ADDENDUM 1 (2011) TO

ONONDAGA LAKE BASELINE MONITORING BOOK 3 TRIBUTARY MONITORING WORK PLAN FOR 2009

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LIST OF ACRONYMS

DUSR	Data Usability and Assessment Report
IRM	interim remedial measure
NYSDEC	New York State Department of Environmental Conservation
QAPP	quality assurance project plan
SMU	sediment management unit
SOP	standard operating procedure
TSS	total suspended solids
UFI	Upstate Freshwater Institute
USGS	United States Geological Survey

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EXECUTIVE SUMMARY

This second addendum to the 2009 Book 3 Work Plan (Parsons and Exponent, 2011) presents the scope for the 2011 tributary monitoring that is part of Honeywell's baseline monitoring program for Onondaga Lake prior to the beginning of dredging and capping in the lake in 2012. The baseline monitoring program objectives and program elements presented previously (Parsons, Exponent, and Anchor QEA, 2010a) remain unchanged for 2011.

The 2011 Book 3 work scope focuses on collecting and analyzing baseflow and storm event water samples from Onondaga Creek and Ninemile Creek, which are the largest tributary sources of mercury loadings to Onondaga Lake. Analyses will include measurements of low-level total mercury, low-level methylmercury and total dissolved solids. Field and laboratory work presented in this addendum are based on the 2009 Book 3 Standard Operating Procedures (SOPs) and Quality Assurance Project Plan (QAPP) approved previously. No new SOPs will be implemented during 2011. The only worksheet revised from the QAPP for the 2009 Book 3 work is Worksheet 20 presented as Table 2.

SECTION 1

INTRODUCTION

This addendum to the *Onondaga Lake Baseline Monitoring Book 3 Tributary Monitoring Work Plan for 2009* (Parsons and Exponent, 2011) presents the work scope for Honeywell's 2011 tributary monitoring efforts. This work scope has been developed in part based on results from the 2009 Book 3 work efforts and is consistent with baseline monitoring program objectives, program elements, and data uses outlined in the *Baseline Monitoring Scoping Document* (Parsons, Exponent and Anchor QEA, 2010a). Sampling and analysis work presented in this Book 3 Work Plan Addendum for 2011 will employ relevant procedures from the 2009 Book 3 SOPs and QAPP contained in the work plan approved for the 2009 tributary monitoring work.

1.1 OBJECTIVES AND DATA USES

Program objectives, program elements, and data uses for the deep basin water and zooplankton monitoring are described in the draft Baseline Monitoring Scoping Document (Parsons, Exponent and Anchor QEA, 2010a).

Baseline monitoring for Onondaga Lake has three objectives that are listed below as discussed in the Baseline Monitoring Scoping Document (Parsons, Exponent and Anchor QEA, 2010). Tributary monitoring addresses the second objective.

- Establish a comprehensive description of baseline chemical conditions prior to remediation to assess remedy effectiveness and to facilitate remedy design
- Provide additional data for future understanding of remedy effectiveness in achieving remediation goals for Onondaga Lake
- Provide habitat-related information

The two data uses for the tributary baseline monitoring as presented in the draft Baseline Monitoring Scoping Document that are relevant for 2011 work are discussed below along with a brief description of how each will be addressed by the 2011 tributary monitoring work. The sampling design and rationale for each activity are described in Section 2 of this work plan.

- Quantify loading of mercury entering Onondaga Lake.
  - This work plan for 2011 includes sampling and analysis of total mercury, methylmercury, and total suspended solids (TSS) in the water of Ninemile Creek and Onondaga Creek biweekly and during two significant storm events.
- Verify effectiveness of upland Honeywell remedies for the chemical parameters of interest.
  - Results from 2009 analyses of baseflow samples for organic compounds show no significant input of monitored organics from tributaries to Onondaga Lake

(Tables 15 and 16 in Parsons, Exponent and Anchor QEA, 2010b). For example, PCBs were only detected at 0.11 and 0.21 part per billion in two of 48 samples collected and analyzed from 10 tributary locations during 2009. If needed in the future, additional water sampling in the West Flume, East Flume, Tributary 5A and Harbor Brook will be conducted as part of the baseline monitoring work associated with the upland remedial sites to provide baseline data on mercury loading to Onondaga Lake associated with remediation by Honeywell of various upland sites.

