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**MULTI-CITY STUDY**

**FIELD REPORT FOR MOBILE ALABAMA AND PENSACOLA  
FLORIDA – BATTELLE DUXBURY ACTIVITIES**

**for**

**Project Number  
N100672-01**

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## 1. INTRODUCTION

The objective of the sampling task in this study is to collect representative samples for trace-level analysis of FC residuals, to assess sources, dispersion in the environment, and human exposure via the food chain. The cities selected for sample collection will be considered 'study' or 'control' cities. 'Study' cities are considered those areas with FC production facilities or large FC-consumers. 'Control' cities do not contain FC production or consumption facilities and are matched to study cities based on general location, population size, and drinking water source.

During the initial phase of the study phone calls were made to municipal agencies requesting access to various matrices of interest. Based upon the level of cooperation received from the municipal agencies, appropriate sampling strategies were developed. The Quality Assurance Project Plan (QAPP) and the Survey Plan contain the appropriate information concerning the matrices for collection and methods to be utilized for this process.

The full project sampling scope is accomplished using two field teams: 1) Battelle's Duxbury Personnel collect drinking water, POTW, landfill and urban air samples, and 2) Battelle's Marine Sciences Laboratory (MSL) personnel collect surface water microlayer, bulk water and finfish samples. This report summarizes the Duxbury team effort. A separate report summarizes the MSL activities.

### 1.1 Survey Specific Approval

Organizations in Mobile Alabama responded favorably to sampling requests at the Publicly Owned Treatment Works (POTW), the municipal drinking water plant, and the Mobile Fire Department (for atmospheric sampling) and granted permission to sample at these sites. Permission was not granted for sampling at the municipal landfill. Responsible parties in Pensacola Florida also responded favorably and granted permission for sampling at the POTW, the municipal drinking water plant, and the Pensacola Fire Department (for atmospheric sampling). Permission to sample was denied at the Pensacola municipal landfill. Table 1 highlights the cities visited during this survey and the approvals granted by municipal departments.

**Table 1. Municipalities Sampled and Approvals Granted During Survey**

| City         | Study or Control | Fire Department (Air Sampling) | POTW | Drinking Water Plant | Municipal Landfill |
|--------------|------------------|--------------------------------|------|----------------------|--------------------|
| Pensacola FL | Study            | ✓                              | ✓    | ✓                    | NA                 |
| Mobile AL    | Study            | ✓                              | ✓    | ✓                    | NA                 |

NA = No Approval Received

## 2. METHODS

The collection of environmental samples was conducted according to Standard Operation Procedures (SOP's). The SOP's used in the Multi-City Study were written by Battelle and are used to train personnel prior to field activities and also serve as a reference documents while in the field. These documents, along with the QAPP, serve as the guidance documents for the collection of field samples. The methods used for collection are summarized below.

The collection of position data (latitude and longitude) was completed at each sampling location using a Garmin 12XL GPS unit according to Battelle SOP 3-164-01. Instrument accuracy was validated by comparing an acquired position versus a position of known location. The collection of air samples was completed using a General Metals Model PS-1 atmospheric sampler. The sampling was conducted according to Battelle SOP M3-MC-F-1.1. The use of this system allows the separate collection of particulate and vapor phase compounds using a glass fiber filter for particulate matter and a polyurethane foam PUF for the vapor phase. Water samples from drinking water supplies, POTW's, and landfills were collected according to SOP M3-F-2.0. Surface water samples were collected via direct submersion of the sample bottle. Tap water and drinking water, supplied by the municipal plant, were collected via a valve system. Effluent was collected using either a bucket or small sampling beaker. Sediment samples were collected using Battelle SOP M3-F-7.0. Sediment samples were collected using a stainless steel spoon in Mobile, see Section 6 for an explanation of the collection procedure in Pensacola. Sludge in Mobile was collected using a valve system, in Pensacola it was collected using a stainless steel spoon supplied by the POTW.

## 3. CHRONOLOGY

Tables 2-7 highlight the events that occurred each day of the survey. Sample matrix collection times have been transcribed from the sample log; all other times have been estimated based on the events that transpired during the survey. All times have been recorded in Eastern Standard Time.

**Table 2. Chronology of Events on June 23, 1999**

|           |                                                                                                                                                                                                                        |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0615      | Battelle Duxbury personnel depart Boston.                                                                                                                                                                              |
| 1130-1500 | Arrive in Mobile.                                                                                                                                                                                                      |
|           | Pick up rental van and proceed to Federal Express to retrieve sampling materials.                                                                                                                                      |
|           | All materials present and accounted for.                                                                                                                                                                               |
|           | Proceed to meet with Michael Byrd, Deputy Chief of Field Operations for the Mobile Fire Department. Discuss location of Atmospheric sampler, we agree on Station 11.                                                   |
|           | Arrive at Station 11 and place air sampling unit behind building for sample collection.                                                                                                                                |
| 1515      | Conduct calibration of air sampler and start sampling for 12hr period.                                                                                                                                                 |
| 1600-1830 | Conduct reconnaissance of Mobile River for surface water sampling area.                                                                                                                                                |
|           | Discover US Coast Guard Station Mobile located along river. Entered base and proceeded to secure bearings for aid to navigation positions on site. The forward of the two positions was used to verify the GPS system. |
|           | Return to hotel.                                                                                                                                                                                                       |

