BZ # 204 = U5HM = UWCH. Some PCB recovery and cleanup stds not added/reported. SDG has sediment OPR, true/acceptance limit not known/evaluated, assume = USE.	1068			1067		1	
WG3592A	Some pest recovery standards not added/reported, assume = USE. FHTE3 = UWC. SDG has sediment OPR data (same values reported twice), true/acceptance limits not known/evaluated, assume = USE.	156			115	41		
WG3592B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects endrin aldehye, endrin ketone = U5HM = UWCH, with FHTE3 = UWC. Sediment OPR results reported twice.	69			48	19	2	
WG3599	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3599-104/L2761-2 [2DMR00701] precision reasonable.FCSH1 = UWCH.	500			465		35	
WG3616	PAH hold time exceednaces FHTE2 = UWC. MB detect acenaphthene = U5HM = UWC with FHTE2. FCSL1 = UWCL for dibenz[ah]anthracene.	122			78	42		2
WG3619	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3619-104/L2763-1(A) [2DMR00618] precision reasonable.	416			358		58	
WG3625	Some dioxin stds not added/reported. MB detects = U5HM = UWCH. Sample results reported twice. Two different 2378-TCDF rersults reported for samples.	211			139		72	
WG3631A	Some pest recovery stds not added/reported. FHTE1 = UWC. MB detects = U5HM = UWCH. Two identical results reported for some samples. FAMM1 from PCB surr used as pest surr.	251			195	41	15	
WG3631B	Some pest recovery stds not added/reported. FHTE1 = UWC. Two identical sample results reported for some samples.	115			96	19		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG3632	Some PAH recovery stds not added/reported. FHTE3 = UWC. Two identical results reported for field sample. FLCL1 = UWCL, with FHTE3 = UWC.	150			80	70		
WG3651X	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH.	1545			1504		41	
WG3663	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FLCH1 with FHTE3 = UWC.	286			160	126		
WG3664	Some PAH recovery stds not added/reported. FHTE3 = UWC. Sample results reported twice. Lab dup WG3664-104/L2923-8 [1SPL02466] precision reasonable. FLCL1 with FHTE3 = UWC. FLCL1, FLCL2 = UWCL. FCSH3 = UWCH.FCSH1 = UWCH.	332			101	212	2	17
WG3669A	Some pest recovery stds not added/reported. FHTE1 = UWC. FAMM1 from PCB surr used as pest surr. MB detect HCB = U5HM = UWCH.	128			86	41	1	
WG3669B	Some pest recovery stds not added/reported. FHTE1 = UWC. MB detect endrin aldehyde = U5HM, with FHTE1 = UWC.	58			39	19		
WG3670	Some pest recovery stds not added/reported. MB detects = U5HM = UWCH.	774			765		9	
WG3718	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH.Lab dup WG3718-104/L2760-10R [2DMR00696] precision reasonable.	374			353		21	
WG3738X	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH.	774			758		16	
WG3739A	Some pest recovery stds not added/reported. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. MB detects HCB = U5HM, with FHTE3 = UWC. Sample results reported twice.	128			46	82		
WG3739B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. Sample results reported twice.	58			20	38		
WG3766	Some PAH recovery stds not added/reported. FHTE3 = UWC. FUNI1 from units reported as ng/sample rather than pg/sample. mB detects = U5HM = UWCH, with FHTE3 = UWC. FLCL1 with FHTE3, U5HM = UWC. FCSL1 = UWCL, with FHTE3 = UWC.	430			78	350		2
WG3774X	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH. FLCL1 with U5HM = UWC. FLCL1,FLCL2, FLCL3 = UWCL. FCSL1 = UWCL to LCS. BZ# 155 = NOU for L3026-1 from < 10 % CARP114 recovery.	2208		1	2102	3	69	33
WG3775A	Some pest recovery stds not added/reported. FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. MB detects = U5HM = UWCH, with FHTE3 = UWC. FLCL3 = UWCL, with U5HM and FHTE3 = UWC. FCSH1, FCSH2 = UWCH, with FHTE3 = UWC. FCSL3 = UWCL.	415			34	369	9	3
WG3775B	Some pest recovery stds not added/reported. FHTE3 = U5HM, with FHTE3 = UWC. Sample results reported twice.	191			20	171		
WG3777	Dioxin MB detect 1,2,3,7,8,9-HxCDF = U5HM = UWCH.	116			115		1	
WG3795	Dioxin MB detects = U5HM = UWCH. Sample results reported twice.	140			126		14	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG3815	Dioxin SDG has sediment OPR sample with results reported twice, true/acceptance limits not known/evaluated, assume = USE. NOU for no result reported for % solids for WG3815-101.	144		1	143			
