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OPERATIONS & MAINTENANCE MANUAL FOR THE GROUND WATER TREATMENT SYSTEM AT HÜLS AMERICA INC. STONY POINT, NEW YORK

PREPARED FOR:

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1.0 INTRODUCTION

This Operations and Maintenance (O&M) Manual sets forth the operating and maintenance procedures for the Ground Water Treatment System (GWTS) constructed at the former Kay Fries facility located in Stony Point, New York. The GWTS was designed and constructed to recover and treat ground water below the central eastern portion of the site and subsequently discharge the treated water to Cedar Pond Brook in compliance with the New York State Pollution Discharge Elimination System (SPDES) Permit #3-44-023 for the site and New York State Department of Environmental Conservation (NYSDEC) directives.

1.1 PURPOSE

The purpose of this manual is to identify specific operating and maintenance items which can be anticipated during the operational life of the GWTS and presents the procedures and implementation schedules to facilitate the operation of the GWTS in an efficient and economical manner. The GWTS is designed to operate continuously with periodic remote monitoring and minor on-site maintenance. Through knowledge and familiarity with this manual and the GWTS, operations personnel should be able to perform routine O&M relative to the GWTS.

It should be noted within the scope of this O&M manual, that it is not feasible or practical to anticipate or identify all of the problems which may arise in the operation of the GWTS. Should non-routine problems or malfunctions arise, operations personnel should refer to manufacturers' literature and/or qualified and authorized contractors. Specific details of the GWTS components and their operation, including pertinent manufacturers' literature, are contained within the *Control Systems Documentation Manual*, prepared by Panelmatic Systems Inc. during the design and construction of the GWTS. Copies of this two-volume manual are maintained within the GWTS trailer and the offices of Hüls America Inc. (HAI) and operating contractors.

To assist in identifying the O&M procedures contained herein, this manual additionally includes a generalized description of the GWTS equipment and the basis of design, as outlined in Section 1.2.

1.2 GENERAL SYSTEM DESCRIPTION

The system generally consists of ground water recovery components; pumping and piping to the GWTS; water treatment components; temporary water storage; and piping to Cedar Pond Brook for final discharge, as outlined below. The system components and their operation and required maintenance are further detailed in Section 2.0.

Ground water recovery is achieved through a series of three recovery trenches located in the central eastern portion of the site (Figure 1). The trenches are designed, located, and constructed to intercept ground water within the upper water-bearing zone, downgradient of the designated source areas. Ground water flows generally eastward below the target area, in response to natural and enhanced gradients (i.e., due to pumping of the trench sumps). Ground water enters into the gravel matrix of the trench and collects in a four-inch diameter perforated polyvinyl chloride (PVC) or slotted agricultural drain pipe, which extends along the length of each trench to a precast concrete recovery sump located in the midsection of each trench. Dewatering of the sumps, and subsequently, the recovery trenches, is achieved by dual sump pumps within each recovery sump, which operate on an alternating sequence in response to the water level within each sump. The water is conveyed through double-walled piping to a tie-in valve box located west of Trench 1, where the inflow lines from the three recovery sumps converge into a common line. The double-walled common line then extends from the tie-in box to the GWTS trailer (Figure 1).

As water enters the GWTS trailer, it flows through a set of four bag filtration units (Figure 2) (consisting of two parallel sets in series) and enters a 500-gallon settling tank (T-101). The flow into the GWTS trailer is monitored via a differential pressure in-line flow meter located between the filter units and Tank T-101. Water is transferred from T-101 by a transfer pump (P-101), to two low-profile air strippers (configured in parallel). Air flow through the air stripper system is initiated by a pressure blower (B-106) located prior to the strippers. A secondary heater/blower (B-107) applies a negative pressure (vacuum) and heat to the vapor stream from the air stripper system,

which flows to two vapor-phase carbon adsorbers oriented in series, prior to discharge to the atmosphere. Current operations recirculate the air stream from the carbon back to the strippers in an effort to maintain a lowered pH, in an attempt to reduce precipitating solids.

Water from the air stripper system accumulates in the air stripper sump (T-103), which is controlled by a level switch. When T-103 reaches 80% capacity, the air stripper sump pump (P-103) is activated and pumps the water through a bag and cartridge filter system to further remove particulates from the water stream. The filtered water then passes through four liquid-phase carbon drums (two parallel sets in series) for the removal of residual organics, and flows to a 500-gallon flow equalization storage tank (T-105).

The water is pumped from T-105 via Discharge Pump P-105 through two Ion Exchange units in series (A-109 A and B) for the removal of dissolved metals. The treated water is subsequently transferred to two 7,000-gallon above ground storage tanks (T-110 and T-111). The storage tanks are equipped with water level indicators, which include a two-point high level alarm system to permit monitoring of the water level in each tank. When water reaches the designated high operating level, the influent valve of the operating tank is automatically closed to prevent overfilling of the tank and the influent valve of the secondary tank is automatically opened to permit filling. In the event that both tanks fill to the designated capacities, a high level alarm triggers a suspension of the P-105 discharge pump to prevent overfilling; the remaining pumps within the trailer are subsequently suspended when high conditions are reached in the associated tanks.

The treated water is released from Tank T-110 or T-111 by remote activation of the control discharge valve on each storage tank. Upon activation of the valve, water flows through an in-line flow meter and by gravity, through a four-inch PVC pipe to the final discharge in Cedar Pond Brook. In the event that the monthly effluent discharge sample analytical results indicate the treated water does not meet New York State Department of Environmental Conservation (NYSDEC) effluent criteria, the water can be recycled through the GWTS for reprocessing or sent off-site for disposal. A site plan and flow diagram of the GWTS are presented as Figure 1 and Figure 2, respectively.

The GWTS is fully automated, which allows system operation without full-time on-site personnel. The computer automation system is designed so operating personnel can remotely monitor system processes, including observations of pump status, tank levels, and inflow and discharge rates and volumes, and provides the ability to activate discharge valves and adjust level controls. Additionally, through remote monitoring, malfunctioning equipment is detected through the system alarm screen. Pumps can be reset in the event of a minor pump malfunction alarm and system operation can be suspended in the event of major equipment malfunctioning. Interlocks are also built into the automation system which would deactivate the system in the event of malfunctioning system components.

1.3 CONTACT INFORMATION SUMMARY

The multiple aspects of operation, maintenance, monitoring, inspection, repair, and management associated with the Stony Point GWTS involves a project team comprised of contractors with various expertise. As the Stony Point project is anticipated to remain active over the course of several years, the relative contact information is summarized in Attachment 1, which can be removed, amended, and replaced periodically, as necessary.

2.0 GROUND WATER TREATMENT SYSTEM OPERATION & MAINTENANCE

This section of the O&M Manual outlines the individual components of the Stony Point GWTS, including a description of their general location, purpose, and specifically, their operation and required maintenance to maintain efficient operation of the system. Additional supporting documentation is referenced and/or attached, as needed. The component information contained within this manual is further documented within the Stony Point GWTS *Control Systems Documentation Manual*, originally compiled by Panelmatic Systems, Inc. during the design and construction of the system. Copies of both manuals are maintained at the GWTS and at the offices of HAI and the operating contractor.

2.1 GROUND WATER RECOVERY TRENCHES

The ground water recovery trench system consists of three recovery trenches, associated pumps, and piping. Trench 1 is 10 to 12 feet in depth and extends approximately 280 feet laterally. Recovery Trench 2 is eight feet deep and extends approximately 260 feet laterally. Recovery Trench 3 is six feet deep and extends approximately 220 feet laterally (Figure 1). The width of each trench is a minimum of four feet.

Each trench is lined with geotextile fabric and additionally lined on the downgradient side with a 40 millimeter (mm) high density polyethylene (HDPE) liner. The base of each trench contains six inches of pea gravel to provide a bed for the four-inch diameter perforated PVC or slotted agriculture drainage pipe. The trench laterals, located on the north and south side of each collection sump, vary between 50 and 150 feet in length and drain to a precast concrete sump located toward the central section of each trench (designated RS-1, RT-2, and RT-3, respectively). Precast concrete valve boxes are located adjacent to each trench sump. The valve box contains manual inlet valves, pressure gauges, and check valves. Clean-outs for the PVC pipe in Trench 1 are located at the end of each lateral and at each bend in the trench. Clean-outs for the agricultural drain pipe in Trenches 2 and 3 are located at 25-foot intervals.

Maintenance:

The trench laterals are generally maintenance-free as a result of the geotextile fabric and pea gravel that surrounds the trench piping. In the event that the laterals were to clog or become obstructed, jetting of the pipes by a qualified contractor should be utilized to free silt and sediment build-up. This cleaning is scheduled on an as-needed basis.

The ground water recovery trenches should be inspected semi-annually via opening of the pipe clean-outs and visual inspection for any obvious obstructions in the drainage pipe.

2.1.1 LEVEL TRANSMITTERS

Water levels within Recovery Sumps RS-1, RT-2, and RT-3 are monitored using Magnetek 7025 continuous liquid level transmitters, coupled with Magnetek 7030 transducers mounted in each sump (designated as LE-RS, LE-RT2, and LE-RT3, respectively). The 7025 transmitter provides an analog current and voltage signal, ranging from 4 to 20 milliamperes and 0 to 10 volts, respectively, which can be scaled over the required range of operation. The 7030 transducer provides time-based pulses to the transmitter, based on the relative position of a magnetic float which travels the length of the transducer rod. Resulting water level measurements can be accessed remotely or on a digital display within the control room of the GWTS trailer. The standard measuring accuracy of the 7030 transducer is approximately 1/32 of an inch over a float movement range of 17 feet.

Water level measurements in each sump are obtained based on the position of the transducer's magnetic float, which rises and falls concurrent with the water level. Based on the water level data transmitted to the GWTS software, the sump pumps are activated or deactivated as the water level in each sump reaches the preset high or low water level point, respectively. The high and low set points can be adjusted via remote monitoring to achieve optimum pumping from each trench. Each pump can also be manually controlled from the GWTS trailer.

Maintenance

The transmitter probes (transducers) are designed for maintenance-free operation. However, at a minimum, the probes are periodically removed from the sump and cleaned with a solution of soap and water on an annual basis to ensure consistent operation. The equipment and procedures utilized to perform these tasks are described below.

EQUIPMENT: Bucket; clean rags or sponge; safety glasses, steel-toed boots, waterproof gloves, and protective clothing; manhole hook (for accessing sump RS-1); large straight-blade screwdriver (for accessing sumps RT-2 and RT-3); surfactant solution (such as Alconox®); drum for disposal of wash and rinse waters; de-ionized water; small brush or fine emery cloth/sandpaper.

1. Suspend system operation by manually turning the mode selector switch in the control room to the OFF position.
2. Don safety glasses, gloves, and protective clothing.
3. Prepare to open the cover of the sump whose transducer is to undergo cleaning. For sump RS-1, insert the manhole hook into one of the slots in the manhole lid covering the sump, and physically remove the lid from the sump opening. For sumps RT-2 and RT-3, insert a straight-blade screwdriver into the latch slot on the access doors, and rotate the screwdriver approximately 1/2 turn to open the latch. **WARNING: Use care when removing the heavy manhole lid from RS-1, in order to avoid possible injury to hands and/or feet. For all sumps, stand clear of the sump opening and check footing at all times. Sumps are permit-required confined spaces; NEVER bodily enter a sump during ANY routine maintenance activity.**
4. Locate and unscrew the yellow electrical cable from the end of the Magnetek 7030 transducer within the sump. Inspect the cable connector and transducer jack for possible debris or corrosion; if corrosion is evident, gently clean the electrical contacts with a small brush or fine emery cloth.
5. Unscrew the locking ring which attaches the transducer to the mounting bracket within the sump. Carefully extract the transducer and magnetic float from the sump through the ring in mounting bracket.

6. Stand the transducer over a bucket in a secure location away from the sump opening. Soak a clean rag or sponge in surfactant, and thoroughly wipe down the transducer rod to remove any accumulated debris. Rinse the rod with de-ionized water after completing the washing activities. Wash and rinse water collected in the bucket should be transferred to a storage drum pending coordination of off-site disposal.
7. Inspect the transducer rod and float for evidence of corrosion, pitting, or other structural problems. If these are observed, contact the operations manager in order to coordinate servicing or further maintenance of the unit through HAI.
8. Carefully place the transducer rod and magnetic float back into the sump through the ring in the mounting bracket, and re-tighten the transducer locking ring. Reposition the yellow electrical cable connector over the end of the transducer and tighten snugly.
9. Replace the sump cover lid (if closing RS-1), or close and securely tighten the access doors over the sump opening (if closing RT-2 or RT-3).

To verify that the level transducer and transmitter are functioning properly, compare the measured level value to the observed level within the sump. If there is a variation of six inches between the values, calibration may be required. Specific calibration procedures are described in the manufacturers' literature contained within the Stony Point GWTS *Control Systems Documentation Manual*; copies of this manual are maintained at the GWTS trailer and at the HAI and operating contractor's offices.

2.1.2 SUBMERSIBLE PUMPS AND PIPING

Each ground water recovery trench contains two sump pumps located within the precast concrete trench sump. The sump pumps transfer water from the sumps to the GWTS trailer. The sump pumps are activated and deactivated as the water level within the sumps reaches preset high and low points, respectively.

In automatic mode, the sump pumps operate on an alternating sequence. If the level in the recovery sump reaches the designated low set point (de-watered condition), the associated current sensor for the recovery sump pump will deactivate the operating pump. When the sump recovers to the high set point, the alternate pump will activate until the sump level drops to the low set point again, unless a full-capacity condition

exists within the GWTS (specifically, the high level alarm is triggered in settling tank T-101). In manual mode, either pump may be started and stopped independently of the other.

Piping inside Recovery Sump 1 (RS-1, located within Recovery Trench 1) is 1½-inch diameter, schedule 40 PVC pipe. The sump pumps are connected to the piping via a clip-on design for ease of removal during servicing. Sump pumps are ½-horsepower Grundfos Rediflo-4 submersible pumps, which typically operate at a rate of 25 to 30 gallons per minute (gpm). Water from the sumps is pumped through a common effluent line to Valve Box 1 (VB-1). The effluent pipe running through from VB-1 is 1½-inch double-walled fiberglass piping. All piping external to the trenches (i.e., piping which connects VB-1 to the GWTS) is at least 42 inches below grade.

The pumps within Recovery Sumps 2 and 3 are Myers ME 150 series, and are mounted on a guide-rail/slide assembly with a pulley to assist in pump maintenance. Each pump set has dedicated effluent piping that runs through the respective valve boxes (VB-2 and VB-3). Each pump has a ½-horsepower rating and operates at rates between 15 and 20 gpm. Effluent piping which connects the pumps to the valve box is 2-inch diameter schedule 40, galvanized, threaded steel pipe. Valves and pressure gauges are located inside each of the valve boxes. The two pump lines from each sump are joined together with a tee, fitting into a single line inside the respective valve boxes. The effluent line from the valve boxes to the common tie-in box near Trench 1 is double walled epoxy piping. The effluent line from VB-3 is of similar construction and connects below grade prior to VB-2. From VB-2, a common line then connects with the Trench 1 effluent line at VB-1 (see Figure 1). All external piping in this configuration is at least 42 inches below grade.

Maintenance

The recovery sump pumps are monitored remotely through the computer automation system. This remote monitoring provides the status of the sump pumps (activated or deactivated) and the cumulative operating hours for each pump. The running time indicator, or hour meter, measures the time, in decimal hours, that each pump has operated. The pump running hours are totaled on the remote monitoring system and are used to balance the usage of the pumps and obtain maximum performance. The running hour totals can also be used to assess points at which service or maintenance

should be performed on the pumps. The automation software also alerts the operator of pump failure occurrences. If a pump fails, an alarm will appear on the alarm summary screen. The system automation will restart the pump automatically if the failure was a result of a temporary or minor condition. Repeated pump failure may indicate the need for additional maintenance or replacement by the authorized contractor.

In the event of a sump pump malfunction, the alternate pump in that sump would run repeatedly whenever the sump pumps were activated. The malfunctioning pump would be detected on the alarm screen of the computer automation system. Initially, the conditions of the pump can be assessed remotely by toggling the high and low levels within the sump, in an attempt to start the pump, after activating the alarm reset and acknowledging the alarms. If these attempts are unsuccessful in re-activating the pump, a site visit is required to inspect the pump for debris, clogging, or other evidence of disrepair.

Appropriate electrical lock-out/tag-out procedures must be followed during these inspections. If the cause of the malfunction is not readily apparent upon visual inspection (e.g., a broken pipe), the pump can be pulled from the sump for further inspection and/or repair. Follow the manual suspension procedures outlined under Section 2.4.1. The pump can be removed from the sump by pulling the vertical galvanized piping attached to the pump housing (for Recovery Sump 1), or by pulling up the chain and raising the pump on the rail system via the pulley (for Recovery Sumps 2 and 3).