**Table 3. Chronology of Events on June 24, 1999**

|           |                                                                                                                                                                                                          |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0830-1000 | Arrive at the Station 11, Mobile Fire Department. Collect air sample filter and PUF sample. Cleaned sampler and collected quality control samples.                                                       |
| 1000      | Site 2 tap water samples collected at Station 11 following the completion of air sampling.                                                                                                               |
| 1030      | Arrive at USCG station and verify GPS.                                                                                                                                                                   |
| 1100      | Arrive at C.C. Williams Wastewater Treatment Plant (WWTP). Met with Mr. Chris Freeman who assisted us in the collection of sludge and effluent.                                                          |
| 1115      | Mr. Freeman collected sludge using a valve system from the onsite truck-loading depot.                                                                                                                   |
| 1125      | Collected effluent samples via a one-gallon plastic jug with the assistance of Mr. Freeman. Samples collected from the spillway leading to the discharge.                                                |
| 1200-1220 | Arrive at 1 <sup>st</sup> surface water collection site, located on the east side of the Mobile River under the Cochrane – Africatown USA Bridge. Collect surface water and sediment samples.            |
| 1230-1240 | Collect surface water and sediment sample at Site 2.                                                                                                                                                     |
| 1240-1250 | Collect surface water and sediment sample at Site 3.                                                                                                                                                     |
| 1300      | Collect Quiet Surface water sample at intersection of Telegraph Rd and 3 Mile Creek.                                                                                                                     |
| 1430      | Collect Site 3 tap water samples.                                                                                                                                                                        |
| 1600-1615 | Arrive at the H.E. Myers Water Filtration Facility. Meet with Mr. Joe Pitts, the plant supervisor. Following a brief conversation we are allowed to initiate sampling.                                   |
| 1620      | Collect finished water from H.E. Myers Water Filtration Facility.                                                                                                                                        |
| 1715      | Upon completing the finished water sampling we are escorted to the Palmer Guillard Pumping Station located on the J.B. Converse/ Big Creek Reservoir. Collected raw intake water at the pumping station. |
| 1745-1815 | Determine location of landfill. The Schillengers Road Landfill was located within a complex that also contained Gulf Hauling and Construction Dirt Inc. Pit #1.                                          |
| 1830      | Collect alternative leachate sample from Halls Mill Creek.                                                                                                                                               |
| 1915      | Return to hotel and collect Site 1 tap water samples.                                                                                                                                                    |

**Table 4. Chronology of Events on June 25, 1999**

|           |                                                                                                           |
|-----------|-----------------------------------------------------------------------------------------------------------|
| 0800-0900 | Commence spiking of field spike samples. Repack samples for shipping including the addition of fresh ice. |
| 1045-1115 | Arrive at Federal Express office, ship samples and equipment.                                             |
| 1230      | Depart Mobile for Boston.                                                                                 |
| 1800      | Arrive in Boston.                                                                                         |

**Table 5. Chronology of Events on June 28, 1999**

|           |                                                                                                                                                             |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0715      | Depart Boston for Pensacola FL.                                                                                                                             |
| 1630      | Arrive in Pensacola, secure a rental vehicle and proceed to Federal Express to pick up sampling supplies.                                                   |
| 1645-1715 | At the Federal Express station it was discovered that the cooler containing our sampling supplies was lost during shipment from Mobile.                     |
| 1820      | Arrive at Pensacola Fire Department Station 2. Describe sampling scheme to Captain Russell Bobe, following the conversation the air sampler was calibrated. |
|           | The instrument was cleaned and sampling was initiated. The sampler was not placed on a timer because it was lost during shipment.                           |
|           | Arrive at hotel to conclude the day.                                                                                                                        |

**Table 6. Chronology of Events on June 29, 1999**

|           |                                                                                                                                                                                                                                                                                                                                |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0730-0800 | Arrive at PFD Station 2 to collect air sampler. Upon arrival at the station the sampler was not running. After a discussion with one of the men on duty it was discovered that the sampler stopped at approximately 0700 following a nearby lightning strike that caused the electrical circuit to trip.                       |
|           | Complete air sample collection, clean the unit and collect the Blank and Blank Spike samples.                                                                                                                                                                                                                                  |
| 0830      | Collect Site 2 tap water sample from PFD Station 2.                                                                                                                                                                                                                                                                            |
| 0915-0950 | Conduct reconnaissance of the proposed quiet water site, no access was found to Crescent Lake. Private citizens owned all property surrounding the water body.                                                                                                                                                                 |
|           | After consulting the map a body of water was chosen for the quiet water sample. It was located at the corner of Michigan Avenue and Mobile Highway.                                                                                                                                                                            |
|           | A call was placed to Bernard Dahl of the Escambia County Utilities Authority (ECUA) to coordinate the collection of drinking water, waste water, and treated effluent.                                                                                                                                                         |
|           | Receive call from Tom Porter of ECUA, proceed to meet with him at ECUA offices located at 401 W. Government St.                                                                                                                                                                                                                |
| 1100-1130 | Following a discussion with Mr. Porter we were brought to the W St. / Avery St. pumping station. Following a brief tour and explanation of the station's operation, the drinking water intake and treated water samples were collected.                                                                                        |
| 1130      | Arrive at ECUA headquarters for the collection of POTW effluent and sludge.                                                                                                                                                                                                                                                    |
| 1130-1200 | We met with the shift supervisor who provided an employee to assist us in our sampling efforts. The effluent samples were collected by submerging the bottles into the effluent stream. The sludge samples were collected using a spoon from the conveyer belt that transports the post centrifuged sludge to the incinerator. |
| 1300      | Collect Site 3 tap water.                                                                                                                                                                                                                                                                                                      |
| 1330      | Collect Site 1 surface water and sediments at a boat ramp on southern end of Texar Bayou                                                                                                                                                                                                                                       |
| 1400      | Collect Site 2 surface water and sediments from a right of way on the east side of Texar Bayou.                                                                                                                                                                                                                                |
| 1410      | Collect Site 3 surface water and sediments at the end of Hyde Park Road.                                                                                                                                                                                                                                                       |
| 1530-1630 | Discover Peridido Landfill (County Landfill) located at 13009 Buelah Rd. Buelah is a town located north/northwest of Pensacola. Follow Buelah Rd. past landfill and found small creek intersecting the road. Collect alternative leachate samples from this creek. The site was off the map.                                   |
| 1700      | Arrive at hotel. Collect Site 1 tap water. Commence spiking of field spike samples. Ice samples for the evening.                                                                                                                                                                                                               |

