GROUNDWATER EXTRACTION AND TREATMENT SYSTEM ANNUAL OPERATIONS REPORT FOR THE PERIOD JANUARY 1, 2009 THROUGH DECEMBER 31, 2009 FORMER YORK NAVAL ORDNANCE PLANT

SAIC Project 4501020024 / 1000 / 600

Prepared for:

Harley-Davidson Motor Company Operations, Inc.

York, PA

March 2010

From Science to Solutions

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March 2009

Respectfully submitted,

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cfm	-	cubic feet per minute
cis-1,2-DCE	-	cis-1,2-dichloroethene
DCE	-	1,1-dichloroethene
EPA	-	United States Environmental Protection Agency
EPBA	-	Eastern Property Boundary Area
GAC	-	granular-activated carbon
gpd	-	gallons per day
gpm	-	gallons per minute
GWTS	-	groundwater extraction and treatment system
Harley-Davidson	-	Harley-Davidson Motor Company Operations, Inc.
IWTP	-	industrial wastewater treatment plant
lbs/day	-	pounds per day
MCL	-	maximum contaminant level
mg/L	-	milligrams per liter
NB4	-	North Building 4
NPBA	-	Northeast Property Boundary Area
NPDES	-	National Pollutant Discharge Elimination System
PADEP	-	Pennsylvania Department of Environmental Protection
PCE	-	tetrachloroethene
PTA	-	packed tower aerator
RI	-	remedial investigation
SAIC	-	Science Applications International Corporation
SPBA	-	Southeast Property Boundary Area
SRBC	-	Susquehanna River Basin Commission
TCA	-	1,1,1-trichloroethane
TCE	-	trichloroethene
TFO	-	thermal fume oxidizer
μg/L	-	micrograms per liter
VOCs	-	volatile organic compounds
WPL	-	West Parking Lot

EXECUTIVE SUMMARY

The groundwater extraction and treatment system (GWTS) for the former York Naval Ordnance Plant (fYNOP) located at Harley-Davidson Motor Company Operations, Inc. (Harley-Davidson) in York, Pennsylvania, has been in operation since November 1990. The system operated with few interruptions during the report period of January 1, 2009, through December 31, 2009. The GWTS, including a soil vapor extraction system, is designed to accomplish the following:

1. Prevent off-site groundwater migration in the Northeast Property Boundary Area (NPBA).

2. Remove volatile organic compound (VOC)-impacted groundwater in the 1,1,1-trichloroethane (TCA) Tank Area near Building 2.

3. Prevent off-site migration of groundwater in the West Parking Lot (WPL) Area.

4. Remove VOC-impacted groundwater at the former degreaser in the North Building 4 (NB4) Area.

5. Collect groundwater from the Building 3 Softail Dewatering Area's groundwater interceptor trench system east of the Softail plant which prevents VOC-impacted groundwater from discharging to the surface or into the building.

The extraction system consists of fifteen (15) active extraction wells: nine (9) in the NPBA, one (1) in the TCA Tank Area, four (4) in the WPL/NB4 Area, and the Softail Dewatering Area's interceptor trench system including one (1) well CW-19.

Several significant maintenance-related modifications or repairs were conducted during the 2009 report period. These included:

- Upgrading the TFO Lower Flammability Limit (LFL) meter with a Hydrogen fuel source
- Cleaning of the NPBA conveyance line using a water jetting technique
- Testing of a Variable Frequency Drive (VFD) to remotely control the flow of CW-6
- Installing a chlorine delivery system in CW-6 to control the iron bacteria
- Cleaning of the valves in the effluent pump valve vault
- Replacement of granular carbon in the off-gas treatment system

The permanent groundwater interceptor trench system at the Softail facility was operated for the entire reporting period. This collection system consists of a shallow interceptor trench (or toe drain), a deep interceptor trench and drain, and a capture well (CW-19). This system drains by gravity (except CW-19) to a pumping station which has automated controls.

Science Applications International Corporation (SAIC) estimates that approximately 1,584 pounds of VOCs were removed by the groundwater treatment system during the time period of January through December 2009. The total amount of groundwater extracted during this 12-month reporting period was approximately 161 million gallons. Since initiation of the program, approximately 37,056 pounds of VOCs have been removed.

Groundwater elevation data collected in June and December 2009 indicate that operation of groundwater extraction wells at the NPBA and the WPL resulted in areas of groundwater table depression. These depressions (or troughs) represent areas of groundwater capture that prevent off-site migration of VOC-impacted groundwater.

Extraction well CW-8 creates an area of groundwater depression in the TCA Tank Area. The pumping of this well prevents migration of VOCs from this interior plant area. Additionally, extraction well CW-15A (located at the northwestern corner of Building 4) has historically created a cone of depression in the area of a former degreaser capturing localized VOC-impacted groundwater. Groundwater elevation data collected in 2009 confirm that the groundwater level in these two pumping wells is at least three to four feet lower than in the surrounding monitoring wells. Extraction well CW-8 was off-line for repairs during the December 2009 round of site wide water levels, therefore no distinct cone of depression in the TCA Tank Area (Figure 3-2).

The combined influent total VOC concentrations in captured groundwater averaged 1,156 micrograms per liter (µg/L) during 2009. Trichloroethene (TCE), TCA, cis-1,2-dichloroethene (cis-1,2-DCE), and tetrachloroethene (PCE) are the predominant VOCs in the influent groundwater entering the Packed Tower Aerator (PTA). The PTA effluent was sampled and reported on a quarterly basis in 2009. The treatment system effluent has maintained non-detectable concentrations of target VOCs during this reporting period.

During 2009, the extraction wells, off-site monitoring locations, and key monitoring wells were sampled for priority pollutant VOCs, metals and cyanide. Site-wide water levels measured in June and December 2009 showed little variation in the configuration of the site groundwater table. Water levels measured in December were generally one to four feet higher compared to June. This difference in groundwater levels is consistent with the water level trends that are expected based on the natural recharge cycle.

Historically, VOC concentrations in the NPBA extraction wells show a generally decreasing trend since November 1990. Concentrations in the NPBA monitoring wells have fluctuated during this same time period. For 2009, analytical data continued to support these trends.

The VOC concentrations in the TCA Tank Area extraction well (CW-8) have exhibited a decreasing concentration trend since June 1996, with total VOC concentrations stabilizing in the 400 to 900 µg/L range since 2001. Concentrations in the TCA Tank Area monitoring wells have fluctuated but show a generally decreasing trend during this same time period.

VOC concentrations have generally decreased at the WPL extraction wells since May 1994. During this time, most of the WPL monitoring wells have exhibited a relatively flat or gradual decreasing concentration trend for the most prevalent VOC in this area (TCE). In 2009, similar trends are evident for all collection and monitoring wells in the WPL.

Off-site sampling of three local water supplies (one well and two springs) is routinely conducted proximal to the northern edge of the property. Laboratory analysis of these samples in 2009 detected no chemicals of concern common to Harley-Davidson groundwater. The off-site samples will continue to be collected as part of an annual monitoring program (every June).