If the pump inlet port is obstructed, the pump should be thoroughly cleaned with a brush and water. More extensive cleaning may require dismantling of the pump and soaking of the unit in a dilute (10%) acid bath. This would typically be conducted off-site by the operation contractor. After re-attaching the pump to the discharge pipe, remove electrical lock out tags, reset the breaker within the control panel, and toggle the mode selector switch on the control panel to the MANUAL setting (see Manual Controls, Section 2.4.1). The pump can be tested by activating the appropriate start switch and taking a manual flow reading on the in-line flow meter located adjacent to T-101. The pump would then be tested by measuring flow rate into the GWTS.

If the sump pump malfunction appears more complex, additional efforts may be necessary to troubleshoot and/or replace the pump, which may require contacting the authorized contractor for the facility. Subcontractor pump repair should typically be scheduled within 24 hours of the malfunction. The nature and location of a suspected piping problem should be conveyed to the authorized plumbing contractor to permit proper mobilization and acquisition of materials. Subsequent to the repair, the observed pump flow rate should be compared to the manufacturers' operating pump curve (within the GWTS *Control Systems Documentation Manual*) for proper flow to the GWTS. At a minimum, the flow rates of the pumps are compared to the manufacturers' operating pump curve on a semi-annual basis.

The sump pumps manufacturers' literature is presented within the GWTS *Control Systems Documentation Manual*; copies of this manual are maintained at the GWTS trailer and at the offices of HAI and the operating contractor. One Grundfos and one Myers pump are maintained in inventory at the operating contractor's office, as back-up sump pumps.

2.2 GWTS TRAILER COMPONENTS

The GWTS trailer houses the water treatment components. The water treatment system consists of two filtration systems, one settling and one flow-equalization storage tank, an air stripper system, liquid- and vapor-phase carbon adsorption systems, and Ion Exchange units. The following subsections describe the operation of each component and required maintenance.

2.2.1 SETTLING AND EQUALIZATION TANKS

Tank T-101 is a 500-gallon coal tar epoxy-lined steel settling tank located in the north end of the GWTS trailer (Figure 2). Liquid level in the tank is monitored by a Magnetek 7025 continuous level transmitter, coupled to a Magnetek 7030 transducer. The flow into T-101 can be monitored remotely using the computer automation system, or on-site within the GWTS trailer via an in-line flow meter. The settling time for the tank is preset, and is designed to allow suspended solids to settle out of the influent water. If a longer or shorter settling time is required, based on observed solids loading of the

influent, this parameter can be adjusted by clicking on the appropriate graphics within the "Inflow" screen of the GWTS remote monitoring software. Water is pumped from T-101 by Transfer Pump P-101 when the water level reaches a preset high point and the settling time has elapsed.

Solids that accumulate in the bottom of tank T-101 should be flushed to a container for disposal. If a floating emulsion or product layer is observed within the tank, the floating layer should be decanted and drummed for off-site disposal. These tasks are described in the "Maintenance" portion of this section.

Tank T-105 is a 500-gallon coal tar epoxy-lined steel equalization tank located in the southern portion of the trailer (Figure 2). T-105 receives water from the liquid-phase carbon adsorption units and functions as a flow equalization tank prior to the Ion Exchange units. Liquid level in the tank is monitored by a Magnetek 7025 transmitter, coupled to a Magnetek 7030 transducer unit. Level information relayed by the transmitter to the GWTS software triggers pumping of water from the tank through P-105 to the Ion Exchange units when water reaches a preset high level, and deactivation of P-105 when the level decreases to a preset low point.

In addition, a separate "high-high" alarm point is designated for both tank T-101 and T-105. When this level is reached, the recovery sump and/or transfer pumps are deactivated in order to prevent tank overflow. If the level within a tank reaches the high-high alarm point, the alarm is also logged on the computer automation system alarm screen to alert the system operator. If the level within the tank falls below the designated high-high level, the alarm automatically clears, allowing the GWTS system to continue running.

Maintenance

The settling and flow equalization tanks are visually inspected for sediment build-up, scaling, and presence of a floating layer during weekly site visits. The inspection of the tanks includes observation around the exterior of the tanks for leakage. The interiors of the tanks are inspected by opening the top access doors. Flow into the tank is also visually monitored to assess problems with flow or piping.

Cleaning of either tank is scheduled upon evidence of appreciable sediment or scale build-up, and at a minimum is performed semi-annually. Equipment and procedures utilized to perform this task are described below.

EQUIPMENT: Bucket; safety glasses, waterproof gloves, and protective clothing; waterproof boots or waders; brushes (short- and long-handled); wet vacuum and extension cord; pressure washer; scraping tools; hand shovel; small ladder; long-handled decanting tool (scoop); source of clean water; drum for disposal of collected sediments.

1. Switch system operation into manual mode by turning the mode selector switch in the control room to the MANUAL position (see Section 2.4.1).
2. Don safety glasses, gloves, protective clothing, and waterproof boots or waders.
3. Inspect the surface of the water within the tank. If floating emulsion or a product layer are detected on the water, the layer should be removed from the surface with the decanting tool and collected in a bucket. The collected product should be segregated and stored in a separate drum pending possible analysis and coordination of off-site disposal.
4. Pump remaining water out of the tank by activating the manual starter switch for Transfer Pump P-101 (for Tank T-101) or P-105 (for Tank T-105), located on the front of the control panel in the GWTS trailer. Deactivate the respective pump once a minimal water level is observed in the tank.
5. Inspect the interior of the tank for sedimentation and/or scaling. If visible, clean accumulated sediments off of the tank interior with the long-handled scraper. Sediment observed within the inflow or out-flow tank piping should be removed with an appropriately sized brush. Collect clean water in a bucket, and rinse the scraped tank areas with water to remove any remaining residue.
6. A pressure washer is also used to clean sedimentation from the tank interior and remaining residue.
7. Clean visible sedimentation and/or scale from interior tank surfaces with an appropriately sized (long-handled) scraping tool. Inflow or outflow piping with visible sediment should be cleaned with an appropriately sized brush. Transfer resulting sludge to a bucket using a hand shovel. Collected residue should be stored in a drum pending off-site disposal. Rinse scraped areas with clean water to remove any remaining surface residue.

8. Collect liquid residue on the tank bottom from cleaning and rinsing activities with a wet vacuum, using the extension attachment. The collected liquids should be transferred to a storage drum pending off-site disposal.
9. After final inspection of the tank interior, securely close the tank access doors.

Tanks should also be inspected for chips or cracks in the coal tar epoxy finish to ensure this material does not cause problems in the pumps or other GWTS components. If evidence of significant cracking or other features which may comprise the integrity of the tank is observed, repair or replacement efforts should be coordinated through HAI.

The level transmitters and transducers within the tanks are designed for maintenance-free operation. However, at a minimum, the transducers are removed from the tanks and cleaned with a solution of soap and water on an annual basis to ensure consistent operation. The equipment and procedures utilized to perform these tasks are described below.

EQUIPMENT: Bucket; clean rags or sponge; safety glasses, waterproof gloves, and protective clothing; surfactant solution (such as Alconox®); drum for disposal of wash and rinse waters; de-ionized water; small brush or fine emery cloth/sandpaper; small ladder.

1. Suspend system operation by manually turning the mode selector switch in the control room to the OFF position (see Section 2.4.1).
2. Don safety glasses, gloves, and protective clothing.
3. Open the access doors to the tank whose transducer is to undergo maintenance, and place a small ladder on the edge of the tank where the transducer assembly is located. **WARNING: Use caution when climbing or standing on the ladder, and ensure that the ladder is firmly balanced on the trailer floor prior to use.**
4. Locate and unscrew the yellow electrical cable from the end of the Magnetek 7030 transducer within the tank. Inspect the cable connector and transducer jack for possible debris or corrosion; if corrosion is evident, gently clean the electrical contacts with a small brush or fine emery cloth.
5. Unscrew the locking ring which attaches the transducer to the mounting bracket within the tank. Carefully extract the transducer and magnetic float from the tank through the ring in mounting bracket.

6. Stand the transducer over a bucket on the trailer floor. Soak a clean rag or sponge in surfactant, and thoroughly wipe down the transducer rod to remove any accumulated debris. Rinse the rod with de-ionized water after completing the washing activities. Wash and rinse water collected in the bucket should be transferred to a storage drum pending coordination of off-site disposal.
7. Inspect the transducer rod and float for evidence of corrosion, pitting, or other structural problems. If these are observed, contact the operations manager in order to coordinate servicing or further maintenance of the unit through HAI.
8. Carefully place the transducer rod and magnetic float back into the tank through the ring in the mounting bracket, and re-tighten the transducer locking ring. Reposition the yellow electrical cable connector over the end of the transducer and tighten snugly.
9. Securely close the access doors to the tank.

To verify that the level transducer and transmitter are functioning properly, compare the measured level value to the observed level within the tank. If there is a variation of six inches between the values, calibration may be required. Specific calibration procedures are described in the manufacturers' literature contained within the GWTS *Control Systems Documentation Manual*; copies of this manual are maintained at the GWTS trailer and at the offices of HAI and operating contractor.

2.2.2 TRANSFER PUMPS

The liquid level in tanks T-101, T-103, and T-105 activate and deactivate system transfer pumps P-101, P-103, and P-105, respectively. The pumps are activated when the level of water reaches the high set point, and deactivate when the level falls below the low set point. The range for which the high and low set points can be adjusted in T-101 and T-105 is zero to 100%. The high and low set point in T-103 is predetermined by the Carbtrol L-21N liquid level switch located in T-103. Each of the transfer pumps is equipped with a protective current sensor switch (Coyote), to prevent damage to the pump from running dry or overheating due to a restriction.

The P-101 transfer pump is a Jacuzzi Series D centrifugal pump and is bolted to a stand at the base of T-101. The pump is a 1/3-horsepower TEFC motor suction pump designed to pump water from the settling tank T-101 to the air stripper system. The

associated piping and fittings are constructed of schedule 80 polypropylene, chemical resistant materials.

The P-103 air stripper sump pump is a MP, cast iron centrifugal pump with a ¾-horsepower motor. This pump is bolted to a schedule 80 PVC deck located between the air strippers and next to T-103. Water from the air strippers collects in T-103 and is pumped by P-103 through the particle filters and carbon adsorption units. The piping associated with the T-103 inlet and discharge ports is 1½-inch vinyl tubing.

The P-105 discharge pump is a Burkes 1/3-horsepower TEFC centrifugal pump bolted to the floor at the base of T-105. The pump is designed to draw water from T-105, pump it through the Ion Exchange columns, and ultimately to the treated water storage tanks (T-110 and T-111). The associated piping and fittings for P-105 are constructed of schedule 80 polypropylene, chemical resistant materials.

Maintenance

The three transfer pumps operate automatically and are monitored remotely through the computer automation software. During remote monitoring operations, the status of each pump (activated or deactivated) and the associated alarm record can be reviewed. In the event of a pump malfunction, the pump will automatically attempt to reset via the Coyote current sensor switch, and will continue to operate if the failure was the result of a temporary or minor condition. If the automatic attempts to restart the pump prove unsuccessful, the condition is logged on the alarm screen, and a site visit is required to inspect and assess the condition of the pump.

Inspection of the pump can be done during automatic system operation or by placing the system in manual mode and activating the appropriate pump switch (see Section 2.4.1). During the operation of the suspect pump, the pump should be inspected for visible signs of leakage, excessive vibration, and audible grinding or knocking. The operations manager should be contacted if removal and/or dismantling of the pump is assessed to be necessary based on the inspection; this work can be done by the (operating) contractor or by an authorized subcontractor. Prior to assessing a pump, the appropriate circuit breaker, which is labeled and located behind the GWTS trailer control panel, must be tripped, and appropriate lock-out/tag-out procedures must be implemented to prevent injury or pump damage.

In addition to the maintenance described above, Transfer Pump P-103 requires additional inspection and maintenance. The interior impeller housing of P-103 is visually inspected on a bi-monthly basis for solids/scale build-up, which precipitate as a result of the air stripping process. To inspect the pump, the appropriate circuit breaker is tripped in the control room and the impeller housing is removed by the following procedure:

1. Loosen the band hose clamps and disconnect vinyl tubing on the suction and discharge ports of the pump.
2. Remove the four nuts and washers on the backside of the impeller housing.
3. Carefully tap the impeller housing with a mallet until it loosens and can be pulled free by hand.
4. Note the condition of the gasket and replace with backup gasket if necessary.
5. If the impeller is heavily coated with white calcium buildup, an electrical contractor is needed to disconnect the pump for off-site cleaning. Off-site cleaning typically entails soaking of the impeller in a 10% acid bath solution by the operating contractor. A backup pump is installed as the P-103 replacement pump by the electrical contractor, and the cleaned pump is placed in inventory.
6. If no cleaning of P-103 is required, reinstall the impeller housing in the reverse order of instructions 1 through 3 above.

2.2.3 PARTICULATE FILTRATION

Particulate filters and associated filter housings are located at several points in the GWTS system (Figure 2). Two types of particulate filters are used in the system: fabric (bag) filters, and cartridge filters. Bag filters used are supplied by Absolute Filtration (Kendall Park, New Jersey; Model No. SP73210FC). These filters are designed to remove particulates down to a size of 10 microns. System cartridge filters are also supplied by Absolute Filtration (Model No. A164010), and are designed to remove solids down to a diameter of 10 microns with a removal efficiency of 99 percent.

The particulate filters used in the GWTS are grouped into two separate filtration systems: the influent filter system, located at the inflow point to the GWTS trailer, prior to the influent flow meter and T-101 settling tank; and the secondary filter system, located between the air stripper sump/pump (T-103 and P-103) and the carbon units.

The influent filter system consists of four bag filters (F-101 through F-104), which are oriented in two parallel sets connected in series. The influent filter system was installed in the GWTS after initial start-up operations due to an observed heavy solids load within T-101.

The secondary filtration system is comprised of a bag filter housing (F-108A) and a cartridge filter housing (F-108B) connected in series. The initial purpose of the cartridge filter was for removal of iron-forming solids. The bag filter unit was added to the system after initial start-up due to excessive solids loading. The observed solids were evaluated to be primarily calcium carbonate, which precipitates out of solution during the air stripping process.

Maintenance

Maintenance of the filter systems includes visual inspection during scheduled site visits, regular replacement of filters, and periodic (at a minimum, quarterly) cleaning of the filter housings. The filter replacement frequency is dependent on flow through the system and particle concentration in the influent. The need for replacement of the filters is assessed through daily remote monitoring. The criteria used to assess filter conditions and need for subsequent replacement are outlined below.

2.2.3.1 Influent Filter System (F-101 through F-104)

The need for replacement of the influent bag filters is assessed by monitoring flow rates via the influent flow meter, either remotely or on site. The minimum filter replacement frequency has been weekly. The following general criteria are used to assess influent filter performance:

INFLUENT FLOW RATE	ACTION TAKEN
10 to 25 gallons per minute (gpm)	Within optimum flow rate of system; filter replacement generally not needed. Continue monitoring.
Less than 10 gpm	Schedule site visit for filter inspection and replacement.

2.2.3.2 Secondary (Post-Air Stripper) Filtration System (F-108A and F-108B)

The flow rate across the secondary filter system is monitored remotely by timing the level change in T-105 (the flow equalization tank). The flow rate, in gallons per minute, is calculated by multiplying the percent level change observed in T-105 over 60 seconds by the capacity of the tank (500 gallons).

Example:

% Level Change in T-105 Over 60 Seconds:	| 59.7% - 56.1% | = 3.6% per minute
Flow Rate to T-105:	3.6% x 500 gallons = **18 gpm**

The flow rate is monitored daily; if it decreases below 20 gpm, a site visit to inspect and change out the filters is scheduled. The flow rates through either the influent or secondary filter systems should not be allowed to drop below 10 gpm for more than a 24-hour period.

Particulate filter replacement is completed by utilizing the equipment and procedures described below.

EQUIPMENT: Bucket; replacement filters; socket wrench set; safety glasses, waterproof gloves, and protective clothing; short drainage hose.

1. Suspend system operation by manually turning the mode selector switch in the control room to the OFF position (see Section 2.4.1).
2. Prepare the area surrounding the filter to be changed:
   - Position bucket to contain water.
   - Have replacement filter at hand.
   - Have necessary tools (socket wrench) for cover removal.
   - Don safety glasses, gloves, and protective clothing.

   WARNING: Do not service while the unit contains pressure. Do not at any time, remove or loosen filter housing clamp before draining the housing assembly. Failure to drain and vent the filter housing will result in pressurized liquid rapidly escaping when the clamp is loosened. Protect face and keep hands clear of vent cock while venting pressure.
3. Open top butterfly valve to vent unit. Listen for pressure drop.