WG3819	PAH recovery stds not added/reported. FHTE3, FHTE2 = UWC. MB detects = U5HM = UWCH, with FHTE3, FHTE2 = UWC.	360			38	322		
WG3824	Some PAH recovery stds not added/reported. FHTE3 = UWC. FLCL1, FLCL3 = UWCL, with other alerts = UWC. FCSL1 = UWCL.	430			78	350		2
WG3857	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. MBs in SDG extracted over a month apart.	673			614		59	
WG3887A	Some pest recovery stds not added/reported. FHTE3 = UWC. FHTE3, FHTE2 = UWC. FAMM1 from PCB surr used as pest surr. MB detects = U5HM = UWCH, with FHTE3 = UWC.	356			46	310		
WG3887B	Some pest recovery stds not added/reported. FHTE3, FHTE2 = UWC. MB detects = U5HM, with FHTE3 = UWC.	100			20	80		
WG3888X	Some PCB recovery and cleanup stds not added/reported. FLCH1 not need UWCH, as ND.	2253			2252		1	
WG3908A	Pest lab dup WG3908-103/L3032-2 [2DMR00280] precision reasonable, except oxychlorane = FLDP3 = UWC.	334			332	2		
WG3908AR	Arcolor SDG lab dup WG3908-103/L3032-2 [2DMR00280] precision reasonable.	70			70			
WG3908B	Pest lab dup WG3908-103/L3032-2 [2DMR00280] precision reasonable.	154			154			
WG3912	Some PAH recovery stds not added/reported. No LCS in SDG, but OPRs present. True/acceptance limits for OPR not known/evaluated, assume = USE. FHTE3 = UWC. OPR result reported twice, lab dup precision reasonable.	154			84	70		
WG3920	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3920-103/L3030-1 [2DMR01062] precision reasonable. FLCL1 = UWCL, with U5HM = UWC.	710			575	2	130	3
WG3930	PCB SDG has two samples (L3065-3W, 4W) with few congeners reported, no MB, no LCS. Assume = Use.	6			6			
WG3930X	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH, with FLCL1 = UWC. FLCL1, FLCL2 = UWCL. FCSL2 = UWCL.	1246			1212	1	20	13
WG3931A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. FLCL2, FLCL3 = UWCL to MB, SA. FCSH1 = UWCH, with FHTE3 = UWC. FCSL3, FLCL2, 3 = UWCL.	169			42	123	1	3
WG3931B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FCSH1 methoxychlor = UWCH to LCS, with FHTE3 = UWC.	77			19	57	1	
WG3956	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Two 2378-TCDF results reported for samples.	271			257		14	
WG3956C	PCB BZ# 77, 126, 169 data only. Lab dup WG3956-104/L3032-5(A) [2DMR01083] precision reasonable.	72			72			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG3962	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH. Lab dup WG3962-104/L3030-1(A) [2DMR01062] precision reasonable. Two 2378-TCDF results reported for samples.	306			290		16	
WG3968	Some PCB recovery stds not added/reported. MB detect BZ# 204= U5HM = UWCH. SDG has a sediment OPR sample, acceptance limits not known/evaluated.	535			534		1	
WG4018X	SDG contains PISCES hexane extracts. Some PCB recovery stds not added/reported. FLCL1, FLCL2 = UWCL in MB, SA. FCSL1, FCSL2, FCSL3= UWCL to LCS.	1976			1964			12
WG4019A	SDG has PISCES hexane extracts. Some pest recovery stds not added/reported. FHTE1 = UWC. FAMM1 from PCB surr used as pest surr. Many FLCH1 alerts in extracts, with FHTE1 = UWC. Results reported in both mass and concentration units.	298			46	252		
WG4019B	SDG has PISCES hexane extracts. Some recovery stds not added. FHTE1 = UWC. Results reported for extracts in both mass and concentration units.	134			20	114		
WG4023	Dioxin MB detects = U5HM = UWCH. Two identical results reported for samples. Two different 2378-TCDF results reported for each sample twice. FLCL1, FLCL2, FLCL3 = UWCL, with U5HM = UWC.	958			708	2	210	38
WG4105	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. Two identical results reported for each sample.	500			80	420		
WG4110X	Some PCB recovery stds not added/reported. PCB DU and FBs blind to lab, conc < 5 X FB = U5HF= UWCH. DU L3218-3 not match any SA, other DU concs not match any SA. Some metered surr values reported as XX "U" % recovery.	2519			2326	1	174	18
WG4113	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM with FHTE3 = UWC. Sample results reported twice. DU blind to lab. U5HF to results < 5x FB. FLCL1 with FHTE3 = UWC. FCSL1, FCSL2 = UWCL to LCS only.	500			78	420		2
