2010 Groundwater Monitoring Report
Lockheed Martin Tallevast Site

Prepared for:

Lockheed Martin Corporation

Prepared by:

ARCADIS

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Engineers Certification

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TPOC	temporary point of compliance
UIC	underground injection control
USAS	Upper Surficial Aquifer System
USD	undifferentiated surficial deposit
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

Section 1

1. Introduction

This *2010 Groundwater Monitoring Report* (GWMR) contains a description of groundwater monitoring activities, analytical results, and interpretations of the nature and extent of specific compounds at the Lockheed Martin Corporation (Lockheed Martin) Tallevast Site [previously described as the former American Beryllium Company (ABC) Facility] located at 1600 Tallevast Road in Tallevast, Manatee County, Florida. The Site consists of both the Tallevast Facility (referred to as the "Facility" or "on-facility" portion of the Site) and the affected groundwater in the surrounding area (referred to as the "off-facility" portion of the Site).

Figure 1-1 is a site location map showing the entire study area (Site). Figure 1-2 is a map of the vicinity surrounding the Tallevast Facility. The assessment and cleanup tasks are being conducted pursuant to the requirements detailed in Consent Order No. 04 1328 executed by and between Lockheed Martin and the Florida Department of Environmental Protection (FDEP), effective July 28, 2004. The assessment activities described in this annual GWMR comply with applicable sections of Chapter 62-780, Florida Administrative Code (F.A.C.).

Lockheed Martin acquired ownership of the Facility through its 1996 acquisition of Loral Corporation, the parent company of ABC. Lockheed Martin ceased operations in 1997 and, in 2000, sold the former ABC Facility to BECSD, LLC. Lockheed Martin leased the property from BECSD in July 2007 and in June 2009, purchased it from BECSD, LLC.

Lockheed Martin submitted a *Remedial Action Plan* (RAP) to FDEP on May 4, 2007 in accordance with applicable sections of Chapter 62-780, F.A.C., Contaminated Site Cleanup Criteria. The FDEP commented on the RAP in a letter dated July 27, 2007. On September

11, 2007, Lockheed Martin requested a time extension to respond to the FDEP RAP comments. Lockheed Martin proposed supplemental field activities in a meeting with FDEP on September 27, 2007. In a letter dated October 2, 2007, FDEP granted the extension request and Lockheed Martin subsequently completed the supplemental field activities.

A revised RAP incorporating the results of the supplemental field activities was submitted to FDEP on August 29, 2008. The FDEP commented on the revised RAP in a letter dated March 16, 2009. Lockheed Martin responded by submitting a RAP *Addendum* on July 14, 2009 2 0

- Obtain analytical data to comply with In Situ Chemical Oxidation (ISCO) Pilot Test Underground Injection Control (UIC) monitoring requirements (in accordance with the UIC monitoring program outlined in the April 25, 2008 Interim Data Report – In Situ Pilot-Study (ARCADIS, 2008b), the In Situ Pilot Study Work Plan (ARCADIS, 2008a), and the May 14, 2008 internal FDEP memo from Simone Core, P.E. to Bill Kutash).

- Obtain analytical data to verify or adjust the temporary point of compliance (TPOC) on an annual basis. [Note that the TPOC is the boundary of all COC GCTL lines in each affected aquifer projected to the ground surface. The outermost edge of these lines is composited and is used to establish the proposed TPOC line.]

Only the field sampling and analytical data collected to monitor the characteristics and extent of the plume (referred to as the annual event) are discussed in detail below. Information collected to satisfy other program requirements may be found in the quarterly IRAP report (ARCADIS, 2010) and a pending UIC monitoring report. Some minor portions of data collected under these other programs are presented in the GWMR when they augment analysis and understanding of the annual event data. Validated laboratory analytical reports and data assessment reports for the annual and Interim Remedial Action (IRA) programs and analytical reports for the UIC program are included as Appendix A.

This 2010 GWMR includes potentiometric contour maps constructed using groundwater elevations measured in August and September 2010, contaminant of concern (COC) concentration contour maps constructed using analytical results for samples collected in September 2010, and concentration vs. time plots for selected wells. This report also includes water level and groundwater sampling logs, chain-of-custody forms, and historical data tables in appendices. Based on analysis of results obtained from this and prior sampling events, this report also contains recommendations for future annual groundwater sampling events and analyses.

1.2 Summary of Activities Included in 2010 GWMR

The groundwater monitoring program described in this report consists of the following primary activities:

- 2010 comprehensive water level monitoring event. This task is referred to as the August and September 2010 comprehensive water level event. Both the raw data and interpreted potentiometric surface maps are presented herein.

- 2010 comprehensive groundwater sampling event. The 2010 comprehensive groundwater sampling event was conducted in September 2010. The comprehensive event is comprised of annual, UIC, and IRA sampling components. The 2010 sampling event analytical data, associated maps, summaries, and interpretations are presented herein.

Figure 1-3 is a map showing the location of groundwater extraction and monitoring wells and open private wells within the Site. There are 180 monitoring wells and private wells listed in the July 2009 RAP Addendum that were scheduled to be sampled during the 2010 comprehensive groundwater sampling event (see Table 1-1 of this report and Table 13-1 of the RAP Addendum). The only modifications to this list of wells that occurred during the 2010 sampling event included the following:

- Addition of monitoring well MW-255 (replacement well for private well 2411 Tallevast Road) and private well 2411 Tallevast Road Well #2 (replacement well for MW-218)

- Deletion of private well 2105 Tallevast Road, private well 2411 Tallevast Road, and monitoring well MW-218 due to abandonment of these wells

- Inclusion of the analytical results for the 10 quarterly IRA extraction wells sampled concurrently with the other wells in the annual event

In addition to the 180 wells proposed to be sampled for the annual event, the 45 wells that are sampled for the quarterly IRA program are listed in Table 2-2. The 31 wells that are sampled for the quarterly UIC program are also listed in Table 2-2. All of these wells (except for two monitoring wells and five pilot test wells sampled for the UIC program and 10 extraction wells sampled for the IRA program) are a subset of the wells sampled for in the annual program.

A summary of the well types that were sampled in 2010 for each of the sampling programs is provided below.

Well Type	Annual Program	UIC Program	IRA Program	Unique Wells Sampled in 2010 Comprehensive Groundwater Event
Monitoring Wells	165	16 *	35	167
Extraction Wells	10	10	10	10
Private Wells	7	0	0	7
Piezometers	7	0	0	7
Pilot Test Wells	0	5 *	0	5
Subtotal	189	31	45	196

* MW-3, MW-4, CO-A1D, CO-B1D, CO-B4D, CO-C1D, and CO-D1D were sampled as part of the UIC program, but are not part of the annual monitoring event.