4. Attach short hose to bottom valve cock and direct hose to bucket. Open bottom valve and allow vessel to drain.
5. Loosen and remove one bolt of the V-band clamp and remove clamp.
6. Using handles, turn the cover counter-clockwise to disengage the internal safety latch and remove cover.
7. Remove filter from housing, allowing entrapped water to drain back into the filter housing.
8. Inspect vessel housing interior, cover, O-ring, V-clamp, and bolts for wear, corrosion, or damage. Clean or replace as necessary. **WARNING: Operating the vessel with worn or damaged parts may result in further damage and/or serious injury.**
9. Install new filter. Particular attention should be given during installation to ensure the bag filters extend to the base of the housing and the cartridge filters are properly seated on the in guides.
10. To reposition the filter housing cover, align the outside locating lugs on the cover and body and rotate the cover clockwise onto the internal safety latch.
11. Realign the V-band clamp on the vessel and tighten the clamp bolts. Do not exceed 10.5 foot pounds of torque.
12. Leave the top vent valve of the filter housing open. **WARNING: Failure to leave the vent valve open when starting the system will allow air to become entrapped and compressed in upper portion of the vessel, resulting is possible damage and/or serious injury.**
13. Close the lower drain and detach the hose.
14. Residual filters and water should be placed in a drum, properly sealed and labeled for future off-site disposal
15. Repeat steps 3 through 14 for each filter vessel to be changed.
16. Restart the system turning the mode selector switch in the control room to the AUTOMATIC position.
17. Close the top vent valve after air is expelled from the vessel and water begins to bleed from the vent.
18. Inspect the vessel for leakage. If leaks are observed, suspend the system and repeat the above steps sequentially. **WARNING: Do not attempt to tighten the V-band clamp while the vessel is pressurized. Doing so could damage the clamp and rupture the vessel, resulting is serious injury and damage.**

2.2.4 AIR STRIPPER SYSTEM

A Carbtrol air stripper system is located opposite of the influent filter system (Figure 2). Major components of the air stripper system include two 250-gallon capacity multi-stage diffuser tanks located adjacent to T-101, two submersed air spargers within the diffuser tanks, a diffuser blower (B-106), a blower/heater (B-107), a sump tank (T-103), and a sump pump (P-103).

Water from the settling tank (T-101) is pumped via a transfer pump (P-101) to the two low profile, multi-stage diffuser air stripper tanks oriented in parallel (see Figure 2). Air is introduced into the diffuser tanks through submerged spargers via the diffuser blower (B-106). A secondary heater/blower (B-107) applies a negative pressure (vacuum) and a heat source to the vapor stream within the diffuser tanks. Air removed from the water within the diffuser tanks by blowers B-106 and B-107 is ducted to two vapor-phase carbon adsorption units identified jointly as D-107 (See Section 2.2.5 for further detail relative to the carbon adsorption units).

Blowers B-106 and B-107 are started automatically, via flow and pressure sensors associated with tanks T-101 and T-103, as water enters the diffuser tanks. When the water level drops below the preset low level point in T-103, the flow and pressure sensors signal the GWTS automation system to stop the blowers. Blowers B-106 and B-107 can be started or stopped manually, independent of the aforementioned flow and pressure sensors, by using the start and stop buttons located on the outer cover of the GWTS control panel (see Section 2.4.1). Manual operation of Blowers B-106 and B-107 is performed during troubleshooting and maintenance of the system in order to verify that these blowers are operational. It should be noted that when in manual mode, blower B-107 should be started prior to starting Blower B-106. If maintenance and/or repair of the blowers, is assessed to be necessary, qualified repair contractors should be contacted.

After flowing through the air stripper system, water accumulates in the air stripper sump tank (T-103). T-103 is a 100-gallon PVC tank, located between the two diffuser tanks. Tank T-103 is equipped with a level switch, which activates the air stripper transfer pump (P-103) upon achieving a preset water level (currently set at 80 percent of the

total capacity of T-103). T-103 is also equipped with a "high-high" level switch, which will deactivate Transfer Pump P-101 and prevent overfilling of the sump.

Alternate Operations

In an effort to reduce the precipitation of calcium carbonate from the water flow stream, a temporary modification of the air stripping operation is currently being implemented. This modification involves the recirculation of the air stripper exhaust vapor back into the diffuser tanks. The purpose of this modification is to lower the pH level of the air stripper environment through re-introduction of carbon dioxide, in order to enhance the solubility of calcium carbonate and to reduce the formation of precipitants and scale within the diffuser tanks.

Maintenance

The diffusers are visually inspected for build-up of solids on a monthly basis. This is accomplished by removing the diffuser tank covers (secured by wing nuts) and inspecting the interior of the tanks for scaling or buildup of solids. The diffusers are also monitored weekly for solids build-up via air pressure gauges associated with Blower B-106, Blower/Heater B-107, and a differential pressure gauge between the blowers. If these gauges indicate increased or decreased differential pressure readings and an associated air pressure imbalance, an alarm will be logged on the computer automated alarm screen (Section 2.4), and system operations will automatically suspend. Shutdown of the blowers would be detected by the system operator during remote monitoring (see Sections 2.4 and 5.0 for further detail relative to remote monitoring); and a system inspection would be conducted to assess the cause of the automatic suspension of the system. An inspection for solids buildup would be conducted as described above.

If cleaning of the air stripper tanks and diffusers is required, the solids/scaling is scraped from the sidewalls and base of the diffuser tanks, and removed via a portable wet/dry vacuum located in the GWTS trailer. The residuals are subsequently drummed and temporarily stored for subsequent off-site disposal. Similar equipment and procedures are utilized for this cleaning as those described for cleaning of tanks T-101 and T-105, described in Section 2.2.1.

The air stripper sump (T-103) is cleaned bi-weekly, in a manner similar to the cleaning of the air stripper. Solids build up in this ***sump more frequently*** than in the diffusers, and thus T-103 requires a more frequent cleaning schedule. The level switch in T-103 is relatively maintenance-free, and generally would be replaced and/or checked electrically only as required, based on observations during remote monitoring (Section 2.4) or if site inspections indicate that the switch is malfunctioning (e.g., visual observations of liquid levels in the tank differ from levels indicated by the switch, or transfer pump P-103 is not activated upon reaching its preset high water level).

The air stripper diffuser pipes should be inspected monthly and, as necessary, removed and cleaned. Cleaning of the diffuser pipes should, at a minimum, be completed semi-annually, or if monthly inspection and/or remote monitoring ***indicate solids buildup (as indicated by low or high pressure alarms for the blowers).*** The air diffuser pipes are threaded for easy removal and cleaning, which is implemented in the following manner:

Drain the diffuser tanks through the bottom drain using containers in the GWTS trailer, and transfer drained water back to the settling tank (T-101). Soak the diffuser pipes in a dilute (10%) hydrochloric acid solution and scrape with a wire brush to alleviate any restriction in the diffuser holes that could cause pressure build up.

Maintenance and service frequency relative to Blower B-106 and Blower/Heater B-107 is dependent on the severity of the application as defined by the manufacturers' literature, which is presented in the GWTS *Control Systems Documentation Manual.* Generally, the blower fans should be inspected semi-annually. The blower components requiring service are generally the moving parts, which include bearings, fan wheel, belts, sheaves, and motor. Due to the sophistication of the blower parts, maintenance is conducted by the qualified repair and maintenance contractor.

2.2.5 CARBON ADSORPTION

2.2.5.1 Liquid Phase Units

Subsequent to air stripper treatment and filtration, water is pumped by P-103 through four liquid-phase, activated carbon adsorption units, located after the air stripper system (Figure 2), to remove residual organics. The carbon units consist of four Carbtrol L-1 drums oriented in two parallel sets in series. Each drum contains 200 pounds of activated carbon, and is rated for a maximum influent rate of 20 gpm. Influent pressure gauges are installed on the units to monitor sediment loading into the carbon units (see "Maintenance" below).

Maintenance

Liquid-phase carbon units are monitored for solids accumulation. Optimum operating pressure is 10 pounds per square inch (psi) or less. When a pressure greater than 10 psi is noted on the gauges installed on the units, the liquid-phase carbon units are replaced, as pressures greater than 10 psi indicates that the carbon is restricted, possibly do to solids loading. Additionally, liquid phase-carbon units should be replaced when effluent sampling indicates increasing concentrations of tested compounds (see Section 3.1 for further detail relative to effluent sampling). At a minimum, liquid-phase carbon units are replaced semi-annually. Spent liquid-phase carbon units are changed using the following procedure:

1. Disconnect the influent and effluent valves located on the top of the two primary carbon drums to be replaced. These valves are attached to 1¼-inch vinyl tubing via barbed attachments.
2. Drain each unit by connecting hosing to the ¾-inch drain bung on the lower side of each canister. The water from each unit should be transferred to the settling tank (T-101) via containers located in the GWTS trailer.
3. Off-load each spent drum using the winch mounted to the trailer deck next to the double doors of the trailer, and place adjacent to the GWTS trailer in the drum storage area for later disposal. **WARNING: Use extreme caution in maneuvering the drums, and avoid having personnel stand below the drum being maneuvered.**

4. Reposition the secondary drums in the primary drum locations and reconnect the influent and effluent valves to the proper ports on the tops of the drums.
5. Lift the two new carbon drums into the trailer using the deck mounted winch. Note **WARNING** in Item 3.
6. Degas each new unit by filling each with water through the effluent outlet, waiting for 24 hours for residual gas left in the new canister to dissipate, and returning to top off water in the unit.
7. Replace inlet and outlet fittings and reconnect each new unit to the influent and effluent lines located on the top of each drum.

Vinyl tubing associated with the influent and effluent valves should be replaced when degraded or cracked (as discussed further in Section 2.5).

2.2.5.2 Vapor Phase Units

As stated in Section 2.2.4, exhaust gases from the air stripper system are ducted to two Carbtrol G-3 vapor-phase units. These units are located adjacent to the liquid-phase carbon units (Figure 2). The two vapor-phase units are in series, have a maximum rating of 500 cubic feet per minute (cfm), and each contain 140 pounds of activated carbon. As the gases pass through the canisters, the granulated activated carbon adsorbs the compounds of concern prior to discharge of the treated gases from the canister. After continued use, the carbon within the units becomes saturated and replacement is required (see "Maintenance" below).

Exhaust gases from the air stripper system are currently recirculated from the vapor-phase carbon units back to the air stripper system, in an effort to control the pH of the water within the air stripper system and reduce precipitating solids. This alternate configuration temporarily eliminates air emissions from the stripper process. The vapor phase units will be used in the standard system configuration following installation of a pH control mechanism within the air stripper system.

Maintenance

When the carbon bed within each vapor-phase unit becomes saturated, replacement of the drum is required. Collection and analysis of gases exiting the units was conducted in order to develop a baseline time frame for replacement of the vapor-phase carbon,

and to assess if the units were effectively removing compounds of concern (see Section 3.2 for further detail relative to sampling of the discharged gases). Currently, the replacement frequency for the vapor phase carbon units is semi-annually.

Vapor-phase carbon drum replacement follows the procedures outlined for liquid-phase carbon drum replacement, outlined in Section 2.2.5.1. It is recommended that a continuous air flow be maintained through the new canister for the first 24 hours following replacement, to avoid heat build-up caused by carbon adsorption.

2.2.6 ION EXCHANGE

The ion exchange component of the GWTS was designed for removal of dissolved metals during treatment processing of the recovered ground water. The system is manufactured by Serfilco, Ltd. and consists of two, 6.5 cubic feet (ft^3) columns (A-109A and A-109B) constructed of fiberglass reinforced plastic, fiberglass, and Chemical Poly Vinyl Chloride (CPVC) piping with one-inch National Pipe Thread (NPT) connections. The ion exchange resin within the columns is SIR-300 pH-adjusted, macroporous cation exchange resin. The ion exchange columns are arranged in series and are located adjacent to P-105 and the carbon adsorption units (Figure 2).

Water from the flow equalization tank (T-105) is pumped through the ion exchange units via transfer pump P-105 at a maximum rate of 25 gpm (2 gpm/ft^3 of resin). Operation of the ion exchange system is primarily monitored through the automation software. Flow through the units is monitored by checking flow rates from T-105 to one of the treated water storage tanks (T-110 or T-111). The conductivity of the water between the units is monitored via a Foxboro Electrodeless Conductivity Sensor (Model No. 871EC-SP0) and Transmitter (Model No. 870ITEC-FXFNZ-7). The meter can be read directly from the gauge, from the Multi-Point Display Station in the control room, or remotely on the automation outflow screen. The effectiveness of (heavy) metals removal is also monitored by tracking reported metals concentrations from the discharge monitoring program (Section 3.1).

Maintenance

Generally, the ion exchange columns require minimal regular maintenance due to their fiberglass- reinforced construction. Regular maintenance entails general inspection of the exterior fittings and columns for incidental leakage. Inspection of the column interiors and internal piping and connections is conducted during resin replacement. The ion exchange resin requires changing semi-annually (at a minimum), or when breakthrough of the primary (first) column is indicated. Breakthrough of the primary column is monitored through observed changes in conductivity levels and/or noted increases in metals concentrations in the discharge sampling results. Specific procedures for breakthrough monitoring are outlined below:

1. Immediately following resin replacement, measure the conductivity of the influent and effluent of the primary column. Generally, the influent water will have a conductivity; however, the effluent from the column will have a zero or marginal conductivity due to the cationic and anionic charge being removed from the ion exchange resin.
2. The primary column influent water conductivity is measured by a portable specific conductivity meter and recorded as *"Primary Column Influent Conductivity - New Resin"* on the Stony Point GWTS Field Activity Log (Attachment 2).
3. The effluent conductivity is metered by the continuous-reading specific conductivity meter installed between the primary and secondary ION EXCHANGE columns. This reading can be obtained from the LED display on the meter during on-site inspection or remotely monitored on the computer automation system, where it is displayed on the outflow screen. Operating personnel record conductivity during daily GWTS remote monitoring, which at a minimum, occurs twice per day, seven days a week. The effluent conductivity value is recorded on the Stony Point GWTS Remote Log (Attachment 2).
4. The initial influent and effluent conductivity readings are used as a baseline to ascertain potential exhaustion of the ion exchange resin in the primary unit. When the conductivity value between the primary and secondary units approaches one-half of the initial and current influent conductivity, the primary column resin may be exhausted. To assess breakthrough of the primary column ion exchange resin, a breakthrough water sample is collected from the petcock valve located between the columns and analyzed for effluent criteria metals. If metals are detected approaching the effluent criteria limitations (see NYSDEC discharge limitations), the

ion exchange resin in the primary column requires replacement. The effluent conductivity meter is currently inoperable due to mechanical failure and will be replaced upon acquisition of a suitable replacement.

Procedures to inspect the columns and replace ion exchange resin are as follows:

1. Suspend system operation by placing the control panel selector switch in the OFF mode (see Section 2.4.1).
2. Inspect the exteriors of the columns and hose fittings for cracks or physical damage. Record observations on the Daily Field Activity Log. If structural damage is noted, notify the operations manager of damaged parts or equipment immediately. Damaged parts will be replaced from the equipment inventory. The operations manager will immediately order new parts from Serfilco, Ltd. to replenish any part removed from inventory.
3. Open the cover of the column by unscrewing the top cap, which is attached to the internal effluent center tube. Setup the wet/dry vacuum. Vacuum ion exchange resin out of the column and store in a 17-H open-top drum for off-site disposal.
4. Rinse out the interior of the column and inspect the center tube and six screens at the bottom of the center tube. Replace worn or damaged parts from the equipment inventory.
5. Fill the column with new or regenerated resin as follows:
   - Place approximately one cubic foot of dry resin into a large funnel;
   - Place the funnel in the top opening of the column;
   - Add water to the resin to create a slurry which will drain into the column;
   - Repeat this process until approximately 6.5 ft^3 of resin is loaded into unit;
   - Re-screw the cap on the column; ensure that the effluent center tube is properly inserted in the cap and avoid cross threading of the plastic cap.
   - Position the newly replenished column in the secondary column position, and move the secondary column to the primary position.
6. Restart the system and observe flow through the ion exchange columns for leaks. If leaks are noted, suspend operation and correct the leak. Repeat process.
7. Record the initial baseline conductivity measurements as described in the breakthrough monitoring procedure outlined above.

2.2.7 CONTROL DEVICES

Control devices are installed in the GWTS to facilitate proper operation of the system. These include pressure gauges, various valves, and flow meters, as outlined in the following subsections. Operation and maintenance items are presented together under each device subsection.

2.2.7.1 Pressure Gauges

Four WIKA pressure gauges are installed throughout the GWTS to monitor pump performance and solids build-up. All gauges are suitable for corrosive environments compatible with 316 stainless steel wetted parts, dry and liquid-fillable cases, where vibration and/or pressure pulsation occurs in liquid or gas media which will not obstruct the pressure system.

Liquid-fillable pressure gauges are installed on the discharge pipe of P-101 and P-105. All liquid gauges are manually read in pounds per square inch (psi), and should be monitored on a regular basis to evaluate the performance of the system components according to the manufacturers' specifications. The gauges are associated with P-101, the primary liquid-phase carbon drums, and P-105. Gaseous fillable pressure gauges are installed on the discharge end of the blowers and are read as "inches of H_2O", while the primary liquid-phase carbon filter gauges are read in psi. These gas gauges are installed to monitor the performance of the blowers and carbon filters and should be checked during site visits to ensure the units are working according to the manufacturers' literature.

