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Appendix T

Summary of Quality Assurance Assessment

Data Validation Summary and Quality Assurance
Phase I of Benning Road Facility RI/FS Project
3400 Benning Rd. NE, Washington DC 20019

Polychlorinated biphenyls (PCBs) by EPA Method 8082A

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs provide in Appendix A of the SAP.

Field and QC Samples

A total of 267 normal (N) sediment samples and 17 sediment field duplicate samples (FD=6.4% of N) were collected and analyzed. This meets and exceeds the SAP Table 5 plan for 229 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 159 normal (N) soil samples and 9 soil field duplicate samples (FD=5.7% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 140 soil samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 32 of the sediment and soil samples combined (MS=7.5% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

A total of 87 normal groundwater samples and 7 groundwater field duplicate samples (FD=9.2% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 56 groundwater samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 29 normal surface water samples and 2 surface water field duplicate samples (FD=6.9% of N) were collected and analyzed. This meets and exceeds the SAP Table 5 plan for 20 surface water samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 7 of the 174 ground and surface water samples combined (MS=6.0% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 6010 results for Aroclor analytes were reviewed. A total of 559 results (9.3%) were qualified as estimated (J flagged) based on data validation. No results were rejected and all results are considered useable for decision making purposes. Table R-1 provides all qualified data points and the reasons for data qualification. Laboratory report numbers, also called Sample Delivery Groups (SDG), are provided to connect qualified data with specific Data Validation Reports.

A total of 26 results (0.4% of total) were qualified as estimated (J) based on field duplicate relative percent differences (RPDs) which exceeded the 50% maximum criterion.

A total of 13 results (0.2% of total) were qualified as estimated (J or UJ) based on matrix spike recoveries that exceeded laboratory control limits or matrix spike duplicate RPD criteria.

A total of 132 results (2.2% of total) were qualified as estimated (J or UJ) based on minor calibration issues such as continuing calibration verification (CCV) % drift criteria exceedance on one or two of the peaks in the Aroclor CCV.

A total of 202 results (3.3% of total) were qualified as estimated (J or UJ) based on surrogate recovery results exceeding laboratory criteria.

A total of 89 results (1.5% of total) were qualified as estimated (J) based on dual column RPDs exceeding 40% for detected Aroclors.

A total of 356 results (5.6% of total) were qualified as estimated (J) based on quantitation issues such as reporting multiple overlapping Aroclors.

No results were qualified based on LCS/LCSD recoveries, method or equipment blank results, holding time exceedance, or sample preservation problems.

Semivolatile Organic Compounds (SVOCs) and Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270D

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 266 normal (N) sediment samples and 17 sediment field duplicate samples (FD=6.4% of N) were collected and analyzed. This meets and exceeds the SAP Table 5 plan for 249 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 95 normal (N) soil samples and 6 soil field duplicate samples (FD=6.3% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 60 soil samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 35 of the 361 sediment and soil samples combined (MS=9.7% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

A total of 87 normal groundwater samples and 7 groundwater field duplicate samples (FD=8.0% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 56 groundwater samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 28 normal surface water samples and 2 surface water field duplicate samples (FD=7.1% of N) were collected and analyzed. This is 97% of the SAP Table 5 plan for 29 surface water samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 7 of the 115 ground and surface water samples combined (MS=6.1% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 16,471 results for the SVOC (including PAH) analytes were reviewed. A total of 18 results (0.11%) were rejected based on data validation and are not useable for decision making purposes. A total of 673 results (4.1%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all these qualified results are considered useable for decision making purposes. Table R-2 provides all qualified data points and the reasons for data qualification.

A total of seven results (0.042% of total) were rejected (R) based on matrix spike recoveries which were less than 10% recovery.

A total of 11 results (0.067% of total) were rejected (R) based on laboratory control sample recoveries which were less than 10% recovery.

A total of 128 results (0.78% of total) were qualified as negated (U) based on the presence of laboratory method blank, field blank or equipment blank contamination.

A total of 64 results (0.39%) were qualified as estimated (J or UJ) based on exceedance of the extraction holding time criterion.

A total of 144 results (0.87% of total) were qualified as estimated (J or UJ) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or 50% maximum criterion for solid samples.

A total of 86 results (0.52% of total) were qualified as estimated (J or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 14 results (0.085% of total) were qualified as estimated (J) based on matrix spike/matrix spike duplicate RPDs which exceeded laboratory control limits.

A total of 77 results (0.47% of total) were qualified as estimated (J or UJ) based on laboratory control sample recoveries which did not meet laboratory recovery control limits.

A total of 77 results (0.47% of total) were qualified as estimated (J or UJ) based on minor calibration issues such as exceedance of the continuing calibration verification (CCV) percent difference (%D) criteria.

A total of 110 results (0.67% of total) were qualified as estimated (J) based on exceeded internal standard criteria.

No results were qualified based on surrogate recoveries or sample preservation problems.

Volatile organic compounds (VOCs) by EPA Method 8260B

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 45 normal (N) sediment samples and 13 sediment field duplicate samples (FD=28.9% of N) were collected and analyzed. This meets and exceeds the SAP Table 5 plan for 29 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 88 normal (N) soil samples and 5 soil field duplicate samples (FD=5.7% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 70 soil samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 21 of the 133 sediment and soil samples combined (MS=15.8% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

A total of 88 normal groundwater samples and 7 groundwater field duplicate samples (FD=8.0% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 56 groundwater samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 19 normal surface water samples and 2 surface water field duplicate samples (FD=10.5% of N) were collected and analyzed. This meets the SAP Table 5 plan for 19 surface water samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 13 of the 107 ground and surface water samples combined (MS=12.1% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 15,340 results for the VOC analytes were reviewed. A total of 25 results (0.16%) were rejected based on data validation and are not useable for decision making purposes. A total of 442 results (2.9%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-3 provides all qualified data points and the reasons for data qualification.

A total of 25 results (0.16% of total) were rejected (R) based on low relative response factors in the initial or continuing calibration standards.

A total of 125 results (0.81% of total) were qualified as negated (U) based on the presence of laboratory method blank, trip blank or equipment blank contamination.

A total of 3 results (0.020% of total) were qualified as estimated (J or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 7 results (0.046% of total) were qualified as estimated (J or UJ) based on laboratory control sample recoveries which did not meet laboratory recovery control limits.