WG4123A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr. HCB FCSL3, FLCL3 = UWCL.	292			43	247		2
WG4123B	Some pest stds not added/reported. FHTE3 = UWC.	134			20	114		
WG4127A	Some pest stds not added/reported. FHTE2, FHTE1 = UWC. MB detects = U5HM, with FHTE = UWC. FB and DU blind to lab. FAMM1 from PCB surr used as pest surr. Results reported twice. U5HF = results < 5X FB.	374			87	287		
WG4127B	Some pest recovery stds not added/reported. FHTE2, FHTE1 = UWC. FB and DU blind to lab, no results < 5 X FB.	172			39	133		
WG4128X	Some PCB recovery stds not added/reported. FB and DU blind to lab. MB detects = U5HM, detects < 5 X FB = U5HF. FLCL1 BZ#1= UWCL.	2208			2134		72	2

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG4130A	Some pest recovery stds not added/reported. FB, DU blind to lab. FHTE2, FHTE1 = UWC.FAMM1 from PCB surr used as pest surr.MB detects HCB = U5HM, with FHTE = UWC.FCSH1 mirex = UWCH to detects (LCS only).	374			83	290	1	
WG4130B	Some pest recovery stds not added/reported. FHTE2, FHTE1 = UWC.FB, DU blind to lab. MB detects = U5HM, FB detects = U5HF, with FHTE = UWC.	191			39	152		
WG4132	Some dioxin recovery stds not added/reported. SDG has no LCS, OPR or MS. FB, DU blind to lab. FB detects = U5HF, MB detects = U5HM= UWCH.Results reported twice. Two different 2378-TCDF results reported.	585			432		153	
WG4175	Some dioxin recovery stds not added/reported. MB detects = U5HM, with FHTE2 = UWC. FHTE2 = UWC.Lab dup WG4175-104/L3032-5RL3 [2DMR01083] precision reasonable.Two 2378-TCDF results reported for samples. FLCL1 = UWCL, with U5HM = UWC.	200			70	129		1
WG4182C	PCB BZ# 77, 126, 169 data only.	24			24			
WG4194X	Dioxin SDG has sediment OPR, no field samples. Some PCB recovery stds not added/reported.FCSL1 BZ # 3L, 1L = UWCL to LCS.	536			534			2
WG4233	Dioxin SDG has sediment OPR results, same sample reported twice.	142			142			
WG4243	Dioxin SDG has some recovery stds not added/reported. Lab dup WG4243-103 i/L3283-7 W (A) [1SPL02691] precision reasonable.Sample results reported twice. Two different 2378-TCDF results reported for each sample.	947			947			
WG4269X	Some PCB recovery stds not added/reported.Lab dup WG4269-103 L/L3283-10 L [1SPL02694] precision reasonable except BZ # 79 = FLDP3 = UWC.FLCL1, FLCL2, FLCL3 = UWCL. FCSL2, FCSL3 = UWCL to LCS only.	2686			2651	2		33
WG4286	Dioxin SDG contains sediment OPR data, true/acceptance limits not known/evaluated.Two different 2378-TCDF results reported for each OPR.	298			298			
WG4294	Some PAH recovery stds not added/reported. FHTE3= UWC. MB detect 2-methylnaphthalene = UWCH, with FHTE3 = UWC.	220			80	140		
WG4295	Some PAH recovery stds not added/reported. FHTE3 = UWC. SDG has sediment OPRs, true/acceptance limits not known/evaluated. Lab dup precision reasonable if assume all OPRs are same sediment source.	416			122	294		
WG4305A	Some pest recovery stds not added/reported. FHTE3, FHTE2 = UWC. SDG has sediment OPR samples, true/acceptance limits not known/evaluated.FAMM1 from PCB surr used as pest surr.	256			133	123		
WG4305B	Some pest recovery stds not added/reported.FHTE3, FHTE2 = UWC. FAMM1 = mass of hexane received (CARP076)? Same result reported twice for samples. SDG has sediment OPRs, true/acceptance limit not known/evaluated.	122			62	60		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG4340X	Some PCB recovery and cleanup stds not added/reported. SDG has sediment OPR reported in % recovery units. FLCL1 = UWCL. FCSL1, FCSL2 = UWCL to OPR only.	3460			3455			5
WG4345	Some PAH recovery stds not added/reported. FHTE3 = UWC.MB detects= U5HM, with FHTE3 = UWC. FCSL2 with FHTE3 = UWC.	164			79	84		1
WG4346	Some PAH recovery stds not added/reported. Sludge results reported in ng/g, no indication if dry weight or as received.FHTE3, FHTE1 = UWC.Lab dup WG4346-104L2N/L3283-12 L2N [1SPL02696] precision reasonable.Sample results reported twice.	962			682	280		
WG4359	Some dioxin recovery stds not added/reported.MB detects = U5HM = UWCH.	253			234		19	
WG4380	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH.Two different 2378-TCDF results reported for each sample.	362			358		4	
