Appendix A

Documents Reviewed

Appendix A
Documents Reviewed

Agency for Toxic Substances Disease Registry (ATSDR), 1989. Health Assessment for North Indian Bend Wash, Scottsdale, Maricopa County, Arizona, CERCLIS NO. AZD980695969. April.

ATSDR, 1993. Site Review and Update, Indian Bend Wash Area, Scottsdale, Maricopa County, Arizona, CERCLIS NO. AZD980695969. September.

ATSDR, 2005. Health Consultation, North Indian Bend Wash Area 12 Treatment Facility, City of Scottsdale, Maricopa County, Arizona. EPA Facility ID: AZD980695969. March.

ATSDR, 2006. Health Consultation, North Indian Bend Wash Miller Road Treatment Facility, Scottsdale, Maricopa County, Arizona. EPA Facility ID: AZD980695969. March.

ATSDR, 2006. Health Consultation, North Indian Bend Wash Central Ground Treatment Facility, Scottsdale, Maricopa County, Arizona. EPA Facility ID: AZD980695969. September.

ATSDR, 2007. Health Consultation, North Indian Bend Wash Area 7 Groundwater Extraction and Treatment Facility, Scottsdale, Maricopa County, Arizona. EPA Facility ID: AZD980695969. March.

CH2M HILL, 1991. Public Comment Draft, North Indian Bend Wash RI/FS Report. April.

CH2M HILL, 1997. Indian Bend Wash-South Final RI. July.

City of Scottsdale, 2010. North Indian Bend Wash Superfund Site Central Groundwater Treatment Facility (CGTF) Operation and Maintenance Plan, Revision 3, August.

Environ International Corporation, 2008. Miller Road Treatment Facility Evaluation Report. April 17.

EPA, 1988. Final Record of Decision, Scottsdale Groundwater Operable Unit, Indian Bend Wash Superfund Site, Scottsdale, Arizona. September.

EPA, 1991. Record of Decision, North Indian Bend Wash Superfund Site. September.

EPA, 1993. Record of Decision, VOCs in Vadose Zone, Indian Bend Wash Superfund Site, South Area, Tempe, Arizona, Plug-In and Presumptive Remedy Approach. September.

EPA, 1998. Record of Decision, VOCs in Groundwater Operable Unit, Indian Bend Wash Superfund Site, South Area, Tempe, Arizona. September.

EPA, 2001a. Comprehensive Five-Year Review Guideline. EPA 540-R-01-007. June.

EPA, 2001b. Record of Decision Amendment for the North Indian Bend Wash Superfund Site, Final Operable Unit, Scottsdale, Arizona. September.

EPA, 2004. Record of Decision Amendment for the South Indian Bend Wash Superfund Site Groundwater Operable Unit, Tempe, Arizona. June.

NIBW PCs, 2002. Groundwater Monitoring and Evaluation Plan, North Indian Bend Wash Superfund Site, October 8.

NIBW PCs, 2005. 2004 Site Monitoring Report, North Indian Bend Wash Superfund Site, Volume I and Volume II. April 7.

NIBW PCs, 2006a. Operation and Maintenance Plan – Groundwater Monitor Well Network, North Indian Bend Wash Superfund Site. June 5.

NIBW PCs, 2006b. Operation and Maintenance Plan – Miller Road Treatment Facility. June 5.

NIBW PCs, 2006c. Operation and Maintenance Plan – Area 7 Groundwater Extraction and Treatment System. June 5.

NIBW PCs, 2006d. Operation and Maintenance Plan – Area 12 Groundwater Extraction and Treatment System. June 5.

NIBW PCs, 2007a. North Indian Bend Wash Superfund Site Communication Plan. July 11.

NIBW PCs, 2007b. North Indian Bend Wash Superfund Site Contingency and Emergency Response Plan – Miller Road Treatment Facility. July 11.

NIBW PCs, 2007c. North Indian Bend Wash Superfund Site Contingency and Emergency Response Plan – Area 7 Groundwater Extraction and Treatment System. July 11.

NIBW PCs, 2007d. North Indian Bend Wash Superfund Site Contingency and Emergency Response Plan – Area 12 Groundwater Extraction and Treatment System. July 11.

NIBW PCs, 2008. North Indian Bend Wash Superfund Site 2008 Interim Operating Plan – Miller Road Treatment Facility. April 25.

NIBW PCs, 2010. 2009 Site Monitoring Report, North Indian Bend Wash Superfund Site. February 28.

NIBW PCs, 2011. North Indian Bend Wash Superfund Site Five-Year Review Analysis of Groundwater Remedy Effectiveness. January.

SIBW Groundwater Monitoring Database. Updated March 2010.

Scottsdale Economic Vitality Department, June 2009.

Salt River Project, 2007. Contingency and Emergency Response Plan for An Accidental Release of Untreated Groundwater from SRP NIBW Extraction Wells. January.

U.S. District Court, District of Arizona (USDC), 1992. Consent Decree, CIV-91-1835-PHX-WPC, April 28.

U.S. District Court, District of Arizona. 1993. Consent Decree, CIV 92-2314 PHX PGR, August 11.

U.S. District Court, District of Arizona. 2003. Amended Consent Decree, CIV 91-1835 PHX JFM, June 06.

Appendix B

Data Review Memorandum

Technical Memorandum

To:	Rachel Loftin, Remedial Project Manager, United States Environmental Protection Agency, Region 9
From:	Larry Phillips, R.G., Innovative Technical Solutions, Inc.
Date:	20 September 2011
Subject:	**Data Review, Indian Bend Wash Superfund Site, Five Year Review**
Contract/TO:	EP-S9-08-03/0044 **ITSI DCN:** 07163.0045.0010R4

1.0 INTRODUCTION AND PURPOSE

Innovative Technical Solutions, Inc. (ITSI) has prepared this Data Review Technical Memorandum summarizing the evaluation of the groundwater contamination concentrations and groundwater elevations for the Indian Bend Wash (IBW) Superfund Site to determine if the Remedial Action Objectives (RAOs) are being met. This Data Review Technical Memorandum is an appendix to the Five Year Review (FYR) for the IBW Superfund Site on behalf of United States Environmental Protection Agency (EPA) Region 9.