A total of 333 results (0.022% of total) were qualified as estimated (J or UJ) based on minor calibration issues such as exceedance of the continuing calibration verification (CCV) percent difference (%D) criteria.

No results were qualified based on surrogate recoveries, field duplicate imprecision, holding time exceedances or sample preservation problems

Organochlorine pesticides (OCPs) by EPA Method 8081B

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 25 normal (N) sediment samples and 10 sediment field duplicate samples (FD=40% of N) were collected and analyzed. This is 86% of the SAP Table 5 plan for 29 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 20 normal (N) soil samples and 3 soil field duplicate samples (FD=15% of N) were collected and analyzed. This meets the SAP Table 4 plan for 20 soil samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 11 of the 45 sediment and soil samples combined (MS=24.4% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

A total of 39 normal groundwater samples and 4 groundwater field duplicate samples (FD=10.2% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 20 groundwater samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 19 normal surface water samples and 2 surface water field duplicate samples (FD=10.5% of N) were collected and analyzed. This meets the SAP Table 5 plan for 19 surface water samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 4 of the 58 ground and surface water samples combined (MS=6.9% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 3003 results for the OCP analytes were reviewed. A total of 2 results (0.067%) were rejected based on data validation and are not useable for decision making purposes. A total of 705 results (23.4%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-4 provides all qualified data points and the reasons for data qualification.

A total of 2 results (0.067% of total) were rejected (R) based on matrix spike recoveries which were less than 10% recovery.

A total of 14 results (0.47% of total) were qualified as negated (U) based on the presence of laboratory method blank or equipment blank contamination.

A total of 28 results (0.93% of total) were qualified as estimated (J or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 24 results (0.80% of total) were qualified as estimated (J) based on matrix spike/matrix spike duplicate RPDs which exceeded laboratory control limits.

A total of 18 results (0.60% of total) were qualified as estimated (J) based on minor calibration issues such as exceedance of the continuing calibration verification (CCV) percent difference (%D) criteria.

A total of 63 results (2.1% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or 50% maximum criterion for solid samples.

A total of 526 results (17.5% of total) were qualified as estimated (J) based on dual column RPDs exceeding 40% for detected OCPs.

A total of 171 results (5.7% of total) were qualified as estimated (J or UJ) based on surrogate recovery results outside of laboratory control limits.

No results were qualified based on holding time exceedances, sample preservation problems or laboratory control sample nonconformances.

Total petroleum hydrocarbons (TPH) by EPA Method 8015C

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica North Canton laboratory per SOPs provide in Appendix A of the SAP. The TestAmerica Pensacola lab listed in Table 8 of the QAPP for GRO and the ECCS mobile lab listed for DRO/ORO were not used due to cost and schedule issues.

Field and QC Samples

A total of 5 normal (N) sediment samples and 1 sediment field duplicate samples (FD=20% of N) were collected and analyzed. This is 56% of the SAP Table 5 plan for 9 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 158 normal (N) soil samples and 8 soil field duplicate samples (FD=5.1% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 140 soil samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 6 of the 163 sediment and soil samples combined (MS=3.7% of N) which is below the requirement of 5% per Section 3.2.1 of the QAPP.

A total of 57 normal groundwater samples and 5 groundwater field duplicate samples (FD=8.8% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 40 groundwater samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 8 normal surface water samples and 1 surface water field duplicate samples (FD=12.5% of N) were collected and analyzed. This is 89% of the SAP Table 5 plan for 9 surface water samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 14 of the 66 ground and surface water samples combined (MS=21.2% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 761 results for the TPH analytes were reviewed. No data were rejected. A total of 228 results (30%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-5 provides all qualified data points and the reasons for data qualification.

A total of 143 results (18.8% of total) were qualified as negated (U) based on the presence of laboratory method blank, trip blank or equipment blank contamination.

A total of 20 results (2.6% of total) were qualified as estimated (J or UJ) based on exceedance of the extraction holding time criterion.

A total of 54 results (7.1% of total) were qualified as estimated (J or UJ) based on inadequate preservation of samples (i.e., samples were not frozen within 48 hours of sample collection).

A total of 2 results (0.26% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples.

A total of 5 results (0.66% of total) were qualified as estimated (J or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 26 results (3.4% of total) were qualified as estimated (J) based on minor calibration issues such as exceedance of the continuing calibration verification (CCV) percent difference (%D) criteria.

No results were qualified based on surrogate recoveries or laboratory control sample nonconformances.

Hexane extractable material (HEM) oil and grease by EPA Method 1664

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 11 normal surface water samples and 1 surface water field duplicate samples (FD=9.1% of N) were collected and analyzed. This meets and exceeds the SAP Table 5 plan for 10 surface water samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 1 of the 11 surface water samples (MS=9.1% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 13 results for the TPH analytes were reviewed. No data were rejected. A total of 2 results (15.3%) were qualified as negated (U flagged) based on data validation and all results are considered useable for decision making purposes. Table R-6 provides all qualified data points and the reasons for data qualification.

A total of 2 results (15.4% of total) were qualified as negated (U) based on the presence of equipment blank contamination.

No results were qualified based on holding time exceedances, calibration nonconformances, matrix spike nonconformances, laboratory control sample nonconformances, or field duplicate imprecision.

Polychlorinated dibenzodioxins and Polychlorinated dibenzofurans (PCDDs/PCDFs) by EPA Method 8290A

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Knoxville laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 21 normal (N) sediment samples and 9 sediment field duplicate samples (FD=43% of N) were collected and analyzed. This is 95% of the SAP Table 5 plan for 22 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 20 normal (N) soil samples and 3 soil field duplicate samples (FD=15% of N) were collected and analyzed. This meets the SAP Table 4 plan for 20 soil samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 3 of the 41 sediment and soil samples combined (MS=7.3% of N) which meets the requirement of 5% per Section 3.2.1 of the QAPP.

A total of 26 normal groundwater samples and 2 groundwater field duplicate samples (FD=7.7% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 20 groundwater samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 11 normal surface water samples and 1 surface water field duplicate samples (FD=9.1% of N) were collected and analyzed. This meets and exceeds the SAP Table 5 plan for 10 surface water samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 2 of the 37 ground and surface water samples combined (MS=5.4% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 2825 results for the PCDD/PCDF analytes were reviewed. No data were rejected. A total of 1164 results (41.2%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-7 provides all qualified data points and the reasons for data qualification.