**Table 7. Chronology of Events on June 30, 1999**

|           |                                                                                                                                             |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 0800-1100 | Repack samples for shipping including the addition of fresh ice.                                                                            |
|           | Arrive at Federal Express and ship samples to there respective destinations. All sampling equipment shipped to Battelle Duxbury Operations. |
|           | Arrive at airport and depart for Boston.                                                                                                    |

## 4. RESULTS

This survey, as part of the Multi-City Study, resulted in the collection of the majority of the samples described in Tables 3-5 of the QAPP. Tables 8 and 9 contain a description of all the samples collected during the survey. As a result of the quality assurance audit conducted during the initial survey several minor changes were required to the QAPP. These amendments to the document are located in Amendment 1 to Revision 1. The following sections describe the results of the sample collection effort that occurred during this survey.

Table 8. Collected Samples from Mobile AL

| Matrix                                 | Sample ID | Volume Collected (L)<br>*Sediment Mass (g) | Location Collected              |
|----------------------------------------|-----------|--------------------------------------------|---------------------------------|
| Drinking Water Unprocessed             | MC-415B   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-416B   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-417B   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-418B   | 1 (spike 100 ng)                           | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-419B   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed Field Blank | MC-420B   | Blank                                      | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-415K   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-416K   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-417K   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-418K   | 1 (spike 100 ng)                           | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-419K   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed Field Blank | MC-420K   | Blank                                      | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-415H   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-417H   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-418H   | 1 (spike 100 ng)                           | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed             | MC-419H   | 1                                          | Palmer Guillard Pumping Station |
| Drinking Water Unprocessed Field Blank | MC-420H   | Blank                                      | Palmer Guillard Pumping Station |
| Drinking Water Processed               | MC-421B   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-422B   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-423B   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-424B   | 1 (spike 100 ng)                           | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-425B   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-421K   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-422K   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-423K   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-424K   | 1 (spike 100 ng)                           | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-425K   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-421H   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-423H   | 1                                          | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-424H   | 1 (spike 100 ng)                           | H.E. Meyers Filtration Facility |
| Drinking Water Processed               | MC-425H   | 1                                          | H.E. Meyers Filtration Facility |
| Tap Water Site #1                      | MC-426B   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-427B   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-428B   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-429B   | 1 (spike 100 ng)                           | Hampton Inn                     |
| Tap Water Site #1                      | MC-430B   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-426K   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-427K   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-428K   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-429K   | 1 (spike 100 ng)                           | Hampton Inn                     |
| Tap Water Site #1                      | MC-430K   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-426H   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-428H   | 1                                          | Hampton Inn                     |
| Tap Water Site #1                      | MC-429H   | 1 (spike 100 ng)                           | Hampton Inn                     |
| Tap Water Site #1                      | MC-430H   | 1                                          | Hampton Inn                     |
| Tap Water Site #2                      | MC-431B   | 1                                          | MFD Station #11                 |
| Tap Water Site #2                      | MC-431K   | 1                                          | MFD Station #11                 |
| Tap Water Site #2                      | MC-431H   | 1                                          | MFD Station #11                 |
| Tap Water Site #3                      | MC-432B   | 1                                          | Hooters Restaurant              |
| Tap Water Site #3                      | MC-432K   | 1                                          | Hooters Restaurant              |
| Tap Water Site #3                      | MC-432H   | 1                                          | Hooters Restaurant              |
| Tap Water Field Blank                  | MC-433B   | Blank                                      | Hampton Inn                     |
| Tap Water Field Blank                  | MC-433K   | Blank                                      | Hampton Inn                     |
| Tap Water Field Blank                  | MC-433H   | Blank                                      | Hampton Inn                     |