In summary, the wells sampled for each type of event follow:

- 196 total wells sampled in the 2010 comprehensive groundwater event
- 189 wells sampled as part of the annual event

- 31 wells sampled as part of the UIC event (24 wells also part of the annual event and 7 wells unique to the UIC event)

- 45 wells sampled as part of IRA event (all part of the annual event as well)

1.3 Overview of Site Hydrogeology

The regional hydrogeologic setting is described in this section. There are three main lithostratigraphic units, which are further subdivided for monitoring purposes into hydrogeologic units and water-bearing zones. The lithology, physical characteristics, and hydrostratigraphic characteristics of each of the units is summarized on Figure 1-4. From the surface downward, the geologic units underlying southern Manatee County consist of the following:

- Undifferentiated surficial deposits (USD) (Pleistocene to Recent).

- The Hawthorn Group, consisting of the Peace River Formation (PRF) and the Arcadia Formation (AF) (Miocene to Oligocene). The AF consists of an upper undifferentiated section and the lower Tampa Member.

- A thick sequence of marine carbonates (limestone and dolomite) exists below the Tampa Member of the AF and includes the Suwannee Limestone (Oligocene), Ocala Limestone (Eocene), and the Avon Park Formation (Eocene), (not shown on Figure 1-4).

The main geologic units listed above have been further subdivided into the local hydrogeologic units and water-bearing zones listed below. More detailed descriptions are presented on Figure 1-4. Characteristics of these systems are briefly described below.

- Surficial Aquifer System (SAS) – The unconfined surficial aquifer overlying the Hawthorn Group.

- Upper Surficial Aquifer System (USAS) – The unconfined surficial aquifer, consisting of unconsolidated Pleistocene to recent siliciclastic sand units with up to 20 percent fines.

- Intermediate Aquifer System (IAS) and Confining Units – The confined aquifers overlying the Upper Floridan Aquifer (Floridan). This aquifer system is made up of strata from the Hawthorn Group, which is comprised of the PRF and the AF.

  - Lower Shallow Aquifer System (LSAS) – The uppermost portion of the PRF, the top of which is indurated limestone/calcareous rock, known locally as the Hard Streak. The LSAS consists of a series of interbedded limestone, clay, and carbonate mudstone units. The LSAS is generally encountered around 30 feet below ground surface (ft bgs).

  - Venice Clay – The lower portion of the PRF, consisting of siliciclastic to calcareous clays with a distinctive greenish-grey to olive color.

  - Clay/Sand Zone 1 – The uppermost sub-unit of the AF, consisting of a series of low-permeability carbonate mudstones.

  - Upper AF Gravels (AF Gravels) – A fractured to vuggy carbonate unit approximately 100 ft bgs in the AF. This unit is significantly more permeable than the overlying and underlying AF units, and is usually identified in drilling logs as "wet." Co0w (o) Tj /F11 69.6evhich j 1(AF Gravels) [illegible] than the overlying and underlying units, but less permeable than the AF Gravels. It is generally found approximately 145 ft bgs.Clay/Sand Zone 3 & 4 and Lower AF Gravels - A sub-unit of the AF consisting of a series of low-permeability calcareous mudstones and underlying a somewhat higher permeability carbonate (Lower AF Gravels).

- Lower AF Sands – A sub-unit of the AF containing an increased percentage of sand sized particles and located approximately 280 ft bgs.
- Clay/Sand Zone 5 – A sub-unit of the AF consisting of a series of calcareous mudstones.

In addition to the SAS and IAS, the underlying Floridan (Oligocene) is monitored at seven locations across the Site. The Floridan consists of the Tampa Member of the AF, the Suwannee and Ocala Limestones, and the upper part of the Avon Park Formation (Tetra Tech 2005). The Floridan is comprised of a series of limestone to dolomite units, which are used for local water supply and irrigation wells.

1.4 Description of Contaminants of Concern

Groundwater COCs at the Facility have been defined as 1,4-dioxane; trichloroethene (TCE); tetrachloroethene (PCE); cis-1,2-dichloroethene (cis-1,2-DCE); 1,1-

Section 2

2. 2010 Comprehensive Groundwater Sampling

ARCADIS personnel began the 2010 comprehensive groundwater monitoring and sampling event on August 30, 2010. The IRA and UIC ISCO quarterly sampling events were conducted concurrently with the annual event. Field personnel vented accessible wells on the first day of the event (August 30), allowed the water levels to stabilize for up to 24 hours, and then gauged the water level on the following day. Surface water levels were also measured at accessible staff gauges and stilling wells. Most monitoring well water levels were measured on August 31; however, 48 of the monitoring wells located in low areas northeast and southeast of the Facility could not be gauged on August 31 because they were inaccessible due to localized flooding caused by heavy rainfall. Consequently, three smaller gauging events occurred on September 7, 8, and 13 after the water receded. Since 1 to 2 weeks had elapsed since the August 31 water level measuring event, additional water levels were measured on September 8 and 13 in previously gauged wells surrounding the flooded areas for comparison with the August data.

Water levels were eventually measured in 279 wells during the gauging events. Only four targeted monitoring wells (MW-82, MW-88, MW-147, and MW-250) did not have water levels measured in this time frame for reasons described below the annual monitoring program, and will not be targeted for water level measurements in the future.

The well pads at MW-82 and MW-88 were underwater on August 31 during the initial gauging event. The water level was measured in MW-82 on September 10, 2010 during the annual monitoring program and was added to the annual water level data set because it was measured before September 13. The water level in MW-88 was not collected as this well is not included in the annual monitoring program and therefore was not revisited before September 13.

Additionally, water levels were not gauged at four staff gauges and five stilling wells because they were submerged. The water level measured in Stilling Well 2 on September 3, 2010, when the transducer was downloaded for the Long-Term Water Level Monitoring (LTWLM) program, has been added to the annual water level data set because it was measured before September 13. Table 2-1 provides the well completion information and the August/ September 2010 groundwater and surface water level measurements. Water level measurement logs are included in Appendix B.

Groundwater sampling for the annual, UIC, and quarterly IRA programs began on September 1, 2010, and was completed on September 27, 2010. Most of the sampling was completed by September 17 except for wells located on the airport property and irrigation well MW-203 located east of the Facility and just north of Tallevast Road. The airport wells were sampled on September 22 after property access was obtained. Sampling of well MW-203 was delayed because of localized flooding in the area and because the down-hole pump did not operate during initial sampling. The well was sampled on September 27 after the electricity was restored to operate the pump. Figure 1-3 shows the locations of extraction wells, monitoring wells, private wells, piezometers, staff gauges, and stilling wells associated with the Tallevast Site. Table 2-2 lists the wells sampled during the September 2010 event. The following sections describe sampling methods, laboratory analytical methods, and data validation procedures.