If a pressure gauge requires repair or replacement (e.g., broken cover glass), refer to the automation and maintenance manual supplied by Panelmatic Systems, Inc. (PSI) to contact the manufacturer. All gauges are threaded and can be replaced by unscrewing, and then manually screwing in a replacement gauge.

2.2.7.2 Valves and Pipe Fittings

Several types of valves are incorporated into the GWTS to control and/or divert the flow of water. The types and functions of the valves are described below:

A. **Gate Valves**

A 2-inch manually operated gate valve, specified as corrosion-resistant type 1, grade 1, non-rising stem, PVC body, and containing a PP cylindrical plug and EPDM seals, is installed in the piping manifold prior to the air stripper system. The purpose of this valve is to stop flow from P-101 to the air stripper if the need arises (i.e., maintenance). A cast iron, 4-inch manually operated gate valve is also installed on the discharge pipe to regulate flow from the treated water storage tanks to Cedar Brook Pond.

B. **Ball Valves**

Schedule 80 black polypropylene Chemtrol pressure-fitted, manually operated ball valves are installed in the piping of the GWTS to regulate flow. The valves are installed to provide shut-off at various points throughout the system, to stop or divert the flow of water on an as needed basis, including: influent connections to T-101 and T-105; T-101 and T-105 sampling ports; T-101 re-circulation system; between T-103 and P-103; between T-105 and P-105; T-105 re-circulation system; between P-105 and the ion exchange columns; and between the ion exchange columns and the treated water storage tanks.

C. **Check Valves**

Schedule 80 black polypropylene Chemtrol pressure fitted check valves are installed at various strategic locations in the GWTS piping. The check valves are installed to relieve back pressure on pumps, keeping the piping primed and maintaining the flow of water in one direction.

D. **Unions**

All piping associated with the GWTS has unions installed (schedule 80 polypropylene or galvanized where applicable) to facilitate dismantling of the piping. The unions can be unscrewed and the section of pipe removed for repair, cleaning, or replacement.

E. **Automated Valves (FV-110A, FV-110B, FV-111A, FV-111B)**

The GWTS is equipped with four (4) electrically operated valves. Located influent to the treated water storage tanks T-110 and T-111, are valves FV-110A and FV-111A, respectively. These valves are F.S. Welsford 1½-inch electric on/off valves Model 44ISO46T-SE/SDX4B-5-115VAC. The valves consist of a FNPT 3-piece ball valve, steel body, and a Teflon seat, and are NEMA 4 120 VAC actuator-mounted, powered to open and close with battery back-up.

T-110 and T-111 are also equipped with discharge valves FV-110B and FV-111B, respectively. Each valve consists of one (1) 4-inch electrical on/off valve F.S. Welsford Model S15W-1122-O/MR4B-15-P1-115VAC. The valves consist of a water butterfly valve, steel body, and a Teflon sear, and are NEMA 4 120 VAC actuator-mounted, powered to open and close with battery back-up. The influent valves are operated automatically via the actuators and controlled by the level in the storage tanks. The discharge valves are operated automatically via actuators and are controlled through the remote monitoring software. If a valve fails, an alarm will be logged on the system summary screen, notifying the system operator, who will contact a qualified contractor to troubleshoot and/or repair the valve(s).

F. **Dual Display Monitoring Valve (FV-210)**

An Accutrak 1000 dual display monitoring valve is installed post P-105 and monitored remotely to indicate if water from T-105 is being pumped to the treated water storage tanks. The valve can also be checked manually to determine its position via the Westlock Beacon, a non-metallic valve performance monitor.

Generally, the GWTS valves and pipe fittings are maintenance-free. However, a particular valve or fitting may occasionally become obstructed due to accumulation of solids. Such restrictions can usually be detected through remote monitoring operations via reduced flow rates or pump overload. If such conditions are observed, a site visit is required to resolve the potential problem. If the cause is determined to be a pipe or fitting, the authorized plumbing contractor is contacted to make the necessary repairs.

Failure of an electronic or automatic valve would alert the system operator via an alarm on the automated system. The authorized automation or electrical contractor would be contacted to make the repair.

2.2.7.3 Flow Meters

There are three flow meters associated with the GWTS:

A. Influent Flow Meter

The inflow meter is a V-cone flow meter installed in-line prior to the water entering Settling Tank T-101, and is used to measure influent flow rate into the GWTS. The flow meter is monitored remotely via the computer automation system, which receives signals from the Mycro XTC model 340D Differential Pressure Transmitter-Controller connected to the flow meter. The meter can also be monitored manually on-site via the digital display readout on the Differential Pressure Transmitter-Controller. The in-line meter is installed with flange fittings, which can be removed to clean the flow meter as necessary.

B. Discharge Flow Meter

The discharge flow meter (FIT-212) is installed horizontally in the 4-inch PVC discharge pipe, downstream from the treated water storage tanks (T-110 & T-111) discharge valves. The meter is an Armor-Flo 3600 with signal output which can be monitored via the software program and viewed on the storage tank screen. A direct reading can be recorded by viewing the vane located behind a tempered glass window on the meter. The rate is calculated as a direct reading from the vein, multiplied by 10, equaling the rate in gpm through the meter. The meter is self-cleaning and should be serviced by the manufacturer or a qualified contractor as needed.

C. Emerson Model 1305 O-Ring Seal Flowmeter

This meter is installed in the piping manifold that precedes the air stripper system. The model 1305 O-ring Seal Flowmeter is a glass-tube, variable-area flowmeter providing local flow rate indication.

It is necessary to remove the flowmeter from the line for tube float cleaning on an as-needed basis. The tube and float may be cleaned with a soft absorbent swab. To disassemble the flowmeter proceed as follows:

1. Remove the front and rear window shields.
2. Remove four (4) screws connecting the bottom end fitting to the side plate.
3. Carefully pull the end fitting and tube away from the side plates and top fitting. Do not cock the tube when removing it from the top fitting.
4. Remove the float from the tube. Be careful not to drop the float or tube. If the float or tube is chipped or damaged, both accuracy and sensitivity will be affected.
5. Using a suitable solvent, carefully swab and flush the inside of the metering tube. Clean the floats and air dry all parts thoroughly. Re-assemble using reverse instructions.

2.2.7.4 Magnehelic Differential Pressure Gauge

The GWTS air stripper system is equipped with a Dwyer Series 2000 Magnehelic Differential Pressure Gauge. The Magnehelic is installed on the wall of GWTS above the air stripper units and is tied into the outlet air header of the strippers. This gauge senses either positive pressure or negative pressure, and differential pressure between B-106 (MSD Blower) and B-107 (Blower-Heater). The signal is transmitted from the Magnehelic to the Dwyer Pressure Switch. Re-calibration or repair should be conducted by manufacturer (see manufacturers' literature).

2.2.7.5 Integral Explosion-Proof Switch

As referenced above, a Dwyer Series 1950 Integral Explosion-Proof Pressure Switch is installed adjacent to the Magnehelic Differential Pressure Gauge. This pressure switch receives a signal from the Magnehelic and will shut down the air stripper blowers (B-106 and B-107) if a pressure imbalance ($< \pm 1.9$ inches of H_2O) is detected. To make an adjustment of the set points, remove the plastic cap and turn the slotted adjustment screw at the top of the housing clockwise to raise the set point pressure, and counter-clockwise to lower the set point. Subsequently, replace the plastic cap. The only maintenance required is to keep the switch reasonably clean; repairs should be conducted by the manufacturer.

2.3 TREATED WATER STORAGE TANKS

Treated water from the GWTS is piped into and stored in two 7,000-gallon tanks (T-110 and T-111), which are positioned on a concrete slab located adjacent to the west side of the GWTS trailer (Figure 2). The dimensions of each tank are 142 inches in diameter and 168 inches in height. The construction of the tanks is of high density polyethylene plastic. Each tank is fitted with an 18-inch manway in the domed top, 4-inch double flanged fittings for the inlet and outlet piping, and ¾-inch brass gate valve sampling ports. The tanks are heat traced and spray-covered with foam insulation, to prevent stored water from freezing during the winter season.

Water is pumped (via P-105) to the treated water storage tanks following the ion exchange units within the trailer. The water level in the tanks is monitored by Magnetek continuous level transmitters in each tank. The level of water is represented as a percent of total capacity within each tank. The transmitters monitor level through three control level points: Low (LO), High (HI), and High-High (HI-HI). The automation functions of each set point within the tanks are:

- LO Closes lower discharge valve; opens upper inlet valve, allowing tank to fill.
- HI Closes upper inlet valve; permits opening of lower discharge valve (via remote activation), allowing tank to discharge. Also opens upper inlet valve on second tank.
- HI-HI Triggers a High Point Alarm, automatically suspending system operations to prevent overflow.

Water is allowed to flow into one of the two tanks if the level is below the HI-level set point. Once level reaches the HI-level, the automatic inlet valve on the tank being filled closes and the alternate (empty) tank inlet valve opens. The full tank must be remotely discharged by the system operator via the computer automation system (Section 2.4). Once the tank level reaches the LO-level set point, the discharge valve automatically closes and this tank is ready to accept water once the alternate tank is full. The HI-HI level set point will detect level in the unlikely event that the HI-level point fails to stop flow to the tank. If level in the tank reaches the HI-HI set point, an alarm will be logged on the computer automation system alarm screen and the system operations will automatically be suspended to avoid overflow from the tank.

The treated water tanks are equipped with automatic inlet (FV-110A and FV-111A) and discharge (FV-110B and FV-111B) valves, which are interlocked to the tank level transmitters. The inlet valves will open and close automatically when prompted by level control in the tanks, as described above. The discharge valve must be remotely activated by the system operator. Additionally, the system is programmed to suspend operations in the event that the water level in both tanks reaches the designated HI-Level set points.

The volume of water discharged from the treated water storage tanks is totaled by an in-line flow meter (FV-210; Accutech Model 1000) located in the discharge line. The flow meter is described in detail in Section 2.2.7 (Control Devices).

Maintenance

Maintenance of the treated water storage tanks and their appurtenant equipment is generally limited to inspection for operation, leakage, or disrepair. The inspections and frequency are provided below:

Storage Tanks - On a monthly basis, cursory inspection of the exteriors of the tanks is conducted and any damage is reported to the operations manager for repair. Annually, prior to the winter months, the heat trace around the tanks is checked by a licensed electrician for proper operation. Faulty heat trace is repaired or replaced by the electrical contractor. Additionally, the foam insulation is inspected for weathering, such as cracking or splitting, gouging, or pitting. If insulation damage is noted, it is repaired by an insulation contractor.

The interior of the tanks is inspected annually for sedimentation build-up. The interior can be inspected by opening the 18-inch manway on the top of the tanks. If sedimentation or scaling is observed within the tanks, interior cleaning of the tanks is scheduled with a tank cleaning contractor.

Level Transmitters - The level transmitters are inspected annually in conjunction with the tank interior inspection described above. The manway at the top of the tank(s) is opened and the transmitter probe (transducer) which extends to the bottom of the tank(s) is visually inspected for deposit build-up. If the probe appears in good visual condition, the level transmitted to the computer automation system is compared to the

measured level in the tank to assess accuracy. If the probe requires cleaning or the accuracy of the transmitted level is inaccurate, a qualified repair contractor is contracted for cleaning and/or calibration.

Automatic Inlet and Outlet Valves - The automatic valves are maintenance-free, with exception to incidental repairs on an as-needed basis. Malfunctioning valves would be detected by the operations personnel through an alarm on the computer automation system and/or observed malfunction of a valve. Valve malfunctions are rectified immediately by contacting the GWTS automation contractor and/or a qualified repair contractor.

2.4 GWTS CONTROL AND AUTOMATION

The GWTS is capable of operating both manually and automatically. The Stony Point GWTS *Control Systems Documentation Manual*, developed by Panelmatic Systems, Inc., details the automatic and remote monitoring control system, and is kept on file within the GWTS trailer and at both the HAI and operating contractor offices. Operation and Maintenance items relative to the system automation and remote monitoring system are included in the GWTS *Control Systems Documentation Manual*

The base level of the system are manual functions, provided by switches, push-buttons, and pilot lights on the GWTS trailer control panel face. The second level comprises the automatic system function. A programmable sequence controller is used to handle the execution of sequential logic that starts and stops portions of the GWTS. In addition to automatic control, the second level also includes a remote monitoring system that allows the detailed monitoring and limited operation of the GWTS status from a remote location. From the remote location, one can connect to the GWTS trailer via a modem and a personal computer. The custom-designed graphic displays are descriptive of the ground water remediation process and include the indication of system status and alarm conditions.

2.4.1 MANUAL CONTROLS

The local operation of the GWTS is designed to permit on-site, process-specific, control of the GWTS during routine maintenance functions. The manual control switches are located on the main control panel face within the control room of the GWTS trailer. The layout of the control panel is illustrated in Figure 3.

To utilize manual operation of the system, toggle the mode selector switch (SS-676) to the MANUAL position. The red MANUAL MODE indicator light (XL-679) will illuminate, indicating that the automatic controller has been de-activated and the system may be controlled by the on-site operator. In this mode, the on-site operator may manually activate individual pumps and blowers to assess operation and performance of individual system components. The control panel houses a row of green-start and red-stop bottom switches for the individual trench sump pumps. In addition, each pump has a running time indicator, or hour meter, which measures the total operating hours for each pump. Each of these timers are located above its associated button switch and indicator light, and are used to balance the usage of the pumps to maximize usage and performance. The timers can also be used to assess service schedules for the pumps. A second row of switches is located below the pump switches, which includes the three transfer pumps within the GWTS trailer (T-101, T-103, and T-105), and the two air stripper blowers (B-106 and B-107). Activation of each component is indicated by a green operation light above its respective switch.

Upon completion of manual operations, the automation of the system is re-activated by toggling the mode selector switch to the AUTOMATIC position. The on-site operator should confirm that the green AUTO MODE indicator light (XL-466) illuminates and that the systems restarts automatically. If the system does not restart, evaluate the conditions of the system components for possible causes (i.e., low sump or tank levels) and correct. If the system cannot be restarted, contact the operations manager immediately and prior to departing the site.

2.4.2 AUTOMATIC CONTROLS

The automatic operation of the GWTS is designed to allow the system equipment to perform treatment functions in an unattended automatic fashion. The automatic mode

of operation is the normal mode of operation. Automatic control of the system equipment is done via the programmed logic functions of the Moore Products Series 324 Programmable Sequence Controller and the configuration of the Moore Products Mycro 383 Multi-Point Display Station. To select automatic mode, the selector switch (SS-676) must be in the "AUTO" position. The "AUTO" indicator light (XL-466) will be illuminated. This indicates the system has control of the starting and stopping of all system pumps. The start and stop push-button controls on the GWTS control panel will not function in the automatic mode.

Each specific pump and blower in the system operates when specific system conditions trigger the activation sequence. This begins with each recovery trench, where one pump within each sump will activate when the water level is above the low set point and/or the high is point is reached. When water reaches the upper (start) level in the settling tank (T-101), a timer is activated to allow settling time for solids (adjustable from zero to ten minutes). Upon expiration of the set time, the air stripper blower/heater (B-107) is activated. Upon running verification of B-107, the air stripper blower (B-106) is started. Upon running verification of B-106, the first transfer pump (P-101) is activated. This begins to pump water from the settling tank into the air strippers and subsequently into the T-103 sump.

Once the level of water in T-103 exceeds the control level switch point (LSL-206), the sump pump P-103 is activated, transferring water from the air stripper sump through four L-1 activated carbon drums and into the flow equalization tank (T-105). The transfer pump T-101 and the two blowers (B-106 and B-107) are stopped when the level of water in the T-101 equalization tank reaches the low level.

Once the level of water in T-105 reaches its designated high level and the treated water discharge valve (FV-210) is proven open, the third transfer pump (P-105) is started. Water is pumped from T-105, through the two ion exchange units and out to the treated water storage tanks. P-105 de-activates when the water within the tank hits the designated low-set point. The treatment sequence is repeated as the water levels within the sumps and T-101 dictate.

2.4.3 REMOTE MONITORING

The remote monitoring system is divided into a series of screens which guides the user and provides specific information relative to selected components of the GWTS. Remote monitoring screens include a Main Screen for modem hookup and telecommunications; three Recovery Sump Screens; an Inflow Screen; an Outflow Screen; a Storage Tank Screen; two System Summary Screens; and a Flow Totalization Screen. Additionally, an alarm screen can be accessed by clicking on the alarm graphic present on all screens.

System parameters (e.g., high water levels, valve status) can be reset for specific GWTS components by manipulating graphic symbols within the associated screens. The following subsections describe the function of each of the system screens.