The FYR for the IBW Superfund Site is being conducted to meet the statutory mandate established under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 121. ITSI is conducting these activities under Remedial Action Contract (RAC) number EP-S9-08-03, Task Order 0044.

The IBW Superfund Site encompasses approximately thirteen square miles of the Paradise Valley Basin. The IBW Site is divided into two operable units: North Indian Bend Wash (NIBW), located north of the Salt River within the City of Scottsdale (COS) (Figure 1-1) and South Indian Bend Wash (SIBW), located south of the Salt River with the City of Tempe (COT) (Figure 1-2). An operable unit (OU) is a discrete part of an overall site and can be examined separately if the remedial action for the operable unit can be done expeditiously, is cost-effective, controls contaminant sources or migration, and is consistent with the final site remedy.

This Data Review Technical Memorandum highlights existing groundwater conditions and the status of site cleanup at NIBW and SIBW.

2.0 NIBW DATA REVIEW

The following sections include an evaluation of the groundwater quality and groundwater elevations at NIBW during the period of October 2001 through October 2009. The data set from 2001 was selected because the last ROD amendment for NIBW became effective in 2001. The data set from 2009 was selected because it was the most recent complete data set available when the FYR process began in early 2010. The groundwater data evaluation associated with the Upper Alluvial Unit (UAU), Middle Alluvial Unit (MAU) and Lower Alluvial Unit (LAU) areas of NIBW are discussed in separate subsections.

2.1 BACKGROUND

In 1981, groundwater at IBW was found to contain elevated levels of volatile organic compounds (VOCs) including trichloroethene (TCE), tetrachloroethene (PCE), and chloroform above federal maximum contaminant levels (MCLs) in COS production wells. EPA and the Arizona Department of Environmental Quality (ADEQ) have been involved in the characterization and remediation of the IBW Site since the initial discovery of VOCs in the groundwater in 1981. The entire IBW Superfund Site was placed on the National Priorities List (NPL) in 1983 and divided into NIBW and SIBW.

In September 1988, EPA issued the OU I record of decision (ROD) addressing groundwater contamination in the MAU and the LAU. EPA negotiated two Consent Decrees (CDs) with the NIBW participating companies (PCs) at NIBW, with the first CD negotiations completed in 1991 for implementation of cleanup actions selected in the 1988 ROD. The Remedial Investigation/Feasibility Study (RI/FS) for soils was completed in April 1991. In August 1993, the second CD was finalized for implementation of the cleanup actions selected in the 1991 ROD. In 2001, EPA issued the Final ROD Amendment consolidating the previous decisions regarding both groundwater and soil cleanup actions and incorporating voluntary actions by the PCs as part of the final remedy. The 2001 ROD Amendment focused on eliminating any remaining threats to groundwater due to residual soil contamination. A complete discussion of all ROD and CD background information is included in the FYR report.

The 2001 ROD Amendment for NIBW (EPA, 2001) lists the following RAOs:

- Restore the Upper, Middle, and Lower Aquifers to drinking water quality by decreasing the concentrations of the contaminants of concern (COCs [i.e., VOCs]) to below the cleanup standards;
- Protect human health and the environment by eliminating exposure to contaminated groundwater;
- Provide the City of Scottsdale (COS) with a water source that meets MCLs for NIBW COCs;

- Achieve containment of the groundwater contamination plume by preventing any further lateral migration of contaminants in groundwater;
- Reuse the water treated at the Site to the extent possible, in accordance with Arizona's Groundwater Management Act;
- Mitigate any soil contamination that continues to impact groundwater; and
- Provide long-term management of contaminated groundwater to improve the regional aquifer's suitability for potable use.

These RAOs were selected based on the following considerations:

- The need to restore the groundwater for drinking water use by decreasing VOCs to below MCLs because the groundwater at NIBW is used as a public water supply;
- COS water supply wells were shut down and Paradise Valley public supply wells were threatened due to groundwater contamination from the NIBW Site;
- Containment of contaminated groundwater at NIBW is necessary to protect existing public supply wells; and
- The necessity for effective management of groundwater resources in the state of Arizona.

The NIBW area encompasses approximately ten square miles of groundwater for cleanup (Figure 1-1), with groundwater present in three distinct alluvial units: the UAU, MAU and LAU. There are no known continuing source areas or non-aqueous phase liquids (NAPLs) present at the NIBW.

At NIBW, groundwater quality is monitored for five target COCs: TCE, PCE, 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethene (1,1-DCE), and chloroform. Groundwater concentrations of 1,1,1-TCA, 1,1-DCE and chloroform are below their respective MCLs. PCE is found at concentrations slightly above the MCL at some of the monitor wells. TCE is the primary COC because it is present in groundwater at higher concentrations than the other NIBW COCs.

At the southwestern margin of NIBW, groundwater from the UAU and MAU moves vertically into the LAU. The MAU and the LAU are used for drinking water. The four active groundwater extraction and treatment systems (GWETSs) constitute the final remedy for the NIBW area. These include the Miller Road Treatment Facility (MRTF), the Central Groundwater Treatment Facility (CGTF), the Area 7 GWETS (Area 7) and the Area 12 GWETS (Area 12). These treatment systems extract and clean up contaminated groundwater to below the MCLs. Approximately 20 production wells, some of which are part of the NIBW groundwater extraction and treatment systems, are within the NIBW.

The following subsections describe the groundwater quality in the UAU, MAU and LAU for NIBW and the status of the TCE plume. Potentiometric surface maps and discussions of groundwater flow directions within the alluvial units are also provided to assist in the understanding of plume movement.