| Matrix                    | Sample ID | Volume Collected (L)<br>*Sediment Mass (g) | Location Collected |
|---------------------------|-----------|--------------------------------------------|--------------------|
| Tap Water Field Blank     | MC-434B   | Blank                                      | Hampton Inn        |
| Tap Water Field Blank     | MC-434K   | Blank                                      | Hampton Inn        |
| Surface Water Site #1     | MC-401B   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-402B   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-403B   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-404B   | 1 (spike 100 ng)                           | Mobile River       |
| Surface Water Site #1     | MC-405B   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-401K   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-402K   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-403K   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-404K   | 1 (spike 100 ng)                           | Mobile River       |
| Surface Water Site #1     | MC-405K   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-401H   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-403H   | 1                                          | Mobile River       |
| Surface Water Site #1     | MC-404H   | 1 (spike 100 ng)                           | Mobile River       |
| Surface Water Site #1     | MC-405H   | 1                                          | Mobile River       |
| Surface Water Site #2     | MC-406B   | 1                                          | Mobile River       |
| Surface Water Site #2     | MC-406K   | 1                                          | Mobile River       |
| Surface Water Site #2     | MC-406H   | 1                                          | Mobile River       |
| Surface Water Site #3     | MC-407B   | 1                                          | Mobile River       |
| Surface Water Site #3     | MC-407K   | 1                                          | Mobile River       |
| Surface Water Site #3     | MC-407H   | 1                                          | Mobile River       |
| Surface Water Field Blank | MC-408B   | Blank                                      | Mobile River       |
| Surface Water Field Blank | MC-408K   | Blank                                      | Mobile River       |
| Surface Water Field Blank | MC-408H   | Blank                                      | Mobile River       |
| Surface Water Field Blank | MC-409B   | Blank                                      | Mobile River       |
| Surface Water Field Blank | MC-409K   | Blank                                      | Mobile River       |
| Sediment Site #1          | MC-410B   | 200*                                       | Mobile River       |
| Sediment Site #1          | MC-410K   | 200*                                       | Mobile River       |
| Sediment Site #2          | MC-411B   | 200*                                       | Mobile River       |
| Sediment Site #2          | MC-411K   | 200*                                       | Mobile River       |
| Sediment Site #3          | MC-412B   | 200*                                       | Mobile River       |
| Sediment Site #3          | MC-412K   | 200*                                       | Mobile River       |
| Sediment Field Blank      | MC-413B   | Blank                                      | Mobile River       |
| Sediment Field Blank      | MC-413K   | Blank                                      | Mobile River       |
| Sediment Field Blank      | MC-414B   | Blank                                      | Mobile River       |
| Sediment Field Blank      | MC-414K   | Blank                                      | Mobile River       |
| POTW Effluent             | MC-439B   | 1                                          | C.C. Williams WWTP |
| POTW Effluent             | MC-440B   | 1                                          | C.C. Williams WWTP |
| POTW Effluent             | MC-441B   | 1 (spike 1000 ng)                          | C.C. Williams WWTP |
| POTW Effluent             | MC-442B   | 1                                          | C.C. Williams WWTP |
| POTW Effluent             | MC-439K   | 1                                          | C.C. Williams WWTP |
| POTW Effluent             | MC-440K   | 1                                          | C.C. Williams WWTP |
| POTW Effluent             | MC-441K   | 1 (spike 1000 ng)                          | C.C. Williams WWTP |
| POTW Effluent             | MC-442K   | 1                                          | C.C. Williams WWTP |
| POTW Effluent             | MC-439H   | 1                                          | C.C. Williams WWTP |
| POTW Effluent             | MC-441H   | 1 (spike 1000 ng)                          | C.C. Williams WWTP |
| POTW Effluent             | MC-442H   | 1                                          | C.C. Williams WWTP |
| POTW Effluent Field Blank | MC-443B   | Blank                                      | C.C. Williams WWTP |
| POTW Effluent Field Blank | MC-443K   | Blank                                      | C.C. Williams WWTP |
| POTW Effluent Field Blank | MC-443H   | Blank                                      | C.C. Williams WWTP |
| POTW Sludge               | MC-444B   | 200*                                       | C.C. Williams WWTP |
| POTW Sludge               | MC-444K   | 200*                                       | C.C. Williams WWTP |
| POTW Sludge Field Blank   | MC-445B   | Blank                                      | C.C. Williams WWTP |
| POTW Sludge Field Blank   | MC-445K   | Blank                                      | C.C. Williams WWTP |
| Urban Air (Vapor)         | MC-446B   | 1 PUF                                      | MFD Station 11     |

| Matrix                                  | Sample ID | Volume Collected (L)<br>*Sediment Mass (g) | Location Collected |
|-----------------------------------------|-----------|--------------------------------------------|--------------------|
| Urban Air (Particulate)                 | MC-447B   | 1 Filter                                   | MFD Station 11     |
| Urban Air (Vapor) Field Spike           | MC-448B   | 1 PUF (spike 100 ng)                       | MFD Station 11     |
| Urban Air (Particulate) Field Spike     | MC-449B   | 1 Filter (spike 100 ng)                    | MFD Station 11     |
| Urban Air (Vapor) Field Blank           | MC-450B   | 1 PUF                                      | MFD Station 11     |
| Urban Air (Particulate) Field Blank     | MC-451B   | 1 Filter                                   | MFD Station 11     |
| Alternate Landfill Leachate             | MC-435B   | 1                                          | Halls Mill Creek   |
| Alternate Landfill Leachate             | MC-435K   | 1                                          | Halls Mill Creek   |
| Alternate Landfill Leachate             | MC-435H   | 1                                          | Halls Mill Creek   |
| Alternate Landfill Leachate Field Blank | MC-436B   | Blank                                      | Halls Mill Creek   |
| Alternate Landfill Leachate Field Blank | MC-436K   | Blank                                      | Halls Mill Creek   |
| Alternate Landfill Leachate Field Blank | MC-436H   | Blank                                      | Halls Mill Creek   |
| Quiet Surface Water                     | MC-484B   | 1                                          | 3 Mile Creek       |
| Quiet Surface Water                     | MC-484K   | 1                                          | 3 Mile Creek       |
| Quiet Surface Water                     | MC-484H   | 1                                          | 3 Mile Creek       |
| Mobile Trip Blank                       | MC-485B   | 1                                          | Battelle, Duxbury  |
| Mobile Trip Blank                       | MC-486B   | 1                                          | Battelle, Duxbury  |

