SAMPLING & QUALITY ASSURANCE PLAN FOR RIVER STREET SITE LAKE PLACID, NEW YORK

New York DEC Site # 5-16-005

July 12, 2001

Prepared for:

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Griffin Project # 11971

QAP REPORT CERTIFICATION

Griffin Project # 11971

NYSDEC Site #5-16-005

Location: River Street, Lake Placid, NY

I hereby certify I have reviewed the information contained in this plan, and find that it meets the intent of the Project Specification, to the best of my knowledge.

Donna Lazarek

Ms. Donna Lazarek, Project Quality Assurance Officer

Alan R. Liptak

Alan R. Liptak, Immunoassay Operator

Mark A. McCullough

Mark A. McCullough, C.I.H., Project Manager

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ATTACHMENT

I. INTRODUCTION

This document is a Sampling and Quality Assurance Plan (QAP) for the River Street Site in Lake Placid, New York, as defined by the New York State Department of Environmental Conservation (DEC) in Section 000506.4 of the project specification [1]. The methods and procedures outlined herein are project specific and therefore serve as modifications to any and all referenced standard procedures.

1.1 Project Description

The River Street Site in Lake Placid, New York is reportedly contaminated with PCBs in soils at concentrations above the action levels set by the DEC. These action limits are 1 part per million (ppm) from 0'-1' below ground surface (bgs) and 10 ppm below 1' bgs [1]. Excavation of soils with PCB concentrations in excess of the specified action limits has been designated as the preferred remedial strategy. Sampling and analysis of soil samples will be performed before, during and after excavation is complete, to ensure that the remedial action has achieved the remedial goals. A Site Location map and a Site Map are included in Appendix A.

2.0 SOIL SAMPLING PLAN

This soil sampling plan consists of three elements:

- a description of the types and quantities of soil samples to be collected;
- data quality objectives and data uses; and,
- a description of the various methodologies to be used in collecting and handling the samples prior to sampling.

2.1 Soil Sampling Plan Summary

The project specifications indicate that this project will utilize four discrete sample collection groups. These are described as follows.

- Waste Extent samples: ten grab samples to be collected from locations selected by the NYDEC's on-site representative to confirm the NYDEC's estimate of the limits of excavation.
- Waste Characterization samples: composite soil samples collected from excavated materials to properly categorize the nature of the soils for transport and disposal purposes.
- Preconstruction and post-construction soil samples taken in locations where expected contractor's activity will take place, such as decontamination and staging areas, to verify that the remedial work has not spread contamination to these areas.
- Confirmatory samples taken during excavation from residual soils within the remediation area to ascertain whether the action limits have been met.

A description of each of these sampling elements is provided in Section 2.3.

2.2 Data Quality Objectives and Data Uses

The overall data quality objective is to estimate PCB concentrations in appropriate media (primarily soil) with the highest practical degree of accuracy and precision, and the minimal spurious effects on sample and data quality.

2.2.1 Specific Data Quality Objectives for Laboratory Analyses

The principal data quality objective for laboratory analyses is to carry out and report the analyses in a manner which conforms with the quality assurance and control requirements set forth in the laboratory's Quality Manual and in specific EPA SW-846 protocols. A copy of the laboratory's quality manual is included Attachment 1.

2.2.2 Specific Data Quality Objectives for Immunoassay Testing

The principal data quality objective for immunoassay testing is to carry out and report the testing in a manner which conforms with the manufacturer's quality control limits, which are in conformance with the requirements of EPA Method 4020 for immunoassay testing [2]. The immunoassay test kit is manufactured by Strategic Diagnostics, Inc. of Newark, Delaware (SDI). A copy of SDI's testing protocols and quality requirements is included in Appendix B.

2.2.3 Data Utilization

Specific data uses are described below.

Waste Extent Samples: Analytical results for this category of samples will be used to confirm and/or adjust the NYDEC's previous delineation of the extent of contamination, which was used to estimate the extent of soil excavation necessary to attain the action limits. Action limits are 1 ppm from 0-1' bgs and 10 ppm below 1' bgs [1].

Waste Characterization Samples: Analytical results for this category of samples will be used to ascertain whether soils are legally non-hazardous or hazardous waste. The criteria of concern is whether the samples are reported to contain less than or greater than or equal to 50 ppm total PCB concentration.

Preconstruction and Post-construction samples: Analytical results for this category of samples will be used to obtain background PCB soil concentrations for this project, and to ascertain whether background areas have become contaminated as a result of construction and remediation activities. The criteria of concern will be whether PCBs are present at detectable concentrations in background areas before and after the remediation work is performed.

Verification samples: Analytical results for this category of samples will be used to determine whether the previously-specified horizontal and vertical limits of excavation are sufficient to attain the specified action levels. The action level will be 1 ppm from 0-1' bgs and 10 ppm below 1' bgs [1].

2.3 Detailed Soil Sampling Plan

2.3.1 Waste Extent Samples

Section 00506.2 of the Project Specification requires that ten soil samples be collected and analyzed to confirm the extent of contamination for the NYDEC's determination of the limits of excavation.

These samples will be collected prior to the commencement of on-site excavation activities. Each sample will be a grab sample at the location and depth specified by the on-site representative of the NYSDEC.

The waste extent samples will be collected using a hand auger as described in Section 2.4.1. The samples will be containerized and labeled as described in Section 2.4.4. The samples will be transported to Adirondack Environmental Services, Inc. for PCB analysis via Method 8080 Modified as described in Section 3.1.

2.3.2 Waste Characterization Samples

Section 00504.1 of the Project Specification requires that a minimum of one soil sample per every 100 cubic yards of below grade material be analyzed to sufficiently characterize soils for disposal purposes. Each sample may include up to 5 grab samples for compositing purposes. One grab sample will be collected from approximately every 20 cubic yards of excavated material as it is excavated. A total of five grab samples will be collected and composited from approximately every 100 cubic yards of excavated soil. It is anticipated that a total of nine composite waste characterization samples will be collected, based on anticipated soil removal volume of 825 cubic yards.

The grab samples will be collected as described in Section 2.4.1, and composited as described in Section 2.4.2. Once composited, an aliquot of mixed soils will be containerized and labeled as described in Section 2.4.4. The samples will be transported to Adirondack Environmental Services for PCB analysis as described in Section 3.1.

2.3.3 Preconstruction and Post Construction Soil Samples

Section 00506.1 of the project specification requires that preconstruction soil samples be taken in locations where expected contractor's activity will take place (such as

decontamination area, staging areas, etc.). This section further requires that post construction soil samples be taken in the same locations as preconstruction soil samples, but after construction activities have been completed.

Soil samples will be collected before and after the construction work, from construction areas outside the currently-delineated areas to be excavated (See Appendix A). The purpose of these samples is to verify that these areas currently do not contain PCBs in soil at detectable concentrations , and to ascertain that PCBs have not been spread to these areas in detectable concentrations during construction activities.

Approximately three (3) composite soil samples will be collected from the construction area, outside the areas to be excavated, before the commencement of excavation. Each composite soil sample will be composed of five (5) grab samples. The grab samples will be collected with a metal trowel from the top four inches (4") of soil or surfacing material. The locations of each grab sample will be measured off of fixed site reference points to allow for re-sampling at approximately the same locations after the excavation work is complete. The grab sample collection locations will be specified at the time of collection, to allow for adjustment to the contractor's site setup configuration.

The grab samples will be collected as described in Section 2.4.1. The grab samples will be composited as described in Section 2.4.2. Each composite soil sample will be containerized and labeled as described in Section 2.4.4, and will be transported to Griffin offices for PCB testing via immunoassay methods, as described in Section 3.2.

2.3.4. Confirmatory Soil Samples

Section 00506.1 of the project specification requires that confirmation soil samples be collected from excavated areas to verify that the action limits set by the NYSDEC have been attained. These samples shall be collected from the excavations after the depths called for in the specifications or as directed by the engineer have been attained. The estimated sample quantity as indicated in Section 00506.3 is 30 samples. Although not stated in the project specification, it is assumed that these will be grab samples.

The grab samples will be collected with a trowel as described in Section 2.4.1. Each grab sample will be containerized and labeled as described in Section 2.4.4, and will be transported to Griffin offices for PCB testing via immunoassay methods as described in Section 3.2.

Approximately 20% of the confirmatory soil samples will be split for laboratory analysis of PCBs off the Target Compound List as described in Section 3.1. These samples will be containerized and labeled as described in Section 2.4.4 and will be shipped to Adirondack Environmental Services for analysis as described in Section 3.1.

Laboratory confirmation sample results will be compared with immunoassay results and analyzed using a Relative Percent Difference (RPD) method, defined as the difference in reported concentration between sample and duplicate, divided by the mean concentration of sample and duplicate, multiplied by 100%. RPD results will be

reviewed on a case-by-case basis but generally, RPD of less than or equal to 100% will be considered acceptable.

2.4 Soil Sampling and Transit Methodologies

2.4.1 Soil Sampling Methodologies

Soil sample collection during this project will be via one of two methods.

A hand auger will be used to collect samples from depths more than 3" below exposed ground and sidewall surfaces. These samples primarily consist of the Waste Extent Samples described in Section 2.3.1, and the Preconstruction and Post Construction Samples described in Section 2.3.3.

The second sample collection method includes utilization of a hand trowel to collect samples at or very close to (<3") from the earth surface. These consist of waste characterization samples described in Section 2.3.2 and confirmation samples as described in Section 2.3.4.

For the hand auger method, the auger bucket will be advanced to a depth equal to the depth of the bucket. Depending on the desired sample collection depth, the first retrieved soils may be used or discarded.

For the trowel method, the soil to be sampled will be exposed and scooped with the trowel.

For both methods, the sample collection device will be decontaminated as described in Section 2.4.3 prior to collection of the first sample, between samples and after collection of the last sample in the run. During sample collection, personal protection equipment will be used, and health and safety monitoring will be performed, as described in the accompanying health and safety plan.

