AECOM
1555 RiverCenter Drive, Suite 214
Milwaukee, Wisconsin 53212

414.944.6080 tel
414.944.6081 fax

January 3, 2017

Ms. Kelley O'Connor
Natural Resources Basin Supervisor
WDNR, NE Region Headquarters
2984 Shawano Ave
Green Bay, Wisconsin 54313-6727

Subject: **Request for Coverage under Wisconsin Pollutant Discharge Elimination System Wastewater Discharge Permit (WI-0046566-06) for Contaminated Groundwater from Remedial Action Operations**
Former Town of Newton Gravel Pit Project
BRRTS #: 02-36-000268, DNR Facility ID #: 436104020
AECOM Project No. 60135471(82518)

Dear Ms. O'Connor,

On behalf of the City of Manitowoc, AECOM is requesting coverage under the Wisconsin Pollutant Discharge Elimination System (WPDES) wastewater discharge general permit for remedial action operations at the Former Town of Newton Gravel Pit.

This application is being sent to you for your review at the suggestion of Ms. Nanette Jameson, our WPDES general permit application contact, and Mr. Tauren Beggs, our WDNR Remediation & Redevelopment (R&R) Program project manager.

Presented below is a project background summary, a chronological description of our correspondence with the Department, and a request for a WPDES general permit for discharge from a remedial action operation.

Project Background

The Former Town of Newton Gravel Pit site is a 58-acre property located at 3130 Hecker Road in the Town of Newton, Manitowoc County Wisconsin. The property is owned by the City of Manitowoc. Approximately one acre along the western property boundary (i.e. the Western Source Area) was the location of a disposal pit that received industrial wastes during the 1960s and early 1970s. Approximately 0.2 miles to the east-southeast of the Western Source Area, a small creek (Silver Creek) flows through the property.

An engineered groundwater treatment pond is being proposed to intercept and treat the groundwater contaminant plume within a designated Groundwater Treatment Area directly down-gradient of the Western Source Area. The contaminants of concern (COCs) within the Groundwater Treatment Area are principally volatile organic compounds (VOCs).

The proposed pond will have a length of approximately 500 feet (ft), a width of approximately 160 ft, and a depth of approximately 20 ft. The pond is designed to treat VOCs using volatilization, phytoremediation, aerobic-bioremediation, and solar (i.e. UV radiation) oxidation. To facilitate volatilization, circulation equipment will be installed to provide physical mixing and aeration of the water. This mixing will improve evaporation and stripping of COCs, as well as keep the pond open and operational during the winter months.

Permit coverage is requested for the discharge of treated groundwater from the proposed pond to Silver Creek. Additional project details are provided in the attached permit application.

WPDES Permit Correspondence

August 18, 2016: AECOM and the City of Manitowoc submitted a Remedial Action Options Report (RAOR) to the R&R Program for review. On September 6, 2016, Mr. Beggs held a WDNR internal meeting with program staff (Waterways, Wastewater, and Air) to introduce the project. After the meeting, AECOM was told that an individual WDPES permit was required and that we should contact Mr. Trevor Moen, Wastewater Engineer, WDNR Central Office, to discuss the permit.

September 14, 2016: AECOM contacted Mr. Moen and explained the permit request. Mr. Moen did not see a need for an individual permit and questioned why we were directed to him. He suggested that we contact local WDNR staff in Green Bay. After this discussion with Mr. Moen, AECOM contacted Mr. Beggs who suggested a teleconference with Ms. Jameson and Mr. James Schmidt, Water Resources Engineer, WDNR Central Office, to discuss the permit application process.

September 19, 2016: AECOM discussed the permit process with Ms. Jameson and Mr. Schmidt via teleconference. After a long and varied conversation Ms. Jameson stated that she "…insists on an individual permit." Our understanding for Ms. Jameson's insistence was her concern over how to incorporate groundwater monitoring into a general permit control letter. In response to her concern, we discussed that the site groundwater was being actively managed under the R&R Program. Although Ms. Jameson did not change her requirement for an individual permit, she acknowledged the option to challenge her decision, and in doing so she further suggested that we "emphatically underscore" that:

- a general permit will convey protection to Waters of the State,
- the chemicals of concern are covered by the general permit,
- the R&R Program will continue to monitor groundwater impacts, and
- conventional pollutants are not involved.

Mr. Schmidt commented that:

- where applicable, a general permit was more stringent than an individual permit by design and, therefore, was protective to the Waters of the State,
- the chemicals of concern associated with the proposed groundwater treatment operations appear to be covered by the general permit,
- it is anticipated that the R&R Program would continue to require monitoring of the groundwater during remedial actions, and
- with the exception of Total Suspended Solids, which is covered by the general permit, conventional pollutants probably don't apply to the site.

Currently the RAOR is moving through the R&R Program review process. In addition, we have received concurrence with the WDNR Air program concerning site-wide air emissions and we are in a Chapter 30 permit "Notice of Pending Application" 30-day public comment period. Pending the receipt of all permit approvals, construction of the groundwater treatment operations will begin in 2017.

WPDES General Permit Application

Our WPDES general permit application for contaminated groundwater from remedial action operations (WI-0046566-06) is attached for your review. The application is being elevated to you for review based on our objection to Ms. Jameson's decision that an individual permit is required.

The City of Manitowoc and AECOM appreciate your support in this matter. Please call me at (414) 944-6190 or email at dave.henderson@aecom.com if you have any questions.

Respectfully Submitted,

AECOM

D. S. Henderson

David S. Henderson, P.E.
Project Manager

Cc:
WDNR Water Permits Central Intake – WT/3, PO Box 7185, Madison, WI 53707-7185
Mr. Tauren Beggs, WDNR R&R Program, NE Region
Ms. Nanette Jameson, WDNR Water Quality Bureau, NE Region
Mr. James Schmidt, WDNR Water Quality Bureau, Central Office
Ms. Kathleen McDaniel, Manitowoc City Attorney
Mr. Dan Koski, City of Manitowoc, Director of Public Infrastructure

Attachments:
Request for Coverage under Wisconsin Pollutant Discharge Elimination System (WPDES) Wastewater Discharge Permit (WI-0046566-06) for Contaminated Groundwater from Remedial Action Operations with attachments.

Date Received_____
(Leave blank)

Request for Coverage Under
Wisconsin Pollutant Discharge Elimination System (WPDES)
Wastewater Discharge Permit (WI-0046566-06) for
Contaminated Groundwater from Remedial Action Operations

(Revised 8 / 2012)

Please type or print required information, except for the signature.

I. GENERAL INFORMATION

A: FACILITY LOCATION INFORMATION		
Name of Facility / Project Former Newton Pit Property	Official Representative Onsite None	Title
(Address or Highway / Road with Distance and Direction from nearest City) 3130 Hecker Road	Telephone No.: None	Fax #
City, State, Zip Code Town of Newton, Wisconsin 54220	County Manitowoc	Email Address None

B: Individual, parent company, or organization with direct control over the facility. Enter full official legal name of the owner or parent company, if there is one, the mailing address, and the name and title of the official representative (responsible party) signing this application if he/she is located at address of parent company.

Parent Company/Owner City of Manitowoc	Company Contact Dan Koski, PE, Director of Public Infrastructure	Title
Mailing Address - PO Box, Street, or Route 900 Quay Street	Telephone No.: (920) 686-6910	Fax # (920) 686-6906
City, State, Zip Code Manitowoc, Wisconsin 54220	Email Address DKoski@manitowoc.org	

C: Consulting Firm for Groundwater		
Company Name AECOM	Company Contact David Henderson, PE, Senior Project Manager	Title
Mailing Address - PO Box, Street, or Route 1555 North RiverCenter Drive	Telephone No.: 414-944-6190	Fax # 414-944-6081
City, State, Zip Code Milwaukee, Wisconsin 53212	Email Address Dave.Henderson@aecom.com	

D. **Name of Person to Receive Discharge Monitoring Report Forms** from Department:

Dave Henderson, AECOM (see Section III A for contact information)

E. **Any Other Necessary Contact Person** (name, phone, email)

F. **DNR Environmental Response & Repair Project Number, and DNR Project Manager name:**

BRRTS #: 02-36-000268, DNR Facility ID #: 436104020, Mr. Tauren Beggs, Hydrogeologist

II. SPECIFIC INFORMATION ON PROJECT

A. Pollutants

1. The suspected **sources of the pollutants** (estimate of material release quantity and contributing activities)
The Former Newton Pit was the location of disposal practices that included discharge of liquid industrial wastes such as petroleum products and chlorinated solvents.

2. Check **all fuel and waste types** suspected in the contamination at this site:

☐ Unleaded Gasoline	☐ Jet Fuel	☐ Pesticides
☐ Leaded Gasoline	☒ Waste Oil	☐ Fertilizers
☐ Diesel Fuel	☒ Solvents	
☐ Heating Oil	☐ Other:	

3. Check **all pollutants identified at this site**:

☒ BETX (Benzene, Ethylbenzene, Toluene, Xylene)	☐ Pesticides/Fertilizers
☐ PAHs (Polynuclear aromatic hydrocarbons)	☐ Total Recoverable Lead *
☒ VOCs (Volatile Organic Chemicals)	☐ Other _____

* Include upstream receiving water hardness analysis if lead is detected.

B. Treatment

1. **Describe the existing treatment system**:
Engineered groundwater treatment pond with volatilization, phytoremediation, aerobic-bioremediation, and solar oxidation in the ground water treatment area.

Treatment Techniques Used

- ☐ Pump & Treat
  - ☐ Air stripping
  - ☐ GAC (Granular Activated Carbon)
- ☐ Augmented Insitu Bioremediation (with chemicals or nutrient addition)
- ☒ Other (describe)

2. **If any cleaning, softening or descaling of the treatment system**

a. Identify any additives that are proposed or being used for cleaning, softening, or descaling of the treatment system. Provide Material Safety Data Sheets, and describe dosage.
Not Applicable.

b. Describe what is done to clean, soften or descale, and how often it is done.
Not Applicable.

c. Where is the reject water from cleaning and descaling discharged?

☐ same discharge point as treated effluent ☐ sanitary sewer ☒ other (please describe)
Not Applicable

3. **Anticipated operating schedule** during the new permit term (2012 – 2017)
2017 to 2037

4. **Anticipated flowrate** (in gpm), and total volume of treated water to be discharged per month:
Max = 1,795 gpm, Min = 112 gpm, Avg = 175 gpm. Avg = 7,800,000 gal/mo

5. **Effluent discharge point location**:
Silver Creek, at: Lat 44º 3’ 35.0” Long -87º 43’ 3.2”

6. Is an **air permit** from the DNR air management program required? If not, why not
Concentrations of volatilized VOCs in the air from pond are expected to be negligible, based on concentrations in groundwater. Total emissions will be below air permitting thresholds.

III. DISCHARGE MANAGEMENT PLAN UPDATE

Include the following information:

1. A **summary** of analytical results for contaminants **detected** at the site.

2. Results from the most recent **volatile organic compounds (VOC) scan**, including methods used and detection levels.

3. Results from an analysis of the **poly-nuclear aromatic hydrocarbons (PAHs)** shown on the right, including methods used and detection levels (unless PAH data are already submitted)

   The lab needs to reach the lowest detection level achievable for each parameter because of the low limit for total PAHs. EPA test method SW-846 8310 is recommended.

benzo(a)anthracene	dibenzo(a,h)anthracene
benzo(a)pyrene	fluoranthene
benzo(b)fluoranthene	indeno(1,2,3-cd)pyrene
benzo(g,h,i)perylene	naphthalene
benzo(k)fluoranthene	phenanthrene
chrysene	pyrene

4. **Contaminants proposed for periodic monitoring** and demonstration of why any monitoring required in the permit should be exempted due to low level of contaminants in the wastewater discharge.

5. **Information to support request for any alternate effluent limit** for discharges to groundwater (Part 5 of permit) or request for temporary exemption for in-situ discharges (Part 6 of permit).

6. **Plans and specifications for the proposed treatment system** identifying sampling points. For supplier furnished package treatment units, only a flow diagram, design summary, and unit sizing calculations are required.

7. **General description of operations**, identifying operational tasks, who is responsible to do that task, and how frequently the task is done (particularly needed at pump & treat systems).

8. A **site plan** that identifies general land uses, underground storage tanks and pipelines, groundwater monitoring and recovery wells, contaminant plume definition and zone of influence, other known spills in the area, septic tanks and drain fields, separation distances to potable water supply wells and residences, and other pertinent information.

9. A **detailed map** of the discharge location, showing if discharge is direct or via a storm sewer or other conveyance. Indicate distance from site to discharge location and other impacted water bodies or wetlands.
   - If a city storm sewer is used, approval from the municipality is required.
   - If a new outfall structure is proposed, the plans should identify the outfall and incorporate appropriate erosion control methods. A permit for riprap projects (available at most DNR offices) should be obtained.
   - Wetland discharges are not allowed unless they meet wetland protection requirements of Ch. NR 103, Wis. Admin. Code.

III. SIGNATURES

A. Signature of person completing the form, attesting to the accuracy and completeness of the statements made.

Dave Henderson, PE	Senior Project Manager, AECOM	1/3/17
Name	Title	Date Signed
1555 North RiverCenter Drive, Milwaukee, WI 53212	Dave.Henderson@aecom.com	414-944-6190
Address	Email	Telephone Number

B. This application must be signed by the official representative of the permitted facility (responsible party) who is: the owner, the sole proprietor for a sole proprietorship, a general partner for a partnership, or by a ranking elected official or other duly authorized representative for a unit of government, or an executive officer of at least the level of vice president for a corporation, having overall responsibility for the operation of the facility. If the application is not signed, or is found to be incomplete, it will be returned.

Dan Koski, PE	Director of Public Infrastructure, City of Manitowoc
Typed or Printed Name of Official Representative	Title
PE	1-3-17
Signature of Official Representative	Date Signed

Submit this General Permit Request for Coverage:

Department of Natural Resources,
Water Permits Central Intake - WT/3,
P.O. Box 7185,
Madison, WI 53707-7185.

The decision on whether to cover this discharge under the remediation general permit will be made by regional DNR wastewater staff. Upon receipt in Madison, this application will be forwarded to the appropriate regional staff person.

A copy of the submittal should also be sent to the Department Remediation & Redevelopment Project Manager.
Watershed Central:\General Permits\Reissue Docs\Grw Remediation\Request For Coverage 2012.doc

Prepared for:
City of Manitowoc
Manitowoc, Wisconsin

Prepared by:
AECOM
Milwaukee, WI
January 3, 2017

WPDES Discharge Monitoring Plan

Former Town of Newton Gravel Pit
3130 Hecker Road, Manitowoc, Wisconsin

WDNR FID 436104020, BRRTS #02-36-000268

Contents

List of Attachments

Introduction

The Discharge Monitoring Plan is prepared as an attachment to and in compliance with General Permit WI-0046566-6 – General Permit to Discharge under the Wisconsin Pollutant Discharge Elimination System (WPDES). The discharge will occur from a proposed engineered groundwater treatment pond through a channel leading to a single 18-inch pipe that will discharge to Silver Creek, which flows through the Former Town of Newton Gravel Pit property.

The Former Town of Newton Gravel Pit property is owned by the City of Manitowoc, is approximately 58 acres in size, and is located at 3130 Hecker Road in the Town of Newton, Manitowoc County Wisconsin. The property's legal description is the southwest ¼ of the northwest ¼ of Section 2, Township 18 north, Range 23 east (See Figure 1, *Site Location Map* in Attachment 6).

Within the 58 acres, approximately one acre along the western property boundary was the location of a disposal pit that received industrial wastes (the Western Source Area) during the 1960s and early 1970s. The Western Source Area is located on an elevated area of the property. Former gravel pit operations have lowered the ground surface elevation to the west from 15 to 20 feet and to the east approximately 30 feet.

The land use in the vicinity of the property is rural. Bordering the property to the west is an active gravel pit, to the north is farmland and forest, to the east is farmland and rural residences, and to the south is farmland and an active gravel pit. A small creek, Silver Creek, flows through the property from the north/northwest to the south/southeast (See Figure 2, *Site Features* in Attachment 6).

An engineered groundwater treatment pond is being proposed to intercept and treat the groundwater contaminant plume within the Groundwater Treatment Area directly down-gradient of the Western Source Area (See Figure x-Draft, *Conceptual Site Plan, Site Layout* in Attachment 3 and the Photo Log in Attachment 6). The contaminants of concern (COCs) within the groundwater treatment area are principally volatile organic compounds (VOCs).

The proposed pond will have a length of approximately 500 feet (ft), a width of approx. 160 ft, and a depth of approx. 20 ft. The maximum depth of the pond is designed to intercept approximately two-thirds of the vertical extent of the groundwater contaminant plume. It is anticipated that engineering controls (e.g. a discharge to Silver Creek and a phytoremediation component) will improve the hydraulic gradient control (i.e. capture zone) around and underneath the pond, effectively increasing the size of the pond.

In addition to the pond's size, the ability of a pond to effectively reduce the mass of VOCs in the captured groundwater is largely dependent upon volatilization of the COCs from the pond. To facilitate volatilization under this alternative, circulation equipment (e.g. Solar Bee model SB5000 mixer) will be used to provide physical mixing and aeration of the water (See product information in Attachment 4). This mixing will improve evaporation and stripping of COCs, as well as keep the pond open and operational during the winter months.

Additional information copied from the RAOR report on the groundwater impacts and selection of the engineered pond groundwater treatment alternative is provided in Attachment 4. The complete R&R Program file for the site is available at the WDNR NE Region office (BRRTS #: 02-36-000268, DNR Facility ID #: 436104020).

1.1 Summary of Analytical Results of the Detected Contaminants

As identified during site investigation activities, the following are the principal COCs within the Groundwater Treatment Area (i.e. the proposed treatment pond area):

- Petroleum VOCs: Benzene and toluene.
- Chlorinated VOCs (CVOCs): Tetrachloroethylene (PCE), trichloroethylene (TCE), 11-dichloroethane, 11-dichloroethene, cis-1,2-dichloroethylene (cis-1,2-DCE), trans-1,2-dichloroethylene (trans-1,2-DCE), and vinyl chloride.

A summary table of the analytical results of detected contaminants within the Groundwater Treatment Area are included as Attachment 1. The analytical results are from a *Groundwater Treatment Area Feasibility Study Technical Memorandum*[1] that has been submitted to the WDNR R&R Program.

1.2 Results of Volatile Organic Compounds Testing

The laboratory results for the VOC testing within the Groundwater Treatment Area are included as Attachment 2.

1.3 Results of Polynuclear Aromatic Hydrocarbon Analysis

Polynuclear Aromatic Hydrocarbons (PAHs) were not detected in groundwater analysis from the Western Source Area, up-gradient from the Groundwater Treatment Area. Because PAHs are not anticipated to be present in the groundwater, PAHs were not analyzed in the groundwater sampled within the Groundwater Treatment Area.

1.4 Contaminants Proposed for Periodic Monitoring

AECOM proposes to incorporate pre-discharge monitoring into the WDPES Discharge Monitoring Plan.

The upstream end of the outfall discharge pipe will be equipped with a valve allowing for the regulation of flow from the pond (See Figure y-Draft, *Conceptual Site Plan, Details* in Attachment 3). Upon substantial completion of the pond and the start of the in-pond circulation equipment, the valve will remain closed preventing discharge from the pond.

With a stated 'combined flow rate' of 5,000 gallons/minute for the circulation equipment and a total pond volume of approximately 5.453 million gallons, it is anticipated that full mixing of a single pond volume will occur once per day (approximately 18.2 hours).

Pre-Discharge Monitoring:

At substantial completion, the pond will be allowed to mix for a minimum of one week prior to a pre-discharge monitoring event.

The proposed pre-discharge sampling location is at the pond entrance to the discharge channel at approximately the midpoint of the channel. The sample will be obtained with a typical groundwater sampling bailer to sample the discharge channel water column.

[1] Groundwater Treatment Area Feasibility Study Technical Memorandum, AECOM, April 4, 2016.

Weekly pond samples will be collected until two consecutive samples meet the discharge requirements of the permit. At that time, the valve will be opened and discharge to Silver Creek will begin. Periodic monitoring under the permit will commence at that time per the criteria outline below.

Discharge Monitoring:

Initial periodic monitoring of the discharge will include those parameters listed in Tables 3.1 and 4.1 of the WPDES General Permit. The initial monitoring period shall consist of the first six weeks of discharge. After the sixth week, the monitoring frequency will be reduced to monthly and consist of those contaminants detected during the initial monitoring period. After one year of monitoring, if no analysis results exceed 60% of any discharge limitation, the City of Manitowoc will request a reduction in the monitoring frequency to monthly per Section 2.5 of the WPDES permit.

Flow measurements will be collected during each sampling event based on calibrated flow over the discharge weir. An average flow rate based on the recorded measurements will be reported during the Discharge Monitoring Reporting process.

1.5 Alternate Effluent Limits

Alternate effluent limits are not proposed for the covered discharge.

1.6 Plans of the Treatment System

The plans for the pond system and informational material for the solar powered circulation equipment are included as Attachments 3 and 4 respectively. Details of the inlet structure showing the control valve and fish screen along with the outfall structure and location are also included with Attachment 3.

The engineered pond is designed to capture the groundwater plume from the Western Source Area and treat the groundwater to below discharge limits. The details of the pond operation as designed are in the WDNR files with the submitted Remedial Action Options Report & Conceptual Design Report (RAOR)[2]. A copy of the pertinent sections of the RAOR is included in this document for reference as Attachment 5.

1.7 Description of Operations

The treatment system (capture pond, circulation system and discharge) are designed for minimal operational needs. Periodic maintenance of the solar-power circulation equipment will occur following the manufacturer's recommendations. In addition, the discharge inlet and outfall structures will be inspected during sampling events. All operation and maintenance of the pond, outfall and circulation equipment will be carried out by the City of Manitowoc staff.

1.8 Site Plans and Detailed Maps

Plans showing the Site Location (Figure 1), Site Features (Figure 2), and a Photo Log of the pond area are included as Attachment 6. Also included are the plans for the pond and detail sheet indicating the discharge outfall location, details of the discharge pipe inlet and the pond outfall structure (Attachment 3).

[2] Remedial Action Options Report & Conceptual Design Report, AECOM, August 18, 2016

ATTACHMENTS

Attachment 1
Summary of Detected Contaminants

SUMMARY OF CONTAMINATES DETECTED IN THE POND GROUNDWATER IMPACT DELINEATION FEASIBILITY STUDY
FORMER TOWN OF NEWTON GRAVEL PIT
MANITOWOC, WISCONSIN

Analyte	ES[1]	PAL[2]	WPDES general permit limits		P-1			P-2			P-2R	P-3		
					8/26/15	9/15/15	3/22/16	8/26/15	9/15/15	3/22/16	3/22/16	8/26/15	9/15/15	3/22/16
Volatile Organic Compounds (VOCs) (µg/L):														
Benzene	5	0.5	50	mthly avg	< 0.44	< 22	< 4.4	< 0.44	< 0.44	< 0.44	< 0.44	*0.75* J	< 0.44	< 0.44
Chloroform	6	0.6	120	mthly avg	< 0.43	< 21.5	< 4.3	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43
1,1-Dichloroethane	850	85	n/a		1.77 J	< 55	< 11	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
1,1-Dichloroethene	7	0.7	50	mthly avg	*0.76* J	< 32.5	< 6.5	< 0.65	< 0.65	< 0.65	< 0.65	< 0.65	< 0.65	< 0.65
cis-1,2-Dichloroethene	70	7	n/a		**880**	**840**	**287**	< 0.45	< 0.45	< 0.45	< 0.45	*38*	*18.6*	*17.2*
trans-1,2-Dichloroethene	100	20	n/a		4.7	< 27	< 5.4	< 0.54	< 0.54	< 0.54	< 0.54	*46*	*25.5*	*25.7*
Tetrachloroethene	5	0.5	50	mthly avg	*1.88*	< 24.5	< 4.9	< 0.49	< 0.49	< 0.49	< 0.49	< 0.49	< 0.49	< 0.49
Toluene	800	160			< 0.44	< 22	< 4.4	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44
Trichloroethene (TCE)	5	0.5			**105**	**90**	**25**	< 0.47	< 0.47	< 0.47	< 0.47	**46**	**9.4**	**6.7**
Vinyl Chloride	0.2	0.02			**0.6**	< 8.5	< 1.7	< 0.17	< 0.17	< 0.17	< 0.17	**0.27** J	**0.23** J	< 0.17

NOTES:

[1] Enforcement Standard from NR140, January 2012.
[2] Preventive Action Limit from NR140, January 2012.
NL - ES or PAL not listed in NR140.

NA - Not analyzed.
J - Compound was detected at a concentration between the limit of detection (LOD) and the limit of quantitation (LOQ).
Bold indicates a PAL exceedance.
Bold and underlining indicates an ES exceedance.

SUMMARY OF CONTAMINATES DETECTED IN THE POND GROUNDWATER IMPACT DELINEATION FEASIBILITY STUDY
FORMER TOWN OF NEWTON GRAVEL PIT
MANITOWOC, WISCONSIN

Analyte	ES[1]	PAL[2]	WPDES general permit limits		P-4 8/26/15	P-5 8/26/15	P-6 8/26/15	P-7 8/26/15	P-8 8/26/15	P-9 8/26/15	P-10 8/26/15	P-11 8/26/15	P-12 3/22/16	P-13 3/22/16
Volatile Organic Compounds (VOCs) (µg/L):														
Benzene	5	0.5	50	mthly avg	< 220	**78** J	**75** J	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44
Chloroform	6	0.6	120	mthly avg	< 215	< 43	< 43	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43
1,1-Dichloroethane	850	85	n/a		< 550	< 110	< 110	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
1,1-Dichloroethene	7	0.7	50	mthly avg	< 325	< 65	< 65	< 0.65	< 0.65	< 0.65	< 0.65	< 0.65	< 0.65	< 0.65
cis-1,2-Dichloroethene	70	7	n/a		**24000**	**3000**	**3900**	**63**	**35**	< 0.45	< 0.45	1.75	< 0.45	< 0.45
trans-1,2-Dichloroethene	100	20	n/a		< 270	< 54	< 54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54
Tetrachloroethene	5	0.5	50	mthly avg	< 245	< 49	< 49	< 0.49	< 0.49	< 0.49	< 0.49	< 0.49	< 0.49	< 0.49
Toluene	800	160			*240* J	*168*	71	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44
Trichloroethene (TCE)	5	0.5			< 235	< 47	< 47	**25**	**44**	*2.64*	*2.82*	< 0.47	< 0.47	< 0.47
Vinyl Chloride	0.2	0.02			**4900**	< **4000**	**3120**	< 0.17	< 0.17	< 0.17	< 0.17	**0.24 J**	< 0.17	< 0.17

NOTES:

[1] Enforcement Standard from NR140, January 2012.
[2] Preventive Action Limit from NR140, January 2012.
NL - ES or PAL not listed in NR140.

NA - Not analyzed.
J - Compound was detected at a concentration between the limit of detection (LOD) and the limit of quantitation (LOQ).
Bold indicates a PAL exceedance.
Bold and underlining indicates an ES exceedance.

Attachment 2
Laboratory Analytical Results

Synergy Environmental Lab, INC.