1.0 INTRODUCTION

This report presents a summary of the operating record for the former York Naval Ordnance Plant (fYNOP) groundwater extraction and treatment system (GWTS) and groundwater quality data and groundwater level data monitored at the site. The fYNOP facility is located at the Harley-Davidson Motor Company Operations, Inc. (Harley-Davidson) York facility in Springettsbury Township, York, Pennsylvania, as shown on Figure 1-1. This report covers a 12-month period from January 1 through December 31, 2009. Groundwater quality data for monitoring wells were collected during the 2009 Key Well annual sampling event. An analysis of these data was presented under a separate report entitled 2009 Key Well Sampling Report (SAIC, January 2010). A more complete analysis of the larger data set will be conducted as part of the groundwater remedial investigation report, which will be completed this year.

At the fYNOP, groundwater is extracted from fourteen (14) wells (CW-1, CW-1A, CW-2 through CW-7, CW-7A, CW-8, CW-9, CW-13, CW-15A, and CW-17) operating in three (3) separate areas designated as the Northeast Property Boundary Area (NPBA), the West Parking Lot (WPL) Area (including the North Building 4 [NB4] Area), and the 1,1,1-trichloroethane (TCA) Tank Area. Groundwater is also extracted from a subsurface gravity drainage system located along the upgradient (eastern) perimeter of Harley-Davidson's Softail facility (Building 3). This collection system, known as the Softail Dewatering System, was implemented in 2002 and consists of approximately 800 feet of deep interceptor trench and approximately 600 feet of shallow interceptor trench (toe drain). The locations of these collection systems are shown on Figure 1-2.

All extracted groundwater is piped to a central treatment system, located in the groundwater treatment building (Building 41) for processing through a packed tower aerator (PTA) system prior to discharge to the Codorus Creek, designated as Outfall No. 003 (Figure 1-1). Figure 1-3 presents a schematic flow diagram for this system. Prior to May 1994, PTA off-gases were treated by a granular-activated carbon (GAC) filter system for removal of volatile organic compounds (VOCs) before being discharged to the atmosphere. In May 1994, a thermal fume oxidizer (TFO) was installed and brought on-line to thermally destroy VOCs prior to atmospheric discharge. The economics of utilizing the TFO versus using GAC are regularly evaluated, and the most cost-effective treatment method is used with the other system serving as a backup. For calendar year 2009, the GAC served as the primary treatment method, operating 100 percent of the time the GWTS operated.

The groundwater extraction and PTA treatment system was designed and installed pursuant to an order from the Pennsylvania Department of Environmental Protection (PADEP) dated September 11, 1990. In November 1990, 10 extraction wells in the NPBA and TCA Tank Areas were brought on-line, while ongoing studies were performed in the WPL. The WPL Area groundwater extraction system was brought on-line in May 1994. In conjunction with the WPL system start-up, PTA off-gases were redirected from the GAC filter to the TFO. Finally, the Softail Dewatering System was brought on-line in January 2004.

On December 2, 1993, the National Pollutant Discharge Elimination System (NPDES) permit No. PA0085677 was issued for the system. The most current permit renewal was issued by the PADEP on February 1, 2006. The renewed permit contained interim and final discharge limits

based on relocating the treated groundwater discharge from Johnson Run, a tributary of Codorus Creek, to the Codorus Creek. Since June 2007, treated groundwater has been collected in a wet well located immediately northwest of Building 41 (refer to Figure 1-2). From the wet well, groundwater is pumped through a force main to Outfall 003 located along the Codorus Creek.

The data presented in this annual report were collected by Science Applications International Corporation (SAIC) under contract to Harley-Davidson and are summarized in the following chapter format:

- Chapter 2.0, Geology and Hydrogeology, summarizes the hydrogeologic conditions of the site.

- Chapter 3.0, Site-Wide Groundwater Monitoring, summarizes groundwater levels and quality.

- Chapter 4.0, Groundwater Extraction and Treatment System, describes the design capacity of the system and presents the record of influent and effluent water quality. The VOC loading to the PTA and GAC/TFO unit also is presented.

- Chapter 5.0, NPBA Groundwater Extraction System, summarizes water levels and VOC concentrations for each extraction well in the NPBA. System performance is evaluated based upon observed trends in the data.

- Chapter 6.0, TCA Tank Area Groundwater Extraction System, describes operation and performance of extraction well CW-8 located in this area. Water levels and VOC concentration data are used to evaluate system performance.

- Chapter 7.0, West Parking Lot Groundwater Extraction System, describes the operation of extraction wells in this area. System performance, water level data, and VOC trends are presented.

- Chapter 8.0, Softail Dewatering System, describes the operation of the groundwater collection system in this area.

- Chapter 9.0, Southern Property Boundary Area Well Monitoring, describes the groundwater quality in this area where no groundwater extraction is currently occurring.

- Chapter 10.0, Eastern Area Well Monitoring, discusses the groundwater quality monitored in this area, which is upgradient of the treatment plant.

- Chapter 11.0, Additional Site-Wide Groundwater Chemistry, discusses the groundwater quality at selected wells across the site.

2.0 GEOLOGY AND HYDROGEOLOGY

Two geologic rock formations underlie the site. Solution-prone gray limestone underlies the flat lowland (western) portion of the site. Quartzitic sandstone underlying the more steeply sloping hills or upland area is present on the eastern part of the site. Groundwater beneath the site generally flows from the upland area at the eastern part of the site westward toward Codorus Creek. A detailed discussion of the geology and hydrogeology is included in a document prepared by SAIC in July 2006 entitled, "Field Sampling Plan for Supplemental Remedial Investigations."

3.0 SITE-WIDE GROUNDWATER MONITORING

The groundwater monitoring program at the Harley-Davidson site for this year consisted of:

- Measuring depth to water in all available monitoring and observation wells twice during the year,
- Sampling and chemical analysis of water from selected wells once during the year.

3.1 Groundwater Flow Direction

The depth to water was measured in site-wide groundwater wells two times during the reporting period (June 4 and 5, 2009 and December 15, 2009). These measurements were taken from approximately 170 points (including 2 surface water locations in Codorus Creek) during both the June and December groundwater level monitoring events. The depth to water data for these events were converted to groundwater surface elevations and are presented in Table A-1 (found in Appendix A). Figures 3-1 and 3-2 (included in pockets at the end of the report) identify the location of each well that was measured, including the classification as a groundwater extraction well (see the symbol of a circle with a cross and two quadrants filled in), a key groundwater monitoring well (see the symbol of a circle with a dot inside), or a groundwater monitoring well (see the symbol of a circle with a cross and all quadrants empty).

Figures 3-1 and 3-2 present the interpreted shallow groundwater table from water levels measured on June 4 and 5 and December 15, 2009. The groundwater contours presented on these maps were generated using only water levels collected from wells screened in the shallow portion of the aquifer. The general configuration of the water table in the eastern half of the site indicates a gradient toward the west-southwest. The water table gradient beneath the eastern portion of the site, underlain by sandstone, is relatively steep. The water table gradient in the western half of the site, underlain by limestone bedrock, is relatively flat, and generally westward towards the Codorus Creek.

An area centered around the Softail facility (Building 3) has a lower density of monitoring wells compared to the rest of the site. Groundwater contours in this area were adjusted to account for known surface seeps and the elevations of groundwater depression trenches actively collecting groundwater at the time of the survey. The trench locations and elevations are shown on Figures 3-1 and 3-2.

Figures 3-1 and 3-2 display general areas of groundwater depression as depicted by enclosed circles around active collection (pumping) wells at the site. Groundwater capture areas have also been approximated on Figures 3-1 and 3-2 using green lines. The capture zone boundaries represent a groundwater divide that is created by active pumping of collection wells. Groundwater on the inside of the capture zone boundary (i.e., toward the collection well) will flow toward the collection well while water on the outside of the capture zone boundary will flow in the direction of the natural gradient. Note that five locations (CW-1A, CW-2, CW-6, CW-8, and the Softail lift station) did not pump groundwater (or very little) on the day of the December water level measurement event due to low water conditions.