2.4.2 Soil Sample Compositing Methodologies

When called for in this plan, grab soil samples will be composited by placing the grab samples into a stainless steel mixing bowl. When all the grab samples are in the bowl, they will be broken up and mixed with stainless steel spoons. Care will be taken not to overtop the bowl with soil. Mixing will occur for at least 50 strokes, or more until the field technician is satisfied that thorough mixing has occurred.

The compositing equipment will be decontaminated as described in Section 2.4.3 prior to compositing of the first sample, between samples and after collection of the last sample in the run. During sample collection, personal protection equipment will be used, and health and safety monitoring will be performed, as described in the accompanying health and safety plan.

2.4.3 Soil Sampling Equipment Decontamination Methodologies

All reusable equipment that comes into contact with samples will be decontaminated before sample collection, between sample collection, and after the last sample collection, using the following procedures. The decontamination will take place in the designated decontamination area.

Stage I

First, all significant loose soil will be removed from the surfaces of the object being decontaminated. This will be accomplished using sampling spoons or other suitable devices. The scraped soil will be considered as decontamination waste and will not be returned to the ground. This activity will occur inside suitable containment such as a 5-gallon pail.

Stage II

Next, the object will be soaked and pre-washed in a mixture of water and phosphate soap. The objective is to loosen soil adhering to the object. The object will be agitated in the soap and water mixture. A scraping tool will be used if necessary to remove visible contamination. The soap and water mixture may be re-used on more than one object at the discretion of the field technician. Water may be deionized or tap water at the discretion of the field technician. This activity will occur inside a 5-gallon pail. Spent soap and water solution will be disposed of as decontamination waste.

Stage III

Next, the object will be washed with a clean mixture of deionized water and phosphate soap to remove residual contamination and decontamination solutions. This soap and water mixture will not be re-used. If visible contamination is noted at this stage of decontamination, the object will revert to Stage II. In this event, the decontamination solution may be re-used for other Stage II decontamination activities. This activity will occur inside a 5-gallon pail. Spent soap and water solution will be disposed of as decontamination waste or used in Stage II decontamination.

Stage IV

The object will be rinsed with deionized water to remove residual soap and water. The deionized water will be captured in a 5-gallon pail and will be disposed of as decontamination waste or used in Stage II decontamination.

Stage V

The object will be rinsed with reagent-grade hexane or methanol to remove water. The rinsing solution will be trapped in a 5-gallon pail and will not be reused. Spent solution will be disposed of as decontamination waste.

Stage VI

The object will be dried with clean paper towels. These will not be reused between cleanings and may be disposed of as solid waste.

At this stage the object is ready for re-use. If re-use is to occur immediately, no further decontamination procedures are necessary. If reuse is not to occur immediately, then the object is to be wrapped in heavy weight aluminum foil to preserve its state of cleanliness. The foil is not to be reused between cleanings. It may be disposed of as solid waste upon removal from the object.

2.4.4 Soil Sample Containers, Handling, Labeling and Packaging Methodologies

Soil sample containers will consist of new, precleaned clear 4-ounce glass jars with plastic screw-on lids. Manufacturer's certification of cleaning shall be available for review prior to sample collection. Custody seal(s) on manufacturer's shipping packaging shall be intact at the start of sampling, and shall only be broken by the sampling technician, project manager or QA officer. Soil sample containers shall not be re-used, but shall be discarded after use. Broken, damaged or suspect sampling containers shall not be used.

Each sample shall be appropriately labeled immediately following placement of the sample into the container. The label shall clearly indicate the sample identity, the date and time of collection, the initials of the sampler, the presence or absence of preservatives, the analytical method to be used. An example of a suitable sample label is included in Appendix C. Griffin Standard Protocols for Sampling Handling and Packaging are also included in Appendix C.

2.4.5 Soil Sample Chain of Custody and Transit Methodologies

Samples will be transported by either of the following methodologies, depending on the analytical destination to be used.

For laboratory analysis, samples will be transported via overnight courier to Adirondack Environmental Services, Inc. Typical courier services include Federal Express or United Parcel Service.

For immunoassay testing, samples will be transported directly from the site by Griffin personnel to Griffin's testing facility.

Samples will be subjected to chain-of-custody procedures as described herein. Chain of custody forms will be supplied by Adirondack Environmental Services, Inc. for samples destined for that facility, and by Griffin International for immunoassay samples.

Each chain of custody form contains the following information:

- Project name and identification number.
- Identification of Sampler.
- Identification of testing facility.
- Address and phone number of testing facility.
- Sample identification number.
- Date and time of collection.
- Analysis requirements.
- Location information/comments.
- Signature lines for sampler, handlers and laboratory staff.

Chain of custody forms will be filled out in the field during sample collection in non-erasable ink. Changes that must be made to these forms will be performed by crossing out the inaccurate information with a single, horizontal line, writing the corrected information next to or above the inaccurate information, and initialing the change. The sampler shall retain a copy of the chain of custody form as shall the laboratory. The original chain of custody form will be transmitted along with the laboratory report.

3.0 QUALITY ASSURANCE PLAN (QAP)

3.1 Laboratory Analytical Methodologies

Adirondack Environmental Services Inc will perform PCB testing via EPA Method 8080 modified for soil samples for this project. PCB testing will include PCB congeners off the Target Compound List and will be sampled according to the 1991 or most recent NYSDEC Contract Laboratory Protocols with the required deliverable and reportable requirements.

Adirondack Environmental Services holds NYSDOH Environmental Laboratory Approval (ELAP) Contract Laboratory Certification (CLP) for PCB analysis as required by the project specifications. All laboratory analyses will be in accordance with the 1991 edition of the NYSDEC Analytical Services Protocol (ASP). A copy of Adirondack's Quality Assurance Plan is included as Attachment 1.

3.2 Immunoassay Testing Procedures

Griffin will utilize the RaPID Assay® testing system to quantitatively estimate concentrations of PCB in soil samples. The PCB screening kit is manufactured by Strategic Diagnostics, Inc. of Newark, Delaware (SDI). SDI is a leading manufacturer of antibody reagents, and manufacturers and markets many different types of immunoassay test kits for the environmental, food service, agricultural and medical markets [2]. Copies of SDI information are included in Appendix B. The RaPID Assay® testing system is the most accurate and precise immunoassay testing method available,

and provides rapid and quantitative testing results. USEPA has independently tested and verified the PCB immunoassay test method proposed in this document [3].

One important concern when proposing environmental testing methods is to confirm that the testing method can achieve detection limits comparable to or lower than the applicable standards. The SDI RaPID Assay® immunoassay test method is capable of achieving a detection limit of 0.25 mg/kg for PCB-1254 (with sequential dilution), regardless of soil type. This level is ¼ of the action level for this site, and should be sufficiently conservative to allow delineation of contaminated areas with a high degree of confidence in the data.

3.2.1 Background on Immunoassay Testing Methodology

Immunoassay test methods are ideal for field screening of various contaminant types because they are sensitive, dependable, fast (less than 8 hour turnaround time), and inexpensive relative to laboratory test methods, when batch-tested as is proposed for this project. The relatively low cost of immunoassay test methods means that more samples can be analyzed in a given analytical budget, resulting in more data with which to make critical site decisions. The fast turnaround time means that test results are often available in time to focus further investigation efforts.

Immunoassay test methods rely on competitive attractive forces between an antigen (either contaminant molecules or tagged enzyme) and an antibody (magnetic particles in solution). They have been in use in the food service, agricultural and medical diagnostic laboratory industry for decades, and are coming into more widespread use in environmental work.

Griffin and Griffin personnel have utilized immunoassay testing methods on numerous sites contaminated with petroleum, PCB, and wood preserving chemicals. Immunoassay methods have been studied and endorsed by the US Environmental Protection Agency (USEPA), which has assigned SW-846 test method number EPA Method 4020 to the PCB immunoassay method. The RaPID Assay® PCB Test Method has also been certified by the State of California Environmental Protection Agency (Certificate No. 94-01-006) [2].

3.2.2 Quality Assurance Plan for Immunoassay Testing

All immunoassay testing will be subject to internal and external quality control and assurance (QAQC) procedures as recommended by SDI. Important aspects of the QAQC program for immunoassay testing are:

- Eight point concentration calibration for each batch of samples.
- Multiple point internal, known concentration control analysis for each sample batch (a run of 20 samples will utilize two control samples).
- Internal duplicate sampling (generally 10% of samples collected).
- Extraction duplicate analysis (generally 15% of samples analyzed).

- Filtration duplicate analysis (5-10% of samples analyzed).
- Second qualified person review of all raw analytical data and laboratory reports.
- External laboratory confirmation analysis of 20% of samples collected.

Utilization of these measures allows for data comparison and checking at all phases of the analysis. A copy of Griffin's immunoassay bench sheet is included in Appendix C.

4.0 PERSONNEL AND ORGANIZATION

A project organizational chart is included in Appendix D. All Griffin personnel and Adirondack Environmental Services, Inc. will work under the direction of Mr. Mark McCullough, Certified Industrial Hygienist, and Vice-President of Griffin International. Mr. McCullough will be responsible for timely execution of all sample collection planning, sample collection, sample transit and analyses, and report submission.

Immunoassay testing will be performed by Alan Liptak, CPG, an experienced immunoassay operator, immediately following soil sample collection. Mr. Liptak has performed thousands of immunoassay tests, including Rapid Assay, ENSYS and Enviroguard. His resume is included in Appendix D.

Ms. Donna Lazarek will serve as the Project Quality Assurance Officer (QAO). Ms. Lazarek holds a B.S. in Chemical Engineering from Worcester Polytechnic Institute, and has seven year's experience in the environmental field. Her resume is included in Appendix D. The Project Quality Assurance Officer's duties will include performance of field and immunoassay laboratory audits and sampling audits, interface with the analytical laboratory to make requests and solve problems, interface with the data validation (if performed) and develop a project specific data usability report. The QAO will attend site specific meetings between the contractor and the NYSDEC and sign off on the site specific Quality Assurance Project Plan and all revisions.