2.4.3.1 General Screen Layout

Each of the GWTS remote monitoring screens can be divided into four (4) sections, which include the following:

1. Screen title, date, time, and communication status of the system located at the top of each screen and, along the bottom of the screen, a standard set of function key definitions that correspond to the 10 numbered function keys located along the top of a standard personal computer keyboard.
2. Push-button graphic symbols located along the right side of the screen. Several of these graphic symbols correspond to other screens within the remote monitoring system and will transfer the user to the associated screen. Additionally, the **ALARM** button will transfer the user to the alarm list screen and the **HELP?** button will display the helpful information relative to the current screen. On the lower right-hand corner of each screen are two arrow buttons, which will shift the user to either the next or previous screen.
3. A display section located in the center area of each screen. This section includes graphics and text that are associated with the GWTS components. Data values and associated graphical representations of each GWTS component provide information relative to the status of that component. Green lights typically indicate that a pump or valve is on or open, and blue coloration indicates that a pipe has

water flowing through it. Other information provided by this section includes water levels within tanks and sumps, total hours of operation for pumps, flow rates, total flow information, and the system conditions (e.g., temperature, conductivity, etc.).

4. Alarm and Error indicator lights. These lights indicate when either an alarm or error has occurred. Errors are signaled by a red indicator and alarms are signaled by a flashing red indicator.

2.4.3.2 Main Screen

The Main Screen is the first screen that appears when the monitoring program is activated on the personal computer. This screen allows access to the GWTS via modem.

Three push-buttons identified as **DIAL, ENABLE**, and **HANG-UP** are located in the center section of the screen. A **CONNECTION STATUS** indicator is located in the lower right corner of the display section. When no connection has been made with the GWTS, two (2) asterisks (* *) will be indicated as the **CONNECTION STATUS**.

The following procedure should be used to access the GWTS from the Main Screen:

1. Click on the **DIAL** graphic. The modem will initiate a telephone call to the GWTS.
2. After a series of tones are emitted by both modems, click on the **ENABLE** button to complete the connection process.
3. After a short delay, the "CONNECTION STATUS" should indicate "CONNECTED".

If an "ERROR" message is displayed for the connection status, retry the procedures specified above after clicking on **HANG-UP**. If repeated attempts at connection with the GWTS are unsuccessful, an outside contractor familiar with the operation of the remote monitoring system should be contacted.

To disconnect from the system, click on the **HANG-UP** graphic located on the Main Screen. Please note that it is important that the **HANG-UP** procedure be completed.

2.4.3.3 Recovery Sump Screens

The Recovery Sump Screens provide graphical representations of the three recovery sumps (RS-1, RS-2 and RS-3) and the two pumps associated with each sump. The level indicators located in the center of each screen, and the digital displays on the top of the recovery sump, represent the level of the water in each recovery sump.

A running time indicator is associated with each of the recovery sump pumps. These indicators correlate with the hour meters found on the GWTS Trailer Control Panel.

The set-points for the upper (start) and lower (stop) points for each recovery sump pump are located at the bottom of each screen. These points activate or deactivate the sump pumps based on the water levels within the sumps. Arrow graphics marked **HI** and **LO**, which correspond to the upper (start) and lower (stop) points, are present adjacent to the graphic representation of each sump.

To change the upper (start) or lower (stop) points, complete the following procedure:

1. Position the mouse cursor over the set point value located at the bottom of the screen and click the right mouse button. A thin red line box should appear around the set point.
2. Click the R* key or the word "CHANGE" found in the menu line along the bottom section of the screen. A box will appear along the right side of the sump display.
3. Enter the new set point value by one of the following methods: typing the number on the keyboard; using the mouse to click on the appropriate button graphics; using the mouse to click the up or down arrow; or "dragging" the level bar to the desired position.

Once the new set-point value has been entered, the digital display will change to show the new value and the arrow graphic indicator will reposition.

2.4.3.4 Inflow Screen

The INFLOW screen includes a graphical representation of the Settling Tank (T-101), the air stripper system, and associated pumps and piping. Water flow into T-101 is graphically represented and a digital display indicates the level of water in T-101.

A settle timer is displayed above T-101. This timer regulates the flow of water from T-101 to the air stripper system. Once the level of water reaches the HI set-point, the settle timer starts. When the settle timer has reached a preset value, the water is transferred from T-103 to the air stripper system via transfer pump P-101.

A High-High level set point is used to prevent the overfilling of T-103. Achievement of this level in T-103 is indicated by flashing blue water in the tank. This condition will automatically cease following a decrease in the level of water in T-103 to a level below the High-High level. The Transfer Pump P-101 is inhibited when water in T-103 reaches the High-High level.

Like the RECOVERY SUMP screen, the color of each pump and the associated piping corresponds to the status of the pump. The pump will be red and the piping will be black when the pump is off. When the pump is running, the pump color will change to green and the piping color will turn to blue.

The set-points for the upper (start) and lower (stop) points, as well as the HI-HI (Alarm) point for Transfer Pump P-101 are located at the upper right-hand corner of the display section. Arrows marked **HH**, **HI**, and **LO**, are displayed to the side of T-101 and correspond to the numeric values entered for the set-points.

To change a set-point value, repeat the procedure specified above for the Recovery Sump Screen.

"INFLOW INFORMATION" is displayed in the center of the screen. This includes the current total of the volume of ground water that has been pumped into the GWTS and the current flow rate. The flow rate should be zero (0) if the recovery sump pumps are inactive (indicated by red coloration).

2.4.3.5 Outflow Screen

The OUTFLOW screen includes a graphical representation of the flow equalization storage tank (T-105) and the discharge pump, valve, and piping. The water level in T-105 is graphically represented and a digital display above T-105 also indicates the water level.

Located in the upper right-hand corner of the display section are the set-points for the upper (start) and lower (stop) points for the Discharge Pump P-105, as well as the Hi-Hi (Alarm) point. Once the level of water in T-105 reaches the preset HI set-point, discharge pump P-105 will start and will pump the water through the Ion Exchange units and into the Treated Water Storage Tanks (T-110 and T-111) until the preset LO set-point is reached. The HI-HI Alarm point represents the point at which the air stripper sump pump P-103 is automatically disabled to prevent overflow of T-105.

2.4.3.6 Storage Tank Screen

The STORAGE TANK screen includes a graphical representation of the treated water storage tanks, valving, and piping which are located outside of the trailer. Water is pumped from Tank T-105 through the Ion Exchange units and into either Tank T-110 or T-111. A digital display located above the tanks and the graphical representation, indicates the level of water.

As long as the water level in the clean water storage tanks has not reached the high level alarm point, water is pumped into the tanks. Water is discharged by clicking the black button next to the discharge valve to change the state (open or close) of the valve. By clicking on the black button, a pop-up window will appear to confirm that the valve should be opened. Once confirmed, the valve will open and will automatically close once the level in the tanks reached the low alarm point. The black button may be used to close the valve at any time while it is open.

The option exists to redirect the flow of water from the GWTS to an external "frac" tank or other means of water storage. This allows for the option to continue to process water while waiting for required testing results prior to discharge of the clean water storage tank(s). The "Select Flow To Frac Tank" button allows water to be discharged

from Tank T-105 without any level interlocks (i.e., the preset Hi alarm points for Tanks T-110 and T-111). To select this option, click on the "Select Flow To Frac Tank" button. A pop-up window will appear. When "ENABLED", the level interlocks on Tanks T-110 and T-111 are ignored. When "DISABLED", the operation of the GWTS will suspend when the HI alarm points for the treated water tanks are reached.

The graphical display depicts the tank levels through both a numeric readout and through a bar graph. Directly below the graphical display of the clean water storage tank(s) is the section for setting the upper and lower control and alarm points for the tanks(s). The arrows on the side of the tanks indicate approximately where the alarm and control points are set.

Once the new set-point value has been entered, the digital display will change to show the new value and reposition the arrow indicator.

The final indicator found on this screen is the Treated Water Storage Tank temperature indicator. A graphical representation of a thermometer appears along with a digital indicator showing the temperature of the Treated Water Storage Tank T-110. In the event the tank temperature falls below the low set-points, the system will stop all automatic processing to prevent any further damage due to freezing temperatures.

2.4.3.7 System Summary Screens

The system summary screens consist of two related screens designed to provide the status of the system at a glance. Since more information about the system exists that could be displayed on a single screen, two screens were developed. The first screen provides the status of the system at a glance. The second screen, reached by choosing the **ADJUST SET-PT** push-button on the right side of the SYSTEM SUMMARY screen, shows all of the control and alarm set points for the level, temperature, and flow rates.

The SYSTEM SUMMARY SCREEN is a key screen in the remote monitoring of the GWTS. Once an alarm occurs, all or part of the automatic operation of the system may be inhibited. The system will not automatically clear the alarm condition until the remote system clears the alarm. Alarms are reviewed by choosing the ALARM push-

button on the right side of any display. Once the alarms have been reviewed, they should be acknowledged using the **F5** key on the Alarm Screen. While this acknowledges the alarms, this step does not tell the GWTS to restart or attempt to retry the failed device. This is accomplished by choosing the ALARM RESET push-button found on the SYSTEM SUMMARY screen.

A. System Summary (Screen 1)

The SYSTEM SUMMARY screen provides the running status as well as the running time, in hours, of all of the pumps and blowers for the GWTS. In addition, the levels of the recovery sump, equalization tank, and treated water storage tank are shown. Inflow and outflow totals are also summarized here.

Information about the Uninterrupted Power Supply (UPS) is provided on this screen. The "STATUS" tells whether the UPS is ON, indicating that the system is running from the battery backup capabilities of the system, which last approximately 20 minutes. The "COUNT" shows the number of times the UPS system was ON since the last time the ALARM RESET button was pressed. This allows one to make an assessment of the power status, as well as the reliability of the system power.

As described above, the ALARM RESET push-button is found on this display. This push-button is used to signal the GWTS to attempt to restart after the alarm list has been reviewed, and an assessment has been made as to the severity of the alarms. This should be done to avoid any possibility of equipment damage or injury.

B. System Summary 2 (Set-point Adjust)

The SYSTEM SUMMARY 2 screen provides the ability to adjust all of the related set-points for the six (6) analog points. Set-points can be adjusted for the upper (start) and lower (stop) control points, as well as for the upper and lower alarm points. Since some of these values should not change over time, the ability to change all of the related set-points was not included on any other screen except this one.

Four temperature alarms exist. High and low temperature warning points exist, for which no action is taken, except to signal that the ambient temperature of the trailer has fallen into a range that could become undesirable. The other two alarms that

exist for ambient temperature are the high-high and low-low alarm points. When the temperature is above the high-high or falls below the low-low point, all system control is halted. This is done to prevent the pumps from trying to pump water that could be frozen, or equipment from operating in too hot of an environment. Either of these alarms may indicate a failure in the heating or cooling system of the GWTS trailer.

Flow rate alarms are defined to warn against abnormally high or low flow rates. These alarms are only enabled when the associated meter should have water flowing. These high and low flow rate alarms are only warnings and have no effect on the processing of water. An occurrence of a low flow rate warning could indicate a pump malfunction, a valve partially or completely closed, or that debris has accumulated and is restricting flow through the line.

2.4.3.8 Flow Totalization Screen

The final screen in the set of screens for the GWTS computer automation is the FLOW TOTALIZATION screen. This screen shows the complete information about the inflow and outflow totals for the GWTS.

The first indicator shows the number of gallons of ground water that have been pumped into the GWTS from the recovery sump. This is the same number that appears for the flow totals shown on other system screens, and has a limit of 9,999,999.9 gallons. Once this amount has been processed, the next indicator will increment and the flow totalization will reset at zero.

The second flow totalization box show the number of gallons of clean water that have been discharged by the GWTS. This is same number that appears for the flow totals show on other system screens, and has a limit of 9,999,999.9 gallons. Once this amount has been processed, the next indicator will increment and the flow totalization will reset at zero.

Thus, the system is currently configured to total the number of gallons of ground water processed through the GWTS trailer up to 9.9 million gallons. If run continuously at a

flow rate of 20 gallons per minute, the system would be capable of totaling flow for a period of 9.5 years.

2.5 ROUTINE MAINTENANCE (HOUSEKEEPING)

Routine maintenance is performed during all site inspections of the GWTS. Several of these tasks are inclusive of several system components. Routine maintenance tasks include the following items:

2.5.1 HOUSEKEEPING

Routine cleaning and housekeeping tasks are performed during each site visit. These include inspection and inventory of site supplies, removal of solid waste, clearing of areas surrounding the system components in order to provide clear access and inspection, and cleaning exterior portions of system components.

2.5.2 PIPING INSPECTION

All aboveground piping is inspected during each site visit for evidence of deterioration (i.e., cracks, bends) or leakage that indicate replacement is necessary. In particular, inspection is performed on the 1¼-inch vinyl tubing associated with the influent and effluent valves for the liquid phase carbon adsorption units and the ION EXCHANGE units. If evidence of deterioration is noted, replacement of piping (vinyl tubing) is performed or outside contractors are contacted for necessary hard pipe repairs.

2.5.3 LEAK INSPECTION

All system components, with the exception of underground piping, are inspected for leakage during each site visit. This inspection is inclusive of piping, storage tanks, and treatment components. If evidence of leakage is noted, the operation of the GWTS is suspended and necessary repairs are performed.

2.5.4 Drum Storage Area Inspection

A 55-gallon drum storage area is located to the east of the GWTS trailer immediately outside the double-doors of the trailer. Spent filters, carbon, ION EXCHANGE resin, untreated ground water, and other waste material associated with the GWTS are stored in these drums. During each site inspection, this area is inspected to ensure that drums are in good condition, the drum lids are secure, and that no leakage has occurred or is occurring.

Drums are removed from this area, as needed, by HAI for disposal. Typically, the number of drums stored in this area does not exceed five. Disposal is conducted by HAI in accordance with all applicable Federal and State regulations.

2.5.5 Security

Following each site inspection, the GWTS trailer is inspected to ensure that it is locked and secure. All loose equipment is put in the GWTS trailer prior to exiting the site. During site inspections that occur between 8 a.m. and 5 p.m., Monday through Friday, personnel should sign in at the adjacent INSL-X facility. The INSL-X building is located to the southwest of the GWTS trailer. Drive around to the left of the INSL-X building and enter the first door on the right.

2.6 Materials Storage and Disposal

The operation of the GWTS requires the use and on-site storage of dedicated and disposable tools and supplies. These materials, as well as back-up equipment, are inventoried by the operations contractor and are replenished on an as-needed basis. In addition, the operation of the GWTS generates non-hazardous byproducts as a result of particulate filtration, granular carbon adsorption, Ion Exchange metals removal, and general maintenance efforts. Given the limited space available within and around the GWTS trailer, proper segregation, packaging, and storage of both supply materials and residual wastes is vital. These materials and associated handling practices are outlined within the following subsections.

2.6.1 EQUIPMENT INVENTORY

Replacement equipment and materials are inventoried and maintained by the operating contractor. Specific or larger pieces of equipment are housed at the operating contractor offices. These items include the following:

EQUIPMENT TAG	DESCRIPTION	INVENTORIED QUANTITY
Pumps		
P-101	Jacuzzi Transfer Pump	1 pump
P-103	MP Transfer Pump	1 pump
P-105	Burjes Discharge Pump	1 pump
P-RS-1 and 2	Grundfos Redi-flo 4	1 pump
P-RW-1 through 4	Myers - ME Series	1 pump
Filter System		
Filter Housing	Shell Cover O-Rings	2 rings
Bag Filters	SP 73210FC (10 micron)	1 box of 50
Cartridge Filters	A1320-10 (10 micron)	1 box of 50
Air Stripper System		
Flex Bellows Hose	Air Duct Flex Hose	20 feet
Carbon Adsorption System		
Drum Lids	L-1 Drum Covers	2 covers
Plumbing	Miscellaneous Fittings/Valves	various quantity

Equipment used from inventory is logged by the operations personnel, who notify the operations manager with the equipment ID and part number. Replacement equipment is then ordered from the appropriate vendors. Replacement carbon and ion exchange resin can be ordered and delivered to the site typically within 24 hours. Control and automation equipment is ordered through the automation contractor, usually within a 24-hour period.

A supply of miscellaneous tools, materials, personal protective equipment (PPE), and disposable supplies is maintained at the GWTS. These materials include:

EQUIPMENT	DESCRIPTION	QUANTITY	STORAGE LOCATION
Tools	Miscellaneous Hand Tools	1 tool box	Top of 1st air stripper
	Wet Vac	1	Top of 2nd air stripper
	Drum Cart	1	Next to ION EXCHANGE units
	Disposable towels, trash bags	various	Top of 1st air stripper
Health & Safety PPE	Tyvek Suits	box of 25	Top of 1st air stripper
	Disposable Boots	5 pairs	Top of 1st air stripper
	Safety Glasses	5 pairs	Top of 1st air stripper
	Eye-Wash Stations	2	Wall mounted
Lab Sample Bottles	Discharge samples	various	Top of T-105
	Sample coolers	2	Top of T-105
	Air Sampling Canisters	4	Top of T-105
Vinyl Hose	1¼" carbon inlet/outlet hose	100 feet	Next to ION EXCHANGE units
	1" ION EXCHANGE column inlet/outlet hose	100 feet	Next to ION EXCHANGE units
Fittings	Miscellaneous	various	Truck bin under GWTS

2.6.2 RESIDUAL WASTES

GWTS waste residuals include filter elements, bottom solids from the settling and equalization tanks (T-101 and T-105), solids from air stripper clean-outs, exhausted granular carbon, and ion exchange resins. These system wastes are contained in 17-H, 55-gallon drums and temporarily stored in the drum storage area east of the GWTS trailer. The handling of the waste prior to drum storage is described in the respective section for the specific GWTS component.