Tributary sampling for effectiveness verification will be conducted after the Geddes Brook Interim Remedial Measure (IRM), the Ninemile Creek remedial actions, the Harbor Brook/Wastebed B remedial action, and other Honeywell remedial actions in tributaries as appropriate such as Tributary 5A (Willis Avenue and Semet sites) are all complete. Surface water sampling may also be needed in the lake following remediation of Sediment Management Units 1, 2, 3, and 7 within the lake, the Willis/Semet and Wastebed B IRMs and Wastebeds 1 through 8 along the lakeshore.

1.2 RATIONALE FOR BOOK 3 2011 WORK SCOPE

Tributaries to Sample - Surface water sampling will focus on Onondaga Creek and Ninemile Creek. These two tributaries were identified in the Onondaga Lake Remedial Investigation Report (TAMS, 2002) as the tributaries providing significant contributions of mercury to the lake (i.e., 13.7 and 50.8 percent, respectively, of the combined load from tributaries and Metro). Baseline tributary monitoring completed on behalf of Honeywell during 2009 confirmed the significance of mercury loadings from both creeks. Loadings of mercury to the lake are based on flows and concentrations of mercury entering the lake. Flows within the Onondaga Lake watershed are heavily influenced by the size of a watershed's drainage area.

Sampling Locations - Surface water samples will be collected at three tributary locations: (1) Onondaga Creek 30 yards upstream of the Spencer Street bridge, (2) in Ninemile Creek at Amboy Dam just upstream of the Warners Road (State Route 173) bridge and upstream of upland sites being remediated on behalf of Honeywell, and (3) 30 yards downstream of the State Fair Boulevard (State Route 48) bridge and the United States Geological Survey (USGS) gauging station) near the outlet of the creek (see Figure 1 for tributary surface water sampling locations). These locations are consistent with historical sampling stations in the Onondaga Lake remedial investigation, the Onondaga County annual ambient monitoring program, and annual monitoring being conducted by the Upstate Freshwater Institute (UFI) as documented in Parsons and Exponent, 2010. For Onondaga Creek, the Spencer Street location provides estimates of mercury mass load entering Onondaga Lake from Onondaga Creek. For Ninemile Creek, data from Amboy Dam provide information on the mercury mass load from upper reaches, while data from State Fair Boulevard include the mercury mass load contributed by Geddes Brook and the lower reaches of Ninemile Creek and provide estimates of mercury mass load from Ninemile Creek entering Onondaga Lake.

Frequency - Sampling from the two Ninemile Creek locations and from the Onondaga Creek location will be conducted biweekly on approximately 12 different dates every other week from late June through mid-November 2011. Water samples will also be collected during two significant 2011 storm events (see Section 2.3). The number of samples to be collected during each storm event will be determined in the field. For planning purposes, six samples per event are assumed. The intent is to collect three of the six storm event samples prior to peak stream flow associated with a storm event. Numerous studies in other creeks and rivers indicate that high flow events can carry significant portions of the annual total mercury load due to resuspension of particles from the sediment bed and runoff of particles from the watershed.

Analytes - Given the primary objective is to quantify mercury loading to the lake, analytes for the baseflow and storm flow samples are unfiltered total mercury, unfiltered methylmercury, and TSS. TSS is often correlated with total mercury. A sonde to provide hourly measurement of turbidity will be deployed near the mouth of Ninemile Creek at State Fair Boulevard. Turbidity measurements will be compared to TSS measurements to identify the relationship between these two parameters, which are likely to be correlated with total mercury concentration. Strong empirical relationships among these analytes would support more accurate estimates of mercury loading. In addition, three base flow and three storm event water samples from both Ninemile Creek locations and from Onondaga Creek will also be analyzed for dissolved total mercury following filtration in the laboratory.

Results from Book 3 tributary sampling conducted during 2009 on behalf of Honeywell showed similar response of turbidity, suspended solids, total mercury and methylmercury concentrations to increases in creek flow during storm events. As tributary creek flow increased due to storm events, levels of turbidity, suspended solids, total mercury and methylmercury increased at each of the three tributary water sampling locations.