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

DAVE HENDERSON
AECOM
1555 N RIVER CENTER DRIVE
MILWAUKEE, WI 53212

Report Date *04-Sep-15*

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560A
Sample ID P-1
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/28/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/28/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/28/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/28/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/28/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/28/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/28/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/28/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/28/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/28/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/28/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethane	1.77 "J"	ug/l	1.1	3.6	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethene	0.76 "J"	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
cis-1,2-Dichloroethene	880	ug/l	4.5	14	10	8260B		8/31/2015	CJR	1
trans-1,2-Dichloroethene	4.7	ug/l	0.54	1.7	1	8260B		8/28/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/28/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/28/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/28/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/28/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/28/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/28/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560A
Sample ID P-1
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/28/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/28/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/28/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/28/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/28/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/28/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Tetrachloroethene	1.88	ug/l	0.49	1.5	1	8260B		8/28/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/28/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/28/2015	CJR	1
1,1,1-Trichloroethane	19.2	ug/l	0.84	2.7	1	8260B		8/28/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/28/2015	CJR	1
Trichloroethene (TCE)	105	ug/l	0.47	1.5	1	8260B		8/28/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/28/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/28/2015	CJR	1
Vinyl Chloride	0.60	ug/l	0.17	0.54	1	8260B		8/28/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/28/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/28/2015	CJR	1
SUR - Toluene-d8	100	REC %			1	8260B		8/28/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	102	REC %			1	8260B		8/28/2015	CJR	1
SUR - 4-Bromofluorobenzene	105	REC %			1	8260B		8/28/2015	CJR	1
SUR - Dibromofluoromethane	99	REC %			1	8260B		8/28/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560B
Sample ID P-2
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/28/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/28/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/28/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/28/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/28/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/28/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/28/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/28/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/28/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/28/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/28/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		8/28/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/28/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/28/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/28/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/28/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/28/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/28/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/28/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/28/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/28/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/28/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/28/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/28/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		8/28/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/28/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/28/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		8/28/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/28/2015	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		8/28/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/28/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/28/2015	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		8/28/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/28/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/28/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	105	REC %			1	8260B		8/28/2015	CJR	1
SUR - 4-Bromofluorobenzene	106	REC %			1	8260B		8/28/2015	CJR	1
SUR - Dibromofluoromethane	101	REC %			1	8260B		8/28/2015	CJR	1
SUR - Toluene-d8	101	REC %			1	8260B		8/28/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560C
Sample ID P-3
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	0.75 "J"	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/28/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/28/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/28/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/28/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/28/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/28/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/28/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/28/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/28/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/28/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/28/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
cis-1,2-Dichloroethene	38	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
trans-1,2-Dichloroethene	46	ug/l	0.54	1.7	1	8260B		8/28/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/28/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/28/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/28/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/28/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/28/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/28/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/28/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/28/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/28/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/28/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/28/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/28/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		8/28/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/28/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/28/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		8/28/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/28/2015	CJR	1
Trichloroethene (TCE)	46	ug/l	0.47	1.5	1	8260B		8/28/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/28/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/28/2015	CJR	1
Vinyl Chloride	0.27 "J"	ug/l	0.17	0.54	1	8260B		8/28/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/28/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/28/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	101	REC %			1	8260B		8/28/2015	CJR	1
SUR - 4-Bromofluorobenzene	107	REC %			1	8260B		8/28/2015	CJR	1
SUR - Dibromofluoromethane	99	REC %			1	8260B		8/28/2015	CJR	1
SUR - Toluene-d8	102	REC %			1	8260B		8/28/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560D
Sample ID P-4
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 220	ug/l	220	700	500	8260B		8/31/2015	CJR	1
Bromobenzene	< 240	ug/l	240	750	500	8260B		8/31/2015	CJR	1
Bromodichloromethane	< 230	ug/l	230	750	500	8260B		8/31/2015	CJR	1
Bromoform	< 230	ug/l	230	750	500	8260B		8/31/2015	CJR	1
tert-Butylbenzene	< 550	ug/l	550	1700	500	8260B		8/31/2015	CJR	1
sec-Butylbenzene	< 600	ug/l	600	1900	500	8260B		8/31/2015	CJR	1
n-Butylbenzene	< 500	ug/l	500	1650	500	8260B		8/31/2015	CJR	1
Carbon Tetrachloride	< 255	ug/l	255	800	500	8260B		8/31/2015	CJR	1
Chlorobenzene	< 230	ug/l	230	700	500	8260B		8/31/2015	CJR	1
Chloroethane	< 325	ug/l	325	1050	500	8260B		8/31/2015	CJR	1
Chloroform	< 215	ug/l	215	700	500	8260B		8/31/2015	CJR	1
Chloromethane	< 950	ug/l	950	3000	500	8260B		8/31/2015	CJR	1
2-Chlorotoluene	< 200	ug/l	200	650	500	8260B		8/31/2015	CJR	1
4-Chlorotoluene	< 315	ug/l	315	1000	500	8260B		8/31/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 700	ug/l	700	2250	500	8260B		8/31/2015	CJR	1
Dibromochloromethane	< 225	ug/l	225	700	500	8260B		8/31/2015	CJR	1
1,4-Dichlorobenzene	< 245	ug/l	245	800	500	8260B		8/31/2015	CJR	1
1,3-Dichlorobenzene	< 260	ug/l	260	800	500	8260B		8/31/2015	CJR	1
1,2-Dichlorobenzene	< 230	ug/l	230	750	500	8260B		8/31/2015	CJR	1
Dichlorodifluoromethane	< 435	ug/l	435	1400	500	8260B		8/31/2015	CJR	1
1,2-Dichloroethane	< 240	ug/l	240	750	500	8260B		8/31/2015	CJR	1
1,1-Dichloroethane	< 550	ug/l	550	1800	500	8260B		8/31/2015	CJR	1
1,1-Dichloroethene	< 325	ug/l	325	1050	500	8260B		8/31/2015	CJR	1
cis-1,2-Dichloroethene	24000	ug/l	225	700	500	8260B		8/31/2015	CJR	1
trans-1,2-Dichloroethene	< 270	ug/l	270	850	500	8260B		8/31/2015	CJR	1
1,2-Dichloropropane	< 215	ug/l	215	685	500	8260B		8/31/2015	CJR	1
2,2-Dichloropropane	< 1550	ug/l	1550	4900	500	8260B		8/31/2015	CJR	1
1,3-Dichloropropane	< 210	ug/l	210	650	500	8260B		8/31/2015	CJR	1
Di-isopropyl ether	< 220	ug/l	220	700	500	8260B		8/31/2015	CJR	1
EDB (1,2-Dibromoethane)	< 315	ug/l	315	1000	500	8260B		8/31/2015	CJR	1
Ethylbenzene	< 355	ug/l	355	1150	500	8260B		8/31/2015	CJR	1
Hexachlorobutadiene	< 1100	ug/l	1100	3550	500	8260B		8/31/2015	CJR	1
Isopropylbenzene	< 410	ug/l	410	1300	500	8260B		8/31/2015	CJR	1
p-Isopropyltoluene	< 550	ug/l	550	1750	500	8260B		8/31/2015	CJR	1
Methylene chloride	< 650	ug/l	650	2100	500	8260B		8/31/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 550	ug/l	550	1850	500	8260B		8/31/2015	CJR	1
Naphthalene	< 800	ug/l	800	2600	500	8260B		8/31/2015	CJR	1
n-Propylbenzene	< 385	ug/l	385	1200	500	8260B		8/31/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 260	ug/l	260	850	500	8260B		8/31/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 240	ug/l	240	750	500	8260B		8/31/2015	CJR	1
Tetrachloroethene	< 245	ug/l	245	750	500	8260B		8/31/2015	CJR	1
Toluene	240 "J"	ug/l	220	700	500	8260B		8/31/2015	CJR	1
1,2,4-Trichlorobenzene	< 850	ug/l	850	2800	500	8260B		8/31/2015	CJR	1
1,2,3-Trichlorobenzene	< 1350	ug/l	1350	4300	500	8260B		8/31/2015	CJR	1
1,1,1-Trichloroethane	< 420	ug/l	420	1350	500	8260B		8/31/2015	CJR	1
1,1,2-Trichloroethane	< 240	ug/l	240	760	500	8260B		8/31/2015	CJR	1
Trichloroethene (TCE)	< 235	ug/l	235	750	500	8260B		8/31/2015	CJR	1
Trichlorofluoromethane	< 435	ug/l	435	1400	500	8260B		8/31/2015	CJR	1
1,2,4-Trimethylbenzene	< 800	ug/l	800	2500	500	8260B		8/31/2015	CJR	1
1,3,5-Trimethylbenzene	< 750	ug/l	750	2400	500	8260B		8/31/2015	CJR	1
Vinyl Chloride	4900	ug/l	85	270	500	8260B		8/31/2015	CJR	1
m&p-Xylene	< 1100	ug/l	1100	3450	500	8260B		8/31/2015	CJR	1
o-Xylene	< 450	ug/l	450	1450	500	8260B		8/31/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	102	REC %			500	8260B		8/31/2015	CJR	1
SUR - 4-Bromofluorobenzene	107	REC %			500	8260B		8/31/2015	CJR	1
SUR - Dibromofluoromethane	99	REC %			500	8260B		8/31/2015	CJR	1
SUR - Toluene-d8	102	REC %			500	8260B		8/31/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560E
Sample ID P-5
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	78 "J"	ug/l	44	140	100	8260B		8/31/2015	CJR	1
Bromobenzene	< 48	ug/l	48	150	100	8260B		8/31/2015	CJR	1
Bromodichloromethane	< 46	ug/l	46	150	100	8260B		8/31/2015	CJR	1
Bromoform	< 46	ug/l	46	150	100	8260B		8/31/2015	CJR	1
tert-Butylbenzene	< 110	ug/l	110	340	100	8260B		8/31/2015	CJR	1
sec-Butylbenzene	< 120	ug/l	120	380	100	8260B		8/31/2015	CJR	1
n-Butylbenzene	< 100	ug/l	100	330	100	8260B		8/31/2015	CJR	1
Carbon Tetrachloride	< 51	ug/l	51	160	100	8260B		8/31/2015	CJR	1
Chlorobenzene	< 46	ug/l	46	140	100	8260B		8/31/2015	CJR	1
Chloroethane	< 65	ug/l	65	210	100	8260B		8/31/2015	CJR	1
Chloroform	< 43	ug/l	43	140	100	8260B		8/31/2015	CJR	1
Chloromethane	< 190	ug/l	190	600	100	8260B		8/31/2015	CJR	1
2-Chlorotoluene	< 40	ug/l	40	130	100	8260B		8/31/2015	CJR	1
4-Chlorotoluene	< 63	ug/l	63	200	100	8260B		8/31/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 140	ug/l	140	450	100	8260B		8/31/2015	CJR	1
Dibromochloromethane	< 45	ug/l	45	140	100	8260B		8/31/2015	CJR	1
1,4-Dichlorobenzene	< 49	ug/l	49	160	100	8260B		8/31/2015	CJR	1
1,3-Dichlorobenzene	< 52	ug/l	52	160	100	8260B		8/31/2015	CJR	1
1,2-Dichlorobenzene	< 46	ug/l	46	150	100	8260B		8/31/2015	CJR	1
Dichlorodifluoromethane	< 87	ug/l	87	280	100	8260B		8/31/2015	CJR	1
1,2-Dichloroethane	< 48	ug/l	48	150	100	8260B		8/31/2015	CJR	1
1,1-Dichloroethane	< 110	ug/l	110	360	100	8260B		8/31/2015	CJR	1
1,1-Dichloroethene	< 65	ug/l	65	210	100	8260B		8/31/2015	CJR	1
cis-1,2-Dichloroethene	3000	ug/l	45	140	100	8260B		8/31/2015	CJR	1
trans-1,2-Dichloroethene	< 54	ug/l	54	170	100	8260B		8/31/2015	CJR	1
1,2-Dichloropropane	< 43	ug/l	43	137	100	8260B		8/31/2015	CJR	1
2,2-Dichloropropane	< 310	ug/l	310	980	100	8260B		8/31/2015	CJR	1
1,3-Dichloropropane	< 42	ug/l	42	130	100	8260B		8/31/2015	CJR	1
Di-isopropyl ether	< 44	ug/l	44	140	100	8260B		8/31/2015	CJR	1
EDB (1,2-Dibromoethane)	< 63	ug/l	63	200	100	8260B		8/31/2015	CJR	1
Ethylbenzene	< 71	ug/l	71	230	100	8260B		8/31/2015	CJR	1
Hexachlorobutadiene	< 220	ug/l	220	710	100	8260B		8/31/2015	CJR	1
Isopropylbenzene	< 82	ug/l	82	260	100	8260B		8/31/2015	CJR	1
p-Isopropyltoluene	< 110	ug/l	110	350	100	8260B		8/31/2015	CJR	1
Methylene chloride	< 130	ug/l	130	420	100	8260B		8/31/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 110	ug/l	110	370	100	8260B		8/31/2015	CJR	1
Naphthalene	< 160	ug/l	160	520	100	8260B		8/31/2015	CJR	1
n-Propylbenzene	< 77	ug/l	77	240	100	8260B		8/31/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 52	ug/l	52	170	100	8260B		8/31/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 48	ug/l	48	150	100	8260B		8/31/2015	CJR	1
Tetrachloroethene	< 49	ug/l	49	150	100	8260B		8/31/2015	CJR	1
Toluene	168	ug/l	44	140	100	8260B		8/31/2015	CJR	1
1,2,4-Trichlorobenzene	< 170	ug/l	170	560	100	8260B		8/31/2015	CJR	1
1,2,3-Trichlorobenzene	< 270	ug/l	270	860	100	8260B		8/31/2015	CJR	1
1,1,1-Trichloroethane	< 84	ug/l	84	270	100	8260B		8/31/2015	CJR	1
1,1,2-Trichloroethane	< 48	ug/l	48	152	100	8260B		8/31/2015	CJR	1
Trichloroethene (TCE)	< 47	ug/l	47	150	100	8260B		8/31/2015	CJR	1
Trichlorofluoromethane	< 87	ug/l	87	280	100	8260B		8/31/2015	CJR	1
1,2,4-Trimethylbenzene	< 160	ug/l	160	500	100	8260B		8/31/2015	CJR	1
1,3,5-Trimethylbenzene	< 150	ug/l	150	480	100	8260B		8/31/2015	CJR	1
Vinyl Chloride	4000	ug/l	17	54	100	8260B		8/31/2015	CJR	1
m&p-Xylene	< 220	ug/l	220	690	100	8260B		8/31/2015	CJR	1
o-Xylene	< 90	ug/l	90	290	100	8260B		8/31/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	104	REC %			100	8260B		8/31/2015	CJR	1
SUR - 4-Bromofluorobenzene	103	REC %			100	8260B		8/31/2015	CJR	1
SUR - Dibromofluoromethane	100	REC %			100	8260B		8/31/2015	CJR	1
SUR - Toluene-d8	103	REC %			100	8260B		8/31/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560F
Sample ID P-6
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	75 "J"	ug/l	44	140	100	8260B		9/1/2015	CJR	1
Bromobenzene	< 48	ug/l	48	150	100	8260B		9/1/2015	CJR	1
Bromodichloromethane	< 46	ug/l	46	150	100	8260B		9/1/2015	CJR	1
Bromoform	< 46	ug/l	46	150	100	8260B		9/1/2015	CJR	1
tert-Butylbenzene	< 110	ug/l	110	340	100	8260B		9/1/2015	CJR	1
sec-Butylbenzene	< 120	ug/l	120	380	100	8260B		9/1/2015	CJR	1
n-Butylbenzene	< 100	ug/l	100	330	100	8260B		9/1/2015	CJR	1
Carbon Tetrachloride	< 51	ug/l	51	160	100	8260B		9/1/2015	CJR	1
Chlorobenzene	< 46	ug/l	46	140	100	8260B		9/1/2015	CJR	1
Chloroethane	< 65	ug/l	65	210	100	8260B		9/1/2015	CJR	1
Chloroform	< 43	ug/l	43	140	100	8260B		9/1/2015	CJR	1
Chloromethane	< 190	ug/l	190	600	100	8260B		9/1/2015	CJR	1
2-Chlorotoluene	< 40	ug/l	40	130	100	8260B		9/1/2015	CJR	1
4-Chlorotoluene	< 63	ug/l	63	200	100	8260B		9/1/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 140	ug/l	140	450	100	8260B		9/1/2015	CJR	1
Dibromochloromethane	< 45	ug/l	45	140	100	8260B		9/1/2015	CJR	1
1,4-Dichlorobenzene	< 49	ug/l	49	160	100	8260B		9/1/2015	CJR	1
1,3-Dichlorobenzene	< 52	ug/l	52	160	100	8260B		9/1/2015	CJR	1
1,2-Dichlorobenzene	< 46	ug/l	46	150	100	8260B		9/1/2015	CJR	1
Dichlorodifluoromethane	< 87	ug/l	87	280	100	8260B		9/1/2015	CJR	1
1,2-Dichloroethane	< 48	ug/l	48	150	100	8260B		9/1/2015	CJR	1
1,1-Dichloroethane	< 110	ug/l	110	360	100	8260B		9/1/2015	CJR	1
1,1-Dichloroethene	< 65	ug/l	65	210	100	8260B		9/1/2015	CJR	1
cis-1,2-Dichloroethene	3900	ug/l	45	140	100	8260B		9/1/2015	CJR	1
trans-1,2-Dichloroethene	< 54	ug/l	54	170	100	8260B		9/1/2015	CJR	1
1,2-Dichloropropane	< 43	ug/l	43	137	100	8260B		9/1/2015	CJR	1
2,2-Dichloropropane	< 310	ug/l	310	980	100	8260B		9/1/2015	CJR	1
1,3-Dichloropropane	< 42	ug/l	42	130	100	8260B		9/1/2015	CJR	1
Di-isopropyl ether	< 44	ug/l	44	140	100	8260B		9/1/2015	CJR	1
EDB (1,2-Dibromoethane)	< 63	ug/l	63	200	100	8260B		9/1/2015	CJR	1
Ethylbenzene	< 71	ug/l	71	230	100	8260B		9/1/2015	CJR	1
Hexachlorobutadiene	< 220	ug/l	220	710	100	8260B		9/1/2015	CJR	1
Isopropylbenzene	< 82	ug/l	82	260	100	8260B		9/1/2015	CJR	1
p-Isopropyltoluene	< 110	ug/l	110	350	100	8260B		9/1/2015	CJR	1
Methylene chloride	< 130	ug/l	130	420	100	8260B		9/1/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 110	ug/l	110	370	100	8260B		9/1/2015	CJR	1
Naphthalene	< 160	ug/l	160	520	100	8260B		9/1/2015	CJR	1
n-Propylbenzene	< 77	ug/l	77	240	100	8260B		9/1/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 52	ug/l	52	170	100	8260B		9/1/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 48	ug/l	48	150	100	8260B		9/1/2015	CJR	1
Tetrachloroethene	< 49	ug/l	49	150	100	8260B		9/1/2015	CJR	1
Toluene	71 "J"	ug/l	44	140	100	8260B		9/1/2015	CJR	1
1,2,4-Trichlorobenzene	< 170	ug/l	170	560	100	8260B		9/1/2015	CJR	1
1,2,3-Trichlorobenzene	< 270	ug/l	270	860	100	8260B		9/1/2015	CJR	1
1,1,1-Trichloroethane	< 84	ug/l	84	270	100	8260B		9/1/2015	CJR	1
1,1,2-Trichloroethane	< 48	ug/l	48	152	100	8260B		9/1/2015	CJR	1
Trichloroethene (TCE)	< 47	ug/l	47	150	100	8260B		9/1/2015	CJR	1
Trichlorofluoromethane	< 87	ug/l	87	280	100	8260B		9/1/2015	CJR	1
1,2,4-Trimethylbenzene	< 160	ug/l	160	500	100	8260B		9/1/2015	CJR	1
1,3,5-Trimethylbenzene	< 150	ug/l	150	480	100	8260B		9/1/2015	CJR	1
Vinyl Chloride	3120	ug/l	17	54	100	8260B		9/1/2015	CJR	1
m&p-Xylene	< 220	ug/l	220	690	100	8260B		9/1/2015	CJR	1
o-Xylene	< 90	ug/l	90	290	100	8260B		9/1/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	102	REC %			100	8260B		9/1/2015	CJR	1
SUR - 4-Bromofluorobenzene	106	REC %			100	8260B		9/1/2015	CJR	1
SUR - Dibromofluoromethane	102	REC %			100	8260B		9/1/2015	CJR	1
SUR - Toluene-d8	102	REC %			100	8260B		9/1/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560G
Sample ID P-7
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/31/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/31/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/31/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/31/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/31/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/31/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/31/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/31/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/31/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/31/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/31/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/31/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/31/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/31/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/31/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		8/31/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		8/31/2015	CJR	1
cis-1,2-Dichloroethene	63	ug/l	0.45	1.4	1	8260B		8/31/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		8/31/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/31/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/31/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/31/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/31/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/31/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/31/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/31/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/31/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/31/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/31/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/31/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/31/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/31/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		8/31/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/31/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/31/2015	CJR	1
1,1,1-Trichloroethane	4.7	ug/l	0.84	2.7	1	8260B		8/31/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/31/2015	CJR	1
Trichloroethene (TCE)	25	ug/l	0.47	1.5	1	8260B		8/31/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/31/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/31/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/31/2015	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		8/31/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/31/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/31/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	105	REC %			1	8260B		8/31/2015	CJR	1
SUR - 4-Bromofluorobenzene	103	REC %			1	8260B		8/31/2015	CJR	1
SUR - Dibromofluoromethane	100	REC %			1	8260B		8/31/2015	CJR	1
SUR - Toluene-d8	102	REC %			1	8260B		8/31/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560H
Sample ID P-8
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/31/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/31/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/31/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/31/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/31/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/31/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/31/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/31/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/31/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/31/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/31/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/31/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/31/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/31/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/31/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		8/31/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		8/31/2015	CJR	1
cis-1,2-Dichloroethene	35	ug/l	0.45	1.4	1	8260B		8/31/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		8/31/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/31/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/31/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/31/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/31/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/31/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/31/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/31/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/31/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/31/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/31/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/31/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/31/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/31/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		8/31/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/31/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/31/2015	CJR	1
1,1,1-Trichloroethane	3.5	ug/l	0.84	2.7	1	8260B		8/31/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/31/2015	CJR	1
Trichloroethene (TCE)	44	ug/l	0.47	1.5	1	8260B		8/31/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/31/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/31/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/31/2015	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		8/31/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/31/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/31/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	106	REC %			1	8260B		8/31/2015	CJR	1
SUR - 4-Bromofluorobenzene	102	REC %			1	8260B		8/31/2015	CJR	1
SUR - Dibromofluoromethane	102	REC %			1	8260B		8/31/2015	CJR	1
SUR - Toluene-d8	104	REC %			1	8260B		8/31/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560I
Sample ID P-9
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/31/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/31/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/31/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/31/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/31/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/31/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/31/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/31/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/31/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/31/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/31/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/31/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/31/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/31/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/31/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		8/31/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		8/31/2015	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		8/31/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		8/31/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/31/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/31/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/31/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/31/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/31/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/31/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/31/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/31/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/31/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/31/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/31/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/31/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/31/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		8/31/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/31/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/31/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		8/31/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/31/2015	CJR	1
Trichloroethene (TCE)	2.64	ug/l	0.47	1.5	1	8260B		8/31/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/31/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/31/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/31/2015	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		8/31/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/31/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/31/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	103	REC %			1	8260B		8/31/2015	CJR	1
SUR - 4-Bromofluorobenzene	104	REC %			1	8260B		8/31/2015	CJR	1
SUR - Dibromofluoromethane	100	REC %			1	8260B		8/31/2015	CJR	1
SUR - Toluene-d8	101	REC %			1	8260B		8/31/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560J
Sample ID P-10
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/31/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/31/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/31/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/31/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/31/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/31/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/31/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/31/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/31/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/31/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/31/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/31/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/31/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/31/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/31/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/31/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		8/31/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		8/31/2015	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		8/31/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		8/31/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/31/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/31/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/31/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/31/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/31/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/31/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/31/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/31/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/31/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/31/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/31/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/31/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/31/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/31/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		8/31/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/31/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/31/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/31/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		8/31/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/31/2015	CJR	1
Trichloroethene (TCE)	2.82	ug/l	0.47	1.5	1	8260B		8/31/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/31/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/31/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/31/2015	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		8/31/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/31/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/31/2015	CJR	1
SUR - Toluene-d8	103	REC %			1	8260B		8/31/2015	CJR	1
SUR - Dibromofluoromethane	101	REC %			1	8260B		8/31/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	106	REC %			1	8260B		8/31/2015	CJR	1
SUR - 4-Bromofluorobenzene	106	REC %			1	8260B		8/31/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560K
Sample ID P-11
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/28/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/28/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/28/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/28/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/28/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/28/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/28/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/28/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/28/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/28/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/28/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
cis-1,2-Dichloroethene	1.75	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		8/28/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/28/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/28/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/28/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/28/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/28/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/28/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/28/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/28/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/28/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/28/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/28/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/28/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		8/28/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/28/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/28/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		8/28/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/28/2015	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		8/28/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/28/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/28/2015	CJR	1
Vinyl Chloride	0.24 "J"	ug/l	0.17	0.54	1	8260B		8/28/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/28/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/28/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	111	REC %			1	8260B		8/28/2015	CJR	1
SUR - Toluene-d8	98	REC %			1	8260B		8/28/2015	CJR	1
SUR - Dibromofluoromethane	110	REC %			1	8260B		8/28/2015	CJR	1
SUR - 4-Bromofluorobenzene	106	REC %			1	8260B		8/28/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560L
Sample ID P-1 DUP
Sample Matrix Water
Sample Date 8/26/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/28/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/28/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/28/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/28/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/28/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
Chloroform	0.51 "J"	ug/l	0.43	1.4	1	8260B		8/28/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/28/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/28/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/28/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/28/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/28/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethane	2.46 "J"	ug/l	1.1	3.6	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethene	1.03 "J"	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
cis-1,2-Dichloroethene	920	ug/l	4.5	14	10	8260B		8/31/2015	CJR	1
trans-1,2-Dichloroethene	3.6	ug/l	0.54	1.7	1	8260B		8/28/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/28/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/28/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/28/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/28/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/28/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/28/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/28/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/28/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/28/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/28/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/28/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/28/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Tetrachloroethene	1.93	ug/l	0.49	1.5	1	8260B		8/28/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/28/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/28/2015	CJR	1
1,1,1-Trichloroethane	23.6	ug/l	0.84	2.7	1	8260B		8/28/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/28/2015	CJR	1
Trichloroethene (TCE)	106	ug/l	0.47	1.5	1	8260B		8/28/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/28/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/28/2015	CJR	1
Vinyl Chloride	0.75	ug/l	0.17	0.54	1	8260B		8/28/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/28/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/28/2015	CJR	1
SUR - 4-Bromofluorobenzene	100	REC %			1	8260B		8/28/2015	CJR	1
SUR - Dibromofluoromethane	115	REC %			1	8260B		8/28/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	120	REC %			1	8260B		8/28/2015	CJR	1
SUR - Toluene-d8	95	REC %			1	8260B		8/28/2015	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E29560
Project #

Lab Code 5029560M
Sample ID TRIP BLANK
Sample Matrix Water
Sample Date 8/26/2015

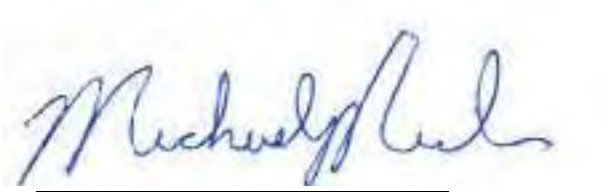
	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		8/28/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		8/28/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		8/28/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		8/28/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		8/28/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		8/28/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		8/28/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		8/28/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		8/28/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		8/28/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		8/28/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		8/28/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		8/28/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		8/28/2015	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		8/28/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		8/28/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		8/28/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		8/28/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		8/28/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		8/28/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		8/28/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		8/28/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		8/28/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		8/28/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		8/28/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		8/28/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		8/28/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		8/28/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		8/28/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		8/28/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		8/28/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		8/28/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		8/28/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		8/28/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		8/28/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		8/28/2015	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		8/28/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		8/28/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		8/28/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		8/28/2015	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		8/28/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		8/28/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		8/28/2015	CJR	1
SUR - Toluene-d8	103	REC %			1	8260B		8/28/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	97	REC %			1	8260B		8/28/2015	CJR	1
SUR - 4-Bromofluorobenzene	102	REC %			1	8260B		8/28/2015	CJR	1
SUR - Dibromofluoromethane	101	REC %			1	8260B		8/28/2015	CJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	*Comment*
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature



CHAIN OF STODY RECORD

Synergy Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # NE 2931

Page 1 of 2

Sample Handling Request
____ Rush Analysis Date Required ____
(Rushes accepted only with prior authorization)
X Normal Turn Around

Lab I.D. #

Account No. : | Quote No.:

Project #:

Sampler: (signature)

Project (Name / Location): Newton Gravel Pit / Manitowoc, WI

Reports To: Dave Henderson	Invoice To: DAVE Henderson
Company AECOM	Company SAME
Address 1555 N. RiverCenter Dr. STE 214	Address
City State Zip Milwaukee, WI 53212	City State Zip
Phone 414-944-6190	Phone
FAX 414-944-6081	FAX

Analysis Requested | **Other Analysis**

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	LEAD	NITRATE/NITRITE	OIL & GREASE	PAH (EPA 8270)	PCB	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	TOTAL SUSPENDED SOLIDS	VOC DW (EPA 542.2)	VOC (EPA 8260)	8-RCRA METALS	PID/FID
5029560A	P-1	8/26/15	900		X	N	3	GW	HCl													X		
B	P-2		940		X	N	3	GW	HCl													X		
C	P-3		1025		X	N	3	GW	HCl													X		
D	P-4		1230		X	N	3	GW	HCl													X		
E	P-5		1200		X	N	3	GW	HCl													X		
F	P-6		1150		X	N	3	GW	HCl													X		
G	P-7		1330		X	N	3	GW	HCl													X		
H	P-8		1405		X	N	3	GW	HCl													X		
I	P-9		1440		X	N	3	GW	HCl													X		
J	P-10		1515		X	N	3	GW	HCl													X		

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Analysis per Contract

Sample Integrity - To be completed by receiving lab.
Method of Shipment:
Temp. of Temp. Blank ___ °C On Ice: X
Cooler seal intact upon receipt: X Yes ___ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
	0900	8/27/15			

Received in Laboratory By: Time: 8:00 Date: 8/28/15

CHAIN OF STODY RECORD

Synergy

Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # N2 2931

Page 2 of 2

Sample Handling Request
Rush Analysis Date Required ____
(Rushes accepted only with prior authorization)
Normal Turn Around

Lab I.D. #
Account No. : Quote No.:
Project #:
Sampler: (signature) Jordan J

Project (Name / Location): Former Newton Gravel Pit / Manitowoc, WI

Reports To: DAVE Henderson	Invoice To: Dave Henderson
Company AECOM	Company SAME
Address 1555 N. RiverCenter Dr. STE 214	Address
City State Zip Milwaukee, WI 53212	City State Zip
Phone 414-944-6190	Phone
FAX 414-944-6081	FAX

Analysis Requested | **Other Analysis**

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	LEAD	NITRATE/NITRITE	OIL & GREASE	PAH (EPA 8270)	PCB	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	TOTAL SUSPENDED SOLIDS	VOC DW (EPA 542.2)	VOC (EPA 8260)	8-RCRA METALS	PID/ FID
So29560k	P-11	8/26/15	1100		x	N	3	GW	HCl													X		
L	P-1 DUP	↓	900		x	N	3	GW	HCl													XX		
M	Trip Blank	↓	800		x	N	3	GW	HCl													X		

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Analysis per Contract

Sample Integrity - To be completed by receiving lab.
Method of Shipment: Courier
Temp. of Temp. Blank ____ °C On Ice: X
Cooler seal intact upon receipt: X Yes ____ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
Jordan J	0900	8/27/15			

Received in Laboratory By: Christopher J. Rom Time: 8:00 Date: 8/28/15

Synergy Environmental Lab, INC.

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

DAVE HENDERSON
AECOM
1555 N RIVER CENTER DRIVE
MILWAUKEE, WI 53212

Report Date *22-Sep-15*

Project Name NEWTON PIT
Project # 60135471

Invoice # E29682

Lab Code 5029682A
Sample ID P-1
Sample Matrix Water
Sample Date 9/15/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 22	ug/l	22	70	50	8260B		9/18/2015	CJR	1
Bromobenzene	< 24	ug/l	24	75	50	8260B		9/18/2015	CJR	1
Bromodichloromethane	< 23	ug/l	23	75	50	8260B		9/18/2015	CJR	1
Bromoform	< 23	ug/l	23	75	50	8260B		9/18/2015	CJR	1
tert-Butylbenzene	< 55	ug/l	55	170	50	8260B		9/18/2015	CJR	1
sec-Butylbenzene	< 60	ug/l	60	190	50	8260B		9/18/2015	CJR	1
n-Butylbenzene	< 50	ug/l	50	165	50	8260B		9/18/2015	CJR	1
Carbon Tetrachloride	< 25.5	ug/l	25.5	80	50	8260B		9/18/2015	CJR	1
Chlorobenzene	< 23	ug/l	23	70	50	8260B		9/18/2015	CJR	1
Chloroethane	< 32.5	ug/l	32.5	105	50	8260B		9/18/2015	CJR	1
Chloroform	< 21.5	ug/l	21.5	70	50	8260B		9/18/2015	CJR	1
Chloromethane	< 95	ug/l	95	300	50	8260B		9/18/2015	CJR	1
2-Chlorotoluene	< 20	ug/l	20	65	50	8260B		9/18/2015	CJR	1
4-Chlorotoluene	< 31.5	ug/l	31.5	100	50	8260B		9/18/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 70	ug/l	70	225	50	8260B		9/18/2015	CJR	1
Dibromochloromethane	< 22.5	ug/l	22.5	70	50	8260B		9/18/2015	CJR	1
1,4-Dichlorobenzene	< 24.5	ug/l	24.5	80	50	8260B		9/18/2015	CJR	1
1,3-Dichlorobenzene	< 26	ug/l	26	80	50	8260B		9/18/2015	CJR	1
1,2-Dichlorobenzene	< 23	ug/l	23	75	50	8260B		9/18/2015	CJR	1
Dichlorodifluoromethane	< 43.5	ug/l	43.5	140	50	8260B		9/18/2015	CJR	1
1,2-Dichloroethane	< 24	ug/l	24	75	50	8260B		9/18/2015	CJR	1
1,1-Dichloroethane	< 55	ug/l	55	180	50	8260B		9/18/2015	CJR	1
1,1-Dichloroethene	< 32.5	ug/l	32.5	105	50	8260B		9/18/2015	CJR	1
cis-1,2-Dichloroethene	840	ug/l	22.5	70	50	8260B		9/18/2015	CJR	1
trans-1,2-Dichloroethene	< 27	ug/l	27	85	50	8260B		9/18/2015	CJR	1
1,2-Dichloropropane	< 21.5	ug/l	21.5	68.5	50	8260B		9/18/2015	CJR	1
2,2-Dichloropropane	< 155	ug/l	155	490	50	8260B		9/18/2015	CJR	1
1,3-Dichloropropane	< 21	ug/l	21	65	50	8260B		9/18/2015	CJR	1
Di-isopropyl ether	< 22	ug/l	22	70	50	8260B		9/18/2015	CJR	1
EDB (1,2-Dibromoethane)	< 31.5	ug/l	31.5	100	50	8260B		9/18/2015	CJR	1
Ethylbenzene	< 35.5	ug/l	35.5	115	50	8260B		9/18/2015	CJR	1
Hexachlorobutadiene	< 110	ug/l	110	355	50	8260B		9/18/2015	CJR	1
Isopropylbenzene	< 41	ug/l	41	130	50	8260B		9/18/2015	CJR	1

Project Name NEWTON PIT **Invoice #** E29682
Project # 60135471

Lab Code 5029682A
Sample ID P-1
Sample Matrix Water
Sample Date 9/15/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
p-Isopropyltoluene	< 55	ug/l	55	175	50	8260B		9/18/2015	CJR	1
Methylene chloride	< 65	ug/l	65	210	50	8260B		9/18/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 55	ug/l	55	185	50	8260B		9/18/2015	CJR	1
Naphthalene	< 80	ug/l	80	260	50	8260B		9/18/2015	CJR	1
n-Propylbenzene	< 38.5	ug/l	38.5	120	50	8260B		9/18/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 26	ug/l	26	85	50	8260B		9/18/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 24	ug/l	24	75	50	8260B		9/18/2015	CJR	1
Tetrachloroethene	< 24.5	ug/l	24.5	75	50	8260B		9/18/2015	CJR	1
Toluene	< 22	ug/l	22	70	50	8260B		9/18/2015	CJR	1
1,2,4-Trichlorobenzene	< 85	ug/l	85	280	50	8260B		9/18/2015	CJR	1
1,2,3-Trichlorobenzene	< 135	ug/l	135	430	50	8260B		9/18/2015	CJR	1
1,1,1-Trichloroethane	< 42	ug/l	42	135	50	8260B		9/18/2015	CJR	1
1,1,2-Trichloroethane	< 24	ug/l	24	76	50	8260B		9/18/2015	CJR	1
Trichloroethene (TCE)	90	ug/l	23.5	75	50	8260B		9/18/2015	CJR	1
Trichlorofluoromethane	< 43.5	ug/l	43.5	140	50	8260B		9/18/2015	CJR	1
1,2,4-Trimethylbenzene	< 80	ug/l	80	250	50	8260B		9/18/2015	CJR	1
1,3,5-Trimethylbenzene	< 75	ug/l	75	240	50	8260B		9/18/2015	CJR	1
Vinyl Chloride	< 8.5	ug/l	8.5	27	50	8260B		9/18/2015	CJR	1
m&p-Xylene	< 110	ug/l	110	345	50	8260B		9/18/2015	CJR	1
o-Xylene	< 45	ug/l	45	145	50	8260B		9/18/2015	CJR	1
SUR - Toluene-d8	108	REC %			50	8260B		9/18/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	95	REC %			50	8260B		9/18/2015	CJR	1
SUR - 4-Bromofluorobenzene	111	REC %			50	8260B		9/18/2015	CJR	1
SUR - Dibromofluoromethane	102	REC %			50	8260B		9/18/2015	CJR	1

Project Name NEWTON PIT **Invoice #** E29682
Project # 60135471

Lab Code 5029682B
Sample ID P-2
Sample Matrix Water
Sample Date 9/15/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		9/21/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		9/21/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		9/21/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		9/21/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		9/21/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		9/21/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		9/21/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		9/21/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		9/21/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		9/21/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		9/21/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		9/21/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		9/21/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		9/21/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		9/21/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		9/21/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		9/21/2015	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		9/21/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		9/21/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		9/21/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		9/21/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		9/21/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		9/21/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		9/21/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		9/21/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		9/21/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		9/21/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		9/21/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		9/21/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		9/21/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		9/21/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		9/21/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		9/21/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		9/21/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		9/21/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		9/21/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		9/21/2015	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		9/21/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		9/21/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		9/21/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		9/21/2015	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		9/21/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		9/21/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		9/21/2015	CJR	1
SUR - Dibromofluoromethane	103	REC %			1	8260B		9/21/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	95	REC %			1	8260B		9/21/2015	CJR	1
SUR - 4-Bromofluorobenzene	112	REC %			1	8260B		9/21/2015	CJR	1
SUR - Toluene-d8	110	REC %			1	8260B		9/21/2015	CJR	1

Project Name NEWTON PIT **Invoice #** E29682
Project # 60135471

Lab Code 5029682C
Sample ID P-2 DUP
Sample Matrix Water
Sample Date 9/15/2015

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		9/21/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		9/21/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		9/21/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		9/21/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		9/21/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		9/21/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		9/21/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		9/21/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		9/21/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		9/21/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		9/21/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		9/21/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		9/21/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		9/21/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		9/21/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		9/21/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		9/21/2015	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		9/21/2015	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		9/21/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		9/21/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		9/21/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		9/21/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		9/21/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		9/21/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		9/21/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		9/21/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		9/21/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		9/21/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		9/21/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		9/21/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		9/21/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		9/21/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		9/21/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		9/21/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		9/21/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		9/21/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		9/21/2015	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		9/21/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		9/21/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		9/21/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		9/21/2015	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		9/21/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		9/21/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		9/21/2015	CJR	1
SUR - Toluene-d8	105	REC %			1	8260B		9/21/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	101	REC %			1	8260B		9/21/2015	CJR	1
SUR - 4-Bromofluorobenzene	114	REC %			1	8260B		9/21/2015	CJR	1
SUR - Dibromofluoromethane	108	REC %			1	8260B		9/21/2015	CJR	1

Project Name NEWTON PIT **Invoice #** E29682
Project # 60135471

Lab Code 5029682D
Sample ID P-3
Sample Matrix Water
Sample Date 9/15/2015

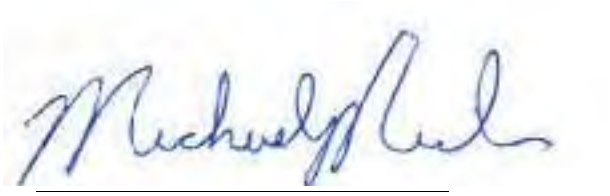
	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		9/21/2015	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		9/21/2015	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		9/21/2015	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		9/21/2015	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		9/21/2015	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		9/21/2015	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		9/21/2015	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		9/21/2015	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		9/21/2015	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		9/21/2015	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		9/21/2015	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		9/21/2015	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		9/21/2015	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		9/21/2015	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		9/21/2015	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		9/21/2015	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		9/21/2015	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		9/21/2015	CJR	1
cis-1,2-Dichloroethene	18.6	ug/l	0.45	1.4	1	8260B		9/21/2015	CJR	1
trans-1,2-Dichloroethene	25.5	ug/l	0.54	1.7	1	8260B		9/21/2015	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		9/21/2015	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		9/21/2015	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		9/21/2015	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		9/21/2015	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		9/21/2015	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		9/21/2015	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		9/21/2015	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		9/21/2015	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		9/21/2015	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		9/21/2015	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		9/21/2015	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		9/21/2015	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		9/21/2015	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		9/21/2015	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		9/21/2015	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		9/21/2015	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		9/21/2015	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		9/21/2015	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		9/21/2015	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		9/21/2015	CJR	1
Trichloroethene (TCE)	9.4	ug/l	0.47	1.5	1	8260B		9/21/2015	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		9/21/2015	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		9/21/2015	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		9/21/2015	CJR	1
Vinyl Chloride	0.23 "J"	ug/l	0.17	0.54	1	8260B		9/21/2015	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		9/21/2015	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		9/21/2015	CJR	1
SUR - Toluene-d8	107	REC %			1	8260B		9/21/2015	CJR	1
SUR - 1,2-Dichloroethane-d4	99	REC %			1	8260B		9/21/2015	CJR	1
SUR - 4-Bromofluorobenzene	121	REC %			1	8260B		9/21/2015	CJR	1
SUR - Dibromofluoromethane	103	REC %			1	8260B		9/21/2015	CJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	*Comment*
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature



CHAIN OF STODY RECORD

Synergy Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # N2 2821

Page 1 of 1

Sample Handling Request
____ Rush Analysis Date Required ____
(Rushes accepted only with prior authorization)
X Normal Turn Around

Lab I.D. #

Account No.: Quote No.:

Project #: 60135471

Sampler: (signature) DSH

Project (Name / Location): Newton Pit

Reports To: DAVID Henderson	Invoice To: SAME
Company AECOM	Company
Address 1555 N Rivercenter	Address
City State Zip Milw WI 53212	City State Zip
Phone 414 429 8304	Phone
FAX	FAX

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	LEAD	NITRATE/NITRITE	OIL & GREASE	PAH (EPA 8270)	PCB	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	TOTAL SUSPENDED SOLIDS	VOC DW (EPA 542.2)	VOC (EPA 8260)	8-RCRA METALS	PID/ FID
502968[illegible]A	P-1	9/15	2:15		X	N	3	GW	HCl		X											X		
B	P-2	"	2:35		"	"	"	"	"													X		
C	P-2 DUP	"	2:35		"	"	"	"	"													X		
D	P-3	"	2:44		"	"	"	"	"													X		

Analysis Requested — Other Analysis

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

VOC's only

Sample Integrity - To be completed by receiving lab.