WG4385A	Some pest recovery stds not added/reported.FHTE3, FHTE1 = UWC. FAMM1 from PCB surr used as pest surr.FPUM from surrogate reported in mass units, % recovery not known. MB detects of C13 surrogate = U5HM = UWCH, with FHTE = UWC.	265			118	147		
WG4385B	Some pest recovery stds not added/reported.FHTE1 = UWC.	155			50	105		
WG4386X	Some PCB recovery and cleanup stds not added/reported.FLCL3, FLCL2, FLCL1 = UWCL to SA, MB results.MB detects = U5HM = UWCH.FCSL3, FCSL2 = UWCL to LCS.	1272			1239		1	32
WG4389A	Some pest recovery stds not added/reported. FHTE3, FHTE2, FHTE1 = UWC. MB detects = U5HM, with FHTE = UWC.FAMM1 from PCB surr used as pest surr.	292			126	164	2	
WG4389B	Some pest recovery stds not added/reported. FHTE3, FHTE2, FHTE1 = UWC.	134			58	76		
WG4407	Some PAH recovery stds not added/reported. FHTE3 = UWC. FLCL1 = UWCL, with FHTE = UWC. FCSL1 = UWCL, with FHTE = UWC.	500			79	420		1
WG4428	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH.FCSL1 = UWCL to LCS.	1527			1502		21	4
WG4459X	Some PCB recovery stds not added/reported. MB detect BZ# 209 = U5HM = UWCH.	1545			1544		1	
WG4475A	Some pest recovery stds not added/reported.FHTE3= UWC. FAMM1 from PCB surr used as pest surr.MB detects = U5HM, with FHTE = UWC.13C DDE reported in mass units, % recovery not known.	449			98	351		
WG4475B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM, with FHTE = UWC.	193			40	153		
WG4486	Some PAH recovery stds not added/reported. FHTE3, FHTE2, FHTE1 = UWC.	220			80	140		
WG4491	Some PCB recovery stds not added/reported.MB detects = U5HM = UWCH. FLCL1,FLCL2 = UWCL to SA, MB. FCSL1, FCSL2, FCSL3 = UWCL to LCS.	1013			995		6	12
WG4533X	No LCS, MS or BS in this PCB SDG, assume = USE. FLCL1, FLCL2 = UWCL. MB detects = U5HM = UWCH.	1203			1183		4	16

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG4535	Some PAH recovery stds not added/reported.FHTE1 = UWC. SDG has sediment OPRs and lab dup of OPR. Lab dup precision reasonable.	209			166	43		
WG4545A	Some pest recovery stds not added/reported. FAMM1 from PCB surr used as pest surr. Lab dup WG4545-103 W/L3283-11W [1SPL02695] precision reasonable.	415			139	276		
WG4562	Some PAH recovery stds not added/reported. FHTE3 = UWC. MB detects = U5Hm, with FHTE3 = UWC.	164			80	84		
WG4573	Dioxin MB detects = U5HM = UWCH. FLCL1, FLCL3 for OCDD = UWCL. Two different 2378-TCDF results reported for each sample.	373			341		28	4
WG4580X	Some PCB recovery stds not added/reported. SDG has sediment OPR samples, true/acceptance limits not known/evaluated. FLCL1, FLCL2 = UWCL. FCSL1 = UWCL to LCS.	1013			1004			9
WG4582	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH, with FHTE3 = UWC. FHTE3= UWC.Lab duplicate WG4582-103i/L3529-2i [2DMR01369] precision reasonable.	500			382	84	34	
WG4592	Some PAH recovery stds not added/reported. FHTE3, FHTE2 = UWC. MB detect naphthalene = U5HM = UWC with FHTE3, FHTE2.	204				204		
WG4613	Some PAH recovery stds not added/reported. FHTE3, FHTE2 = UWC.	162			78	84		
WG4625	Some PAH recovery stds not added/reported.Lab dup WG4625-104/L3529-20 [2DMR01401] precision reasonable. No perylene recovery in LCS reported, coded by lab with "Y", meaning unknown, assume = UWC.	500			489	11		
WG4629	Some PAH recovery stds not added/reported. FHTE2 = UWC. MB detects = U5HM with FHTE2 = UWC.Lab dup WG4629-104/L3529-25 [2DMR01407] precision reasonable. LCS for Perylene, BAP coded with "Y", no result reported = UWC.	500				500		
WG4633	Some PAH recovery stds not added/reported.MB detects = U5HM = UWCH. Lab duplicate WG4633-104i/L3529-29i [2DMR01415] precision reasonable. No result reported for LCS BAP, perylene = FCSL3 = UWC.	416			389	20	7	
WG4661X	PCB SDG has no LCS, OPR or MS, assume = USE.EB L3609-23i blind to lab, all sample results > 5 X EB. MB detects = U5HM = UWCH (in EB).	2629			2623		6	
WG4663A	Some pest recovery stds not added/reported. FHTE3, FHTE2, FHTE1 = UWC. MB detects HCB = U5HM = UWCH, with FHTE3 = UWC. EB, FB blind to lab, collection dates not match any samples.FAMM1 from PCB 101L used as pest surr.	299			46	253		
WG4663B	Some pest recovery stds not added/reported. FHTE3, 2, 1 = UWC.EB blind to lab, collect date not match any samples. MB detects = U5HM = UWCH, with FHTE3,2,1 = UWC (EB only).	171			18	153		