Standard operating procedure in the drum storage area is not to exceed a maximum of 10 stored drums. When the drum storage area reaches the maximum storage capacity, arrangements are made between HAI and the authorized disposal contractor for off-site transport and disposal at an HAI-approved facility.

3.0 NYSDEC MONITORING CRITERIA

3.1 DISCHARGE MONITORING

Discharge samples from the treated water tanks are collected in accordance with the New York State Department of Environmental Conservation (NYSDEC) permit and associated effluent limitation and monitoring requirements. The discharge flow rate is monitored continuously by means of a flow meter located on the common discharge line after the treated water tanks. The discharge sample is collected as a grab sample from the sample port located at the base of each tank, utilizing the following procedures.

1. Confirm the water level in each treated water storage tank and select the tank to be sampled. The selected tank should be at least 90 percent of full capacity. Document the selected tank and its volume on the field log.
2. Compile sampling equipment from the GWTS trailer, including: iced sample shuttle, preserved sample bottles for discharge parameters, pH meter, latex gloves, and five-gallon bucket.
3. Proceed to the west side (opposite side from GWTS trailer) of the selected tank and remove the white PVC insulated cap from the sample port.
4. Place bucket under sample port. Purge approximately one gallon of water from port prior to sampling.
5. Collect grab sample from sample port, filling sample bottles in the following sequence:

Parameter	Container	Quantity	Preservative
BOD_5	Plastic Quart	1	Non-Preserved
VOC	40 ml Purge vials	3	HCl
BN	Amber Glass Quart	1	Non-Preserved
Metals	Plastic Pint	1	HNO_3
Cyanide	Plastic Quart	1	NaOH

6. Measure pH of the non-preserved sample and record the value on chain of custody and field log.
7. Record the time of sample collection on the chain of custody and field log. Complete sample information on labels and place samples in the iced sample shuttle for transport to the laboratory.

8. Replace the PVC insulated cap on the sample port. Place purged water in Settling Tank T-101, for reprocessing.

Discharge monitoring samples are submitted to the contract laboratory in an iced sample shuttle, under chain-of-custody documentation, to be analyzed for pH, 5-day Biological Oxygen Demand (BOD_5), volatile organics, semi-volatile organics, and metals. Quarterly sampling for selected compounds is also required. A sample Chain of Custody form and an Effluent Monitoring Report (EMR), which includes the parameters and discharge limits, is included in Attachment 2.

Upon completion and quality assurance review of each EMR, the report is reviewed and endorsed by the operations manager, who also checks if the discharge limitation criteria have been met. In the event of an exceedance of the criteria, the laboratory is contacted to confirm the reported results. If the results are confirmed, system operations are temporarily suspended and the HAI representative is contacted with the results and possible resolutions to correct the exceedance. The Effluent Monitoring Reports are completed monthly and are kept on file at the HAI and operating contractors' offices.

3.2 AIR MONITORING

The exhaust air from the air stripper system is sent through two vapor-phase carbon drums in series to remove volatile organic compounds (VOC) prior to final atmospheric discharge. In order to ensure that the carbon drums are effectively removing VOC from the effluent air, a breakthrough air monitoring program was included in the initial GWTS Start-Up Plan. The plan consisted of breakthrough air monitoring between the primary and secondary vapor-phase carbon drums to develop a baseline evaluation of the exhaustion rate of the primary carbon drum. However, due to intermittent start-up operations and modification to the exhaust emissions (i.e., air re-circulation), the air monitoring plan was replaced with a minimum semi-annual changing of the vapor-phase carbon units. The vapor-phase carbon is replaced more frequently if discharge sampling results indicate increased VOC levels.

Once the air stripper pH control system is installed, exhaust air will be discharged to the atmosphere. To monitor the effluent air from the vapor phase carbon drums,

breakthrough air monitoring will be implemented and the carbon changed as necessary. Breakthrough air monitoring is conducted as described below.

Air samples are collected between the two carbon drums utilizing Summa sampling canisters provided by Pace Environmental Laboratories. Sampling procedures are as follows:

1. Insert vacuum gauge and sampling port on the inlet fitting to the Summa canister.
2. Open inlet valve and confirm 30 inches of vacuum within the Summa canister.
3. If canister pressure is less than 30 lbs, **DO NOT USE CANISTER**. Use alternate canister or contact the operations manger.
4. Insert Teflon sample line in inlet valve fitting.
5. Insert sample line in breakthrough sample port located between the primary and secondary vapor phase carbon drums.
6. Open inlet port of the Summa canister and draw an air sample for a 30-minute period.
7. Concurrent with breakthrough air monitoring, sample the ambient air outside of the GWTS trailer, utilizing the methods described above, to measure background VOC concentrations.
8. Close the Summa canister inlet valve after the 30-minute period and remove the inlet Teflon tubing.
9. Cap the inlet port with the stainless steel threaded cap.
10. Prepare sample chain of custody documentation and ship samples for VOC analyses to laboratory.

3.3 GROUND WATER MONITORING

The static level of ground water in the specified on-site wells is monitored monthly. This information is used to generate ground water contour maps to evaluate the effectiveness of the hydraulic control of the target area.

4.0 MAINTENANCE SCHEDULE

Inspection and maintenance to the GWTS should be completed as outlined in the above sections. A summary of the inspection and maintenance tasks and schedule is presented Attachment 3.

5.0 DOCUMENTATION

Documentation relative to the operation and maintenance procedures for the GWTS is maintained to evaluate the effectiveness of the GWTS and to assist in troubleshooting and repair of the GWTS. Minimum documentation relative to the operation and maintenance of the GWTS includes the items listed below.

5.1 REMOTE MONITORING LOGS

As described in Section 2.4, remote monitoring of the system occurs a minimum of twice daily, seven days per week. As part of the remote monitoring program, personnel can monitor the status of the GWTS using a modem and a personal computer.

The monitoring program includes a review of system component conditions and alarm situations. Information obtained during remote monitoring includes: levels within recovery trenches and storage tanks; pump status (i.e., running, total hours in operation, flow rates); alarm conditions; temperature within the GWTS trailer; and inflow and outflow information. Information obtained during remote monitoring is used to evaluate system performance and troubleshooting. Additionally, preset functions (e.g., high and low tank alarm levels) and other system parameters can be reset and adjusted via the remote monitoring system.

All data obtained during remote monitoring are recorded on the system-specific Remote Monitoring Log. A sample Remote Monitoring Log is included within Attachment 2. It should be noted that the operations manager is notified, as necessary, of emergency conditions noted during remote monitoring of the GWTS so that outside contractors can be contacted for repairs, if necessary.

5.2 WEEKLY FIELD ACTIVITY LOGS

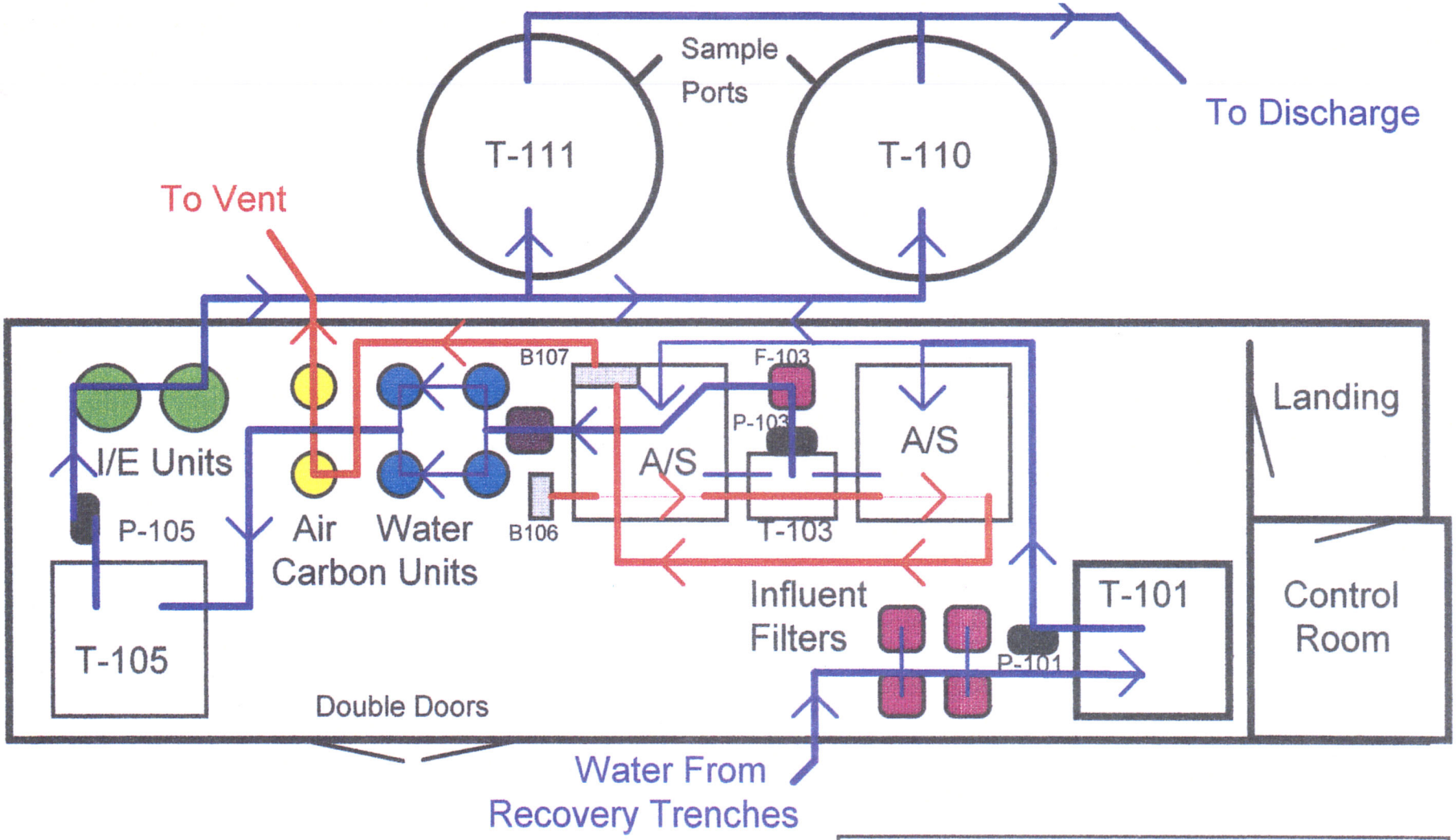
As part of each field inspection of the GWTS, Weekly Field Activity Logs are completed, which include all operation and maintenance activities completed during the inspection, the condition of the GWTS components, unusual conditions, and meter readings and measurements. This information is used in conjunction with remote

monitoring data to evaluate system conditions and maintenance requirements. For example, measurements obtained from the portable conductivity meter associated with the ION EXCHANGE columns are used with remote monitoring data to determine whether resin replacement is necessary. A sample Weekly Field Activity Log is included in Attachment 2.

5.3 MONTHLY MONITORING REPORTS

Monthly Monitoring Reports are prepared and submitted to HAI, which include an evaluation of GWTS performance over the previous month, GWTS conditions, and a summary of monthly operation and maintenance tasks. The Monthly Monitoring Reports summarize information included in the Remote Monitoring Logs and the Weekly Field Activity Logs. A sample Monthly Monitoring Report is included in Attachment 2.

FIGURES



LEGEND:

- Bag Filter
- Cartridge Filter
- Vapor Carbon Filter
- Liquid Carbon Filter
- Ion Exchange (I/E) Unit
- Pump
- Blower
- A/S Air Stripper
- Water Stream
- Air Stream
- Tank (T-101/T-105)
- Tank (T-110/T-111)

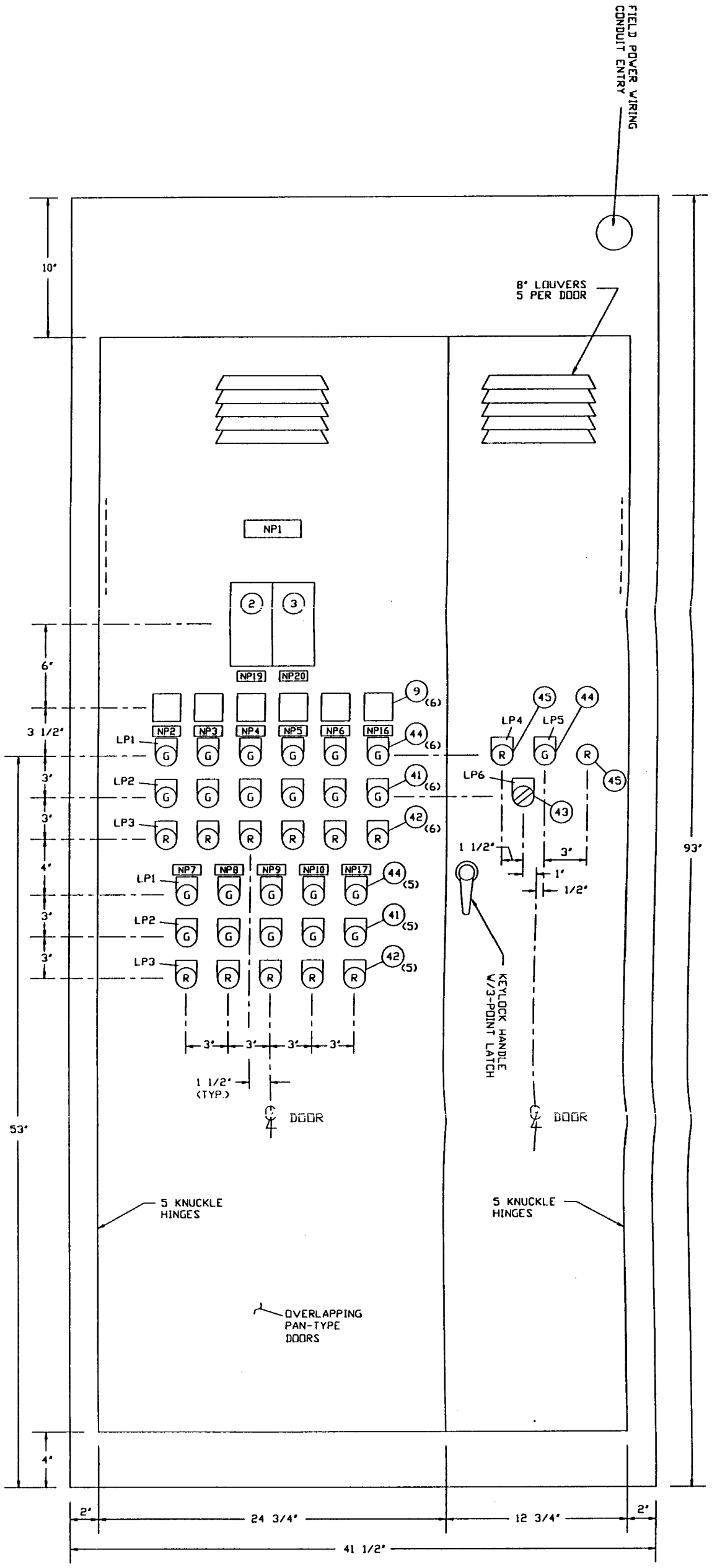
ECM

349 Route 206 • South Somerville, NJ • 08876 • 908-874-0990

FIGURE 2
GENERALIZED SCHEMATIC OF
GROUND WATER TREATMENT SYSTEM
HÜLS AMERICA INC.
STONY POINT, NEW YORK

NAMEPLATE SCHEDULE		
ITEM	LETTER SIZE	DESCRIPTION
NP1	1/4"	GROUND WATER REMEDIATION SYSTEM CONTROL PANEL CP-GWRS
NP2	5/32"	RECOVERY WELL PUMP #1
NP3		RECOVERY WELL PUMP #2
NP4		RECOVERY WELL PUMP #3
NP5		RECOVERY WELL PUMP #4
NP6		RECOVERY WELL SUMP PUMP #1
NP7		TRANSFER PUMP
NP8		AIR STRIPPER SUMP PUMP
NP9		DISCHARGE PUMP
NP10		AIR STRIPPER BLOWER
NP14		ERROR/ALARM
NP16		RECOVERY WELL SUMP PUMP #2
NP17		AIR STRIPPER BLOWER HEATER
NP18		MODE SELECTOR SWITCH
NP19		INDEPENDENT COMPUTER INTERFACE
NP20		MULTI-POINT DISPLAY STATION