2.1 Sampling Methodology

Groundwater sampling was conducted in accordance with FDEP Standard Operating Procedure (SOP) FS 2200 Groundwater Sampling, revision date March 31, 2008. Three FDEP SOP sampling scenarios were used during the annual sampling event, two for well screens completely submerged (Options 1a and 1b) and one for well screens partially submerged (Option 2b). Most Site wells have completely submerged well screens that are 10-feet or less in length and were sampled using the minimal purge volume method (Option 1a). However, several Site monitoring wells have 20-foot submerged well screens. These wells were sampled using the conventional purge method (Option 1b). A variable speed submersible pump was used for purging and sampling these wells because of the depth to water (which can be more than 20 ft bgs) and quantity of water purged. A few site wells have partially submerged screens which required the use of Option 2b.

In accordance with the SOP, purging was conducted as follows for the three FDEP SOP sampling scenarios:

Well Screen Completely Submerged (FDEP SOP Option 1a: Minimal Purge Volume): Dedicated tubing was connected to a peristaltic pump and the bottom of the tubing was set at mid-screen. At least one equipment volume was purged before the first set of stabilization parameters was recorded. Subsequent stabilization parameters were recorded no fewer than two to three minutes apart. The SOP requires that at least three equipment volumes are purged.

Well Screen Completely Submerged (FDEP SOP Option 1b: Conventional Purge): These wells were purged and sampled using a submersible pump. The pump was placed at the top of the water column. At least one well volume was removed before the first set of stabilization parameters was recorded. Thereafter, one quarter of a well volume was purged between stabilization parameter readings.

Well Screen Partially Submerged Wells (FDEP SOP Option 2b): This procedure is the same as that for Option 1a with two exceptions: the bottom of the tubing is set in the middle of the saturated portion of the screen and one well volume must be removed before the first set of stabilization parameters is recorded.

Wells that are sampled with peristaltic pumps are equipped with dedicated tubing which was inspected and replaced if necessary.

At each monitoring well, a copy of FDEP Form FD 9000-24 Groundwater Sampling Log was completed. These forms include entries for field measurements as wells as observations and other notes from the samplers. Completed groundwater sampling logs are included in Appendix B. Equipment used for field measurements was calibrated in the morning before beginning sampling and a calibration check was conducted in the afternoon after sampling was completed for the day. Equipment primarily used in the field included a LaMotte 2020e for turbidity and a YSI 556 multimeter for all other parameters. While most teams used this standard set of equipment, other types of field meters were used including a HACH 2100P, YSI 55, Oakton Acorn pH6 meter, Oakton Acorn CON6, and LaMotte 2020.

T purging and sampling

ARCADIS field staff collected the following quality assurance/quality control (QA/QC) samples: two equipment blanks, 10 field blanks, 11 sets of matrix spike/matrix spike duplicate (MS/MSD) samples, and 13 blind duplicate samples. Trip blanks were placed in most coolers containing VOCs to evaluate potential impacts to samples during transport.

Samples were placed into insulated coolers and maintained at temperatures below 4 degrees Celsius (°C). The coolers were sealed and the contained samples were delivered to TestAmerica Laboratories in Tampa, Florida for laboratory analysis. The coolers and samples were delivered to the laboratory under appropriate chain-of-custody procedures. Chain-of-custody forms are included in Appendix A.

All groundwater purged during monitoring well sampling was stored in containers within secondary containment. Purged water was later transferred and treated through the on-facility IRA treatment system. All disposable equipment including personal protective equipment was placed into labeled 55-gallon drums for appropriate off-site disposal.

2.2 Laboratory Analytical Methods

Unless otherwise stated, the annual groundwater monitoring event samples were analyzed for VOCs by United States Environmental Protection Agency (USEPA) Method 8260B and for 1,4-dioxane by USEPA Method 8260C Selective Ion-Monitoring by Isotope Dilution (SIM ID).

In addition to the annual groundwater monitoring event, wells were also sampled in September 2010 as part of the UIC or IRA quarterly monitoring event. Most wells included in the UIC and IRA programs were also scheduled to be sampled for the annual sampling event. Seven of the 31 monitoring wells for the UIC program were only sampled under the UIC program and not for the annual event. The 10 extraction wells sampled for the IRA quarterly monitoring event included the annual event analytical parameters, but had additional parameters analyzed that were unique to the IRA quarterly monitoring. The additional analyses included for those wells sampled under the IRA and/or UIC sampling programs are:

- IRA— The 10 extraction wells included in the IRA quarterly monitoring were analyzed for metals by USEPA Inductively Coupled Plasma (ICP) Method 6010B (aluminum, arsenic, bery

Guidelines (USEPA, 2002). USEPA Region II SOP HW-24, Revision 2 (USEPA 2006) Validating Volatile Organic Compounds by SW-846 Method 8260B was also used to supplement data review. Details of the data review and verification are presented in the validation report and data review summaries provided in Appendix A.

Section 3

3. Groundwater Monitoring Results

The following sections discuss the results of the groundwater and surface water elevation monitoring and annual groundwater sampling. The manual water level measurements that were collected in conjunction with the annual sampling event are discussed in Sections 3.1.1 through 3.1.7. Analytical results from the annual groundwater monitoring event are discussed in Section 3.2. Graphical trends of historic data over time at representative wells are described in Section 3.3.

3.1 Surface Water and Groundwater Elevation Measurements

The August/September 2010 Comprehensive Water Level Event was conducted primarily on August 31, 2010; however, certain monitoring wells were measured on subsequent dates (September 7, 8, and 13, 2010). Flooding in low areas due to the high rainfall in August at well locations northeast and southeast of the Facility delayed water level measurements until the September dates. The manual groundwater elevations collected in August/September 2010 are shown in Table 2-1. Historical groundwater elevation data are summarized in Appendix C.

