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2010 ANNUAL SUMMARY REPORT
FORMER ROWE INDUSTRIES SUPERFUND SITE
1668 SAG HARBOR TURNPIKE
SAG HARBOR, NEW YORK

Prepared For:

Kraft Foods Global, Inc.

September 2011

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EXECUTIVE SUMMARY

On behalf of Kraft Foods Global, Inc. (Kraft Foods), LBG Engineering Services, P.C. (LBGES) has prepared the 2010 Annual Summary Report for the Former Rowe Industries Superfund Site (Site) located at 1668 Sag Harbor Turnpike in Sag Harbor, New York. The full-scale pump and treat (FSP&T) and focus pump and treat (FP&T) systems operated at the Site during 2010. The FSP&T system focuses on cleanup of volatile organic compounds (VOCs) (the contaminants of concern (COCs)) in the groundwater of the Upper Glacial Aquifer in the area located hydraulically downgradient from the former drum storage area (FDSA). The discharge of the FP&T system was routed to the Equalization (EQ) tank of the FSP&T system and the focus recovery wells (FRWs) resumed operation on September 22, 2008 to remediate the COCs in the perched groundwater in the FDSA.

The following conclusions and recommendations are based on the performance of the FSP&T and FP&T systems during 2010.

FSP&T

1. The recommended State Pollution Discharge Elimination System (SPDES) discharge quality criteria for volatile organic compounds (VOCs) were not exceeded in any discharge samples in 2010.

2. In the second half of 2010, the concentrations of tetrachloroethylene (PCE), trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) in the downgradient plume of impacted groundwater in the Upper Glacial Aquifer were below applicable or relevant and appropriate requirements (ARAR) in samples from all recovery wells and monitor wells tested with the exception of the concentration of PCE in the samples from RW-6 of 5.3 µg/l (micrograms per liter) in November, the

concentration of TCA in the sample from RW-4 of 5.6 µg/l in July, and the concentration of TCA in the sample from MW-53 of 9.9 µg/l in September.

3. The concentrations of PCE, TCE and TCA continue to slowly decrease with time in the downgradient plume. The highest concentrations of PCE, TCE and TCA in the downgradient plume remain along Carroll Street in the vicinity of MW-53, RW-6 and RW-7.

4. Based on the improving water quality in the downgradient plume and the defined capture zones developed from measured groundwater levels, LBGES recommends discontinuing the operation of RW-3, RW-5, RW-8 and RW-9. Active groundwater remediation of the downgradient plume will continue with downgradient recovery wells RW-2, RW-4, RW-6 and RW-7.

5. Concentrations of PCE, TCE and TCA were below the ARARs (5 µg/l) and below the laboratory reporting limits of 1 µg/l in the groundwater samples from RW-1 from the start of FSP&T system operation in December 2002 to July 2005, at which time operation of the well was discontinued. The quality of the groundwater samples collected from RW-1 in March and September 2010 continues to meet the ARARs; the concentrations of PCE, TCE and TCA being below laboratory reporting limits. Therefore, this recovery well will be left off. Semi-annual collection of samples from this well is scheduled for 2011.
6. Cross-sections along the plume from Lily Pond to the MW-50 cluster show that with the operation of the FSP&T system the PCE plume is not discharging to Sag Harbor Cove or Ligonee Creek. The cross-sections also illustrate the decreasing size of the PCE plume with the operation of the FSP&T system with time.

7. Groundwater elevation contour maps, from which the capture zones of the recovery wells are defined, provide evidence that the plume is being captured by the recovery wells. The exception to this statement is of the COCs in monitor well MW-49B near

RW-9. Possible reasons why water quality has improved with time in MW-49B may be natural attenuation and indirect influence of operation of RW-9.

8. Surface and groundwater levels at Crooked Pond, Lily Pond and Ligonee Brook were not impacted by the operation of the FSP&T System. Water levels at these locations were measured in March and September 2010. Groundwater levels in the piezometers at these locations will continue to be measured during semi-annual groundwater monitoring events.

9. The maximum allowable vapor emissions from this system of 0.022 lbs/hr were not exceeded in 2010. Vapor emissions, averaging 0.00026 lbs/hr, remain well below the maximum allowable vapor emissions limit. LBGES will continue to analyze vapor samples on a monthly basis.

10. Airflow through the air-stripper tower in 2010 ranged from approximately 1,220 scfm to 1,827 scfm and was adequate to treat the water by stripping the COCs from the influent water. In 2010, a decrease in air flow with time was observed and troubleshooting in 2011 will be continued to determine the cause of the decreased air flow. Corrective actions to restore air flow will be taken as necessary.

11. Recovery well rehabilitation to improve well performance was completed in April and May 2010 for recovery wells RW-2, 4, 5, 6, 7, 8 and 9; RW-3 was rehabilitated in September 2010. The well rehabilitation efforts continue to be effective in the wells where high iron concentrations in the groundwater result in biofouling that is the primary cause of reduced yield (RW-2, 4, 8 and 9). This finding was based on an increase in specific capacity, an increase in the pumping rate, or a reduction in the percent motor speed for a given flow setting after rehabilitation of the wells. For additional information regarding the 2010 well rehabilitation work and results, refer to Appendix A.

12. All operating recovery wells will be evaluated in 2011 to determine what level of well rehabilitation is needed at that time. Well rehabilitation (with the use of Unicid^{TM}) is currently projected for RW-2, 4, 8 and 9.

13. Following well rehabilitation activities, biofouling and iron encrustation was removed from the sump of the air-stripper tower in May 2010 and taken from the property for disposal as hazardous waste. The accumulation of biofouling and iron encrustation is caused by normal system operation. No significant accumulation of biofouling or iron encrustation was observed on the packing material during 2010, however, algae was observed to be growing out of the iron bacteria, which covered the influent distribution trough of the air-stripper tower. The algae was removed during the May 2010 maintenance activities. The pattern of biofouling and iron encrustation accumulation in the treatment system suggests that the iron bacteria in the treated water continue to pass through the packing of the tower. In 2011, the air-stripper tower packing material and the tower sump will be inspected periodically for biofouling and iron encrustation, and backwashed and/or cleaned as needed.

14. Biofouling and iron encrustation was removed from the bag filter housing, transfer tank and equalization tank in May 2010. The biofouling and iron encrustation from these tanks were removed and disposed of as hazardous waste following well rehabilitation activities. The accumulation of biofouling and iron encrustation at these locations is caused by normal system operation.

15. A total of 221.1 lbs of VOCs has been recovered by the FSP&T and FP&T system since startup in December 2002. The recovered mass of VOCs exceeds the initial general estimate for total dissolved-phase VOCs (183 lbs) provided by the original groundwater model. This difference suggests that some of the COC mass that was recovered (and continues to be recovered) is being desorbed from the soil to the groundwater. Continuation of the exponentially decreasing rate of VOC recovery (based on COC desorption rates) is anticipated with ongoing operation of the FSP&T system.

16. During 2010, the FSP&T system operated an average of 66% of the time. The FSP&T system was down for extended periods during the month of May for scheduled maintenance; during June due to a leaking below-grade pipe cleanout port and associated repairs; during July and September due to problems associated with the user interface computer (UIC); and during August due to a leaking pipe fitting in the FSP&T system.