Time Period of Data

The groundwater quality data collected by the NIBW PCs, and groundwater elevation trends from October 2001 through October 2009 were reviewed. The rationale for using this time period is discussed in Section 2.0.

2.2 GROUNDWATER QUALITY REVIEW

Groundwater monitoring requirements for the NIBW site are specified in the Groundwater Monitoring and Evaluation Plan (GMEP), approved by EPA on October 8, 2002 (NIBW PCs, 2002).

Groundwater monitoring at NIBW includes collection, analysis and reporting of water elevation, water quality, and water production data from groundwater monitor, extraction and production wells completed in the UAU, MAU and LAU. In addition to periodic water elevation monitoring conducted at unit-specific monitor wells, continuous water elevation monitoring is conducted at a select group of LAU monitor, production, and extraction wells in the vicinity of the Arizona American Water Company (AAW) well field as part of the enhanced northern LAU monitoring program.

Currently, groundwater quality is monitored for five target COCs: TCE, PCE, 1,1,1-TCA, 1,1-DCE and chloroform. The annual groundwater quality monitoring program is conducted in October. Review of NIBW groundwater quality data focuses on TCE and PCE since the remaining COCs concentrations are below their respective MCLs and encompassed within the TCE plume.

In addition, ITSI utilized existing ArcMap GIS project files to calculate approximate areas for each of the 2009 plumes in the NIBW area relative to the UAU, MAU and LAU. All NIBW ArcMap files are registered with a known horizontal datum set: U.S. State Plane, NAD 83, Arizona Central (International Feet). ArcMap stores polygon areas within the properties of the polygon feature based on the specified horizontal datum. As a result, polygons representing plume boundaries within the ArcMap file provided a reliable source to query the approximate extent of each plume, expressed in square feet. Square feet were converted to acres for convenience.

For the 2001 NIBW data, ITSI located paper copies of figures showing the 2001 plume delineations to semi-rectify and digitally trace the approximate plume boundaries to calculate the plume area. The area value associated with the 2001 data was then compared with the 2009 data. The NIBW contamination is present in the UAU, MAU and LAU, with multiple contamination plumes associated with each alluvial unit. In this case, the area of each plume associated with each specific alluvial unit was combined and the total value was used to compare temporal changes in plume size for each alluvial unit. For example, three contamination plumes were associated with UAU for 2009. The linear areas of the three plumes in the UAU were aggregated for a total linear plume area in that specific alluvial unit (the UAU).

Percent changes in the plume size between 2001 and 2009 were also calculated. This information is provided below in each of the unit subsections.

2.2.1 Upper Alluvial Unit

In September 1991, EPA issued the OU II ROD to address VOCs in the UAU groundwater and vadose zone at NIBW based on data generated subsequent to the 1988 ROD. The 1991 ROD addressed the potential for VOCs in the UAU groundwater to migrate to the MAU and LAU. The 1991 ROD discussed the migration of UAU groundwater to the MAU would be captured and treated by the existing MAU GWETSs and the prevention of further groundwater contamination from soil sources. This ROD outlined a vadose zone investigation and use of soil vapor extraction (SVE) to remove the threat of continuing groundwater contamination from the vadose zone at selected source locations.

The OU II vadose zone investigation included installation of soil vapor monitoring (SVM) wells, collection and analysis of shallow soil gas sampling, and periodic evaluation of impacts to groundwater due to flux of VOCs from soil to groundwater in the UAU. The OU II ROD also included expansion of the groundwater monitoring program to include installation of new MAU and UAU groundwater monitor wells.

Per the OU II ROD, SVE began at Area 7 in July 1994 to address potential source areas in the UAU. The SVE system has operated since July 1994 with periodic shut down periods for rebound testing of the vadose zone. The Area 7 GWETS, constructed in 1998, extracts groundwater from one UAU and three MAU wells.

The Area 8 SVE system operated from September 1995 through October 1996. The system was decommissioned in 1997 following analysis of soil vapor data from rebound testing indicating the system had achieved its performance objectives. In July 1997, EPA issued a Notice of Determination that the Area 8 performance standards had been met.

The Area 6 SVE system was operated from December 1998 to August 2000 followed by issuance of an Area 6 closure letter to EPA in October 2000.

The Area 12 SVE system operated from December 1996 to June 1998 to address VOC contamination in the vadose zone. The SVE system was decommissioned in 2000 following analysis of soil vapor data from rebound testing indicating the system had achieved its performance objectives.

In the vicinity of NIBW, the thickness of the UAU is approximately 120 to 160 feet. The UAU in this area consists primarily of sand, course gravel, cobbles, and boulders. Groundwater occurs at depths ranging from approximately 65 feet to approximately 104 feet below ground surface (bgs), with up to 40 feet of saturated thickness. Further physical description of the UAU is discussed in the FYR report.

The direction of groundwater movement in the UAU is from east to west in the area south of McDowell Road, and from northeast to southwest in the vicinity of Thomas Road. The UAU groundwater migrates from all directions toward the southwest margin of the NIBW area where bedrock is encountered and groundwater moves vertically into underlying alluvial units. Figure 2-1 shows the groundwater elevation contour map for the UAU wells in October 2009.

In the NIBW area, the VOCs plume size and concentrations are lowest in the UAU. In 1997, TCE concentrations in the UAU ranged from 13 micrograms per liter (µg/L) at D-U1A to 190 µg/L at PG-31UA. In 2001, TCE concentrations in the UAU ranged from 7.9 µg/L at PG-10UA to 45 µg/L at PG-31UA. Well PG-31UA was selected as a representative monitor well as it has shown the highest TCE concentrations in the UAU.