5.0 REFERENCES

[1] Specification 00506, Sampling and Analysis, New York State Department of Environmental Conservation, undated.
[2] Strategic Diagnostics Inc., "RaPID Assays® PCB Immunoassay Test Kit Literature," Newark, Delaware. (800)-544-8881.
[3] United States Environmental Protection Agency, Office of Research and Development, "Environmental Technology Verification Report, Strategic Diagnostics Inc. RaPID Assay System for PCB Analysis," Washington, D.C., August 1998.

APPENDIX A

Maps

Site Location Map
Site Map

- Use a new tip each time you use the Repeater pipettor to pipette a different reagent to avoid reagent cross-contamination. Tips can be rinsed thoroughly, dried completely and reused. By using the same tip to dispense the same reagent each time you can avoid cross contamination.

NOTE: Repeator tips should be changed periodically (after ~10 uses) since precision deteriorates with use.

- Draw the desired reagent volume into the Repeater pipettor and dispense one portion of the reagent back into the container to properly engage the ratchet mechanism. If you do not do this, the first volume delivered may be inaccurate.
- To add reagents using the Repeater pipettor, pipette down the side of the test tube just below the rim.
- When adding samples and standard using the positive displacement pipettor, always pipette into the bottom of the tube without touching the sides or bottom of the tube.
- Use a new adjustable volume pipet tip each time you pipette a new unknown.

Assay Procedure

Prior to performing your first Rapid Assay®, please take time to read the package inserts in their entirety and review the videotape if available. **On site training is strongly recommended for new users of this test system.** Please contact your account manager for further information. This procedure is designed for quantitative analysis. For running the kit semi-quantitatively or qualitatively, please contact Technical Support.

Collect/Store the Sample

The following steps explain how to properly collect and store your samples.

1. Water samples should be collected in glass vessels with teflon cap liners). **Immediately upon collection, water samples should be diluted with an equal volume (1:1) of methanol (HPLC grade) to prevent adsorptive losses to the glass containers.** This is a 2x dilution, which must be accounted for when interpreting results. See "Results Interpretation", Section 3a for further details. Use this diluted sample as "sample" in "Perform the Test".

NOTE: This 2x dilution is <u>not</u> required for soil samples.

2. Samples should be collected in appropriately sized and labeled containers.
3. If testing soil samples, follow the SDI Sample Extraction Kit User's Guide or the appropriate technical bulletin to properly collect and store your sample.
4. Samples should be tested as soon as possible after collection. If this is not possible, storage at 4°C (39°F) is recommended to minimize evaporative losses.

Set Up

1. Remove kits from refrigerator. All reagents must be allowed to come to room temperature prior to analysis. Remove reagents from packaging and place at room temperature <u>at least</u> 1 hour prior to testing.
2. Turn on the RPA-1 or other spectrophotometer. The RPA-1 should be warmed up for at least 30 minutes prior to the run.
3. Label five 12.5 mL Combitips "Conjugate", "Particles", "Wash", "Color" and "Stop". In addition, add the name of the compound you are testing for to each Combitip.
4. Remove nine clean blank test tubes for standards and control and one test tube for each sample (if testing in singlicate). Label the test tubes according to contents as follows.

<u>Tube #</u>	<u>Contents</u>
1	Negative control (replicate 1)
2	Negative control (replicate 2)
3	Standard 1 (replicate 1)
4	Standard 1 (replicate 2)
5	Standard 2 (replicate 1)
6	Standard 2 (replicate 2)
7	Standard 3 (replicate 1)
8	Standard 3 (replicate 2)
9	Control
10	Sample 1
11	Etc.

***Label at top of tubes to avoid interference with reading of tubes in photometer**

Sample Extraction, Filtration and Dilution

Filtration may be necessary to remove gross particulate from the water sample. If testing samples at levels higher than standard kit level is desired, contact SDI for special instructions. Water samples should be diluted 1:1 in methanol as described in "Collect/Store the Sample". Please follow the instructions from the SDI Sample Extraction Kit to prepare and dilute the soil extract prior to running the assay.

Perform the Test

1. Separate the upper rack from the magnetic base. Place labeled test tubes into the rack.

2. Add **200 uL** of standards, control or samples to the appropriate tubes using the adjustable volume pipet with the dial set on **0200**. The negative control, standards and control must be run with each batch of samples.

NOTE: Sample should be added to the bottom of the tube by inserting the pipet tip into the tube without touching the sides or the bottom of the tube. Take care not to contact sample with pipette tip once dispensed into bottom of the tube.

3. Using the Repeater Pipettor with the "Conjugate" tip attached and the dial set on **"1"**, add **250 uL** of Enzyme conjugate down the **inside wall** of each tube. (Aim the pipet tip ¼" to ½ below the tube rim or tube wall; deliver liquid gently to avoid splashback.)

4. Thoroughly mix the magnetic particles by swirling (avoid vigorous shaking) and attach the "Particles" tip to the Repeater Pipettor. With the dial set on **"2"** add **500 uL** of magnetic particles to each tube, aiming down the side of the tube as described above. Vortex, mixing each tube 1 to 2 seconds at low speed to minimize foaming. Pipetting of magnetic particles should be kept to 2 minutes or less.

5. Incubate 15 minutes at room temperature.

6. After the incubation, combine the upper rack with the magnetic base and press all tubes into the base; allow 2 minutes for the particles to separate.

7. With the upper rack and magnetic base combined, use a smooth motion to invert the combined rack assembly over a sink and pour out the tube contents.

NOTE: If the rack assembly inadvertently comes apart when lifting to pour out tube contents, re-combine and wait an additional 2 minutes to allow particles to separate.

8. **Keep the rack inverted** and gently blot the test tube rims on several layers of paper towels. It is important to remove as much liquid as possible but **do not bang** the rack or you may dislodge the magnetic particles and affect the results.

9. Set the Repeater Pipettor dial to **"4"** and put on the tip labeled "Wash". Add **1 mL** of Washing Solution down the inside wall of each tube by using the technique described earlier. Vortex tubes for 1-2 seconds. **Wait 2 minutes** and pour out the tube contents as described previously. **Repeat this step one more time.**

NOTE: The number of washes and wash volume are important in ensuring accurate results.

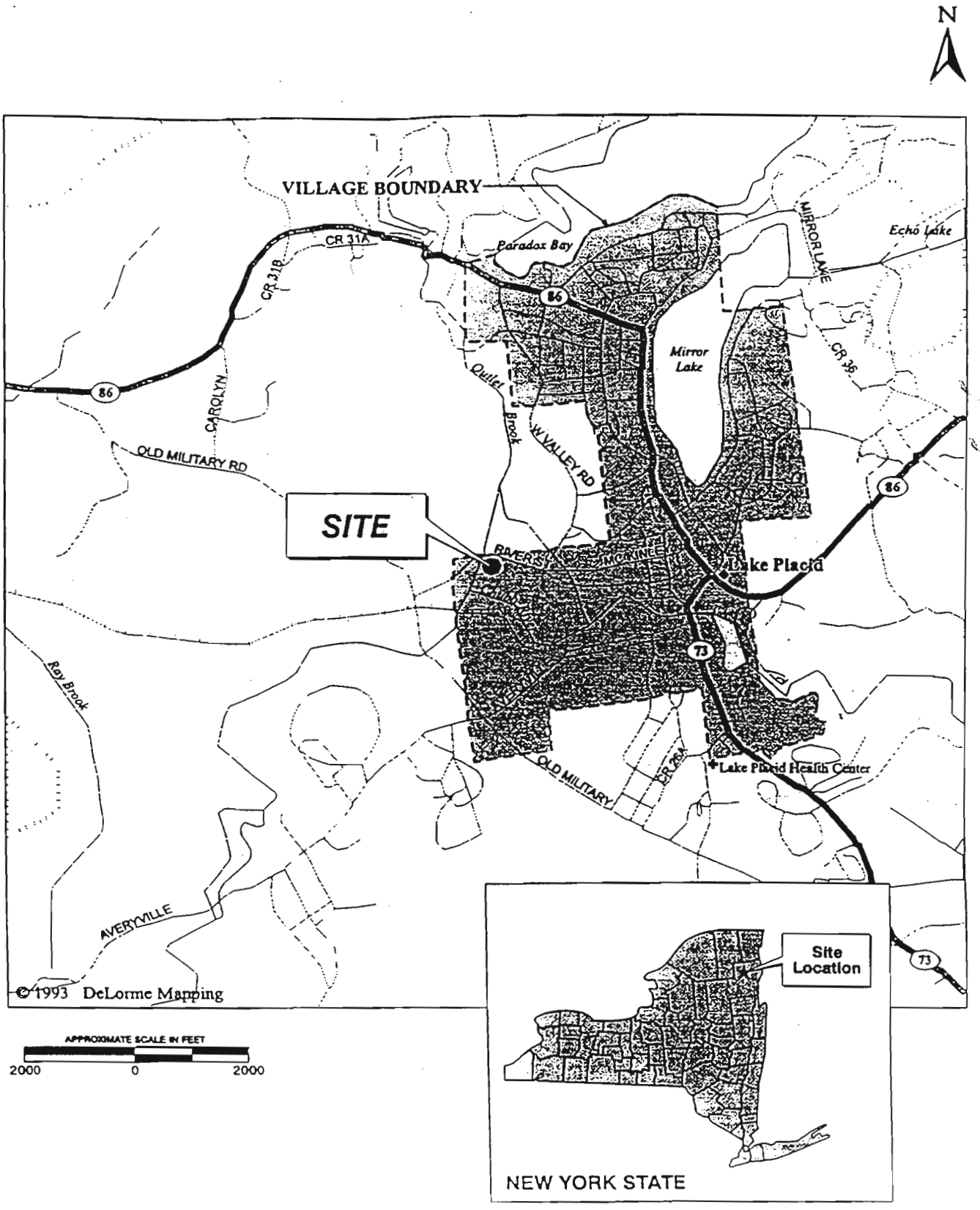
10. Remove the upper rack (with its tubes) from the magnetic base. With the "Color" tip attached to the Repeater Pipet and the dial set to **"2"** add **500 uL** of Color Reagent down the inside wall of each tube as described previously. Vortex 1 to 2 seconds (at low speed).