FP&T

1. The FP&T system was shut down in April 2010 because of very low flow from the wells and then was left off for a short down period to assess the rebound of contaminant concentrations in the FDSA. The FP&T was to have been restarted in July 2010; however, due to problems with the FSP&T user interface computer (UIC), the FP&T system could not be restarted until January 2011. Active groundwater remediation of the FDSA is projected to continue with the existing FSP&T system for 2011. In the event contaminated water migrates from the perched conditions of the FDSA to the Upper Glacial Aquifer, it will be captured by the onsite recovery wells of the FSP&T system.

2. Concentrations of PCE, TCE, cis-1,2-dichloroethene (1,2-DCE) and vinyl chloride (VC) in the groundwater samples from the FP&T recovery wells varied throughout the year. The highest PCE concentrations were detected in groundwater samples from FRW-1 during October 2010.

3. Following the shutdown of the FP&T system in April 2010; chloroform was detected above the ARAR in groundwater samples from FRW-2 and FRW-3. The concentrations decreased each month and chloroform was not detected in FRW-2 and FRW-3 in November and October, respectively.

4. Concentrations of PCE, TCE and 12DCE were below the ARAR (5 µg/l) and VC was below the New York State Department of Environmental Conservation (NYDEC)

ambient water quality standard (1 µg/l) in groundwater samples from FRW-4 during the second, third and fourth quarters of 2010.

5. Recovery well maintenance to improve well performance was completed in May 2010 for recovery wells FRW-1 thru FRW-4. The maintenance event consisted of evacuating accumulated sediment from the recovery well sumps, and cleaning and inspecting the pumps. All recovery wells will be routinely evaluated in 2011 and maintenance will be scheduled as needed.

6. Following recovery well maintenance activity, sediment was evacuated from the equalization tank. The below-grade piping connecting the FP&T and FSP&T systems was cleaned once during 2010. Flow from the FP&T system to the FSP&T system will be monitored during 2011 and maintenance will be scheduled as needed.

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I. INTRODUCTION

On behalf of Kraft Foods Global, Inc. (Kraft Foods), LBG Engineering Services, P.C. (LBGES) has prepared the 2010 Annual Summary Report for the former Rowe Industries Superfund Site (Site) located at 1668 Sag Harbor Turnpike in Sag Harbor, Suffolk County, New York. The purpose of this report is to present a performance summary of the Full Scale Pump and Treat (FSP&T) system (Section II) and a summary of activities that occurred during operation of the Focused Pump and Treat (FP&T) system (Section III). A summary of the waste generated for the Site is included in Section IV. A summary of proposed operational changes to the FSP&T system is included in Section V. The conclusions and recommendations for future actions at the Site are included in Section VI. Site maps are provided as figures 1 and 2.

II. FULL SCALE PUMP AND TREAT SYSTEM

This section of the report provides a summary of the performance of the FSP&T system with respect to operation and maintenance (O&M) activities, water-quality data, air quality data and hydrogeological data.

A total of 125,175,074 gallons of groundwater was treated through the FSP&T and FP&T systems from January 1, 2010 to December 31, 2010. A total of 2.5 pounds of volatile organic compounds (VOCs) was recovered by the FSP&T and FP&T systems from December 22, 2009 to December 29, 2010.

A. Operation and Maintenance (O&M) Activities

The system operated for 66% of the time during 2010, which equates to a total of 242 days out of a possible 365 days. Some reasons for the low operating time in 2010 are as follows:

- in May 2010, below-grade pipe and system cleaning;

- in June 2010, a leaking clean-out port used for servicing below-grade pipes;
- in July and September 2010, a malfunctioning user-interface computer (UIC); and
- in August 2010, a leaking pipe fitting located in the FSP&T building.

A summary of the major O&M activities for the year is presented below:

- replaced damaged or malfunctioning flow meter parts and flow meter transmitters as needed at RW-2, RW-3, RW-4, RW-5, RW-6 and RW-8;
- replaced the battery for the Programmable Logic Computer (PLC) (January 2010);
- completed maintenance on the FSP&T system garage doors by technicians from All Island Garage Door (January 2010);
- completed a performance assessment of the booster blower and air stripper blower by technicians from Air Flow Dynamics (January 2010);
- replaced the drive pulleys and belts on the air-stripper blower and booster blower, and replaced the isolation damper on the booster blower by technicians from Air Flow Dynamics (February 2010);
- repaired the malfunctioning FSP&T system control panel air-conditioning unit (January, February 2010);
- completed maintenance on the FSP&T system transfer pumps TP1-A, TP1-B, TP2-A and TP2-B when necessary (April, May, September 2010);
- replaced the broken hinges on the RW-7 vault doors (April 2010);
- inspected the FSP&T system roof gutters and sealed the roof around the guy wire attachment points (May 2010);
- replaced the malfunctioning motor disconnect switch for the transfer tank mixer (May 2010);
- cleaned algae that were observed to be growing out of the iron bacteria which covered the influent distribution trough of the air-stripper tower. Visually inspected the air-stripper tower packing material, and covered the air-stripper tower access port with a black polyethylene sheet in order to prevent sunlight from entering the air-stripper tower thus minimizing the potential for algae growth (May 2010);
- repaired a hairline crack on a fitting on the influent pipes from the on-site recovery wells (May 2010);

- repaired a cracked joint connecting the cleanout port near RW-8 to the below grade pipe (June 2010);

- inspected the condition of the FSP&T system control panel by technician from Rockwell Automation (June 2010);

- replaced the malfunctioning RW-9 motor disconnect switch (June 2010);

- replaced a leaking pipe fitting located near the influent transfer pumps in the FSP&T system (August 2010);

- tested the potable water backflow preventor (by a GF Schiavioni representative) (August 2010);

- replaced the malfunctioning pump and/or motor in RW-2 RW-3, RW-4, RW-5, RW-7, RW-8 and RW-9;

- reset the flow meter totalizers for RW-2, RW-3, RW-4, RW-5, RW-6, RW-7, RW-8, RW-9, EQ TP101 and effluent flow meters when necessary (January, May, July, December 2010);

- inspected and replaced the booster blower (BB) and air stripper blower (ASB) belts when necessary;

- evaluated the DSL modem connection and diagnosed a bad modem (by a technician from Verizon); replaced the modem (by LBGES) (September 2010);

- completed well rehabilitation activities for recovery wells RW-2, 4, 5, 6, 7, 8 and RW-9 in April and May 2010, and RW-3 in September 2010, and summarized the recovery well rehabilitation activities and results in a report entitled "Recovery Well Rehabilitation -2010", attached in Appendix A;

- removed the biofouling and iron encrustation from the equalization (EQ) tank, air-stripper tower sump and transfer tank (May 2010);

- completed two maintenance events to remove biofouling and iron encrustation that included cleaning vault piping and flow meters at the recovery wells, below-grade piping, check valves and building piping. The heaviest biofouling and iron encrustation continues to occur in recovery wells RW-2, 4, 8 and 9 (May and October 2010);

- conducted routine O&M activities including lubricating pumps and motors, FSP&T system sampling, recovery well sampling, vapor sampling, and troubleshooting/resetting alarms;

- replaced the malfunctioning UIC (December 2010);

- installed a new wellhead pressure sensor in RW-4 (December 2010); and
- cleaned out and inspected the trench drain in front of the FSP&T system building and the storm drain catch basin behind the FSP&T system building (May 2010).