This GWMR includes potentiometric surface maps and associated analyses for the USAS, upper portion of the LSAS, lower portion of the LSAS, AF Gravels, S&P Sands, Lower AF Sands, and Floridan aquifer zones. An effort was made to incorporate groundwater elevation data on the contoured maps from every well measured. However, in some cases, not every data point could be contoured. Cases in which data were plotted on the map but not used in contouring are noted on the maps by an asterisk (*). Horizontal and vertical gradients were calculated for each unit. Vertical gradients between the overlying unit and underlying unit were

and discharge points to the USAS. Groundwater elevations ranged from 12.24 to 29.88 feet (above) mean sea level (ft msl) in August and September 2010. The USAS potentiometric surface during the measurement events shows a groundwater depression beneath the Facility. The USAS potentiometric surface also shows a groundwater high on the adjacent golf course to the southwest of the Facility. The horizontal component of groundwater flow is towards the Facility within the groundwater depression. Outside the depression, groundwater flows radially away from the Facility with a gradient ranging from approximately 0.002 to 0.02 feet per foot (ft/ft). The average vertical downward gradient from the USAS to the lower LSAS at the Facility and across the monitored area is approximately 0.5 ft/ft.

Some features of the USAS potentiometric surface include the following:

- A groundwater high near the southwestern portion of the Facility and the northeastern portion of the golf course that is lik 1 235.rTp016 TmTd 3 0 Td 0.005 Tc 0.000 Tw (Sodpo0 0 1 215.64

- Groundwater elevations generally increased by 0.50 to 6.25 ft in the USAS monitoring wells between March/April 2009 and August/September 2010. A groundwater elevation decrease was measured in only one well (MW-121). The increase in groundwater elevations in 96 percent of the wells was greater than 2 ft.
- The lowest hydraulic head in a monitoring well was measured at MW-208, in the southeast portion of the contoured area, near the Pearce Canal.

3.1.2 Upper Portion of the Lower Shallow Aquifer System Potentiometric Surface

Figure 3-2 shows the potentiometric surface of the upper portion of the LSAS in August 2010. Monitoring of water levels and hydraulic responses during pumping tests or IRA pumping changes has demonstrated that the upper portion of the LSAS at the Facility responds differently than the lower portion. Therefore, water level contours are displayed for the upper portion separately. Hydraulic heads in the upper portion of the LSAS ranged from 21.81 to 25.39 ft msl in the August and September 2010 monitoring event. Limited data points are available in the uppermost LSAS. The wells in this zone are screened just below the Hard Streak, which forms the interface between the USAS and LSAS, and the vertical downward gradient from the USAS to the uppermost portion of the LSAS is approximately 0.12 ft/ft, as measured from MW-38 to PZ-LSAS-2. Groundwater elevations in the piezometers on-facility decreased by 0.49 to 0.80 ft due to the operation of the IRA system in 2010 (the system was shut down during the 2009 event). Groundwater elevations increased by 0.17 to 2.57 ft in the upper portion of the LSAS monitoring wells between March/April 2009 and August/ September 2010.

3.1.3 Lower Portion of the Lower Shallow Aquifer System Potentiometric Surface

Figure 3-3 shows the potentiometric surface of the lower portion of the LSAS in August and September 2010. Hydraulic heads in the lower portion of the LSAS ranged from 6.26 to 24.50 ft msl during the monitoring events. The highest head was at well MW-87 (on the golf course). The lowest contoured hydraulic head was at well MW-246, located in the northwest corner of the contoured area.

The horizontal component of groundwater flow in the center of the area is towards the Facility due to the operation of the IRA system. A groundwater depression exists over most of the Facility and extends to the north and east. Outside the depression, the horizontal gradient ranges from approximately 0.001 to 0.007 ft/ft, depending on direction. The vertical gradient is downward throughout most of the mapped area. However, the vertical gradients are upward from the AF Gravels to the lower portion of the LSAS over the eastern portion of the Facilitytn0A s used to maintain water levels in a decorative pond (TL-1). A flow control device has been installed which has resulted in a reduction in water usage at this property.

- In the vicinity of the Facility, groundwater elevations at 14 wells generally decreased by -7.37 to -0.33 ft in the lower portion of the LSAS monitoring wells between March/April 2009 and August/September 2010 due to operation of the IRA system. In areas farther from the Facility, the water levels in 31 wells increased by 0.71 to 10.34 ft.

3.1.4 AF Gravels Potentiometric Surface

Figure 3-4 shows the potentiometric surface of the AF Gravels in August and September 2010. The hydraulic heads in the AF Gravels ranged from 9.64 to 15.90 ft msl in August and September. The lowest head was at well MW-247, in the northwest corner of the contoured area. The highest head occurred at the Facility at MW-130. The horizontal component of groundwater flow is to the northwest and southeast, away from the Facility. The horizontal gradient ranges from approximately 0.002 to 0.007 ft/ft with the strongest gradients toward the southeast and south. The vertical gradient is downward from the AF Gravels to the S&P Sands throughout most of the mapped area. However, the vertical gradients are upward from the S&P Sands to the AF Gravels south of the Facility (including part of the golf course area) and in the far northeast portion of the contoured area. The vertical gradient ranges from approximately -0.05 ft/ft (upward) to 0.06 ft/ft (downward). The main features of the potentiometric surface of the AF Gravels are as follows:

- A groundwater high beneath the western portion of the Facility which extends to the north, west, and south of the Facility. The horizontal flow is to the northwest and southeast, away from this high. The Facility and immediate vicinity are located in a regional recharge area between discharge boundaries (ARCADIS

- The apparent depression present in the southwest contoured area in March/April 2009 was not evident in August/September 2010. The depression was due to groundwater extraction from a private well, located at 7921 15th Street E in the area, used to maintain water levels in a decorative pond (TL-1). A flow control device has been installed which has resulted in a reduction in water usage at this property.

- An apparent depression was present in the south contoured area during this monitoring event. The depression is attributed to groundwater extraction from a private well, located at 8005 15th St E. in the area, used for landscaping associated with the property. This private well, which was not being used during the March/April 2009 monitoring event, began operating in September 2009 after repairs were made to the well.

- An apparent groundwater low was present in the AF Gravels south of the Facility.

- Groundwater elevations generally increased by 3.06 to 9.29 ft in the AF Gravels monitoring wells between March/April 2009 and August/September 2010. The greatest increase in water levels (15.69 ft) was observed southwest of the Facility, where the apparent depression was located in March/April 2009. Water levels decreased in MW-169 (located south of the golf course).

3.1.5 S&P Sands Groundwater Potentiometric Surface

Figure 3-5 shows the S&P Sands potentiometric surface in August and September 2010. The hydraulic heads in the S&P Sands ranged from 8.66 to 16.25 ft msl in the August and September 2010 event. The lowest heads were in the northwest and south/southeast portions of the contoured area, and the highest heads were on the golf course and in the northeastern portion of the Site. The horizontal component of groundwater flow is toward the northwest and southeast away from the Facility. The horizontal gradient ranges from approximately 0.002 to 0.007 ft/ft. The vertical gradient ranges from -0.04 to 0.02 ft/ft (flow is downward to the southwest away from the Facility). Upward gradients were observed throughout most of the

component of groundwater flow near the Facility is toward the northwest and southwest with a gradient of between 0.001 and 0.002 ft/ft. The vertical gradient averaged 0.04 ft/ft upwards from the Floridan Aquifer System during this monitoring event.