11. Incubate 20 minutes at room temperature. During this period, add approximately 1 mL of Washing solution to a clean tube for use as an instrument blank for "Results Interpretation".

12. After the incubation, position the Repeater pipettor at Setting **"2"** and use the "Stop" tip to add **500 uL** of Stop solution to all test tubes.

13. Proceed with results interpretation.

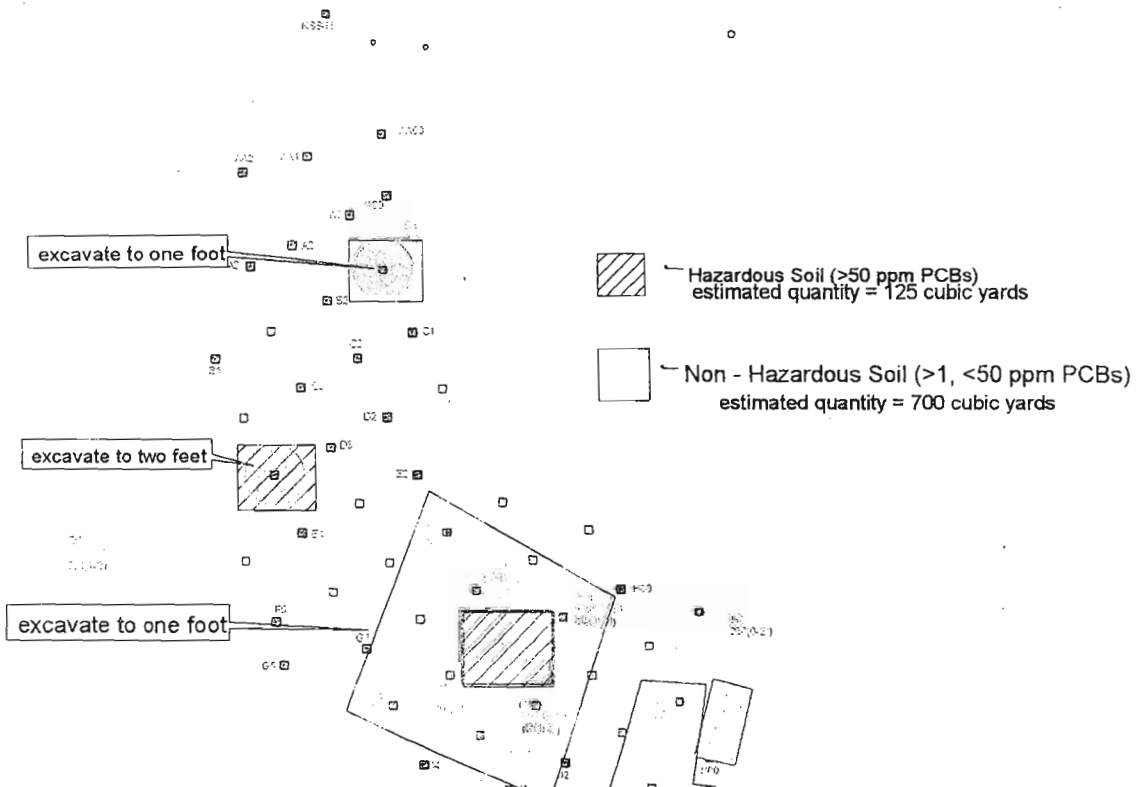
WARNING: Stop solution contains 2M sulfuric acid. Handle carefully.



URS Greiner	RIVER STREET SITE SITE LOCATION MAP	FIGURE 2

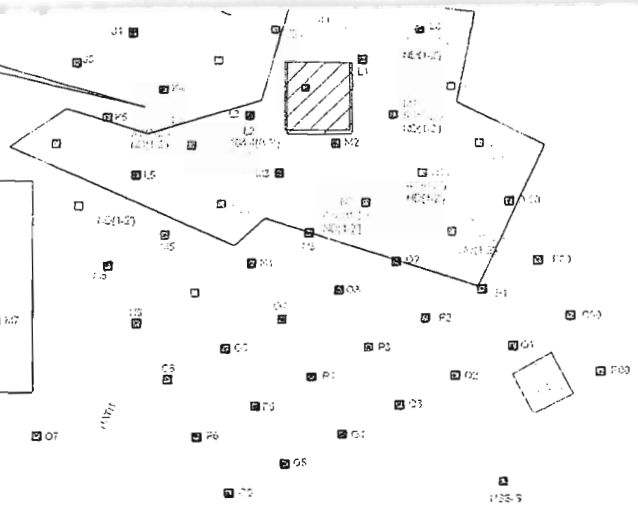
AG126/12-35569.01-042898.CDM

Figure 1: Areas to be excavated
River Street Site #516005

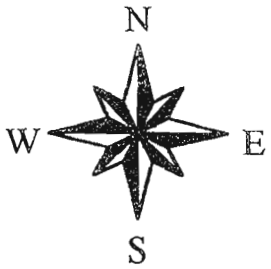


excavate to one foot

Site boundary is restricted at entrance to what is shown, but is larger than what is shown further south.
[i.e.,more support zone areas further into the site]



Soil sample locations are on a 25' X 25' grid



APPENDIX B

SDI Immunoassay Testing Information

Remediation, Assessment & Industrial Testing

RaPID Assay®

PCB RaPID Assay

Features

- rapid field or lab testing method for the analysis of soil, water and wipe samples
- quantitative or semi-quantitative data results
- test up to 50 samples at one time
- results in approximately 60 minutes
- magnetic particle immunoassay
- training recommended
- EPA SW-846 Method # 4020

Test Result Type

- Quantitative, semi-quantitative or qualitative.

Samples per Kit

- Two kit sizes available:
  - 30 Test Kit (tests up to 20+ samples)
  - 100 Test Kit (tests up to 80+ samples)

Assay Range

- Soil: 0.5 to 10.0 ppm Total PCB's as Aroclor 1254
- Water: 0.5 to 10.0 ppb Total PCB's as Aroclor 1254
- Wipes: 5 to 100 ug per wipe Total PCB's as Aroclor 1254
- Range can be extended with additional dilutions

Sample Preparation

- Soil and wipe samples require prior extraction using the SDI Sample Extraction Kit (sold separately).
- The Sample Extraction Kit provides materials for 12 soil sample extractions with methanol.
- Water samples must be diluted one part sample to one part methanol to prevent adsorptive loss.

The Sample Extraction Kit

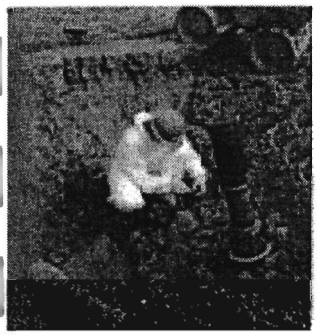
provides materials for 12 soil sample extractions with methanol.

Sampling Time

- Soil extraction time is typically 2 minutes per sample plus assay run time of approximately 60 minutes.

Rapid Immunoassay Technology

RaPID Assay®



Basic Test Procedures

- Add prepared sample, enzyme conjugate, and antibody coupled magnetic particles to a test tube. Vortex.
- Incubate for 15 minutes.
- Using the RaPID Magnetic Separator, decant & wash two times.
- Add color solution and incubate 20 minutes.
- Stop the reaction and read color at 450 nm.
- Quantitative results and QC parameters are calculated and printed automatically using the RPA-I spectrophotometer.

Specificity

The table below shows compounds at the limit of quantitation (LOQ) - an approximate concentration required to yield a positive result at the lowest standard. The IC50 is the concentration required to inhibit one-half of the color produced by the negative control. It is also used to calculate cross-reactivity values to similar compounds.

PCBs in Soil (ppm)

Contaminant	LOQ	IC50	Reactivity Factor
Aroclor 1254	0.5	3.60	1.00
Aroclor 1260	0.3	2.30	1.56
Aroclor 1248	0.6	4.22	0.85
Aroclor 1242	1.2	8.80	0.41
Aroclor 1262	0.7	4.74	0.76
Aroclor 1232	2.6	18.76	0.19
Aroclor 1268	3.0	21.80	0.16
Aroclor 1016	3.6	25.60	0.14
Aroclor 1221	22.6	162.6	--

for water, divide above values by 1000

Test Kit Components

- Antibody coated magnetic particles for analysis of 30 or 100 test tubes
- Diluent zero, wash, enzyme conjugate, color development, stop reagents and wash solution
- Standards for 0.25, 1.0, and 5.0 ppb as Aroclor 1254
- Kit Control at 3.0 ppb as Aroclor 1254
- Disposable test tubes
- Test kit instructions

Storage & Precautions

- Shelf life is typically one year from date of manufacture, with specific kit expiration date informatio provided on product packaging.
- Reagents must be stored at 39° to 46°F (4° to 8°C) when not in use.
- Storage at ambient temperature 64° to 81°F (18° to 27°C) is acceptable for day of use.
- Kits must be brought to 64° to 81°F (18° to 27°C) before use.
- Do not expose color solution to direct sunlight.

Required Test Materials	SDI Part #
PCB Assay Test Kit: 30 Tube	A00133
PCB Assay Test Kit: 100 Tube	A00134
SDI Sample Extraction Kit (for soil samples only)	A00137EA or A00137EB
SDI Sample Extraction Kit (for wipe samples only)	A00137WA or A00137WB
PCB Sample Diluent: 100 ml (as needed)	A00136
Universal Range Extension Kit (as needed to extend range)	A00235

Required Test Equipment

RaPID Assay Accessory Kit	6050100 purchase
which contains:	6997010 rental
RPA-I RaPID Analyzer	A00003
Magnetic Separation Rack	A00004
Repeator Pipet	A00008
Adjustable Volume Pipet	A00176
Vortex Mixer	A00014
Portable Balance	A00131
Digital Timer	A00015
Repeator Pipet Tips	A00009
Adjustable Pipet Tips	A00013

Other Recommended Materials

- Latex gloves
- Liquid and solid waste containers
- Calculator
- Absorbant paper for blotting
- Marking pen

SDI

Strategic Diagnostics Inc.