B. Water-Quality Data

The results of all weekly effluent water-quality sampling events for the FSP&T system in 2010 have been below the recommended state pollutant discharge elimination system (SPDES) Equivalent Effluent Criteria. The New York State Department of Environmental Conservation (NYSDEC) renewed the SPDES Equivalent Effluent Criteria for the Site in 2006. The duration of the SPDES permit is five years and will be renewed in 2011. The minimum pH value in the SPDES permit was lowered from 6.5 to 5.0 to reflect the natural pH conditions in the groundwater at the Site.

C. Recovery Well Performance

Table 1 presents average groundwater quality parameters measured in the field at the recovery wells during 2010. The table includes pH, temperature, turbidity, dissolved oxygen (DO), conductivity, and oxidation reduction potential (ORP). A calibrated Horiba U-22 water quality meter was used for all the measurements in 2010. The pH of the groundwater measured at operating FSP&T recovery wells ranged from 5.81 (RW-2) to 6.23 (RW-3). The DO and ORP values in the groundwater at the recovery wells indicate that aerobic conditions are present.

Table 2 presents a summary of the construction details of the recovery wells RW-1 thru RW-9 and FRW-1 thru FRW-4. The table summarizes the top of casing elevations, well diameters, total depth, screen and casing setting and the material used in the well construction. Table 3 presents a summary of recovery well operation for 2009 and 2010. The table includes the total volume of water pumped and the average flow rate from each recovery well. The total volume of water value represents groundwater recovered from both the FSP&T system recovery wells and the FP&T system recovery wells.

The slight decrease in the volume of water pumped from the recovery wells between the years 2009 and 2010 is attributed to an increase in the down time due to maintenance activities. The volume of water pumped from RW-3 and RW-7 decreased slightly in 2010 because the flow set point of RW-3 was decreased from 30 gpm (gallons per minute) to 28 gpm and the flow set

point of RW-7 was decreased from 80 gpm to 70 gpm to prevent pump fault alarms (i.e. motor overload) from occurring and subsequently causing the shutdown of the well. The average flow rates from RW-4, RW-8 and RW-9 were slightly higher in 2010 than in 2009.

The pumping rate has been set at 15 gpm for RW-6 since June 2005 to prevent excessive groundwater drawdown that could de-water the pump. As previously discussed in monthly status reports, the increase in groundwater drawdown in RW-6 is believed to be caused by a combination of factors, including finer soils in the immediate vicinity of RW-6 and microbial growth that is resistant to well rehabilitation efforts.

Based on a review of the hourly operational data for RW-6 in 2010, a summary of which is presented in Table 4, the groundwater drawdown has varied between 29.25 ft (feet) (post-redevelopment) and 45.90 ft at an average pumping rate of 15 gpm. Groundwater drawdown in RW-6 increased steadily in 2010; reflecting the normal pattern of declining well efficiency that has been documented for this well. Drawdown in RW-6 will continue to be monitored monthly through 2011 and this well will be scheduled for redevelopment if necessary in 2011. The 2006 groundwater model has indicated that the plume can be captured without RW-6 operating. However, it is more efficient and cost effective to capture the plume where it is present at the highest concentrations, than to allow it to migrate downgradient before capture. Therefore, the operation of RW-6 will continue as long as aquifer conditions allow and the remaining portion of the plume around the well is effectively being recovered.

Table 5 presents a summary of the groundwater quality results from monthly sampling of the operating recovery wells in the FSP&T system for 2009 and 2010 and the groundwater quality results from RW-1 for 2004 through 2010. The 2009 and 2010 time periods are presented to assist with evaluating trends and for easy reference to highlight a few key points discussed below.

Graph 1 illustrates annual average tetrachloroethylene (PCE), trichloroethene (TCE), and 1,1,1-trichloroethane (TCA) concentrations in the groundwater at RW-2 through RW-7 for 2010. VOCs were not detected in groundwater samples collected from RW-8 in 2010. PCE, TCE and TCA were not detected in groundwater samples collected from RW-1, RW-8 or RW-9 in 2010. However, during the month of December, low concentrations of chloromethane (1.8 µg/l (micrograms per liter)) were detected in RW-9. Historically low concentrations of chloromethane have been detected in the recovery wells with decreasing frequency in recent

times. TCE was detected in groundwater samples collected from RW-3 and RW-4, but below the ARAR of 5 µg/l. TCE was not detected in groundwater samples from RW-1, 2, 5, 6, 7, 8 and 9.

Graph 2 illustrates monthly PCE concentrations in groundwater from recovery wells RW-2, RW-4, RW-6 and RW-7; this graph excludes RW-1, RW-3, RW-5, RW-8 and RW-9 because PCE was not detected in groundwater samples from these recovery wells in 2010. The PCE concentrations in the groundwater at RW-2 and RW-4 were below the ARAR of 5 µg/l in 2010. July 2010 was the first month since the commencement of the operation of the FSP&T system that PCE concentrations in groundwater samples collected from all of the downgradient recovery wells (RW-2 thru RW-9) were below the chemical specific ARAR of 5 µg/l. The PCE concentrations in the groundwater at RW-6 and 7 showed a decreasing trend and were below the ARAR of 5 µg/l from July to December 2010, with the exception of the concentration of RW-6 during the month of November (5.3 µg/l).

Graph 3 illustrates the monthly TCA concentrations in groundwater for recovery wells RW-2, 3, 4, 5, 6 and 7. RW-1, RW-8 and RW-9 are excluded from this graph because TCA was not detected in groundwater samples from these wells during 2010. TCA concentrations in RW-2, 3, 5 and 7 were below the ARAR of 5 µg/l in 2010. TCA concentrations in the groundwater at RW-4 and RW-6 ranged from less than 1 µg/l to 7 µg/l with a modest downward trend in 2010.

PCE, TCA and TCE concentrations have been at or below the ARAR of 5 µg/l in groundwater samples collected from:

- RW-2 for 22 consecutive months (1 year and 10 months);
- RW-3 for 42 consecutive months (3 years and 6 months);
- RW-4 for 4 consecutive months;
- RW-5 for 49 consecutive months (4 years and 1 month);
- RW-6 for 4 consecutive months before increasing above the ARAR;
- RW-7 for 6 consecutive months;
- RW-8 for 66 consecutive months (5 years and 6 months); and
- RW-9 for 66 consecutive months (5 years and 6 months).

D. Semi-Annual Groundwater Sampling

Semi-annual groundwater samples were collected and analyzed from recovery wells and select monitor wells in March and September 2010. Tables 2 and 6 present a summary of the construction details and date of construction of the recovery and monitor wells, respectively. The PCE, TCE and TCA concentrations are summarized in tables 7, 8 and 9, respectively. The laboratory reports for the March and September 2010 sampling events are presented in Appendix B.

VOC concentrations were not detected in the groundwater sample from monitor well MW-B1 near the recharge basin in September 2010. In addition, weekly effluent system water samples contained no detected VOC concentrations above the SPDES discharge criteria in 2010. The above information suggests that the FSP&T system is adequately removing the contaminants of concern (COCs) from the groundwater before it is discharged, and that the discharge of treated groundwater to the recharge basins has not impacted the quality of the underlying groundwater.

Monitor well MW-43A located along Carroll Street between RW-5 and RW-6 was dry during the September semi-annual sampling event, thus it was not sampled. Also during the September sampling event, monitor well N-37 located on the property of Mrs. Fabiano went dry during the sampling efforts and did not recharge, therefore it was not sampled. No other problems were encountered during either the March or September sampling events.