SECTION 2

2011 TRIBUTARY MONITORING WORK SCOPE

The components of the 2011 tributary monitoring program are described below.

2.1 CONTINUOUS MEASUREMENTS

A sonde to monitor turbidity hourly will be deployed in Ninemile Creek at State Fair Boulevard from late June through mid-November as it was during 2009 (see Appendix A of the Book 3 work plan for 2009 for sonde procedures). The sonde will be swapped every two weeks for data downloading and maintenance. Sonde measurements from Ninemile Creek will not be available in real time. Sonde measurements are also collected from Onondaga Creek near Spencer Street.

Flow rates are monitored in Ninemile Creek at State Fair Boulevard and in Onondaga Creek at Spencer Street by the USGS, and these data will be available on the USGS website in almost real-time.

2.2 BASEFLOW SAMPLING

Consistent with Book 3 efforts completed during 2009, surface water samples will be collected manually as grab samples on a biweekly basis late June through mid-November. These samples will be collected using ultraclean sample jars and clean hands/dirty hands sampling technique.

Also consistent with Book 3 efforts completed during 2009, surface water samples for base flow and for storm events will be collected from near the water surface to avoid disturbance and collection of sediments that are not naturally suspended in the stream. Samples will be collected from the main channel, avoiding areas of stagnant water. Whenever it is deemed appropriate by the field staff, samples will be collected by dipping the sample container directly into the stream. This method is preferred because it is simple and there are only minimal chances for contamination. When the field team determines that a representative sample cannot be collected safely by hand, a 6- to 12-ft. long polyethylene dipper will be used. The dipper will be rinsed with distilled water and rinsed in the stream prior to sample collection. The dipper will be double-bagged when stored and during transport from site-to-site. Grab surface water samples will be collected at each location. Samples will not be composited.

2.3 STORM EVENT SAMPLING

Storm events will be identified using a combination of real-time flow data available on the USGS website for Ninemile and Onondaga Creek, the weather forecast, and direct observations to identify significant runoff events. Samples will be collected manually as grab samples as flows are rising during a significant storm event and also as storm flows are falling. Surface water samples will be collected during two significant 2011 storm events. The intent is to collect three of the six storm event samples before the stream flows peak.

Consistent with the storm event sampling conducted on behalf of Honeywell during 2009, monitored storm events will have at least peak daily flows during a storm that are at least twice the seasonal median daily flow. The basis again for 2011 is to target storm events with peak daily flows of at least 200 cfs. Selecting storm events to monitor also depends on the frequency, intensity, and duration of storm events and flow conditions in the creeks prior to each storm. Weather forecasts, creek flow data available online and professional judgment gained from storm event monitoring conducted in Central New York during previous years will be used to help identify target storm events. If the spring, summer and/or fall of 2011 is significantly drier than normal, then storm events with lower peak flows will be targeted.

2.4 LABORATORY ANALYSES

Water samples will be submitted to the analytical laboratory primarily for total mercury (unfiltered), methylmercury (unfiltered), and total suspended solids analysis in accordance with the methodologies presented in the Book 3 QAPP (Appendix B of Parsons and Exponent, 2011). Total mercury and methylmercury analyses will be conducted using low-level sample handling and analytical techniques. Dissolved (filtered) total mercury (1630 series methods) will be measured for a subset of surface water samples as described in Section 1.2 (see Table 1 as well).

2.5 HEALTH AND SAFETY

Maintaining health and safety is the highest priority for the all of the baseline monitoring work efforts. The UFI Safety Plan prepared for previous Onondaga Lake field activities will be used as a starting point for this work effort. The UFI Safety Plan will be strictly followed by all personnel. Any task outside of the current scope defined in the Safety Plan including deployment and collection of sediment traps will have a new Job Safety Analysis completed before the task begins.

2.6 QUALITY ASSURANCE, DATA MANAGEMENT AND REPORTING

Various field and laboratory duplicate and blank samples will be collected and analyzed in accordance with the previously-approved quality assurance project plan for Book 3 work. The extent of field and matrix duplicate and blank sample collection and analysis is summarized in Table 2.