The capture areas were estimated by SAIC using preexisting knowledge obtained from groundwater pumping tests performed during the initial design phase of the groundwater collection systems, along with site-specific data including an evaluation of groundwater flow paths and a review of measured hydraulic gradients. The northern extent of the capture zone for the NPBA wells is based on limited information, due to the proximity of the property line and only one observation point (RW-2) on adjacent properties (at the time of the measurement events), but also benefits from observations made during pumping tests performed during design of the extraction system.

The June and December 2009 groundwater table contours are generally similar. In normal precipitation years, June water levels would be declining after winter recharge ceased in May. December water levels generally increase due to groundwater recharge, which starts when trees drop their leaves in October/November. Amount and timing of precipitation events result in the variations that are noted from year to year. A brief summary of seasonal water level fluctuations is presented below by bedrock aquifer type (also refer to Table 3-1, Table 3-2, and Figure 3-3):

- The water levels in the eastern portion of the site that is underlain by sandstone were approximately one to four feet higher in December 2009 compared to June 2009. This determination was made using data for wells in areas that are not affected by the NPBA extraction wells. The difference in groundwater levels is consistent with the water level trends that are expected based on the natural recharge cycle. Calendar year 2009 was a slightly wetter than normal year (refer to Table 3-1, Table 3-2 and Figure 3-3).

- Water levels in the limestone aquifer were generally one to two feet higher in December 2009 compared to June 2009. This difference in groundwater levels is consistent with the water level trends that are expected based on the natural recharge cycle. The months of June and December were both wetter than normal in 2009 compared to an average year (refer to Table 3-1).

3.2 Site-Wide Groundwater Sampling

Groundwater chemistry at the Harley-Davidson facility has historically been monitored by sampling a select group of monitoring wells (called “key wells”) and active groundwater extraction wells. The key well program was initiated in 1992. Selected characterization wells were designated as “key wells” based upon location and spatial distribution in order to provide representative groundwater quality data across the site. The key wells have historically been sampled to maintain a baseline of groundwater quality and to monitor changes in groundwater chemistry over time. Each year, the list of wells to be sampled is reviewed, and changes are made to cover new areas of concern, to replace wells that are abandoned for various reasons, or to achieve a better representation of the groundwater quality beneath the site. The key well groundwater sampling and analysis event has typically been conducted during June of each calendar year.

A total of 113 wells were sampled during the 2009 Key Well sampling event.

Presenting and evaluating the results of all groundwater analytical results for 2009 is beyond the scope of this report. A complete analysis of these data was presented under a separate report

entitled 2009 Key Well Sampling Report (SAIC, January 2010). This annual O&M report contains the analytical results from the 2009 Key Well Sampling Report.

General groundwater quality trends based on current and past analytical results are discussed in subsequent chapters of this report. A summary of the analytical results from the 2009 key well sampling is presented on Table A-2. The groundwater extraction well analytical results are displayed on Table A-3. Graduated symbol posting maps for the total VOCs, trichloroethene (TCE), tetrachloroethene (PCE), total chromium (Cr^{+3} and Cr^{+6}, dissolved phase), and dissolved hexavalent chromium (Cr^{+6}) concentrations detected in the key wells in 2009 have also been included as Figures 3-4 through 3-8.

4.0 GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

The GWTS serves to remediate groundwater containing dissolved VOCs that is recovered from five main areas of the site: NPBA, TCA Tank, NB4, WPL, and the Softail dewatering system.

4.1 System Description

Extraction wells within the NPBA, TCA Tank Area, NB4, and the WPL groundwater extraction areas remove groundwater by means of electric submersible pumps. A lift station pump removes water from a series of collection trenches in the vicinity of the Softail plant. The pumping water level within each extraction well is maintained by liquid level probes and control circuitry between the "on" and "off" probes. This produces an area of drawdown and groundwater capture. The extracted groundwater is conveyed via underground piping to the treatment system where the dissolved VOCs are removed from the groundwater.

The groundwater treatment system is housed in a 30-foot by 40-foot building attached to the west wall of the industrial wastewater treatment plant (IWTP). The process flow diagram for the system is presented in Figure 1-3. The treatment system consists of a 2,600-gallon equalization tank; a 5-foot-diameter by 47-foot-high PTA capable of treating 400 gallons per minute (gpm) of water; and a 10,000-pound vapor-phase GAC unit for PTA off-gas treatment

Extracted groundwater is pumped from the equalization tank at a maximum flow rate of 400 gpm to the top of the PTA. The water is then distributed evenly over the top of the polypropylene packing and flows down through the 36-foot-high packed section of the PTA. A 4,000 cubic foot per minute (cfm) centrifugal blower draws air through the PTA column. The VOCs are effectively "stripped" from the water and then adsorbed to the GAC. The treated groundwater flows to a groundwater pump station located on the north side of Building 41 where it is pumped to a storm water outlet (Outfall No. 3) and discharged to Codorus Creek.

The groundwater treatment system is equipped with a PC-based RSView monitoring system. Remote computer terminals are located in both Harley-Davidson and SAIC offices where extraction well pumping rates and treatment processes can be monitored. System and extraction well pumping rates are adjusted at the site. System data, recorded in an Access® data base (via the RSView monitoring system) during 2009, is included in Appendix B.

4.2 System Maintenance and Modifications

Twice a month, system inspections are performed on the groundwater treatment system at the Harley-Davidson facility. The purpose of these inspections is to ensure effective operation of the system. A summary of operation and maintenance data recorded during these visits is included in Appendix C. Items reviewed during each visit include the following:

- Check for system alarms.
- Inspect control panels.
- Check water conveyance line pressures.
- Check pressure differential across the stripping tower.
- Check piping and pumps for leaks.

- Clean y-strainers of buildup, etc., as necessary.
- Check and record amperage draws on all motors (quarterly).
- Record flow rates on recovery wells and transfer pump.
- Inspect TFO components.

Several significant maintenance-related modifications or repairs were identified and addressed during the report period. A brief summary is presented below:

- The Lower Explosive Limit (LEL) meter was showing age. The old meter was upgraded to a Hydrogen fueled Lower Flammability Limit (LFL) meter. During start-up testing, an air flow blockage was discovered in the heat exchanger of the TFO. The TFO was a back up treatment method. Due to the high cost of repairing the heat exchanger. A decision was made to retire the system. The TFO will no longer be utilized in the groundwater treatment process.

- In November 2009 the entire NPBA conveyance line was cleaned from the NPBA control building to the GWTP using a water jetting technique. Iron precipitation had built up in the line triggering critical alarms due to high pressure buildup in the line.

- A VFD was installed in CW-6 on August 6, 2009. This setup was installed to allow the flexibility to remotely adjust flow from this well using the human machine interface (HMI). The VFD was compared to the actuated valve installed on CW-5 in November 2008. The VFD was tested for two weeks and functioned properly. In the following months the CW-6 routinely tripped due to line noise. To keep the VFD from tripping line noise suppression equipment would need to be installed. The costs and space requirements to pursue new VFDs versus installing actuated valves are prohibitive.