111 Pencader Drive
Newark, DE USA 19702

302.456.6789 *tele*
800.544.8881 *tele*
302.456.6782 *fax*

www.sdix.com

STRATEGIC DIAGNOSTICS INC.

RaPID Assay® PCB In Soil Application

Intended Use

For detection of Polychlorinated Biphenyls (PCB's) (as Aroclor 1254) in soil. For testing in other matrices, please contact our technical support department at 1-800-544-8881.

Materials Required but Not Provided

SDI Sample Extraction Kit
(Part Number: A00137EA/A00137EB)

Procedural Notes and Precautions

- Prepare soil samples for analysis according to the procedure in the SDI Sample Extraction Kit Users Guide.
- After extraction and dilution of samples, follow the immunoassay procedure as described in the Rapid Assay ® PCB Test Kit User's Guide.
- The initial 2x dilution described for water samples in Step 1 of "Collect/Store the Sample" does not need to be performed for soil samples.

Quality Control

A control solution at approximately 3 ppb (as Aroclor 1254) is provided with the PCB RaPID Assay® Kit. It is recommended that it be included in every run and treated in the same manner as unknown samples. If running standard soil procedures an acceptable result should be 2000 times the value stated on the control vial (i.e. 6.0 + or – 1.2 ppm) when the control results are corrected for the dilution factors (see Results section below).

Results Interpretation

Interpret soil sample results as described in the RaPID Assay® PCB Test Kit procedure, accounting for the total dilution factor indicated in the table of the SDI Sample Extraction Kit Users Guide. Alternatively, program the RPA-1 Analyzer as listed below to automatically correct for this dilution factor.

1. The RPA-I photometer (provided in the Rapid Assay® Accessory kit) can be used to calculate and store calibration curves. To obtain soil results from the PCB Rapid Assay® test kit on the RPA-I the following parameter settings are recommended:

Data Reduct	:	Lin. Regression
Xformation	:	Ln/LogitB
Read Mode	:	Absorbance
Wavelength	:	450 nm
Units	:	PPM
# Rgt Blk	:	0

Calibrators:

# of Cals	:	4
# of Reps	:	2

Concentrations:

#1:	0.00 PPM
#2:	0.50 PPM
#3:	2.00 PPM
#4:	10.00 PPM

Range	:	0.5 – 10.00
Correlation	:	0.990
Rep. %CV	:	10%

Performance Data

The PCB RaPID Assay® does not differentiate between PCB and other related compounds. The table below shows compounds at the method detection limit (MDL) which is the lowest concentration of the compound in soil

that can be picked up in the assay. The limit of quantitation (LOQ) is an approximate concentration required to yield a positive result at the lowest standard, this is the lowest concentration of the compound in soil that can be quantified in the assay. The IC50 is the concentration in soil required to inhibit one half of the color produced by the negative control. It is also used to calculate cross-reactivity values to similar compounds.

Compound	MDL (ppm)	LOQ (ppm)	IC50 (ppm)
Aroclor 1254	0.20	0.5	3.60
Aroclor 1260	0.20	0.3	2.30
Aroclor 1248	0.22	0.6	4.22
Aroclor 1242	0.34	1.2	8.80
Aroclor 1262	0.36	0.7	4.74
Aroclor 1232	0.84	2.6	18.76
Aroclor 1268	0.92	3.0	21.80
Aroclor 1016	0.94	3.6	25.60
Aroclor 1221	13.54	22.6	162.6

Soil Contaminants

Some contaminants found in soils that also contain PCB's can interfere with the analysis and cause false positives, false negatives or both when the compound is present at elevated concentrations. Interferences were assessed by adding increasing concentrations of some relevant contaminants to blank and PCB spiked soils prior to the extraction procedure. The concentration of the compound shown below produced no evidence of interference in a positive or negative direction in the 500 ppb to 10 ppm detection range of the procedure described above.

soil contaminant	concentration in soil producing no interference
trichloroethylene	100,000 ppm or 10%
gasoline	25,000 ppm or 2.5%
transformer oil	5,000 ppm or 0.5%
1-chloronapthalene	2,000 ppm or 0.2%
1,2,4 trichlorobenzene	1,000 ppm or 0.1%
diesel fuel	1,000 ppm or 0.1%

If additional dilutions of the soil extract are made to detect soil PCB concentrations greater than 10 ppm, these interferences are diminished in direct proportions to the dilution made.

Range of Detection

The PCB RaPID Assay® has a range of detection in soil of 500 ppb to 10 ppm (as Aroclor 1254) when used in conjunction with the SDI Sample Extraction Kit.

Recovery

PCB recoveries will vary depending on soil type, retention mechanism, solvent and extraction apparatus used, length of extraction period and levels of potentially interfering substances in the soil.

Z00254.1 Rev. 4/10/00

STRATEGIC DIAGNOSTICS INC.

RaPID Assay® PCB Test Kit
A00133/A00134

Intended Use

The RaPID Assay® PCB Test Kit can be used as a quantitative, semi-quantitative or qualitative enzyme immunoassay (EIA) for the analysis of PCB (polychlorinated biphenyl) in water (groundwater, surface water, well water). For applications in other matrices please contact our Technical Service department or refer to the soil application procedure provided. The RaPID Assay® PCB Test Kit allows reliable and rapid screening for PCB (measured and reported as Aroclor 1254), with quantitation between 0.5 and 10 ppb (as Aroclor 1254), in water. The minimum detection level of the kit is 0.2 ppb (as Aroclor 1254.)

Test Principles

The PCB RaPID Assay® kit applies the principles of enzyme linked immunosorbent assay (ELISA) to the determination of PCB and related compounds. The sample to be tested is added, along with an enzyme conjugate, to a disposable test tube, followed by paramagnetic particles with antibodies specific to PCB attached. Both PCB (which may be in the sample) and the enzyme labeled PCB (the enzyme conjugate) compete for antibody binding sites on the magnetic particles. At the end of an incubation period, a magnetic field is applied to hold the paramagnetic particles (with PCB and labeled PCB analog bound to the antibodies on the particles, in proportion to their original concentration) in the tube and allow the unbound reagents to be decanted. After decanting, the particles are washed with Washing Solution.

The presence of PCB is detected by adding the enzyme substrate (hydrogen peroxide) and the chromogen (3,3',5,5' – tetramethylbenzidine). The enzyme labeled PCB analog bound to the PCB antibody catalyzes the conversion of the substrate/chromogen mixture to a colored product. After an incubation period, the reaction is stopped and stabilized by the addition of acid. Since the labeled PCB (conjugate) was in competition with the unlabeled PCB (sample) for the antibody sites, the color developed is inversely proportional to the concentration of PCB in the sample.

NOTE: Color development is inversely proportional to the PCB concentration.

Darker color = lower concentration
Lighter color = higher concentration

The determination of the PCB level in an unknown sample is interpreted relative to the standard curve generated from kit standards after reading with a spectrophotometer.

Performance Characteristics

The PCB RaPID Assay® will detect different PCB Aroclors to different degrees. Refer to the table below for data on several of these. The PCB RaPID Assay® kit provides screening results. As with any analytical technique (GC, HPLC, etc.) positive results requiring some action should be confirmed by an alternative method.

The PCB RaPID Assay® immunoassay test does not differentiate between PCB and other related compounds. The table below shows compounds at the method detection limit (MDL) which is the lowest concentration of the compound, in water, that can be picked up in the assay. The limit of quantitation (LOQ) is an approximate concentration, in water, required to yield a positive result at the lowest standard. **This is the lowest concentration of the compound that can be quantified in the assay.** The IC50 is the concentration required to, inhibit one half of the color produced by the negative control. It is also used to calculate cross-reactivity values to similar compounds.

Compound	MDL (ppb)	LOQ (ppb)	IC50 (ppb)
Aroclor 1254	0.20	0.50	3.6
Aroclor 1260	0.20	0.32	2.3
Aroclor 1248	0.22	0.59	4.22

Aroclor 1242	0.34	1.22	8.8
Aroclor 1262	0.36	0.66	4.74
Aroclor 1232	0.84	2.61	18.76
Aroclor 1268	0.92	3.03	21.80
Aroclor 1016	0.94	3.56	25.60
Aroclor 1221	13.54	22.58	162.60

*The following compounds demonstrated no reactivity in the PCB RaPID Assay® test kit at concentrations up to 10,000 ppb: Biphenyl, 2,5-Dichlorophenol, 2,3,5-Trichlorophenol, Di-n-octyl-phthalate.

The presence of the following substances up to 250 ppm were found to have no significant effect on PCB RaPID Assay® results: copper, nickel, zinc, mercury, manganese, phosphate, sulfate, sulfite, magnesium, calcium, nitrate and thiosulfate. Humic acid up to 25 ppm and iron to 100 ppm were found to have no significant effect. In addition, sodium chloride concentrations up to 1.0 M showed no effect on results.

Precautions

- Training is strongly recommended prior to using the RaPID Assay® test system. Contact Strategic Diagnostics for additional information.
- Treat PCB, solutions that contain PCB, and potentially contaminated samples as hazardous materials.
- Use gloves, proper protective clothing, and methods to contain and handle hazardous material where appropriate.
- Reagents must be added in a consistent manner to the entire rack. A consistent technique is the key to optimal performance. Be sure to treat each tube in an identical manner.
- Water samples should be at a neutral pH prior to analysis. Samples containing gross particulate should be filtered (e.g. 0.2 um Anotop™ 25 Plus, Whatman, Inc.) to remove particles.
- Store all test kit components at 2°C to 8°C (36°F to 46°F). Storage at ambient temperature (18°C to 27°C or 64°F to 81°F) on the day of use is acceptable. *Test tubes require no special storage and may be stored separately to conserve refrigerator space.*
- Allow all reagents to reach ambient temperature (18°C to 27°C or 64°F to 81°F) before beginning the test. This typically requires at least 1 hour to warm from recommended storage conditions.
- Do not freeze test kit components or expose them to temperatures above 100°F (39°C).
- Do not use test kit components after the expiration date.
- Do not use reagents or test tubes from one test kit with reagents or test tubes from a different test kit.
- Do not mix reagents from kits of different lot numbers.
- Use approved methodologies to confirm any positive results.
- Do not under any circumstances attempt to disassemble the base of the magnetic rack. Magnets will be violently attracted to each other.
- Adequate sample number and distribution are the responsibility of the analyst.
- The photometer provided in the accessory kit requires electricity and comes with a 110V adapter. Adapters for 220V are available. Do not attempt to operate with a car adaptor.
- Do not expose color solution to direct sunlight.
- Do not dilute or adulterate test reagents or use samples not called for in the test procedure; this may give inaccurate results.
- Tightly recap the standard vials when not in use to prevent evaporative loss.