The groundwater samples from the monitor wells and RW-1 were collected using the low-flow procedure and the recovery wells (with the exception of RW-1) were sampled via a sampling port. Once the samples were collected in labeled 40 ml (milliliter) vials and preserved with hydrochloric acid (HCl), the vials were closed and placed in bubble wrap bags in a cooler with ice. The groundwater samples were then transported to a certified laboratory under standard chain of custody procedures.

1. Regional Aquifer – FSP&T

PCE concentrations in groundwater continue to decrease in the downgradient plume since the start of the FSP&T system in December 2002. PCE concentrations in the groundwater continue to be detected above the ARAR along Carroll Street. During March 2010 PCE was detected in groundwater samples from MW-43C and MW-54 at 12 µg/l and 5.1 µg/l, respectively; during September the PCE concentration in groundwater samples from these wells

were below the ARAR. PCE was detected above laboratory detection limits but below the ARAR in 2010 in groundwater samples from MW-43B and MW-53 (along Carroll Street), MW-44A, MW-44B, MW-45A MW-47A (on the SHI property) and MW-49B (along Noyack Road). PCE was not detected in groundwater samples from the remaining monitor wells tested in 2010.

TCE was detected in the groundwater samples from MW-47A (on the SHI property), MW-43C and MW-54 (along Carroll Street) at concentrations below the ARAR. TCE was not detected at any other regional monitoring locations during the March and September 2010 sampling events.

TCA concentrations in the groundwater were detected above the ARAR concentration of 5 µg/l at MW-53 (9.9 to 18 µg/l) along Carroll Street in 2010. TCA concentrations were detected above the laboratory detection limit but below the ARAR in the groundwater samples from N-16 (along Sag Harbor Turnpike), MW-43B, MW-43C, MW-54, (along Carroll Street). TCA was not detected at any other regional monitoring locations during the March and September 2010 sampling events.

2. Local Perched Groundwater - FDSA

During March 2010, PCE was detected above the ARAR of 5 µg/l in the groundwater sample from MW-98-05A (65 µg/l); PCE was not detected in the groundwater sample from this well during the September sampling event. However, the daughter products 1,2-dichloroethene (1,2-DCE) (41 µg/l) and vinyl chloride (VC) (7.9 µg/l) were detected in September 2010 from MW-98-05A which suggests some biodegradation is occurring in this area. The FP&T system was operating in March but was not operating from April to December 2010; further discussion about the FSP&T system is provided in Section III. Additionally PCE was detected above laboratory detection limits but below the ARAR during the month of March in groundwater samples collected from MW-98-01A and MW-98-04. Groundwater in the FDSA continues to have the highest PCE concentrations in the entire plume.

For the March and September 2010 sampling events, the TCE concentrations in the FP&T recovery wells FRW-1 and FRW-4 and monitor well MW-98-5A in the FDSA ranged from not detected at the laboratory detection limit of 1 µg/l to 18 µg/l. Groundwater in the FDSA had the highest TCE concentrations in the entire plume.

During the March and September sampling events TCA was detected in the groundwater samples from FRW-1, FRW-3 and MW-98-05A, with concentrations ranging from 1.8 µg/l to 5.7 µg/l. The highest concentration, 5.7 µg/l, which is above the ARAR of 5 µg/l, was detected in the groundwater sample collected from FRW-1 during the month of September. The FDSA water quality is further discussed in Section III.

E. Air-Quality Data

Vapor-phase carbon is used to treat the air from the air stripper that is carrying VOCs. Table 10 presents a summary of the vapor-phase carbon operating data for 2010. The dates presented in the table indicate when the air samples were collected. The operating time indicates the total amount of time the system operated for that month. The annual average airflow through the tower and the carbon units was 1,341 standard cubic feet per minute (scfm).

A continued decrease in volumetric air flow from 1,827 to 1,220 was observed over time during 2010. Possible causes for the decrease in air flow may be one or a combination of the following:

- iron build up in the air stripper tower;
- pressure building up in the carbon vessels;
- operation of the blower;
- a leak in the air duct; and
- accuracy of the hand held air meter.

Some of these factors were evaluated in 2010 and the results of the troubleshooting are provided below.

In January 2010, an evaluation of the air stripper blower and booster blower (both blowers were manufactured by New York Blower, Inc.) were completed by ACFM Dynamics, Inc. The evaluation concluded that the blowers were in good mechanical condition with the exception of some needed routine maintenance, which was completed in February 2010. The routine maintenance consisted of:

- laser aligning the V-Belt drives on both blowers;
- furnishing and installing new V-Belt drives on both blowers;
- furnishing and installing new spring isolators on the booster blower; and

- taking post-corrective action vibration readings.

The results of these actions provided a small, but insignificant improvement in air flow.

The packing material in the air stripper tower was visually inspected during the annual maintenance event (May 18 through May 25, 2010). During the inspection of the air-stripper tower packing material, algae was observed growing out of the iron bacteria which covered the air stripper distribution trough. The algae and iron bacteria were manually cleaned out of the trough. The air-stripper tower packing material near the top of the tower appeared to be in good condition with only minimal signs of iron bacteria deposition. The exterior access port's existing translucent cover was covered with a black polyethylene sheet in order to prevent sunlight from entering the air-stripper tower thus minimizing the potential for algae growth. The air-stripper tower will be periodically inspected for algae growth. There was no improvement in the average volumetric air flow following the cleanout of the algae.

The air ducts for the blower and booster blower are continually checked for leaks and corrosion as part of monthly O&M activities. In December an air leak was detected from a corroded section of air duct between the air-stripper blower and tower. A technician from the Matz Rightway Company designed, fabricated and installed a replacement duct between the air-stripper blower and tower. The result of this action provided a small, but insignificant improvement in air flow. Leaking air ducts do not appear to be a major contributing factor to the decrease in air flow.

The accuracy of the hand held air flow meter was checked and certified in November of 2009, and the air flow meter continues to function properly. In the first half of 2011, the air flow through the carbon vessels will be investigated to determine if there is an obstruction in this area, which is causing the decrease in the air flow.

The VOC vapor emissions ranged from 0.00010 lbs/hr (January 2010) to 0.00051 lbs/hr (March 2010). These vapor emissions are well below the allowable VOC emissions of 0.022 lbs/hr. The VOC emission rates for January to December 2010 were fairly constant with small to moderate month-to-month variability through the year. The VOC vapor emissions are expected to increase slightly as the adsorption capacity of the carbon is used up. During the investigation of the air flow in the carbon vessel area discussed above, a carbon change will be scheduled for the first half of 2011. The carbon change will allow the interior of the vessels to be inspected for

obstructions to the air flow, and if necessary, the ability to fix any issues related to decreasing air flow. The air quality and air flow will continue to be monitored monthly in 2011.

Graph 4 illustrates effluent VOC vapor concentrations (mg/m^3) and VOC vapor emissions (lbs/hr) for 2010. The total VOC vapor emissions from the effluent stack from January 1, 2010 to December 31, 2010 were 1.58 pounds.

Table 11 presents a summary of air quality concentrations for the FSP&T system. Based on the influent and effluent vapor data, the vapor-phase portion of the remediation system is functioning properly. The effectiveness of the vapor-phase carbon is more evident on some of the VOCs (PCE and TCE) compared to others (TCA, 1,1-dichloroethane (DCA), 1,1-dichloroethene (1,1-DCE) and cis-1,2-dichloroethene (cis-DCE)). There is evidence of breakthrough of TCA, DCA, 1,1-DCE and cis-DCE in several of the samples collected at the mid and post-carbon sample locations. However, the concentrations at the post-carbon location are well below the stack emissions concentrations that would exceed the Ambient Guideline Concentrations (AgC) at the property boundary based on the model and associated calculations completed during the design of the FSP&T system.