Method of Shipment: Driven

Temp. of Temp. Blank ___ °C On Ice: X

Cooler seal intact upon receipt: X Yes ___ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
D.S. Henderson		9/16/15			

Received in Laboratory By: [signature] Time: 8-00 Date: 9/17/15

Synergy Environmental Lab, INC.

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

DAVE HENDERSON
AECOM
1555 N RIVER CENTER DRIVE
MILWAUKEE, WI 53212

Report Date *25-Mar-16*

Project Name NEWTON GRAVEL PIT **Invoice #** E30715
Project # 60135471

Lab Code 5030715A
Sample ID P-12
Sample Matrix Water
Sample Date 3/22/2016

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		3/24/2016	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		3/24/2016	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		3/24/2016	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		3/24/2016	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		3/24/2016	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		3/24/2016	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		3/24/2016	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		3/24/2016	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		3/24/2016	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		3/24/2016	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		3/24/2016	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		3/24/2016	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		3/24/2016	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		3/24/2016	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		3/24/2016	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		3/24/2016	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		3/24/2016	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		3/24/2016	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E30715
Project # 60135471

Lab Code 5030715A
Sample ID P-12
Sample Matrix Water
Sample Date 3/22/2016

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		3/24/2016	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		3/24/2016	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		3/24/2016	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		3/24/2016	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		3/24/2016	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		3/24/2016	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		3/24/2016	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		3/24/2016	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		3/24/2016	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		3/24/2016	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		3/24/2016	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		3/24/2016	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		3/24/2016	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		3/24/2016	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		3/24/2016	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		3/24/2016	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		3/24/2016	CJR	1
SUR - 1,2-Dichloroethane-d4	94	REC %			1	8260B		3/24/2016	CJR	1
SUR - 4-Bromofluorobenzene	105	REC %			1	8260B		3/24/2016	CJR	1
SUR - Dibromofluoromethane	93	REC %			1	8260B		3/24/2016	CJR	1
SUR - Toluene-d8	101	REC %			1	8260B		3/24/2016	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E30715
Project # 60135471

Lab Code 5030715B
Sample ID P-2R
Sample Matrix Water
Sample Date 3/22/2016

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		3/24/2016	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		3/24/2016	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		3/24/2016	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		3/24/2016	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		3/24/2016	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		3/24/2016	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		3/24/2016	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		3/24/2016	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		3/24/2016	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		3/24/2016	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		3/24/2016	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		3/24/2016	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		3/24/2016	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		3/24/2016	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		3/24/2016	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		3/24/2016	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		3/24/2016	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		3/24/2016	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		3/24/2016	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		3/24/2016	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		3/24/2016	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		3/24/2016	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		3/24/2016	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		3/24/2016	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		3/24/2016	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		3/24/2016	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		3/24/2016	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		3/24/2016	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		3/24/2016	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		3/24/2016	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		3/24/2016	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		3/24/2016	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		3/24/2016	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		3/24/2016	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		3/24/2016	CJR	1
SUR - 1,2-Dichloroethane-d4	103	REC %			1	8260B		3/24/2016	CJR	1
SUR - Toluene-d8	96	REC %			1	8260B		3/24/2016	CJR	1
SUR - 4-Bromofluorobenzene	99	REC %			1	8260B		3/24/2016	CJR	1
SUR - Dibromofluoromethane	102	REC %			1	8260B		3/24/2016	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E30715
Project # 60135471

Lab Code 5030715C
Sample ID P-13
Sample Matrix Water
Sample Date 3/22/2016

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		3/24/2016	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		3/24/2016	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		3/24/2016	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		3/24/2016	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		3/24/2016	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		3/24/2016	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		3/24/2016	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		3/24/2016	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		3/24/2016	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		3/24/2016	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		3/24/2016	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		3/24/2016	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		3/24/2016	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		3/24/2016	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		3/24/2016	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		3/24/2016	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		3/24/2016	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		3/24/2016	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		3/24/2016	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		3/24/2016	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		3/24/2016	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		3/24/2016	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		3/24/2016	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		3/24/2016	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		3/24/2016	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		3/24/2016	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		3/24/2016	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		3/24/2016	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		3/24/2016	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		3/24/2016	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		3/24/2016	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		3/24/2016	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		3/24/2016	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		3/24/2016	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		3/24/2016	CJR	1
SUR - 1,2-Dichloroethane-d4	94	REC %			1	8260B		3/24/2016	CJR	1
SUR - 4-Bromofluorobenzene	101	REC %			1	8260B		3/24/2016	CJR	1
SUR - Dibromofluoromethane	109	REC %			1	8260B		3/24/2016	CJR	1
SUR - Toluene-d8	97	REC %			1	8260B		3/24/2016	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E30715
Project # 60135471

Lab Code 5030715D
Sample ID P-2
Sample Matrix Water
Sample Date 3/22/2016

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		3/24/2016	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		3/24/2016	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		3/24/2016	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		3/24/2016	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		3/24/2016	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		3/24/2016	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		3/24/2016	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		3/24/2016	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		3/24/2016	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		3/24/2016	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		3/24/2016	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		3/24/2016	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		3/24/2016	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		3/24/2016	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		3/24/2016	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		3/24/2016	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		3/24/2016	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		3/24/2016	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		3/24/2016	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		3/24/2016	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		3/24/2016	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		3/24/2016	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		3/24/2016	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		3/24/2016	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		3/24/2016	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		3/24/2016	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		3/24/2016	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		3/24/2016	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		3/24/2016	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		3/24/2016	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		3/24/2016	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		3/24/2016	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		3/24/2016	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		3/24/2016	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		3/24/2016	CJR	1
SUR - Toluene-d8	99	REC %			1	8260B		3/24/2016	CJR	1
SUR - Dibromofluoromethane	113	REC %			1	8260B		3/24/2016	CJR	1
SUR - 4-Bromofluorobenzene	101	REC %			1	8260B		3/24/2016	CJR	1
SUR - 1,2-Dichloroethane-d4	113	REC %			1	8260B		3/24/2016	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E30715
Project # 60135471

Lab Code 5030715E
Sample ID P-1
Sample Matrix Water
Sample Date 3/22/2016

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 4.4	ug/l	4.4	14	10	8260B		3/24/2016	CJR	1
Bromobenzene	< 4.8	ug/l	4.8	15	10	8260B		3/24/2016	CJR	1
Bromodichloromethane	< 4.6	ug/l	4.6	15	10	8260B		3/24/2016	CJR	1
Bromoform	< 4.6	ug/l	4.6	15	10	8260B		3/24/2016	CJR	1
tert-Butylbenzene	< 11	ug/l	11	34	10	8260B		3/24/2016	CJR	1
sec-Butylbenzene	< 12	ug/l	12	38	10	8260B		3/24/2016	CJR	1
n-Butylbenzene	< 10	ug/l	10	33	10	8260B		3/24/2016	CJR	1
Carbon Tetrachloride	< 5.1	ug/l	5.1	16	10	8260B		3/24/2016	CJR	1
Chlorobenzene	< 4.6	ug/l	4.6	14	10	8260B		3/24/2016	CJR	1
Chloroethane	< 6.5	ug/l	6.5	21	10	8260B		3/24/2016	CJR	1
Chloroform	< 4.3	ug/l	4.3	14	10	8260B		3/24/2016	CJR	1
Chloromethane	< 19	ug/l	19	60	10	8260B		3/24/2016	CJR	1
2-Chlorotoluene	< 4	ug/l	4	13	10	8260B		3/24/2016	CJR	1
4-Chlorotoluene	< 6.3	ug/l	6.3	20	10	8260B		3/24/2016	CJR	1
1,2-Dibromo-3-chloropropane	< 14	ug/l	14	45	10	8260B		3/24/2016	CJR	1
Dibromochloromethane	< 4.5	ug/l	4.5	14	10	8260B		3/24/2016	CJR	1
1,4-Dichlorobenzene	< 4.9	ug/l	4.9	16	10	8260B		3/24/2016	CJR	1
1,3-Dichlorobenzene	< 5.2	ug/l	5.2	16	10	8260B		3/24/2016	CJR	1
1,2-Dichlorobenzene	< 4.6	ug/l	4.6	15	10	8260B		3/24/2016	CJR	1
Dichlorodifluoromethane	< 8.7	ug/l	8.7	28	10	8260B		3/24/2016	CJR	1
1,2-Dichloroethane	< 4.8	ug/l	4.8	15	10	8260B		3/24/2016	CJR	1
1,1-Dichloroethane	< 11	ug/l	11	36	10	8260B		3/24/2016	CJR	1
1,1-Dichloroethene	< 6.5	ug/l	6.5	21	10	8260B		3/24/2016	CJR	1
cis-1,2-Dichloroethene	287	ug/l	4.5	14	10	8260B		3/24/2016	CJR	1
trans-1,2-Dichloroethene	< 5.4	ug/l	5.4	17	10	8260B		3/24/2016	CJR	1
1,2-Dichloropropane	< 4.3	ug/l	4.3	13.7	10	8260B		3/24/2016	CJR	1
2,2-Dichloropropane	< 31	ug/l	31	98	10	8260B		3/24/2016	CJR	1
1,3-Dichloropropane	< 4.2	ug/l	4.2	13	10	8260B		3/24/2016	CJR	1
Di-isopropyl ether	< 4.4	ug/l	4.4	14	10	8260B		3/24/2016	CJR	1
EDB (1,2-Dibromoethane)	< 6.3	ug/l	6.3	20	10	8260B		3/24/2016	CJR	1
Ethylbenzene	< 7.1	ug/l	7.1	23	10	8260B		3/24/2016	CJR	1
Hexachlorobutadiene	< 22	ug/l	22	71	10	8260B		3/24/2016	CJR	1
Isopropylbenzene	< 8.2	ug/l	8.2	26	10	8260B		3/24/2016	CJR	1
p-Isopropyltoluene	< 11	ug/l	11	35	10	8260B		3/24/2016	CJR	1
Methylene chloride	< 13	ug/l	13	42	10	8260B		3/24/2016	CJR	1
Methyl tert-butyl ether (MTBE)	< 11	ug/l	11	37	10	8260B		3/24/2016	CJR	1
Naphthalene	< 16	ug/l	16	52	10	8260B		3/24/2016	CJR	1
n-Propylbenzene	< 7.7	ug/l	7.7	24	10	8260B		3/24/2016	CJR	1
1,1,2,2-Tetrachloroethane	< 5.2	ug/l	5.2	17	10	8260B		3/24/2016	CJR	1
1,1,1,2-Tetrachloroethane	< 4.8	ug/l	4.8	15	10	8260B		3/24/2016	CJR	1
Tetrachloroethene	< 4.9	ug/l	4.9	15	10	8260B		3/24/2016	CJR	1
Toluene	< 4.4	ug/l	4.4	14	10	8260B		3/24/2016	CJR	1
1,2,4-Trichlorobenzene	< 17	ug/l	17	56	10	8260B		3/24/2016	CJR	1
1,2,3-Trichlorobenzene	< 27	ug/l	27	86	10	8260B		3/24/2016	CJR	1
1,1,1-Trichloroethane	< 8.4	ug/l	8.4	27	10	8260B		3/24/2016	CJR	1
1,1,2-Trichloroethane	< 4.8	ug/l	4.8	15.2	10	8260B		3/24/2016	CJR	1
Trichloroethene (TCE)	25	ug/l	4.7	15	10	8260B		3/24/2016	CJR	1
Trichlorofluoromethane	< 8.7	ug/l	8.7	28	10	8260B		3/24/2016	CJR	1
1,2,4-Trimethylbenzene	< 16	ug/l	16	50	10	8260B		3/24/2016	CJR	1
1,3,5-Trimethylbenzene	< 15	ug/l	15	48	10	8260B		3/24/2016	CJR	1
Vinyl Chloride	< 1.7	ug/l	1.7	5.4	10	8260B		3/24/2016	CJR	1
m&p-Xylene	< 22	ug/l	22	69	10	8260B		3/24/2016	CJR	1
o-Xylene	< 9	ug/l	9	29	10	8260B		3/24/2016	CJR	1
SUR - 1,2-Dichloroethane-d4	110	REC %			10	8260B		3/24/2016	CJR	1
SUR - 4-Bromofluorobenzene	109	REC %			10	8260B		3/24/2016	CJR	1
SUR - Dibromofluoromethane	113	REC %			10	8260B		3/24/2016	CJR	1
SUR - Toluene-d8	99	REC %			10	8260B		3/24/2016	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E30715
Project # 60135471

Lab Code 5030715F
Sample ID P-3
Sample Matrix Water
Sample Date 3/22/2016

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		3/24/2016	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		3/24/2016	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		3/24/2016	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		3/24/2016	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		3/24/2016	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
Chloroform	< 0.43	ug/l	0.43	1.4	1	8260B		3/24/2016	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		3/24/2016	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		3/24/2016	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		3/24/2016	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		3/24/2016	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		3/24/2016	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
cis-1,2-Dichloroethene	17.2	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
trans-1,2-Dichloroethene	25.7	ug/l	0.54	1.7	1	8260B		3/24/2016	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		3/24/2016	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		3/24/2016	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		3/24/2016	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		3/24/2016	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		3/24/2016	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		3/24/2016	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		3/24/2016	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		3/24/2016	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		3/24/2016	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		3/24/2016	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		3/24/2016	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		3/24/2016	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		3/24/2016	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		3/24/2016	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		3/24/2016	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		3/24/2016	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		3/24/2016	CJR	1
Trichloroethene (TCE)	6.7	ug/l	0.47	1.5	1	8260B		3/24/2016	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		3/24/2016	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		3/24/2016	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		3/24/2016	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		3/24/2016	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		3/24/2016	CJR	1
SUR - 1,2-Dichloroethane-d4	94	REC %			1	8260B		3/24/2016	CJR	1
SUR - 4-Bromofluorobenzene	99	REC %			1	8260B		3/24/2016	CJR	1
SUR - Dibromofluoromethane	108	REC %			1	8260B		3/24/2016	CJR	1
SUR - Toluene-d8	97	REC %			1	8260B		3/24/2016	CJR	1

Project Name NEWTON GRAVEL PIT **Invoice #** E30715
Project # 60135471

Lab Code 5030715G
Sample ID TRIP BLANK
Sample Matrix Water
Sample Date 3/22/2016

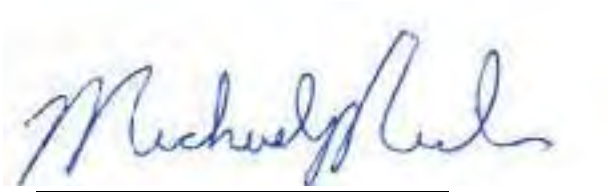
	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
Bromobenzene	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Bromodichloromethane	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Bromoform	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
tert-Butylbenzene	< 1.1	ug/l	1.1	3.4	1	8260B		3/24/2016	CJR	1
sec-Butylbenzene	< 1.2	ug/l	1.2	3.8	1	8260B		3/24/2016	CJR	1
n-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		3/24/2016	CJR	1
Carbon Tetrachloride	< 0.51	ug/l	0.51	1.6	1	8260B		3/24/2016	CJR	1
Chlorobenzene	< 0.46	ug/l	0.46	1.4	1	8260B		3/24/2016	CJR	1
Chloroethane	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
Chloroform	0.53 "J"	ug/l	0.43	1.4	1	8260B		3/24/2016	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6	1	8260B		3/24/2016	CJR	1
2-Chlorotoluene	< 0.4	ug/l	0.4	1.3	1	8260B		3/24/2016	CJR	1
4-Chlorotoluene	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
1,2-Dibromo-3-chloropropane	< 1.4	ug/l	1.4	4.5	1	8260B		3/24/2016	CJR	1
Dibromochloromethane	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
1,4-Dichlorobenzene	< 0.49	ug/l	0.49	1.6	1	8260B		3/24/2016	CJR	1
1,3-Dichlorobenzene	< 0.52	ug/l	0.52	1.6	1	8260B		3/24/2016	CJR	1
1,2-Dichlorobenzene	< 0.46	ug/l	0.46	1.5	1	8260B		3/24/2016	CJR	1
Dichlorodifluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2-Dichloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethane	< 1.1	ug/l	1.1	3.6	1	8260B		3/24/2016	CJR	1
1,1-Dichloroethene	< 0.65	ug/l	0.65	2.1	1	8260B		3/24/2016	CJR	1
cis-1,2-Dichloroethene	< 0.45	ug/l	0.45	1.4	1	8260B		3/24/2016	CJR	1
trans-1,2-Dichloroethene	< 0.54	ug/l	0.54	1.7	1	8260B		3/24/2016	CJR	1
1,2-Dichloropropane	< 0.43	ug/l	0.43	1.37	1	8260B		3/24/2016	CJR	1
2,2-Dichloropropane	< 3.1	ug/l	3.1	9.8	1	8260B		3/24/2016	CJR	1
1,3-Dichloropropane	< 0.42	ug/l	0.42	1.3	1	8260B		3/24/2016	CJR	1
Di-isopropyl ether	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		3/24/2016	CJR	1
Ethylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		3/24/2016	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	7.1	1	8260B		3/24/2016	CJR	1
Isopropylbenzene	< 0.82	ug/l	0.82	2.6	1	8260B		3/24/2016	CJR	1
p-Isopropyltoluene	< 1.1	ug/l	1.1	3.5	1	8260B		3/24/2016	CJR	1
Methylene chloride	< 1.3	ug/l	1.3	4.2	1	8260B		3/24/2016	CJR	1
Methyl tert-butyl ether (MTBE)	< 1.1	ug/l	1.1	3.7	1	8260B		3/24/2016	CJR	1
Naphthalene	< 1.6	ug/l	1.6	5.2	1	8260B		3/24/2016	CJR	1
n-Propylbenzene	< 0.77	ug/l	0.77	2.4	1	8260B		3/24/2016	CJR	1
1,1,2,2-Tetrachloroethane	< 0.52	ug/l	0.52	1.7	1	8260B		3/24/2016	CJR	1
1,1,1,2-Tetrachloroethane	< 0.48	ug/l	0.48	1.5	1	8260B		3/24/2016	CJR	1
Tetrachloroethene	< 0.49	ug/l	0.49	1.5	1	8260B		3/24/2016	CJR	1
Toluene	< 0.44	ug/l	0.44	1.4	1	8260B		3/24/2016	CJR	1
1,2,4-Trichlorobenzene	< 1.7	ug/l	1.7	5.6	1	8260B		3/24/2016	CJR	1
1,2,3-Trichlorobenzene	< 2.7	ug/l	2.7	8.6	1	8260B		3/24/2016	CJR	1
1,1,1-Trichloroethane	< 0.84	ug/l	0.84	2.7	1	8260B		3/24/2016	CJR	1
1,1,2-Trichloroethane	< 0.48	ug/l	0.48	1.52	1	8260B		3/24/2016	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		3/24/2016	CJR	1
Trichlorofluoromethane	< 0.87	ug/l	0.87	2.8	1	8260B		3/24/2016	CJR	1
1,2,4-Trimethylbenzene	< 1.6	ug/l	1.6	5	1	8260B		3/24/2016	CJR	1
1,3,5-Trimethylbenzene	< 1.5	ug/l	1.5	4.8	1	8260B		3/24/2016	CJR	1
Vinyl Chloride	< 0.17	ug/l	0.17	0.54	1	8260B		3/24/2016	CJR	1
m&p-Xylene	< 2.2	ug/l	2.2	6.9	1	8260B		3/24/2016	CJR	1
o-Xylene	< 0.9	ug/l	0.9	2.9	1	8260B		3/24/2016	CJR	1
SUR - Toluene-d8	95	REC %			1	8260B		3/24/2016	CJR	1
SUR - 1,2-Dichloroethane-d4	97	REC %			1	8260B		3/24/2016	CJR	1
SUR - 4-Bromofluorobenzene	91	REC %			1	8260B		3/24/2016	CJR	1
SUR - Dibromofluoromethane	98	REC %			1	8260B		3/24/2016	CJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	*Comment*
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature



CHAIN OF STODY RECORD

Synergy Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # No 3035
Page 1 of 1

Sample Handling Request
___ Rush Analysis Date Required ___
(Rushes accepted only with prior authorization)
X Normal Turn Around

Lab I.D. #
Account No. : **Quote No.:**
Project #: 60135471
Sampler: (signature) T. Schultz (TAS)

Project (Name / Location): NEWTON GRAVEL PIT / MANITOWOC, WI

Reports To: DAVE HENDERSON	Invoice To: DAVE HENDERSON
Company AECOM	Company SAME
Address 1555 N. RIVERCENTER DR. STE 1	Address
City State Zip MILWAUKEE, WI 53212	City State Zip
Phone 414-944-6190	Phone
FAX 414-944-6081	FAX

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	LEAD	NITRATE/NITRITE	OIL & GREASE	PAH (EPA 8270)	PCB	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	TOTAL SUSPENDED SOLIDS	VOC DW (EPA 542.2)	VOC (EPA 8260)	8-RCRA METALS	PID/ FID
50507154	P-12	3/22/16	0915		X	N	3	GW	HCL													X		
B	P-2R		0935		X	N	3	GW	HCL													X		
C	P-13		1015		X	N	3	GW	HCL													X		
D	P-2		1036		X	N	3	GW	HCL													X		
E	P-1		1235		X	N	3	GW	HCL													X		
F	P-3		1135		X	N	3	GW	HCL													X		
G	Trip Blank		0800		X	N	3	W	HCL													X		

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Analysis Per Contract

Sample Integrity - To be completed by receiving lab.
Method of Shipment: Sm
Temp. of Temp. Blank ___ °C On Ice: X
Cooler seal intact upon receipt: X Yes ___ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
T. Schultz	0815	3/23/16			

Received in Laboratory By: [signature] Time: 10:00 Date: 3/24/16

Attachment 3
Pond Layout and Details Plans

NOTES:
1. CONTOURS GENERATED FROM SURVEY PERFORMED BY CITY OF MANITOWOC
2. VERTICAL DATUM: NAD 88
3. HORIZONTAL DATUM: MANTIOWOC COUNTY COORDINATES

EXCAVATION FOR POND (PURPLE LINES):
ABOVE ELEVATION 685; CUT = 50,230 CU YD
BELOW ELEVATION 685; CUT = 27,020 CU YD
CAP AREA (ORANGE LINES):
WASTE VOLUME CAPACITY; FILL = 12,170 CU YD
VOLUME OF 2.5 FEET OF ROOTING ZONE; CLEAN FILL = 7,000 CU YD
FILL AREA NORTH OF CAP AREA (GREEN LINES); FILL = 1,510 CU YD
FILL AREA WEST OF POND (PINK LINES); FILL = 12,380 CU YD
FILL AREA EAST OF POND (RED LINES); FILL = 12,090 CU YD

LEGEND:
- PROPERTY BOUNDARY
- PROPERTY BOUNDARY - CITY LIMITS
- ROAD
- EXISTING TOPOGRAPHIC CONTOURS
- PROPOSED TOPOGRAPHIC CONTOURS
- ELECTRICAL UTILITY LINE
- MONITORING WELL (WT-11)
- MONITORING WELL NEST (WT-25, PZ-25A, PZ-25B, PZ-25C)
- TREE
- WILLOW BRUSH
- GROUNDWATER PLUME LINE
- PROPOSED ROAD

NORTH
0 50 100 Feet

712.19
22 TRA
B-01
WT-01
PZ-01

716.63
29 TRA
B-3
WT-03
PZ-03

EXISTING DRIVEWAY
PROPOSED CAP CONTOURS
PROPOSED SWALE
PROPOSED TREE PLANTING (TYP.)
GROUND WATER MONITORING WELL (TYP.)
ELECTRIC LINE
PROPOSED OUTLET STRUCTURE (SEE DETAIL) 2
POND BOTTOM EL. 685'
PROPOSED 18" DIA. DISCHARGE PIPE
PROPOSED NWL 685'
SILVER CREEK
PROP ENDWALL W/ 18" OUTFALL PIPE (SEE DETAIL) 1
6' WILLOW BRUSH BUFFER (TYP.)
PROPERTY LINE (TYP.)
W. 1/4 COR. SECTION 2 T.18N., R.23E. (1" I.P.)
1388 N 100.00 STAKE
GROUNDWATER PLUME (TYP.)

PROP. 18"Ø OUTFALL PIPE
PROP. ENDWALL
OHWM ELV. 683.0

Plotted By: engelhardts
Plot File Date Created: Dec/05/2016 4:07 PM
Filename: \\USMWK1FS001\PROD\DATA\LIBRARY\WORK\82518\CADD\2016\2016 – NEWTON GRAVEL CONCEPTUAL SITE PLAN – Layout–Sheet Name: SITE LAYOUT – DECEMBER.DWG

AECOM

PROJECT

FORMER NEWTON GRAVEL PIT - CAP & POND DESIGN

MANITOWOC, WISCONSIN

CLIENT

CITY OF MANITOWOC

900 QUAY ST.
MANITOWOC, WI 54220
920-686-6910 tel
www.manitowoc.org

CONSULTANT

AECOM
1555 RIVERCENTER DRIVE, SUITE 214
MILWAUKEE, WI 53212
414-944-6080 tel 414-944-6081 fax
www.aecom.com

SUB CONSULTANT

REGISTRATION

ISSUE/REVISION

1	10/21/2016	Cap final topography grade
0	8/18/2016	Original
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

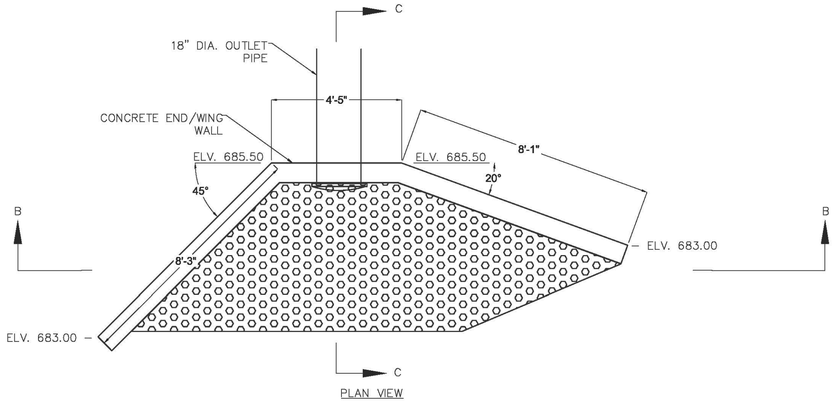
60311767

FIGURE TITLE

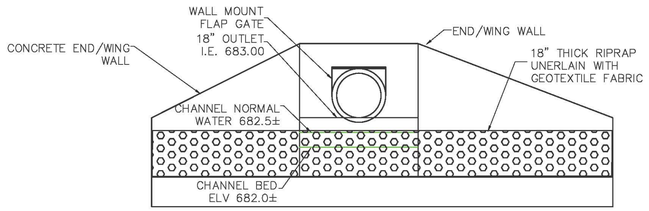
CONCEPTUAL SITE PLAN

FIGURE NUMBER

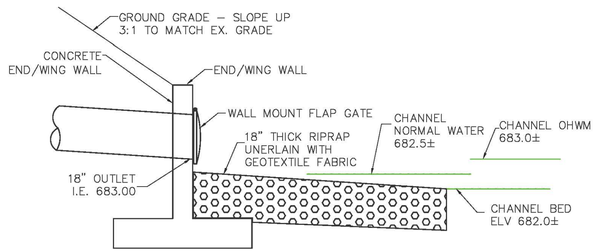
FIGURE X - DRAFT



PLAN VIEW

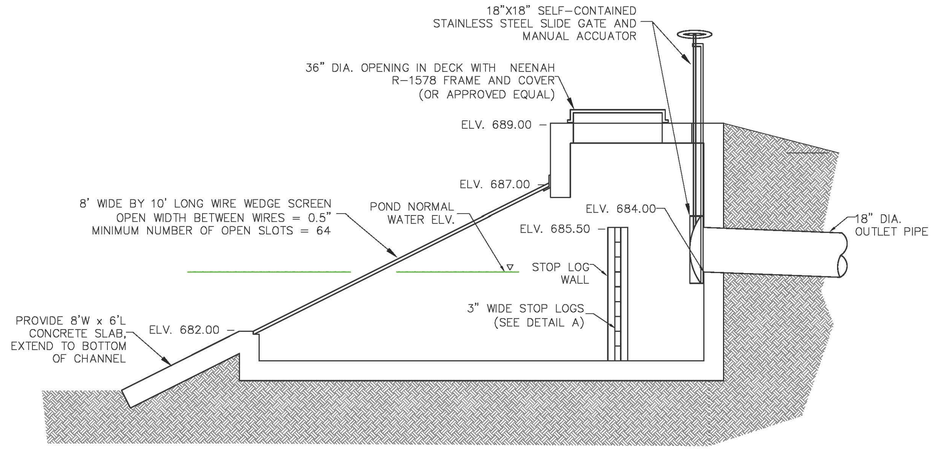


SECTION B–B

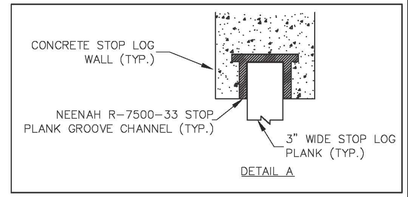


SECTION C–C

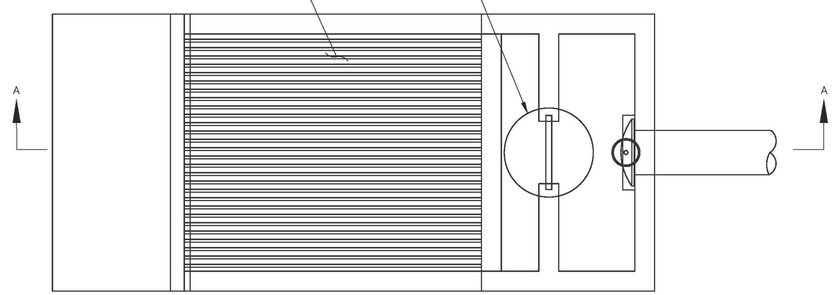
OUTFALL ENDWALL DETAIL 1



SECTION A–A



DETAIL A



PLAN VIEW

POND OUTLET STRUCTURE DETAIL 2

AECOM

PROJECT

FORMER NEWTON GRAVEL PIT - CAP & POND DESIGN
MANITOWOC, WISCONSIN

CLIENT

CITY OF MANITOWOC
900 QUAY ST.
MANITOWOC, WI 54220
920-686-6910 tel
www.manitowoc.org

CONSULTANT

AECOM
1555 RIVERCENTER DRIVE, SUITE 214
MILWAUKEE, WI 53212
414-944-6080 tel 414-944-6081 fax
www.aecom.com

SUB CONSULTANT

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER
60311767

FIGURE TITLE
POND STRUCTURAL DETAILS

FIGURE NUMBER
FIGURE Y - DRAFT

Layout–Sheet Name: DETAILS
Plotted By: engelhardts
Plot File Date Created: Dec/05/2016 2:12 PM
Filename: \\USMWK1FS001\PROD\DATA\LIBRARY\WORK\82518\CADD\2016\2016 – NEWTON GRAVEL CONCEPTUAL SITE PLAN – DECEMBER.DWG

Attachment 4
Solar Powered Circulation Equipment Information

Medora Corporation

SolarBee®

Contents

SB5000 OWNER'S MANUAL

Medora Corp • 3225 Hwy 22• Dickinson, ND 58601
Ph +1 701 225 4495 • +1 866 437 8076 • Fax +1 701 225 0002 • www.medoraco.com

578_20160510

Safety Instructions

IMPORTANT

YOU MUST COMPLETELY READ AND FULLY UNDERSTAND THESE INSTRUCTIONS BEFORE INSTALLING, OPERATING, OR SERVICING THIS UNIT.

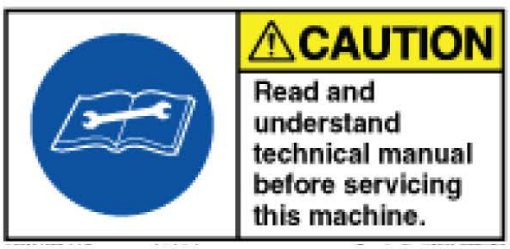
Be sure you have read all installation, operation, maintenance, and safety instructions before you install, service or begin to operate this unit.

Accidents occur every year because of careless use of industrial equipment. You can avoid hazards by following these safety instructions, and applying some ordinary common sense when operating or servicing this unit.

Keep in mind that **full operator attention and alertness** are required when operating or servicing this unit.

Use common sense! Most accidents can be avoided by using **common sense and concentrating** on the job being done.

Carefully read safety information when you see any safety symbols:



Safety

Crush Hazard

CAUTION: DO NOT REMOVE ANY FLOAT ARM OR TURNBUCKLE PINS OR BOLTS WHILE THE SOLARBEE IS FLOATING IN THE WATER! THE SOLARBEE MUST BE RESTING ON THE GROUND OR SAFELY SUPPORTED TO RELIEVE THE FORCES ON THE FLOAT ARM AND TURNBUCKLE STRUCTURES PRIOR TO DISASSEMBLY! FAILURE TO FOLLOW THIS WARNING COULD LEAD TO SINKING THE SOLARBEE, OR CAUSE SERIOUS INJURY!

Rotating Equipment

CAUTION: KEEP BODY APPENDAGES OR LOOSE CLOTHING AWAY FROM THE IMPELLER ASSEMBLY WHILE THE MACHINE IS OPERATING! IF MAINTENANCE IS REQUIRED, BE SURE TO TURN THE SOLARBEE OFF FIRST! WEAR PROTECTIVE GLOVES AND BE CAUTIOUS OF SHARP LEADING EDGES ON IMPELLER BLADES WHILE CLEANING! FAILURE TO FOLLOW THESE WARNINGS COULD LEAD TO INJURY!