LEGEND PLATE SCHEDULE		
ITEM	LETTER SIZE	DESCRIPTION
LP1	1/8"	RUNNING
LP2		START
LP3		STOP
LP4		MANUAL
LP5		AUTOMATIC
LP6		MANUAL AUTOMATIC



HULS AMERICA INC.
P.O. No. 002-016-012

PANELMATIC, INC.
YOUNGSTOWN, OHIO

GROUND WATER RECOVERY & TREATMENT
CONTROL PANEL
ARRANGEMENT

NO.	DATE	REVISION	BY	APP'D
1	10/15/92	AS BUILT	RJP	

DRAWN PR DATE 4-22-92
CHK'D DATE
APP'D DATE
SCALE 1/4"=1'
DRAWING NO. SP-590-D6

ATTACHMENTS

ATTACHMENT 1

CONTACT SUMMARY INFORMATION

ATTACHMENT 1
CONTACT SUMMARY INFORMATION

Category	Company Name	Address	Contact	Telephone
Owners				
GWTS	Hüls America Inc. (HAI)	2 Turner Place P.O. Box 365 Piscataway, NJ 08855-0365	Mr. John Wnek Mr. Andrew Kruczek	(908) 981-5042 (908) 981-5453
Property	INSL-X	50 Halt Drive P.O. Box 694 Stony Point, NY 10980	Mr. Bill Bicknell	(914) 786-5000
Contractors				
Operations	Environmental Compliance Monitoring, Inc. (ECM)	349 Route 206; Hillsborough Professional Building South Somerville, NJ 08876	Mr. Bruce Manganiello	(908) 874-0990
Alternate	Dixon Environmental Associates, Inc. (DEA)	722 East Lincoln Highway Whiteland Business Park Exton, PA 19341	Mr. Michael Dixon	(610) 524-9797
Engineering	HAI	See GWTS Owner		
Automation	Panelmatic Systems, Inc.	141 Southpointe Drive Bridgeville, PA 15017-1235	Mr. Scott Cloherty	(412) 257-2330
Mechanical	Burde, Inc.	P.O. Box 247 Paramus, NJ 07653	Mr. Greg Burde	(201) 664-0400
	Marshall Industrial Technologies (Marshall)	529 South Clinton Avenue Trenton, NJ 08611	Terry Moonlight	(888) 806-4400
Plumbing	Burde	See Mechanical Contractors		
	Marshall	See Mechanical Contractors		
Electrical	Burde	See Mechanical Contractors		
	Marshall	See Mechanical Contractors		
Disposal	Disposal Consultant Services, Inc. (DCS)	7 Ilene Court, Suite 5 Belle Mead, NJ 08502	Mr. Stephen Gephart	(908) 874-7888
Disposal Facility	Michigan Disposal, Inc.	49350 North I-94 Service Drive Belleville, MI 48111		(313) 669-1700
	DuPont Treatment Facility	Chamber Works Plant Route 130 Deepwater, NJ 08023		(609) 299-5000
Laboratories				
Discharge Monitoring	Envirotech Research, Inc.	777 New Durham Road Edison, NJ 08817	Mr. Rob McGrady	(908) 549-3000
Air Analyses	Air Toxics	180 Blue Ravine Road Suite B Folsom, CA 95630		(916) 985-1000
BOD Analyses	Industrial Corrosion Management, Inc. (ICM)	1152 Route 10 Randolph, NJ 07869	Ms. Bianca Buckwalter	(201) 584-0330
Vendors				
Micron Bag & Cartridge Filters	Absolute Filtration, Inc.	P.O. Box 5056 Kendall Park, NJ 08824	Mr. Buddy Atherton	(800) 989-5959
Carbon Canisters	Carbtrol	51 Riverside Avenue Westport, CT 06880	Mr. John MacKellar	(203) 226-5642
Pipe Jetting	National Water Main Cleaning, Inc.	875 No. Summer Avenue Newark, NJ 07104-3684		(201) 483-3200
Resin	Resin Tech, Inc.	615 Deer Road Cherry Hill, NJ 08034-1409	Mr. Larry Gottlieb	(609) 354-1152

ATTACHMENT 2

GWTS PROJECT FORMS

- Remote Monitoring Log
- Monthly Monitoring Report
- Weekly Field Activity Log

ECM

STONY POINT GWTS REMOTE LOG

LOG-ON DATE	/ /	/ /	/ /	/ /
LOG-ON TIME	am/pm	am/pm	am/pm	am/pm
OPERATOR				
LOCATION				
T-2 LEVEL	%	%	%	%
RW-P #1	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs
RW-P #2	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs
T-3 LEVEL	%	%	%	%
RW-P #3	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs
RW-P #4	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs
T-1 LEVEL (RS)	%	%	%	%
RS-P #1	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs
RS-P #2	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs	off / on ⇨ hrs
INFLOW TOTAL	gal	gal	gal	gal
INFLOW RATE	gpm	gpm	gpm	gpm
T-101 LEVEL	%	%	%	%
P-101	on / off	on / off	on / off	on / off
P-103	on / off	on / off	on / off	on / off
B-106	on / off	on / off	on / off	on / off
B-107	on / off	on / off	on / off	on / off
CONDUCTIVITY	µohms	µohms	µohms	µohms
T-105 LEVEL	%	%	%	%
P-105	on / off	on / off	on / off	on / off
Flow into T-105 *	gpm	gpm	gpm	gpm
TEMPERATURE	°F	°F	°F	°F
T-110 LEVEL	%	%	%	%
FV-110A	open / closed	open / closed	open / closed	open / closed
FV-110B	open / closed	open / closed	open / closed	open / closed
T-111 LEVEL	%	%	%	%
FV-111A	open / closed	open / closed	open / closed	open / closed
FV-111B	open / closed	open / closed	open / closed	open / closed
OUTFLOW TOTAL	gal	gal	gal	gal
OUTFLOW RATE	gpm	gpm	gpm	gpm
COMMENTS:				
LOG-OFF TIME	am/pm	am/pm	am/pm	am/pm

** To calculate flow rate into T-105: Confirm P-103 is on and P-105 is off; Record % change in T-105 level over 60 seconds; multiply by 5.*

ECM
environmental compliance monitoring, inc.

July 25, 1996

Mr. John Wnek, P.E.
Director, Environmental & Regulatory Affairs
Hüls America Inc.
2 Turner Place; P.O. Box 365
Piscataway, New Jersey 08855

RE: Ground Water Treatment System - Monthly Monitoring Report - June 1996
Hüls America Inc., Stony Point, New York Facility
Site No. 344023
ECM Project # 1059

Dear Mr. Wnek:

This letter serves as the Monthly Monitoring Report for the Ground Water Treatment System (GWTS) operations at the above referenced site. This document describes treatment system operations for the month of June 1996. A summary of system operations is provided below.

PERIOD OF OPERATION

The GWTS was operational throughout June 1996, with periodic down time for level transmitter repairs in the recovery sumps. On June 1, 1996, ECM noted erratic level transmission from Recovery Sump 1 (RS-1). Marshall Industrial Technologies (Marshall) was contacted to make necessary transmitter repairs. Marshall was on-site June 10, 1996, but was unsuccessful repairing the transmitter, indicating that the transmitter probe was malfunctioning. However, a recovery sump level reading above zero was noted on the computer. Therefore, recovery from Trench No. 1 resumed on June 10, 1996 without level transmission. Pumping from Trench 1 was continuous throughout June.

Trenches 2 and 3 were operable through June 13, 1996, with Trench 2 effectively dewatered during this period. Trench 3 dewatered to 50 percent on June 6, 1996, but recovered to 86% as a result of heavy rain on June 6 and 7. On June 13, 1996, the level transmitters in Recovery Sumps 2 and 3 malfunctioned and pumping from both trenches was suspended through the month during troubleshooting and repair.

PROCESS VOLUME

During June 1996, a total volume of 246,870 gallons of water was treated and discharged to Cedar Pond Brook. The water quality of the discharge volume was in compliance with NYSDEC discharge limitation criteria. The weekly Effluent Monitoring Reports for June 1996 are presented as Attachment 1. The total discharged volume from the onset of system operations through June 1996 is 1,095,638 gallons.

SYSTEM PERFORMANCE

System performance during June 1996 was generally compliant with design specifications. However, as previously noted, pumping was intermittent from all three trenches due to level transmitter malfunctions.

Noted performance items during the month of June 1996 include:

- RS-1 operation was suspended for approximately five days due to a level transmitter malfunction. Marshall attempted repair to the transmitter but was unsuccessful. However, on June 6, 1996, pumping from the Recovery Sump resumed as a result of a fixed reading on the transmitter. Trench 1 was dewatered and remained dewatered during 90 percent of the month. Therefore, water accumulated in site frac tanks was pumped into the recovery sump for treatment.

- Dewatering of Trench 2 was achieved for approximately one week in June 1996, until pumping was suspended as a result of transmitter malfunctions on June 13, 1996.

- Pumping from Trench 3 was continuous through June 13, until the level transmitter malfunctioned, suspending operation from the trench.

- Dewatering of Trenches 2 and 3 continues to progress at a slower rate relative to Trench 1.

- The air recirculation modification currently remains in use. However, accumulation of solids is still evident through observed build-up in the post air stripper filtration system, thus requiring a minimum of bi-weekly site visits for filter change-out. During the last week of June, filter change-out was required three times.

- Synoptic water level measurements were collected from selected area monitoring points on a bi-weekly basis during June 1996. The water level measurements are presented in Attachment 2.

- During June, effluent discharge monitoring was conducted on a weekly basis.

OPERATION AND MAINTENANCE (O&M)

O&M during June 1996, consisted of the following items:

- Filter inspection and changes at a frequency of approximately twice per week to maintain an adequate flow rate through the system. Recent operation has required more frequent visits as a result of a noticeable increase in solids in the air strippers.

- On June 18, 1996, ECM disassembled and cleaned P-103 with an acid wash to remove scaling; the pump was reinstalled.

ADDITIONAL SITE ACTIVITIES

- On June 10, 1996, Marshall assessed RS-1 level transmitter for erratic transmission. Marshall assessed that the probe requires replacement.

- On June 10, 1996, ECM noted a leak in the cover of the liquid phase carbon drum and the lid was replaced. ECM contacted Carbtrol to inquire as to the cause of the leak.

- On June 18 and 19, 1996, Marshall was on-site for troubleshooting and repair of the level transmitters for all three trenches. Marshall determined that the transducers in the system control room were short circuited and required replacement. Magnetek Inc., the transmitter manufacturer, delayed the transducer delivery due to production schedule, which delayed installation until July 1, 1996. Marshall indicated that the defective transmitters would be returned to Panelmatic so Panelmatic could assess if the units could be repaired.

- On June 19, 1996, Marshall raised electrical boxes for RS-3 above grade.

- Reconstruction, repair and assessment of catch basins was completed by Burde, Inc. during June 1996. ECM photo-documented the catch basin repairs nearing completion (Attachment 3).

- During the catch basin repairs, samples were collected on two occasions from the flowing water in the upper portion of the system. On June 12, a sample was collected from CB-1 for Volatile Organic Analysis (VOA) to characterize the consistent flow in the catch basin. On June 18, to further define conditions in the upper portion of the storm sewer system, a series of samples were collected as listed below:

Sample Location	Sample ID
Manhole upstream from CB-1	Manhole-1
Re-sample of CB-1	CB-1
Downstream from CB-1	CB-2

The samples were analyzed for VOA+15, and a summary the results are tabulated and presented in Attachment 4. Additionally, during excavation for catch basin repairs, two sewer lines were uncovered. One connected to the storm system which was ascertained to be a footing drain for the Insl-x tank farm; the second appeared to be an abandoned line from previous operations. ECM collected a water sample from the discharge from the footing drain and a soil sample from below the abandoned line. The samples were analyzed for VOA+15. The analytical results are tabulated and presented in Attachment 4.

- A drum was uncovered during catch basin repairs. HAI requested that ECM collect a sample of the drum contents for waste classification. The analytical results are presented in Attachment 4.

- During late June 1996, ECM initiated treatment of water contained in the Frac Tank adjacent to RS-1. Two other full frac tanks remain on-site. ECM will evacuate the tanks to the recovery sumps when the sumps are sufficiently dewatered.

PROJECTED ACTIVITIES

The projected activities for July 1996, include the following:

1. Continued operation and recovery from all three trenches with the frequency of ground water level monitoring reduced to monthly [ECM].

2. Change-out of system filters on a twice per week basis (dependent upon system flow rates).

3. Select and implement design modifications to reduce or eliminate continued precipitate conditions in the air strippers [HAI/ECM]. Recently, the frequency of site visits has increased for filter change-outs as a result of in-system precipitate accumulation.

4. New level probe ordered for replacement of malfunctioning level transmitter in RS-1 [Marshall]. July 1, 1996 Trenches 2 and 3 level transmitter replacement was completed.

5. Water seal and winterize valve box for Trench 3 and the Trench 1, 2, and 3 tie-in [IT].

6. Procure and construct storage shed [HAI/ECM].

7. Coordinate transport and disposal of staged drums containing granular carbon, spent filters and water/oil. Additionally, coordinate disposal of soils excavated from fuel oil spill, and buried drum uncovered during catch basin repair [ECM].

8. Contact Carbtrol and resolve the cause of corrosion holes in the carbon drum lids [ECM].

9. Continue to monitor GWTS pump performance [ECM].

10. Pumping and treatment of accumulated water contained in on-site Frac Tanks [ECM].

If you have any questions pertaining to this information, or to other matters, please do not hesitate to contact our office.

Sincerely,

ENVIRONMENTAL COMPLIANCE MONITORING, INC.

Bruce Manganiello
Project Manager

cc: P. Samulewicz, DEA
B. Griffith, HAI (w/o Attachment 4)
A. Kruczek, HAI (w/o Attachment 4)
M. Szewczyk, HAI (w/o Attachment 4)
ECM Project File #1059-C

Huls America Inc. - Stony Point, New York

Effluent Monitoring Report

Outfall-001; Treated Groundwater

Sample Date: 06/06/96 Time(s): 1:39 pm Tank T110 [ ] Tank T111 [X]

Samples Collected By: Bruce Manganiello Sample ID: _____

Effluent Parameter	Sample Result	Units	Discharge Limitations	Unit	Allowable Discharge
Flow	7000	gallon	N/A	gpd	YES/NO
pH (Range)	7.82	SU	6.0 - 9.0	SU	YES/NO
BOD, 5-day	< 2.0	mg/l	40	mg/l	YES/NO
1,1,1-Trichloroethane	< 0.2	ug/l	10	ug/l	YES/NO
1,1,2,2-Tetrachloroethane	< 0.3	ug/l	10	ug/l	YES/NO
1,4-Dioxane	6.5	ug/l	10	ug/l	YES/NO
Benzene	< 0.2	ug/l	10	ug/l	YES/NO
Chlorobenzene	< 0.1	ug/l	10	ug/l	YES/NO
Chloroethane	< 1.0	ug/l	10	ug/l	YES/NO
Chloroform	< 0.2	ug/l	10	ug/l	YES/NO
1,1-Dichloroethene	< 0.6	ug/l	10	ug/l	YES/NO
1,1-Dichloroethane	< 0.3	ug/l	10	ug/l	YES/NO
1,2-Dichloroethane	< 0.2	ug/l	10	ug/l	YES/NO
Ethylbenzene	< 0.2	ug/l	10	ug/l	YES/NO
Methylene Chloride	< 1.0	ug/l	10	ug/l	YES/NO
Toluene	< 0.2	ug/l	10	ug/l	YES/NO
Xylenes, Total	< 1.0	ug/l	10	ug/l	YES/NO
Diethylphthalate	< 1.2	ug/l	30	ug/l	YES/NO
Dimethylphthalate	< 1.3	ug/l	30	ug/l	YES/NO
Napthalene	< 2.6	ug/l	10	ug/l	YES/NO
Copper, Total	28.6	ug/l	0.012	lb/d	0.0017 Y/N
Cyanide, Amenable	< 10.0	ug/l	0.007	lb/d	< 0.0006 Y/N
Mercury, Total	< 0.1	ug/l	0.0001	lb/d	< 0.000006 Y/N
Lead, Total	6.2	ug/l	0.06	lb/d	0.0004 Y/N
Nickel, Total	< 1.1	ug/l	0.04	lb/d	< 0.0001 Y/N
Zinc, Total	7.2	ug/l	0.11	lb/d	0.0004 Y/N
Bis(2-ethylhexyl)Phthalate	< 1.2	ug/l	200	ug/l	YES/NO
Phenols, Total	< 50.0	ug/l	600	ug/l	YES/NO
Arsenic, Total	3.9	ug/l	0.001	lb/d	0.0002 Y/N
Chromium, Total	< 0.9	ug/l	240	ug/l	YES/NO
Selenium, Total	< 4.2	ug/l	6	ug/l	YES/NO
Vanadium, Total	4.8	ug/l	200	ug/l	YES/NO
Aluminum, Total	< 62.4	ug/l	2000	ug/l	YES/NO
Iron, Total	< 40.7	ug/l	4000	ug/l	YES/NO
Manganese, Total	20.4	ug/l	1000	ug/l	YES/NO