F. Hydrogeological Summary

The following section provides a summary of water-level data and capture zone information collected in 2010.

1. Water-Level Data

Comprehensive rounds of groundwater levels were measured in March and September 2010. During each event, the water levels were measured when the system was off (static groundwater elevation) and when it was operating. These measurements were used to define groundwater flow patterns, which were interpreted to evaluate the effectiveness of the FSP&T system recovery wells at capturing the VOC plume. Table 12 presents a summary of the groundwater elevations at the recovery wells and at select monitor well locations that were used to update the capture zone figures discussed in the next section.

Water-level monitoring was conducted using the piezometers in Crooked Pond, Lily Pond, and five locations in Ligonee Brook during March and September 2010 to assess the potential for impacts by the FSP&T system on water levels in these surface-water bodies. The

Whaler's pond and Round Pond piezometers were missing during the 2010 monitoring events. Because historical data has shown that the FSP&T system has not impacted the water levels in these surface-water bodies, these piezometers will not be replaced at this time. The remaining piezometers will continue to be monitored on a semi-annual basis. Accompanying pond and creek hydrograph data are included as Appendix C.

Groundwater levels and pond water levels are measured in the piezometers to determine the difference between the potentiometric heads in the underlying aquifer and the pond water levels. Based on an independent review of 2001 thru 2007 water level data by Inter-Science Research Associates, Inc. (IRA) in the report titled "Recommendations for Continued Salinity, Groundwater Elevation and Surface Water Elevation Monitoring," which was included in Appendix D of the 2007 annual summary report, the operation of the FSP&T system does not have a measurable impact on the water levels in the cove and ponds. Groundwater levels and pond water levels measured during 2010 are consistent with historic trends indicating that the conclusions reached in 2007 are still applicable.

Supplemental background groundwater elevation data are presented to provide information about groundwater elevations for the region and were obtained from the United States Geological Survey (USGS) monitor well (identified as USGS well number 405756072173502 S 8833.2) located near Crooked Pond from January 1, 2010 to December 31, 2010, which are presented in Appendix D. Water-level data are both downloaded from the USGS website and periodically measured as part of the monitoring program. The N.G.V.D. 1929 is used as the reference datum for reporting groundwater elevations. This USGS monitor well is close enough to the site to be able to reflect local patterns in groundwater elevation fluctuations but not close enough to be influenced by the operation of the FSP&T system. This USGS well is located approximately one mile hydraulically upgradient of the Site. Water elevations measured at the USGS well indicate fluctuations of over four feet during the course of the year. The highest water elevations occurred in May, and the lowest water elevations occurred in December. Data were not collected or recorded by the USGS during the month of June.

2. Capture Zone Evaluation

An analysis of the capture zone was completed for the Site by preparing groundwater elevation contour maps using March and September 2010 data. Figures 3 and 4 show the March 2010 groundwater flow conditions when the FSP&T and FP&T systems were not operating (static conditions) and during pumping conditions, respectively. Figures 5 and 6 show the September 2010 groundwater flow conditions when the FSP&T and FP&T systems were not operating and when the FSP&T system was operating, respectively. The FP&T system was shut down in April to assess the rebound of contaminant concentrations in the FDSA and was not operating during September 2010.

In figures 3 and 5, the groundwater flow direction is to the north and northwest. Figures 4 and 6 show the influence on the groundwater flow patterns when the FSP&T recovery wells are operating. Capture zone lines for each recovery well are shown as dashed red lines on figures 4 and 6. In order to evaluate the capture zones, the PCE plume maps for March and September 2010 are shown on figures 7 and 8, respectively. Similarly the TCA plume maps for March and September 2010 are shown on figures 9 and 10, respectively. Both sets of plume maps are discussed in the "Groundwater Plume" section of the report.

Based on comparison of the capture zones shown on figures 4 and 6 with the plumes shown on figures 7, 8, 9 and 10, the contaminant plume is being effectively captured by the FSP&T remediation system with the exception of the residual concentrations below ARARs in the vicinity of the MW-49 well cluster. During the September semi-annual sampling event, PCE was not detected in the groundwater samples collected from the MW-49 well cluster. The MW-49 well cluster is outside of the capture zone, however, the decrease in PCE concentrations over time at this location suggests that, along with natural attenuation, the operation of RW-9 may have an indirect impact on groundwater quality in this area.

3. Flora and Fauna Monitoring

IRA conducts quarterly (winter, spring, summer and fall) flora and fauna inspections of the wetlands near Ligonee brook and Sag Harbor Cove. The quarterly reports provided by IRA have been included in Appendix E. IRA records and analyzes long term trends to determine if the operation of the groundwater remediation system has made any measurable alteration in the flora and fauna present in the Ligonee Brook and Ligonee Creek estuary. Based on IRA's

conclusions, the operation of the FSP&T system has had no measurable effects on flora and fauna in the area.

G. Groundwater Plume

In addition to measuring water levels, water samples were collected from select monitor wells and recovery wells for laboratory analyses in March and September 2010. The groundwater quality data were used to prepare updated PCE and TCA plume maps. Figures 7 and 8 present the PCE plume maps for March and September 2010, respectively. Figures 9 and 10 present the TCA plume map for March and September 2010, respectively. Table 13 and Graph 5 show total VOCs recovered by the FSP&T system and influent PCE concentrations from November 26, 2002 to December 29, 2010.

1. PCE Plume

The concentrations in the samples collected to delineate the regional PCE plume in September 2010 decreased slightly when compared to the concentrations in samples collected to delineate the PCE plume in March 2010. As a result the approximate size of the September 2010 plume decreased slightly compared to the PCE plume in March 2010. In general, the PCE concentrations near RW-6 and RW-7, the area of historically highest concentrations in the downgradient plume, have decreased slightly during 2010.

The FDSA PCE plume map shows that the approximate lateral extent of the PCE plume remained the same as in 2010, while the size of the area of higher concentrations within the plume at the FDSA increased from March to September 2010. The peak PCE concentration in the groundwater in the FDSA was 190 µg/l in March 2010 and 180 µg/l in September 2010.

Figure 11 presents the pre-remediation, October 2007 and the September 2010 regional PCE plume maps. PCE concentrations in the groundwater continued to decrease between October 2007 and September 2010. The comparison of the October 2007 and September 2010 plume maps indicates that the FSP&T system continues to be effective at remediating the VOCs in the plume. During 2010, the overall horizontal extent of the plume remained approximately the same size as in 2009, however, the concentrations within the plume continued to decrease. As the highest concentrations of contaminants are now lower than the historically detected concentrations, and are either approaching or below the ARARs, the rate at which PCE is

recovered and the rate at which concentrations decrease in the groundwater will slow. Past experience with the pump-and-treat methods of groundwater remediation has shown that there would initially be a rapid decline in the contaminant concentrations in groundwater but eventually the rate of decline will slow. As concentrations decrease, natural fluctuations in groundwater quality become more apparent and can influence how the plume is depicted on maps.