A total of 63 results (2.2% of total) were qualified as negated (U) based on the presence of laboratory method blank, field blank or equipment blank contamination.

A total of 141 results (5.0% of total) were qualified as estimated (J) based on the presence of laboratory method blank, field blank or equipment blank contamination.

A total of 126 results (4.5% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or the 50% maximum criterion for solid samples.

A total of 2 results (0.071% of total) were qualified as estimated (J) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 3 results (0.11% of total) were qualified as estimated (J) based on matrix spike/matrix spike duplicate RPDs which exceeded laboratory control limits.

A total of 13 results (0.46% of total) were qualified as estimated (J or UJ) based on labeled compound recoveries which did not meet the laboratory control limits.

A total of 967 results (34.2% of total) were qualified as estimated with a tentative identification (JN). These results were reported by the laboratory to be estimated maximum potential concentrations [EMPCs] since all identification criteria were not met.

A total of 57 results (2.0% of total) were qualified as estimated (J) based on quantitation issues such as 1) exceeding the calibration range, 2) the presence of co-eluting compounds, or 3) as is the case of 2,3,7,8-TCDF, results were reported from a non-isomer specific column.

A total of 7 results (0.25% of total) were qualified as estimated (J) based on the presence of ion suppression.

No results were qualified based on holding time exceedances, sample preservation problems, calibration nonconformances or laboratory control sample nonconformances.

Polychlorinated biphenyl (PCB) congeners by EPA Method 1668C

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Knoxville laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

Field duplicate and matrix spike/matrix spike duplicate samples were not submitted for analysis for this method.

Data Qualifications

A total of 7194 results for the PCB congener analytes were reviewed. No data were rejected. A total of 1267 results (17.6%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-8 provides all qualified data points and the reasons for data qualification.

A total of 27 results (0.38% of total) were qualified as negated (U) based on the presence of laboratory method blank or equipment blank contamination.

A total of 75 results (1.04% of total) were qualified as estimated (J) based on the presence of laboratory method blank or equipment blank contamination.

A total of 24 results (0.33% of total) were qualified as estimated (J or UJ) based on labeled compound recoveries which did not meet the laboratory control limits.

A total of 1194 results (16.6% of total) were qualified as estimated with a tentative identification (JN). These results were reported by the laboratory to be estimated maximum potential concentrations [EMPCs] since all identification criteria were not met.

A total of 6 results (0.083% of total) were qualified as estimated (J) based on the presence of ion suppression.

No results were qualified based on holding time exceedances, sample preservation problems, calibration nonconformances or laboratory control sample nonconformances.

Alkylated polycyclic aromatic hydrocarbons (PAHs) by TestAmerica SOP ID-0016

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Knoxville laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

Field duplicate and matrix spike/matrix spike duplicate samples were not submitted for analysis for this method.

Data Qualifications

A total of 1470 results for the alkylated PAH analytes were reviewed. No data were rejected. A total of 683 results (46.5%) were qualified as estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-9 provides all qualified data points and the reasons for data qualification.

A total of 42 results (2.9% of total) were qualified as estimated (J) based on the exceeded extraction holding time criterion.

A total of 83 results (5.6% of total) were qualified as estimated (J) based on the presence of laboratory method blank or equipment blank contamination.

A total of 38 results (2.6% of total) were qualified as estimated (J or UJ) based on labeled compound recoveries which did not meet the laboratory control limits.

A total of 598 results (40.7% of total) were qualified as estimated with a tentative identification (JN). These results were reported by the laboratory to be estimated maximum potential concentrations [EMPCs] since all identification criteria were not met.

A total of 6 results (0.41% of total) were qualified as estimated (J) based on quantitation issues such as exceeding the calibration range.

No results were qualified based on sample preservation problems, calibration nonconformances or laboratory control sample nonconformances.

Metals by EPA Methods 6020A, 7470A and 7471B

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 79 normal (N) sediment samples and 13 sediment field duplicate samples (FD=16.4% of N) were collected and analyzed. This meets and exceeds the SAP Table 5 plan for 64 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 86 normal (N) soil samples and 4 soil field duplicate samples (FD=4.7% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 44 soil samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples (for all metals except mercury) were collected and analyzed for 29 of the 165 sediment and soil samples combined (MS=17.6% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples (for mercury) were collected and analyzed for 37 of the 165 sediment and soil samples combined (MS=22.4% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

A total of 87 normal groundwater samples and 7 groundwater field duplicate samples (FD=8.0% of N) were collected and analyzed. This meets and exceeds the SAP Table 4 plan for 56 groundwater samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

A total of 28 normal surface water samples and 2 surface water field duplicate samples (FD=7.1% of N) were collected and analyzed. This is 97% of the SAP Table 5 plan for 29 surface water samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 12 of the 115 ground and surface water samples combined (MS=10.4% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 10,626 results for the metals analytes were reviewed. A total of 3 results (0.028%) were rejected based on data validation and are not useable for decision making purposes. A total of 2448 results (23.0%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and are considered useable for decision making purposes. Table R-10 provides all qualified data points and the reasons for data qualification.

A total of 3 results (0.028% of total) were qualified as rejected (R) based on matrix spike recoveries which recovered below 30%.

A total of 276 results (2.6% of total) were qualified as estimated (J or UJ) based on matrix spike/matrix spike duplicate RPDs which did not meet laboratory control limits.

A total of 1197 results (11.3% of total) were qualified as estimated (J, J-, J+ or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 784 results (7.4% of total) were qualified as negated (U) based on the presence of laboratory method blank, field blank or equipment blank contamination.

A total of 106 results (1.0% of total) were qualified as estimated (J or J+) based on the presence of field blank or equipment blank contamination.

A total of 5 results (0.047% of total) were qualified as estimated (J-) based on the exceeded analytical holding time criterion.

A total of 344 results (3.2% of total) were qualified as estimated (J or UJ) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or the 50% maximum criterion for solid samples.

A total of 91 results (0.86% of total) were qualified as estimated (J, J-, J+ or UJ) based on interelement interference check standard nonconformances.

A total of 107 results (1.0% of total) were qualified as estimated (J) due to serial dilution result nonconformances.

No results were qualified based on sample preservation problems, calibration nonconformances or laboratory control sample nonconformances.