WG4669X	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH.	1730			1702		28	
WG4670X	PCB EB blind to lab, collect date not match any samples. MB detects = U5HM = UWCH.FLCL1 = UWCL.	3442			3396		44	2

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG4680	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. No LCS result reported for BAP, pyrene = FCCL3 = UWC. Lab duplicate WG4680-104/L3530-7 [2DMR01463] precision reasonable.	500			386	24	90	
WG4698	Dioxin OPR true/acceptance limit not known/evaluated. FLCL1 = UWCL. FCSH1 = UWCH. Two different 2378-TCDF results reported for sample.	319			301		16	2
WG4732A	Some pest recovery stds not added/reported. FHTE3 = UWC. EB blind to lab, collect date not match. MB detects U5HM with FHTE3 = UWC. FAMM1 due to PCB 101L used as pest surr. FPUM1 from surr reported in mass units, % recovery not calculated/reported.	378			49	329		
WG4732B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects = U5HM = UWCH, with FHTE3 = UWC. EB blind to lab, not match sample collection dates. LCS not extracted with samples/MB.	225			18	207		
WG4749	Some PAH recovery stds not added/reported. FHTE3 = UWC. SDG has sediment OPR data, no field samples. True/acceptance limits not known/evaluated.	244			160	84		
WG4759	Some PAH recovery stds not added/reported. FHTE3, 2 FHTA1 = UWC. MB detects = U5HM, with FHTE/FHTA = UWC.	288			78	210		
WG4769X	Some PCB recovery stds not added/reported. MB detects = U5HM = UWCH. FLCL1 BZ#1 = UWCL.	1969			1943		24	2
WG4774X	Some PCB recovery and cleanup stds not added/reported. FLCL1, FCUL1 = UWCL.	2537			2527			10
WG4783A	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects HCB = U5HM, with FHTE3 = UWC. FLCL1 with FHTE3 = UWC. FAMM1 due to PCB surrogates used for pest.	333			46	287		
WG4783B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detects endosulfan sulfate, alpha endosulfan = U5HM, with FHTE3 = UWC.	153			20	133		
WG4815A	Some pest recovery stds not added/reported. Pest meter surr reported in mass (FPUM1), recovery not known/evaluated. FHTE3, 2 = UWC. surr used for pest = FAMM1. MB detects HCB = U5HM = UWC with FHTE3, 2.	445			49	396		
WG4815B	Some pest recovery stds not added/reported. FHTE3, FHTE2 = UWC.	191			20	171		
WG4832	Some PAH recovery stds not added/reported. FHTE3, FHTA3 = UWC. MB detects = U5HM = UWC with FHTE3. OPR sediment true/acceptance limits not known/evaluated.	163			78	85		
WG4837	Some PAH recovery stds not added/reported.	138			138			
WG4838	SDG has two identical dioxin results reported for L3830-1	143			143			
WG4838BR	SDG has brominated dioxins, not a CARP analyte, no business rules created for validation. NOT VALIDATED.	74	74					
WG4838CB	SDG has chlorinated biphenylene data, not a CARP analyte, no business rules written for validation. NOT VALIDATED.	4	4					

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG4839BD	SDG has PBDPE data, not a CARP analyte, no business rules written for validation. NOT VALIDATED.	213	213					
WG4839X	Some PCB recovery/cleanup stds not added/reported. FLCL1, FLCL2, FCUL1, FCSL2, FCSL3 = UWCL.	535			515			20
WG4848X	Some PCB recovery and clean up stds not added/reported. FLCL1, 2, 3 = UWCL to SA and MB. FCSL2 = UWCL to LCS.	535			523			12
WG4851X	Some PCB recovery and cleanup stds not added/reported. FLCL1, FLCL2 = UWCL.	1041			1031			10
WG4859X	PCB 1JMS00182 duplicates WG4859-103W and L3645-1 W precision reasonable.	774			774			
WG4869BD	SDG contains PBDPE data, not a CARP analyte. No business rules written for PBDPE, NOT VALIDATED.	405	405					
WG4869X	Some PCB recovery and cleanup stds not added/reported. MB detects = U5HM = UWCH, with FLCL1 = UWC. FLCL1, FLCL2, FLCL3 = UWCL. FCSL1, FCSL2 to LCS only. U5HM with FLCL3 = UWC L3886-13.	1969			1832	3	101	33
WG4870	Dioxin MB detects = U5HM = UWCH. Two identical results reported for each field sample. Two 2378-TCDF results reported for each sample.	551			307		244	
WG4870BR	SDG had brominated dioxin/furan data, not a CARP analyte. No business rules written for validation, NOT VALIDATED.	234	234					