Table 9. Collected Samples from Pensacola FL

| Matrix                                 | Sample ID | Volume Collected (L)<br>*Sediment Mass (g) | Location Collected           |
|----------------------------------------|-----------|--------------------------------------------|------------------------------|
| Drinking Water Unprocessed             | MC-315B   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-316B   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-317B   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-318B   | 1 (spike 100 ng)                           | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-319B   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed Field Blank | MC-320B   | Blank                                      | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-315K   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-316K   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-317K   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-318K   | 1 (spike 100 ng)                           | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-319K   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed Field Blank | MC-320K   | Blank                                      | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-315H   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-317H   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-318H   | 1 (spike 100 ng)                           | W and Avery St. Pump Station |
| Drinking Water Unprocessed             | MC-319H   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Unprocessed Field Blank | MC-320H   | Blank                                      | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-321B   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-322B   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-323B   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-324B   | 1 (spike 100 ng)                           | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-325B   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-321K   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-322K   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-323K   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-324K   | 1 (spike 100 ng)                           | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-325K   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-321H   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-323H   | 1                                          | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-324H   | 1 (spike 100 ng)                           | W and Avery St. Pump Station |
| Drinking Water Processed               | MC-325H   | 1                                          | W and Avery St. Pump Station |
| Tap Water Site #1                      | MC-326B   | 1                                          | Ramada Inn                   |
| Tap Water Site #1                      | MC-327B   | 1                                          | Ramada Inn                   |
| Tap Water Site #1                      | MC-328B   | 1                                          | Ramada Inn                   |
| Tap Water Site #1                      | MC-329B   | 1 (spike 100 ng)                           | Ramada Inn                   |

| Matrix                    | Sample ID | Volume Collected (L)<br>*Sediment Mass (g) | Location Collected |
|---------------------------|-----------|--------------------------------------------|--------------------|
| Tap Water Site #1         | MC-330B   | 1                                          | Ramada Inn         |
| Tap Water Site #1         | MC-326K   | 1                                          | Ramada Inn         |
| Tap Water Site #1         | MC-327K   | 1                                          | Ramada Inn         |
| Tap Water Site #1         | MC-328K   | 1                                          | Ramada Inn         |
| Tap Water Site #1         | MC-329K   | 1 (spike 100 ng)                           | Ramada Inn         |
| Tap Water Site #1         | MC-330K   | 1                                          | Ramada Inn         |
| Tap Water Site #1         | MC-326H   | 1                                          | Ramada Inn         |
| Tap Water Site #1         | MC-328H   | 1                                          | Ramada Inn         |
| Tap Water Site #1         | MC-329H   | 1 (spike 100 ng)                           | Ramada Inn         |
| Tap Water Site #1         | MC-330H   | 1                                          | Ramada Inn         |
| Tap Water Site #2         | MC-331B   | 1                                          | PFD Station #2     |
| Tap Water Site #2         | MC-331K   | 1                                          | PFD Station #2     |
| Tap Water Site #2         | MC-331H   | 1                                          | PFD Station #2     |
| Tap Water Site #3         | MC-332B   | 1                                          | Hooters Restaurant |
| Tap Water Site #3         | MC-332K   | 1                                          | Hooters Restaurant |
| Tap Water Site #3         | MC-332H   | 1                                          | Hooters Restaurant |
| Tap Water Field Blank     | MC-333B   | Blank                                      | Ramada Inn         |
| Tap Water Field Blank     | MC-333K   | Blank                                      | Ramada Inn         |
| Tap Water Field Blank     | MC-333H   | Blank                                      | Ramada Inn         |
| Tap Water Field Blank     | MC-334B   | Blank                                      | Ramada Inn         |
| Tap Water Field Blank     | MC-334K   | Blank                                      | Ramada Inn         |
| Surface Water Site #1     | MC-301B   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-302B   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-303B   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-304B   | 1 (spike 100 ng)                           | Texar Bayou        |
| Surface Water Site #1     | MC-305B   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-301K   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-302K   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-303K   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-304K   | 1 (spike 100 ng)                           | Texar Bayou        |
| Surface Water Site #1     | MC-305K   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-301H   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-303H   | 1                                          | Texar Bayou        |
| Surface Water Site #1     | MC-304H   | 1 (spike 100 ng)                           | Texar Bayou        |
| Surface Water Site #1     | MC-305H   | 1                                          | Texar Bayou        |
| Surface Water Site #2     | MC-306B   | 1                                          | Texar Bayou        |
| Surface Water Site #2     | MC-306K   | 1                                          | Texar Bayou        |
| Surface Water Site #2     | MC-306H   | 1                                          | Texar Bayou        |
| Surface Water Site #3     | MC-307B   | 1                                          | Texar Bayou        |
| Surface Water Site #3     | MC-307K   | 1                                          | Texar Bayou        |
| Surface Water Site #3     | MC-307H   | 1                                          | Texar Bayou        |
| Surface Water Field Blank | MC-308B   | Blank                                      | Texar Bayou        |
| Surface Water Field Blank | MC-308K   | Blank                                      | Texar Bayou        |
| Surface Water Field Blank | MC-308H   | Blank                                      | Texar Bayou        |
| Surface Water Field Blank | MC-309B   | Blank                                      | Texar Bayou        |
| Surface Water Field Blank | MC-309K   | Blank                                      | Texar Bayou        |
| Sediment Site #1          | MC-310B   | 200*                                       | Texar Bayou        |
| Sediment Site #1          | MC-310K   | 200*                                       | Texar Bayou        |
| Sediment Site #2          | MC-311B   | 200*                                       | Texar Bayou        |
| Sediment Site #2          | MC-311K   | 200*                                       | Texar Bayou        |
| Sediment Site #3          | MC-312B   | 200*                                       | Texar Bayou        |
| Sediment Site #3          | MC-312K   | 200*                                       | Texar Bayou        |
| Sediment Field Blank      | MC-313B   | Blank                                      | Texar Bayou        |
| Sediment Field Blank      | MC-313K   | Blank                                      | Texar Bayou        |
| Sediment Field Blank      | MC-314B   | Blank                                      | Texar Bayou        |
| Sediment Field Blank      | MC-314K   | Blank                                      | Texar Bayou        |