Preliminary, unvalidated data can be submitted to New York State Department of Environmental Conservation (NYSDEC) prior to data validation upon request by NYSDEC. Analytical data generated during this investigation will be reviewed and validated as described in 2008 Book 3 QAPP (Appendix B in Parsons and Exponent, 2011). All analytes will be subject to Level III validation as described in the QAPP for the Phase I Pre-Design Investigation (Parsons, 2005). In addition, 10 percent of the total mercury and methylmercury results will be validated based on Level IV protocols. Parsons will incorporate the validated results into the Locus Focus database.

Once the data validation has been completed, a data usability and summary report (DUSR) will be prepared and submitted to NYSDEC as an appendix to the baseline monitoring report for 2011. The DUSR will present the results of data validation and data usability assessment. In addition to the DUSR, tributary monitoring results for 2011 will be summarized in the 2011 baseline monitoring report. Data interpretation and trend analysis will be presented to NYSDEC separate from the DUSR and the baseline monitoring report.

2.7 REFERENCES

Parsons, 2005. *Onondaga Lake Pre-Design Investigation: Phase I Work Plan*. Prepared for Honeywell.

Appendix A *Phase I Sampling And Analysis Plan*

Appendix B *Quality Assurance Project Plan*

Appendix C *Project Safety Plan*

Parsons, Exponent and Anchor QEA, 2010a. *Baseline Monitoring Scoping Document for the Onondaga Lake Bottom Subsite*. Prepared for Honeywell. July 2010.

Parsons, Exponent and Anchor QEA, 2010b. *Onondaga Lake Baseline Monitoring Report for 2009*. Prepared for Honeywell. July 2010. Draft report.

Parsons and Exponent. 2011. *Onondaga Lake Baseline Monitoring Book 3 Tributary Monitoring Work Plan for 2009*. Prepared for Honeywell. February 2011.

TAMS Consultants, Inc.. 2002. *Onondaga Lake Remedial Investigation Report*. Prepared with YEC, Inc. for NYSDEC, Division of Environmental Remediation, Albany, New York.