Entanglement Hazard

WARNING: IF MOVING OR DEPLOYING MOORING BLOCKS CONNECTED TO THE ANCHOR CHAIN, BE SURE THAT YOU AND OTHERS ARE CLEAR OF THE ANCHOR CHAIN BEFORE SINKING THE MOORING BLOCKS! LOWER THE MOORING BLOCKS INTO THE WATER SLOWLY. FAILURE TO DO SO COULD CAUSE SERIOUS INJURY OR DEATH BY DROWNING!

THIN ICE HAZARD

WARNING: DURING WINTER CONDITIONS WHEN THE SOLARBEE IS FROZEN IN OR PARTIALLY FROZEN IN, THE MACHINE SHOULD NOT BE APPROACHED. THE ICE AND SNOW AROUND THE SOLARBEE SHOULD NOT BE ASSUMED TO SUPPORT WEIGHT. FAILURE TO DO SO CAN RESULT IN SERIOUS INJURY OR DEATH BY DROWNING OR HYPOTHERMIA!!!

Lock Out - When the On/Off switch is in the On position, the SolarBee may start up at any time. The SolarBee On/Off switch can be locked out by placing a pad lock through the shroud of the switch while it is in the Off position. The On/Off switch is to be used as the emergency stop.

EU Declaration of Conformity
Trade Name: SolarBee
Responsible Party: Medora Corporation
Address: 3225 Hwy 22
Dickinson, ND 58601 USA
Telephone: 1-866-437-8076
This equipment complies with:
- Machinery Directive 98/37/EC
- Noise Emissions of Outdoor Equipment Directive 2004/14/EC
- Electromagnetic Compatibility Directive (EMC) 89/336/EEC

Signage and Instuctions - The SolarBee is supplied with warning signage and instructions written in the english language. It is very important that all operators and the public having access to the SolarBee equipment be informed of the associated safety hazards. If english is not the dominant language in the region, Medora Corporation strongly recommends that all warning signage and instructions be translated to the dominant language.

For SolarBee machines installed into a public reservoir where there is open access to the machine, it is strongly encouraged to properly notify the public of its presence. To avoid an injury or damage to the equipment, the public should remain at least 5 meters away from the machine at all times. Below is a sample public notification sign

PUBLIC INFORMATION NOTICE

The **City of** _____ has installed SolarBee® solar-powered high-flow long-distance circulation equipment in (type name of pond/lake) to improve the water quality and to enhance the recreational value of the lake.

Some facts about SolarBee SB5000 / 5000 gpm Circulators:

Medora Corporation
SolarBee®

- SolarBees come in various sizes, the largest unit circulates 14 million gallons per day. The machine in this lake circulates 7.2 million gallons per day.
- The machine runs during daylight & night hours entirely powered by solar energy.
- SolarBee long distance water circulation helps:
  - prevent lake water stagnation,
  - control blue-green algae blooms,
  - improve the lake ecosystem,
  - provide a healthy environment for fish, frogs, crayfish, and other aquatic organisms.
- SolarBee units have an expected life of 25+ years.
- More information on this technology is available at ***www.medoraco.com***.

We trust that you'll find the SolarBee to be very effective in treating your water. Every SolarBee is tested and inspected at our manufacturing facility before being delivered to you. An experienced and trained Medora Corp. field team will deliver and install your SolarBee. During the installation, the field team will present to you a summary of the background, operation, and routine maintenance of your SolarBee. They are very helpful and willing to answer any field questions you may have.

The SolarBee has proven to be effective in a variety of applications including wastewater, freshwater, potable water, stormwater, and salt water. Research and development continue to be a high priority in order to provide you with the up-to-date knowledge and best technology available for your application. Extensive design efforts have been made to make the SolarBee easy to maintain with high quality, long life parts.

If at any time you feel that your SolarBee is not operating at its full potential, feel free to contact the main office where a knowledgeable Medora Corp. service team is available to offer help. There are methods of field adjustment that may be beneficial following the installation. Our service team will gather the latest information on your application and combine it with their experience to optimize the performance of your SolarBee.

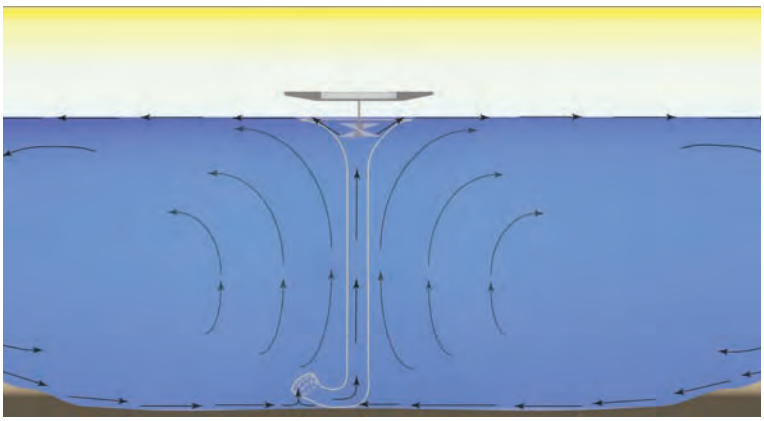
Technology Features

- *Solar power achieving day/night operation*
- *Durable brushless motor*
- *Advanced control system*
  - *Scheduled-reverse, and anti-jam routine*
  - *SCADA outputs, machine monitoring*
  - *SD Card reprogrammable*
  - *Seasonal RPM Schedule*
- *Robust frame and float arm structures*
- *Swinging PV module gates*
- *PV modules with angle adjustment*
- *Quick detachable impeller*
- *Lower floating profile, improved aesthetics*
- *Smooth, quiet operation*

Medora Corporation Factory and Delivery Fleet

Operation

The SolarBee is designed to circulate water by bringing water from below and sending it out across the top in a thin layer causing a mixing effect. The laminar layer flows outward radially, in diverging “stream lines” from the distribution dish. As it does, vertical flow is induced in between the water being drawn below and the water above. At the level of the flow intake, water is drawn from all corners of the pond. As this lower layer of fluid makes its way inward with converging streamlines to the SolarBee, the water is forced upward, toward the surface, providing gentle mixing, de-stratification, and surface renewal



SB5000 Flow Pattern

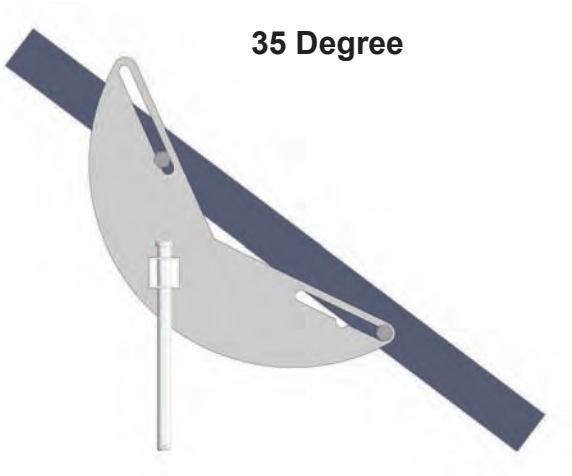
The SolarBee obtains all the energy it needs from the sun. Its solar panels provide power to the onboard battery which energizes the drive system’s controls and motor. The new Technology allows excess solar energy to be stored during the day and used during the night allowing the SolarBee to operate during the night without being connected to the grid.

During operation, a visible flow can be observed coming off the distributor dish and spreading outward. The impeller of the SolarBee is designed to operate at full speed when there is sufficient sunlight and battery charge. The rpms may drop down some during the later night and early morning when the battery uses up its charge after a longer period of overcast days. In severe sunlight limited conditions, the machine may slow down or stop temporarily to protect the battery from damage.

Flow Coming Off Distributor Dish

Features

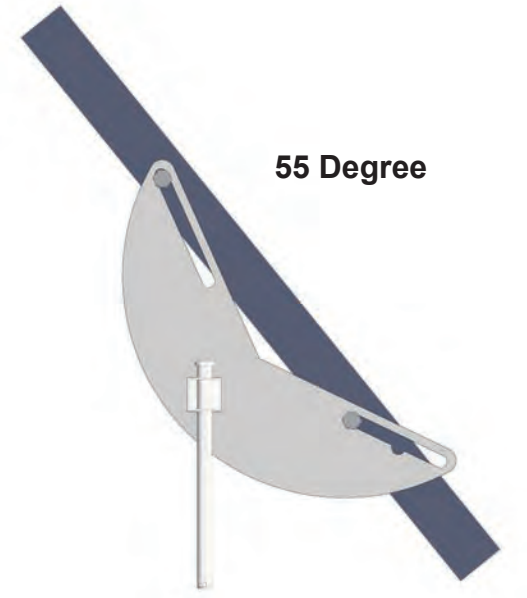
The SolarBee with technology includes new features which enhance its performance through more efficient and durable components, improved operation monitoring capablilities, easy component access, and a robust frame structure.



Solar / Electronics

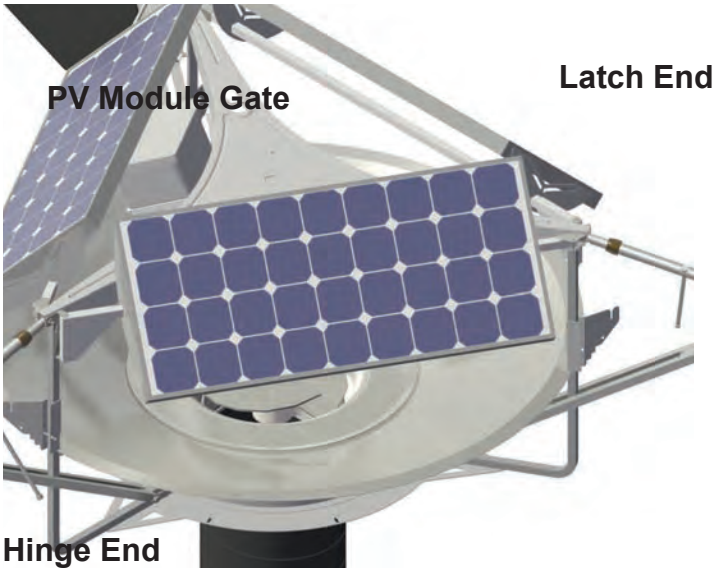
Photovoltaic (PV) Modules -The PV modules are often referred to as the solar panels. The SolarBee uses 100% solar energy to provide day/night operation. The PV modules collect solar power to operate the machine with excess left over to charge an onboard 12-volt, deep cycle battery. The SolarBee has 3 80-watt PV modules which individually connect to the digital controller. A bird deterrent is located directly above the PV modules to prevent bird fouling.

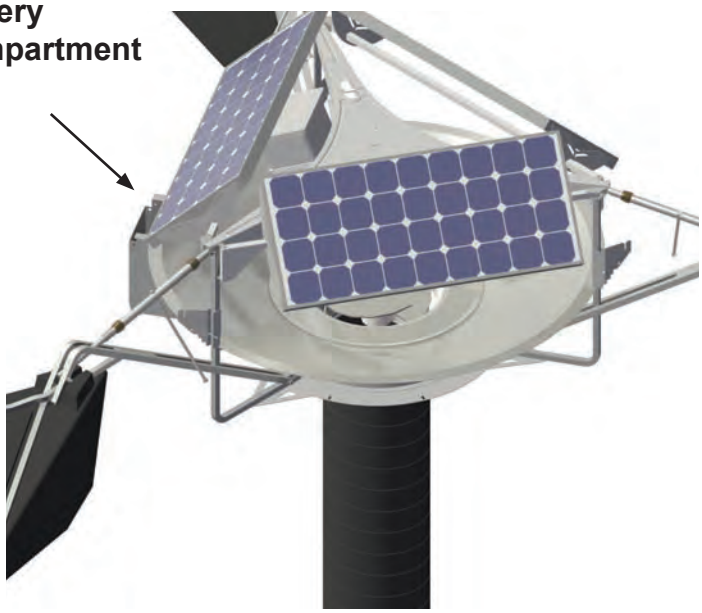
The PV modules have 3 angle settings that are set at the factory based on solar energy availability unique to the customer's geographic location. The flattest position is a 35 degree angle for customers located where solar power availability is greatest. The mid-range setting position is a 45 degree angle for customers where solar power availability is moderately available. The steepest position is a 55 degree angle intended for winter conditions to prevent snow and ice buildup from lasting a long time period on the PV modules (following winter conditions, the PV modules should be returned to their original position to maximize solar energy collection).



For cable tethered anchoring, the north facing panel may be flipped to face the south using a special panel gate. A tethered machine is fixed and will not rotate, so the north facing panel will receive the least sunlight, unless flipped using the special gate. For mooring block anchoring, this is not an option due to the machine rotating about the mooring blocks.

Each PV module is fixed to a gate that opens up allowing quick access to the interior components of the machine. Each gate opens by simply removing a pin on the latch end.





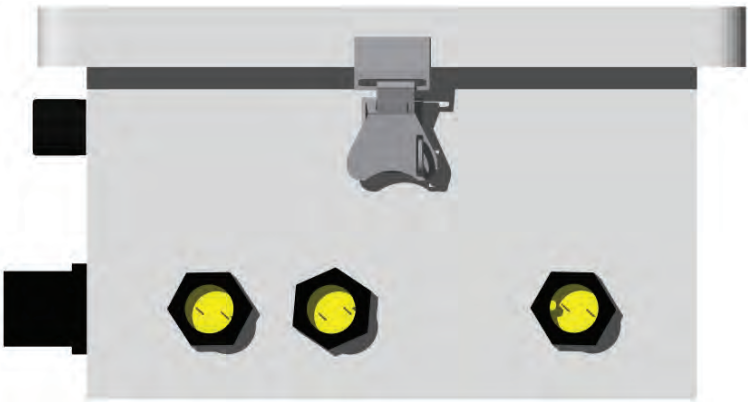
Onboard Battery - The onboard battery is located directly below the dish in a stainless steel compartment. During operation, the battery is submerged in the water to maintain a stable-temperature environment that increases its performance and life. The battery is double walled to isolate its contents from the water it is submerged in.
The onboard battery stores excess power from the solar panels during the day and operates the machine using the stored power during the night and extremely overcast days. Be sure to follow local regulations and laws when disposing of the battery following its useful life.

Onboard Battery

Digital Controller - The digital controller is located near the top center of the SolarBee. The digital controller can be easily accessed by opening the PV module gate directly above and in front of it. The digital controller is constructed with a NEMA 4X (IP66) Enclosure.

All solar energy collection and motor operation are managed by the digital controller. This component has two primary functions: (1) To direct and divide the power being collected by the PV modules between the brushless motor and battery. (2) To serve as the main control center that operates the brushless motor.

There are 3 PV module connections located on the front face of the digital controller. If the onshore power accessory was purchased, a connection will be located on the right side face. The onshore connection is used only in applications where onshore grid power is desired.



Front Face Of Digital Controller

The left side face of the digital controller contains the brushless motor connection, battery connection, and On/Off switch. The On/Off switch activates power to the motor. When the switch is turned to the Off position, the motor will not operate. The charging function of the controller will continue to charge the battery even when the switch is turned off.

Left Side Face Of Digital Controller

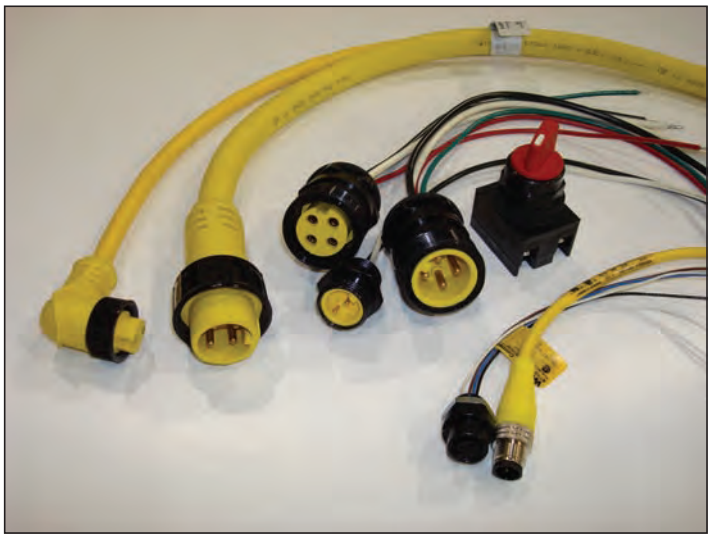
SCADA outputs offering machine operation parameters reside within the digital controller. Please contact SolarBee if you are interested in receiving these parameters.

SCADA Signal From SolarBee Unit

Motor Controller - The motor controller is located near the motor just below the top plate of the SolarBee. The motor controller is sealed in line with the electrical cord that runs to the brushless motor.

The motor controller on the SolarBee receives power and signals from the main control center located inside the external enlosure. These signals are used to operate the brushless motor at the commanded speed. The motor controller also sends feedback signals back up to the main control center.

Due to the high frequency of communication between the motor controller and brushless motor, the two components need to be located close to one another. This is the primary reason for having the motor controller located directly on the SolarBee.



Durable Wiring And Connectors

All electronic connections on the SolarBee equipment should only be used for the inputs or outputs that they are labeled and designed for. If any of the leads going into the electronic controller are disconnected, be sure when re-connecting to place them in the proper position.

Wiring - All electric wiring includes corrosion-resistant, industrial cords with molded, weather and watertight connectors. The connectors are indexed to prevent improper wiring. A general electrical schematic can be found in the Maintenance and Field Adjustment section.

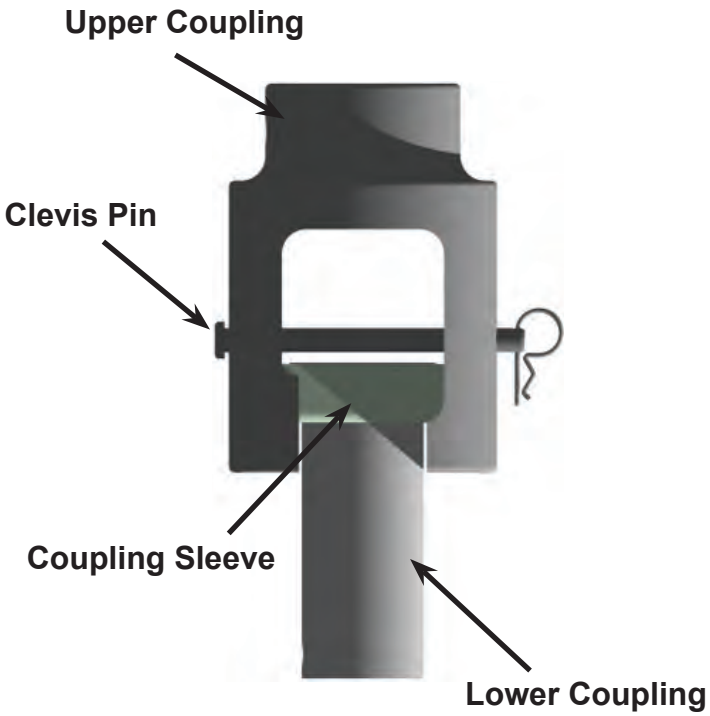
Brushless Motor / Impeller

Brushless Motor - The brushless motor is located directly below the Top Deck. 4 bolts run down through the Top Deck and into the housing of the brushless motor fastening it onto the machine.

CAUTION: THE BRUSHLESS MOTOR WEIGHS APPROXIMATELY 80 LBS (36KG). DO NOT REMOVE WITHOUT DISCUSSING THE PROCEDURES AND EQUIPMENT NECESSARY WITH A MEDORA CORP. SERVICE TEAM MEMBER.

Brushless Motor

The brushless motor is built to be very durable. The housing is constructed of casted aluminum. The brushless motor runs very quietly and smoothly. It does not require any maintenance. A drive shaft extends through the bottom center of the housing.



Shaft Coupling - The shaft coupling connects the brushless motor drive shaft to the impeller shaft. The shaft coupling is located directly below the brushless motor and is made up of 3 main components. These components are called the upper coupling, lower coupling, and coupling sleeve. The shaft coupling is designed to allow quick disconnect for removal of the impeller assembly. Disconnecting the impeller shaft from the brushless motor shaft is simply accomplished by pulling out a pin and requires no tools. The upper coupling remains attached to the brushless motor while the lower coupling and coupling sleeve remain on the impeller shaft.

Impeller Assembly - The impeller assembly is made up of the stainless steel impeller shaft, stainless steel flag indicato , freeze sleeve, stainless steel impeller blades, and plastic impeller bushing. The impeller assembly is easily removed by pulling a pin on the shaft coupling.

CAUTION: KEEP BODY APPENDAGES OR LOOSE CLOTHING AWAY FROM THE IMPELLER ASSEMBLY WHILE THE MACHINE IS OPERATING! IF MAINTENANCE IS REQUIRED, BE SURE TO TURN THE SOLARBEE OFF FIRST!

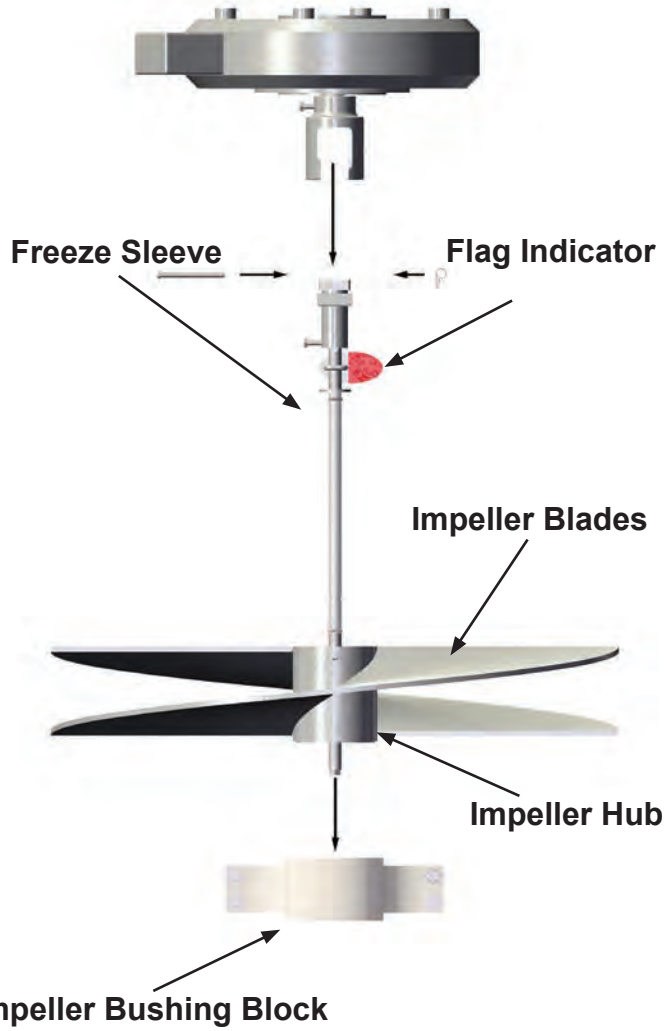
The flag indicator is fixed to the shaft and use as a visual indicator of the impeller shaft's rotational speed.

An food grade oil-filled, Teflon freeze sleeve secured with o-rings surronds the impeller shaft. The freeze sleeve is free to rotate on the shaft. If the water should freeze around the machine, the freeze sleeve will stand still, frozen in by the ice, but inside the plastic sleeve, the impeller shaft will be turning.

The impeller blades are welded to a hub that is securely fastened to the impeller shaft. The impeller is designed to gently pump water from below and can handle up to 4-inch (10cm) spherical solids.

The impeller bushing is a smooth collar that the impeller shaft tip fits into. The impeller bushing aligns and centers the impeller shaft within the machine.

Turn SolarBee Off Before Performing Maintenance



Distributor Dish / Hose / Intake Plate

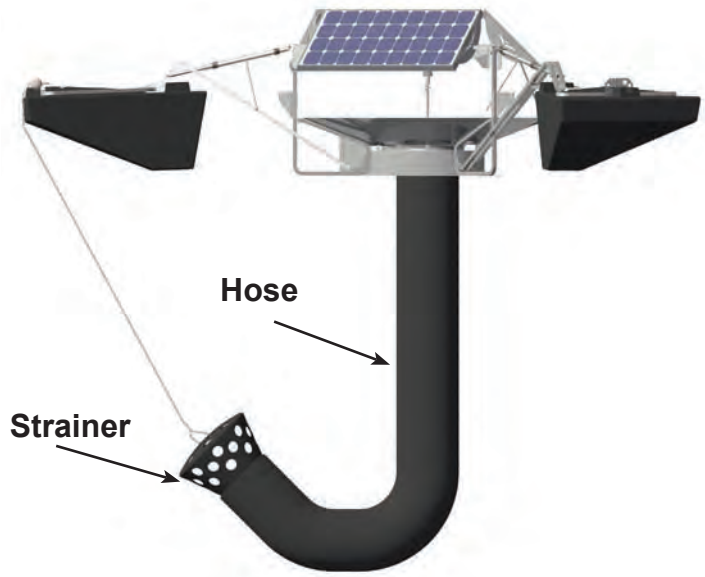
The distributor dish, structural members, structural fasteners, and mounting brackets are constructed of stainless steel.

Distributor Dish - Near-laminar flow is achieved by the SolarBee due to its uniquely designed distributor dish. The impeller rotates while sitting within the lower half of the distributor dish. There are also small water passages located below the dish to strengthen the induced flow e fect (water movement occuring between the lower water layer entering the machine and the upper water layer leaving the dish).

Distributor Dish

The top lip of the distributor dish is set approximately 1 inch to 1-1/2 inch (2.5cm to 3.8cm) below the surface of the water to achieve best flow results. The distributor dish depth is set by rotating the turnbuckles located on the float arms

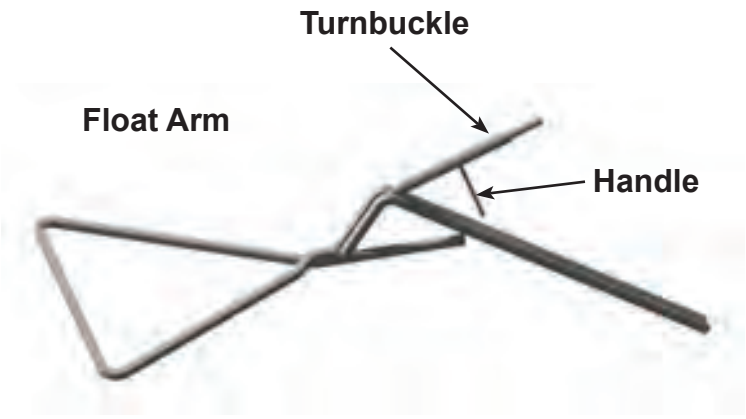
Hose / Strainer - On the SB5000 , the hose is directly below the distributor dish and the strainer is located at the end of the hose. The strainer contains a buoyant float ball inside that allows the strainer to draw water from approximately 1.5 ft to 2 ft (0.45m to 0.6m) above solid bottom. The hose is designed to make a "J" shaped bend at the bottom so that the strainer does not draw sediment up from the bottom. The strainer has a chain connected to it and can be chained up at more shallow depths if necessary. The chain also is used for pulling up the strainer to check it for plugging.



SB5000 Hose And Strainer Configuratio

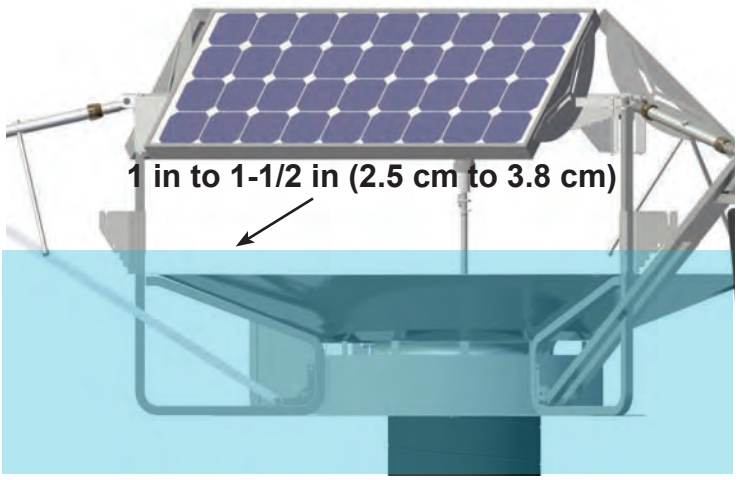
Float Arms / Floats

The SolarBee contains 3 float arms and 3 floats. The float arms allow vertical positioning of the machine and the floats provide buoyancy.



Float Arms - The float arms are constructed of stainless steel components. They connect the floats to the central machine structure. Each float arm has a sturdy turnbuckle. The turnbuckles can easily be rotated to adjust the vertical height of the distributor dish. Lengthening the turnbuckle (rotating clockwise) will raise the lip of the distributor dish, whereas shortening the turnbuckle (rotating counter-clockwise) will cause the lip of the distributor dish to lower.

The turnbuckle and float arm structure components are constructed with robust stainless steel materials allowing the SolarBee to operate in severe environments without being damaged. The turnbuckle is self locking. Simply rotate the handle to expand or collapse the turnbuckle for dish depth adjustment.



Distance Between Distributor Dish And Water Level

It is important to check the distributor dish depth routinely. The SolarBee naturally drops into the water over time due to biomass buildup and trapped air escaping from the hose. If the distributor dish lip is too high, the water coming off the lip may become turbulent and the flow rate of the machine may be reduced.

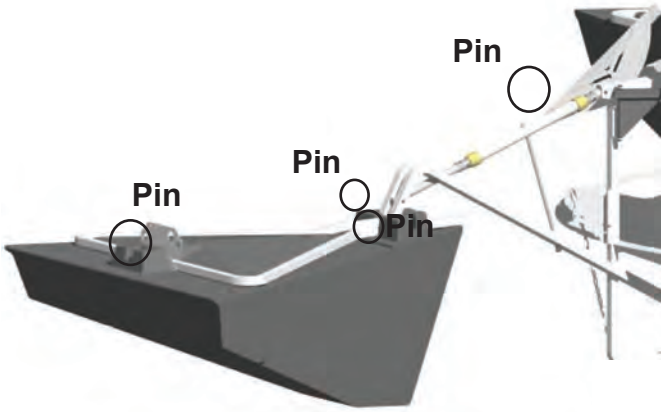
If the distributor dish lip is too low, the water coming off the lip will flow just underneath the surface of the pond and the surface will not be renewed.

Each float arm is connected to the central machine structure with 1 bolt and 1 pin. Each float is connected to the float arm by 2 pins. The turnbuckle can be removed from the float arm by pulling a pin, but should only be done when the unit is resting on the shore.

If re-attaching the turnbuckle to the float arm, be sure that each threaded end of the turnbuckle together are screwed all the way in or all the way out before re-attaching. If threaded ends are not equally expanded or collapsed before fixing the ends, the turnbuckle will have limited adjustment.

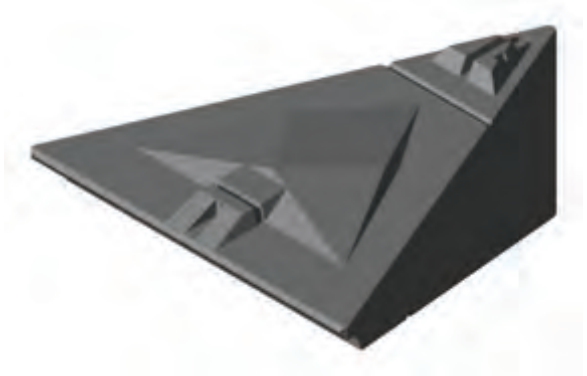
Floats - The SolarBee has 3 floats, made from high density Polyethylene. The floats are fille with a Polystyrene closed-cell foam for long term buoyancy. The floats have a uniquely designed shape to:

- Minimize the interference with the water flow on the surface coming o f the distributor dish.
- Have a low profile above the water for minimizing wind resistance and offering less exposure to vandalism.
- Avoid being crushed by ice pressure.
- Provide extra buoyancy when needed without going much deeper into the water.



Float Arm Connection Points

CAUTION: DO NOT REMOVE ANY FLOAT ARM OR TURNBUCKLE PINS OR BOLTS WHILE THE SOLARBEE IS FLOATING IN THE WATER! THE SOLARBEE MUST BE RESTING ON THE GROUND OR SAFELY SUPPORTED TO RELIEVE THE FORCES ON THE FLOAT ARM AND TURNBUCKLE STRUCTURES PRIOR TO DISASSEMBLY! FAILURE TO FOLLOW THIS WARNING COULD LEAD TO SINKING THE SOLARBEE, OR CAUSE SERIOUS INJURY!



Float

Anchoring Systems

The SolarBee uses one of the following anchoring systems. The mooring block system consists of submerged anchors and doesn't require lines running from the shoreline. The tethering system uses cable that spans across the pond or reservoir connecting to tethering posts on the shorline.

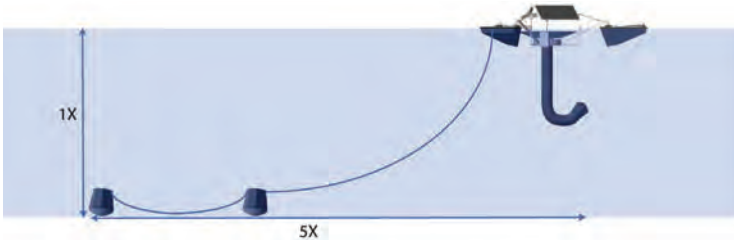
Mooring Block System - The mooring block system consists of two mooring blocks made of high density Polyethylene with smooth, rounded bottoms. The smooth bottoms prevent any damage being done to a pond liner or reservoir bottom. The mooring blocks are concrete filled and weigh approximately 70-lbs. (31.75 kg).

Stainless steel anchor chain is used to connect the mooring blocks to the SolarBee at the float plate on one of the floats. The anchor chain contains swivels approximately every 15-ft (4,5m) to prevent the chain from twisting and tangling.

A 7:1 scope is generally preferred for the length of anchor chain. For example, if the pond is approximatley 10-ft (3m) deep, the anchor chain will go from the first mooring block out 70-ft (21m) to the machine. The 7:1 scope prevents the machine from moving during high wind and wave conditions. The two mooring blocks are generally spaced apart along the anchor chain by a distance approximately the depth of the water. From time to time, as determined by specific circumstances, the scope can be reduced to 5:1.

Mooring Blocks

Movement of machine - For a SolarBee anchored by a mooring block system, the machine may rotate 360 degrees around the mooring blocks on a radius of approximately 5X to 7X the water depth. For example, a machine that is in 10 ft (3m) of water may travel on a 70 ft (21 m) radius from the location of the mooring blocks

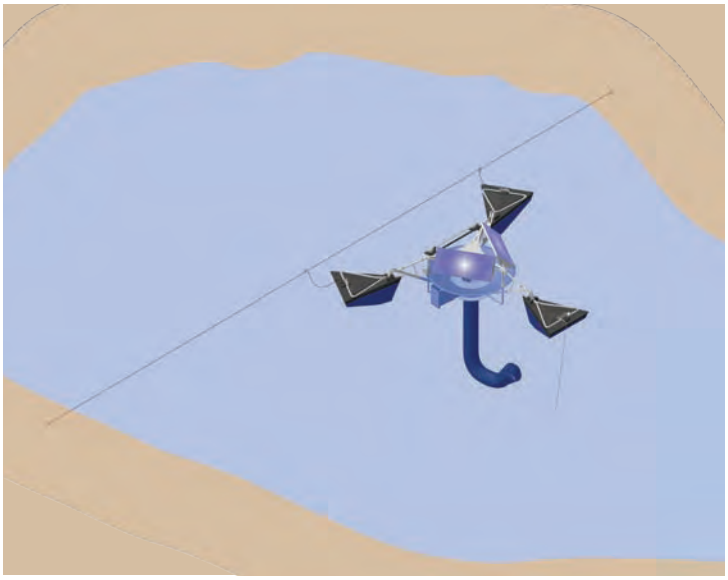


Mooring Block System (7:1 Scope)

Following severe weather conditions (greater than 80-mph (129 km/hr) wind, higher than 4-ft (1.2m) waves, or ice thaw), it is possible for the SolarBee to drag the anchors and move out of position. If this should happen, the pond or reservoir operator will need to re-locate the machine to its original position.