- In November, the plug and check valves were cleaned and replaced in the wet well valve vault. The GWTS was shut down for three days while the work was completed.

- Calcium carbonate and/or iron fouling (i.e., deposits) on the new groundwater pump station pumps caused operational problems throughout the year. Fouling of the pump impellers caused the pumps to shut down and required that the impellers be cleaned or replaced on several occasions.

- In November, SAIC installed a chlorine delivery system in collection well CW-6. There is a high iron bacteria concentration in CW-6 that causes pump fouling. The chlorine helps to control the growth of the iron bacteria which may reduce pump fouling. Chlorine concentrations are tested weekly (when CW-6 is operating) to determine the effectiveness.

- The GAC was removed and replaced in January, April, August, and October 2009.

4.3 Groundwater Withdrawal and VOC Removal

Table 4-1 presents recorded groundwater withdrawal and total VOC removal that has been accomplished through operation of the GWTS. A system-wide total of approximately 37,056pounds of VOCs have been removed since the groundwater treatment system began operation in November 1990. On average, prior to start-up of the WPL system in May 1994, approximately 131 gpm of groundwater and 1.2 pounds per day (lbs/day) of total VOCs were being extracted by the system. Since the WPL system became operational, the average groundwater pumping rate from 1995 through December 2009 was approximately 274 gpm with 5.83 lbs/day of total VOCs being removed.

The total amount of groundwater extracted during the period from January 1 through December 31, 2009 was approximately 161 million gallons (an average of 441,566 gallons per day [gpd]; 306 gpm). This extraction rate is the highest ever recorded for the Harley-Davidson groundwater treatment system. The 2009 extraction data is approximately 4 percent higher than the previous year (2008) when the average values were approximately 424,000 gpd and 295 gpm. This increase is attributable to the consistent run time for all wells in 2009.

Quarterly PTA influent analyses (shown in Table A-4), along with the measured extraction volumes, are used to calculate the mass of VOCs removed from site groundwater during the reporting period (see Figure 4-1). Using these data, the total estimated mass of VOCs removed from January through December 2009 was 1,584 pounds (132 pounds per month). This mass removal rate is approximately 2 percent higher than the value calculated during the previous reporting period (130 pounds per month). This increase in mass removal rate can be attributed to a higher volume of groundwater was removed in 2009 (161,171,721 gallons) compared to 2008 (155,341,655 gallons) even though there was a slightly lower overall average influent concentration determined for 2009 (1,176 micrograms per liter [μg/L]) compared to 2008 (1,205μg/L). Estimated pounds per day of total VOCs extracted by the groundwater treatment system for the last five calendar years are shown below:

- 2009 – 4.3 pounds/day
- 2008 – 4.3 pounds/day
- 2007 – 4.8 pounds/day
- 2006 – 3.6 pounds/day
- 2005 – 4.2 pounds/day

From the time that groundwater remediation began in November 1990 until start-up of the WPL extraction system in May 1994, the PTA influent concentrations averaged approximately 750 μg/L of total VOCs. Following start-up of the WPL system, the average total VOC concentration spiked to greater than 10,000 μg/L and then asymptotically decreased to a base level. The average total VOC concentrations detected in the PTA influent samples during the 2009 report period were approximately 1,176 μg/L. The trend in PTA influent total VOC chemistry is illustrated on Figure 4-1. Figure 4-2 shows PTA influent chemistry trends since the start of pumping for PCE, TCA, TCE, and 1,1-DCE.

The PTA effluent was sampled and reported on a quarterly basis in 2009, as required by the NPDES permit. Analytical testing results for the reporting period are presented in Table A-4. The treatment system effluent has maintained non-detectable concentrations of target VOCs during this reporting period.

On a quarterly basis, Harley-Davidson submits data to the Susquehanna River Basin Commission (SRBC) regarding groundwater withdrawal associated with the groundwater treatment system in accordance with dockets 19900715 and 19980901. Information provided to the SRBC includes daily groundwater withdrawal totals (i.e., groundwater volumes extracted) from all collection wells and the overall system influent groundwater quality. The most recent submittal to the SRBC occurred in January 2010.

5.0 NPBA GROUNDWATER EXTRACTION SYSTEM

Groundwater extraction at the NPBA commenced in November 1990. Nine groundwater extraction wells (CW-1, CW-1A, CW-2, CW-3, CW-4, CW-5, CW-6, CW-7, and CW-7A) pump to the NPBA control building where individual pumping rates are controlled and measured. The groundwater from each well is combined to a common 3-inch-diameter pipe, which transmits the water a distance of approximately 2,300 feet to the groundwater treatment system.

5.1 System Operational Conditions

The majority of the NPBA extraction wells operated continuously during the report period. On occasion, periods of interrupted pumping occurred and were related to various repairs and maintenance of the system. For example, a VFD was installed on CW-6 to test this technology as a means of better controlling extraction rates. At first, the VFD functioned properly, but after a few weeks, over/under voltage faults began occurring in CW-6, which most likely were caused by line noise. The over/under voltage faults have continued on a constant basis. To address the line noise, frequency filters would need to be installed. The VFD is scheduled to be replaced with an actuated valve in early 2010.

Table 5-1 presents a record of monthly groundwater withdrawals for each extraction well for this reporting period. During 2009, the NPBA extraction system removed approximately 6.5 million gallons of groundwater at an average rate of approximately 541,600 gallons per month, or 12.5 gpm. This volume is slightly higher than the withdrawal from the NPBA reported for 2008 (12.3 gpm). Figure 5-1 presents a graphical comparison of the 2009 monthly total volumes of groundwater pumped from the NPBA with respect to the other on-site systems. Overall, the NPBA pumped approximately 4.0 percent of the total volume of groundwater withdrawn at the site.

Measured groundwater levels for the current report period are presented in Table A-1. The groundwater contour maps (Figures 3-1 and 3-2) show the effect that the groundwater extraction system imposed on the water table at the NPBA on June 4 and 5 and December 15, 2009. Additionally, Table 5-2 summarizes measurements of water levels for extraction wells in the NPBA during 2009. This table also includes design “pump on” and “pump off” water level elevations. The NPBA wells require frequent flow adjustments to maintain a balanced number of pump cycles, which is controlled by the pumping rate of each well. When a flow rate is too low for current conditions, it results in water levels above the “pump on” elevation and a high level alarm.

In 2009, Harley-Davidson measured water levels in the groundwater extraction wells on a monthly basis to help determine if proper groundwater drawdown was being maintained. During 2009, approximately two to six wells were noted each month to be above the designed drawdown range.

The groundwater contours on Figures 3-1 and 3-2 indicate that areas of groundwater depression are present along the northeast property boundary, which confirms that groundwater capture was occurring in June and December. Note that at the time of the December 15 water level measurement event, three of the NPBA collection wells (CW-1A, CW-2, and CW-6) were not

pumping (or pumping very little) groundwater due to low groundwater levels and/or maintenance issues.

Maintenance

SAIC replaced several groundwater extraction well pumps and acid-cleaned the underground conveyance piping during the report period. Check valves, y-strainers, and other components of the groundwater extraction system are maintained on a twice-per-month schedule. The current maintenance program has been sufficient to keep the system operational. A brief summary of several maintenance issues addressed in 2009 is presented below:

- New pump ends were installed at CW-3 in February and September, 2009.
- A new pump end was installed at CW-4 in May 2009.
- The pump end and motor were replaced at CW-5 in April 2009
- New pump ends were installed at CW-6 in January, February, May, July, and December 2009.
- The underground groundwater conveyance lines were acid cleaned in May 2009.