TCE concentrations in the UAU monitor wells generally are low compared to the MAU and the LAU, with a maximum concentration in October 2009 of 38 µg/L, detected at well PG-31UA, located downgradient from Area 7. The occurrence of TCE concentrations in the UAU groundwater in excess of the MCL of 5 µg/L is limited to discrete zones associated with Area 7 and Area 12 as indicated on Figure 2-2. As of October 2009, there were five monitor wells in the UAU with TCE concentrations exceeding the MCL. These monitor wells include: PG-31UA, PG-22UA, E-5UA, PG-5UA, and PG-24UA. TCE concentrations in monitor wells generally have decreased since October 2001. The highest TCE concentrations were detected in PG-31UA and ranged from 12 µg/L in October 2005 to 61 µg/L in October 2008. Figure 2-2 depicts the October 2009 TCE plume in the UAU in comparison with the October 2001 TCE plume.

In addition, the TCE plume area has decreased significantly since October 2001, with plume boundaries appearing to have stabilized or contracted. In October 2001, the total TCE plume size was approximately 793 acres. In October 2009, the total TCE plume size was approximately 221 acres, a decrease of approximately 72 percent.

Five representative wells were chosen for concentration trend plots. Wells representative of the UAU were chosen based on one of the following criteria: (1) wells with the highest COC concentrations, PG-31UA; (2) wells with COC concentrations that have decreased to below the MCLs, D-1UA and PG-10UA; and (3) boundary wells, E-5UA and PG-5UA, which will provide information about the stabilization and/or decrease of the plume areas. Figures 2-3A through 2-

3E show TCE and PCE concentration and groundwater elevation trend plots for the representative wells of the UAU at NIBW.

The following table presents the TCE concentrations for October 2001 and October 2009 for the five representative wells of the UAU, when the TCE concentration decreased to below the MCL, if applicable, and which of the aforementioned criteria was used to select each of the representative wells.

UAU Monitor Well	Criteria Used For Well Selection	1997 TCE Concentration (µg/L)	October 2001 TCE Concentration (µg/L)	October 2009 TCE Concentration (µg/L)	First Sampling Event TCE Concentration Decreased Below MCL
D-1UA	Well had TCE concentration above MCL, but has decreased to below MCL	13	14	< method detection limit of 0.5 µg/L	December 2008
E-5UA	Boundary well	39	11	9.8	N/A
PG-5UA	Boundary well	31	15	5.2	N/A
PG-10UA	Well had TCE concentration above MCL, but has decreased to below MCL	170	7.9	1.7	October 2003
PG-31UA	Well with highest TCE concentration in UAU	190	45	38	N/A

Note: All results less than the method detection limit, 0.5 µg/L, are considered non-detect. Only results greater than or equal to 1.0 µg/L were used to create the COC concentration contours.

The PCE concentrations in all but one of the UAU monitor wells are below the method detection limit of 0.5 µg/L. The PCE concentration in one UAU monitor well, E-5UA, is at the laboratory reporting limit of 1.0 µg/L. PCE concentrations in the UAU monitor wells have decreased slightly since October 2001; the PCE concentration in E-5UA decreased from 2.2 µg/L in October 2001 to 1.0 µg/L in October 2009.

In summary, since October 2001 the TCE UAU plume size has decreased approximately 72 percent and the TCE concentrations in the UAU have decreased from 1997 TCE concentrations ranging from 13 μg/L to 190 μg/L to concentrations ranging from less than 1.0 μg/L to 38 μg/L in 2009. All PCE concentrations in the UAU monitor wells are at or below the laboratory reporting limit.

2.2.2 Middle Alluvial Unit

The first IBW ROD was issued in April 1988, to address VOCs in the groundwater in the MAU and LAU. The remedy consisted of groundwater extraction from four existing supply wells with delivery to and treatment of the extracted groundwater at a central treatment plant located in Scottsdale, Arizona. Treatment of extracted groundwater consists of air stripping and treatment of air stripper vapors with vapor phase granular activated carbon (vGAC) at the CGTF. The RAOs outlined in the OU I ROD include containment of the MAU and LAU VOCs groundwater plume with concentrations above federal drinking water standards, treatment of extracted groundwater with concentrations above federal drinking water standards, treatment of extracted groundwater to below MCLs, and delivery of the treated groundwater to the COS for potable supply. The Area 7 GWETS, constructed in 1998, extracts groundwater from one UAU and two MAU wells. In 2000, Siemens Manufacturing (a member of the PCs) expanded the MAU remedy by installing a third MAU extraction well (7EX-5MA) at Area 7. Groundwater is extracted from the MAU wells: MEX-1MA and Granite Reef well (also known as SRP well 23.6S-6.0N) and treated via air stripping prior to discharge to an SRP irrigation canal.

The Area 7 and Area 12 groundwater extraction and treatment systems were installed to minimize the migration of contaminants to the southwest margin of the NIBW area and nearby production wells. In Area 7, extraction wells, 7EX-3MA, 7EX-4MA, and 7EX-5MA, are controlling significant migration of the high concentration TCE plume to the southwest margin, as evidenced by the slight decrease in the TCE concentration at well PA-12MA2. In Area 12, the remedy is also effectively controlling significant migration to the southwest margin as evidenced by the decrease of the middle aquifer plume area with TCE concentrations above 50 ppb since October 2001. At the southwest margin, the TCE concentration at well PG-6MA has increased slightly from 110 ppb in October 2001 to 120 ppb in October 2009. This portion of the TCE plume at the southwest margin is not captured by the middle aquifer extraction wells, and it is expected this portion of the TCE plume will likely continue to migrate and be captured by remedy wells in the lower aquifer as envisioned by the Record of Decision.

The MAU primarily consists of silt, clay, and interbedded fine sands. Relatively thin layers of coarser deposits are scattered throughout the unit. The fine grained sediment in the MAU results in a mass diffusion process which contributes to plume migration. The thickness of the MAU ranges from approximately 360 to 660 feet. Water elevations in wells perforated in the MAU occur at depths of approximately 90 to 150 feet bgs. Further detail of the MAU is presented in the FYR report.