WARNING: IF MOVING OR DEPLOYING MOORING BLOCKS CONNECTED TO THE ANCHOR CHAIN, BE SURE THAT YOU AND OTHERS ARE CLEAR OF THE ANCHOR CHAIN BEFORE SINKING THE MOORING BLOCKS! LOWER THE MOORING BLOCKS INTO THE WATER SLOWLY. FAILURE TO DO SO COULD CAUSE SERIOUS INJURY OR DEATH BY DROWNING!

Tethering System - The tethering system constists of 2 tether posts or duckbill anchors set into the shoreline across from one another. A stainless steel cable is strung across the pond or reservoir and tied to both tether posts. The SolarBee has 2 short chains running from two of the float plates on the machine out to the cable line running across the pond or reservoir.



Tethering System

The tethering system is used in applications where the body of water is very narrow or the Mooring Block System is not applicable. Following severe weather conditions (greater than 80-mph (129 km/hr) wind, higher than 4-ft (1.2m) waves, or ice thaw), it is possible for the tether posts to pull partly or completely out of the ground. If this should happen, the pond or reservoir operator will need to re-locate the machine to its original position.

Movement of machine - For a SolarBee anchored by a tether system, the machine will have limited movement, however slack will be left to allow for water fluctuation. The tether line slack will be field determined based on tether line span and expected water fluctuation. The SolarBee will not rotate when it is anchored using the tether system.

Maintenance and Field Adjustment

The performance of the SolarBee has proven to increase tremendously when its operator understands the operation of the machine and knows how to carry out field adjustment procedures. Because the SolarBee operates at low voltage power, all maintenance tasks can be carried out by the operator with proper safety precautions and equipment. During installation, an experienced Medora Corp. field team thoroughly trains the operator on how to keep the SolarBee performing at its best.

In most applications, it is strongly encouraged that the operator have a boat to perform routine checkups (at least once per month or as needed) and field adjustment procedures on the SolarBee. A large, expensive boat isn't necessary. Our Medora Corp. field teams use 12 ft (3.65m) Jon boats that work fine for almost all applications.

SolarBee Orientation During Install

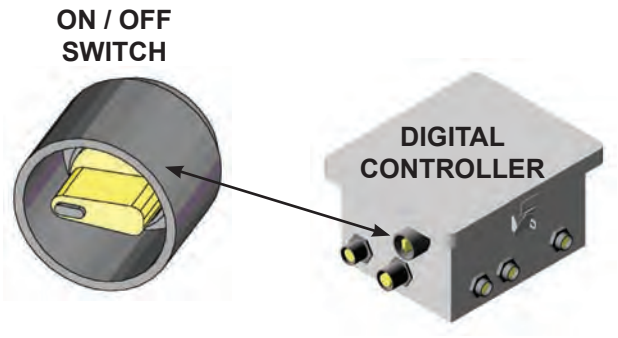
It is extremely important that safety comes first every time the SolarBee is inspected or having maintenance procedures performed. It is strongly encouraged that anyone working on or near the machine follow these rules:

 Wear a personal floatation devic

 Stay focused and alert

 Turn the SolarBee off before working on it

 Stay clear of parts while they are moving



To turn the SolarBee motor off, turn the On / Off switch to the off position. To completely power down the digital controller, remove all power sources in the proper sequence.

PV Module Cleaning

The solar panels are the SolarBee's primary source of energy, so it is important that they be kept clean. Over time, dust collects on the PV modules or birds are not kept completely off by the bird deterrent resulting in the panel's effective surface area decreasing.

PV Module Cleaning

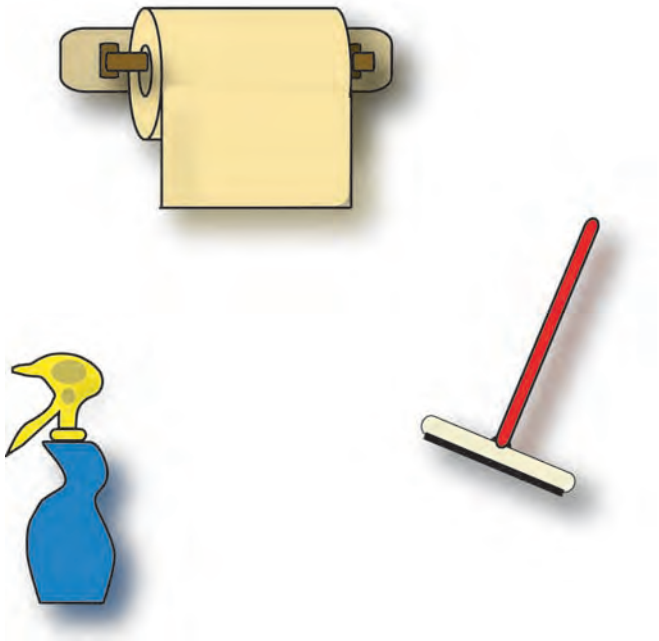
TOOLS RECOMMENDED:
Squeegee
Glass Cleaner
Paper Towel or Wash Cloth

STEP 1: Rinse panel face off with water.

STEP 2: Use squeegee, towel, or wash cloth to clean surface of panel.

STEP 3: Remove any streaks or films using glass cleaner and paper towel/wash cloth.

STEP 4: Repeat Steps 1 through 3 for each solar panel.



Solar Panel Angle Adjustment

The SolarBee technology includes tilting PV modules to allow for optimal solar collection for different geographical regions and changing sun position during the seasons.

Use 35 Degree (Flattest Position):
Where - Locations south of 40 degree latitude.
When - During fall, summer, and spring or year round if no adjustment is preferred.

OR

Where - Locations north of 40 degree latitude.
When - During summer only.

Use 45 Degree (Middle Position):
Where - Locations north of 40 degree latitude (Especially Great Lakes Region and Canada).
When - During spring and fall or year round if no adjustment is preferred.

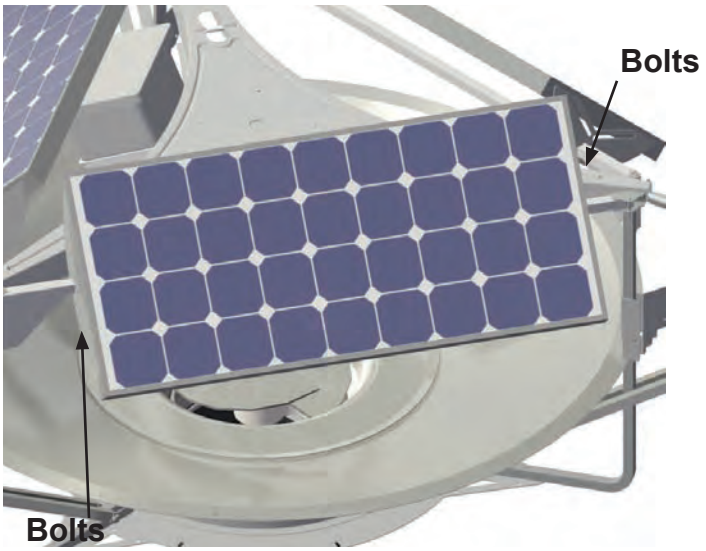
OR

Where - Locations south of 40 degree latitude.
When - During winter

Use 55 Degree (Steepest Position):
Where - Locations north of 40 degree latitude.
When - During winter season or periods of abundant snow (The steep angle will help prevent snow from building up on the panels).

TOOLS RECOMMENDED:
Two 1/2" or 13mm wrenches

STEP 1: Loosen 2 bolts on each end of the PV module using 1/2" or 13mm wrenches as shown in the figure belo .



STEP 2: Firmly grip the PV module and slide it up or down the tracks until it is in the desired position. For each of the three recommended angle settings listed, there is a slot in the top tracks at both ends that the top bolt will drop into.

STEP 3: Once the PV module is in the desired position, tighten all four bolts.

STEP 4: Repeat steps 1 through 3 for other two solar panels

Impeller Rotational Speed Check

During clear skies and good sunlight weather conditions, the drive system of the SolarBee unit should operate:

1) At a rotational speed between 55 and 85 revolutions per minute (rpm).

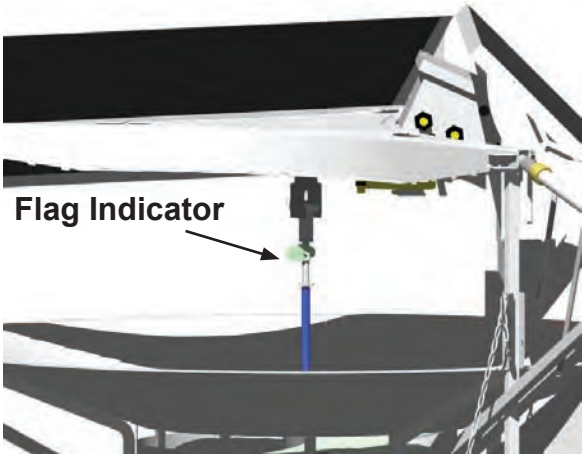
2) In a clockwise direction when looking down at the impeller.

Clockwise Rotation When Looking Down

Checking Rotational Speed

TOOLS RECOMMENDED:
Watch or Stopwatch

STEP 1: Locate the flag indicator on the impeller shaft.



Flag Indicator Section of Impeller Shaft

STEP 2: Start the stopwatch or mark a starting point on the watch. Immediately begin counting each full revolution of the flag indicator (starting with "ZERO", "ONE", "TWO", etc) for a time of less than or equal to 1 minute and at least 20 seconds. This step is easier with two people, one counting revolutions and the other keeping track of the time expired.

STEP 3: Quit counting revolutions and immediately observe how much time has expired in seconds.

STEP 4: Use the following equation to calculate rotational speed in rpms:

$$\text{Revolutions Per Minute (RPM)} = \frac{\text{(\# Revolutions Counted X 60)}}{\text{DIVIDED BY}}$$

$$\frac{\text{(\# Revolutions Counted X 60)}}{\text{\# Seconds Expired}}$$

Example: 30 Revolutions were counted in a time period of 30 seconds.

RPM = (30 revolutions X 60) / (30 seconds) = 60

Impeller Rotational Speed = 60 RPMs

Impeller Cleaning

In some applications, the autoreverse function will not completely eliminate floating debris or aquatic weeds from catching on the impeller blades and shaft. In these applications, impeller cleaning and impeller removal may be necessary.

Impeller Cleaning

TOOLS RECOMMENDED:
Elbow High Rubber Gloves
Squeegee
Garbage Bag

STEP 1: Turn SolarBee off by placing the On/Off switch into the OFF position.

STEP 2: Open PV module gate for easy access to the impeller. If necessary for better access, use the three turnbuckles to raise machine level.

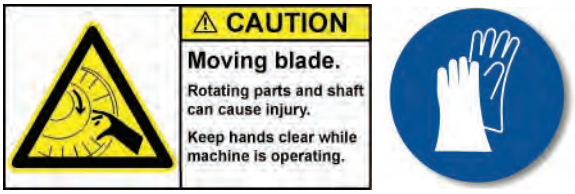
STEP 3: Using gloves and squeegee, clean off debris or aquatic weeds that are wrapped around impeller blades and shaft. Place the debris into a garbage bag and remove from pond to prevent it from going through SolarBee again. **Follow all local laws and regulations when disposing of any materials collected.**

STEP 4: Observe if there is buildup below the impeller blades.

If below the impeller is clean, then close the PV module gate, lower dish into the water at proper setting using the turnbuckles, and screw in fuse switch to turn SolarBee back on.

If there is buildup below the impeller, then see directions for impeller removal on the next page.

SolarBee With Buildup On Impeller



CAUTION: TURN SOLARBEE OFF BEFORE WORKING NEAR IMPELLER! WEAR PROTECTIVE GLOVES AND BE CAUTIOUS OF SHARP LEADING EDGES ON IMPELLER BLADES WHILE CLEANING! FAILURE TO FOLLOW THESE WARNINGS COULD LEAD TO INJURY!

Impeller Removal For Buildup Below Impeller

Impeller Removal

In the case that there is buildup below the impeller that cannot be reached, the impeller assembly can easily be removed.

Impeller Removal

TOOLS RECOMMENDED:
Elbow High Rubber Gloves

STEP 1: With SolarBee machine off and PV module gate open, locate the clevis pin going through the upper shaft coupling. Remove the hair pin and pull clevis pin out.

STEP 2: Grab the impeller shaft below the flag indicator, lift up and then outward until lower coupling and shaft are disconnected from upper coupling and brushless motor.

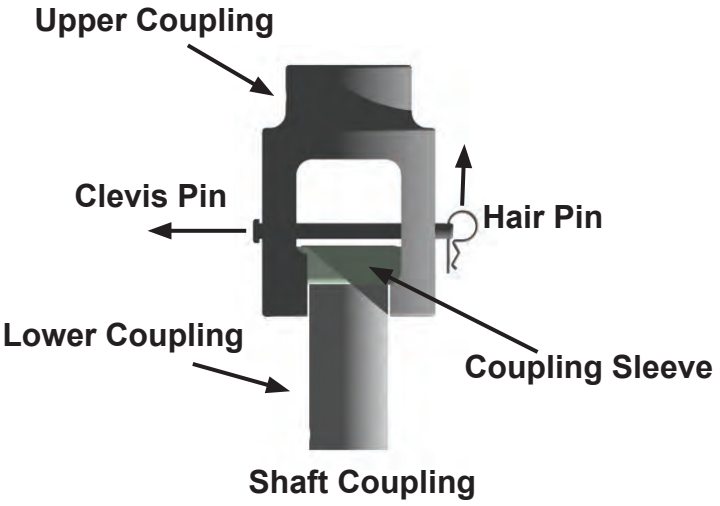
STEP 3: Observe and clean any debris located on the bottom of the impeller.

STEP 4: Observe and clean any debris located down in the dish where the impeller rests. Place the debris into a garbage bag and remove from pond to prevent it from going through SolarBee again. **Follow all local laws and regulations when disposing of any materials collected.**

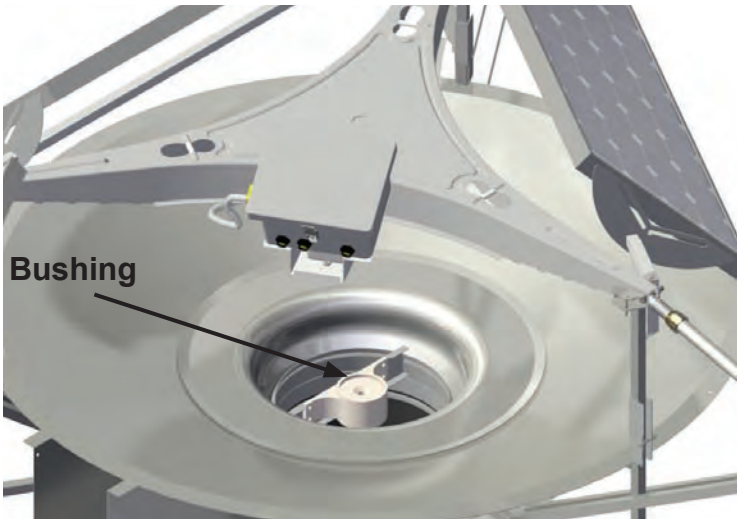
STEP 5: Once clean, place impeller assembly back in place (Slide lower coupling into upper coupling and allow to drop down into place). Be sure bottom of impeller shaft fits into the bushing in the dish and that the coupling sleeve is in place inside the shaft coupling assembly.

STEP 6: Place clevis pin back through upper shaft coupling and secure with hair pin.

STEP 7: Close PV module gate and turn SolarBee machine back on.



Impeller Assembly Removal Motion



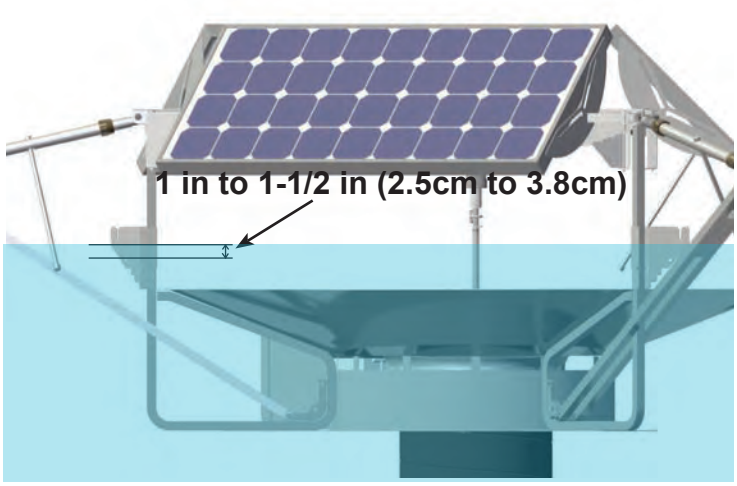
Impeller Assembly Removed

Distributor Dish Level Setting

The SolarBee distribuitor dish depth in the water is a key factor in maintaining the near-laminar flow of water coming o f the machine.

The distributor dish level setting is measured from the top lip of the dish up to the water surface. For this SB5000 , the depth level should fall on or between this range:

1 inch to 1-1/2 inch (2.5 cm to 3.8 cm)



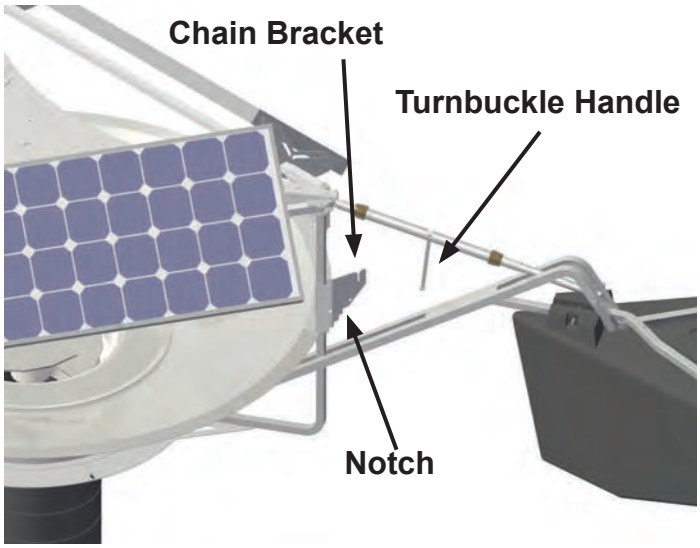
Distance Between Distributor Dish And Water Level

Distribution Dish Level Adjustment

TOOLS RECOMMENDED:
Tape Measure or Ruler

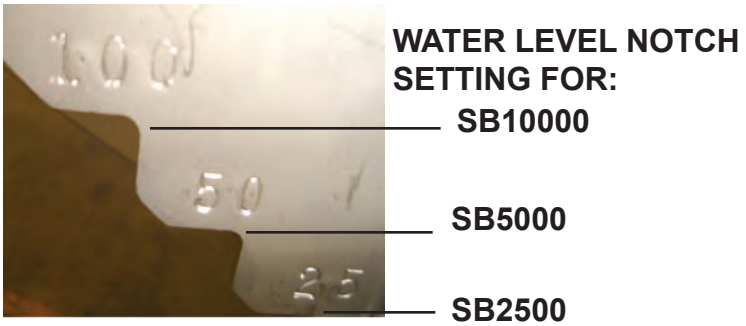
STEP 1: If SolarBee is not on, turn the On/Off switch to the On position.

STEP 2: Observe if the dish level is too deep or not deep enough at the three locations where each float arm extends out from the machine. This can be done using a tape measure, by approximating the height of a nickel, or locating the notch on each chain bracket for machines having a hose. If using the notch on each chain bracket, the water level should be even with the appropriate notch (see picture).



Water Level Even With Notch On Chain Bracket
Or 1 inch to 1-1/2 inch Above Lip Of Dish

STEP 3: Set the dish to the correct level in each of the three locations. To raise the dish level, rotate the turnbuckle around (clockwise) so that it is expanding. To lower the dish level, rotate the turnbuckle around (counter-clockwise) so that it is compressing.



Dish Depths For Different
Models of SolarBees

STEP 4: Double check dish level at all three locations and fine tune as necessar .

Hose Strainer Depth Setting

The hose strainer depth is either set by a buoyant float inside the strainer or chained up at a specific depth. If the hose strainer is not tied up using the attached chain, the water will enter the hose approximately 1.5 to 2 feet (0.45m to 0.6m) above solid bottom of the pond. In some cases, the hose strainer depth will need to be chained up to a higher level in the water.

Hose Strainer Depth Adjustment

TOOLS RECOMMENDED:
Tape Measure

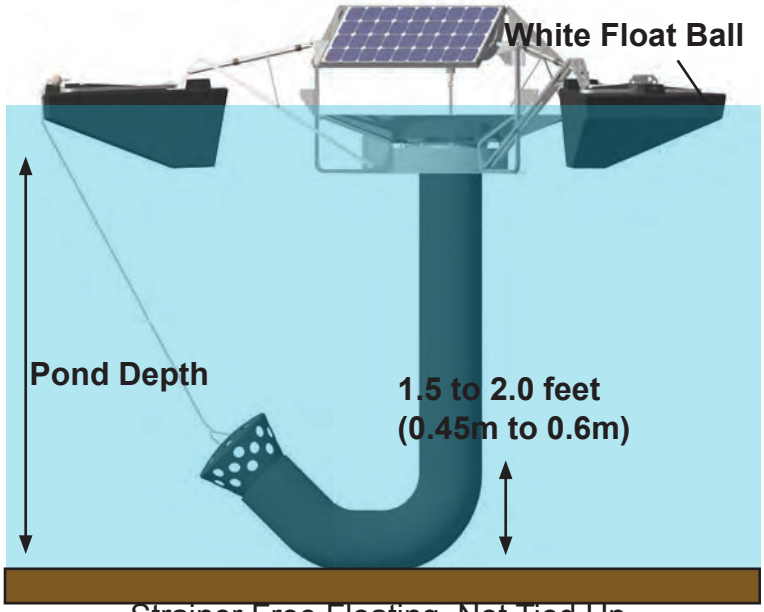
STEP 1: Determine the new hose strainer setting after consulting with a Medora Corp. service team member.

STEP 2: Use the tape measure to determine how deep the pond at the SolarBee unit.

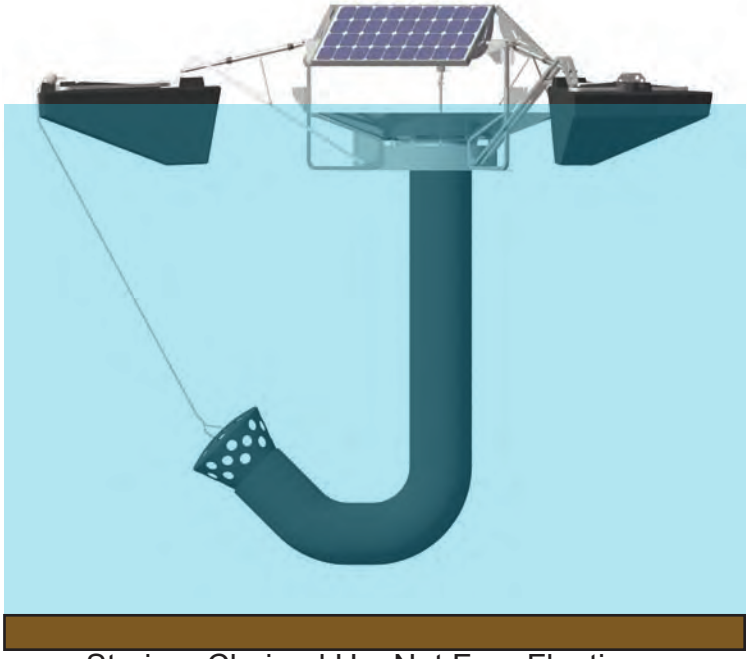
STEP 3: Locate the white float ball that is on one of the floats. This float ball marks the chain that is attached to the submerged hose strainer.

STEP 4: If the strainer is suspended by the buoyant float and not tied up by the chain, the strainer is approximately 1.5 to 2 feet (0.45m to 0.6m) above the solid bottom. If the strainer is tied up, let it loose so it is suspended by the buoyant float. Use the depth measurement made in Step 2 to determing how deep the strainer is.

STEP 5: Lift the chain up until the strainer is at the desired setting and tie off to the float plate



Strainer Free Floating, Not Tied Up


Strainer Chained Up, Not Free Floating

Hose Strainer Cleaning

In some applications where floating debris or garbage is present in the pond, the hose strainer may become plugged. In these applications, the strainer will need to be cleaned on a regular basis to maintain optimal performance of the SolarBee.

TOOLS RECOMMENDED:
Rubber Gloves
Garbage Bag

STEP 1: Turn SolarBee off by placing the On/ Off switch into the OFF position.

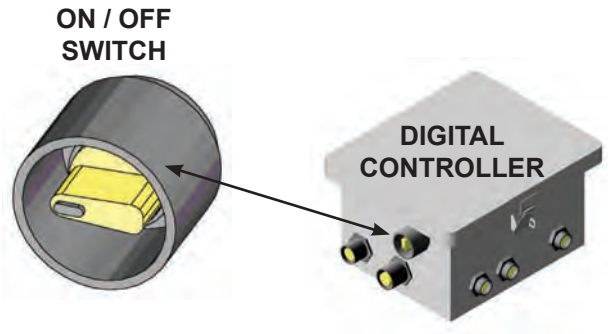
STEP 2: Locate the white float ball on one of the floats. The float white float ball marks th chain that attaches to the submerged strainer.

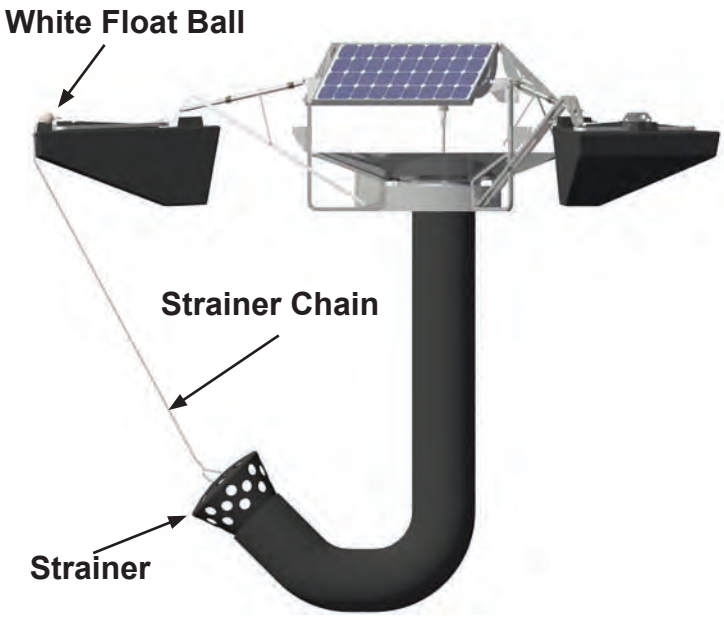
STEP 3: Using rubber gloves, pull up on the chain until the strainer is above the water. If there is debris or garbage on the strainer, remove it, place it in a garbage bag, and take it out of the pond to prevent it from hanging up on the strainer again. **Follow all local laws and regulations when disposing of any materials collected.**

STEP 4: Once all the garbage and debris are removed, let the strainer sink back into place. It is a good idea to setup your own schedule of routinely checking the strainer for plugging based on the amount of garbage and debris you find

STEP 5: Turn SolarBee back on.

Partially Plugged Strainer





Strainer Hose And Chain

Battery Replacement

The SolarBee contains an onboard battery just below the dish that will require infrequent replacement. Between 2 and 3 replacments are expected over the course of the machine life.

Battery Replacement

TOOLS RECOMMENDED:
13 mm wrench
13 mm socket wrench

STEP 1: Extend all 3 turnbuckles out all the way to raise the machine out of the water enough to expose the entire battery compartment.

STEP 2: Open the PV gate over the controller and perform a complete power down procedure on the SolarBee (be sure battery lead is disconnected from controller).

STEP 3: With the SolarBee off, locate the battery compartment below the SolarBee distribution dish.

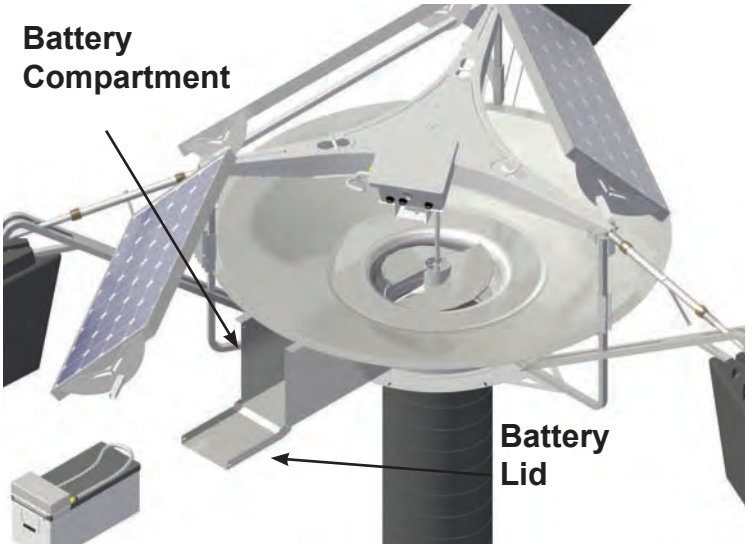
STEP 4: Using the 13mm wrenches, loosen and remove the upper bolt and locking nut. This will allow the battery lid to be opened up. (If possible, allow the battery lid to lay down on a stable part of the boat)

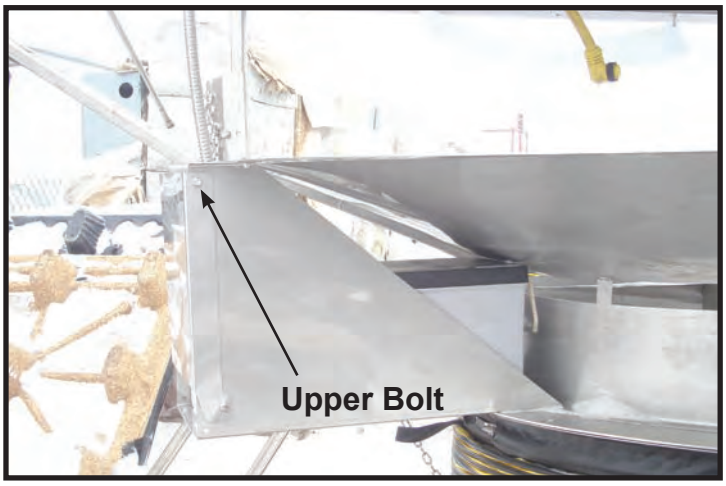
STEP 5: First fish through the battery lead from the back of the battery compartment, then pull the battery out into boat.

STEP 6: Install new battery into position and fish battery lead through the back of the battery comparment.

STEP 7: Close the battery lid and tighten bolt and nut to secure in place.

STEP 8: Completely power up SolarBee, close panel gate, and reset dish depth.





Battery Disposal: Be sure to follow local law and regulations when disposing of the used up battery!

Battery Lid Down, Battery Lead Out

Repositioning The SolarBee

Under some circumstances, the SolarBee unit may need to be moved or placed back into its original location if severe weather hits.

Repositioning Mooring Block Systems

TOOLS RECOMMENDED:
Motor Powered Boat

STEP 1: Locate the white float ball that marks the strainer chain. Pull the strainer chain up and tie off on the float plate, so when moving SolarBee strainer and hose don't hit the bottom.

STEP 2: Locate the anchor chain connection point to the SolarBee.

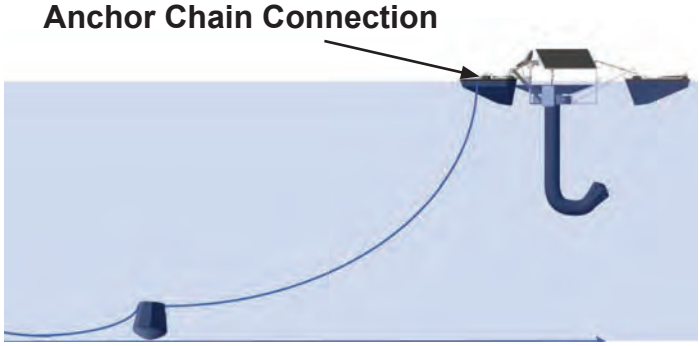
STEP 3: Begin pulling the anchor chain slack until your boat is directly above the first mooring block. Pull up on the anchor chain and pop the first mooring block loose. Once the first moorin block is popped free, pull up more anchor chain and pop the second mooring block.

STEP 4: Once both mooring blocks are loose from the bottom, pull them up so they are off the bottom and tie them off the boat. The mooring blocks don't need to be pulled completely out of the water, just high enough so they won't hit the bottom when you are moving.

STEP 5: Pull the SolarBee with the suspended mooring blocks to the desired location using the boat. Untie the anchor chain from the boat letting the mooring blocks fall to the bottom. Stay clear of sinking anchor chain!

STEP 6: Lower the strainer back down.

Anchor Chain Connection



SolarBee Anchored With Mooring Block System

Mooring Blocks Suspended, Ready To Move

WARNING: WHEN SINKING THE MOORING BLOCKS, BE SURE TO STAY CLEAR OF THE SINKING ANCHOR CHAIN! LOWER THE MOORING BLOCKS INTO THE WATER SLOWLY. FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH BY DROWNING!

Winter Conditions

In some locations, heavy snowfall and frigid temperatures may be present during the winter season. During these conditions, it is possible that the SolarBee becomes frozen in by ice and snow causing it to stop turning.

The SolarBee is designed to avoid being damaged when it is stalled and as the ice starts to melt it will start back up again.

When the SolarBee is beginning to freeze in or starting to thaw out, the ice around the machine is not stable enough to support weight. Also, in many cases, one cannot recognize that the ice is thin around the machine. For this reason, it is highly recommended that the SolarBee should NOT be approached during the period of time it is frozen in.

In some locations there may be public access or recreation such as ice fishing, snowmobile traffic, or other activities on the water body during winter. For these locations, ***Medora Corp. strongly recommends turning the machine off*** by late fall (Nov 15th in U.S.) before freeze up. The area around the SolarBee would then freeze in solid as the rest of the lake does, decreasing the chance of a serious accident near the machine. ***If these recommendations are not followed, the SolarBee will cause thin ice several meters around the vacinity of the SolarBee creating a very large hazardous area.***

When it is desired for the SolarBee to freeze in and the location requires the SolarBee to be turned off in late fall, it is important to verify that the machine is not operating prior to ice formation. Once winter passes and the ice melts away, the machine should be turned back on to get an early spring start.