5.2 Groundwater Chemistry

On-site monitoring wells (MW-10, MW-12, MW-16S, MW-18S, MW-18D, MW-20D, and MW-20S), off-site locations (RW-2, RW-4 Folk, S-6 Tate, and S-7 Herman), and collection wells (CW-1 through CW-7, CW-1A, and CW-7A) were sampled at the NPBA in the 2009 key well sampling event. The dominant VOC found in groundwater beneath the NPBA was TCE. This is consistent with historical data trends for this area. The results of laboratory analyses for these monitoring wells are summarized on Table A-2.

In the collection wells, the dominant VOC is TCE with concentrations ranging from 3.8 µg/L (CW-5) to 180 µg/L (CW-7A). PCE was detected above the MSC for residential used aquifers in CW-4 and CW-6. Historical trends of TCE in the NPBA are shown on Figure 5-2. Historical VOC trends for each collection well are shown on Figures 5-3 through 5-11.

Historical concentrations of TCE in NPBA wells are shown on Figure 5-12. A review of historical TCE concentrations indicates a generally decreasing concentration trend for the on-site monitoring wells MW-10 and MW-12. Monitoring wells MW-18D and MW-18S were installed in 1988, and the initial samples collected in April 1988 had a detection of 50 µg/L in MW-18D and was non-detect for TCE in MW-18S. These two wells were not sampled again until the Supplemental Site-Wide RI sampling rounds in 2008 and during the 2009 key well sampling event. VOC concentrations in these two wells have increased significantly since the initial sampling in 1988, indicating that contaminated groundwater may be migrating beyond the NPBA collection well field in the portion of the aquifer being monitored by the MW-18 well cluster.

Only metals were analyzed at wells MW-16S, MW-20D, and MW-20M in the NPBA. Lead was detected above the laboratory reporting limits in MW-16S and MW-20D. Arsenic, beryllium, lead, and nickel were detected above the laboratory reporting limits in MW-20M.

The TCE concentration in the off-site monitoring well (well RW-2, a former residential well) has remained low and relatively stable during the past 10 years. Prior to bringing the NPBA groundwater extraction system on-line in 1990, concentrations of TCE ranged from 544 to 2,090 micrograms per liter (µg/L) in RW-2. With the exception of one sampling event since 1998 (in 2002), TCE concentrations have been below 5 µg/L in RW-2. A review of historical analytical data for monitoring location RW-2 demonstrates effective capture of groundwater by the NPBA collection wells for groundwater that had been migrating from the NPBA to RW-2, based on the overall reduction of VOCs at this location.

Other off-site locations in the NPBA that were sampled were RW-4, S-6 (Tate), and S-7 (Herman). Concentrations of TCE, the most prevalent VOC at the NPBA, are graphed for the off-site monitoring locations and included as Figure 5-13. A summary of the sampling results from the off-site locations is provided below. It should be noted that the winter 2004 edition of the Drinking Water Standards and Health Advisories published by the EPA indicates that the MCL for chloroform has been lowered from 100 µg/L to 80 µg/L. This value is currently under review but is used herein to make a conservative comparison.

VOCs, total cyanide, free cyanide concentrations were all below the laboratory reporting limits during the sampling event conducted in 2009 at the Folk residence (RW-4) Total lead was detected at a concentration of 6.1 µg/L at the RW-4 sampling location, which is above the Pennsylvania Department of Environmental Protection (PADEP) Act 2 medium-specific concentration (MSC) for residential used aquifers. Lead is not a contaminant of concern related to the Harley-Davidson property.

VOCs, total cyanide, and free cyanide concentrations were all below the laboratory reporting limits during the 2009 sampling event conducted at the Tate spring (S-6).

VOCs, total cyanide, and free cyanide concentrations were all below the laboratory reporting limits during the May 2009 sampling event conducted at the Herman spring (S-7).

6.0 TCA TANK AREA GROUNDWATER EXTRACTION SYSTEM

Groundwater extraction was initiated in November 1990 from CW-8, located south of Building 91, to prevent TCA migration and remove VOCs from the groundwater in this area. Groundwater extraction was initiated in February 1995 from CW-16 to contain and remediate groundwater beneath the former degreaser area located inside Building 2, 150 feet east of CW-8. Groundwater from the TCA Tank Area is conveyed a distance of approximately 1,000 feet through a 3-inch-diameter pipe to the groundwater treatment system.

Initially, extraction well CW-8 was pumped at a rate higher than necessary to maintain capture. The early goal was to reverse the direction of migration prior to initiation of groundwater pumping in the WPL, which would have potentially pulled the western edge of the TCA Tank plume further west, dispersing the concentrated source area. Prior to pumping of the WPL, the groundwater treatment plant, which was designed to handle water from the WPL, had excess capacity. Thus, the capacity was utilized to address the TCA Tank plume. When the WPL extraction system came on-line in May 1994, the pumping rate of CW-8 was reduced to a level that maintains capture of the TCA Tank Area plume.

In June 2002, extraction well CW-16 was removed from service. The pump at this well had failed. Because of the difficulty of servicing CW-16 due to its location in a congested manufacturing area and the ability of CW-8 to maintain capture, it was decided to discontinue groundwater extraction from this well.

6.1 System Operational Conditions

With the exception of three days in November and two days in December, extraction well CW-8 in the TCA Tank Area operated continuously during the report period. Table 5-1 presents a record of monthly groundwater withdrawals from extraction well CW-8. During 2009, approximately 50 million gallons of groundwater were extracted from the TCA Tank Area, averaging approximately 4.17 million gallons per month (96 gpm). An average of approximately 93 gpm was calculated for the previous report period in 2008.

The groundwater contour maps (Figures 3-1 and 3-2) indicate water level conditions that existed on June 4 and 5 and December 15, 2009. The water level at CW-8 was noted to be approximately one to 2 feet below the elevation measured in nearby wells during the June site-wide groundwater level measurement event. Extraction well CW-8 was off-line for piping repairs during the December groundwater event. Additionally, Table 5-2 summarizes measurements of water levels for the CW-8 extraction well in the TCA Tank Area. The table also lists design “pump on” and “pump off” water level elevations.

During January, February, and August 2009, the observed water level in CW-8 was below the design drawdown level for this well. The observed water level at CW-8 was generally within the designed range for the remainder of 2009.

Based on the monthly total flow data, the CW-8 daily extraction rate averaged approximately 138,000 gpd. This value equates to a monthly average of 4.17 million gallons, which represents a 3 percent increase from 2008 (4.1 million gallons per month). This well is consistently

operated at its maximum capacity; therefore, an increase in groundwater recharge (as realized in 2008) does not necessarily explain the annual increase in groundwater extraction. Extraction well CW-8 did not operate for 22 days in 2008, compared to five days in 2009. The 17 extra days of operation explains the increase in flow from 2008 to 2009. Overall, CW-8 pumped approximately 31 percent of the total volume of groundwater withdrawn at the site in 2009.

Maintenance

One significant maintenance activity was performed in 2009 with respect to well CW-8. The conveyance piping from CW-16 and CW-8 to the GWTS was repaired in December 2009. There was a leak in the CW-16 conveyance piping spur that is filled with groundwater from the pumping of CW-8. Collection well CW-16 piping was cut and capped to abandon the leaking section of pipe. CW-16 was taken off line in June of 2002. If there is a need to resume groundwater extraction from CW-16, additional work would be required.