Sample Result Summary:

All Monitoring Parameters meet Discharge Requirements [X]

All Monitoring Parameters DO NOT meet Discharge Requirements(see above) [ ]

Reviewed and Approved By:(Print) Bruce Manganiello

Signature/Date: _____

Huls America Inc. - Stony Point, New York

Effluent Monitoring Report

Outfall-001; Treated Groundwater

Sample Date: 6/10/96 Time(s): 5:00 p.m. Tank T110 [ ] Tank T111 [X]

Samples Collected By: Keith Conlin Sample ID: _____

Effluent Parameter	Sample Result	Units	Discharge Limitations	Units	Allowable Discharge	
Flow	7000	gallon	N/A	gpd	YES/NO	
pH (Range)	8.06	SU	6.0 - 9.0	SU	YES/NO	
BOD, 5-day	< 2.0	mg/l	40	mg/l	YES/NO	
1,1,1-Trichloroethane	< 0.2	ug/l	10	ug/l	YES/NO	
1,1,2,2-Tetrachloroethane	< 0.3	ug/l	10	ug/l	YES/NO	
1,4-Dioxane	7.2	ug/l	10	ug/l	YES/NO	
Benzene	< 0.2	ug/l	10	ug/l	YES/NO	
Chlorobenzene	< 0.1	ug/l	10	ug/l	YES/NO	
Chloroethane	< 1.0	ug/l	10	ug/l	YES/NO	
Chloroform	< 0.2	ug/l	10	ug/l	YES/NO	
1,1-Dichloroethene	< 0.6	ug/l	10	ug/l	YES/NO	
1,1-Dichloroethane	< 0.3	ug/l	10	ug/l	YES/NO	
1,2-Dichloroethane	< 0.2	ug/l	10	ug/l	YES/NO	
Ethylbenzene	< 0.2	ug/l	10	ug/l	YES/NO	
Methylene Chloride	< 1.0	ug/l	10	ug/l	YES/NO	
Toluene	< 0.2	ug/l	10	ug/l	YES/NO	
Xylenes, Total	< 1.0	ug/l	10	ug/l	YES/NO	
Diethylphthalate	< 1.2	ug/l	30	ug/l	YES/NO	
Dimethylphthalate	< 1.3	ug/l	30	ug/l	YES/NO	
Napthalene	< 2.6	ug/l	10	ug/l	YES/NO	
Copper, Total	17.2	ug/l	0.012	lb/d	< 0.0010	Y/N
Cyanide, Amenable	< 10.0	ug/l	0.007	lb/d	< 0.0006	Y/N
Mercury, Total	< 0.1	ug/l	0.0001	lb/d	< 0.000006	Y/N
Lead, Total	5.4	ug/l	0.06	lb/d	0.0003	Y/N
Nickel, Total	< 1.1	ug/l	0.04	lb/d	< 0.0001	Y/N
Zinc, Total	10.5	ug/l	0.11	lb/d	0.0006	Y/N
Bis(2-ethylhexyl)Phthalate	< 1.2	ug/l	200	ug/l	YES/NO	
Phenols, Total	< 50.0	ug/l	600	ug/l	YES/NO	
Arsenic, Total	< 3.2	ug/l	0.001	lb/d	< 0.0002	Y/N
Chromium, Total	< 0.9	ug/l	240	ug/l	YES/NO	
Selenium, Total	< 4.2	ug/l	6	ug/l	YES/NO	
Vanadium, Total	18.4	ug/l	200	ug/l	YES/NO	
Aluminum, Total	< 62.4	ug/l	2000	ug/l	YES/NO	
Iron, Total	< 40.7	ug/l	4000	ug/l	YES/NO	
Manganese, Total	19.9	ug/l	1000	ug/l	YES/NO	

Sample Result Summary:

All Monitoring Parameters meet Discharge Requirements [X]

All Monitoring Parameters DO NOT meet Discharge Requirements (see above) [ ]

Reviewed and Approved By: (Print) ALEX YANKASKAS

Signature/Date: _____

Huls America Inc. - Stony Point, New York

Effluent Monitoring Report

Outfall-001; Treated Groundwater

Sample Date: 06/17/96 Time(s): 1:10 p.m. Tank T110 [ ] Tank T111 [X]

Samples Collected By: Keith Conlin Sample ID: _____

Effluent Parameter	Sample Result	Units	Discharge Limitations	Units	Allowable Discharge
Flow	7000	gallon	N/A	gpd	YES/NO
pH (Range)	7.57	SU	6.0 - 9.0	SU	YES/NO
BOD, 5-day	< 2.0	mg/l	40	mg/l	YES/NO
1,1,1-Trichloroethane	< 0.2	ug/l	10	ug/l	YES/NO
1,1,2,2-Tetrachloroethane	< 0.3	ug/l	10	ug/l	YES/NO
1,4-Dioxane	5.9	ug/l	10	ug/l	YES/NO
Benzene	< 0.2	ug/l	10	ug/l	YES/NO
Chlorobenzene	< 0.1	ug/l	10	ug/l	YES/NO
Chloroethane	< 1.0	ug/l	10	ug/l	YES/NO
Chloroform	< 0.2	ug/l	10	ug/l	YES/NO
1,1-Dichloroethene	< 0.6	ug/l	10	ug/l	YES/NO
1,1-Dichloroethane	< 0.3	ug/l	10	ug/l	YES/NO
1,2-Dichloroethane	< 0.2	ug/l	10	ug/l	YES/NO
Ethylbenzene	< 0.2	ug/l	10	ug/l	YES/NO
Methylene Chloride	< 1.0	ug/l	10	ug/l	YES/NO
Toluene	< 0.2	ug/l	10	ug/l	YES/NO
Xylenes, Total	< 1.0	ug/l	10	ug/l	YES/NO
Diethylphthalate	< 1.2	ug/l	30	ug/l	YES/NO
Dimethylphthalate	< 1.3	ug/l	30	ug/l	YES/NO
Napthalene	< 2.6	ug/l	10	ug/l	YES/NO
Copper, Total	22.7	ug/l	0.012	lb/d	0.0013 Y/N
Cyanide, Amenable	< 10.0	ug/l	0.007	lb/d	< 0.0006 Y/N
Mercury, Total	< 0.1	ug/l	0.0001	lb/d	< 0.000006 Y/N
Lead, Total	8.8	ug/l	0.06	lb/d	0.0005 Y/N
Nickel, Total	< 1.1	ug/l	0.04	lb/d	< 0.0001 Y/N
Zinc, Total	5.9	ug/l	0.11	lb/d	0.0003 Y/N
Bis(2-ethylhexyl)Phthalate	< 1.2	ug/l	200	ug/l	YES/NO
Phenols, Total	< 50.0	ug/l	600	ug/l	YES/NO
Arsenic, Total	< 3.2	ug/l	0.001	lb/d	< 0.0002 Y/N
Chromium, Total	< 0.9	ug/l	240	ug/l	YES/NO
Selenium, Total	< 4.2	ug/l	6	ug/l	YES/NO
Vanadium, Total	13.2	ug/l	200	ug/l	YES/NO
Aluminum, Total	< 62.4	ug/l	2000	ug/l	YES/NO
Iron, Total	< 40.7	ug/l	4000	ug/l	YES/NO
Manganese, Total	11.7	ug/l	1000	ug/l	YES/NO

Sample Result Summary:

All Monitoring Parameters meet Discharge Requirements [X]

All Monitoring Parameters DO NOT meet Discharge Requirements (see above) [ ]

Reviewed and Approved By: (Print) ALEX YANKASKAS

Signature/Date: 7/10/96

Huls America Inc. - Stony Point, New York

Effluent Monitoring Report

Outfall-001; Treated Groundwater

Sample Date: 6/25/96 Time(s): 9:15 a.m. Tank T110 [X] Tank T111 [ ]

Samples Collected By: Mike Conlin Sample ID: _____

Effluent Parameter	Sample Result	Units	Discharge Limitations	Unit	Allowable Discharge
Flow	7000	gallon	N/A	gpd	(YES)/NO
pH (Range)	8.02	SU	6.0 - 9.0	SU	(YES)/NO
BOD, 5-day	< 0.2	mg/l	40	mg/l	(YES)/NO
1,1,1-Trichloroethane	< 0.2	ug/l	10	ug/l	(YES)/NO
1,1,2,2-Tetrachloroethane	< 0.3	ug/l	10	ug/l	(YES)/NO
1,4-Dioxane	6.4	ug/l	10	ug/l	(YES)/NO
Benzene	< 0.2	ug/l	10	ug/l	(YES)/NO
Chlorobenzene	< 0.1	ug/l	10	ug/l	(YES)/NO
Chloroethane	< 1.0	ug/l	10	ug/l	(YES)/NO
Chloroform	< 0.2	ug/l	10	ug/l	(YES)/NO
1,1-Dichloroethene	< 0.6	ug/l	10	ug/l	(YES)/NO
1,1-Dichloroethane	< 0.3	ug/l	10	ug/l	(YES)/NO
1,2-Dichloroethane	< 0.2	ug/l	10	ug/l	(YES)/NO
Ethylbenzene	< 0.2	ug/l	10	ug/l	(YES)/NO
Methylene Chloride	< 1.0	ug/l	10	ug/l	(YES)/NO
Toluene	< 0.2	ug/l	10	ug/l	(YES)/NO
Xylenes, Total	< 1.0	ug/l	10	ug/l	(YES)/NO
Diethylphthalate	< 1.2	ug/l	30	ug/l	(YES)/NO
Dimethylphthalate	< 1.3	ug/l	30	ug/l	(YES)/NO
Napthalene	< 2.6	ug/l	10	ug/l	(YES)/NO
Copper, Total	13.2	ug/l	0.012	lb/d	0.0008 (Y)/N
Cyanide, Amenable	< 10.0	ug/l	0.007	lb/d	< 0.0006 (Y)/N
Mercury, Total	< 0.1	ug/l	0.0001	lb/d	< 0.000006 (Y)/N
Lead, Total	3.1	ug/l	0.06	lb/d	0.0002 (Y)/N
Nickel, Total	< 1.1	ug/l	0.04	lb/d	< 0.0001 (Y)/N
Zinc, Total	< 5.5	ug/l	0.11	lb/d	< 0.0003 (Y)/N
Bis(2-ethylhexyl)Phthalate	< 1.2	ug/l	200	ug/l	(YES)/NO
Phenols, Total	< 50.0	ug/l	600	ug/l	(YES)/NO
Arsenic, Total	< 3.2	ug/l	0.001	lb/d	0.0002 (Y)/N
Chromium, Total	< 0.9	ug/l	240	ug/l	(YES)/NO
Selenium, Total	< 4.2	ug/l	6	ug/l	(YES)/NO
Vanadium, Total	48.7	ug/l	200	ug/l	(YES)/NO
Aluminum, Total	< 62.4	ug/l	2000	ug/l	(YES)/NO
Iron, Total	< 40.7	ug/l	4000	ug/l	(YES)/NO
Manganese, Total	< 0.6	ug/l	1000	ug/l	(YES)/NO

Sample Result Summary:

All Monitoring Parameters meet Discharge Requirements [X]

All Monitoring Parameters DO NOT meet Discharge Requirements (see above) [ ]

Reviewed and Approved By: (Print) Alex Yankaskas

Signature/Date: _____ 7/10/96

Hüls America Inc., Stony Point, NY
Bi-Weekly Water Level Measurements
ECM Project #1059

Well Number	Depth to Water (feet)	
	06/12/96	06/25/96
Required Monitoring Points		
MW-24	14.64	14.50
MW-27	4.11	4.01
MW-31	7.67	7.69
MW-32	7.79	5.49
MW-33S	4.82	4.58
MW-34S	7.35	6.98
MW-36	2.74	2.04
MW-37	6.86	6.31
MW-40	13.98	13.84
MW-41	–	–
MW-42	2.78	2.40
MW-43	9.77	9.57
MW-44	7.14	7.12
MW-47	–	3.12
MW-48	3.21	–
MW-49	1.10	–
TB-17	7.37	8.20
ECM Labeled Monitoring Points		
P-1	3.95	4.80
P-2	3.37	3.15
P-3	7.93	6.35
P-4	11.04	8.10
P-5	6.76	6.77
P-6	9.47	7.58
CB-1	3.56	3.27
CB-2	6.60	4.20
RS-1	–	6.18

Measurements reported in feet below top of casing.
– : Water level not recorded.

ECM

STONY POINT FIELD ACTIVITY LOG

Date: _____ **Arrival Time:** _____ **Departure Time:** _____

ECM Personnel: _____ **Weather Conditions:** _____

Trailer Secured?	Yes ☐	No ☐	Comments:	_____	
System Operational?	Yes ☐	No ☐	Comments:	_____	
Water Leakage?	Yes ☐	No ☐	Source:	_____	
Corrective Actions?	Yes ☐	No ☐	Comments:	_____	

Other Comments: _____

_____

Flow Rate (before filter change-out) Into T-101 _____ gpm Into T-105 _____ gpm

Filter Condition [✓]:	Clear	Silted	Fouled	Changed	Comments
Primary Influent:					
Secondary Influent:					
Post P-103 Bag :					
Cartridges:					

Other Comments: _____

_____

Flow Rate (after filter change-out): Into T-101 _____ gpm Into T-105 _____ gpm

Addtional Activities Conducted:	✓	**Comments:**
Monthly Discharge Sampling:		Circle Location: T-110 : T-111 : Other: _____
Monthly Water Levels:		
Quarterly GWMW Sampling:		
Other (List):		

P-101	_____ psi	Carbon #1	_____ psi	Carbon #2	_____ psi
B-106	_____ "H_2O	B-107	_____ "H_2O	Magnehelic	_____ "H_2O
P-105	_____ psi	T-101	_____ pH	_____ °F	T-103	_____ pH	_____ °F

Contractors/Visitors	**Affiliation**	**Purpose**	**Arrival**	**Departure**

ATTACHMENT 3

INSPECTION AND MAINTENANCE SCHEDULE

ATTACHMENT 3

Hüls America Inc. - Stony Point Facility

INSPECTION & MAINTENANCE IMPLEMENTATION SCHEDULE

Component	Refer to Section	Daily	Weekly	Monthly	Quarterly	Semi-Annually	Annually	Other
Trenches	2.1	-	-	-	-	Inspect Cleanouts	-	-
Level Transmitters:								
Recovery Sump	2.1.1	Monitor OPS	-	-	-	-	Cleaning	-
Tank	2.1.2	Monitor OPS	-	-	-	Cleaning	-	-
Submersible Pumps	2.1.2	Monitor OPS	-	-		Check Operating Curve	-	-
Settling & Equalization Tanks	2.2.1	-	Visual Inspection	-	-	Sediment Cleanout	-	-
Transfer Pumps:								
General	2.2.2	Monitor OPS	-	-	-	Check Operating Curve	-	-
P-103	2.2.2	Monitor OPS	-	-		Check Operating Curve	-	Bi-monthly Impeller Inspection
Particulate Filters	2.2.3	Monitor Flow	Change-out	-	Clean Housing	-	-	-
Air Strippers:								
Tank & Diffusers	2.2.4	Monitor OPS	Monitor Pressure Gauges	Inspect	-	Remove and Clean	-	-
Blowers	2.2.4	Monitor OPS	Monitor Pressure Gauges	-	-	*Inspect and Service	-	-
T-103	2.2.4	Monitor OPS	Inspect	-	-	-	-	Bi-weekly clean-out
Carbon Adsorbers:								
Liquid Phase	2.2.5.1	-	Monitor Pressure Gauges	-	-	Replace	-	Replace as Needed
Vapor Phase	2.2.5.2	-	Monitor Pressure Gauges	-	-	Replace	-	Replace as Needed
Ion Exchange	2.2.6	Monitor Conductivity	-	-	-	Change-out Resin	-	Change-out Resin at Breakthrough

ATTACHMENT 3

Hüls America Inc. - Stony Point Facility

INSPECTION & MAINTENANCE IMPLEMENTATION SCHEDULE

Component		Daily	Weekly	Monthly	Quarterly	Semi-Annually	Annually	Other
Control Devices: Valves and Pipe Fittings	2.2.7.2	-	Monitor OPS	-	-	-	-	**Clean as needed
Flow Meters	2.2.7.3	-	Monitor OPS	-	-	-	-	Clean/Calibrate as needed
Magnehelic Differential Pressure Gauge	2.2.7.4	-	Monitor OPS	-	-	-	-	*As needed (See manufacturers Literature)
Integrated Explosion Proof Switch	2.2.7.5	-	Monitor OPS	-	-	-	-	*As needed (See manufacturers Literature)
Treated Water Tanks	2.3	-	-	Cursory Inspection	-	-	Complete Inspection	Clean as Needed
Vinyl Inlet and Outlet Hose (IE & Carbon)	-	-	-	-	-	-	-	Replace as needed

* - Service or repair by qaulified maintenance contractor.
** - Cleaning or repair by authorized plumbing contractor.