| Matrix                                  | Sample ID | Volume Collected (L)<br>*Sediment Mass (g) | Location Collected            |
|-----------------------------------------|-----------|--------------------------------------------|-------------------------------|
| POTW Effluent                           | MC-339B   | 1                                          | ECUA Main Plant               |
| POTW Effluent                           | MC-340B   | 1                                          | ECUA Main Plant               |
| POTW Effluent                           | MC-341B   | 1 (spike 1000 ng)                          | ECUA Main Plant               |
| POTW Effluent                           | MC-342B   | 1                                          | ECUA Main Plant               |
| POTW Effluent Field Blank               | MC-343B   | Blank                                      | ECUA Main Plant               |
| POTW Effluent                           | MC-339K   | 1                                          | ECUA Main Plant               |
| POTW Effluent                           | MC-340K   | 1                                          | ECUA Main Plant               |
| POTW Effluent                           | MC-341K   | 1 (spike 1000 ng)                          | ECUA Main Plant               |
| POTW Effluent                           | MC-342K   | 1                                          | ECUA Main Plant               |
| POTW Effluent Field Blank               | MC-343K   | Blank                                      | ECUA Main Plant               |
| POTW Effluent                           | MC-339H   | 1                                          | ECUA Main Plant               |
| POTW Effluent                           | MC-340H   | 1                                          | ECUA Main Plant               |
| POTW Effluent                           | MC-341H   | 1 (spike 1000 ng)                          | ECUA Main Plant               |
| POTW Effluent                           | MC-342H   | 1                                          | ECUA Main Plant               |
| POTW Effluent Field Blank               | MC-343H   | Blank                                      | ECUA Main Plant               |
| POTW Sludge                             | MC-344B   | 200*                                       | ECUA Main Plant               |
| POTW Sludge                             | MC-344K   | 200*                                       | ECUA Main Plant               |
| POTW Sludge Field Blank                 | MC-345B   | Blank                                      | ECUA Main Plant               |
| POTW Sludge Field Blank                 | MC-345K   | Blank                                      | ECUA Main Plant               |
| Urban Air (Vapor)                       | MC-346B   | 1 PUF                                      | PFD Station #2                |
| Urban Air (Particulate)                 | MC-347B   | 1 Filter                                   | PFD Station #2                |
| Urban Air (Vapor) Field Spike           | MC-348B   | 1 PUF (spike 100 ng)                       | PFD Station #2                |
| Urban Air (Particulate) Field Spike     | MC-349B   | 1 Filter (spike 100 ng)                    | PFD Station #2                |
| Urban Air (Vapor) Field Blank           | MC-350B   | 1 PUF                                      | PFD Station #2                |
| Urban Air (Particulate) Field Sblank    | MC-351B   | 1 Filter                                   | PFD Station #2                |
| Alternate Landfill Leachate             | MC-335B   | 1                                          | North of Perdido Landfill     |
| Alternate Landfill Leachate             | MC-335K   | 1                                          | North of Perdido Landfill     |
| Alternate Landfill Leachate             | MC-335H   | 1                                          | North of Perdido Landfill     |
| Alternate Landfill Leachate Field Blank | MC-336B   | Blank                                      | North of Perdido Landfill     |
| Alternate Landfill Leachate Field Blank | MC-336K   | Blank                                      | North of Perdido Landfill     |
| Alternate Landfill Leachate Field Blank | MC-336H   | Blank                                      | North of Perdido Landfill     |
| Quiet Surface Water                     | MC-384B   | 1                                          | Michigan Ave / Mobile Highway |
| Quiet Surface Water                     | MC-384K   | 1                                          | Michigan Ave / Mobile Highway |
| Quiet Surface Water                     | MC-384H   | 1                                          | Michigan Ave / Mobile Highway |
| Pensacola Trip Blank                    | MC-385B   | 1                                          | Battelle, Duxbury             |
| Pensacola Trip Blank                    | MC-386B   | 1                                          | Battelle, Duxbury             |

#### 4.1 Sample Matrix Availability

Per client instructions no food items were collected during survey. Due to scheduling and permit issues no finfish were collected during this survey. The collection of POTW influent did not occur at either Mobile or Pensacola due to health concerns. Both POTW influent streams available for sampling contained biological hazards. The staff at facilities in both cities indicated that the chlorination process occurs following secondary treatment.

The collection of landfill leachate did not occur at either Mobile or Pensacola because permission was not granted in either city. In each city an alternative sample was taken from a stream or creek located close to the landfill.