6.2 Groundwater Chemistry

Seven monitoring wells (MW-32S, MW-32D, MW-34S, MW-34D, MW-35D, MW-54, and MW-55 [metals and cyanide only]) and collection well (CW-8) were sampled at the TCA Tank Area during in the 2009 key well sampling event. The TCA Tank Area is the site of a historic TCA spill which occurred prior to the initial sampling performed in 1989. The TCA release resulted in elevated concentrations of TCA (up to 100,000 µg/L at MW-32D in 1990) in the groundwater of this area. Groundwater extraction and treatment initiated at CW-8 in 1991 resulted in a rapid decrease in TCA concentrations in wells near the release, with adjacent monitoring wells exhibiting slow declines.

As groundwater pump and treat progressed in the TCA Tank Area, the dominant VOC present in the area shifted from TCA to TCE. Historical TCA concentrations found in collection wells CW-8 and CW-16 is shown in Figure 6-1, and historical concentrations of TCA in surrounding monitoring wells are shown in Figure 6-2. TCE concentrations in collection wells CW-8 and CW-16 is shown in Figure 6-3. The predominant VOC concentrations in collection wells CW-8 and CW-16 are shown in Figure 6-4. In 2009, TCE concentrations ranged from 13 µg/L (at MW-34S) to 590 µg/L (at MW-32D). Historical concentrations, along with the most recent TCE results from seven TCA Tank Area wells, are displayed graphically on Figure 6-5. The concentrations of TCE in the area wells generally appear to remain steady in the shallow wells, while increasing slightly in deeper wells.

MW-32D and MW-54 were analyzed for 1,4-dioxane by Method SW846 8270C SIM to achieve a lower detection limit during the 2009 Key Well sampling event. Concentrations of 14 µg/L and 58 µg/L, respectively, were detected. The detected concentration at MW-54 exceeded the PADEP Act 2 MSCs for both nonresidential and residential used aquifers, where only the MSC for the residential used aquifers standard was exceeded at MW-32D.

Total lead and total and free cyanide were analyzed at location MW-55 near the TCA area in 2009 and were detected at concentrations above the MSC for residential used aquifers. Monitoring well MW-32S was analyzed for chromium and hexavalent chromium. Total and dissolved chromium were detected at concentrations below the regulatory standards at 17.3 µg/L

and 16.2 µg/L, respectively. Both total and dissolved hexavalent chromium analysis results were non-detect.

7.0 WEST PARKING LOT GROUNDWATER EXTRACTION SYSTEM

Three groundwater extraction wells (CW-9, CW-13, and CW-17) operate in the WPL Area of the Harley-Davidson property. One additional extraction well (CW-15A) is located near the exterior northwest corner of NB4. These four wells are referred to as the WPL wells. The purpose of the WPL groundwater extraction system is to prevent off-site migration of groundwater containing dissolved VOCs and to remove VOCs in a source area located near the northwest corner of Building 4. Extracted groundwater from the WPL wells is conducted via underground piping to the groundwater treatment system in Building 41. The wells are individually piped to the groundwater treatment plant so that flow control, flow measurements, and water samples may be obtained for each well at this central location. Water is piped the following distances from the wells to the treatment plant: CW-9 (1,320 feet), CW-13 (890 feet), CW-15A (310 feet), and CW-17 (590 feet).

Extraction wells CW-9, CW-13, CW-14, and CW-15A began operation in May 1994, and CW-17 began operating in September 1995. Well CW-17 was a replacement extraction well for CW-14, which was discontinued due to excessive sediment buildup in the well.

7.1 System Operational Conditions

Approximately 104 million gallons of groundwater were extracted from the WPL Area during 2009 (see Table 5-1), averaging approximately 8.7 million gallons per month (200 gpm). This groundwater extraction rate represents a 5.3 percent increase from 2008 when the extraction rate was approximately 187 gpm. The WPL wells were on-line for more days in 2009 compared to 2008, which is most likely the cause of the increase. A graphical comparison of the WPL groundwater extraction volumes to the other site extraction systems is presented on Figure 5-1. Overall, the WPL wells pumped approximately 64 percent of the total volume of groundwater withdrawn at the site.

The groundwater contour maps (Figures 3-1 and 3-2) show the effect of the groundwater extraction system imposed on the water table at the WPL Area on June 4 and 5, 2009 and December 15, 2009. Groundwater contours indicate a general area of groundwater surface depression surrounding the WPL Area.

Table 5-2 summarizes measurements of water levels for the WPL extraction wells. The table also lists design “pump on” and “pump off” water level elevations. A review of Table 5-2 indicates that during 2009, the water levels in two of the four WPL wells (excluding CW-15A and CW-17) were generally close to the designed range. The water level at well CW-15A was above the designed range for 9 months of 2009, indicating optimum draw down was not being achieved. For nine months, the pumping water level was above the designed range. Flow rate adjustments would alleviate this issue. Extraction well CW-17 water level was constantly below the designated range, suggesting that probe settings may need to be adjusted. The probe settings will be checked in the first quarter of 2010.

Maintenance

The WPL wells operated as designed throughout the report period with short interruptions for maintenance and repairs. The current maintenance program has maintained reliable operation of extraction wells CW-9, CW-13, CW-15A, and CW-17. A brief summary of several noteworthy maintenance issues addressed in 2009 is presented below:

- In March 2009, a new pump end and motor were installed at CW-15A.
- In September 2009 a new pump end and motor were installed at CW-13.

7.2 Groundwater Chemistry

Twenty-eight WPL monitoring wells (MW-5, MW-6, MW-7, MW-37S, MW-37D, MW-38D, MW-39S, MW-39D, MW-47, MW-49S, MW-49D, MW-50S, MW-50D, MW-51S, MW-51D, MW-74S, MW-74D, MW-75S, MW-75D, MW-93S, MW-93D, MW-95, MW-96S, MW96D, MW-97, MW-105, MW-106, and MW-107) and four collection wells (CW-9, CW-13, CW-15A, and CW-17) were sampled during this key well sampling event. The results of laboratory analyses are summarized on Table A-2.

The dominant VOCs detected in the WPL monitoring wells are TCE (exceeded the PADEP Act 2 MSCs for both nonresidential and residential used aquifers in all WPL wells sampled except MW-5 and MW-6) and PCE (exceeded the same standards in all WPL wells sampled except for MW-5, MW6, MW-38D, MW-50S, MW-51D, MW-93S, and MW-95). Historically, PCE is more prevalent in the southwest corner of the WPL while TCE is more prevalent throughout all other areas in the WPL.

Historical concentrations of VOCs in the WPL collection wells are shown on Figures 7-1 through 7-5. Concentrations of the most prevalent VOC in this area (TCE) are graphed for the WPL key wells on Figures 7-6 and 7-7. Additionally, concentrations of TCE and PCE in the southern WPL area monitoring wells are graphed on Figures 7-8 and 7-9, respectively. Most of the WPL monitoring wells exhibit a relatively flat or gradually decreasing TCE concentration trend. The exceptions to this trend are wells MW-49S and MW-49D that have decreased significantly since the initial sampling that was completed in 1992; MW-50D, where the TCE concentrations have increased since sampling began until 2005, when the concentrations started to decrease; and at MW-75D, where the PCE and TCE concentrations spiked between 2004 and 2006 but have returned to typical levels in 2009.