2. TCA Plume

The concentrations in the groundwater samples collected from the monitor and recovery wells to delineate the regional TCA plume remained similar or increase slightly when compared to the 2009 groundwater quality. The highest concentrations detected for each sampling event, 18 µg/l and 9.9 µg/l, in March and September 2010, respectively, were in the groundwater samples collected from MW-53, located along Carroll Street. TCA was not detected in groundwater samples collected during March and September of 2009 from the FDSA, low concentrations (below ARARs) were detected in monthly samples collected from FRW-1 during January, April and July 2009 only; however TCA detections in the groundwater samples collected from the FDSA increased during 2010.

The TCA concentrations in the groundwater continued to decrease slightly since 2009. However, the overall extent of the TCA plume appears to have increased. This increase in the TCA plume size is attributable to small fluctuations in the groundwater quality, at lower concentrations small fluctuations are amplified and influence to a greater degree how the plume is depicted on a map. Even though the horizontal extent of the plume increased slightly when compared to the plume extent in 2009, the concentrations within the plume decreased slightly. As the highest concentrations are either approaching or are below the ARARs, the rate at which TCA is recovered and the rate at which concentrations in the groundwater decrease will diminish.

H. Cross-Sections

During 2010, LBGES updated cross-sections for select time periods along the plume from Lily Pond to the MW-50 cluster located on Morris Cove Lane for the purpose of evaluating information from which to assess the potential to shut down select recovery wells. The cross-sections show the well locations along the cross-section, approximate extent of geologic units, screen settings, recovery well pump settings, static and pumping groundwater elevations as well as PCE, TCA, TCE concentrations and approximate plume outlines. The cross-sections were completed using the available geologic information for the site obtained from geologic logs for the wells identified on the cross-sections. The cross-sections are included in Appendix F.

The selected time periods for the cross-sections include June and July 2000, (pre-remediation contaminant concentrations), September 2004 (approximately 2 years after FSP&T system startup) and October 2007 (5 years after startup), and September 2010 showing the most current conditions. Static groundwater elevations are only shown for September 2010 because changes from year to year are negligible due to the vertical scale of the cross-sections.

The cross-sections show the decreasing size of the PCE plume and decreasing concentrations with time. The June and July 2000 cross-section shows that the pre-remediation plume migrated beneath Sag Harbor Cove. However, with the operation of the FSP&T system the plume's migration was inhibited and the size of the plume decreased with time. The data illustrated by the cross-sections confirm that the plume is not discharging into Sag Harbor Cove.

III. FOCUSED PUMP AND TREAT SYSTEM AND FDSA WATER QUALITY

In September 2008, subsurface piping was installed to connect the discharge of the FP&T system to the EQ tank of the FSP&T system. Following that work, the FP&T system was restarted and operated until April 2010. FRW-3 was turned off on April 8, 2010 and FRW-1, 2 and 4 were turned off on April 13, 2010 because of very low flow from the wells. The wells were scheduled to be restarted in July 2010 following a short down period to assess the rebound of the COC concentrations. However, due to the UIC problems of the FSP&T system and subsequent necessary maintenance activities, the FP&T recovery wells remained off until January 2011. Monthly sampling of the FRWs continued in order to assess the trends in water quality and a summary of these trends is provided below.

Prior to the shutdown of the FRWs, the groundwater quality fluctuation for the COCs in the FDSA were consistent with historical trends over the past couple of years and PCE continued to be detected at higher concentrations compared to other COCs. Approximately 1 to 6 months after the shutdown of the FP&T system, TCE and 12DCE concentrations increased in the groundwater at FRW-1, 2 and 3. Because TCE and 12DCE are daughter products of PCE, this trend suggests the aquifer conditions in the vicinity of these wells became more anaerobic, thereby promoting the biodegradation of PCE to its daughter products. Further evidence of biodegradation is provided in the water quality results for March and September 2010 for monitor well MW98-05A (located in the hot spot of the FDSA). The contaminant concentrations were:

Contaminant	March 2010	September 2010
PCE	65 µg/l	ND<1.0 µg/l
TCE	6.2 µg/l	ND<1.0 µg/l
12DCE	9.8 µg/l	41 µg/l
VC	ND<1.0 µg/l	7.9 µg/l

Additional evidence that suggest that anaerobic conditions are present in the FDSA is the decrease in ORP from March (84 mV) to September (-39 mV) at monitor well MW98-05A.

The concentration of PCE decreased in FRW-4 following the shutdown of this well. FRW-4 is located in a less contaminated portion of the FDSA so it is possible that while FRW-4 is pumping water, it is drawing groundwater from more contaminated areas of the FDSA. This situation may explain the slightly higher PCE concentrations detected in water samples from this well when it is operating. The remaining COCs were below ARARs in FRW-4 in 2010.

A small increase in TCA concentrations was detected in the water samples from FRW-1 from August to October, which may also be related to the shutdown of the FP&T system in April. The TCA concentrations in groundwater samples from FRW-2, 3 and 4 continued to remain at low concentrations following the FP&T shutdown, and in most cases, were either below the ARARs or below laboratory detection limits in 2010. Tables 14, 15, 16 and 17 and Graphs 6, 7, 8 and 9 show the VOC concentrations in FRW-1 through 4, respectively.

Bromodichloromethane and chloroform were detected in the groundwater from FRW-2 and FRW-3 from May to November, with the highest concentrations being detected in May; after which concentrations of these compounds continually decreased with time in both wells. It is possible a small quantity of chlorine solution, which was used to clean the below-grade pipes for FRW-2 and FRW-3 on May 5, 2010, may have caused these compounds to be present in the groundwater near these wells. Since November 2010, these compounds have not been detected above laboratory reporting limits in groundwater samples from either well.

Table 18 presents groundwater quality parameters measured in the field at the FP&T recovery wells during 2010. The table includes pH, temperature, turbidity, dissolved oxygen (DO), conductivity, and oxidation reduction potential (ORP). A calibrated Horiba U-22 water quality meter was used for all the measurements in 2010. The pH of the groundwater measured at the FDSA recovery wells ranged from 5.58 to 7.29, which is typical for groundwater in the northeastern United States. The ORP values fluctuated significantly from month-to-month in each well which suggested periods of aerobic and anaerobic conditions occurred in the aquifer in 2010. The concentration of DO in the water measured from the FP&T system sample ports suggests aerobic conditions in the aquifer, however, DO concentrations measured in water samples directly from the FRWs are typically lower than that measured at the sample port (i.e. in 2010, DO concentrations in FDSA wells ranged from 1.1 to 2.3 mg/l) and are more representative of current aquifer conditions. The reasons for the higher DO concentrations observed from the sample ports of the FRWs are most likely caused by aeration of the water during pumping, as previously documented in the first quarter 2008 report for the FP&T system (dated on April 22, 2008).

In March and September 2010, toluene was detected in the groundwater at monitor well MW98-05B at a concentration of 440 µg/l and 54 µg/l, respectively. The ARAR for toluene in the groundwater is 5 µg/l. Toluene has been detected routinely in the groundwater from this well for the past three years at concentrations ranging from 19 to 440 µg/l. This monitor well is screened below the clay lens so the operation of the FP&T system (i.e. FRWs are screened at or above the clay lens) most likely does not have a significant impact on the water quality observed at this well.

A. Operation and Maintenance (O&M) Activities

A summary of the major O&M activities for 2010 is presented below:

- cleaned accumulated iron bacteria from the FP&T system equipment;
- evacuated iron bacteria from the FP&T system holding tank (May 2010);
- removed encrustation from the below-grade piping between the FP&T and FSP&T systems;
- conducted routine O&M activities that included replacing bag filters, sampling recovery wells, inspecting and cleaning flow meters, and troubleshooting/resetting alarms;
- redeveloped the FP&T recovery wells (FRW-1, 2, 3 and 4); and
- replaced the malfunctioning FRW-3 pump and motor.