Groundwater elevations generally increased by 1.29 to 5.10 ft in the Lower AF Sands monitoring wells between March/April 2009 and August/September 2010. The increase in groundwater elevations in 96 percent of the wells was found to be more than 2.00 ft.

3.1.7 Floridan Aquifer System Groundwater Potentiometric Surface

Figure 3-7 shows the upper Floridan Aquifer potentiometric surface in August and September 2010. Monitoring data from this event indicate that groundwater flows primarily to the west-northwest. The horizontal gradient was 0.0001 ft/ft to the west-northwest in August 2010. Groundwater elevations increased by 8.79 to 10.22in715.92 Tm2hows the n12 Tf 1 0 0 1 54 3

Notable points to consider with respect to trends in COC concentrations and distribution include the following:

- The method of 1,4-dioxane analysis was modified from USEPA 8270C to USEPA 8260C SIM ID, which was first used in October 2006 (between the preparation of the Site Assessment Report Addendum [SARA] 3 and the RAP). Findings from studies conducted by FDEP and others in 2006 indicate that Method 8260C SIM ID provides better accuracy over a wider range of 1,4-dioxane concentrations than previously approved methods. As a result, 1,4-dioxane concentrations analyzed since October 2006 provide a more reliable comparison than earlier results.

- The first monitoring wells were installed and sampled in 2001, and numerous wells have been installed and sampled over the years. Eleven monitoring wells were installed in late 2007 and early 2008, and one monitoring well was installed in 2010. As a result, some wells have more historical results for comparison than others. Generally, the higher the well identification number, the more recent the well was installed and the fewer times it has been sampled. The 11 monitoring wells installed in 2007/2008 have been sampled only 3 times, and the monitoring well installed in 2010 has been sampled only once, so limited historical comparison can be made in these cases.

- All COC contour figures w

one-half the reporting limit for the purpose of contouring. For duplicate samples, the higher reported result (or in the case of non-detects, half the lower reporting limit) was used for contouring.

- Extraction well data have historically not been used while preparing the contours for the COC maps; however, since the extraction wells were sampled during the August/September 2010 event, the data are posted on the COC maps for completeness. Extraction well data were specifically not used for contouring because they are constructed with 15 to 20-foot screens and were not installed as monitoring wells; however, these data were considered in the contouring, if appropriate. Cases in which data were plotted on the map but not used in contouring are noted on the maps by an asterisk (*).

- As is typical in groundwater plumes and as detailed below, concentrations of COCs in groundwater samples from specific wells have decreased in some instances and increased in others. This is to be expected due to some groundwater movement between sampling events and also due to minor differences in analytical variation. The overall distribution of COCs within monitoring wells in August/September 2010 was similar to the distribution during the March/April 2009 monitoring event (ARCADIS, 2009b) and within expected variation. There were a very few instances of somewhat larger differences between groundwater COC depictions between the last two sampling events, such as contours in the AF Gravels which were more similar to the January/February 2008 monitoring event (ARCADIS, 2008c and 2008d), but these too are within the overall range of expected results.

- Analytical data from the August/September 2010 sampling event are summarized in Table 2-3 and historical analytical data are presented in Appendix C. As a convention, when presenting August/September 2010 analytical results compared to historical results below, concentrations in wells are presented in the following order: sou x

3.2.1 COC Distribution in the USAS

The COC distribution in the USAS is shown in Figures 3-8A through 3-8F. Observed historical variations in distribution and concentrations of COCs are indicated below.

- *1,4-*

62 µg/L, and 46 µg/L, respectively. Concentration-over-time data plots for MW-69 and MW-108 are included in Appendix D.

The extent of 1,4-dioxane above the GCTL to the northeast of the Facility changed between March/April 2009 and August/September 2010. In March/April 2009, concentrations were detected above the GCTL for the first time at wells MW-65 (14 µg/L) and MW-62 (10 µg/L). The recent concentration detected in MW-62 remained above the GCTL (8.6 ug/L); however, 1,4-dioxane was not detected in well MW-65 during the August/September 2010 event. Concentrations in MW-17D and MW-71 dropped to below GCTL during the August/September 2010 event which resulted in separation of the depiction of the GCTL boundary in the area northeast of the Facility from one plume into two smaller plumes. Concentrations detected in well MW-63 exceeded the GCTL in January 2008 (6.7 µg/L) and have been below the GCTL during all other sampling events. Concentrations detected in MW-16D have remained stable. There were no detections of 1,4-dioxane during any sampling event at MW-26, which is east of MW-63. Concentration over time data plots for MW-62 and MW-65 are included in Appendix D.

Data from MW-95 were used to contour the extent of the plume to the east of the Facility. Concentrations detected in MW-95 have fluctuated from 3 µg/L to 35 µg/L to 5.8 µg/L to 11 µg/L in December 2006, January 2008, March 2009, and September 2010, respectively. A concentration of 11 µg/L was detected in MW-95 when it was first sampled in January 2005. There have not been any detections of 1,4 dioxane during any sampling event at MW-107, which is east and downgradient of well MW-95. Concentrations in well MW-27 increased between January 2008 (69 µg/L) and March 2009 (1,100 µg/L) and remained stable in September 2010 (950 µg/L); however, these concentrations are similar to the range detected before January 2008 (760 and 790 µg/L in 2006). Concentration over time data plots for MW-95 and MW-27 are included in Appendix D.

- *TCE*— The extent of TCE above the GCTL to the south has remained relatively stable. Concentrations of TCE have been detected above the GCTL at well MW-25 in early sampling events, whereas concentrations in the January 2008, April 2009, and September 2010 sampling events have been below the GCTL. Concentrations in MW-74 have remained above the GCTL in all sampling events except in January 2008, when TCE was not detected. The September 2010 TCE concentration detected in MW-35 (6.6 µg/L) is lower than the March 2009 concentration (25 µg/L).

  Concentrations of TCE above the GCTL do not extend west or northwest off the Facility. North of the Facility, the recent concentration in well MW-67 (24 µg/L) is the same concentration detected in March 2010. These concentrations are slightly higher than concentrations detected in past sampling events (7 to 15 µg/L). The overall extent of the plume in the northern direction is similar to the 2009 depiction.