Acid volatile sulfides/simultaneously extracted metals (AVS/SEM) by EPA Methods 9034/6010/7470A

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 56 normal (N) sediment samples and 9 sediment field duplicate samples (FD=16.1% of N) were collected and analyzed. This meets and exceeds the Table 5 plan for 55 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 3 of the 56 sediment samples (MS=5.4% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 650 results for the AVS/SEM analytes were reviewed. No data were rejected. A total of 241 results (37.1%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-11 provides all qualified data points and the reasons for data qualification.

A total of 21 results (3.2% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 214 results (32.9% of total) were qualified as estimated (J or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 5 results (0.77% of total) were qualified as estimated (J) based on matrix spike/matrix spike RPDs which did not meet the laboratory control limits.

A total of 10 results (1.5% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 50% maximum criterion for solid samples.

A total of 29 results (4.5% of total) were qualified as estimated (J) based on serial dilution results which did not meet the laboratory control limits.

No results were qualified based on holding time exceedances, sample preservation problems, calibration nonconformances, or laboratory control sample nonconformances.

Total Organic Carbon (TOC) by Lloyd Kahn method

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 75 normal (N) sediment samples and 12 sediment field duplicate samples (FD=16.0% of N) were collected and analyzed. This meets the Table 5 plan for 75 sediment samples, and meets the FD requirement of 5% per Section 3.2.1 of the QAPP.

Matrix spike/matrix spike duplicate samples were collected and analyzed for 14 of the 75 sediment samples (MS=18.7% of N) which meets and exceeds the requirement of 5% per Section 3.2.1 of the QAPP.

Data Qualifications

A total of 87 results for the TOC analyte were reviewed. No data were rejected. A total of 9 results (10.3%) were qualified as estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-12 provides all qualified data points and the reasons for data qualification.

A total of 2 results (2.3% of total) were qualified as estimated (J) based on matrix spike recoveries which did not meet the laboratory control limits.

A total of 1 result (1.1% of total) was qualified as estimated (J) based on matrix spike/matrix spike RPDs which did not meet the laboratory control limits.

A total of 6 results (6.9% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 50% maximum criterion for solid samples.

No results were qualified based on holding time exceedances, sample preservation problems, calibration nonconformances, or laboratory control sample nonconformances.

Data Validation Summary and Quality Assurance
Phase II of Benning Road Facility RI/FS Project
3400 Benning Rd. NE, Washington DC 20019

Data validation was performed on all Phase II laboratory reports to assess data quality per Section 8.2.3 of the QAPP and Section 5 of the Work Plan Addendum #3. Each laboratory report was reviewed to determine compliance of the documentation and quality control results with criteria specified in the QAPP Table 1, the relevant EPA reference methods, and the current guidance provided in EPA's National Functional Guidelines for Inorganic and Organic Data Review (USEPA, 2017). Modifications were made to accommodate non-CLP methodologies. Reviewed data elements are defined in the individual sample delivery group specific data validation reports and may include:

- Data completeness (chain-of-custody (COC)/sample integrity
- Holding times and sample preservation
- Initial calibration/continuing calibration verification
- Laboratory blanks/equipment blanks
- Surrogate spike recoveries
- Matrix spike (MS) and/or matrix spike duplicate (MSD) results
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Field duplicates
- Sample results/reporting issues

Other method specific QC elements were also reviewed if needed. Data validation qualifiers were applied to results where a QC nonconformance required qualification per EPA guidance. Qualified results and the specific reasons for data qualification are listed in each individual Data Validation Report. All Data Validation Reports are provided in Appendix R. Summaries of the method conformance, QC sample frequency, and data qualifications for each major test group or analytical fraction are provided in text and tables below, per Section 8.3.2 of the QAPP.

Polychlorinated biphenyls (PCBs) by EPA Method 8082A

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 165 normal (N) sediment samples and 14 sediment field duplicate samples (FD=8.5% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 501 normal (N) soil samples and 28 soil field duplicate samples (FD=5.6% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for 57 of the sediment and soil samples combined (MS=8.6% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

A total of 17 normal groundwater samples and one groundwater field duplicate sample (FD=5.6% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for 1 of the 17 groundwater samples (MS=5.6% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 6820 results for Aroclor analytes were reviewed. Seven results were rejected (0.10%) and are not considered useable for decision making purposes. A total of 1081 results (16%) were qualified as estimated (J, J+, or J- flagged) based on data validation and all results are considered useable for decision making purposes.

A total of seven results (0.10% of total) were rejected (R) based on matrix spike recoveries which were less than 10% recovery.

A total of 103 results (1.5% of total) were qualified as estimated (J or UJ) based on minor calibration issues such as exceedance of the continuing calibration verification (CCV) percent difference (%D) criteria.

A total of 50 results (0.73% of total) were qualified as estimated (J or UJ) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or 50% maximum criterion for solid samples.

A total of 15 results (0.21% of total) were qualified as estimated (J, J-, J+, or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of six results (0.088% of total) were qualified as estimated (J or UJ) based on MS/MSD RPDs which exceeded laboratory control limits.

A total of 45 results (0.66% of total) were qualified as estimated (J, J+ or UJ) based on surrogate recovery results outside of laboratory control limits.

A total of 10 results (0.15% of total) were qualified as estimated (J) based on dual column RPDs exceeding 40% for detected Aroclors.

A total of 39 results (0.57% of total) were qualified as estimated (J-) based on exceeded internal standard criteria.

A total of 903 results (13% of total) were qualified as estimated (J+) based on quantitation issues such as the presence of multiple Aroclors with overlapping chromatographic patterns.

A total of 54 results (0.79% of total) were qualified as estimated (J or UJ) because of sample receipt temperatures which exceeded the criterion.

A total of nine results (0.13% of total) were qualified as estimated (J or UJ) because of low percent solids.

Semivolatile organic compounds (SVOCs) and Polycyclic aromatic compounds (PAHs) by EPA Method 8270D

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 150 normal (N) sediment samples and 14 sediment field duplicate samples (FD=9.3% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 499 normal (N) soil samples and 30 soil field duplicate samples (FD=6.0% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for 53 of the 649 sediment and soil samples combined (MS=8.2% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

A total of 21 normal groundwater samples and two groundwater field duplicate samples (FD=9.5% of N) were collected and analyzed. This meets and exceeds the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for two of the 21 groundwater samples (MS=9.5% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 17,105 results for the SVOC (including PAH) analytes were reviewed. A total of 144 results (0.84%) were rejected based on data validation and are not useable for decision making purposes. A total of 1339 results (7.8%) were qualified as negated (U flagged) or estimated (J, J-, or J+ flagged) based on data validation and all results are considered useable for decision making purposes. Table R-14 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of 118 results (0.69% of total) were rejected (R) based on exceedance of the extraction holding time criterion.