The complex pattern of groundwater movement observed in the MAU results from competing influences between various pumping centers and influence at the southwest margin, where vertical movement into the LAU occurs. Groundwater movement in the southern part of the area is generally convergent towards Area 12 extraction wells and the southwest margin. Groundwater movement in the northern part of the area is generally convergent toward the Area 7 extraction wells, the CGTF extraction wells, and the AAW well field as identified on Figure 2-4. Groundwater contours for the MAU at the NIBW site for October 2009 are shown on Figure 2-4.

In 1997, TCE concentrations ranged from 5.9 µg/L at E-10MA to 4,200 µg/L at D-2MA. In October 2001, there were 21 monitor wells in the MAU with TCE concentrations exceeding the MCL. As of October 2009, there were 28 monitor wells in the MAU with TCE concentrations exceeding the MCL (Figure 2-5). The maximum TCE concentration of 4,600 µg/L was detected in January 2009 at well W-2MA, which is located downgradient from Area 7. In October 2009, the TCE concentration at monitor well W-2MA was 4,000 µg/L. The maximum concentration of TCE detected in the vicinity of Area 12 was 90 µg/L at well M-6MA in October 2009. The third area of elevated TCE concentrations in the MAU groundwater coincides with the vicinity of the southwest margin. The TCE concentration at well PG-6MA located in this area was 120 µg/L in October 2009.

Changes in TCE concentrations in the MAU groundwater observed over the past eight years (October 2001 to October 2009) are generally small. The overall footprint of the TCE plume in the MAU is generally stable, with the western boundary expanding slightly in the area of PG-38MA/LA. Figures 2-6A through 2-6I show trend plots for TCE (and PCE) concentrations and groundwater elevations at selected representative wells in the MAU at the NIBW Site. In October 2001, the total TCE plume size was approximately 2,122 acres. In October 2009, the total TCE plume size was approximately 2,280 acres, an increase of approximately 7 percent.

In October 2009, PCE concentrations above the MCL of 5 µg/L were detected in three monitor wells: PG-38MA/LA, W-2MA, and D-2MA. In October 2001, PCE concentrations above the MCL of 5 µg/L were detected in two monitor wells: W-2MA, and D-2MA. The PCE plume is much smaller than the TCE plume and is completely encompassed by the footprint of the TCE plume. PCE concentrations in monitor wells have generally decreased or stabilized since October 2001.

Nine representative wells were chosen for concentration trend plots. The representative wells were chosen based on the following: (1) wells with the highest COC concentrations, D-2MA, PG-48MA/LA, and W-2MA; (2) wells with COC concentrations that have decreased; and (3) boundary wells, E-10MA, M-10MA2, PA-12MA2, PG-6MA, PG-23MA/LA, and PG-38MA/LA, which will provide information about the stabilization and/or decrease of the plume areas.

The following table indicates the TCE concentrations for October 2001 and October 2009 for the nine representative wells of the MAU, when the TCE concentration decreased to below the MCL, if applicable, and which of the aforementioned criteria was used to select each of the representative wells.

MAU Monitor Well	Criteria Used For Well Selection	1997 TCE Concentration (µg/L)	October 2001 TCE Concentration (µg/L)	October 2009 TCE Concentration (µg/L)	First Sampling Event TCE Concentration Decreased Below MCL
D-2MA	Well has the highest TCE concentrations	4,200	2,200	1,900	N/A
E-10MA	Boundary well	5.9	13	5.5	Decreased below MCL once in July 2007
M-10MA2	Boundary well	13	33	30	N/A
PA-12MA2	Well along the axis of high-TCE plume	200	590	410	N/A
PG-6MA	Southwest margin well	89	110	120	N/A
PG-23MA/LA	Boundary well	57	36	21	N/A
PG-38MA/LA	Boundary well	36	6.4	5.5	N/A
PG-48MA/LA	Area 12 well with highest TCE Concentration	120	110	100	N/A
W-2MA	Well has the highest TCE concentrations	2,200	3,100	4,000	N/A

Groundwater contour maps show that most of the TCE plume appears to be contained in the capture zones of the existing extraction well system in the MAU, except at the southwest margin where it was expected that a portion of the TCE plume would likely migrate down to the LAU. In order to remediate the groundwater contamination in the LAU that has migrated from the MAU, extraction wells were installed in the LAU with the water treated at the CGTF and MRTF.

In summary, TCE and PCE concentrations in the MAU have decreased since October 2001. This information, as well as the review of groundwater contour information suggests that adequate capture of TCE, PCE and other COCs is occurring in most of the MAU, with the exception of the southwest margin. Since October 2001, the TCE MAU plume size has increased approximately 7 percent; however the TCE concentrations in the MAU have generally decreased from 1997 TCE concentrations ranging from 5.9 µg/L to 4,200 µg/L to 2009 concentrations ranging from 5.5 µg/L to 4,000 µg/L. Although the overall plume size has slightly increased at the southwest margin, the MAU remedy is functioning as planned.

2.2.3 Lower Alluvial Unit

The remedy for the LAU was designed to control the migration of the contaminant plume from the MAU to the LAU. The LAU is being remediated with the replacement / reconfiguration of CGTF extraction well COS-75, installation of LAU extraction wells, and the MRTF located in the northern portion of the NIBW site to protect drinking water wells in the Paradise Valley Well Field. The MRTF includes installation of well PCX-1 which is screened in the LAU, and construction of the MRTF along with conveyance piping from wells PV-14, PV-15 and PCX-1 to MRTF. Extraction of water from wells PV-14, PV-15, and PCX-1 is based on a preferential pumping schedule that emphasizes the capture of the LAU plume while meeting water use demands.