  To the east, the recent concentration at well MW-64 (26 µg/L) is slightly higher than the concentration detected in the previous sampling event (14 µg/L) and is slightly higher than historic concentrations (5.5 to 18 µg/L). In addition, to the east, the recent concentrations at well MW-27 (86 µg/L) are higher than concentrations detected in March 2009 (39 µg/L) but within the range of concentrations detected in past sampling events (23 to 120 µg/L) between June 2005 and January 2008. Concentration over time data plots for MW-27 and MW-64 are included in Appendix D.

  TCE concentrations in most wells on the Facility were stable; however, some wells exhibited a significant decrease. Most notably, the recent concentration at MW-42 (920 µg/L) is significantly lower than the highest concentration detected at this well (4,600 µg/L), which was sampled in January 2006, before the IRA groundwater system began operations. One on-facility well, MW-40, has exhibited fluctuating TCE concentrations. The recent concentration in MW-40 decreased to 140 µg/L. Concentrations have been as high as 1,100 µg/L in March 2008, whereas the lowest concentration detected at this well was 137 µg/L in June 2005. Concentration over time data plots for MW

- *Cis-1,2-DCE*— In the 2010 sampling event, there were no concentrations of cis-1,2-DCE that exceeded the GCTL. The concentration detected in MW-42 (on-facility well) in February 2008 (83 µg/L) decreased to below the GCTL in May 2008 and has remained below the GCTL. The concentration over time data plot for MW-42 is included in Appendix D.

- *1,1-DCE*— An overall decrease in the concentration and distribution of 1,1-DCE is reflected in the recent sampling event. To the south of the Facility, the 1,1-DCE concentration at MW-25 decreased to below the GCTL in March 2009 (4 µg/L) and remained below the GCTL in September 2010 (1.2 µg/L). Additionally, the concentration of 1,1-DCE detected at well MW-35 decreased to below the GCTL in September 2010 (2.5 µg/L) versus March 2009 (10 µg/L). Concentrations in MW-35 fluctuate and have previously been below the GCTL. Concentrations at MW-75 had been below the GCTL for the previous two sampling events [January 2008 (5.1 µg/L) and March 2009 (3.4 µg/L)]. Recent concentrations at MW-75 (24 µg/L) increased to above the GCTL but are within the range of concentrations measured during previous sampling events (3.4 to 45 µg/L).

  To the southwest, the concentrations at MW-73 in January 2008 (91 µg/L), March 2009 (45 µg/L), and September 2010 (8.2 µg/L) exhibit a decreasing trend. The concentrations at MW-74 in September 2010 (39 µg/L), March 2009 (49 µg/L), and January 2008 (37 µg/L) remained lower than the concentrations measured during historical sampling events, which ranged from 85 to 150 µg/L. The concentration over time data plot for MW-74 is included in Appendix D.

  To the north of the Facility, the recent concentration at MW-110 (22 µg/L) is similar to concentrations measured during previous sampling events (6.4 µg/L to 22 µg/L).
  .

To the east, the recent 1,1-DCE concentration at MW-29 (5.1 µg/L) decreased to below the GCTL. The concentration at MW-104 (45 µg/L) is similar to concentrations measured during previous sampling events. The concentration at MW-27 increased from 230 µg/L in March 2009 to 350 µg/L in September 2010 which is within the range of concentrations measured during previous sampling events (120 to 600 µg/L). Concentration over time data plots for MW-27 and MW-104 are included in Appendix D.

- *1,1-DCA*—One off-facility well (MW-27) had a concentration detected above the GCTL. To the southeast, the 1,1-DCA concentrations in MW-27 have remained above the GCTL (ranging from 140 to 290 µg/L), except in January 2008 (69 µg/L); the September 2010 concentration (160 µg/L) is within the range previously detected. Recent concentrations decreased to below the GCTL in extraction wells EW-105 (5.6 µg/L) and EW-101 (22 µg/L), which is similar to historic detections in these wells.

  To the southwest, the concentrations decreased slightly in MW-74 between the January 2008 (82 µg/L) and March 2009 (72 µg/L) sampling events and decreased to below the GCTL in the September 2010 (68 µg/L) sampling event. Concentrations remained significantly lower than the range of concentrations measured during previous sampling events (130 to 300 µg/L).

3.2.2 COC Distribution in the LSAS

The COC distribution in the LSAS is shown on Figures 3-9A through 3-9F. Observed histor

fluctuated but an overall decreasing trend in concentrations is apparent from the highest level of 76 µg/L, detected in October 2006.

On the Facility

in September 2010. Concentration over time data plots for MW-33, MW-37, MW-41, MW-43, MW-68, MW-85, MW-91, and MW-98 are included in Appendix D.

- *PCE*.— To the south and southwest, recent concentrations at MW-87 and MW-98 are similar to concentrations in March 2009 and are within the range of concentrations detected in these wells during previous sampling events. The recent concentration detected at MW-87, which had the highest concentration of PCE in wells to the south or southwest, was 61 µg/L; the range of concentrations detected in previous sampling events was 61 to 150 µg/L. The recent concentrations in MW-78 decreased from 25 µg/L to 17 µg/L. These two most recent concentrations are slightly above the historical range (non-detect to 9.3 µg/L). The area of PCE above GCTLs is much smaller than the area of 1,4-dioxane and TCE above GCTLs. PCE concentrations exceeding GCTLs exist primarily in groundwater at the Facility and to the south and southwest under the golf course. The concentration over time data plots for MW-78 and MW-98 are included in Appendix D.

  Samples from on-facility wells MW-33, MW-39, and MW-37 had recent detected concentrations that decreased to 44 µg/L, 2.8 µg/L, and 3.2 µg/L, respectively. In March 2010, the concentrations detected in these wells (450 µg/L, 220 µg/L, and 160 µg/L, respectively) were notably higher than concentrations detected during previous sampling events. The concentration over time data plots for MW-33 and MW-37 are included in Appendix D.

- *Cis-1,2-DCE*— Concentrations exceeding GCTLs occur primarily below the eastern half of the Facility and off-facility at nearby wells MW-78 and MW-79, to the south and northeast of the Facility, respectively. The recent decrease in concentrations in on-facility wells MW-33, PZ-LSAS-

Although concentrations in MW-78 and MW-79 have fluctuated some, the results do not show an upward or downward trend. For example, concentrations detected in MW-79 range from 67 µg/L to 420 µg/L, with the most recent concentration at 99 µg/L. As with PCE, the area of cis-1,2-DCE above GCTLs is much smaller than the area of 1,4-dioxane and TCE above GCTLs. Concentration over time data plots for MW-33, MW-78 and MW-79 are included in Appendix D.