A total of 20 results (0.12% of total) were rejected (R) based on matrix spike recoveries which were less than 10% recovery.

A total of six results (0.035% of total) were rejected (R) based on laboratory control sample recoveries which were less than 10% recovery.

A total of 14 results (0.081% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 217 results (1.3%) were qualified as estimated (J- or UJ) based on exceedance of the extraction holding time criterion.

A total of 351 results (2.1% of total) were qualified as estimated (J or UJ) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or 50% maximum criterion for solid samples.

A total of 240 results (1.4% of total) were qualified as estimated (J, J-, J+, or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 88 results (0.51% of total) were qualified as estimated (J or UJ) based on MS/MSD RPDs which exceeded laboratory control limits.

A total of three results (0.017% of total) were qualified as estimated (J or UJ) based on laboratory control sample recoveries which did not meet laboratory recovery control limits.

A total of 61 results (0.36% of total) were qualified as estimated (J+ or UJ) based on surrogate recovery results outside of laboratory control limits.

A total of five results (0.029% of total) were qualified as estimated (J-) based on exceeded internal standard criteria.

A total of 402 results (2.4% of total) were qualified as estimated (J- or UJ) because of sample receipt temperatures which exceeded the criterion.

A total of 62 results (0.36% of total) were qualified as estimated (J or UJ) because of low percent solids.

Volatile organic compounds (VOCs) by EPA Method 8260C

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

<u>Field and QC Samples</u>

A total of 16 normal (N) sediment samples and five sediment field duplicate samples (FD=31% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 47 normal (N) soil samples and three soil field duplicate samples (FD=6.4% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for six of the 63 sediment and soil samples combined (MS=9.5% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

A total of 84 normal groundwater samples and six groundwater field duplicate samples (FD=7.1% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for seven of the 84 groundwater samples (MS=8.3% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 11,091 results for the VOC analytes were reviewed. A total of 280 results (2.5%) were rejected based on data validation and are not useable for decision making purposes. A total of 628 results (5.7%) were qualified as negated (U flagged) or estimated (UJ, J, J-, or J+ flagged) based on data validation and all results are considered useable for decision making purposes. Table R-15 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of 81 results (0.73% of total) were rejected (R) based on low relative response factors in the initial or continuing calibration standards.

A total of 199 results (1.8% of total) were rejected (R) based on holding time and sample preservation exceedances.

A total of 46 results (0.41% of total) were qualified as negated (U) based on the presence of laboratory method blank, trip blank or equipment blank contamination.

A total of 25 results (0.23% of total) were qualified as estimated (J or UJ) based on holding time and sample preservation exceedances.

A total of 112 results (1.0% of total) were qualified as estimated (UJ) based on sample integrity issues.

A total of two results (0.018% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or 50% maximum criterion for solid samples.

A total of 16 results (0.14% of total) were qualified as estimated (J, J- or J+) based on matrix spike recoveries which did not meet the laboratory recovery control limits. One of these results was also qualified for MS/MSD imprecision.

A total of two results (0.018% of total) were qualified as estimated (J-) based on laboratory control sample recoveries which did not meet laboratory recovery control limits.

A total of 162 results (1.5% of total) were qualified as estimated (J, J+, or UJ) based on minor calibration issues such as exceedance of the continuing calibration verification (CCV) percent difference (%D) criteria.

One result (0.009% of total) was qualified as estimated (J-) based on exceeded internal standard criteria.

A total of 276 results (2.5% of total) were qualified as estimated (J or UJ) because of sample receipt temperatures which exceeded the criterion.

Organochlorine pesticides (OCPs) by EPA Method 8081B

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 31 normal (N) sediment samples and five sediment field duplicate samples (FD=16% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 50 normal (N) soil samples and five soil field duplicate samples (FD=10% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for nine of the 81 sediment and soil samples combined (MS=11% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

A total of 25 normal groundwater samples and two groundwater field duplicate samples (FD=8.0% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for two of the 25 groundwater samples (MS=8.0% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 2604 results for the OCP analytes were reviewed. A total of 20 results (0.77%) were rejected based on data validation and are not useable for decision making purposes. A total of 386 results (14.8%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-16 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of 20 results (0.77%) were rejected (R) based on matrix spike recoveries which were less than 10% recovery.

One result (0.038% of total) was qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 14 results (0.54% of total) were qualified as estimated (J or UJ) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or 50% maximum criterion for solid samples.

A total of 42 results (1.6% of total) were qualified as estimated (J or UJ) based on holding time exceedances.

A total of 84 results (3.2% of total) were qualified as estimated (J, J-, or UJ) because of sample receipt temperatures which exceeded the criterion.

A total of nine results (0.34% of total) were qualified as estimated (J, J+ or J-) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of seven results (0.27% of total) were qualified as estimated (J) based on MS/MSD RPDs which exceeded laboratory control limits.

A total of 29 results (1.1% of total) were qualified as estimated (J) based on laboratory control sample/laboratory control sample duplicate RPDs which exceeded laboratory control limits.

A total of 245 results (9.4% of total) were qualified as estimated (J) based on dual column RPDs exceeding 40% for detected OCPs.

A total of 46 results (1.8% of total) were qualified as estimated (J or J+) based on surrogate recovery results outside of laboratory control limits.

A total of 20 results (0.77% of total) were qualified as estimated (J or UJ) because of low percent solids.

Total petroleum hydrocarbons (TPH) by EPA Methods 8015C/8015D

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh and TestAmerica North Canton laboratories per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 94 normal (N) sediment samples and nine sediment field duplicate samples (FD=9.6% of N) were collected and analyzed for DRO. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 97 normal (N) soil samples and seven soil field duplicate samples (FD=7.2% of N) were collected and analyzed for DRO. This meets meets the FD requirement of 5% per Section 4.3 of the QAPP. A subset 17 normal (N) and three field duplicate (FD) samples were also analyzed for GRO (FD=18% of N).

MS/MSD samples were collected and analyzed for DRO for 23 of the 191 sediment and soil samples combined (MS=12% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP. Two MS/MSD samples were collected and analyzed with the 17 samples collected for GRO (MS=12% of N).