Also collected, but not included in the QAPP, was a sample of quiet/undisturbed surface water. This sample is intended for use in a long-term transport study that is currently being conducted. The sampling locations in both cities were altered from the original site due to a lack of access. In Mobile the area surrounding the suggested inlet was industrialized with no points of access. A barge construction company was approached for permitting access but the manager denied us because of our inability to disclose the nature of our sampling. In Pensacola private residences surrounded the initial sampling location.

## 4.2 Onsite Observations

**Mobile, AL:** The POTW is located adjacent to a coal depot in a highly industrialized area along the river, they discharge ~500-1,000 feet offshore into the channel of the Mobile River. At surface water sites two and three, several people were fishing and crabbing. The drinking water plant sampled was the smaller of two plants maintained by the city. During peak production both plants can produce approximately 50 MGD. The reservoir that is used as the drinking water source is a spring fed, man made lake constructed in the 1950's. Alternative leachate site was collected at a creek located downslope from Schillenger Rd. landfill. A small bass was observed in the creek when we arrived. The air sampler at this site was positioned approximately 30 feet from the 2-story fire station (station #11) located at 1004 S. Broad St. The surface water collected at each of 3 sites located within the Mobile River in every case was collected within 2 m of shore in ca. 0.5 m depth. Re-suspended bottom sediments were avoided in each case.

**Pensacola, FL:** An article in the local paper on the day we arrived described Texar Bayou as being heavily contaminated with heavy metals from two industrial sites and high levels of fecal coliform. At the drinking water pump station it was discovered that some of the city's wells are contaminated with volatile organic compounds. Those wells are fitted with charcoal filters to remove the compounds. The well sampled was not filtered. The POTW sludge is incinerated onsite at the Government St. facility. The air sampler in Pensacola was positioned approximately 4-5 feet from the 2-story fire station (station #2) located at 4432 N. Davis Highway. The surface water collected at each of the 3 sites within the Texar Bayou was collected in each case within 2 m of shore in ca. 0.5 m depth. Re-suspended bottom sediments were avoided in each case.

## 4.3 Instrumentation Results

Air samples were collected during the survey using a General Metals Model PS-1 air sampler. According to SOP M3-MC-F1.1, the air sampler calibration is acceptable if it is within 10% of the expected results. To determine the acceptable results a calibration was conducted in Duxbury prior to the initiation of the study. The initial calibration curve resulted in a  $R^2$  value of 0.997. The calibration curves generated in Mobile and Pensacola had  $R^2$  values of 0.996 and 0.998 respectively. The percent difference in recorded values from the initial calibration ranged from 0.0% to -5.6% for Mobile and -3.9% to 5.1% for Pensacola.

Site locations in Mobile, Alabama were determined using a handheld Garmin 12XL GPS. The accuracy of the GPS unit was verified prior to departing Duxbury by comparing a benchmark on Battelle property versus the location determined by the instrument. The difference between the benchmark location and the GPS measurement was 30 meters. Following shipment to Alabama the instrument was reinitialized. This was conducted at the Coast Guard Station Mobile on June 23<sup>rd</sup>. The results of the verifications for each sampling day in Mobile are presented in Table 12. The result of the verification for Mobile is a difference of 20 meters on June 23 and 0 meters on June 24 between positions. The instrument was lost during shipment from Mobile to Pensacola, Florida and was not used during the Pensacola survey.

According to the QAPP, the minimum distance between sediment sampling sites positions is 500 feet. The sampling locations for Mobile are presented in Table 10 with the following results calculated using the Garmin GPS. The distance from Mobile Site 1 to Site 2 is 1,267.2', the distance from Site 2 to Site 3 is 369.6' and the distance from Site 1 to Site 3 is 1,531.2'. The distance between Site 2 and Site 3 is less than the required 500 feet but will be accepted. The calculation of a linear distance using the GPS results in a distance of less than 500 feet although it should be noted for the record that the actual distance along the shore was well beyond this minimum distance. The samples were collected on both sides of a localized peninsula created by the bridge abutment.

Table 11 provides the sampling locations for Pensacola FL. Although the GPS was lost an attempt was made to provide an accurate street address or location for each sampling site. The sediment collection sites at Texar Bayou were located at a minimum of 500-1,000 feet apart.

**Table 10. Sampling Site Positions in Mobile AL**

| Sampling Location                       | Latitude      | Longitude     | Address                                    |
|-----------------------------------------|---------------|---------------|--------------------------------------------|
| H.E. Meyers Water Filtration Facility   | N 30°43'20.0" | W 88°15'33.9" | 1475 Hubert Pierce Rd.                     |
| Palmer Guillard Pumping Station         | N 30°43'13.3" | W 88°18'14.9" | End of Private Rd.                         |
| Hampton Inn                             | N 30°40'17.9" | W 88°07'46.5" | 930 South Beltline Highway                 |
| MFD Station #11                         | N 30°39'58.7" | W 88°03'23.1" | 1004 S. Broad St.                          |
| Hooters of Mobile                       | N 30°40'35.0" | W 88°07'08.5" | 3156 Airport Blvd.                         |
| Mobile River Site #1, east side         | N 30°43'57.4" | W 88°02'23.6" | Under Africatown-Cochrane Bridge/East side |
| Mobile River Site #2, west side         | N 30°44'00.0" | W 88°02'37.6" | Under Africatown-Cochrane Bridge/West side |
| Mobile River Site #3, west side         | N 30°44'03.2" | W 88°02'40.0" | Under Africatown-Cochrane Bridge/West side |
| C.C. Williams WWTP                      | N 30°39'37.6" | W 88°02'10.7" | 1600 Yeend St.                             |
| Quiet Water / 3 Mile Creek              | N 30°42'25.0" | W 88°03'31.8" | Telegraph Rd                               |
| Alternative Leachate / Halls Mill Creek | N 30°37'04.2" | W 88°13'28.7" | Schillenger Rd                             |