- *1,1-DCE*— The area of the 1,1-DCE plume above the GCTL is slightly smaller than the 1,4-dioxane plume above the GCTL in the LSAS. The 1,1-DCE plume does not extend as far to the northwest as the 1,4-dioxane plume. Concentrations in MW-82 and MW-85 are used to depict the extent to the south. Although concentrations have fluctuated in both of these wells, the recent concentrations at MW-82 (59 µg/L) and MW-85 (33 µg/L) were slightly lower than the March 2009 results.

  To the west, the recent concentration at MW-98 (280 µg/L) is relatively stable and is similar to concentrations from prior sampling events, excluding the December 2006 event (86 µg/L). North of the Facility, the recent concentration detected at MW-81 (20 µg/L) is lower than the March 2009 (73 µg/L) concentration. Concentrations historically have fluctuated in samples from MW-81 and at times concentrations have been below the GCTL. The concentrations in MW-86, which is farther north and downgradient of MW-81, are stable and have always been below the GCTLs. Northeast of the Facility, the September 2010 concentration detected in MW-91 (4.7 µg/L) decreased to below the GCTL. The concentrations detected in samples from this well have been below the GCTL in all previous sampling events except for March 2009 (7.9 µg/L). The recent concentration detected in MW-79 (2.6 µg/L), which has historically fluctuated, was below the GCTL. To the east, concentrations appear to be stable in MW-77 as the recent concentration (12 µg/L) is very similar to concentrations detected in most of the previous sampling events (8.7 µg/L to 34 µg/L). Concentration over time data plots for MW-82, MW-85, MW-98, MW-81, MW-91, and MW-79 are included in Appendix D.

stable concentrations. Northeast of the Facility, concentrations increased to above the GCTL in MW-131 (23 µg/L) and MW-133 (20 µg/L). Concentrations in these wells have previously been above the GCTL in June 2006 and October 2006, respectively. The presence of 1,4-dioxane in these wells above the GCTL has increased the extent of the impacted area to the east as compared with the 2009 plume depiction.

Southeast of the Facility, the concentration detected at MW-248 decreased from 12 µg/L (1,4-dioxane was detected in the duplicate sample) in January 2008, to non-detect in March 2009 and remained non-detect in September 2010. The absence of 1,4-dioxane in MW-248 has decreased the extent of the impacted area in the south and southeast when compared to the 2008 depiction. However, the depiction of the 1,4-dioxane GCTL boundary in the southeast appears to have increased from 2009 to 2010 based on the concentrations detected in MW-133. Concentration over time data plots for MW-130, MW-131, MW-133, MW-135, MW-239, and MW-248 are included in Appendix D.

A detached area of the plume is indicated farther to the east, based on concentrations detected in MW-158, MW-250, and MW-255 as well as historical data in private supply wells located at 2105 and 2411 Tallevast Road. Private supply wells located at 2105 and 2411 Tallevast Road were not sampled in September 2010 because these wells were abandoned. Monitoring well MW-255 was installed in February 2010 to replace the private well located at 2411 Tallevast Road. The highest concentration previously detected in this area was 120 µg/L at well MW-158 (which occurred both in October 2006 and December 2008). The concentration detected at MW-158 in September 2010 decreased to 39 µg/L. The concentrations detected at MW-250 fluctuate and have been non-detect (duplicate result was 4.4 µg/L), 15 µg/L, 4.1 µg/L, and 6.1 µg/L in February 2007, January 2008, March 2009, and September 2010 respectively. The recent concentration detected in newly installed MW-255 (replacement for 2411 Tallevast Road) was 20 µg/L which was similar to the concentration detected in private well 2411 Tallevast Road in January 2008 (22 µg/L). Recent results from all of the AF Gravels wells surrounding this area were non-detect or below GCTL, confirming the extent of the detached area. The concentration over time data plots for 2411 Tallevast Road/MW-255 and MW-158 are included in Appendix D.

- *TCE*—TCE concentrations above the GCTL in the AF Gravels are limited to wells on-facility and five wells northeast and east of the Facility - MW-131, MW-132, MW-239, MW-135, and MW-133. Northeast of the Facility, the concentration detected at MW-131 (41 µg/L) increased to above the GCTL in September 2010. Concentrations have historically been detected above the GCTL in this well in October 2005 (13.9 µg/L) and January (18 µg/L), June (29 µg/L) and October 2006 (4.6 µg/L). The concentration at MW-132 increased to slightly above the GCTL in January 2008 (3.7 µg/L) and remained above the GCTL in April 2009 (5.9 µg/L) and September 2010 (3.9 µg/L). Results from all previous sampling events at MW-132 have been non-detect. The recent concentration detected at MW-135 (3.9 µg/L) was considerably lower than concentrations detected during previous sampling events conducted between October 2005 and March 2009 (excluding a non-detect result in December 2006), which ranged from 38 to 150 µg/L. This has resulted in a somewhat smaller depiction of the plume 6 0 Td 0mewhat1 T63Ae Facility

March 2009 and 240 µg/L in September 2010. Concentrations in MW-134 increased to above the GCTL in May 2009 and remained above the GCTL in September 2010 (840 µg/L). The concentration in MW-127 increased from 120 µg/L in March 2009 to 350 µg/L in September 2010. The concentration over time data plots for MW-127, MW-134, and MW-253 are included in Appendix D. Cis-1,2-DCE concentrations detected in MW-135, northeast of the Facility, have fluctuated over time and have periodically been above the GCTL. Cis-1,2-DCE was previously detected in MW-135 at a concentration below the GCTL (41 µg/L) in March 2009. In September 2010, the concentration increased to above the GCTL (84 µg/L). The concentration over time data plot for MW-135 is included in remained below the GCTL in September 2010. The concentration over time data plots for MW-127 and MW-253 are included in Appendix D.

3.2.4 COC Distribution in the S&P Sands and Clay/Sand Zone 3 & 4

The COC distribution in the S&P Sands is shown on Figures 3-11A through 3-11F. Observed changes in the concentrations and distribution of COCs are indicated below. Analytical data from well I

Concentrations in IWI-2 (noted as a Clay Zone 3 & 4 well) increased from 4.1 µg/L in October 2005 to 69 µg/L in the March/April 2009 event. Concentrations (61 µg/L) remained stable in this well in September 2010. The 2010 result is posted on the S&P Sands COC distribution Figure 3-11A, but is not included in contouring.