SolarBee In A Lake That Is Partially Frozen

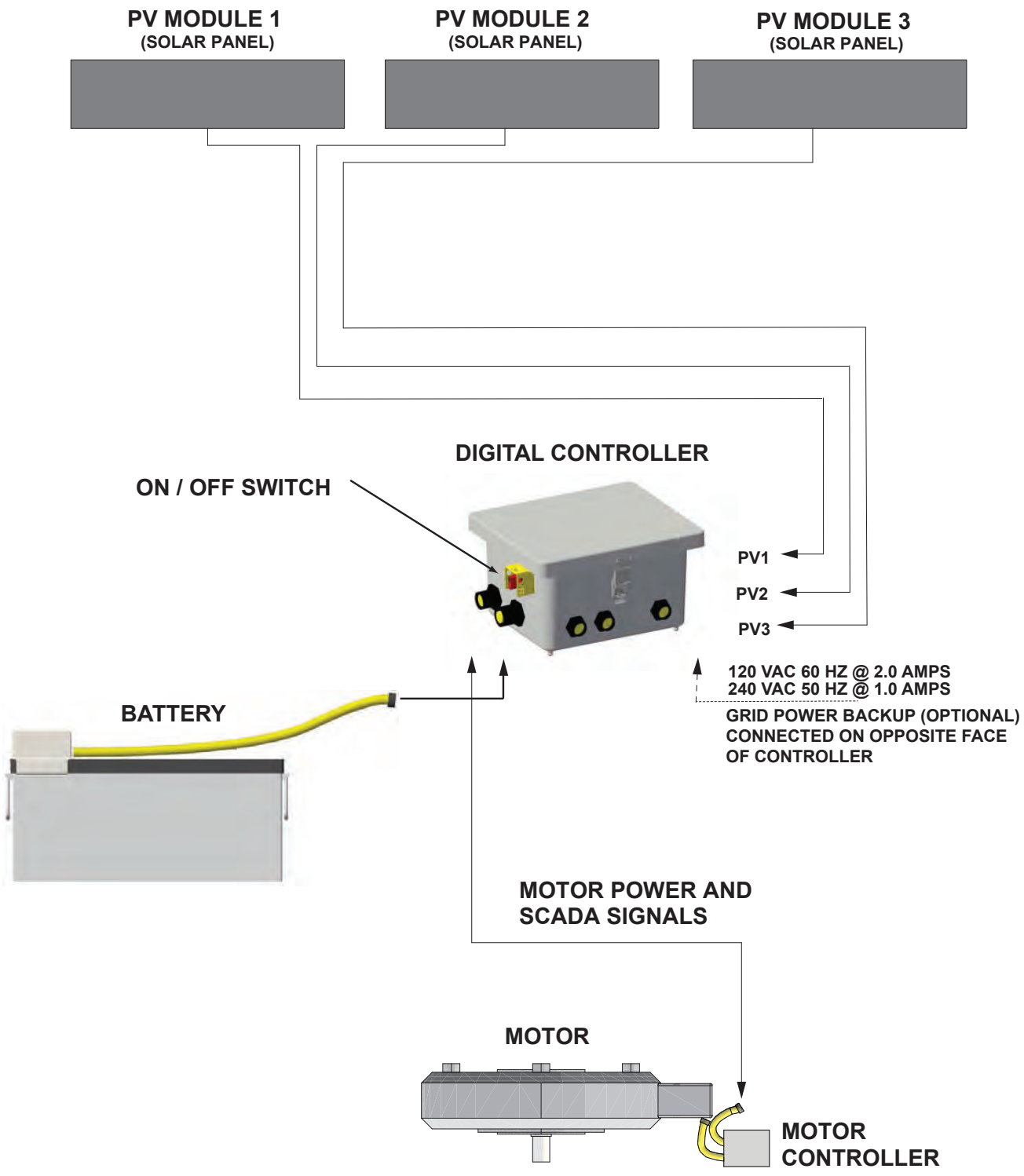
WARNING: DURING WINTER CONDITIONS WHEN THE SOLARBEE IS FROZEN IN OR PARTIALLY FROZEN IN, THE MACHINE SHOULD NOT BE APPROACHED. THE ICE AND SNOW AROUND THE SOLARBEE SHOULD NOT BE ASSUMED TO SUPPORT WEIGHT. FAILURE TO DO SO CAN RESULT IN SERIOUS INJURY OR DEATH BY DROWNING OR HYPOTHERMIA!!!

SolarBee Completely Froze In

Medora Corporation
SolarBee®

Main Office and Service Center
Medora Corporation
3225 Hwy 22, Dickinson, ND 58601
(866) 437-8076 • (701) 225-4495 • Fax (701) 225-0002

GENERAL ELECTRICAL SCHEMATIC FOR SOLARBEE



Updating the SolarBee via the SD card

1. Match the number on the SD card to the serial number. If your card does not have a number, skip this step.
2. Insert the SD card into the slot. Push the card in all the way. The blue light beside the slot will come on.
3. Once the correct files have been found, the green light will begin to flash rapidly. Leave the card inserted.
4. When it is time to remove the card, the green and yellow lights will flash rapidly and be alternating. Remove the SD card from the slot.
5. When the card is removed, the red light will flash rapidly. This is the beginning of the self programming with instructions received from the SD card. After the red light is finished, the yellow light will flash rapidly, followed by the green light.
6. Upon completion the brainboard will restart and perform a check. A successful update will display the red light blinking once followed by one yellow blink and one green. If you miss this or are unsure, you can insert the SD card and perform the update again.
7. The steady blinking green light should return indicating a healthy machine. If you get two yellow blinks followed by a pause, your SolarBee needs charging but the update is successful.
8. If the update was not successful, the red, yellow, and green lights will blink together 10 times. The machine will revert to the default parameters. Insert the card to attempt the update again. If it still fails, contact SolarBee Customer Service.

SolarBee
Circulating the World's Water
3225 Hwy 22
Dickinson, ND 58601
866-437-8076
701-225-4495
Fax 701-225-0002

Complete Power Down Procedure

NO TOOLS REQUIRED:

STEP 1: Turn the On/Off switch to Off position.

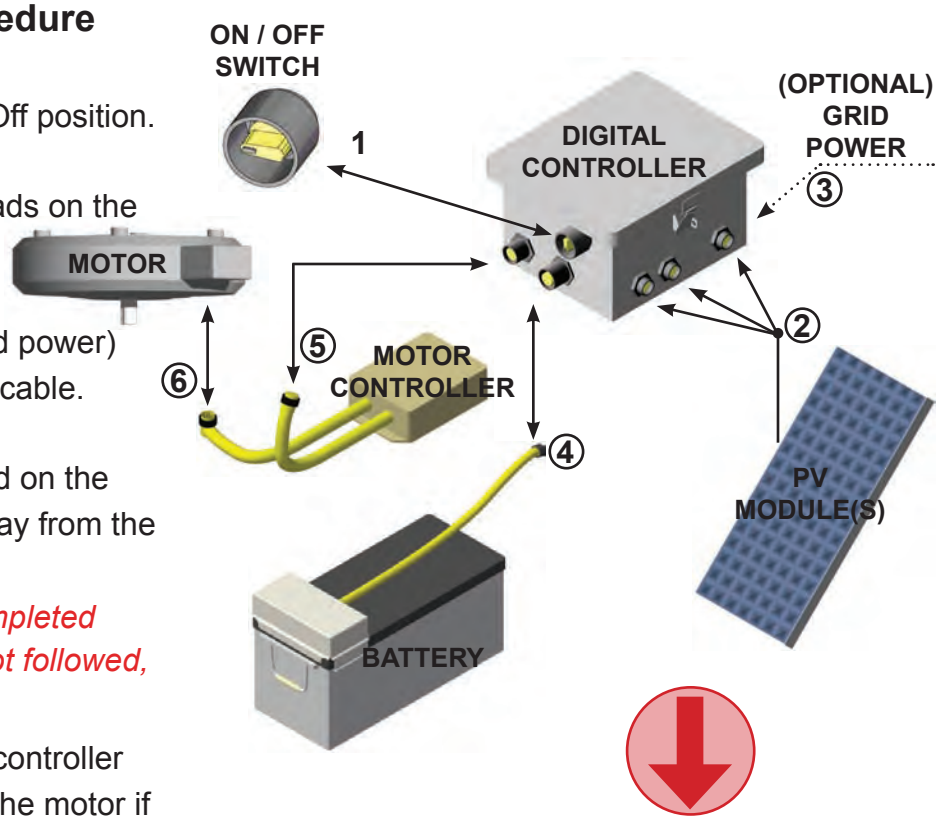
STEP 2: Unscrew all PV module leads on the front side of the digital controller.

STEP 3: Unscrew the on-shore (grid power) connection on the right face, if applicable.

STEP 4: Disconnect the battery lead on the left face. Now all power is taken away from the electrical system.

Be certain steps 1-4 have been completed before continuing. If this order is not followed, component damage may occur.

STEP 5 & 6: Disconnect the motor controller from the digital controller and from the motor if needed.



Complete Power Up Procedure

NO TOOLS REQUIRED:

STEP 1 & 2: Connect the motor controller to the motor and to the digital controller.

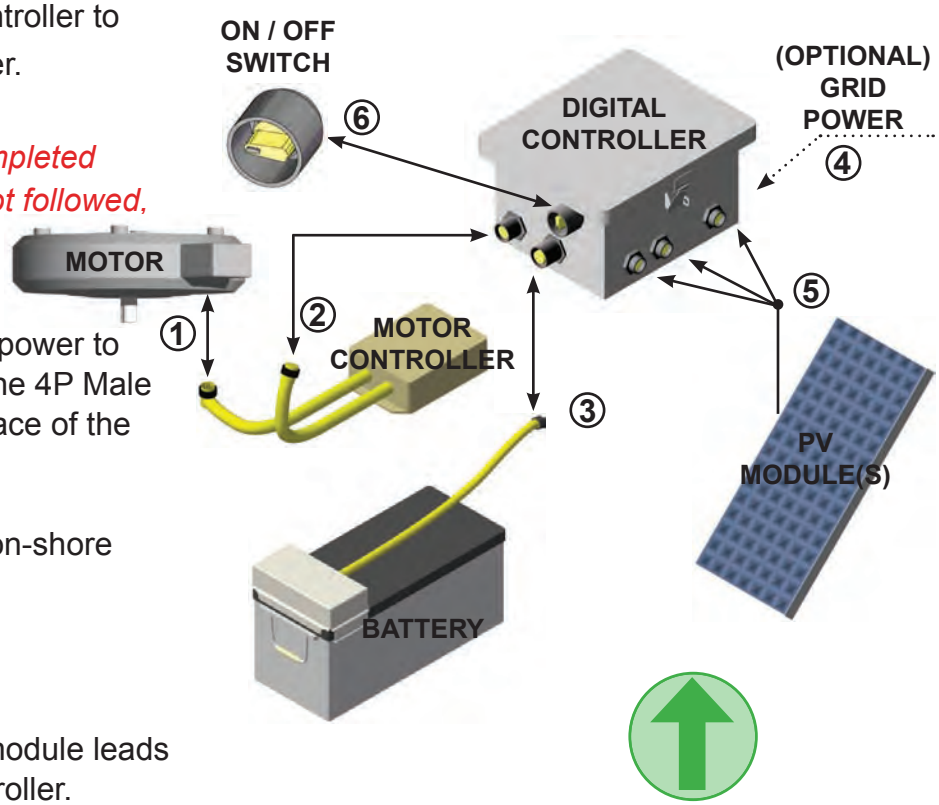
Be certain steps 1-2 have been completed before continuing. If this order is not followed, component damage may occur.

STEP 3: Now you are able to bring power to boot up the system by plugging in the 4P Male connector of the battery to the left face of the digital controller.

STEP 4: If applicable, connect the on-shore (grid power) 2P male connection to the right side of the digital controller.

STEP 5: Connect all available PV module leads into the front face of the digital controller.

STEP 6: Turn the On/Off switch to On position.



SolarBee Troubleshooting

If you find that the SolarBee has quit operating, the following checks can be performed:

Connection Check -
1) Locate the digital controller and be sure that each PV module cord is properly connected.
2) Check that the battery is properly connected.
3) Follow each cord from the digital controller to its originating component and be sure it is not damaged.

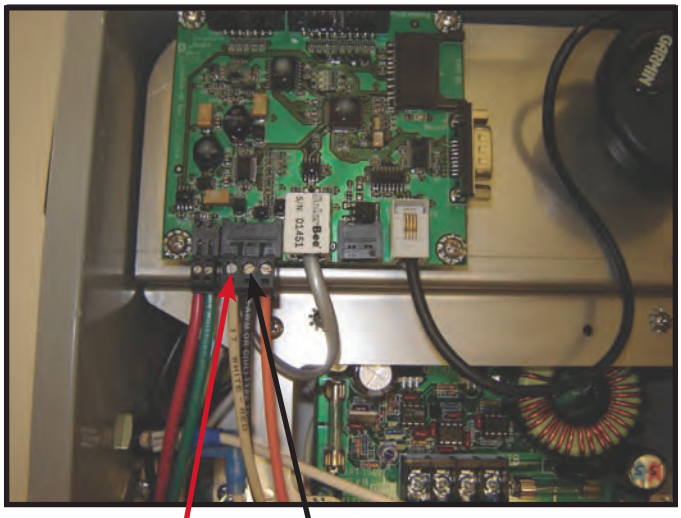
Visual Digital Controller Check - The SolarBee contains an LED (Light Emitting Diode) blink sequence that indicates the machine operation status. The blinking LEDs are found on the Brain-board located inside the digital controller. A solid green LED is also located on the Zahn board. To observe the LEDs,
1) Open the door of the digital controller and locate the laminated LED label on the inside of the door.
2) Using the LED label, locate the Brain-board and the Zahn board. Observe and record the blinking LEDs (color and # of blinks in succession) and solid green LED (off or on).
3) Using the LED label, match your blink observations to the corresponding indication. Use the information on the next two pages to proceed.

DC Voltage Check -
If a DC voltmeter is available, the battery voltage can be measured off of the brainboard at the 3-pin connection (white, black, and orange leads). 1) Using the voltmeter positive lead on the white screw terminal and voltmeter negative lead on the black screw terminal, the voltage can be measured. 2) Record the measurement.

SCADA Information - SolarBee operation status information can be transmitted from the machine to a nearby monitoring station by using one of SolarBee's various SCADA kits. Contact Medora Corp. Customer Service for more information.

Medora Corp. is committed to serving our customers. Feel free to contact a Medora Corp. Customer Service Representative if you experience any problems with your SolarBee. At Medora Corporation, we will get you technical support, parts, or a service visit to make sure that your SolarBee is back online in short time. (866) 437-8076 or customerservice@medoraco.com

Medora Corp Installation / Service Crew



Blink Indication Follow-up Procedures

Blinking Green - System healthy, machine should be operating on programmed run schedule. If not operating on programmed run schedule, contact Medora Corp. Customer Service.

1X Blinking Yellow - High motor current, check the machine for plugging at impeller and/or strainer-intake.

2X Blinking Yellow - Low battery voltage, machine may be operating at reduced speed or temporarily shut down due to cloudy weather period. Re-check machine after sunlight conditions improve.

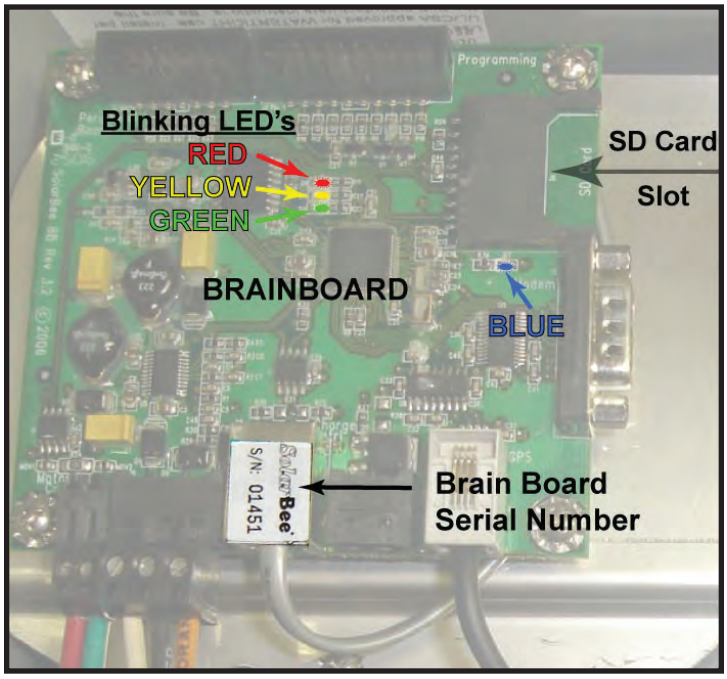
5X Blinking Yellow - Check GPS connection at Brain-Board (lower right corner). If properly connected and blink code persists, contact Medora Corp. Customer Service.

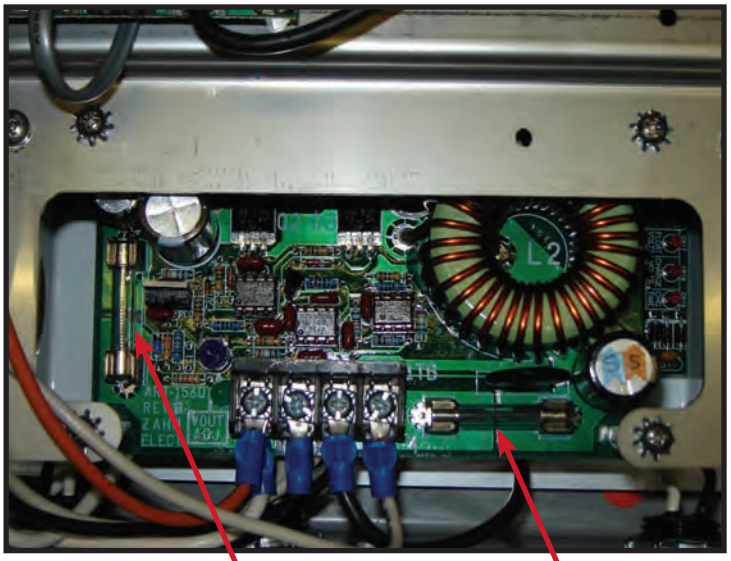
1X Blinking Red - Anti-Jam Routine, machine is operating on a jam removal sequence triggered by high current. Check for plugging only after disconnecting power. If power is not removed first, machine may begin to operate

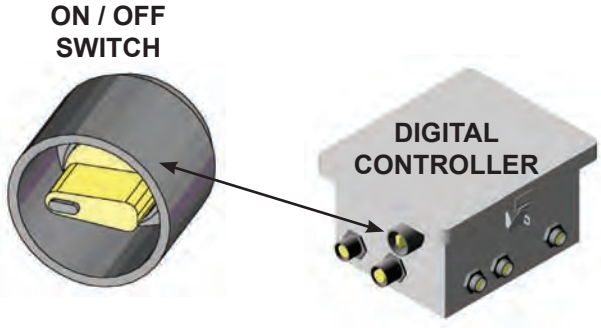
2X Blinking Red - 36 VDC out of range, machine may be shut down due to blown fuse (glass cylindrical) on the Zahn Board. Left side of Zahn board takes a 5 Amp Fuse, Right side of Zahn board takes a 20 Amp Fuse. Disconnect power before changing fuses. Blown fuses may be difficult to observe, so a continuity tester or new fuse should be used to confirm that the problem is not a blown fuse.

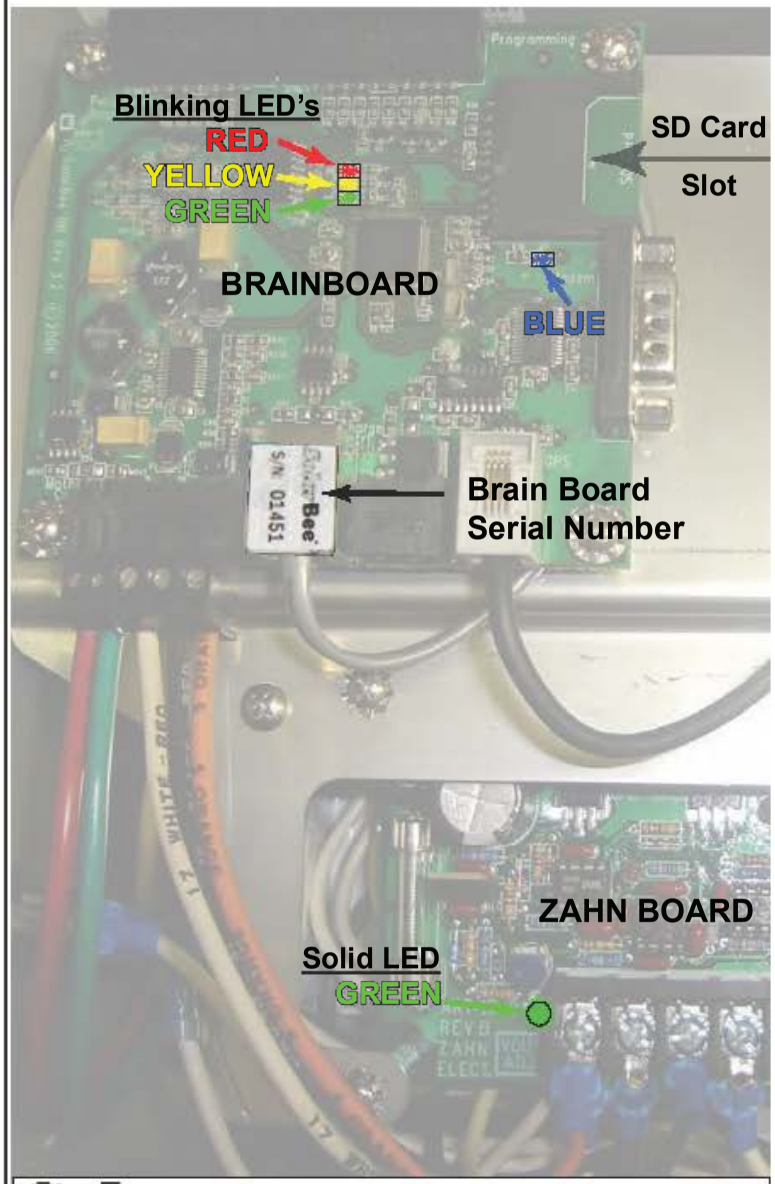
5X Blinking Red - Battery out of range, machine battery is too low. Check and record battery voltage if possible, then contact Medora Corp. Customer Service.

For all other blink codes, please contact Medora Corp. Customer Service.









SolarBee®
Circulating the World's Water

CE

CUSTOMER SERVICE:
1-866-437-8076

Charging Circuit: 12VDC
Motor Power Circuit: 36VDC, 7A max

BRAINBOARD LED

BEHAVIOR	VISUAL	INDICATION
BLINKING GREEN	GPS	HEALTHY SYSTEM
SOLID GREEN, YELLOW, AND/OR RED		HARDWARE ERROR
GREEN, YELLOW, AND RED OFF		HARDWARE ERROR
SOLID BLUE		SD CARD INSERTED
BLINKS IN SUCCESSION		
SINGLE BLINK RED, YELLOW, AND GREEN		CUSTOMIZED SYSTEM BOOT UP
ONE (1) RED BLINK		ANTI-JAM ROUTINE
TWO (2) RED BLINKS		36 VDC OUT OF RANGE
THREE (3) RED BLINKS		MOTOR COMM ERROR
FOUR (4) RED BLINKS		CHARGE COMM ERROR
FIVE (5) RED BLINKS		BATTERY OUT OF RANGE
ONE (1) YELLOW BLINK		HIGH MOTOR CURRENT
TWO (2) YELLOW BLINKS		LOW BATTERY VOLTAGE
THREE (3) YELLOW BLINKS		TEMP OUT OF RANGE
FOUR (4) YELLOW BLINKS		5 VDC OUT OF RANGE
FIVE (5) YELLOW BLINKS		GPS COMM ERROR
10 BLINKS, RED, YELLOW, AND GREEN SIMULTANEOUSLY		INCOMPLETE SD CARD UPDATE
ONE (1) YELLOW AND GREEN SIMULTANEOUSLY		GPS SATELLITE LOCK ERROR

ZAHN BOARD LED

BEHAVIOR	VISUAL	INDICATION
SOLID GREEN LIT		12 VDC ON
SOLID GREEN NOT LIT		12 VDC OFF

SolarBee®

Circulating the World's Water

SB5000 FEATURES

Technology Description:	Floating, solar powered, circulation equipment for wastewater treatment and freshwater applications. Day/night operation on solar only by utilizing a battery to store excess daytime power for nighttime operation.
Flow Rates:	*Flow rates at full speed at 10 feet (3.0 m) diameter*
Direct Flow Rate	700 gallons per minute (2,650 liters per minute).
Induced Flow Rate	4,300 gallons per minute (16,300 liters per minute).
Combined Flow Rate	5,000 gallons per minute (18,950 liters per minute).
Machine Size/Weight:	Assembled machine is 16 feet (5m) in diameter and weighs 850 pounds (380kg).
Shipping Size/Weight:	Machine can be crated and shipped in a 87 inch (2.2 m) wide X 87 inch (2.2 m) long X 65 inch (1.7 m) high crate, estimated shipping weight is 1500 pounds (680 kg). Hose lengths greater than 20 ft (6 m) may require additional crating.
Materials of Construction:	316 stainless steel construction. Foam-filled high-density poly thylene (HDPE) floats. Thermoplastic rubber intake hose. HDPE strainer. Concrete mooring blocks are encapsulated in HDPE.
Drive System:	High torque, direct drive (no gearbox), low voltage brushless D.C. motor.
Power Supply/Control System:	*PV solar panels are protected from bird fouling with bird deterrent kit.*
PV Solar Panels	3 X 80-watt photovoltaic solar panels orientated in triangular pattern. On-board battery storage for day/night operation.
Electronic Controller	Digital solid-state controller, mounted in weather-tight (NEMA 4X) enclosure with externally fused disconnect. SCADA output through RS-232 serial communication (Modbus RTU), DB9 male connection point inside enclosure. Wireless options available, not included.
Wiring	Corrosion-resistant industrial cord with molded watertight connectors that are indexed to prevent improper wiring.
Rotating Assembly:	Removable assembly with easy access to motor and digital controller. Impeller handles 4-inch (10cm) spherical solids. Oil-filled (food grade) teflon eeze sleeve with o-rings, shaft. Rotational indicator on shaft.
Flotation System:	Three floats in triangular pattern each with an adjustable floa arm for proper vertical positioning, total float buoyancy of 1,450 pounds (660kg)
Fluid Intake Assembly - Option 1:	*Hose system bolted to bottom of structural assembly.*
Hose System	20 to 60 ft (6 to 18 meter) available in 16-inch (40cm) diameter X 20 feet (6m)sections.
Intake Type	Inverted bell shape strainer with 4-inch (10cm) holes.
Intake Depth Adjustment	Can vary from 0 to 60 feet (0 to 18 m). No depth adjustment necessary for fluctuations in water level. Weight and flotation of the 'J' bend of hose keeps intake above sludge or bottom of pond at all operating depths. Strainer can be chained up higher if desired.
Fluid Intake Assembly - Option 2:	*Fixed horizontal plate bolted to bottom of structural assembly.*
Intake Type	Fixed horizontal plate with 12-inch (31 cm) openings.
Intake Depth Adjustment	No adjustment necessary. Horizontal inflow from 25 in (64cm) below distribution dish
Anchoring:	(1) Two mooring blocks tethered together with SS chain and attached to structural member on unit or (2) Tethered to shore with SS cable.
Ice Protection:	Freeze sleeve allows shaft to rotate while ice is formed around sleeve.
Minimum Operating Depth:	31 inches (0.8 m) with fixed horizontal plate. No damage to mac ine or bottom of reservoir when run dry in shallow water.
Accessories Available:	(1) Supplemental Shore Power Kit, (2) Chemical Injection Kit, (3) Marker Light Kit
Life/Maintenance/Warranty:	Expect 25-year life, minimal maintenance. Limited 2-year parts and conditional labor warranty. Limited 25 year photovoltaic module manufacturer performance warranty and 10 year motor warranty.

Patent Pending

Subject to change without notice.

Medora Corporation • 3225 Hwy 22 • Dickinson, ND 58601
+1 866 437 8076 • Ph +1 701 225 4495 • Fax +1 701 225 0002 • www.medroaco.com

FeatureSpec_SB5000_20160404

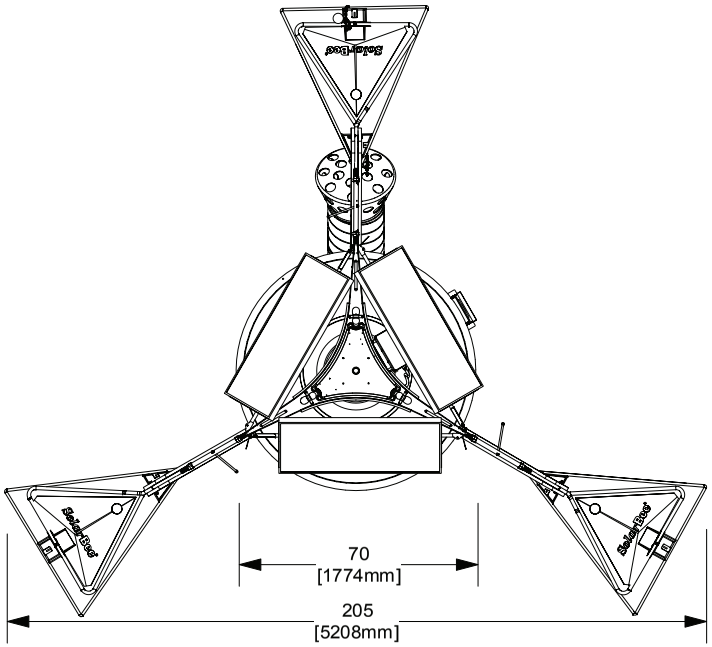
Medora Corporation

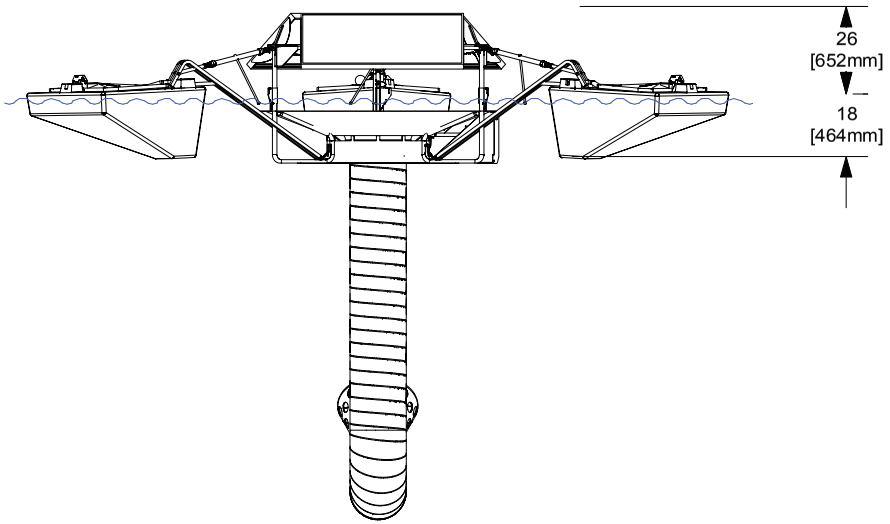
SolarBee®

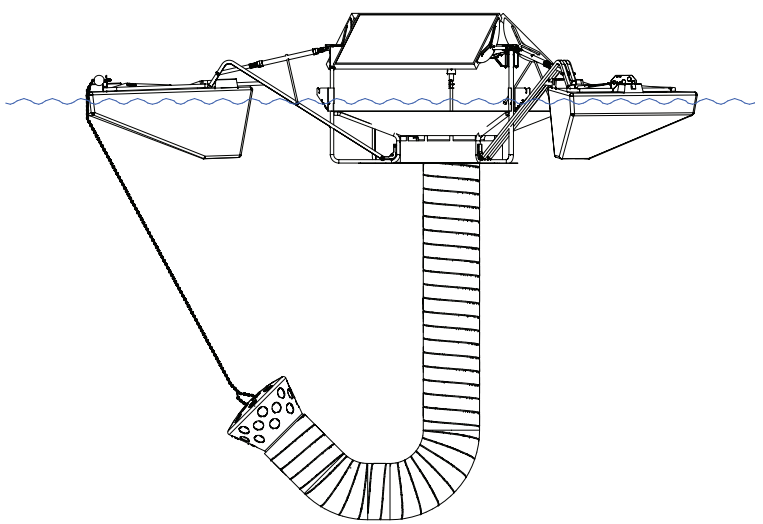
Main Office and Service Center
Medora Corp.
3225 Hwy 22, Dickinson, ND 58601
Ph +1 701 225 4495 • +1 866 437 8076 • Fax +1 701 225 0002

MODEL SB5000

580_20160426







MATERIAL: See Specifications		PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MEDORA CORPORATION. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MEDORA CORPORATION IS PROHIBITED.	Medora Corporation
		TITLE: Dimension Drawing, SB5000	
SCALE: 1:50	DRAWN BY: CM		
DATE: 2016/04/27		DOCUMENT: 1002_20160427	

Medora Corporation

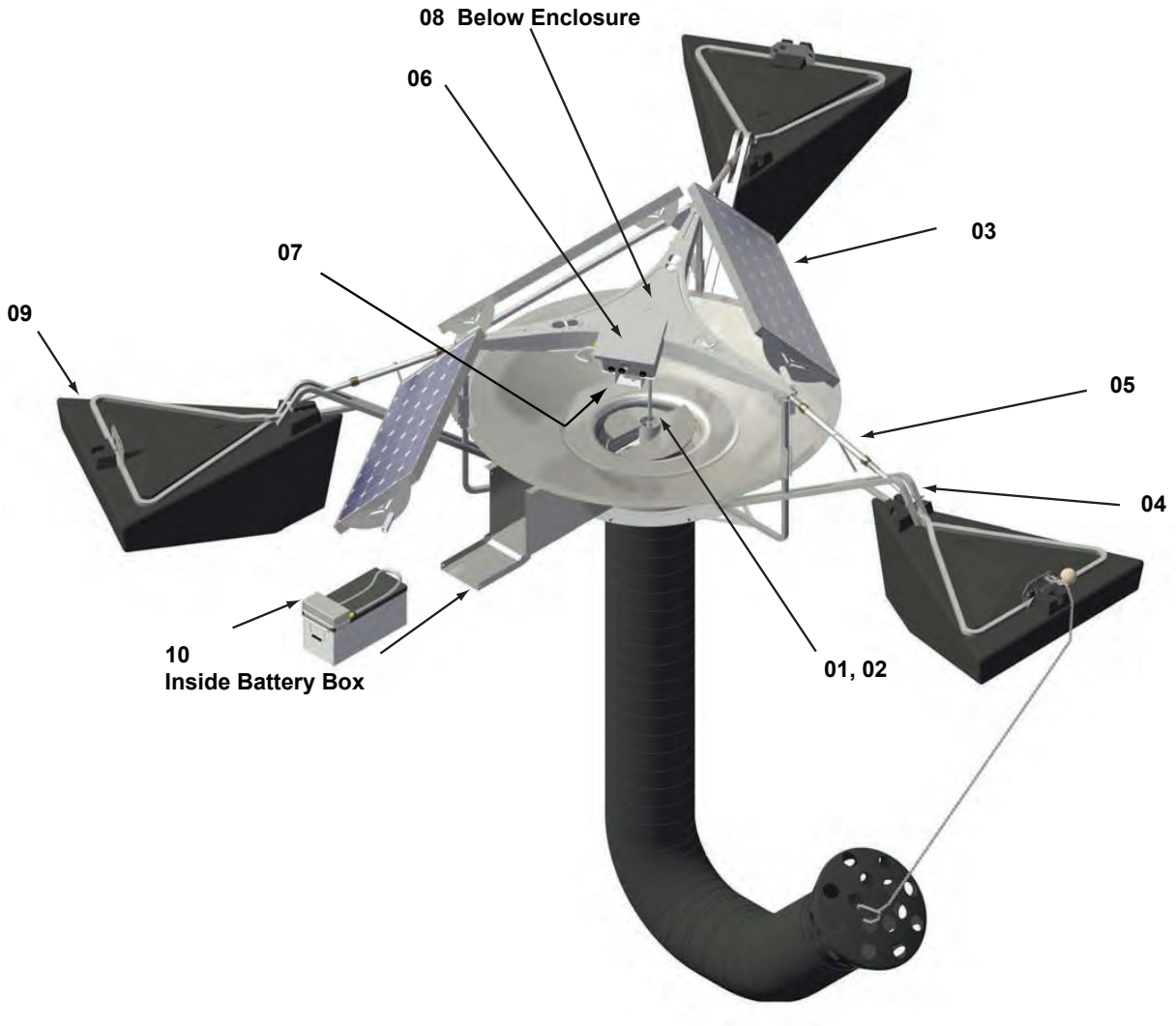
SolarBee®

Main Office and Service Center
Medora Corp.
3225 Hwy 22, Dickinson, ND 58601
Ph +1 701 225 4495 • +1 866 437 8076 • Fax +1 701 225 0002

PARTS DIAGRAM

NO.	PART #	DESCRIPTION
01	22281050	ROTATING ASSEMBLY
02	22010027	LOWER COUPLING SLEEVE
03	14283095	SOLAR PANEL (WIRED)
04	18260225	FLOAT ARM ASSEMBLY
05	18265000	TURNBUCKLE ASSEMBLY
06	14300000	DIGITAL CONTROLLER
07	14013022	MOTOR CONTROL CORD
08	20504500	BRUSHLESS MOTOR
09	24010100	FLOAT
10	14285212	ONBOARD BATTERY

SB5000



581_20160429

Medora Corporation
SolarBee®

Main Office and Service Center
Medora Corporation
3225 Hwy 22, Dickinson, ND 58601
+1 866 437 8076 • +1 701 225 4495 • Fax +1 701 225 0002
www.medoraco.com

SolarBee Limited Replacement Warranty:

All new and factory-refurbished SolarBee equipment is warranted to be free of defective parts, materials, and workmanship for a period of two years from the date of installation. In addition, the SolarBee brushless motor is warranted for a period of ten years from the date of installation. A manufacturer's warranty exceeding this SolarBee warranty, such as photovoltaic modules (solar panels), which currently have a manufacturer's 25-year performance warranty, will be honored. This warranty is valid only for SolarBee equipment used in accordance with the owner's manual, and consistent with any initial and ongoing factory recommendations. This warranty is limited to the repair or replacement, at Medora Corporation's discretion of defective components. The first two years the warranty also includes labor in addition to parts if the factory's service crews performed the original on-site installation. Where labor is part of the warranty, in lieu of sending a factory service crew to the site for minor repairs, Medora Corporation may choose to send the replacement parts to the owner postage-paid and, in some cases, may pay the owner a reasonable labor allowance to install the parts. There is no liability of any consequential damages of any type, or for items that wear out from normal use. See below for Limitation of Liability.