The LAU consists of weakly to strongly cemented gravel, boulders, sand, sandy clay, silty sand, and interbedded clay. The portion of the LAU in which monitor wells are screened has generally coarser grained material than the MAU. The thickness of the LAU in the study area is not well known. Water depths measured in the LAU range from approximately 150 to 350 feet bgs. Further description of the LAU is presented in the FYR report.

Groundwater movement in the LAU is generally from recharge areas located in the south and southwest to points of discharge from groundwater extraction and production wells in the north. Figure 2-7 depicts the groundwater elevation contour map for October 2009.

In 1997, TCE concentrations in the LAU groundwater ranged from less than 1.0 µg/L to 160 µg/L. In October 2001, PCE concentrations were detected above the MCL in 15 monitor wells in the LAU. TCE concentrations in the LAU are generally between those reported for the UAU and the MAU, with a maximum concentration of 200 µg/L detected in October 2009 at monitor well PA-6LA.

As of October 2009, TCE concentrations were detected above the MCL at 15 monitor wells in the LAU. The highest concentrations of TCE in the LAU groundwater occurred in the central part of the NIBW Site in the vicinity of CGTF extraction well COS-75A. TCE concentrations at monitor wells PA-5LA and PA-6LA were 190 µg/L and 200 µg/L, respectively. Figure 2-8 shows TCE concentrations in the LAU in October 2001 and October 2009. In October 2001, the total TCE plume size was approximately 3,102 acres. In October 2009, the total TCE plume size was approximately 2,874 acres, a decrease of approximately 7 percent.

Changes in TCE concentrations in the LAU groundwater observed over the eight-year period between October 2001 and October 2009 are generally small, although TCE concentrations have decreased at some locations within the plume. Decreases observed in the southern part of the NIBW Site in the LAU and along the centerline of the plume (e.g., PA-19LA and PG-23MA/LA) are likely attributed to mass removal at extraction wells and influx over time of UAU and MAU groundwater with progressively lower concentrations of TCE. Increases observed to the north (PA-6LA, PG-2LA, and PG-40LA) are attributable to the migration of the LAU mass towards extraction well PCX-1 and the MRTF extraction wells, as intended by the remedy and shown by the increase in TCE concentrations at the influent of extraction well PCX-1. Figures 2-9A through 2-9G illustrate TCE (and PCE) concentration and groundwater elevation trend plots for selected representative wells in the LAU at the NIBW Site.

In October 2009, PCE concentrations were detected above the MCL of 5 µg/L in four LAU monitor wells: PG-2LA, PA-5LA, PA-6LA and PG-19LA. This is a decrease from October 2001 when PCE concentrations were detected above the MCL of 5 µg/L in five LAU monitor wells: PA-5LA, PA-6LA, PA-8LA, PA-19LA and PA-39LA. The PCE plume in the LAU is much smaller than the TCE plume, and is encompassed by the footprint of the TCE plume. PCE concentrations in monitor wells generally have decreased or stabilized since October 2001.

Seven representative wells were chosen for concentration trend plots. The representative wells were chosen based on the following: (1) wells with the highest COC concentrations, PA-5LA, PA-6LA, PA-19LA, PG-2LA, and PG-40LA; (2) wells with COC concentrations that have decreased; and (3) boundary wells, PG-42LA and S-2LA, which will provide information about the stabilization and/or decrease of the plume areas.

The following table indicates the TCE concentrations for October 2001 and October 2009 for the seven representative wells of the LAU, when the TCE concentration decreased to below the MCL, if applicable, and which of the aforementioned criteria was used to select each of the representative wells.

LAU Monitor Well	Criteria Used For Well Selection	1997 TCE Concentration (µg/L)	October 2001 TCE Concentration (µg/L)	October 2009 TCE Concentration (µg/L)	First Sampling Event TCE Concentration Decreased Below MCL
PA-5LA	Well has the highest TCE concentrations	160	310	190	N/A
PA-6LA	Well along the axis of high-TCE plume	110	180	200	N/A
PA-19LA	Southwest Margin well with high TCE concentration	96	120	98	N/A
PG-2LA	Well along the axis of high-TCE plume	17	33	91	N/A
PG-40LA	Well along the axis of high-TCE plume	< 0.5	6.5	23	N/A
PG-42LA	Boundary well	< 0.5	0.0	1.0	Always under the MCL
S-2LA	Boundary well	2.1	5.5	3.7	April 2002 and January 2003

Groundwater contour maps show that the groundwater in the LAU flows towards the existing extraction wells, and the TCE plume is contained within the capture zones of these extraction wells.

In summary, the TCE plume and PCE concentrations in the LAU have decreased slightly since October 2001. TCE concentrations in the monitor wells are either decreasing or stable, with the exception of three monitor wells near PCX-1 and the MRTF extraction wells. This suggests that adequate capture of TCE, PCE and other COCs is occurring in the LAU. Since October 2001, the TCE LAU plume size has decreased 7.3 percent and the TCE concentrations in the LAU have remained stable from 1997 with TCE concentrations ranging from less than 1.0 µg/L to 160 µg/L to concentrations ranging from 1.0 µg/L to 200 µg/L in 2009.

2.3 NIBW GROUNDWATER ELEVATIONS REVIEW

Groundwater elevation data for NIBW were reviewed with respect to each alluvial unit during the period of October 2001 through October 2009 and general trends were observed.

2.3.1 Upper Alluvial Unit

As shown on Figures 2-3A through 2-3E, groundwater elevations in the UAU monitor wells were generally unchanged between October 2001 and October 2004. However, groundwater elevations in the monitor wells have increased steadily since October 2004, generally from approximately nine feet to as much as 33 feet. Most wells do not display seasonal groundwater elevation variations, likely due to the fact that most production wells in the area are screened in deeper alluvial units and there is little to no seasonal change in groundwater pumping in the UAU.