FIGURE

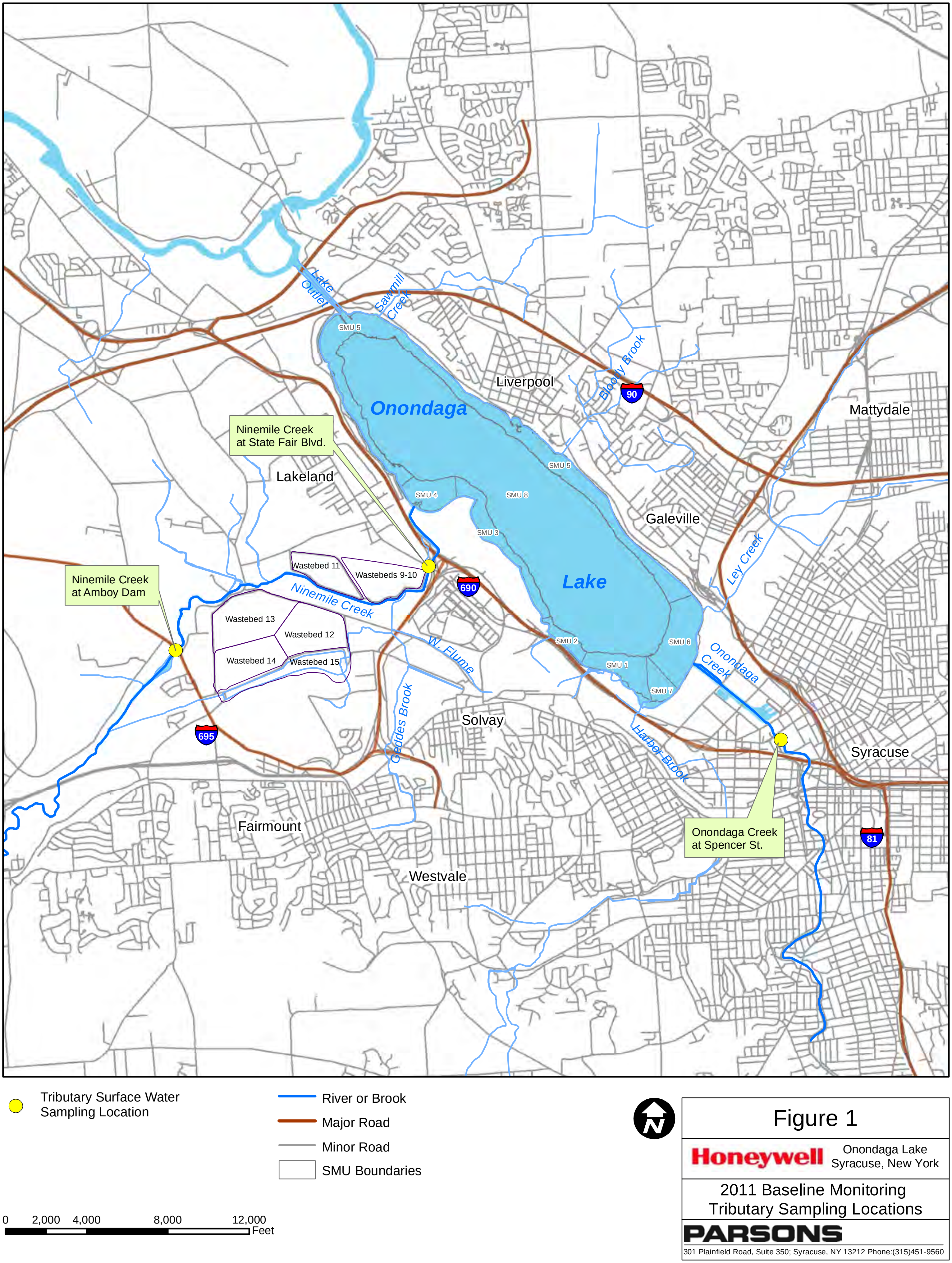

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Figure 1

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2011 Baseline Monitoring
Tributary Sampling Locations

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TABLES

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TABLE 1

SUMMARY OF BOOK 3 2011 SAMPLING SCOPE

Medium	Number of Locations	Number of Sampling Events	Total Number of Field Samples	Analytes
Ninemile Creek surface water	2	12 (biweekly[1]) plus ~2 (storm events[2])	24 (biweekly[1]) plus ~24 (storm events[2])	Total mercury and methylmercury (unfiltered), TSS, 12 water samples for dissolved total mercury, and *in situ* measurements of turbidity at the State Fair Boulevard location
Onondaga Creek surface water	1	12 (biweekly[1]) plus ~2 (storm events[2])	12 (biweekly[1]) plus ~12 (storm events[2])	Total mercury and methylmercury (unfiltered), TSS, and six water samples for dissolved total mercury.

Notes -

[1] Based on conducting baseflow sampling during one day every two weeks from late June through mid-November independent of creek flow conditions.

[2] Based on six samples per storm event per location.

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TABLE 2
QAPP WORKSHEET 20 – FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE FOR BOOK 3 FOR 2011

Matrix	Analytical Group	Concen-tration Level	Analytical and Preparation SOP Reference[1]	No. of Samples[2]	No. of Field Duplicate Pairs[3]	No. of Field Blanks[4]	No. of Equip. Blanks	No. of PT Samples	Total No. of Samples to Lab
Water	Total mercury	Low	L-11	3 locations and 24 samples per location = 72 samples	14	8			94
Water	Filtered (dissolved) total mercury	Low	L-11	3 locations and 6 samples per location = 18 samples	3	2			23
Water	Methyl mercury	Low	L-12	3 locations and 24 samples per location = 72 samples	14	8			94
Water	Total suspended solids	-	See Worksheet 23	3 locations and 24 samples per location = 72 samples					72

1 See Worksheet 23 in the Book 3 Work Plan for 2009 (Parsons and Exponent, 2011).
2 See Table 1.
3 Field duplicate samples will be collected and analyzed at a frequency of one pair per sampling effort.
4 A field blank for non-mercury analyses is termed a “field trip blank” by the laboratory and, as defined in the work plan, will consist of sample bottles that are filled in the laboratory, transported to the field, and then back to the laboratory for analyses. A field blank for total mercury and methylmercury will consist of mercury-free water (i.e., water containing mercury at concentrations below the minimum detection limit) placed in a clean sample bottle in the laboratory, transported to the field, and then poured into a second clean sample bottle for transport back to the laboratory.