EXCEPT AS STATED ABOVE, MEDORA COPRATION AND ITS AFFILIATES EXPRESSLY DISCLAIM ANY AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES ON PRODUCTS FURNISHED HEREUNDER, INCLUDING WITHOUT LIMITATION ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

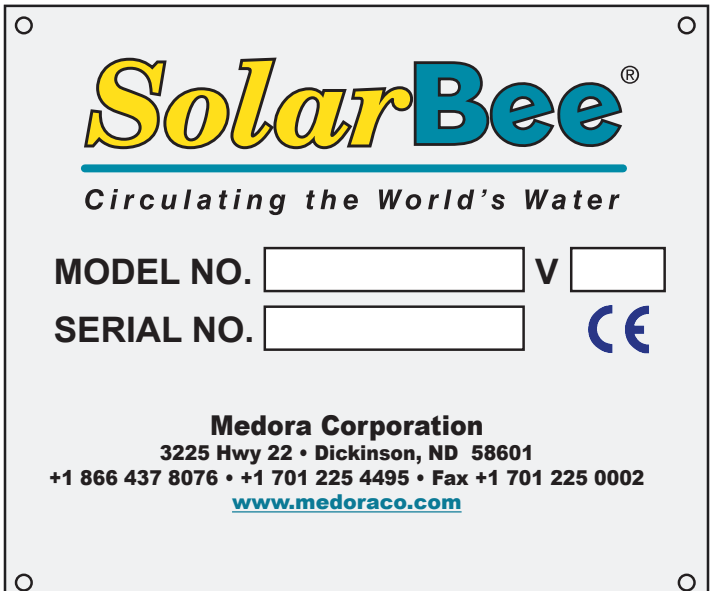
Please consult your state law regarding this warranty as certain states may have legal provisions affecting the scope of this warranty.

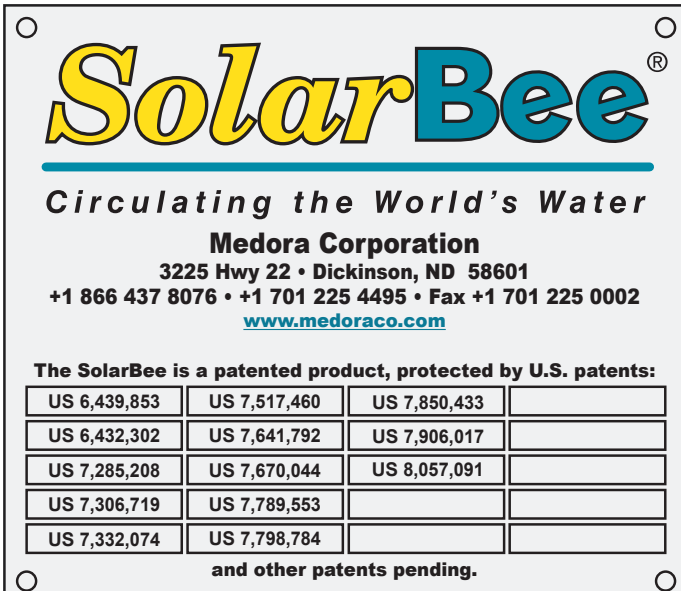
Limitation of Liability:

Many of the employees at Medora Corporation have extensive scientific and practical knowledge relating to solving water quality problems. From time to time, they may offer solicited or unsolicited advice, ideas, judgment or opinions on how to deal with certain situations, none of which offers a guarantee of future events. Due to the many factors, complexity and uncertainty involved in solving water problems, you agree to release and indemnify Medora Corporation and its affiliates, employees and agents from and against any and all claims, liabilities, costs and expenses which such indemnified party may incur or become subject to related to or arising out of any services or products furnished by Medora Corporation to you, except to the extent that any claim, liability or expense results from the gross negligence or intentional misconduct of an indemnified party as determined in a final judgment by a court of competent jurisdiction.

IN NO EVENT WILL MEDORA COPRATION OR ITS AFFILIATES BE LIABLE FOR ANY DAMAGES CAUSED BY FAILURE OF BUYER TO PERFORM BUYER'S RESPONSIBILITIES OR FOR FOLLOWING MEDORA COPRATION ADVICE.

IN NO EVENT WILL MEDORA COPRATION OR ITS AFFILIATES BE LIABLE FOR ANY LOST PROFITS OR USE OR OTHER PUNITIVE, SPECIAL, EXEMPLARY, CONSEQUENTIAL, INCIDENTAL OR INDIRECT DAMAGES, HOWEVER CAUSED, ON ANY THEORY OF LIABILITY, WHETHER OR NOT MEDORA COPRATION HAS BEEN ADVISED OF SUCH DAMAGES, OR REASONABLY COULD HAVE FORESEEN THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM AGAINST BUYER BY ANOTHER PARTY.





Identify all possible hazards. Determine what safeguards are needed and implement them. **Only you, the user,** understand your product and system characteristics fully. ***The ultimate responsibility for safety is with you. Your safety ultimately rests in your hands.*** Do your part and you will enjoy safe, trouble free operation for years to come.

SolarBee Removal

If temporary removal of the SolarBee from the water body is required, please carefully read and follow the instructions in this section.

TOOLS / EQUIPMENT REQUIRED:

• Small Boat with 3+ HP Motor

• 25 ft (7.5 m) Tow Strap/Rope

• Crane, Back Hoe, or other equipment capable of reaching out into the water and hoisting 2000 lb (900 kg).

• 3 point lifting chain/strap, 2000 lb (900 kg) capacity.

• Metric Socket and Wrench Set (Sizes 10mm, 13mm and 19mm Required)

• Pliers

Towing SolarBee Using Small Boat

Hoisting SolarBee Out Of Water

Staging Area With Disassembled SolarBee Units

JOB OUTLINE:

1) Locate Removal and Staging Area

2) Prepare SolarBee for Towing

3) Tow SolarBee to Removal Zone

4) Hoist SolarBee from Water

5) Disassembly of Major Components

JOB PERSONNEL AND DURATION:

Removal of 1 SolarBee unit will require approximately 4 to 6 hours with 2 to 3 workers. For large water bodies with long distances to tow the SolarBee unit, allow for additional time and favorable weather conditions.

1. Locate Removal and Staging Area

The first step in removing the SolarBee from a water body is to find a good location to, 1) tow the SolarBee to, 2) hoist it out of the water, and 3) disassemble it into its major componets for transportation and storage.

The following considerations should be made when choosing a removal and staging area:

- Crane or Hoist Equipment Access to Water
- 2 ft (60cm) Water Depth within Crane/Hoist Reach
- Close proximity to SolarBee locations
- 20 ft X 20 ft (6 m X 6 m) Disassembly Space per SolarBee Unit.

2. Prepare SolarBee for Towing

TOOLS: Pliers, 13mm socket & wrench

Once a location has been chosen for towing the SolarBee to, the next step is to go out to the SolarBee and prepare it for towing. The following steps need to be followed before towing the SolarBee:

STEP 1: Turn the machine off and adjust the hose all the way up as far as it can be pulled up. Be sure to follow correct hose adjustment procedure.

STEP 2: Extend all three turnbuckles all the way out to raise the machine out of the water as much as possible.

DECISION: Can anchor or tether line be left in place? If Yes, it is suggested that a 15 lb (60 N) bouyant float ball be connected to the anchor chain or tether cable to maintain proper positioning when the SolarBee is re-installed. GPS technology can be used to mark position if anchoring or tethering removal is required.

STEP 3: If removing anchors, pull up anchors at this time. If leaving anchors in place, disregard this step.

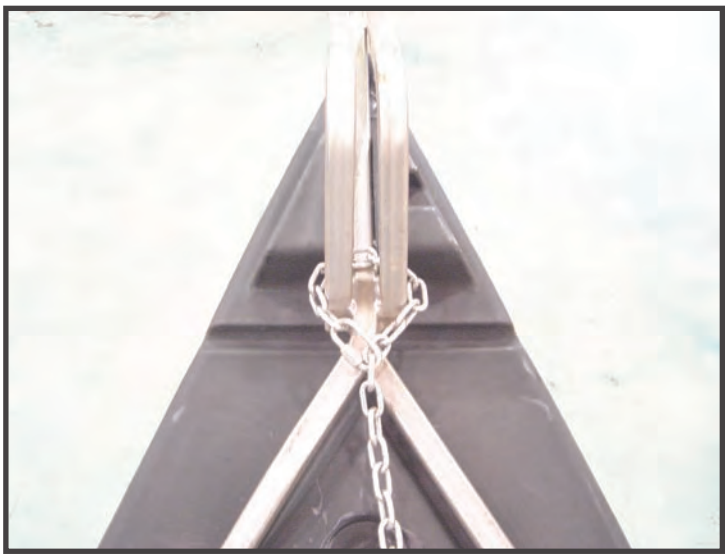
STEP 4: Locate the chain that connects the SolarBee float arm to the anchors or tether line and disconnect at a quick link or swivel using pliers or wrenches, whichever is applicable.

STEP 5: If the SolarBee contains leg extensions, these should be removed.

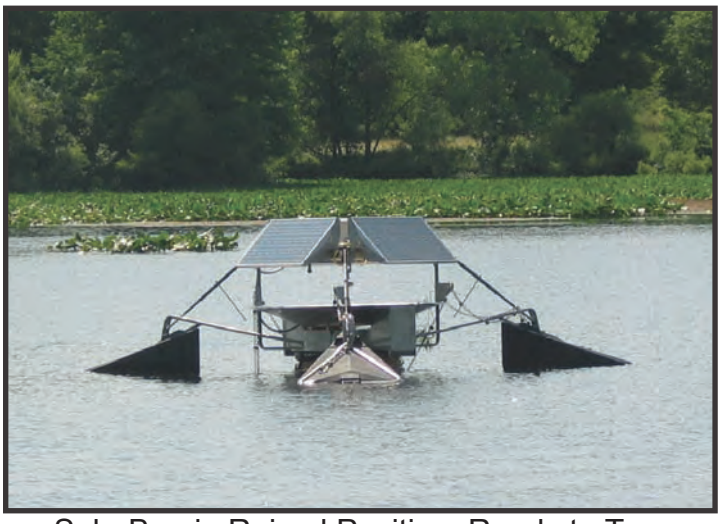
NOTE: The tow rope or strap should be connected to the same point where the anchor chain attaced to the SolarBee float arm

The SolarBee is now ready to be towed.

Raising Hose Up Tight



Anchor Chain Connection Point



SolarBee in Raised Position, Ready to Tow

3. Tow SolarBee to Removal Area

TOOLS: Boat and Boat Motor, Tow Strap/Rope

Towing the SolarBee can be done using several methods, however it is very important to tow slowly, preventing damage to the SolarBee.

One method is to hook a towing strap or rope around one of the float arms at the anchor connection point and pull the SolarBee with a boat.

Another method is to push the SolarBee using the front of the boat. This works the best with a small sized boat. It is important that extra caution be taken not to push in between float arms and not on a solar panel. Push on a solid structure, such as the under side of the distribution dish if using this method.

IMPORTANT: TO PREVENT INJURY AND COSTLY DAMAGE TO THE MACHINE, DO NOT EXCEED 5 MPH (8KM/HR) WHEN TOWING OR PUSHING A SOLARBEE.

Position the SolarBee at the pond edge where it can be reached by the crane or hoist equipment. The SolarBee will float in approximately 2 ft (60 cm) of water.

4. Hoist SolarBee From Water

TOOLS: Crane, Backhoe, or Hoist;
3-Point Lifting Chain/Strap

Now that the SolarBee is at the pond edge where it can be reached, it is ready to be hoisted out of the water.

The following steps need to be followed when removing the SolarBee from the water:

STEP 1: Connect the 3-Point Lifting Chain or Strap to all 3 lifting points on the top frame of the SolarBee. Be sure all points are securely attached.

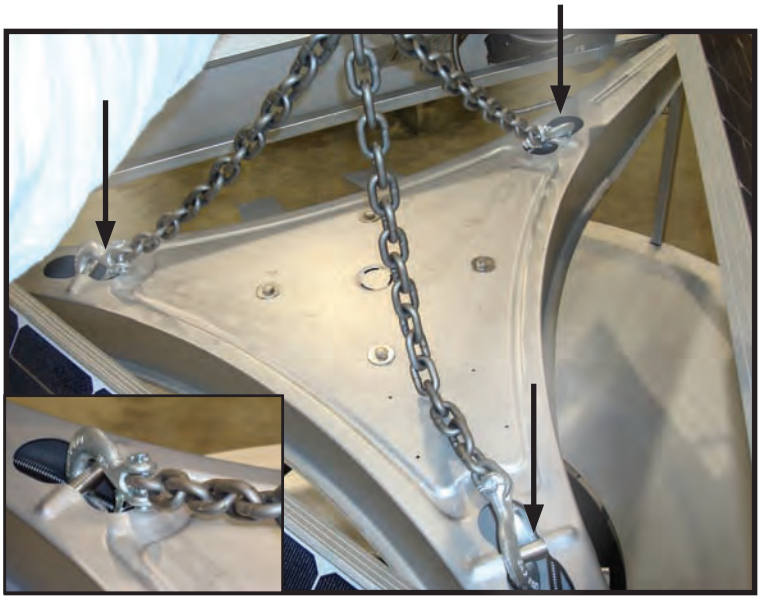
STEP 2: Position the crane, back hoe, or hoisting equipment where it can safely reach and vertically hoist the SolarBee.

STEP 3: Connect to the 3-Point Lifting Chain or Strap and be sure everyone is clear of the lifting zone.

STEP 4: Hoist the SolarBee out of the water and pull up on a flat working surface

STEP 5: Lower the SolarBee until the intake plate is close to touching the ground. Be sure not to lower the machine too much to crush the intake plate. Depending on the hose size, the machine may rest on the extended floats prior to the intake plate hitting the ground. If the intake plate is too low, then utilize blocks or keep the machine suspended for disassembly.

The SolarBee is now ready to be disassembled.



CAUTION: WHILE SOLARBEE IS SUSPENDED IN THE AIR, KEEP CLEAR BELOW AND IMMEDIATELY AROUND SOLARBEE TO AVOID BEING CRUSHED IN THE EVENT OF THE UNIT UNEXPECTEDLY DROPPING TO THE GROUND . FAILURE TO FOLLOW THIS WARNING COULD LEAD TO SERIOUS INJURY!

5. Disassembly Of Major Components

TOOLS:
Metric Socket and Wrench Set (10mm, 13mm, & 19mm)
Marker (Sharpie)

Once the SolarBee is on shore, it is ready for disassembly to make it ready to store or transport.

STEP 1: Disconnect the hose chain from the float plate.

STEP 2: Remove the hose and intake from below the dish.

STEP 3: Once the hose is removed, turn in the turnbuckles until the core unit rests on the ground and the floats are slightly suspended in the air.

STEP 4: Remove the turnbuckles from the core unit.

STEP 5: Remove the floats from the float arms.

STEP 6: Using a marker, place an indicator mark next to the hole that is used to bolt the float arm to the lower part of the core unit. This will aid when reinstalling the machine.

STEP 7: Remove the float arms from the machine.

SolarBee Storage

Transporting and Storage

SPACE: 8 ft X 10 ft (2.5 m X 3 m) per Unit
TOOLS: Crane, Backhoe, or Hoist;
3-Point Lifting Chain/Strap

Now that the SolarBee is disassembled, the following procedures will help to make the SolarBee compact for transporting and storage.

The SolarBee components should all be kept together and organized to avoid missing parts when reinstalling. The SolarBee can be stored outside if necessary.

TIP 1: Open the two panel gates not covering the digital controller and place two floats within the core unit as shown in the photo. Close up the panel gates. One float will have to be stored separately

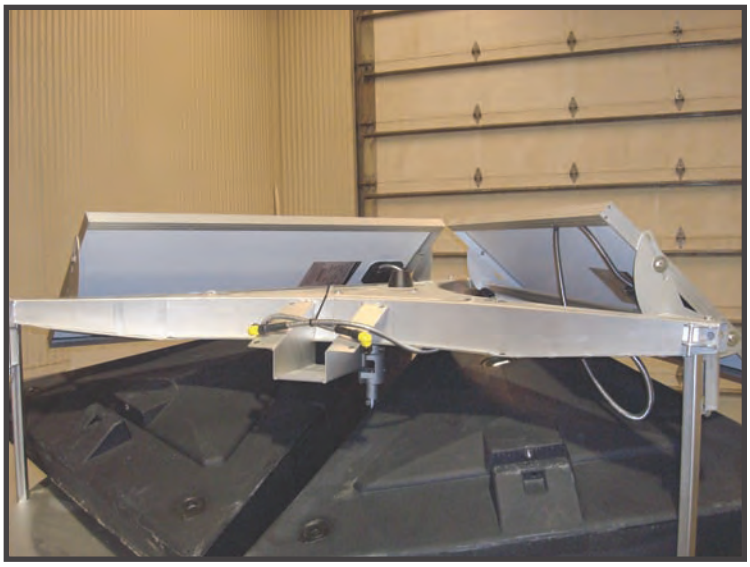
TIP 2: Stack the float arms on top of one another to minimize space.

TIP 3: Keep the hose away from sharp objects or corners that may be abrasive during storage or tranporation.

TIP 4: Place all small hardware and components in a container with a lid.

TIP 5: Follow the instructions on the next page to preserve the battery and electronics during storage.

IMPORTANT: ALWAYS USE A 3-POINT LIFTING CHAIN TO HOIST THE SOLARBEE UNIT.



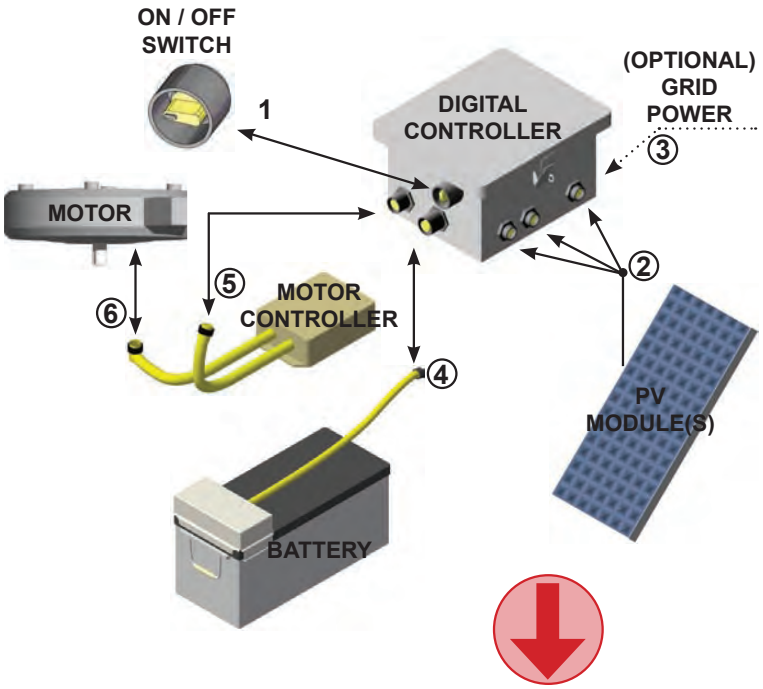
Battery and Electronics Care

If the SolarBee is removed or stored, there are several guidelines to follow for maintaining a healthy battery charge. Following these guidelines will result in the SolarBee being ready to operate when re-installed :

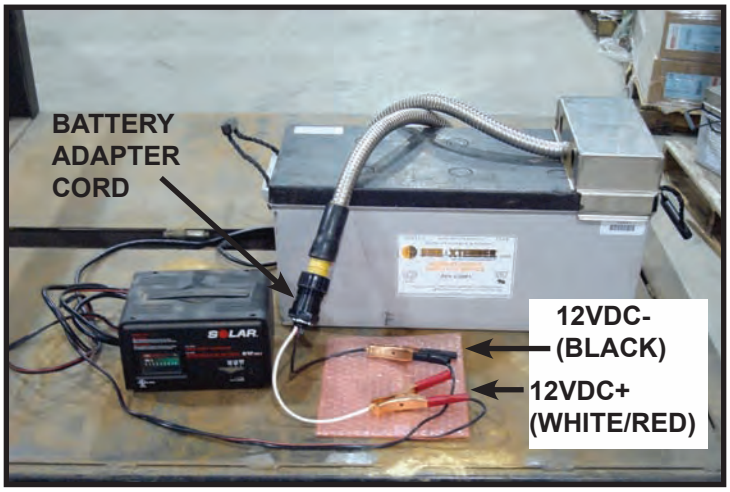
SHELTERED OR SHADED STORAGE:
If you plan to store the SolarBee unit where there is limited or no sunlight hitting the solar panels, follow these steps:
1) Disconnect the battery cord and solar panel cords from the outside panels of the digital controller.
2) Using a 12VDC battery charger and special battery cord adapter (request from SolarBee Customer Service 1-800-437-8076), charge the battery at a rate of 8 Amps or less until fully charged. Repeat this charging once every two months and just prior to re-installing the machine in the spring.

UNSHELTERED OR UNSHADED STORAGE:
If you plan to store the Solarbee unit where it will receive sunlight on the solar panels, follow these steps:
1) Turn the SolarBee off and leave solar panels and battery plugged into the digital controller.
2) Keep solar panels clear of snow or dust at least once every two weeks.

Power Down Order



WARNING: ONCE BATTERY IS CONNECTED TO BATTERY ADAPTER CORD, DO NOT ALLOW WHITE AND BLACK CONTACTS TO TOUCH ONE ANOTHER OR IT WILL RESULT IN A DEAD BATTERY SHORT AND SPARKS WILL BE EMITTED. USE EXTRA CAUTION TO PREVENT A DEAD SHORT WITH BATTERY OR CHARGER.



12 VDC Battery Charge Setup

SolarBee Installation

When re-installing your SolarBee, please carefully read and follow the instructions in this section.

TOOLS / EQUIPMENT REQUIRED:

• Small Boat with 3+ HP Motor

• 25 ft (7.5 m) Tow Strap/Rope

• Crane, Back Hoe, or other equipment capable of reaching out into the water and hoisting 2000 lb (900 kg).

• 3 point lifting chain/strap, 2000 lb (900 kg) capacity.

• Metric Socket and Wrench Set (Sizes 10mm, 13mm and 19mm Required)

• Pliers

Towing SolarBee Using Small Boat

Hoisting SolarBee Out Of Water

Staging Area With Disassembled SolarBee Units

JOB OUTLINE:

1) Locate Staging and Deployment Area

2) Assembly of Major Components

3) Deploy and Float SolarBee

4) Tow SolarBee Into Final Position

5) Final Settings

JOB PERSONNEL AND DURATION:

Installation of 1 SolarBee unit will require approximately 4 to 6 hours with 2 to 3 workers. For large water bodies with long distances to tow the SolarBee unit, allow for additional time and favorable weather conditions.

1. Locate Staging & Deployment Area

The first step to installing the SolarBee into a water body is finding a good location to, 1) unload major components, 2) lowering SolarBee into the water, and 3) towing into position from

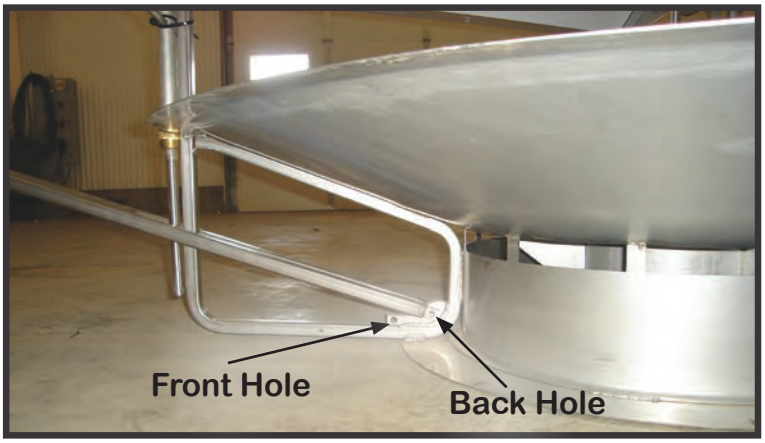
The following considerations should be made when choosing a staging and deployment area:

- Crane or Hoist Equipment Access to Water
- 2 ft (60cm) Water Depth within Crane/Hoist Reach
- Close proximity to SolarBee locations
- 20 ft X 20 ft (6 m X 6 m) Assembly Space per SolarBee Unit.

2. Assembly Of Major Components

TOOLS:
Metric Socket and Wrench Set (10mm, 13mm, & 19mm)
Anti Sieze (Apply small amount on all threaded fasteners and turnbuckles when assembling)

With all major components nearby and battery in place on the core unit, the SolarBee is ready for final assembl .



STEP 1: Connect the float arms to the lower part of the core unit using the M12 stainless steel bolts and locking nuts. Be sure to use the proper hole in the mount block for all three float arms. For hoses shorter than 15 ft (4.5 m), use the front hole, othewise use back hole.

STEP 2: Using the float pins, attach the float and float plates to the float arm (2 pins pe float)

STEP 3: Attach the turnbuckles to connect the core unit to the float arm. IMPO TANT: Prior to connecting turnbuckles be sure that both ends are turned all the way in to achieve full extension.

STEP 4: Once both ends are attached, turn out the turnbuckles out all the way to suspended the bottom of the core unit in the air.

STEP 5: Attach the intake plate to the bottom of the hose. The bottom of the hose contains the three weld links which the indicator chain attaches to.

STEP 6: Slide the hose and intake beneath the core unit and attach the hose chain to one of the float plates not used for anchoring. With the flanges properly aligning, connect the hose flange to the core unit using M8 bolts and locking nuts.

3. Deploy and Float SolarBee

TOOLS: Crane, Backhoe, or Hoist;
3-Point Lifting Chain/Strap

Now that the SolarBee is fully assembled, it is ready to be hoisted into the water.

The following steps need to be followed when lowering the SolarBee into the water:

STEP 1: Tie up the hose and strainer as high out of the water as possible to minimize it from dragging on the bottom or through the water.

STEP 2: Connect the 3-Point Lifting Chain or Strap to all 3 lifting points on the top frame of the SolarBee. Be sure all points are securely attached.

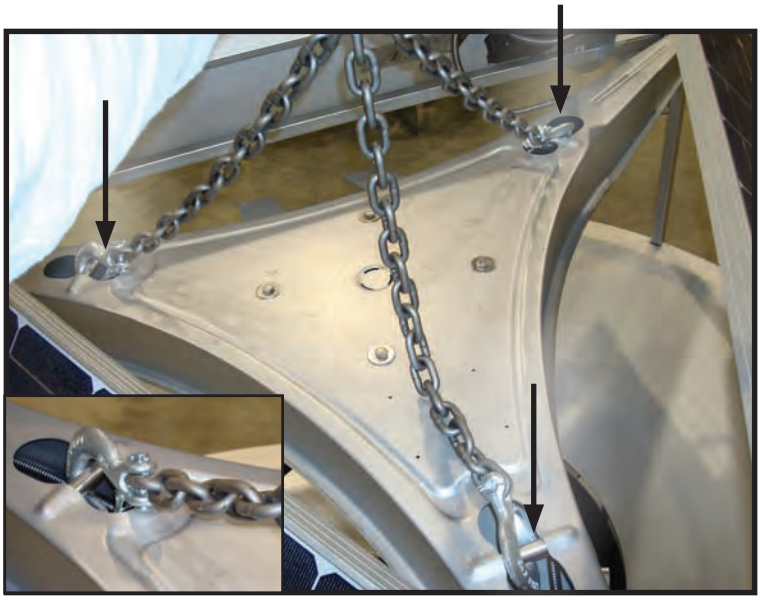
STEP 3: Position the crane, back hoe, or hoisting equipment where it can safely reach and vertically hoist the SolarBee.

STEP 4: Connect to the 3-Point Lifting Chain or Strap and be sure everyone is clear of the lifting zone.

STEP 5: Hoist the SolarBee, back it over the water, and lower it into the water so that it is floating on its own

STEP 6: Disconnect the 3-Point Lifting Chain or Strap

The SolarBee is now ready to be towed into place.



CAUTION: WHILE SOLARBEE IS SUSPENDED IN THE AIR, KEEP CLEAR BELOW AND IMMEDIATELY AROUND SOLARBEE TO AVOID BEING CRUSHED IN THE EVENT OF THE UNIT UNEXPECTEDLY DROPPING TO THE GROUND . FAILURE TO FOLLOW THIS WARNING COULD LEAD TO SERIOUS INJURY!

4. Tow SolarBee Into Final Position

TOOLS: Boat and Boat Motor, Tow Strap/Rope

Towing the SolarBee can be done using several methods, however it is very important to tow slowly, preventing damage to the SolarBee.

One method is to hook a towing strap or rope around one of the float arms at the anchor connection point and pull the SolarBee with a boat.

Another method is to push the SolarBee using the front of the boat. This works the best with a small sized boat. It is important that extra caution be taken not to push in between float arms and not on a solar panel. Push on a solid structure, such as the under side of the distribution dish if using this method.

IMPORTANT: TO PREVENT INJURY AND COSTLY DAMAGE TO THE MACHINE, DO NOT EXCEED 5 MPH (8KM/HR) WHEN TOWING OR PUSHING A SOLARBEE.

The SolarBee will float in approximately 2 ft (60 cm) of water. Tow the unit out to the anchor.

5. Final Settings

TOOLS: Pliers, 13mm socket & wrench

Once the SolarBee is in final position, the last step is to properly set and start it.

STEP 1: Connect the SolarBee unit to the mooring block anchors or tether line. Utilize the float arm as shown in the photo as the tie off point(s) to the anchor system.

STEP 2: Using the proper hose setting procedure, adjust the hose/intake into correct position by slowly and evenly lowering the hose chain.

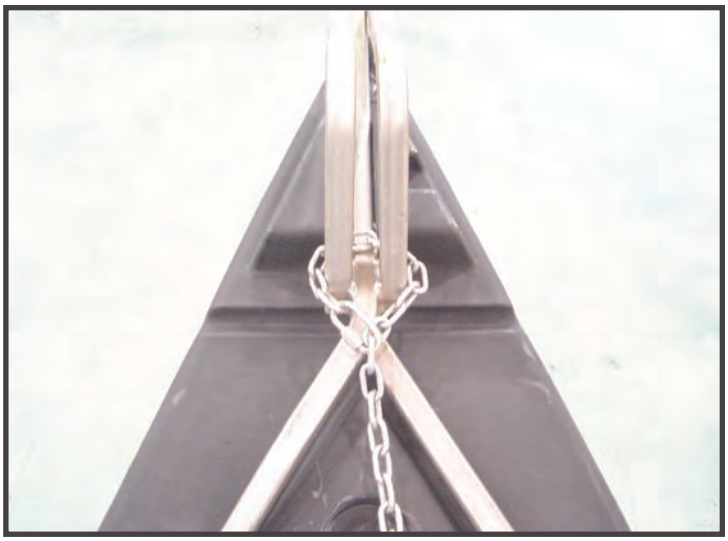
STEP 3: Using the correct startup order, power up the SolarBee unit.

STEP 4: If the SolarBee contains leg extensions, add these at this time.