- *TCE*— Only one on-facility well, MW-128, reported. The September 2010 concentration decreased to 1.5

3.3 Data Plots for Individual Wells

Contaminant concentrations over time at 54 representative wells distributed throughout the aquifer zones are provided in Appendix D. The wells were selected based on the following criteria:

- At least one COC had been detected above GCTLs at that well at some point in time.
- The well is located in an area where a COC GCTL boundary is present or nearby.
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Section 4

4. Discussion and Recommendations to Modify the Future Annual Monitoring Plan

4.1 Summary of Potentiometric Surface Data

The September 2010 sampling event was conducted during the rainy season. Significant precipitation occurred immediately prior to the start of the field program. This resulted in significant increases in water elevations in most monitored geologic layers and surface water features compared to the March/April 2009 event, which occurred during a period of significant drought. Additionally, reduced groundwater pumping also resulted in increased water level elevations. The reduced pumping to the southwest of the Facility resulted in increased water level elevations in the LSAS, AF Gravels, and S&P Sands. Further south, there may be a new pumping source that is reducing water level elevations in the AF Gravels and S&P Sands.

4.2 Summary of Contaminants of Concern Data

The September 2010 annual monitoring event included sampling of 189 wells (165 monitoring wells, 10 extraction wells, seven private wells, and seven piezometers) for field and laboratory water quality analysis. A total of 31 wells (16 monitoring wells, 10 extraction wells, and 5 pilot test wells) were sampled and analyzed for the UIC program. A total of 45 wells (35 monitoring wells and 10 extraction wells) were sampled as part of the quarterly IRA program. This groundwater quality data set provided the basis for comparisons with historical results. Groundwater quality trends at specific monitoring wells were analyzed, as discussed in Section 3 above. In addition, the September 2010 annual monitoring event results were assessed in relation to the data from March/April 2009. This was done on both a Site-wide basis, as well as on an aquifer (layer by layer) basis, as described below.

On a unit-specific basis, the following primary points of differences between 2010 and 2009 annual event results were observed:

- _USAS_ — Representation of the 1,4-dioxane GCTL boundary (Figure 3-8A) to the north and northeast of the Facility in 2010 included a separation of the plume compared to 2009 based on MW-71, MW-17D, and MW-65 having no detections of 1,4-dioxane in 2010. An increase in concentration at MW-89 to above GCTL resulted in a shift of the 1,4-dioxane GCTL boundary to the north in this area. Representation of the 1,4-dioxane GCTL boundary northwest and southeast of the Facility moved slightly due to increased detections in MW-108 (northwest), MW-94 (southeast), and MW-95 (southeast). Representation of the PCE and 1,1-DCE GCTL boundaries (Figures 3-8C and 3-8E, respectively) southwest of the Facility are smaller in 2010 compared to 2009. This change is primarily based on reduced 1,1-DCE detections in MW-25 and reduced PCE detections in MW-73. Representation of the 1,1-DCE GCTL boundary extended farther south of the Facility due to an increased detection in MW-75 which more closely resembles the depiction in 2008. Representation of the PCE and TCE (Figure 3-8B) GCTL boundaries moved slightly southeast of the Facility due to increased detections in MW-27.

- _LSAS_ — Representation of the 1,4-dioxane GCTL boundary (Figure 3-9A) extended slightly farther to the south and to the north of the Facility in 2010 compared to 2009. The change to the south is primarily based on an increase in detected concentration in MW-101. The change to the north is primarily due to an increase in detected concentration in MW-86. Representation of the TCE GCTL boundary (Figure 3-9B) contracted in the west/northwest of the Facility due to reduced concentrations detected in MW-68 and MW-80. The boundary

1,4-dioxane stayed approximately the same, concentrations of TCE decreased, and concentrations of vinyl chloride increased in IWI-2 from 2009 to 2010.

- *Lower AF* — To date, no exceedances of GCTLs have occurred in this unit.
- *Floridan* — To date, no exceedances of GCTLs have occurred in this unit.

On a site-wide basis, the overall GCTL boundary of COCs in groundwater during September 2010 has slightly expanded to the northwest (1,4-dioxane in the USAS), east/northeast (1,4-dioxane and TCE in the AF Gravels), north (1,4-dioxane in the LSAS), and south (1,4-dioxane in the LSAS) compared to that observed during the March/April 2009 event, which was used previously during development of the July 2009 RAP Addendum (ARCADIS, 2009b) and TPOC notice. The majority of these changes are associated with 1,4-dioxane concentration differences that oscillate around the GCTL (3.2 µg/L) which is also near the method detection level (1 µg/L) for this compound. The 1,4-dioxane GCTL boundary in the east/northeast is similar to the 2008 representation. The 1,4-dioxane GCTL boundary in the northwest is similar to the 2007 representation. The remedial alternative presented in the July 2009 RAP Addendum continues to be appropriate for addressing the overall GCTL boundary of COCs.

The 2010 overall GCTL boundary is presented on Figure 4-1. Based on the depiction presented on Figure 4-1, additional TPOC notices are proposed to be provided to the parcel owners listed in Table 4-1.

4.3 Recommended Future Groundwater Monitoring

As stated in Section 1, the annual groundwater monitoring event is intended to provide current data representative of groundwater plume conditions upon which remedial decisions can be made. Previous sampling events included all accessible groundwater monitoring wells at the Site. Based on sampling in 2006, 2008, and 2009, the boundaries of the groundwater plume were well established, and adequate information was obtained to design the recommended remedy. The 2009 RAP Addendum included a recommendation to sample a subset of all Site wells (180 wells) for ongoing annual monitoring. A RAP approval order dated November 4, 2010 was issued by FDEP; therefore, Lockheed Martin will continue to use a subset of wells in the ongoing annual monitoring until the remedy approved in the RAP Addendum is installed and its associated monitoring program (i.e., RAP effectiveness monitoring) can replace the annual monitoring program.

As discussed in Section 1.2, due to closure of certain wells since submittal of the RAP Addendum, the list of 180 wells has changed slightly. Table 1-1 shows the wells that are to be monitored during the next annual event. These wells are also shown on Figure 4-2. Changes from the list presented in the 2009 RAP Addendum include:

- Replacement of AF Gravels private well 2411 Tallevast Road with MW-255 (AF Gravels well)

- Replacement of Floridan well MW-218 with private well 2411 Tallevast Road Well #2 (Floridan well)

- Deletion of AF Gravels private well 2105 Tallevast Road due to closure of this well (note the proximity of AF Gravels well MW-158 which will provide data for this area)

Thus a total of 179 monitoring wells is proposed for the 2011 monitoring event (65 USAS, 42 LSAS, 38 AF Gravels, 19 S&P Sands, 8 Lower AF, and 7 Floridan wells).

Section 5

5. References

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