B. Geologic Cross-Sections

During 2010, LBGES updated the geologic cross-sections for the FDSA. The cross-sections show the approximate extent of geologic units, well locations, screen settings in the recovery wells, static and pumping groundwater elevations; as well as PCE, TCA, TCE concentrations and approximate plume outlines. The cross-sections were completed using the available geologic information for the site obtained from geologic logs for the wells identified on the cross-sections. The cross-sections are included in Appendix G.

The selected time periods for the cross-sections include June and July 2000, September 2004, October 2007 and September 2010. The cross-sections show slight changes in the plume shape and size with time. A slight decrease in contaminant concentrations has occurred, however, the highest concentrations continue to be detected in the same general location in the FDSA.

IV. HAZARDOUS WASTE

Hazardous waste generated at the Site in 2010 includes the following items, along with their associated weights or volumes.

- Used bag filters and excess sediment – 2,075 pounds

- Wastewater generated by cleaning pipes – 4,849 gallons

All hazardous waste was shipped offsite to licensed disposal facilities using standard hazardous waste manifest procedures. Hazardous Waste Manifests for waste generated in 2010 are included as Appendix H.

V. PROPOSED CHANGES TO THE OPERATION OF THE FSP&T AND FP&T SYSTEMS

A. FSP&T System

Based on the improving water quality and the results of the capture zones developed from manual depth to groundwater levels measured during March 2010, LBGES recommends discontinuing the operation of RW-3, RW-5, RW-8 and RW-9.

A reasonable assumption can be made based on the locations of these recovery wells with respect to recovery wells RW-2, RW-4, RW-6 and RW-7, the current position of the PCE plume shown on figures 7 and 8 and the capture zones as shown on figures 4 and 6 that the remaining extent of the downgradient plume will continue to be captured with the operation of the remaining FSP&T recovery wells at their current pumping rates. Because the recovery wells are located generally in a downgradient line (direction) instead of cross gradient, shutting down the noted wells should have minimal impacts to the capture zones of the recovery wells that will remain operating. The concentrations of the COCs in the groundwater at RW-3, RW-5, RW-8 and RW-9 have been below ARARs on a monthly basis for at least three years. The three year timeframe is consistent with the timeframe stated in the aquifer restoration goals described in Section E.2.a in the Statement of Work, Appendix B of the Consent Decree for the Site.

The concentrations of PCE, TCA and TCE in the groundwater samples collected from RW-3 have been below the ARARs for 42 consecutive months (3 years and 6 months). There have been no PCE detections above laboratory detection limits in this recovery well since July 2007. TCA and TCE continues to be detected sporadically, all detection have been below laboratory detection limits since February 2006 and July 2007, respectively. In the event that COCs were to migrate downgradient from the FDSA, they would be recovered by recovery well RW-2.

The concentrations of PCE, TCA and TCE in the groundwater samples collected from RW-5 have been below the ARARs for 49 consecutive months (4 years and 1 month). There have been no PCE detections above laboratory detection limits in this recovery well since February 2007; TCE has not been detected above laboratory detection limits since 2004. TCA continues to be detected sporadically; all detections have been below the ARARs since May 2005. In the event that COCs were to migrate downgradient past RW-5, they would be recovered by RW-6 and 7 which will remain operating.

The concentrations of PCE, TCA and TCE in the groundwater samples collected from RW-8 have been below the ARARs for 66 consecutive months (5 years and 6 months). There have been no PCE, TCA or TCE detections above laboratory detection limits in this recovery well since June 2008. In the event that COCs were to rebound above ARARs in the vicinity of RW-8 or wells downgradient of RW-7; RW-8 will be restarted.

The concentrations of PCE, TCA and TCE in the groundwater samples collected from RW-9 have been below the ARARs for 66 consecutive months (5 years and 6 months). There have been no PCE, TCA or TCE detections above laboratory detection limits in this recovery well since February of 2007. As stated in Section F.2 above, the MW-49A,B,C well cluster is believed to be outside of the RW-9's capture zone, however, RW-9 may have an indirect impact on the groundwater quality in this area. PCE concentrations have not been detected in the groundwater samples collected from MW-49A and C since September 2006, and have been below ARARs in groundwater samples from MW-49B since October 2007. September 2010 was the first sampling event since the initiation of groundwater remediation during which PCE was not detected in groundwater samples from MW-49B. TCE and TCA concentrations have not been detected in groundwater samples from well cluster MW-49A,B,C since March 2004. The frequency of groundwater sampling at this well cluster will be increased for a period of time after the proposed recovery well shut down in order to assess the possible rebound of contaminant concentrations. Following EPA approval of the proposed changes to the operation of the FSP&T, a formal Limited Recovery Well Shut-Down Plan will be submitted. The Plan will include a revised groundwater monitoring schedule to document the continuing capture of the plume and to detect any rebound of plume concentrations. The plan will also include, but is not limited to:

- an increase in the frequency of monitoring of groundwater quality at the shut down recovery wells and select monitor wells;
- depth-to-water measurements for capture zone evaluation with the new pumping scenario; and
- if concentrations of the COCs in any of the shutdown recovery wells rebound above the ARARs for two consecutive monitoring events, then those recovery wells would be restarted.

With the reduced number of operating recovery wells, the total combined flow into the FSP&T treatment system will correspondingly be reduced. The reduced flow will require modifications to the FSP&T which may include the following:

1. modifications to the piping to reduce water hammer, which would be caused by the cycling of the transfer pumps when the flow is reduced; or
2. recycling flow from transfer pumps TP-1A and 1B back to the equalization tank to prevent the transfer pumps from cycling.

B. FP&T System

Based on the improving water quality of the downgradient plume in the regional aquifer, LBGES foresees the possibility of discontinuing the operation of the remaining downgradient recovery wells in the next few years and operating only the FRWs in the FDSA until the water quality in the FDSA achieves the ARARs established for the Site. As such, LBGES recommends evaluating the viability of adding additional recovery wells on the SHI property and changing the treatment of recovered water from liquid-phase carbon to a shallow tray air stripper. The change in the treatment would address the short circuiting of the carbon observed prior to connecting the FP&T to the FSP&T system.

VI. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the performance of the FSP&T system and FP&T system in 2010.

A. FSP&T System

1. The recommended SPDES discharge quality criteria for VOCs were not exceeded in any discharge samples in 2010.

2. In the second half of 2010, the concentrations of PCE, TCE and TCA in the downgradient plume of impacted groundwater in the Upper Glacial Aquifer were below ARAR in samples from all recovery wells and monitor wells tested, with the exception of the concentration of PCE in the sample from RW-6 of 5.3 µg/l in November, the concentration of TCA in the sample from RW-4 of 5.6 µg/l in July, and the concentration of TCA in the sample from MW-53 of 9.9 µg/l in September.

3. The concentrations of PCE, TCE and TCA continue to slowly decrease with time in the downgradient plume. The highest concentrations of PCE, TCE and TCA in the downgradient plume remain along Carroll Street in the vicinity of MW-53, RW-6 and RW-7.