WG4870CB	SDG has chlorinated biphenylene data, not a CARP analyte. No business rules written for validation, NOT VALIDATED.	16	16					
WG4877	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. FLCL1, FLCL2 = UWCL. Two identical results reported for each field sample.	500			393		92	15
WG4906A	Some pest recovery stds not added/reported. FHTE2 = UWC. FAMM1 from PCB surr used as pest surr. MB detects = U5HM = UWCH, with FHTE2 = UWC. FPUM2 due to mass units reported for surr, recovery not evaluated, assume = USE.	124			97	26	1	
WG4906B	Some pest recovery stds not added/reported. FHTE3, FHTE2 = UWC.	77			20	57		
WG4918A	Some pest recovery stds not added/reported. FHTE3 = UWC. Lab duplicate WG4918-104/L3645-1 [1JMS00182] precision reasonable, except 4,4'-DDT = FLDP3 = UWC. FCSL1 = UWCL, with FHTE3 = UWC.	92			65	24		3
WG4918B	Some pest recovery stds not added/reported. FHTE3 = UWC. Lab duplicate WG4918-104/L3645-1 [1JMS00183] precision reasonable.	40			30	10		
WG4924	Some dioxin recovery stds not added/reported. MB detects = U5HM = UWCH, with FHTE3 = UWC. FHTE3 = UWC. Lab duplicate WG4924-103/L3529-5 (A) [2DMR01375] precision reasonable. Two different 2378-TCDF results reported for each sample.	726			558	138	30	
WG4929	Dioxin SDG has hold time exceedances FHTE1, FHTE2 = UWC. Analysis date is before extraction date= FDAE4, assume reporting error. MB detects = U5HM = UWCH, with FHTE2 = UWC. FLCL1, FLCL3 with FHTE1, FHTE2 = UWC.	473			113	344	16	

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG4959	Two dioxin results reported for each field sample. EB blind to lab, matches OPR collection date. True/acceptance limits not known/evaluated for OPR. MB detects = U5HM = UWCH.	652			638		14	
WG4959BR	SDG has brominated dioxin data, not CARP analyte. No business rules written for validation, NOT VALIDATED.	309	101		208			
WG4959CB	SDG has chlorinated biphenylene data, not CARP analyte. No business rules written for validation, NOT VALIDATED.	20	20					
WG4960	PAH hold time exceedances = FHTE3 = UWC. Some recovery standards not added/reported, assume = USE. EB blind to lab, matches collection date of sediment OPR. Two identical results reported for samples.	524			440	84		
WG4961BD	SDG contains PBDPE data, not a CARP analyte. No business rules written for validation, NOT VALIDATED.	623	623					
WG4961X	Some PCB recovery stds not added/reported. EB blind to lab, date matches sediment OPR only. FUNI1 due to EB units being reported as NG/KG DRY, other EB results in PG/SAMPLE.	2522			2522			
WG4962A	Pest recovery standards not added/reported. MB detects HCB = U5HM = UWCH. EB blind to lab. FPUM1 due to DDE surr reported in mass units, assume = USE. FAMM1 from PCB surr used for pest. Results reported twice. CARP093 detected in MB!	399			391		8	
WG4962B	Some pest recovery standards not added/reported, assume = USE. EB blind to lab, matches collect date of sediment OPR only. MB detect endosulfan sulfate = U5HM = UWCH.	174			172		2	
WG4968	Dioxin MB detects = U5HM = UWCH. Two 2378-TCDF results reported for samples. FCSH1 = UWCH.	369			320		49	
WG4977	Some dioxin recovery stds not added/reported. No LCS, MS or BS in SDG = FCSF0, assume = USE. EB blind to lab, collect date does not match any samples. MB detects = U5HM = UWCH. FLCL2, FLCL3 = UWCL.	463			425		6	32
WG5002	Some dioxin recovery stds not added/reported, assume = USE. Two 2378-TCDF results reported for samples.	161			161			
WG5002BR	SDG contains brominated dioxin data, not CARP analyte. No business rules written for validation, NOT VALIDATED.	99	99					
WG5002CB	SDG contains chlorinated biphenylene data, not a CARP analyte. No business rules written for validation. Assume = USE.	6			6			
WG5022X	Some PCB recovery and cleanup stds not added/reported. MB detects BZ# 204, 209 = U5HM = UWCH.	1730			1728		2	
WG5040A	Some pest recovery stds not added/reported. FHTE3, 2,1 = UWC. FPUM1 from pest surr reported in mass units, recovery not known/evaluated. CARP093 surrogate detected in MB = U5HM, with FHTE3 = UWC. FAMM1 from PCB surr used as pest surr.	202			49	153		