2.3.2 Middle Alluvial Unit

In NIBW, the MAU groundwater elevations in the monitor wells remained relatively constant between October 2001 and October 2004, with seasonal variations in most wells (Figures 2-6A through 2-6I). However, as with UAU wells, groundwater elevations have increased significantly (from 26 feet to 60 feet) since October 2004, and seasonal variations in groundwater elevations are now less pronounced. The general rise in groundwater elevations reflects a regional trend, likely associated with decreased sitewide groundwater pumping.

2.3.3 Lower Alluvial Unit

In the LAU, groundwater elevations have varied seasonally from October 2001 to October 2009 (Figures 2-9A through 2-9G) and risen since October 2004. The magnitude of these rises ranges from 38 feet to 91 feet, which is greater than the MAU and significantly greater than the UAU. Similar to the MAU, the rise in groundwater elevations is regional, and is mostly likely due to decreased groundwater pumping from the production wells located in the sitewide area. At NIBW, most production wells withdraw water from the LAU, which has higher hydraulic conductivities than the MAU. Groundwater pumping has decreased from 41,319 acre feet/year in 2004 to 30,725 acre feet/year in 2009.

2.4 NIBW ESTIMATED TIME TO CLEANUP

Using an approach that was mutually agreed upon by EPA and the PCs, the following cleanup projections were developed using the 5YR groundwater model (NIBW PCs, 2011).

- **Upper Alluvium Unit –** TCE concentrations in the UAU have declined significantly over the past decade due to successful operation of SVE remedies in the vadose zone at source areas, UAU groundwater extraction at Area 7, and natural attenuation processes. These declines in TCE concentrations are expected to continue. For the upper aquifer, the time projected for TCE concentrations to meet the cleanup standards was estimated to be on the order of 10 years.

- **Middle Alluvium Unit –** A qualitative approach was relied upon to evaluate the middle aquifer. These results are consistent with the batch flush model. The evaluation suggests that middle aquifer groundwater will take the longest to be restored to below MCLs. Because TCE and PCE concentrations in NIBW are highest in the middle aquifer and the middle aquifer is composed mainly of fine-grained sediments, the rate-limiting process of mass diffusion (which is not accounted for in the batch flush approach) largely controls cleanup of this unit. The portions of the middle aquifer plume with the highest TCE concentrations are captured by Area 7 and Area 12 extraction wells. The portion of the middle aquifer plume not captured by the middle aquifer extraction wells contains relatively low TCE concentrations, and will slowly migrate to the lower aquifer at the southwest margin where the groundwater plume is captured by the lower aquifer extraction wells, as envisioned by the ROD. The analyses suggest the middle aquifer will take over 70 years to completely achieve cleanup while localized portions of the middle aquifer where TCE concentrations are lowest, may be restored in less than 70 years.

- **Lower Alluvium Unit –** For the lower aquifer, the batch flush model predicts an overall range in estimated cleanup times from 11 to 70 years for individual lower aquifer extraction wells. The shortest cleanup times are projected for wells COS-71 and COS-72 (11 and 14 years, respectively) because they are located in the upgradient portion of the TCE plume. Since these wells also capture TCE mass moving into the lower aquifer from overlying units at the southwestern margin, the actual times to reach cleanup goals are anticipated to be longer than those projected by the model. Well PCX-1 is projected to have the longest cleanup time (70 years) because it is located along the plume axis in the downgradient portion of the plume. The projected cleanup time for well COS-75A is 41 years, based on the batch flush model and extrapolation of TCE concentration trends using groundwater modeling.

3.0 SIBW DATA REVIEW

The following section is an evaluation of the groundwater quality and groundwater elevations at SIBW from November 1990 through March 2010. A statistical analysis of groundwater contaminant concentrations during the period of January/February 2004 through March 2010 was also developed. The data set from 1990 was selected for certain comparisons because the data were available in the SIBW database. The data set from 2004 was selected because the ROD amendment for SIBW became effective in 2004. The data set from March 2010 was selected because it was the most complete data set available when the FYR process began in early 2010. The groundwater data evaluation associated with the western plume, central plume and eastern plume of SIBW are divided into subsections.

3.1 BACKGROUND

Groundwater contamination was discovered at the IBW Site in 1981 when elevated levels of VOCs including TCE, PCE and chloroform were found in Scottsdale-area drinking water wells. EPA and the ADEQ have been involved in investigations and cleanup activities at SIBW since the initial discovery of VOCs in the groundwater in 1981. The IBW Site was placed on the NPL in 1983 and divided into the NIBW and SIBW areas. SIBW includes approximately three square miles of groundwater for cleanup and is shown on Figure 1-2.

In 1998, EPA issued a ROD defining the remedy to address VOCs in groundwater in the SIBW western, central, and eastern plumes. The original remedy selected for the western plume identified groundwater extraction and treatment. A monitored natural attenuation (MNA) remedy was selected for the central and eastern plumes. In June 2004, EPA amended the Groundwater OU ROD, based on data accumulated from historic groundwater monitoring indicating that VOC concentrations in the western UAU plume were decreasing at a rate such that remedial objectives could be met in a reasonable time-frame. Additionally, the data indicated that the plume was naturally attenuating and was relatively stable. Based on these site conditions, the groundwater remedy for the western UAU plume was changed from extraction and treatment to MNA. The ROD Amendment contains a contingency similar in nature to that set forth for the central and eastern plumes in the 1998 ROD. This ROD Amendment did not change the central and eastern plume MNA remedy. The cleanup standards for TCE and PCE are set at the MCL of 5 µg/L.

The DCE Circuits sub-site located within the central plume was required by EPA to use SVE in February 1994 by way of a “plug-in” determination. An SVE system was operated intermittently from July 1997 to January 2000. Operation of this SVE system was discontinued and the system was removed in April 2003. In July 2005, a low-flow portable SVE system was installed and began operation to remove VOCs in the vadose zone beneath buildings at DCE Circuits. The SVE system continued to operate until June 2007, at which time it was removed from service.