4. Based on the improving water quality in the downgradient plume and the defined capture zones developed from measured groundwater levels LBGES recommends discontinuing the operation of RW-3, RW-5, RW-8 and RW-9. Active groundwater remediation for the downgradient plume will continue with downgradient recovery wells RW-2, RW-4, RW-6 and RW-7.

5. Concentrations of PCE, TCE and TCA were below the ARARs (5 µg/l) and below the laboratory reporting limits of 1 µg/l in the groundwater samples from RW-1 from the start of FSP&T system operation in December 2002 to July 2005, at which time operation of the well was discontinued. The quality of the groundwater samples collected from RW-1 in March and September 2010 continues to meet the ARARs; the concentrations of PCE, TCE and TCA being below laboratory reporting limits. Therefore, this recovery well will be left off. Semi-annual collection of samples from this well is scheduled for 2011.

6. Cross-sections along the plume from Lily Pond to the MW-50 cluster show that with the operation of the FSP&T system the PCE plume is not discharging to Sag Harbor

Cove or Ligonee Creek. The cross-sections also illustrate the decreasing size of the PCE plume with the operation of the FSP&T system with time.

7. Groundwater elevation contour maps, from which the capture zones of the recovery wells are defined, provide evidence that the plume is being captured by the recovery wells. The exception to this statement is of the COCs in monitor well MW-49B near RW-9. Possible reasons why water quality has improved with time in MW-49B may be natural attenuation and indirect influence of operation of RW-9.

8. Surface and groundwater levels at Crooked Pond, Lily Pond and Ligonee Brook were not impacted by the operation of the FSP&T System. Water levels at these locations were measured in March and September 2010. Groundwater levels in the piezometers at these locations will continue to be measured during semi-annual groundwater monitoring events.

9. The maximum allowable vapor emissions from this system of 0.022 lbs/hr were not exceeded in 2010. Vapor emissions, averaging 0.00026 lbs/hr, remain well below the maximum allowable vapor emissions limit. LBGES will continue to analyze vapor samples on a monthly basis.

10. Airflow through the air-stripper tower in 2010 ranged from approximately 1,220 scfm to 1,827 scfm and was adequate to treat the water by stripping the COCs from the influent water. In 2010, a decrease in air flow with time was observed and troubleshooting in 2011 will be continued to determine the cause of the decreased air flow. Corrective actions to restore air flow will be taken as necessary.

11. Recovery well rehabilitation to improve well performance was completed in April and May 2010 for recovery wells RW-2, 4, 5, 6, 7, 8 and 9. RW-3 was rehabilitated in September 2010. The well rehabilitation efforts continue to be effective in the wells where high iron concentrations in the groundwater result in biofouling that is the primary cause of reduced yield (RW-2, 4, 8 and 9). This finding was based on an

increase in specific capacity, an increase in the pumping rate, or a reduction in the percent motor speed for a given flow setting after rehabilitation of the wells. For additional information regarding the 2010 well rehabilitation work and results, refer to Appendix A.

12. All operating recovery wells will be evaluated in 2011 to determine what level of well rehabilitation is needed at that time. Well rehabilitation (with the use of Unicid™) is currently projected for RW-2, 4, 8 and 9.

13. Following well rehabilitation activities, biofouling and iron encrustation was removed from the sump of the air-stripper tower in May 2010 and taken from the property for disposal as hazardous waste. The accumulation of biofouling and iron encrustation is caused by normal system operation. No significant accumulation of biofouling or iron encrustation was observed on the packing material during 2010, however, algae was observed to be growing out of the iron bacteria which covered the influent distribution trough of the air-stripper tower. The algae was removed during the May 2010 maintenance activities. The pattern of biofouling and iron encrustation accumulation in the treatment system suggests that the iron bacteria in the treated water continue to pass through the packing of the tower. In 2011, the air-stripper tower packing material and the tower sump will be inspected periodically for biofouling and iron encrustation, and backwashed and/or cleaned as needed.

14. Biofouling and iron encrustation was removed from the bag filter housing, transfer tank and equalization tank in May 2010. The biofouling and iron encrustation from these tanks were removed and disposed of as hazardous waste following well rehabilitation activities. The accumulation of biofouling and iron encrustation at these locations is caused by normal system operation.

15. A total of 221.1 lbs of VOCs has been recovered by the FSP&T and FP&T system since startup in December 2002. The recovered mass of VOCs exceeds the initial general estimate for total dissolved-phase VOCs (183 lbs) provided by the original

groundwater model. This difference suggests that some of the COC mass that was recovered (and continues to be recovered) is being desorbed from the soil to the groundwater. Continuation of the exponentially decreasing rate of VOC recovery (based on COC desorption rates) is anticipated with ongoing operation of the FSP&T system.

16. During 2010, the FSP&T system operated an average of 66% of the time. The FSP&T system was down for extended periods during the month of May for scheduled maintenance; during June due to a leaking below-grade pipe cleanout port and associated repairs; during July and September due to problems associated with the user interface computer (UIC); and during August due to a leaking pipe fitting in the FSP&T system.

B. FP&T System

1. The FP&T system was shut down in April 2010 because of very low flow from the wells and then was left off for a short down period to assess the rebound of contaminant concentrations in the FDSA. The FP&T was to have been restarted in July 2010; however, due to problems with the FSP&T UIC, the FP&T system could not be restarted until January 2011. Active groundwater remediation of the FDSA is projected to continue with the existing FSP&T system for 2011. In the event contaminated water migrates from the perched conditions of the FDSA to the Upper Glacial Aquifer, it will be captured by the onsite recovery wells of the FSP&T system.

2. Concentrations of PCE, TCE, 1,2-DCE and vinyl chloride (VC) in the groundwater samples from the FP&T recovery wells varied throughout the year. The highest PCE concentrations were detected in groundwater samples from FRW-1 during October 2010.

3. Following the shutdown of the FP&T system in April 2010; chloroform was detected above the ARAR in groundwater samples from FRW-2 and FRW-3. The

concentrations decreased each month and chloroform was not detected in FRW-2 and FRW-3 in November and October, respectively.

4. Concentrations of PCE, TCE and 12DCE were below the ARAR (5 µg/l) and VC was below the New York State Department of Environmental Conservation (NYDEC) ambient water quality standard (1 µg/l) in groundwater samples from FRW-4 during the second, third and fourth quarters of 2010.

5. Recovery well maintenance to improve well performance was completed in May 2010 for recovery wells FRW-1 thru FRW-4. The maintenance event consisted of evacuating accumulated sediment from the recovery well sumps, and cleaning and inspecting the pumps. All recovery wells will be routinely evaluated in 2011 and maintenance will be scheduled as needed.

6. Following recovery well maintenance activity, sediment was evacuated from the evacuation tank. The below-grade piping connecting the FP&T and FSP&T systems was cleaned once during 2010. Flow from the FP&T system to the FSP&T system will be monitored during 2011 and maintenance will be scheduled as needed.

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TABLES

GRAPHS

FIGURES

APPENDIX A

Recovery Well Rehabilitation -2010

APPENDIX B

March and September 2010 Groundwater Laboratory Reports
(On CD in attached pocket)

APPENDIX C

Piezometer Hydrographs

APPENDIX D

USGS Monitor Well Daily Groundwater Elevations for 2010

APPENDIX E

Flora and Fauna Quarterly Reports

APPENDIX F

Geologic Cross-Sections Along the Plume

APPENDIX G

Source Area Geologic Cross-Sections

APPENDIX H

2010 Hazardous Waste Manifests