A total of 17 normal groundwater samples and one groundwater field duplicate samples (FD=5.9% of N) were collected and analyzed for DRO. This meets the FD requirement of 5% per Section 4.3 of the QAPP. Three of the normal groundwater samples were also analyzed for GRO.

A MS/MSD sample was collected and analyzed for DRO for one of the 17 groundwater samples (MS=5.9% of N) which meets the requirement of 5% per Section 4.3 of the QAPP. No MS/MSDs were collected for GRO analysis in groundwater.

Data Qualifications

A total of 506 results for the TPH analytes were reviewed. No data were rejected. A total of 81 results (16%) were qualified as negated (U flagged) or estimated (J, J+, or J- flagged) based on data validation

and all results are considered useable for decision making purposes. Table R-17 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of 10 results (1.9% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 48 results (9.5% of total) were qualified as estimated (J- or UJ) because of sample receipt temperatures which exceeded the criterion.

A total of four results (0.79% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples.

A total of five results (0.99% of total) were qualified as estimated (J or J-) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of nine results (1.8% of total) were qualified as estimated (J or J+) based on surrogate recovery results outside of laboratory control limits.

A total of seven results (1.4% of total) were qualified as estimated (J or UJ) because of low percent solids.

Polychlorinated dibenzodioxins and Polychlorinated dibenzofurans (PCDDs/PCDFs) by EPA Method 8290A

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the SGS Environmental Services laboratory per SOPs listed in Table 5-6 Workplan Addendum #3.

Field and QC Samples

A total of 30 normal (N) sediment samples and five sediment field duplicate samples (FD=17% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 109 normal (N) soil samples and 10 soil field duplicate samples (FD=9.1% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for eight of the 139 sediment and soil samples combined (MS=5.8% of N). MS/MSDs are not required for this analysis per Section 4.3 of the QAPP.

A total of 27 normal groundwater samples and 2 groundwater field duplicate samples (FD=7.4% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were not collected with the 27 groundwater samples, and are not required for this analysis.

Data Qualifications

A total of 27360 results for the PCDD/PCDF analytes were reviewed. No data were rejected. A total of 1164 results (14%) were qualified as negated (U flagged) or estimated (UJ, J, J+, or -J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-18 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of four results (0.014% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 13 results (0.048% of total) were qualified as estimated (J+) based on the presence of laboratory method blank contamination.

A total of 170 results (0.62% of total) were qualified as estimated (J or UJ) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or the 50% maximum criterion for solid samples.

A total of seven results (0.026% of total) were qualified as estimated (J or J+) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of seven results (0.026% of total) were qualified as estimated (J) based on MS/MSD RPDs which exceeded laboratory control limits.

A total of 49 results (0.18% of total) were qualified as estimated (J) based on laboratory control sample/laboratory control sample duplicate RPDs which exceeded laboratory control limits.

A total of 331 results (1.2% of total) were qualified as estimated (J or UJ) based on labeled compound recoveries which did not meet the laboratory control limits.

A total of 468 results (1.7% of total) were qualified as estimated (J or UJ) based on laboratory control sample recoveries which did not meet laboratory recovery control limits.

A total of 544 results (2.0% of total) were qualified as estimated (J or UJ) based on clean up standard recoveries which did not meet laboratory recovery control limits.

A total of 2677 results (9.7% of total) were qualified as estimated with a tentative identification (JN). These results were reported by the laboratory to be estimated maximum potential concentrations [EMPCs] since all identification criteria were not met.

A total of 13 results (0.048% of total) were qualified as estimated (J) based on quantitation issues such as 1) exceeding the calibration range, 2) the presence of co-eluting compounds, or 3) as is the case of 2,3,7,8-TCDF, results were reported from a non-isomer specific column.

Polychlorinated biphenyl (PCB) congeners by EPA Method 1668C

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Knoxville laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 36 normal (N) sediment samples and four sediment field duplicate samples (FD=11% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 22 normal (N) soil samples and no soil field duplicate samples were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for three of the 58 sediment and soil samples combined (MS=5.2% of N). Note that MS/MSD analyses are not required for this analysis as discussed in Section 4.3 of the QAPP.

A total of 21 normal groundwater samples and one groundwater field duplicate sample (FD=4.8% of N) were collected and analyzed. This falls slightly below the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 20 normal porewater samples and one porewater field duplicate sample (FD=5.0% of N) were generated from sediment samples and analyzed. This falls slightly below the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were not collected in conjunction with groundwater and porewater samples, and are not required for this analysis.

Data Qualifications

A total of 23,794 results for the PCB congener analytes were reviewed. A total of two results (0.0084%) were rejected based on data validation and are not useable for decision making purposes. A total of 5604 results (24%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are considered useable for decision making purposes. Table R-19 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of two results (0.0.0084%) were rejected (R) based on labeled compound recoveries which were less than 10% recovery.

A total of 461 results (1.9% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 151 results (0.63% of total) were qualified as estimated (J+) based on the presence of laboratory method blank contamination.

A total of 1150 results (4.8% of total) were qualified as estimated (J or UJ) based on labeled compound recoveries which did not meet the laboratory control limits.

A total of 2597 results (11% of total) were qualified as estimated with a tentative identification (JN). These results were reported by the laboratory to be estimated maximum potential concentrations [EMPCs] since all identification criteria were not met.

One result (0.0042% of total) was qualified as estimated (J-) based on the presence of ion suppression.

A total of 602 results (2.5% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or the 50% maximum criterion for solid samples.

A total of five results (0.021% of total) were qualified as estimated (J-) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 1463 results (6.1% of total) were qualified as estimated (J or UJ) based on clean up standard recoveries which did not meet laboratory recovery control limits.

Alkylated polycyclic aromatic hydrocarbons (PAHs) by TestAmerica SOP ID-0016

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Knoxville laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 66 normal (N) sediment samples and five sediment field duplicate samples (FD=7.6% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 43 normal (N) soil samples and no soil field duplicate samples were collected and analyzed. This did not meet the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for three of the 109 sediment and soil samples combined (MS=2.8% of N) which does not meet the requirement of 5% per Section 4.3 of the QAPP.

A total of four normal groundwater samples were collected and analyzed. No field duplicate or MS/MSD samples were collected with the four groundwater samples.