STEP 5: Adjust all turnbuckles to achieve the proper distribuition dish depth setting.

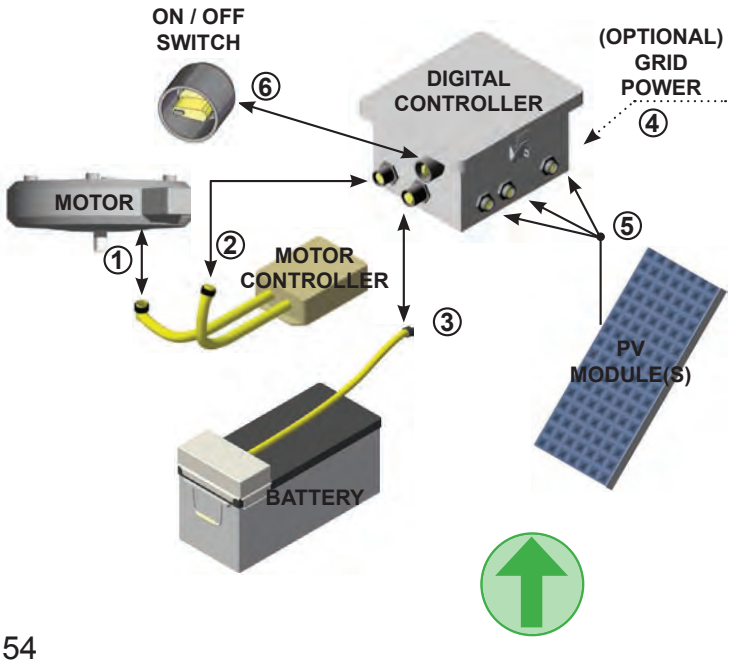
STEP 6: Do a rotational speed check.

The SolarBee should now be completely operational. If you have questions or concerns about it being properly installed, please contact Medora Corp. Customer Service (1-866-437-8076).



Anchor Chain Connection Point

Power Up Order



SolarBee®

Circulating the World's Water

SB5000 FEATURES

Technology Description:	Floating, solar powered, circulation equipment for wastewater treatment and freshwater applications. Day/night operation on solar only by utilizing a battery to store excess daytime power for nighttime operation.
Flow Rates:	*Flow rates at full speed at 10 feet (3.0 m) diameter*
Direct Flow Rate	700 gallons per minute (2,650 liters per minute).
Induced Flow Rate	4,300 gallons per minute (16,300 liters per minute).
Combined Flow Rate	5,000 gallons per minute (18,950 liters per minute).
Machine Size/Weight:	Assembled machine is 16 feet (5m) in diameter and weighs 850 pounds (380kg).
Shipping Size/Weight:	Machine can be crated and shipped in a 87 inch (2.2 m) wide X 87 inch (2.2 m) long X 65 inch (1.7 m) high crate, estimated shipping weight is 1500 pounds (680 kg). Hose lengths greater than 20 ft (6 m) may require additional crating.
Materials of Construction:	316 stainless steel construction. Foam-filled high-density polyethylene (HDPE) floats Thermoplastic rubber intake hose. HDPE strainer. Concrete mooring blocks are encapsulated in HDPE.
Drive System:	High torque, direct drive (no gearbox), low voltage brushless D.C. motor.
Power Supply/Control System:	*PV solar panels are protected from bird fouling with bird deterrent kit.*
PV Solar Panels	3 X 80-watt photovoltaic solar panels orientated in triangular pattern. On-board battery storage for day/night operation.
Electronic Controller	Digital solid-state controller, mounted in weather-tight (NEMA 4X) enclosure with externally fused disconnect. SCADA output through RS-232 serial communication (Modbus RTU), DB9 male connection point inside enclosure. Wireless options available, not included.
Wiring	Corrosion-resistant industrial cord with molded watertight connectors that are indexed to prevent improper wiring.
Rotating Assembly:	Removable assembly with easy access to motor and digital controller. Impeller handles 4-inch (10cm) spherical solids. Oil-filled (food grade) teflon freeze sleeve with o-rings shaft. Rotational indicator on shaft.
Flotation System:	Three floats in triangular pattern each with an adjustable float arm for proper vertica positioning, total float buoyancy of 1,450 pounds (660kg)
Fluid Intake Assembly - Option 1:	*Hose system bolted to bottom of structural assembly.*
Hose System	20 to 60 ft (6 to 18 meter) available in 16-inch (40cm) diameter X 20 feet (6m)sections.
Intake Type	Inverted bell shape strainer with 4-inch (10cm) holes.
Intake Depth Adjustment	Can vary from 0 to 60 feet (0 to 18 m). No depth adjustment necessary for fluctuations in water level. Weight and flotation of the 'J' bend of hose keeps intake above sludge or bottom of pond at all operating depths. Strainer can be chained up higher if desired.
Fluid Intake Assembly - Option 2:	*Fixed horizontal plate bolted to bottom of structural assembly.*
Intake Type	Fixed horizontal plate with 12-inch (31 cm) openings.
Intake Depth Adjustment	No adjustment necessary. Horizontal inflow from 25 in (64cm) below distribution dish
Anchoring:	(1) Two mooring blocks tethered together with SS chain and attached to structural member on unit or (2) Tethered to shore with SS cable.
Ice Protection:	Freeze sleeve allows shaft to rotate while ice is formed around sleeve.
Minimum Operating Depth:	31 inches (0.8 m) with fixed horizontal plate. No damage to machine or bottom of reservoir when run dry in shallow water.
Accessories Available:	(1) Supplemental Shore Power Kit, (2) Chemical Injection Kit, (3) Marker Light Kit
Life/Maintenance/Warranty:	Expect 25-year life, minimal maintenance. Limited 2-year parts and conditional labor warranty. Limited 25 year photovoltaic module manufacturer performance warranty and 10 year motor warranty.

Patent Pending

Subject to change without notice.

Medora Corporation • 3225 Hwy 22 • Dickinson, ND 58601
+1 866 437 8076 • Ph +1 701 225 4495 • Fax +1 701 225 0002 • www.medoraco.com

Attachment 5
Pond Design Information from Remedial Action Options Report
& Conceptual Design Report (pages 25 thru 33)

5.2 Groundwater Treatment Area – Engineered Pond and Phytoremediation

Groundwater treatment includes an engineered groundwater treatment pond with phytoremediation to address impacts within the Groundwater Treatment Area. The components of the treatment system are designed to reduce contaminant levels in groundwater as it flows downgradient to the Potable Well Target Zone. Each of these system components are detailed in the following sections in support of the conceptual design. A drawing presenting the comprehensive treatment system conceptual design (cap, SVE, and LNAPL removal) and engineered treatment pond with phytoremediation is provided on Figure 9.

5.2.1 Engineered Treatment Pond

Background and Physical Parameters

During a project specific Technical Information meeting[16] between the City, WDNR and AECOM; Dave Johnson, Hydrogeologist with the WDNR Division of Environmental Management, Drinking and Groundwater Section, suggested that the Former Newton Pit site presents a unique combination of contaminant compounds, subsurface conditions, and a topographic profile that might make it a good candidate for the installation of a groundwater treatment pond.

[16] *Manitowoc City/Former Newton TN Gravel Pit Technical Information Meeting Minutes*, April 1, 2015, Oshkosh DNR Service Center.

As a result of further discussions, research, and data from additional field investigation activities; an engineered groundwater treatment pond is presented as a recommended remedial alternative. A summary of the specific research and the additional field investigation activities has been previously submitted to the WDNR in a *Groundwater Treatment Area Feasibility Study Technical Memorandum*[17]. The tech memo summarizes that, to the extent that a pond can be engineered to capture the vertical and horizontal extent of the plume, a pond would be a viable in-situ remedial option to treat the contamination plume prior to it traveling off site.

One concept integral to the proposed use of a constructed treatment pond is that the pond itself is not considered by the WDNR as a "water of the state". Rather, it is accepted as a remedial action treatment system that is exempt from the applicable WDNR surface water standards. AECOM requested and received confirmation of this interpretation from the WDNR[18].

Prior to pond construction, existing monitoring wells P-1 through P-13, WT-04, and WT-13 will be properly abandoned. It is anticipated that a limited number of these monitoring wells will be replaced, after pond construction, to facilitate future groundwater monitoring. The exact number of replacement wells will be determined during the drafting of the system operation and maintenance plan.

The pond, as designed, is roughly 'kidney beaned' shaped, approximately 500 feet long, 160 feet wide, with a maximum depth of approximately 20 feet below groundwater elevation (e.g. an approximate bottom of pond elevation of 665 feet MSL). Along the northeastern portion of the pond a discharge channel will terminate at a weir flow control structure that will control the gravity discharge of treated pond water, via a pipe, to Silver Creek. The sidewalls of the pond will be constructed to intersect the water table at an approximate elevation of 685 MSL and the pond will include a 10-foot wide safety shelf.

It is estimated that a total of approximately 82,000 cubic yards (CY) of soil will be excavated to create the pond and channel. Of this volume, approximately 49,000 CYs will be excavated from above the water table elevation (685 MSL) and approximately 33,000 CYs will be excavated from below the water table. AECOM proposes that the excavated material be managed as follows:

- Material excavated from above the water table will be considered clean material not impacted with VOC compounds. AECOM proposes that these clean materials can be used without limitation. They can be relocated on the property for use as fill or they can be transported off-site for use as fill on any commercial project.

- Material excavated from below the water table will be considered impacted by VOC compounds. AECOM proposes that these VOC-impacted materials can be used on-site as fill within the formally delineated VOC groundwater plume area. If these materials are tested and found to have no-detectable levels of VOCs (as defined by the laboratory method detection limit for VOCs) – these materials may be used without limitation.

[17] *2015 Task 31; Groundwater Treatment Area Feasibility Study Technical Memorandum*, AECOM Technical Services, Inc., dated April 4, 2016.

[18] *Surface Water Standards Question for a Pond acting as a Remedial Action*, email from Tauren R Beggs, DNR, dated Friday May 29, 2015, 2:44 PM.

Hydraulic Control

Although the designed depth of the pond (approximately 665 MSL) does not directly intersect the full vertical extent of the groundwater plume (the bottom of the plume is at approximately 655 MSL) it is anticipated that engineering controls will improve the hydraulic gradient control (i.e. the capture zone) of the pond. Additional hydraulic control is also anticipated through phytoremediation as discussed in Section 5.2.2.

The pond design includes a drainage channel to the east with a discharge pipe extending to Silver Creek. The channel and pipe will use gravity flow to discharge water from the pond. The discharge of water will create a predominately horizontal hydraulic gradient within the underlying sand and gravel towards the pond to enhance groundwater capture.

This imposed hydraulic gradient will create a capture zone that will primarily extend up-gradient from the pond and neutralize the downward gradient currently associated with the Western Source Area. The new hydraulic gradient will not re-capture contaminated water that is currently beneath the pond; however, future groundwater flow will be directed horizontally toward the pond bringing with it the newly captured up-gradient groundwater plume.

A preliminary analysis was completed to model the various flow conditions that occur as the pond is "pumped". For the purpose of this evaluation, evaporation of water from the pond surface was considered to have a minimal influence on the "pumping" of the pond.

The analyses began by reviewing approximately 22 years (1993 through 2015) of groundwater elevation data for the monitoring wells located in the vicinity of the proposed pond (WT-02A, WT-03, WT-13 and WP-04). During that period the maximum average groundwater elevation was 686.11 MSL, the average groundwater elevation was 685.14 MSL, and the minimum average groundwater elevation was 684.01 MSL.

Next a range of flow rates for the pond (i.e. of the aquifer draining into the pond) were modeled based on Darcy's Law:

$$Q = KiA$$

Where: Q = flow rate
K = hydraulic conductivity
i = horizontal hydraulic gradient
A = cross sectional area of the pond

A range of flow rates were calculated using the following values:

- The measured hydraulic conductivity (K) for the aquifer is 3.90E-3 cm/sec (11.06 ft/d).
- A range of assumed horizontal hydraulic gradients (i) as follows:
    - A maximum hydraulic gradient of 1.0 ft/ft, with no correction in the aquifer due to drawdown in the pond.
    - An engineer's estimated hydraulic gradient of a 0.10 ft/ft. This is 10% of the maximum gradient and assumes the aquifer will correct itself for pond drawdown within a distance of only 10 feet away from the pond. This may be an unrealistically high gradient given that the measured natural gradient corrects 1 foot over 227 feet (a gradient of 0.004 ft/ft).

  - A minimum hydraulic gradient of 0.004 ft/ft. This is the naturally occurring hydraulic gradient in the aquifer assuming no drawdown in the pond.

- A perimeter cross-sectional area of the pond (A) equal to approximately 30,820 square feet. This assumes horizontal flow predominates in the sand and gravel aquifer.

The calculated flow rates for the pond based on Darcy's Law using the site hydraulic conductivity, the pond cross-sectional area, and pond drawdown conditions equal to the range of assumed hydraulic gradients were as follows:

- Q_{max} was 3.93 cubic feet per second (cfs) at a hydraulic gradient/pond drawdown of 1.0 ft/ft.

- Q_{est} was 0.39 cfs at a hydraulic gradient/pond drawdown of 0.10 ft/ft.

- Q_{min} was 0.02 cfs at the natural hydraulic gradient of 0.004 ft/ft.

These flow rates along with the anticipated groundwater elevation conditions were then used to design operational conditions for the pond, as follows:

- The anticipated pond operating water levels are based on the historical groundwater data as follows:
  - a maximum pond elevation of approximately 686.11 MSL,
  - a minimum pond elevation of approximately 684.01 MSL, and
  - an average pond elevation of approximately 685.14 MSL.

  The current (October 2015 data) groundwater elevation is approximately 685 MSL.

  Based on the historical and current water elevation data, the proposed design normal water level (NWL) elevation for the pond is 685 MSL.

- The maximum drawdown of the pond is anticipated to be 1-foot (an elevation of approximately 684 MSL based on the proposed NWL of 685 MSL), equivalent to the maximum horizontal hydraulic gradient and the historical average minimum groundwater elevation. Calculating the pond flow rate under this condition gives a maximum flow of approximately 4 cfs.

  The impact of storm water flows into the pond and the impact of high groundwater elevations will also impact the maximum flow conditions.

  Storm water flows were reviewed. Based on the limited size of the drainage basin and the sand and gravel nature of the gravel pit surface (e.g. minimal runoff) the impact of storm water flows into the pond was determined to be minimal.

  The future possibility of high groundwater elevations will have an impact on the maximum flow rate from the pond. To account for this variability in high groundwater elevations, the weir structure controlling the flow of water from the pond will be designed to be adjustable, so that pond drawdowns can be managed for differing groundwater elevations.

  Taking into account possible elevated pond surface water elevations created by both storm water flows and elevated groundwater conditions, the top of the pond bank elevation was designed at 688 MSL, approximately two feet above the historic maximum average groundwater elevation.

- The average operating drawdown of the pond is anticipated to be 0.10-foot (an elevation of approximately 684.9 MSL based on the proposed NWL of 685 MSL), equivalent to the

engineer's estimated hydraulic gradient of a 0.10 ft/ft. Calculation of the pond flow rate under this condition gives a flow of approximately 0.39 cfs.

- The pond flow rate based on the minimum hydraulic gradient was not calculated because it assumes no drawdown in the pond.

These pond water level elevations and flow conditions were then used to conduct a hydraulic analysis of the gravity pipe flow from the pond.

Hydraulic Analysis

The intent of the hydraulic analysis was to size the outlet and outlet pipe that would run from the pond's drainage channel to Silver Creek. The criteria for sizing the pipe were to maintain a positive hydraulic gradient from groundwater elevation to the pond surface water elevation, to the discharge point at Silver Creek. To determine this, an XP-SWMM (Storm Water Management Model) model was developed. The hydraulic module of the program, XTRAN, was used to analyze the pond. This model was selected because it is effective in modeling pipe flow that transitions from open to pressure flow conditions, which will likely be the case with the pond outlet pipe.

Based on groundwater monitoring information and topographic survey elevations provided by the City, it is anticipated that pond outlet pipe will have an upstream invert elevation of 684.0 MSL. As a result, if there was no flow input into the pond, the pond water surface elevation would equalize to that elevation. The downstream invert elevation of the pipe is based on elevation of the channel bed of Silver Creek. The creek bed elevation at the proposed outfall location is approximately 682.5 MSL. It is estimated that the downstream end of the outlet pipe will have an invert elevation of 683.0 MSL (0.5 feet above the creek bed). Under high creek flows (subsequent to spring thaw and large rain events), it is likely that water from the creek would backup into the pond. Based on the design intent of the pond for treating groundwater, where water movement is measured in months and years, the short-term creek backflow condition, occurring typically less than a few weeks per year, is acceptable. Creek base flow conditions will likely yield creek water elevations at or below 683.0 MSL adjacent to the pipe outlet.

The results of the hydraulic analysis are presented in Table 2 below. Flows analyzed ranged from 0.25 to 4 cfs, and are based on anticipated groundwater flow into the pond. The results indicate that an outlet pipe at least 15-inches in diameter is required. This size pipe would provide acceptable performance for most anticipated flows, however at higher inflows (e.g. 4 cfs), the resultant water surface elevation (WSE) is higher than desirable (685.6 MSL). The use of an 18-inch diameter pipe would have a higher likelihood of performing in the full range of flows and provide a more favorable hydraulic gradient. Relative to the overall construction costs and efforts, the use of an 18- versus a 15-inch diameter pipe is relatively negligible. A 24-inch diameter pipe was also modeled, and results indicate only a marginal performance improvement over the 18-inch diameter pipe. It is therefore recommended to use an 18-inch diameter outlet pipe from the pond to Silver Creek. During the design process, an outlet structure with stop-logs (or similar) would be designed at the upstream end of the pipe to allow control of discharge during pond "start-up" conditions, to adjust the pond discharge elevation during times of high groundwater levels, and to minimize future maintenance.

Table 2 – Hydraulic Analysis Summary

Pond Outlet Pipe Diameter (in)	Base Flow (cfs)	WSE	Base Flow (cfs)	WSE	Base Flow (cfs)	WSE	Base Flow (cfs)	WSE	Base Flow (cfs)	WSE	Base Flow (cfs)	WSE
6		684.4		686.2		691.5		697.6		700+		700+
8		684.4		684.4		686.0		688.7		692.0		700+
10		684.3		684.4		684.6		685.5		686.7		694.6
12	0.25	684.3	0.5	684.4	1	684.6	1.5	684.7	2	685.1	4	688.5
15		684.2		684.3		684.5		684.6		684.8		685.6
18		684.2		684.3		684.5		684.6		684.7		685.0
24		684.2		684.3		684.4		684.5		684.6		684.9

Treatment

The treatment process of VOCs anticipated to occur within the pond include volatilization, phytoremediation, aerobic-bioremediation, and solar (i.e. UV radiation) oxidation. Volatilization is anticipated to be the main remedial process with phytoremediation, aerobic-bioremediation, and solar oxidation providing minimal benefits that will vary according to the season.

Volatilization is dependent on the physical properties of the aquifer, the pond, and of the VOCs.

The physical hydrologic properties of the aquifer include:

- A hydraulic conductivity (K) of 3.90E-3 cm/sec (11.06 ft/d).
- An average linear flow velocity (V) of 0.20 ft/day (73 ft/yr).

The physical properties of the pond include:

- Dimensions of approximately 500x160x20 (LxWxD) feet.
- A surface area of approximately 86,000 square feet.
- A volume of approximately 6.7 million gallons of water.
- A range of anticipated discharge flow rates from 0.25 to 4 cfs (153 thousand gallons per day (gpd) to 2.6 million gpd) with an estimated discharge rate of 0.39 cfs (255 thousand gpd).

These properties were then used to evaluate the groundwater retention time in the pond.

- Retention time as a function of average pond width (70 feet at elevation 675 MLS) and groundwater velocity (73 ft/yr) indicates that the pond's average physical width is equivalent to

one year's (365 days or 8,760 hours) travel time of the groundwater under the influence of the natural groundwater gradient (i.e. no discharge from the pond).

- Retention time as a function of pond volume (6.7 million gallons) and a range of discharge rates provides:
    - A minimum discharge flow rate of 0.25 cfs (153 thousand gpd) provides a groundwater retention time of approximately 44 days or 1,056 hrs.
    - The estimated discharge flow rate of 0.39 cfs (255 thousand gpd) provides a groundwater retention time of approximately 26 days or 624 hours.
    - A maximum discharge flow rate of 4 cfs (2.6 million gpd) provides a groundwater retention time of approximately 2.6 days or 62 hours.

The physical properties of the VOCs, as discussed in the *Groundwater Treatment Area Feasibility Study Technical Memorandum*, include the Henry's Law constants, vapor pressures, and half-life for the VOCs. The Henry's Law constants and vapor pressures all indicate a strong physical ability for the compounds to volatilize. The half-life data, the amount of time in hours required for a compound to be half of its original concentration during volatilization from a typical surface water body, indicates that for most VOCs present the half-life ranged from 2.5 to 3.4 hours. Only cis-1,2-dichloroethene was significantly different with a half-life of 96 hours.

Comparing the pond groundwater retention times to the VOC half-life data indicates:

- For most VOC compounds to be treated by the pond, with half-lives between 2.5 to 3.4 hours, the pond provides a retention/treatment time ranging from:
    - approximately 20 half-lives under the maximum discharge flow rate of 4 cfs, to
    - approximately 200 half-lives under the estimated discharge flow rate of 0.39 cfs, to
    - greater than 2,000 half-lives when the pond is not discharging water and water flows through the pond driven by the natural hydraulic gradient.
- For cis-1,2-dichloroethene with a half-life of 96 hours, the pond provides a retention/treatment time ranging from:
    - approximately 0.6 half-lives under the maximum discharge flow rate of 4 cfs, to
    - approximately 6.5 half-lives under the estimated discharge flow rate of 0.39 cfs, to
    - greater than 91 half-lives when the pond is not discharging water and groundwater flows through the pond driven by the natural hydraulic gradient.

To improve the treatment efficiency of the pond, AECOM proposes the use of floating solar-powered circulation equipment. The mixer is designed to provide physical mixing and aeration, which will improve evaporation, volatilization of COCs, promote aerobic bio-remediation and solar oxidation, as well as to keep the pond open and operational during the winter months.

In summary, the physical properties of the VOCs found within the pond are characterized by having a strong potential to volatilize. A review of retention times as compared to VOC half-lives indicates that, for

most VOCs present, the pond will provide significant treatment time for volatilization to occur. All of these properties will be improved with the incorporation of a floating solar-powered pond mixer.

5.2.2 Phytoremediation

Phytoremediation within the Groundwater Treatment Area is anticipated to be implemented within three ecological zones; the pond littoral zone, the pond's riparian zone, and the upland zone around the pond.

The shoreline and shallow water littoral zone will be allowed to naturally vegetate with locally occurring plants. The zone should be managed to promote species such as cattails (Typha sp.), a known and hearty phytoremediation species, and to limit invasive species such as common reed grass (Phragmites sp.).

It is anticipated that the pond riparian zone and the surrounding upland zone will be actively managed for phytoremediation in cooperation with the US Department of Agriculture (USDA), Forest Service, under an EPA Great Lakes Restoration Initiative Action Plan II grant. The grant is funding a Forest Service, Landfill Leakage Remediation study. The study is being directed by Ronald S. Zalesny Jr., Team Leader and Research Plant Geneticist at the Northern Research Station in Rhinelander Wisconsin.

The Landfill Leakage Remediation study is a phytoremediation system project using a tree buffer system to control and remediate contaminated runoff to help prevent/decrease contamination to watersheds of the Great Lakes. The specific objectives of the study are to:

1. Project the volume of runoff captured and treated by integrating water quality, hydrogeologic, and soil health metrics (i.e., WATER BALANCE),

2. Delineate potential leakage plumes using *phytoforensic* methods (i.e., PHYTOFORENSICS),

3. Assess the health of existing trees by measuring uptake of inorganic and organic contaminants along with monitoring of physiological parameters (i.e., TREE HEALTH ASSESSMENTS),

4. Install phyto buffers of selected species and varieties for surface and subsurface pollution mitigation (i.e., PHYTO-RECURRENT SELECTION), and

5. Synthesize steps 1-4 to assess the overall reduction of nonpoint source pollution impacts on nearshore health (i.e., SYNTHESIS).

The outcome of the study for the Forest Service will be data for use in presentations and publications.

The outcome of the study for the City and the project site will be a professionally designed and managed phytoremediation study that will leave a legacy of approximately 2.4 acres of trees that will continue to remediate the site.

At this point in the phytoremediation project planning, the conceptual design provides for:

- A ring of willows that will provide an approximately 6-foot wide phyto buffer around the entire pond.

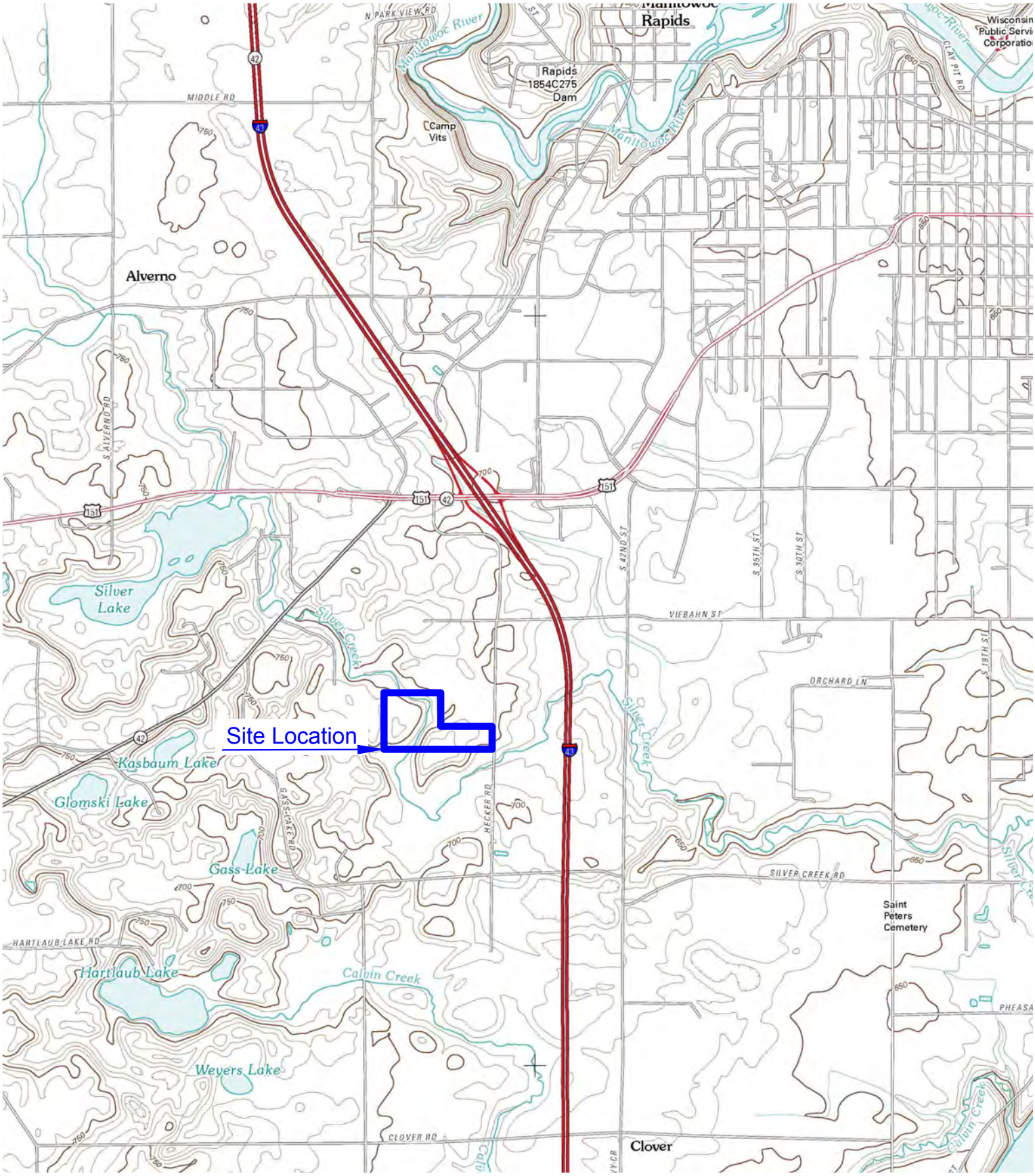
- On the up- and side-gradient (northwest and west) sides of the pond, approximately three rows of hybrid poplar trees planted at approximately 8-foot spacing. A total of approximately 0.4 acres of trees.

- On the down gradient side of the pond (east and southeast), approximately two acres of hybrid poplar trees will be planted at approximately 8-foot spacing.

It is anticipated that 3 to 4 years will be required for the trees to establish their root systems and provide significant water uptake. This uptake will provide additional hydraulic groundwater gradient control within the vicinity of the pond, providing treatment to the impacted groundwater.

At this time the City and the Forest Service have a verbal understanding that the Forest Service is interested in starting the study in 2017, after the pond is constructed. A final contract, in the form of a memorandum of understanding, must be authorized to formalize the project.

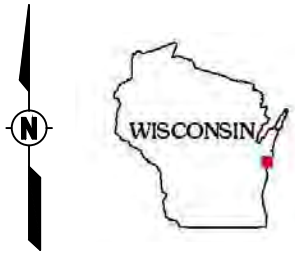
Attachment 6
Site Location Map, Site Features, and Photo Log



3000 4000 5000 6000
FEET

APPROXIMATE SCALE

NOTES:
Topographic Map courtesy of the United States Geological Survey
http://store.usgs.gov
Map Date: 2010



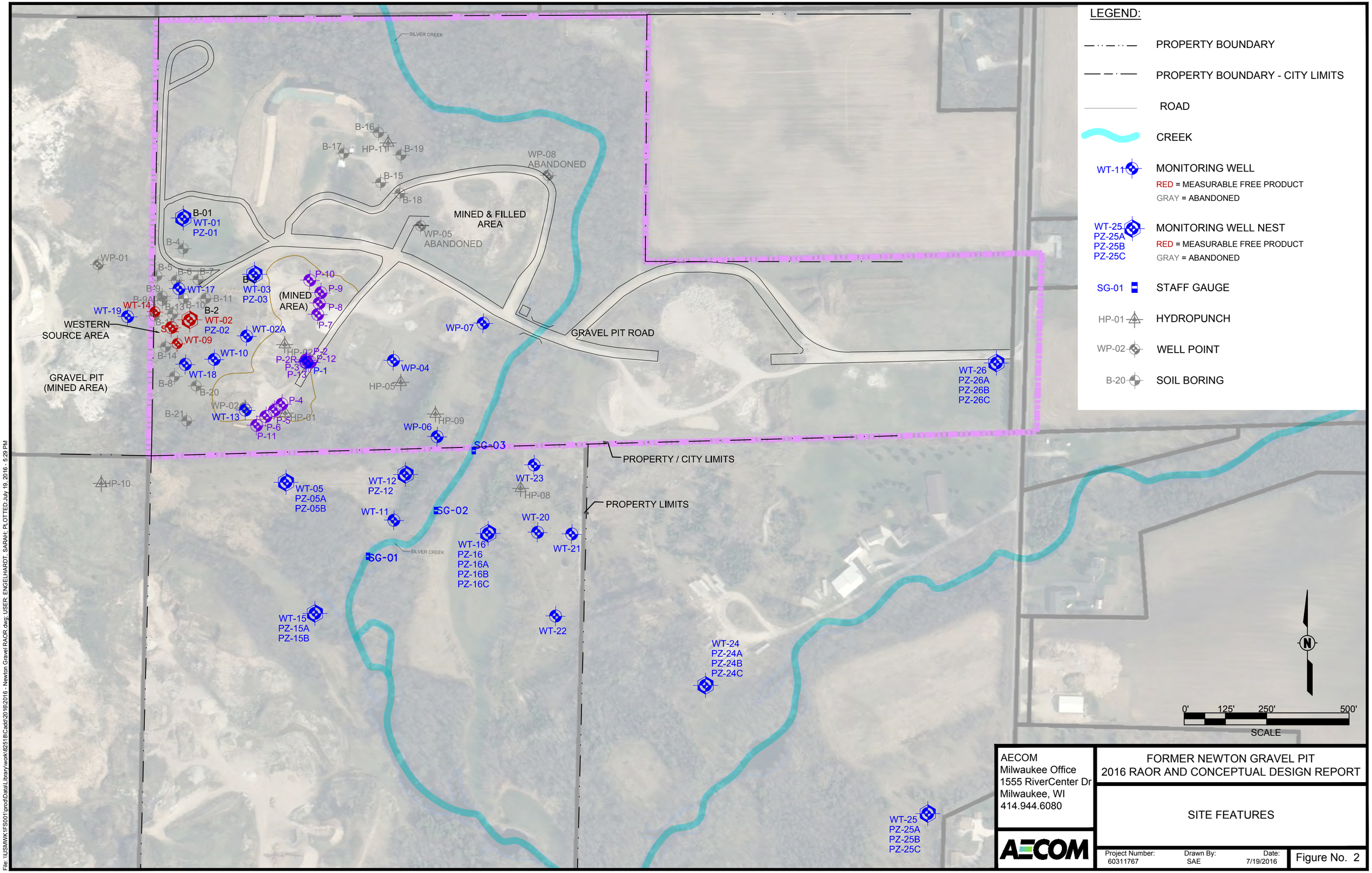
AECOM
Milwaukee Office
1555 RiverCenter Dr
Milwaukee, WI
414.944.6080

FORMER NEWTON GRAVEL PIT
2016 RAOR AND CONCEPTUAL DESIGN REPORT

SITE LOCATION

Project Number:	Drawn By:	Date:	Figure No.
60311767	SAE	7/14/2016	1

File: \\USMWK1FS001\prod\Data\Library\work\62518\Cadd\2016\2016 - Newton Gravel RAOR.dwg; USER: ENGELHARDT, SARAH; PLOTTED:July 14, 2016 - 2:08 PM



AECOM
Milwaukee Office
1555 RiverCenter Dr
Milwaukee, WI
414.944.6080

FORMER NEWTON GRAVEL PIT
2016 RAOR AND CONCEPTUAL DESIGN REPORT

SITE FEATURES

Project Number:	Drawn By:	Date:	Figure No. 2
60311767	SAE	7/19/2016	

File: \\USMWK1FS001\prod\Data\Library\work\82518\Cadd\2016\2016 - Newton Gravel RAOR.dwg, USER: ENGELHARDT, SARAH, PLOTTED: July 19, 2016 - 5:29 PM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
City of Manitowoc	**Former Newton Pit, Manitowoc County, WI**	60135471

Photo No.	Date:
1	04/27/2016

Direction Photo Taken:

East

Description:

Proposed pond location.

Photo No.	Date:
2	04/27/2016

Direction Photo Taken:

East

Description:

Proposed pond location.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
City of Manitowoc	**Former Newton Pit, Manitowoc County, WI**	60135471

Photo No.	Date:
3	04/28/2016

Direction Photo Taken:

North (upstream)

Description:

Proposed pond outfall location.

Photo No.	Date:
4	04/28/2016

Direction Photo Taken:

South (downstream)

Description:

Proposed pond outfall location.