WG5040B	Some pest recovery stds not added/reported. FHTE3, 2, 1 = UWC. MB detect endosulfan sulfate = U5HM = UWCH, with FHTE3 = UWC.	80			20	60		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG5042BD	SDG has brominated dioxin data, not CARP analyte. No business rules written for validation, NOT VALIDATED.	117	117					
WG5072	Dioxin SDG has sediment OPRs, true/acceptance limits not known/evaluated. FLCL1 for OCDD = UWCL.	143			141			2
WG5118	Some PAH recovery stds not added/reported.FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FLCL3, FLCL2, FLCL1 with U5HM = UWC. FCSL2 = UWCL to LCS only, with FHTE3 = UWC.	332			79	252		1
WG5192	Dioxin MB detects = U5HM = UWCH. Two different 2378-TCDF results reported.	285			253		32	
WG5262	Some dioxin recovery stds not added.FHTA3 = UWC. Lab duplicate WG5262-103L/L3530-8L(A) [2DMR01589] precision reasonable.MB detects = U5HM with FHTA3 = UWC.Two 2378-TCDF results reported for each sample.	341			1	340		
WG5264	Some dioxin recovery stds not added/reported. FHTA3 = UWC. MB detects = U5HM, with FHTA3 = UWC. Lab duplicate WG5264-103L/L3528-24L [2DMR01406] precision reasonable.Two 2378-TCDF results reported for each sample.	656			61	595		
WG5266	Some PAH recovery stds not added/reported.	122			122			
WG5293	Dioxin EB blind to lab, collect date not match any samples. MB detects = U5HM = UWCH. OPR reported in % recovery, acceptance ranges not known/evaluated.FLCL1, FLCL2 (L3609-8)= UWCL, FLCH1 (L3609-16 L) = UWCH, with U5HM = UWCH.	463			319		139	5
WG5312	Dioxin MB detects = U5HM = UWCH. Some dioxin recovery stds not added/reported.OPR reported in % recovery, acceptance limits not known/evaluated.Two MBs in SDG, used highest for U5HM = UWCH.	500			473		27	
WG5706	Dioxin MB detects = U5HM = UWCH. Sediment OPR in SDG reported in % recovery, acceptance limits not known/evaluated.wo different 2378-TCDF results reported.	201			192		9	
WG5717A	Pest lab duplicate WG5717-104/L3530-8R (A) [2DMR01589] precision reasonable.	434			434			
WG5717AR	Aroclor lab duplicate WG5717-104/L3530-8R (A) [2DMR01589] precision reasonable. SDG has no LCS, MS or BS, no accuracy check, assume = USE.	42			42			
WG5717B	Pest lab duplicate WG5717-104i/L3530-8Ri(A) [2DMR01589] precision reasonable. MB detect endosulfan sulfate = U5HM = UWCH.	180			172		8	
WG5717X	PCB lab duplicate WG5717-104/L3530-8R [2DMR01589] precision reasonable.	3064			3064			
WG5737X	Some PCB recovery stds not added/reported. Sediment OPR true/acceptance limits not known/evaluated.	1548			1548			
WG5738A	Some pest recovery stds not added/reported. FHTE3 = UWC.FAMM1 from PCB surr used as pest surr. Sediment OPR true/acceptance limits for % recovery not known/evaluated.	184			92	92		
WG5738B	Some pest recovery stds not added/reported. FHTE3 = UWC. MB detect endosulfan sulfate, endrin aldehyde = U5HM, with FHTE3 = UWC.	50			20	30		

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG5768	Some PAH recovery stds not added/reported. FHTE3, FHTA3 = UWC. Lab dup (L3917-6) precision reasonable. OPR reported in % recovery, acceptance range not known/evaluated.	164				164		
WG5772	Some PAH recovery stds not added/reported. FHTE3, FHTA3 = UWC. FCCL3 with FHTE3, FHTA3 = UWC. FLCL2 with FHTE3, FHTE3 = UWC. MB detects = U5HM, with FHTE, FHTA = UWC.	320				320		
WG5793	Some PAH recovery stds not added/reported. FHTA3 = UWC.	122				122		
WG5953	Dioxin MB detects = U5HM = UWCH. FLCL3 with U5HM = UWC. Odd April 2002 MB reported in SDG, matches no samples. Sediment OPR reported in % recovery, limits not known/evaluated.	197			183	1	12	1
WG6057	Some dioxin recovery stds not added/reported. FHTA3 = UWC. Lab duplicate WG6057-103/L4498-8 [2DMR01702] precision reasonable.	341			315	26		
WG6098	Some PAH recovery stds not added/reported. PAH MB detects = U5HM = UWCH. Lab duplicate WG6098-104/L4498-8 (A) [2DMR01702] precision reasonable.	451			403		48	
WG6175A	Pest lab duplicate WG6175-103i/L4488-4i (A) [2DMR01669] precision reasonable.	335			335			
WG6175B	Pest lab duplicate WG6175-103/L4488-4 (A) [2DMR01669] precision reasonable.	144			144			
WG6175C	SDG has BZ # 77, 126, 169 data only. PCB MB detects BZ# 169 = U5HM = UWCH. Lab duplicate precision WG6175-103/L4488-4 (A) [2DMR01669] reasonable.	82			79		3	
WG6175X	PCB lab duplicate WG6175-103i/L4488-4i (A) [2DMR01669] precision reasonable.	1514			1514			