Data Qualifications

A total of 5040 results for the alkylated PAH analytes were reviewed. No data were rejected. A total of 2393 results (44%) were qualified as negated (U flagged) or estimated (J or J- flagged) based on data validation and all results are considered useable for decision making purposes. Table R-20 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of two results (0.040% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 20 results (0.40% of total) were qualified as estimated (J+) based on the presence of laboratory method blank contamination.

A total of 84 results (1.7% of total) were qualified as estimated (J-) based on exceeded extraction holding time criterion.

A total of 78 results (1.5% of total) were qualified as estimated (J) based on labeled compound recoveries which did not meet the laboratory control limits.

A total of 2172 results (43% of total) were qualified as estimated with a tentative identification (JN). These results were reported by the laboratory to be estimated maximum potential concentrations [EMPCs] since all identification criteria were not met.

A total of three results (0.059% of total) were qualified as estimated (J) based on quantitation issues such as exceeding the calibration range.

A total of 100 results (2.0% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or the 50% maximum criterion for solid samples.

A total of six results (0.11% of total) were qualified as estimated (J) based on matrix spike recoveries which did not meet the laboratory recovery control limits. One of these results was also qualified form MS/MSD precision nonconformance.

A total of 42 results (0.83% of total) were qualified as estimated (J or UJ) because of low percent solids.

Alkylated polycyclic aromatic hydrocarbons (PAHs) by ASTM D7363

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the Energy and Environmental Research Center in Grand Forks, ND

Field and QC Samples

A total of 20 normal porewater samples and one porewater field duplicate sample (FD=5.0% of N) were generated from sediment samples and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were not collected in conjunction with porewater samples.

Data Qualifications

A total of 1428 results for the alkylated PAH analytes were reviewed. No data were rejected. A total of 97 results (6.8%) were qualified as estimated with a tentative identification (JN). These results were reported by the laboratory to be estimated maximum potential concentrations [EMPCs] since all identification criteria were not met. No other results were qualified for any reason. Table R-21 provides all qualified data points and the reasons for data qualification.

Metals by EPA Methods 6020A, 7470A and 7471B

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 96 normal (N) sediment samples and 10 sediment field duplicate samples (FD=10% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 137 normal (N) soil samples and 10 soil field duplicate samples (FD=7.3% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for 25 of the 233 sediment and soil samples combined (MS=11% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

A total of 17 normal groundwater samples and one groundwater field duplicate sample (FD=5.9% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 20 normal porewater samples and one porewater field duplicate sample (FD=5.0% of N) were generated from sediment samples and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for seven of the 37 groundwater and porewater samples combined (MS=19% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 7103 results for the metals were reviewed. No data were rejected. A total of 1166 results (16%) were qualified as negated (U flagged) or estimated (J, J+, or J- flagged) based on data validation and all results are considered useable for decision making purposes. Table R-22 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of 109 results (1.5% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 27 results (0.38% of total) were qualified as estimated (J-) based on holding time exceedances.

A total of 169 results (2.4% of total) were qualified as estimated (J or UJ) based on field duplicate RPDs which exceeded the 30% maximum criterion for aqueous samples or the 50% maximum criterion for solid samples.

A total of 825 results (12% of total) were qualified as estimated (J, J+ or J-) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 117 results (1.6% of total) were qualified as estimated (J) based on matrix spike/matrix spike RPDs which did not meet the laboratory control limits.

A total of 12 results (0.17% of total) were qualified as estimated (J) based on serial dilution results which did not meet the laboratory control limits.

A total of 5 results (0.07% of total) were qualified as estimated based on interference check standard results which did not meet the laboratory acceptance limits.

A total of 23 results (0.32% of total) were qualified as estimated (J) because of low percent solids.

Acid volatile sulfides/simultaneously extracted metals (AVS/SEM) by EPA Methods 9034/6010/7470A

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory per SOPs listed in Table 8 of the QAPP.

Field and QC Samples

A total of 20 normal (N) sediment samples and two sediment field duplicate samples (FD=10% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for two of the 20 sediment samples (MS=10% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 220 results for the AVS/SEM analytes were reviewed. A total of three results (1.4%) were rejected based on data validation and are not useable for decision making purposes. A total of 15 results (37.1%) were qualified as estimated (J, J- or J flagged) based on data validation and all results are usable for project objectives. Table R-23 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of three results (1.4% of total) were rejected (R) based on extremely low matrix spike recoveries.

A total of six results (2.7% of total) were qualified as estimated (J, J-, or J+) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of three results (1.4% of total) were qualified as estimated (J) based on matrix spike/matrix spike RPDs which did not meet the laboratory control limits.

A total of two results (0.9% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 50% maximum criterion for solid samples.

A total of nine results (4.1% of total) were qualified as estimated (J or UJ) because of low percent solids.

TOC, POC, and DOC by EPA Methods 440.0/SM5310C/Lloyd Kahn

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory

Field and QC Samples

A total of 31 normal (N) sediment samples and five sediment field duplicate samples (FD=16% of N) were collected and analyzed for TOC. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for four of the 31 sediment samples (MS=13% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

A total of 20 normal porewater samples and one porewater field duplicate sample (FD=5.0% of N) were generated from sediment samples and analyzed for POC and DOC. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for two of the 20 porewater samples analyzed for DOC (MS=10% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP. MS/MSD samples were not collected in conjunction with POC analysis.

Data Qualifications

A total of 80 results for the TOC, POC, and DOC were reviewed. No data were rejected. A total of 17 results (21% of total) were qualified as estimated (J flagged) based on data validation and all results are usable for project objectives. Table R-24 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of three results (3.8% of total) were qualified as estimated (J) based on matrix spike/matrix spike RPDs which did not meet the laboratory control limits.

A total of eight results (10% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 50% maximum criterion for solid samples.

A total of six results (3.8% of total) were qualified as estimated (J) based on laboratory duplicate RPDs which did not meet the laboratory control limits.

Cyanide by EPA Methods 9012B/9014

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Pittsburgh laboratory.

Field and QC Samples

A total of 16 normal (N) sediment samples and five sediment field duplicate samples (FD=31% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 42 normal (N) soil samples and two soil field duplicate samples (FD=4.8% of N) were collected and analyzed. This falls slightly below the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for nine of the 58 sediment and soil samples combined (MS=16% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

A total of 14 normal groundwater samples and one groundwater field duplicate sample (FD=7.1% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

One MS/MSD sample was collected and analyzed for the 14 groundwater samples (MS=7.1% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 85 results for cyanide were reviewed. One result (1.2% of total) was rejected based on data validation and are not useable for decision making purposes. A total of nine results (11%) were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are usable for project objectives. Table R-25 provides all qualified data points and the reasons for data qualification.