Materials Provided

- Antibody Coupled Paramagnetic Particles in buffered saline containing preservative and stabilizers.

  30 test kit: one 20 mL vial
  100 test kit: one 65 mL vial

- Enzyme Conjugate.

  30 test kit: one 10 mL vial

100 test kit: one 35 mL vial

- Standards

  Three concentrations (0.25, 1.0 and 5.0 ppb) of PCB standards (as Aroclor 1254) in buffered saline containing preservative and stabilizers are supplied. Each vial contains 4 mL.

- Control

  A concentration (approximately 3 ppb) of PCB (as Aroclor 1254) in buffered saline containing preservative and stabilizers. A 4 mL volume is supplied in one vial.

- Diluent/Zero Standard

  Buffered saline containing preservative and stabilizers without any detectable PCB.

  30 test kit: one 10 mL vial
  100 test kit: one 35 mL vial

- Color Solution containing hydrogen peroxide and 3,3',5,5'-tetramethylbenzidine in an organic base.

  30 test kit: one 20 mL vial
  100 test kit: one 65 mL vial

- Stop Solution containing a solution of 2M sulfuric acid.

  30 test kit: one 20 mL vial
  100 test kit: one 60 mL vial

- Washing Solution containing preserved deionized water.

  30 test kit: one 70 mL vial
  100 test kit: one 250 mL vial

- Polystyrene test tubes

  30 test kit: one 36 tube box
  100 test kit: three 36 tube boxes

- User's Guide

Materials Required and Ordered Separately

See "Ordering Information" for the appropriate catalogue numbers.

Rapid Assay® Accessory Kit

Accessory equipment may be rented or purchased from Strategic Diagnostics. See "Ordering Information" for the appropriate catalogue numbers.

The accessory kit contains the following items:

- Adjustable Volume Pipet
- Eppendorf™ Repeater® Pipettor
- Electronic timer
- Portable balance capable of weighing 10 g (for soil samples)
- Vortex mixer
- Magnetic separation rack
- RPA-I RaPID Analyzer (or equivalent spectrophotometer capable of reading 450 nm in a 1 mL sample size).

Other Items

- 12.5 mL Combitips® for the Repeater pipettor - for 0.25 mL to 1.25 mL dispensing volumes (5)
- Pipet tips for adjustable volume pipet (100-1000 uL)

NOTE: Order replacement Combitips® and pipet tips separately. See the "Ordering Information" section.

Materials Required but Not Provided

- Methanol (HPLC grade or equivalent) – for water analysis
- Protective clothing (e.g., latex gloves)
- Absorbent paper for blotting test tubes
- Liquid and solid waste containers
- Marking pen
- Instructional video (optional)

Suggestions for Pipettor Use

- Practice using both pipettes (adjustable volume and Repeater pipettor) with water and extra tips before you analyze your samples.

Results Interpretation

1. After addition of Stop Solution to the test tubes, results should be read within 15 minutes.

2. Wipe the outside of all antibody coated tubes prior to photometric analysis to remove fingerprints and smudges.

Photometric Interpretation Using the RPA-I

1. The RPA-I photometer (provided in the Rapid Assay® Accessory kit) can be used to calculate and store calibration curves. It is preprogrammed with various RaPID Assay® protocols. For the PCB RaPID Assay® test kit, parameter settings are as follows:

Data Reduct	:	Lin. Regression
Xformation	:	Ln/LogitB
Read Mode	:	Absorbance
Wavelength	:	450 nm
Units	:	PPB
# Rgt Blk	:	0

Calibrators:

# of Cals	:	4
# of Reps	:	2

Concentrations:

#1:	0.00 ppb
#2:	0.25 ppb
#3:	1.00 ppb
#4:	5.00 ppb

Range	:	0.10 – 5.00
Correlation	:	0.990
Rep. %CV	:	10%

NOTE: Prior to analysis the RPA-I User's Manual should be thoroughly reviewed for more detailed operation instructions.

2. Follow the instrument prompts to read the absorbance of all tubes:

Instrument Display	Operator Response
SELECT COMMAND RUN PROTOCOL	Press RUN Scroll using the YES [] or NO [] keys until the desired protocol appears. Then press ENTER
SPL. REPLICATES (1-5)	Press 1 (for analysis of samples in singlicate.) Press ENTER
BLANK TUBE, INSERT TUBE, EVALUATING TUBE, REMOVE TUBE (Beep)	Insert blank tube containing 1mL wash solution. Remove tube
CAL #1, REP. #1, INSERT TUBE, EVALUATING TUBE, REMOVE TUBE (Beep)	Insert Tube #1 Remove tube

Follow prompts to read tubes.

NOTE: Tube order is important. The RPA-I expects to see the standards in ascending order, in duplicate, starting with the negative control.

Following evaluation of all standards, the instrument will display:

PRINTING DATA,	Data will print
PRINTING CURVE	Curve will print only if programmed to print (See RPA1 User's Manual).
CTRL #1 REP #1, INSERT TUBE, EVALUATING TUBE, REMOVE TUBE (Beep)	Insert Control Tube Remove Tube
EDIT CALIBRATORS YES/NO	Press NO (if editing is necessary press YES and refer to the RPA1 User's Manual).

SPL #1 REP#1	Insert first sample tube
INSERT TUBE	
EVALUATING TUBE	
REMOVE TUBE (Beep)	Remove tube

Continue to follow prompts. After all samples have been read, press STOP.

Expected Results:

- **%CV (coefficient of variation) between standard duplicates of 10% or less.**
- **Absorbance reading for the 0 ppb standard should be between 0.8 and 2.0 for all assays.**
- **Correlation (r) of 0.990 or greater for all assays.**
- **Kit control within range specified on vial.**
- **Absorbance of negative control and standards should be as follows:**

  Negative Control>Std. 1>Std. 2>Std. 3.

3. Concentrations will be indicated for all samples on the RPA-I printout.

   a) The concentration, as indicated on the printout, is multiplied by the appropriate dilution factor (if applicable) introduced in the procedure. The quantitation range of the kit is also multiplied by this factor.

EXAMPLE: Water samples were diluted 2-fold with methanol upon collection (see "Collect/Store the Sample" in this User's Guide). As a result, the concentrations listed on the printout should be multiplied by 2 to determine the sample concentration. The standard concentrations are also multiplied by 2 to give a quantitation range in water for this test kit of 0.5 to 10 ppb.

   b) Samples with an "nd" and no concentration listed have an absorbance greater than the negative control; therefore, no concentration can be computed for these samples. Results must be reported as < 0.5 ppb (or Standard 1 multiplied by the dilution factor.)

   c) Samples with an "nd" next to a listed concentration have an estimated concentration below the minimum detection level of the test kit. Results must be reported as <0.5 ppb (or Standard 1 multiplied by the dilution factor.)

NOTE: Any samples with concentrations determined to be lower than Standard 1 (the limit of quantitation) must be reported as < 0.5 (or Standard 1 multiplied by the dilution factor.) Quantitation is not possible below this standard as this is outside the linear range of the assay.

   d) Similarly, samples with a "hi" next to a listed concentration have an estimated concentration higher than Standard 3 and must be reported as >10 ppb (or Standard 3 multiplied by the dilution factor.)

NOTE: In order to determine the concentration of samples with concentrations greater than Standard 3, they must be subjected to repeat testing using a diluted sample. A ten-fold or greater dilution of the sample is recommended with an appropriate amount of PCB diluent. This additional dilution must then be taken into account when calculating the concentration. Please contact technical support for assistance in performing dilutions.

Photometric Interpretation Using Other Photometers

Other photometers may also be used to interpret results obtained from the RPA-I photometer. It is important that the photometer be able to read absorbance at 450nm and that the instrument can read at a 1 mL fill volume. Absorbances obtained from other spectrophotometers (reading at 450 nm) may be used to manually calculate sample concentrations as outlined below.

1. Calculate the mean absorbance for each of the three standards and the negative control.

2. Determine the standard deviation and %CV (coefficient of variation) of each standard and ensure %CV is less than 10% for each.

3. Calculate the %B/Bo for each standard by dividing the mean absorbance value for the standard by the

mean absorbance value for the negative control and multiplying the results by 100.

4. Construct a standard curve by plotting the %B/Bo for each standard on the vertical logit (y) axis versus the corresponding analyte concentration on the horizontal logarithmic (x) axis on the graph paper provided in the test kit. **Graph papers are specific for each method. Use only the graph paper supplied with each kit.**

5. Draw the best straight line through all points. Using the %B/Bo of the sample, the concentration can be interpolated from the standard curve.

6. Multiply results by the appropriate dilution factor (if applicable) introduced in the procedure. For example, if the sample was diluted 10-fold to increase the detection levels of the kit then the results must be multiplied by 10. This dilution also changes the range of the assay (standards) by the same factor.

NOTE: Do not forget to account for the 2x dilution introduced in the "Collect/Store the Sample" procedure for water samples.

Limitations of the Procedure

The Rapid Assay® PCB Test Kit is a screening test **only**. Sampling error may significantly affect testing reliability. Adequate sample number and distribution are the responsibility of the analyst.