The following noteworthy observations for the WPL sampling locations were identified with the June 2009 sampling event chemistry data:

- Concentrations of TCE and PCE detected at the MW-75S and MW-75D well cluster represent two of the three highest detections at the site (MW-49D is the other). Since the initial sampling event at these locations (September 1999), TCE and PCE concentrations at MW-75S have remained relatively consistent at the 5,000 µg/L to 20,000 µg/L range (refer to Figures 7-8 and 7-9). During this same time period, TCE and

PCE concentrations at MW-75D showed an increasing trend until 2006. Concentrations of TCE and PCE at MW-75D have increased slightly over the past year.

- Based on a review of the 2009 analytical data for well MW-75D, PCE is the most prevalent VOC at this location. Historically, PCE has comprised approximately 60 to 70 percent of the total VOC concentration; however, in the June 2007 event, PCE concentrations represented only 22 percent of the total VOCs (1,300 µg/L of 5,940 µg/L), while TCE concentrations represented 64 percent of the total VOC detection (3,800 µg/L of 5,940 µg/L). During the 2009 sampling event, the PCE concentration (2,900 µg/L) represented 70 percent of the total VOCs, and the TCE concentration (1,200 µg/L) represented 29 percent of the total VOCs, which is consistent with what had typically been observed.

- Wells MW-49S and D near the northwest corner of NB4 represent a second area of concentrated VOCs at the site. TCE is the most prevalent VOC at this location. Following installation of these wells in 1991, TCE was detected in MW-49D at concentrations of 9,200 µg/L (10/22/91) and 130,000 µg/L (10/30/91). Monitoring well MW-49D was not sampled again until 2008. The concentration decreased to 1,700 µg/L (10/6/08). In 2009, the sampling event concentration increased to 5,200 µg/L. Concentrations of TCE in the shallow groundwater at MW-49S had the same trends as MW-49D. Samples collected from MW-49S in October 1991 had TCE concentrations of 98,000 µg/L (10/22/91) and 91,000 µg/L (10/30/91). In the 2009 sampling event, the concentration of TCE was 2,300 µg/L. The compound, 1,4-dioxane, a stabilizer added to TCA, was detected at a concentration of 140 µg/L at MW-49S.

- Monitoring well MW-50D was installed in 1991, and TCE was detected at a concentration of 1,900 µg/L. TCE was detected at similar levels in 2000 (1,450 µg/L), but this well was not sampled again until June 2004. The June 2004 sampling event revealed a significant increase in TCE (to 18,000 µg/L) in the deep groundwater at the MW-50D sampling location. Concentrations of TCE in the shallow groundwater at this monitoring location (at MW-50S) did not show similar magnitude changes (250 µg/L in 2,000 to 520 µg/L in 2004). This information suggests that a plume of high concentration VOCs may have been drawn from the North Building 4 area (the closest known source area), through the deeper portion of the bedrock aquifer (MW-50D is screened from 160 to 170 feet below grade [fbg]), and toward groundwater extraction well CW-17. Another potential source area is related to the high concentrations at MW-114, east of Building 4. The VOC plume does not appear to be impacting the shallower portion of the bedrock aquifer at MW-50S (screened from 110 to 120 fbg) to the magnitude of the impact of the deeper portion of the aquifer. The 2009 TCE concentration at MW-50S was 100 µg/L, which has decreased significantly since 2004. The 2009 TCE detection at MW-50D (3,800 µg/L) indicates that the TCE concentrations have decreased since 2007 (6,900 µg/L) since the maximum historical detection was reported (18,000 µg/L) in June 2004.

- The three highest site-wide detections (above laboratory reporting limits) for dissolved chromium were reported in northern WPL wells (MW-7, MW-47, and MW-51S) as

illustrated on Figure 3-7. Dissolved chromium was detected at six other wells across the site. Concentrations of dissolved chromium ranged from 4.3 µg/L (MW-94) to 4,440 µg/L (MW-47). The three wells (MW-7, MW-51S, and MW-47) within the WPL had dissolved chromium detections of 113 µg/L, 301 µg/L, and 4,440 µg/L, respectively, above the MSC for used nonresidential aquifers.

- The only detections of dissolved hexavalent chromium at the site were reported for the same northern WPL wells (MW-7, MW-47, and MW-51S) as illustrated on Figure 3-8. The hexavalent chromium concentrations ranged between 140 µg/L (MW-7) and 4,400 µg/L (MW-47).

8.0 SOFTAIL DEWATERING SYSTEM

Harley-Davidson constructed the Softail production plant in 2001. This facility was constructed in the eastern portion of the site, in the vicinity of the former test track. Due to the potential for shallow VOC-impacted groundwater to discharge to the surface and to the lowest floor of the facility, a permanent groundwater collection system was designed as part of the project. The permanent groundwater collection system for the Softail site consists of a shallow interceptor trench (or toe drain), a deep interceptor trench and drain, and a capture well (CW-19). All three components of the groundwater collection system are designed to flow to a pumping station. From the pumping station, the groundwater is transported via underground piping to the groundwater treatment facility located in Building 41 (see Figure 1-2).

Groundwater collection via this system was initiated in March 2002. During 2009, this system collected over 965,000 gallons of groundwater (refer to Table 5-1). This groundwater recovery rate represents a 10 percent decrease from 2008 when the annual recovery rate was 1,065,000. A graphical comparison of the WPL groundwater extraction volumes to the other site extraction systems is presented on Figure 5-1. Overall, the Softail dewatering system recovered approximately 0.6 percent of the total volume of groundwater withdrawn at the site.

8.1 Toe Drain System

The northeast corner of the Softail site was identified as the area with the most potential for groundwater to discharge to the surface after final grading. To prevent the potential for human contact with the groundwater, a toe drain was installed at the bottom of the slope cut. This was designed to collect groundwater from this area, thus lowering the groundwater levels and minimizing surface discharges downgradient of the toe drain. The toe drain was constructed as a shallow trench drain filled with gravel and four-inch perforated polyvinyl chloride (PVC) piping. The toe drain trench was lined with geotextile fabric to minimize sedimentation of the piping. An impermeable layer was placed on top of the trench to reduce infiltration of surface water into the drain.

8.2 Deep Trench Drain

The deep trench drain was installed along the eastern perimeter of the building due to the high probability of groundwater levels encountering the lower floor of the facility. The deep trench drain is sloped to gravity drain to the lift station. The depth varies from 22 feet to 26 feet. Four clean-outs were installed along the 760-foot length of piping. The deep trench drain was constructed of perforated PVC piping in a trench filled with coarse gravel. Prior to installation of the piping and drainage course, the trench was lined with a geotextile fabric to minimize sediment mixing with the gravel.

8.3 Capture Well (CW-19)

A capture well (CW-19) and force main were installed in the paint sludge pit area of the Softail plant. The paint sludge pit area consists of a 27-foot-deep pit used to house the paint sludge holding tank. CW-19 was installed seven feet deeper than the pit so that the well could be programmed to begin pumping prior to the groundwater level reaching the elevation of the

bottom of the pit. The force main was installed to transfer groundwater captured in the well to the lift station. The force main was installed with a slope toward the lift station so that groundwater does not remain in the line after the well pump stops running. Groundwater levels have not been recorded in this well. The lowering of groundwater from the deep trench effectively keeps the groundwater below the depth of CW-19.