**Table 11. Sampling Site Positions in Pensacola FL**

| Sampling Location                             | Latitude  | Longitude | Address                                          |
|-----------------------------------------------|-----------|-----------|--------------------------------------------------|
| Avery St. Pumping Station                     | Not Taken | Not Taken | Corner of Avery and W St                         |
| Ramada Inn                                    | Not Taken | Not Taken | 7601 Scenic Highway                              |
| PFD Station #2                                | Not Taken | Not Taken | 4432 N. Davis Highway                            |
| Hooter of Pensacola                           | Not Taken | Not Taken | 400 Quietwater Beach Rd                          |
| Texar Bayou, Surface Water #1                 | Not Taken | Not Taken | Boat Ramp at Cervantes St.                       |
| Texar Bayou, Surface Water #2                 | Not Taken | Not Taken | E. Avery St. / Bayou Ave intersection            |
| Texar Bayou, Surface Water #3                 | Not Taken | Not Taken | Hyde Park Rd                                     |
| ECUA Main Plant                               | Not Taken | Not Taken | 401 W. Government St.                            |
| Alternative Leachate / Timber Creek           | Not Taken | Not Taken | Buelah Rd. Buelah FL, north of Perdido Landfill  |
| Quiet Water, Michigan Ave. and Mobile Highway | Not Taken | Not Taken | Intersection of Michigan Ave. and Mobile Highway |

**Table 12. GPS Position Verification Results**

| Calibration Locations | Mobile AL 6/23/99             | Mobile AL 6/24/99             |
|-----------------------|-------------------------------|-------------------------------|
| USCG at Mobile        | N 30°39'00.9" / W 88°03'35.2" | N 30°39'00.9" / W 88°03'35.2" |
| GPS Derived Position  | N 30°39'00.3" / W 88°03'35.3" | N 30°39'01.0" / W 88°03'35.2" |
| Difference            | 0.02 kilometers - bearing 0°  | 0.0 kilometers - bearing 0°   |

## 5. DEVIATIONS AND CORRECTIVE ACTIONS

The following QAPP deviations were noted/experienced during the collection of samples from Mobile AL and Pensacola FL:

- The collection of effluent samples in Pensacola required the use of a plastic jug that the POTW had on site. This jug was rinsed with the effluent prior to collection but no verification of its pre-collection condition could be ascertained. To avoid the future use of local sampling equipment while collecting samples from the flumes of the POTW's a telescoping pole will be purchased that will allow for the direct placement of the sampling containers into the sample stream.
- Due to the loss of the cooler containing the sampling supplies, the collection of sediments in Pensacola were conducted by directly submerging the sample container into the sediment and collecting the sample. "Cake" sludge was collected using a stainless steel spoon provided by Escambia County Utilities Authority (ECUA) personnel. This spoon is what UCUA personnel use during their regular sludge sample collection. The spoon was not cleaned with methanol prior to use.

- Also due to the loss of the sampling equipment, no GPS readings were taken in Pensacola. To avoid this situation in the future the unit will be carried personally by a member of the field team to the city being sampled.
- Per client instructions no food items were collected during survey.
- The collection of POTW influent did not occur at either Mobile or Pensacola due to health concerns. Both POTW influent streams available for sampling contained biological hazards.
- The collection of landfill leachate did not occur at either Mobile or Pensacola because permission was not granted in either city. In each city an alternative sample was taken from a stream or creek located close to the landfill.

The QA Project Plan Section 7.3.5. states that “whole (bulk) water will be collected from three sites within a surface water source of drinking water, and at the water treatment plant influent and outflow... If the drinking water source is groundwater then the surface water samples will be collected from any selected lake, pond, or river...”. In Mobile, erroneous information led the field crew to collect from surface waters not used for drinking water. In Pensacola, drinking water is pumped from groundwater and so the surface water collected does not relate to drinking water supplies. Sampling specifics follow:

- In Mobile surface water and sediments were collected from the Mobile River. When samples were collected at the drinking water treatment plant it was discovered that the source was not in fact the Mobile River but rather the spring-fed, man-made, Big Creek Reservoir. Samples were not collected from the Big Creek Reservoir. As an added note, the Mobile River samples were later identified to be brackish (slightly saline) indicating that they were collected in a region of the river/estuary system that is tidally (seawater) influenced. The sampling task leader was notified of this issue.
- Pensacola surface water and sediment samples were collected from the Texar Bayou. Due to Pensacola’s dependence on ground water for drinking water, the Bayou was chosen as the surface water and sediment sampling site. This was also brackish water (influenced by/mixed with seawater).

While not specified in the QAPP, quiet/undisturbed surface water was also collected. It is the field crews’ understanding that this sample is intended for possible use as an indicator of long-range transport.

The sampling locations in both cities were altered from the original site due to a lack of access. In Mobile, the area surrounding the suggested inlet was industrialized with no points of access. A barge construction company was approached for permitting access but the manager denied us because of our inability to disclose the nature of our sampling. In Pensacola, private residences surrounded the initial sampling location.