Ordering Information

Description	Catalogue Number
Rapid Assay® PCB Kit	A00133/A00134
Rapid Assay® Accessory Kit**	6050100
Adjustable Volume Pipet Tips (100-1000 uL)	A00013
12.5 mL Combitip for Repeating Pipette (1 each)	A00009
PCB Diluent	A00136
PCB Soil Proficiency Sample	A00175
Rapid Assay® Accessory Kit Rental	6997010
**** To obtain part numbers and pricing for individual items in the Accessory Kit contact SDI at the number below.**	

Ordering/Technical Assistance

Should you have any questions regarding this procedure prior to analysis contact Technical Service to avoid costly mistakes.

To Place an Order or Receive Technical Assistance, please call Strategic Diagnostics Inc. at:

Call toll-free **800-544-8881**`

Or 302-456-6789 Phone
302-456-6782 Fax
Web site: www.sdix.com
E-mail: techservice@sdix.com

General Limited Warranty

SDI's products are manufactured under strict quality control guidelines and are warranted to be free from defects in materials and workmanship. New instruments and related non-expendable items are warranted for one year from date of shipment against defective materials or workmanship under normal use and service.
Warranty obligation is limited to repair or replacement of the defective product or to refund of the purchase price, at the discretion of SDI. Other warranties, express or implied, are disclaimed. SDI's liability under any warranty claim shall not exceed the refund of the purchase price paid by the customer. Under no circumstances shall SDI be liable for special, indirect or consequential damages.

Safety

To receive an MSDS for this product, visit our web site at www.sdix.com.

Z00245.1, Rev 4/4/00

Operation of the Repeater Pipet

To Set or Adjust Volume

To determine the pipetting volume, the dial setting (1-5) is multiplied by the minimum pipetting volume of the tip (indicated on the side of the Combitip, e.g. 1≃100 uL.)

To Assemble Pipet Tip

Slide filling lever down until it stops. Then raise the locking clamp and insert the tip until it clicks into position. Be sure the tip plunger is fully inserted into the barrel before lowering the locking clamp to affix the tip in place.

To Fill Tip

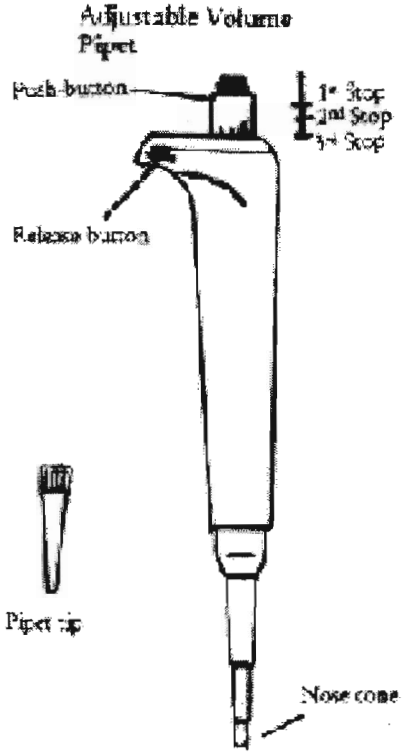
With tip mounted in position on pipet, immerse end of tip into solution. Slide filling lever upward slowly. Combitip will fill with liquid.

To Dispense Sample

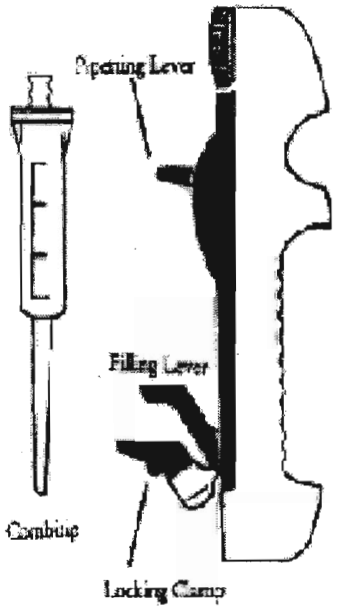
Check the volume selection dial to ensure pipetting volume. Place tip inside test tube so that tip touches the inner wall of tube. Completely depress the pipetting lever to deliver sample. NOTE: Dispense one portion of reagent back into the container to engage the ratchet mechanism and ensure accuracy.

To Eject Tip

Empty tip of any remaining solution into appropriate container by pushing filling lever down. Raise locking clamp upward, and remove the Combitip.



Repeater Pipet



Operation of the Adjustable Volume Pipet

To Set or Adjust Volume

Press release button on side of pipette and turn the push-button to adjust volume up or down. Volume setting is displayed on top of pipet. See kit instructions for appropriate setting. Pipet will accurately dispense volumes between 100 and 1000 uL.

To Assemble Pipet Tip

Gently push nose cone of pipet firmly into a pipet tip contained in the pipet tip rack.

To Withdraw Sample

Keep pipet almost vertical. With tip mounted in position on pipet, press push-button to 1st stop and hold it. Place tip at bottom of liquid sample and slowly release push-button to withdraw measured sample. Ensure that no air bubbles exist in the pipette tip. If bubbles exist, dispense sample and re-withdraw. Slide tip out along the inside of the vessel.

To Dispense Sample

Wipe any liquid from outside of tip taking care not to touch orifice. Place tip into tube, almost to the bottom, and slowly press push-button to 2nd stop. Hold push-button at 2nd stop when removing tip from tube.

To Eject Tip

Press push-button to 3rd stop. Tip is ejected.

APPENDIX C

Griffin Internal Documentation

This protocol details the procedures for sample container handling, following collection in the field.

1. Upon sample collection, each sample container is affixed with an identification label which contains the following information, at a minimum:

- project name & number
- sample identification
- date and time sampled
- analysis required
- preservation used, if required
- sampler's name (initials)

Sample containers will be labeled, using an indelible ink marker, with sample identification, date, and time at the time a sample is actually collected to prevent accidental mix-up of samples that may occur when containers are pre-labeled prior to a sampling event. Other information (project name and number, analysis type, preservation type, and sampler's name) may be completed on the sample label prior to sample collection.

2. All samples are to be placed on ice or refrigerated immediately upon their collection. Samples will remain on ice or under refrigeration until they are delivered to the laboratory.

3. A Chain of Custody form is to be filled out as the samples are collected. Samples are entered onto the form in the order in which they are collected. All data recorded on the sample container label is copied onto the Chain of Custody form. Obvious contamination observed in the sampled material is noted on the Chain of Custody form. A copy of the Chain of Custody form should be maintained for project files.

4. All samples will be delivered to the laboratory within 48 hours (72 hours if a weekend or holiday interferes) of their collection, unless the analytical method requires a more rapid turn-round time, thus necessitating more rapid delivery.

5. If samples are to be shipped to the project analytical laboratory via a mail or transportation service, samples will be packaged according to the Griffin International **Sample Packaging Protocol**.

This protocol details the procedures to be followed for packaging of environmental samples for overnight mail delivery to an analytical laboratory.

1. Check sample labels versus Chain of Custody form(s) for accuracy.

2. Sign and date Chain of Custody form(s) indicating relinquishment of samples to appropriate overnight carrier. Enclose Chain of Custody form(s) in a sealable plastic bag. Maintain a copy of the Chain of Custody form(s) for project files.

3. Enclose sample vials or bottles within sealable plastic bags to protect the labels from potential ice leakage or condensation. Do not enclose more than two 40-mL vials in one bag. Alternately, sample containers may be secured in laboratory-supplied foam cell blocks.

4. Pack samples in a cooler, filling excess empty space with styrofoam particles or plastic bubble wrap.

5. Add units of ice to the cooler as per the following guidance. Ice should be in close contact with sample containers and located at the top of the cooler. A unit of ice is defined as one sealable, sandwich-sized, bag of water ice, or one blue ice block. Blue ice should not be used as the sole coolant source for shipments made during the summer months, or for samples which have not had sufficient time in the field during collection to chill to 4 degrees Celsius. (Blue ice maintains temperatures, but is not as efficient as water ice at reducing temperatures).

Ambient temperatures in excess of 45 degrees F:
- Small cooler: at least two ice units
- Large cooler: at least six ice units

Ambient temperatures less than 45 degrees F:
- Small cooler: at least one ice unit
- Large cooler: at least two ice units.

Please note that more than two units of ice may freeze and/or break aqueous sample vials in transit during periods when ambient temperatures are below freezing.

6. Add additional styrofoam packing or plastic bubble wrap above the ice to fill the cooler, if necessary. Place the bagged Chain of Custody form(s) on top of the packaging directly beneath the cooler lid. Close the cooler lid. Shake the cooler and turn it upside down. If properly packed, the contents should not shift or rattle. Repack the cooler and/or add additional packaging material, if necessary.

7. Seal the lid on the cooler using at least two lengths of wide plastic packaging tape which completely encircle the cooler. Do not use duct tape, as it is difficult for the lab to remove and leaves a sticky residue.

8. Attach a mailing label to the top of the cooler. Mailing label must include a street address. A Post Office box is not sufficient for delivery.

9. Fill out the appropriate mail carrier's shipping label, and deliver. Sender's copies of the Chain of Custody form(s) and shipping label, if provided, shall be attached to the Daily Work Report Sheet, submitted for the project internally at Griffin offices.

Site:

Job#: Pres:

Anly: Init:

Date: Time:

Location/ID:

GRIFFIN INTERNATIONAL, INC.

Site:

Job#: Pres:

Anly: Init:

Date: Time:

Location/ID:

GRIFFIN INTERNATIONAL, INC.

Site:

Job#: Pres:

Anly: Init:

Date: Time:

Location/ID:

GRIFFIN INTERNATIONAL, INC.

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Date: Time:

Location/ID:

GRIFFIN INTERNATIONAL, INC.

Site:

Job#: Pres:

Anly: Init:

Date: Time:

Location/ID:

GRIFFIN INTERNATIONAL, INC.

Griffin International, Inc.