8.4 Lift Station

The lift station is located north of the Softail building. The lift station conveys groundwater to the groundwater treatment plant in Building 41. The lift station controls are automated, and pump operation can be controlled remotely.

8.5 Groundwater Chemistry

Sampling of groundwater collected by the lift station was initially performed in June 2003 in response to a reporting requirement for the SRBC. Groundwater samples were collected from the lift station in December 2009 for the analysis of VOCs. One sample was collected from the toe drain system, and a second sample was collected from the deep drain system using grab methods.

A review of the December 2009 lift station sampling results indicated that only one VOC (TCE) was detected at 0.47 μg/L in the deep drain sample and 0.53 μg/L in the toe drain sample (both samples had a J data qualifier; data indicate the presence of a compound that meets the identification criteria but the result is less than the quantization limit but greater than zero. The concentration is an approximate value). The analytical results from 2009 are included on Table A-3. VOC analysis of groundwater collected by the lift station is scheduled to occur twice (in June and December) during 2010.

9.0 SOUTHERN PROPERTY BOUNDARY AREA WELL MONITORING

Six on-site monitoring wells (MW-40S, MW-40D, MW-43S, MW-43D, MW-64S, and MW-64D) and six off-site wells (MW-108S, MW-108D, MW-109S, MW-109S, MW-110, and RW-5) were sampled during the 2009 key well sampling event in the area of the SPBA. The dominant VOC detected in groundwater beneath this area is TCE. This is consistent with historical sampling data. The analytical results are provided on Table A-2.

Concentrations of the most prevalent VOC in this area (TCE) are graphed and included as Figure 9-1. The highest concentrations of TCE in this area continue to be observed at MW-64D (located in the southeast corner of the property). A review of concentration trends since 1990 indicates that TCE concentrations are decreasing at locations MW-43D, MW-64S, and MW-64D where concentration of TCE historically have been the highest. MW-110 was installed in November 2007 and has been sampled three times with relatively consistent results, demonstrating a very slight increase. This apparent slight increase is most likely a result of seasonal or variability in sampling conditions and does not actually represent an increasing trend. Sampling data for wells MW-40D, MW-40S, MW-43S, MW-109S, and MW-109D indicate consistently low (or non-detectable) levels of TCE.

Three wells near the SPBA (MW-40S, MW-43S, and MW-64S) were sampled for metals during 2009. The total lead result for the sample from MW-40S was 62 µg/L, which exceeds the regulatory standards. The dissolved lead result for the sample from MW-40S is 0.02B µg/L (B data qualifier indicates the result was below the method reporting limit [RL] but above the method detection limit [MDL] resulting in an estimated value), which is below the regulatory MSC Monitoring Well 40S was purged for four and one half hours and the turbidity was 868 NTU when sampled. The high turbidity appears to be a factor in elevated total lead concentrations in this well. In reviewing past sampling results, samples with high turbidity (this sample with 868 NTU and the September 2008 with a turbidity of 863 with a lead concentration of 23.6 µg/L) had high concentrations of lead, whereas the April 2008 sample had a turbidity of 10 NTU, while the lead concentration was 3U µg/L (U data qualifier indicates the analyte was not detected). The turbidity in Monitoring Well MW-40S appears to be a result of multiple sinkholes in the stormwater basin near this well.

The metals and VOC sampling results presented for the SPBA are consistent with those from previous sampling events.

MW-109S and MW-109D had concentrations of benzene and MTBE, which are constituents of gasoline and most likely are associated with the documented release from the Rutter's Gas Station located on the corner of Route 30 and North Sherman Street. Off-site monitoring wells MW-108S, MW-108D, MW-109S, and MW-109D have very low or non-detectable levels of TCE.

In 2009, Harley-Davidson monitored residential well (RW-5). This well is owned by the Jack Giambolvo Company and is located south of the Harley-Davidson property across Route 30 (refer to Figure 1-2). Groundwater from well RW-5 was sampled in July 2009 as part of the key monitoring well sampling event. The analytical results for this well are summarized on Table A-2. There were no concentrations above the MSCs.

10.0 EASTERN AREA WELL MONITORING

Six key monitoring wells (MW-2, MW-17, MW-65D [selected metals], MW-66S [selected metals], MW-91, and MW-92) were sampled to monitor groundwater quality near Harley-Davidson's Eastern Property Boundary Area (EPBA). PCE is the dominant VOC detected in groundwater from wells MW-2, MW-91, and MW-92. TCE is the dominant VOC detected in groundwater sampled from MW-17 (monitors downgradient of the landfill). The analytical results are provided on Table A-2. Historical concentrations of PCE and TCE are graphed and included as Figures 10-1 and 10-2, respectively.

Monitoring wells MW-65D and MW-66D were sampled for selected metals including chromium and hexavalent chromium. There were no concentrations above MSCs.

Groundwater from wells MW-2, MW-91, and MW-92 was analyzed for total and available cyanide. Groundwater from MW-2, MW-91, and MW-92 contained detectable concentrations of total and available cyanide (which is free cyanide, plus cyanide complexes that easily dissociate). The reported concentrations of cyanide in the MW-2 sample were 980 µg/L (total cyanide) and 100J µg/L (free cyanide). The MW-2 total cyanide is above MSC standards for residential used aquifers (200 µg/L). Free cyanide is below the regulatory MSC for used nonresidential aquifers.

Data trends observed for the annual key well sampling locations at the EPBA generally indicate decreasing concentration trends. A summary of the data trends observed for the eastern area is presented below:

MW-2 is located next to a former cyanide disposal area near the eastern site property boundary. PCE and TCE were the only VOCs detected at this location in 2009, with PCE being the most dominant VOC. A review of Figures 10-1 and 10-2 indicates that both TCE and PCE concentrations exhibit a generally decreasing trend since monitoring began in 1986.

MW-17 is located in the east-central portion of the site, downgradient and west of the landfill. The VOCs detected in the 2009 sample from this location were TCE (30 µg/L) and PCE (0.51 µg/L). TCE has exhibited a gradual decreasing concentration trend since it was initially detected at a maximum concentration of 254 µg/L in 1987.

The 2009 total VOC concentrations reported for MW-91 and MW-92 (141.9 µg/L and 289.1 µg/L, respectively) are part of a generally decreasing concentration trend since sampling began in 2000 (see Figures 10-1 and 10-2).

11.0 ADDITIONAL SITE-WIDE GROUNDWATER CHEMISTRY

Seventeen additional monitoring wells not summarized above were sampled as part of the 2009 key well sampling round to monitor groundwater quality at or near the Harley-Davidson facility. One well (MW-82) is located along the property line in the north-central portion of the facility, and well MW-85 is located along the property line in the south-central portion of the facility. Fourteen of the remaining fifteen wells (MW-52, MW-69, MW-77, MW-79, MW-81S, MW-81D, MW-87, MW-88, MW-94, MW-112, MW-113, MW-114, MW-115, MW-116, and MW-117) monitor groundwater beneath the central portion of the facility (MW-52 is located in the north-central portion of the facility). Noteworthy items from the sampling of these wells are summarized under a separate report entitled 2009 Key Well Sampling Report (SAIC, January 2010).

FIGURES

TABLES

APPENDIX A

Data Tables

APPENDIX B

2009 Access® Data base Summary

APPENDIX C

2009 Operation and Maintenance Data Summary

APPENDIX D

2007 through 2009 Groundwater Sampling Data Summary