WG6241X	Some PCB recovery and cleanup stds not added/reported. FHTE2 = UWC. Sediment OPR in SDG reported in % recovery units, acceptance limits not known/evaluated. FCCL1 = UWCL, with FHTE = UWC.	1013			294	717		2
WG6468A	Pest lab duplicate WG6468-103/L4489-2 (A) [2DMR00553] precision reasonable.	363			363			
WG6468AR	Aroclor lab duplicate WG6468-103/L4489-2 (A) [2DMR00553] precision reasonable.	48			48			
WG6468X	PCB lab duplicate WG6468-103/L4489-2 [2DMR00553] precision reasonable.	1686			1686			
WG6502	Some PAH recovery stds not added/reported. MB detects = U5HM = UWCH. Lab duplicate WG6502-104/L4790-6 (A) [2DMR01258] precision unusual, lab dup consistently higher detects than original sample = UWC.	626			465	42	119	
WG6594A	Pest lab duplicate WG6594-103/L4490-4 (A) [2DMR00476] precision reasonable.	335			335			
WG6594AR	Aroclor SDG has no LCS, MS, BS or other accuracy check, assume = USE. Lab duplicate WG6594-103/L4490-4 (A) [2DMR00476] precision reasonable.	44			44			
WG6594B	Pest lab duplicate WG6594-103/L4490-4 (A) [2DMR00476] precision reasonable.	144			144			
WG6594X	PCB lab duplicate WG6594-103/L4490-4 (A) [2DMR00476] precision reasonable.	1552			1552			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
WG6602AR	Aroclor SDG has lab duplicate, L4490-13 (A)/WG6602-103 [2DMR01681], precision reasonable. SDG has no LCS, MS or SRM, assume = USE.	44			44			
WG6602B	Pest SDG lab duplicate WG6602-103/L4490-13 (A) [2DMR01681] precision reasonable.	144			144			
WG6602X	PCB SDG lab duplicate WG6602-103/L4490-13 (A) [2DMR01681] precision reasonable.	1552			1552			
WG6603B	Pest SDG lab duplicate WG6603-13/L4491-1 (A) [2DMR00495] precision reasonable.	156			156			
WG6605B	Pest SDG lab duplicate WG6605-103i2/L4492-5 i2 (A) [2DMR01112] precision reasonable.	144			144			
WG6605X	PCB SDG lab duplicate WG6605-103/L4492-5 (A) [2DMR01112] precision reasonable.	1552			1552			
WG6876	Some dioxin recovery stds not added/reported. FHTA3/A2 = UWC. Lab dup WG6876-103/L3530-12R (A) [2DMR01465] precision reasonable. MB detects OCDD, OCDF = U5HM=UWCH, with FHTA2 = UWC.	201			132	68	1	
WG6931B	Some pest recovery stds not added/reported. FHTE3 = UWC. Sediment OPR reported in % recovery units.	45			30	15		
WG6967A	Pest lab duplicate WG6967-103/L4492-15 (A) [2DMR01118] precision reasonable.	335			335			
WG6967B	Pest lab duplicate WG6967-103/L4492-15 [2DMR01118] precision reasonable.	144			144			
WG6967X	PCB lab duplicate WG6967-103/L4492-15(A) [2DMR01118] precision reasonable.	1552			1552			
WG7020B	Pest lab duplicate WG7020-103/L4493-16 [2DMR00298] precision reasonable.	132			132			
WG7624	Some dioxin recovery stds not added/reported.MB detects OCDD, OCDF = U5HM = UWCH. FLCL1 = UWCL, with U5HM = UWC. FHTA1 = UWC. Two different 2378-TCDF results reported for each sample.	445			429	2	13	1
WG8134	Some PAH recovery stds not aded/reported. FHTE3= UWC. FCSL1 = UWCL.	164			79	84		1
WG8387	Dioxin FHTE3 = UWC. MB detects = U5HM, with FHTE3 = UWC. FLCH3 = UWCH. Two different 2378-TCDF results reported for sample.	116			70	42	4	
WG8513X	PCB FHTE3 = UWC. OPR different extract date than field sample and MB. MB detects = U5HM = UWCH, with FHTE3 = UWC. FCSL1 = UWCL, with FHTE3 = UWC. FLCL1/FLCL2 + FCSL1/FCSL3 = UWCL	776			287	482		7
WG8640	Some dioxin recovery stds not added/reported.Two different 2378-TCDF results reported for sample.	96			96			
ZF20101	Three lab method blanks for methylmercury in SDG, used highest in assigning U5HM alert, as results reported corrected for blank = USE. Lab duplicate precision reasonable.	25			25			
ZF48201	Four MB for cadmium in SDG. Results reported subtracted for lab blank = USE. No LCS in SDG, but MS recovery acceptable.Lab duplicate precision reasonable.	9			9			
ZH21211	Metals lab dup precision reasonable.	52			52			
ZH49211C	Cadmium data, all = USE.	24			24			
ZH49211H	Mercury lab duplicate precision reasonable.	24			24			

SDG	Comment	# of Records	Not Validated	NOU	USE	UWC	UWCH	UWCL
ZH49212C	Cadmium lab duplicate precision reasonable.	23			23			
ZH49212H	Mercury lab duplicate precision reasonable.	23			23			
	TOTALS	752951	10250	2098	599479	114195	19840	7089