SDI Rapid Assay Bench Worksheet

Job Name and Number _____ Personnel _____

Kit Type/Exp. Date _____ Day/Date/Time _____

SAMPLE RECORD

Sample	Net Wt.	Dil. 1	Dil. 2	Sample	Net Wt.	Dil. 1	Dil. 2	Sample	Net Wt.	Dil. 1	Dil. 2
1				18				35			
2				19				36			
3				20				37			
4				21				38			
5				22				39			
6				23				40			
7				24				41			
8				25				42			
9				26				43			
10				27				44			
11				28				45			
12				29				46			
13				30				47			
14				31				48			
15				32				49			
16				33				50			
17				34				51			

RACK CONFIGURATION

51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
Blank	Blank	Cal. #1	Cal. #1	Cal. #2	Cal. #2	Cal. #3	Cal #3	Control	10

Comments and Observations: _____

GRIFFIN INTERNATIONAL INC

CHAIN OF CUSTODY

Project Name:_____

Project Number:_____ Sampler:_____

Sample #	Date	Analysis	Location/Comments	Total Time/Volume

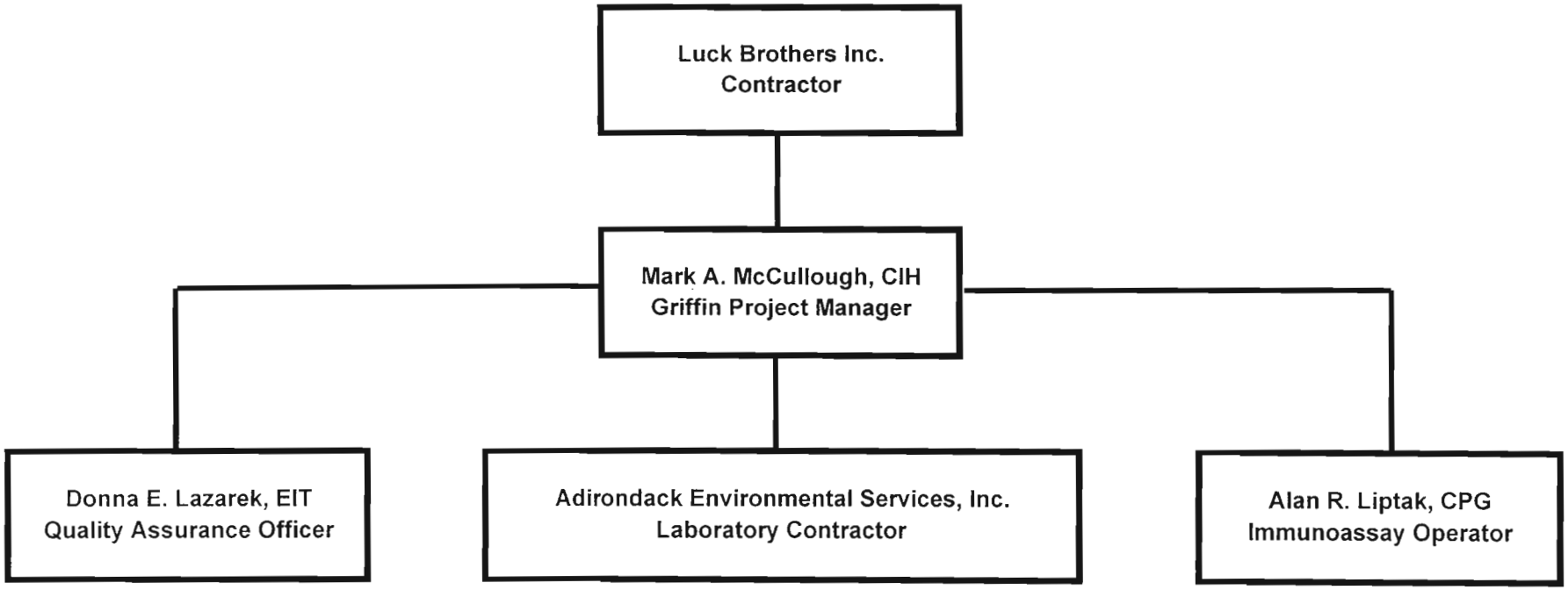
Relinquished By:	Received By:	Date/Time

APPENDIX D

Project Organizational Chart

Resumes

QUALITY ASSURANCE PROJECT ORGANIZATIONAL CHART
RIVER STREET SITE, LAKE PLACID, NY
NY DEC SITE 5-16-005



GRIFFIN INTERNATIONAL, INC.
PROFESSIONAL PROFILE

MARK A. McCULLOUGH, C.I.H.

TITLE	**Certified Industrial Hygienist/ Environmental Engineer** **Vice President, Principal**
EXPERTISE	General management: Phase I and II Environmental Site Assessments; asbestos/ lead management; hazardous waste management; indoor air quality monitoring; OSHA/ CERCLA/ RCRA Health and Safety Plans; air/ water emissions permitting; Quality Assurance/Quality Control Plans; safety and industrial hygiene; compliance management of NRC Licenses and state radioactive waste permits; hazardous waste sampling; UST management; health physics.
EXPERIENCE	**Griffin International, Inc. (formerly HM2), Plattsburgh, NY. 1990 – present.** Vice President/ Principal. Management of daily operations and finances of the Plattsburgh, NY office. OSHA workplace compliance programs and workplace environmental monitoring. Direct management of Griffin's work place safety and training programs. Industrial hygiene and safety evaluations for industrial, commercial, residential clients. Phase I and II Environmental Site Assessments. CERCLA/ RCRA health and safety plan development. Third party OSHA compliance audits and program overviews. **USAF Dec. 1989 - May 1990 Active Duty; NYANG Lt. Colonel May 1990 - Present.** Environmental Engineer. Managed all aspects of hazardous waste management for two large military industrial complexs. Developed plans, performed inspections, sampled waste and audited all disposal activities. Managed the base UST program, including testing/closure projects, monitoring tightness testing and managing leaking tank responses. Prepared air/ water/ sewage discharge permits. **USAF Medical Service. 1981 - 1989.** Bioenvironmental Engineer. Managed industrial health and safety surveillance of up to 85 different industrial areas, totaling approximately 2000 full time-employees. Managed compliance requirements of three State Radioactive Material Permits and one Nuclear Regulatory Commission license.
ACADEMIC BACKGROUND	MS, Systems Management, University of Southern California, 1988. BS, Environmental Engineering, Pennsylvania State University, 1981.
PROFESSIONAL QUALIFICATIONS	NYS Certified Asbestos Inspector, Project Designer. AH91-07168. Certified in the Comprehensive Practice of Industrial Hygiene (CIH) by the American Board of Industrial Hygiene Engineer in Training, Pennsylvania
OTHER	Member, American Conference of Governmental Industrial Hygienists Member, American Society for Testing and Materials

GRIFFIN INTERNATIONAL, INC.
PROFESSIONAL PROFILE

ALAN R. LIPTAK, CPG

TITLE	**Environmental Programs Manager**
EXPERTISE	Environmental project management, solid waste site design, operations, permitting, closure and post closure; contaminated site investigation and clean up, state and local permitting, innovative test methods.
EXPERIENCE	**Griffin International, Inc. , Williston, Vermont May 1999 – present.** Environmental Programs Manager June 2001-Present; responsible for management and supervision of Griffin's environmental programs, including environmental site assessments, UST removals, site investigations, and environmental clean up activities. Supervises professional staff of 10 scientists and engineers. Responsible for fostering technical innovation, quality control and assurance on projects and written materials. Responsible for business development activities in environmental programs. Senior Staff Geologist May 1999 –June 2001: Responsible for management of individual projects including solid waste disposal facility operations, permitting and closure, hazardous site investigations, clean up operations, site assessments and business development activities. **The Johnson Company, Inc., Montpelier, Vermont October 1990 – May 1999.** Senior Scientist responsible for project management of hazardous and solid waste projects and business development. Assisted with company administration including insurance and retirement planning. **State of Vermont Department of Environmental Conservation, Waterbury, Vermont October 1984 – October 1990.** Progressively responsible positions included assistant regional wastewater engineer, solid waste engineer and supervisor of engineering and technical assistance for the Solid Waste Division. **American Cyanamid Company, Pearl River, NY Summers, 1980 & 1984.** Performed chemical analysis in a laboratory setting to meet pharmaceutical production schedules.
ACADEMIC BACKGROUND	M.S. Geology, Chemistry Minor, University of Montana, 1984 B.A. Geology, State University of New York at Potsdam, 1982
PROFESSIONAL QUALIFICATIONS	Certified Professional Geologist # 10166 American Institute of Professional Geologists, Arvada, CO
OTHER	Member, Vermont Geological Society Member, New Hampshire Council of Professional Geologists OSHA 1910.120 Hazardous Waste Site Worker Scoutmaster, Boy Scouts of America Troop 100, Waitsfield, Vermont

GRIFFIN INTERNATIONAL, INC.
PROFESSIONAL PROFILE

DONNA E. LAZAREK, EIT

TITLE	**Project Engineer**
EXPERTISE	Environmental engineering, remedial design/ operation, contaminated site investigation and clean up, state and local permitting, quality assurance audits, health and safety administration, environmental site assessments, SPCC Plans.
EXPERIENCE	**Griffin International, Inc. , Williston, Vermont May 2001 – present.** Management of hazardous site investigations and remediation, environmental site assessments, health and safety oversight and business development activities. Generation of SPCC plans. **Norfolk Environmental, Raynham, MA October 1998 – May 2001.** Project Engineer responsible for remedial design/ operation, contaminated site investigation and clean up, state and local permitting, toxic use reduction plans, pollution prevention plans, environmental site assessments, SPCC Plans. **CytoTherapeutics, Inc., Lincoln, RI 1994 – October 1998.** Environmental, Health and Safety Officer responsible for all safety and environmental issues. Radiation Safety Officer.
ACADEMIC BACKGROUND	M.S. Environmental Engineering, Northeastern University - in process B.S. Chemical Engineering, Worcester Polytechnic Institute, 1993
PROFESSIONAL QUALIFICATIONS	EIT
OTHER	OSHA 1910.120 40 hour Hazardous Waste Site Worker

ATTACHMENT 1

Adirondack Environmental Services Quality Manual

(1 on file at Griffin)

(1 on file at NYDEC)