One result (1.2% of total) was rejected because of sample receipt temperatures which exceeded the criterion.

A total of three results (3.5% of total) were qualified as estimated (J) because of sample receipt temperatures which exceeded the criterion.

A total of five results (5.9% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

One result (4.1% of total) was qualified as estimated (J) because of low percent solids.

Hexavalent Chromium by EPA Method 7199

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the TestAmerica Irvine laboratory.

Field and QC Samples

A total of 17 normal (N) soil samples were collected and analyzed. No field duplicate samples were collected. Precision was evaluated on the basis of MS/MSD RPDs.

MS/MSD samples were collected and analyzed for two of the 17 soil samples (MS=12% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 18 results for the hexavalent chromium were reviewed. One result (5.6% of total) was rejected based on data validation and are not useable for decision making purposes. None of the remaining results were qualified as negated (U flagged) or estimated (J flagged) based on data validation and all results are usable for project objectives. Table R-26 provides all qualified data points and the reasons for data qualification.

One result (1.2% of total) was rejected because of a holding time exceedance.

Radionuclides by Alpha and Gamma Spectroscopy

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the General Engineering Laboratories in Charleston, SC per SOPs listed in Table 5-6 of Work Plan Addendum #3.

Field and QC Samples

A total of 65 normal (N) sediment samples and four sediment field duplicate samples (FD=6.2% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for four of the 65 sediment samples (MS=6.2% of N) which meets and exceeds the requirement of 5% per Section 4.3 of the QAPP.

Data Qualifications

A total of 211 results for the radionuclides were reviewed. No data were rejected. A total of 38 results (18%) were qualified as estimated (J flagged) based on data validation and all results are usable for project objectives. Table R-27 provides all qualified data points and the reasons for data qualification.

A total of 38 results (18% of total) were qualified as estimated (J) based on tracer recoveries which did not meet the laboratory control limits.

Geochemical Biomarkers by EPA 8270D SIM, modified

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the Alpha Analytical laboratory per SOPs listed in Table 5-6 of Work Plan Addendum #3.

Field and QC Samples

A total of 51 normal (N) sediment samples and five sediment field duplicate samples (FD=9.8% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 33 normal (N) soil samples were collected and analyzed. No soil field duplicate samples were collected.

A total of three normal (N) groundwater samples were collected and analyzed. No field duplicate samples were collected.

No MS/MSD samples were collected with the sediment, soil, or groundwater samples because biomarker analysis was a contingent Tier 2 test only.

Data Qualifications

A total of 519 results for the geochemical biomarker analytes were reviewed. No data were rejected. A total of 240 results (46%) were qualified as estimated (J or J+ flagged) based on data validation and all

results are usable for project objectives. Table R-28 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of 76 results (15% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 50% maximum criterion for solid samples.

A total of 114 results 22% of total) were qualified as estimated (J+) based on quantitation issues such as co-eluting matrix interference.

A total of 55 results (11% of total) were qualified as estimated (J) because of low percent solids.

Compound Specific Isotope Analysis of 13C by GC-IRMS and 37Cl by GC-qMS

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the Pace Analytical laboratory.

Field and QC Samples

A total of nine normal (N) groundwater samples were collected and analyzed. No field duplicate or MS/MSD samples were collected and are not required for this analysis.

Data Qualifications

A total of 54 results for the compound specific isotopes were reviewed. No data were rejected. A total of 42 results (78%) were qualified as estimated (J flagged) based on data validation and all results are usable for project objectives. Table R-29 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of 18 results (33% of total) were qualified as estimated (J or UJ) based on laboratory control sample recoveries which did not meet the laboratory recovery control limits.

A total of 32 results (59% of total) were qualified as estimated (J or UJ) based on surrogate recovery results outside of laboratory control limits.

Saturated Hydrocarbons by EPA Method 8015D, modified

All samples were collected by AECOM per field SOPs specified in Appendix A of the SAP and analyzed at the Alpha Analytical laboratory per SOPs listed in Table 5-6 of Work Plan Addendum #3.

Field and QC Samples

A total of 89 normal (N) sediment samples and seven sediment field duplicate samples (FD=7.9% of N) were collected and analyzed. This meets the FD requirement of 5% per Section 4.3 of the QAPP.

A total of 155 normal (N) soil samples and six soil field duplicate samples (FD=3.9% of N) were collected and analyzed. This falls slightly below the FD requirement of 5% per Section 4.3 of the QAPP.

MS/MSD samples were collected and analyzed for 11 of the 244 sediment and soil samples combined (MS=4.5% of N) which falls below the requirement of 5% per Section 4.3 of the QAPP.

A total of four normal (N) groundwater samples were collected and analyzed. No field duplicate or MS/MSD samples were collected with the groundwater samples.

Data Qualifications

A total of 10,478 results for the saturated hydrocarbon analytes were reviewed. A total of 14 results (0.13%) were rejected based on data validation and are not useable for decision making purposes. A total of 770 results (7.4%) were qualified as negated (U flagged) or estimated (J, J+, or J- flagged) based on data validation and all results are usable for project objectives. Table R-30 provides all qualified data points and the reasons for data qualification. Note that results may be qualified for multiple reasons.

A total of 14 results (0.13% of total) were rejected (R) based on exceedance of the extraction holding time criterion.

A total of 49 results (0.5% of total) were qualified as negated (U) based on the presence of laboratory method blank contamination.

A total of 376 results (3.6% of total) were qualified as estimated (J or UJ) based on holding time exceedances.

A total of six results (0.057% of total) were qualified as estimated (J, J+ or UJ) based on matrix spike recoveries which did not meet the laboratory recovery control limits.

A total of 19 results (0.18% of total) were qualified as estimated (J) based on field duplicate RPDs which exceeded the 50% maximum criterion for solid samples.

A total of 54 results (0.51% of total) were qualified as estimated (J+) based on surrogate recovery results outside of laboratory control limits.

A total of 237 results (2.3% of total) were qualified as estimated (J+) based on quantitation issues such as co-eluting matrix interference.

A total of 39 results (0.37% of total) were qualified as estimated (J or UJ) because of low percent solids.