Currently the DCE Circuits sub-site monitoring program consists of soil vapor and indoor air sampling. A complete discussion of all ROD and CD background information is included in the FYR report.

The RAOs included in the 1998 ROD for VOCs in the Groundwater Operable Unit for SIBW (EPA, 1998) are:

- Maintain protection of human health and the environment by reducing the risk of potential exposure to contaminants;
- Expedite site cleanup and restoration;
- Use permanent solutions to the maximum extent practicable;
- Restore contaminated groundwater to the extent practicable to support existing and future uses;
- Achieve compliance with applicable or relevant and appropriate requirements (ARARs);
- Minimize untreated waste.

The RAOs included in the 2004 Groundwater ROD Amendment for SIBW (EPA, 2004) are:

- Protect human health by minimizing the potential for human exposure to groundwater exceeding cleanup standards (cleanup standards for the COCs for the western plume are the MCLs for TCE and PCE, or 5 μg/L;
- Cost-effectively reduce contamination in the western plume to concentrations that meet cleanup standards to return groundwater to its beneficial use to the extent practicable within a time frame that is reasonable, given the particular circumstances of the Site; and
- Protect groundwater resources by preventing or reducing migration of groundwater contamination above ARARs.

Currently, groundwater samples are collected and analyzed and water elevations are calculated on a semi-annual basis for SIBW. The COCs, as established in the ROD, are cis-1,2-dichloroethene (cis-1,2-DCE), PCE, and TCE. All COCs are either near or below their respective MCLs. The primary COC in the western and eastern plumes is TCE. The primary COC in the central plume is PCE. In the eastern plume, cis-1,2-DCE has been detected and is believed to be a by-product of TCE dechlorination. Monitor well locations associated with the SIBW Site are presented on Figure 3-1. Monitor well names highlighted on Figure 3-1 represent those wells where historical groundwater data have been analyzed to evaluate statistical trends as part of the Five-Year Review. Results of these analyses are presented in Attachment B.

The following subsections describe the groundwater quality in the western, central, and eastern plume for SIBW and the status of the TCE and PCE plumes. Potentiometric surface maps and discussions of groundwater flow directions within the plumes are also provided to assist in the understanding of the plume movement.

Time Period of Data

The period of review for the SIBW data is from November 1990 through March 2010, based on the date of installation for each well reviewed. Statistical analyses, groundwater elevation contours, and groundwater contamination contours for the period January/February 2004 through March 2010 are also provided. The rationale for selecting this time period is discussed in Section 3.0.

3.2 Groundwater Quality Review

As noted above, groundwater contamination at SIBW initially was discovered in three areas known as the western, central and eastern plumes. The western and central plumes are present in the UAU where TCE and PCE are the primary COCs, respectively. The eastern plume is present in the MAU and TCE is the primary COC. Figure 3-2 presents the extent of the contaminant plumes in 2004, and Figure 3-3 presents the extent of these contaminant plumes in 2010. The changes in the western, central and eastern plumes from 2004 to 2010 are presented below.

ITSI utilized existing ArcMap GIS project files to calculate approximate areas for the 2004 and 2010 plumes in the SIBW study area relative for the UAU, MAU and LAU. All SIBW ArcMap files are registered with a known horizontal datum set: U.S. State Plain, NAD 83, Arizona Central (International Feet). ArcMap stores polygon areas within the properties of the polygon feature based on the specified horizontal datum. As a result, polygons representing plume boundaries within the ArcMap file provided a reliable source to query the approximate extents of each plume, expressed in square feet and which was converted to acres for convenience. After selecting a given plume polygon and subsequently viewing its properties, the displayed area value generated by ArcMap was compared with data from 2004 and 2010. The SIBW western and central plumes are present in the UAU. In this case, the area of each plume associated with each specific alluvial unit was combined and the total value was used to compare temporal changes in plume size for each alluvial unit. For example, the linear areas of the western and central plumes in the UAU were aggregated for a total linear plume area in that specific alluvial unit (the UAU). Percent changes in the plume size between 2004 and 2010 were also calculated. This information is provided below in each of the plume subsections.

3.2.1 Western Plume

In the western plume, TCE is present in the UAU groundwater only. The groundwater remedy outlined in the 1998 ROD consisted of extraction and treatment of UAU groundwater from the western plume. However, following collection and analysis of additional data, the 2004 ROD Amendment changed the groundwater remedy for the western UAU plume to MNA.

In 1997, TCE in UAU groundwater was detected at 14 UAU monitor wells. Between January 1994 and February 1996, 139 of 354 samples analyzed from the UAU (approximately 39 percent) indicated detectable TCE concentrations, with the highest TCE concentration of 90 µg/L. As of March 2010, the UAU western plume is defined by monitor well SIBW-28U. The original TCE concentration detected at this well in April 1993 was 0.6 µg/L. In January 2004, the TCE concentration exceeded the MCL of 5 µg/L at 6.3 µg/L. The TCE UAU western plume is presented on Figure 3-2.

In October 2004, the TCE concentration at this well decreased to 4.7 µg/L. As of March 2010, the TCE concentration detected in SIBW-28U was 0.79 µg/L, which is slightly above the laboratory reporting limit of 0.5 µg/L and significantly below the MCL. Therefore the UAU western TCE plume is shown with a dashed circle as a reference on Figure 3-3. A trend graph of the decreasing TCE concentration in monitor well SIBW-28U is illustrated on Figure 3-4.

In 2004, the area of the TCE UAU western plume was approximately 32 acres. In March 2010, the well which defines the western plume detected TCE at less than 1.0 µg/L. Continued monitoring of the well SIBW-28U in the UAU western plume will provide data to ascertain whether this plume has naturally attenuated. .

The following table indicates the TCE concentrations for January 2004 and March 2010 for the one representative well of the western plume, when the TCE concentration decreased to below the MCL, and the original TCE concentration of the well.

Western Plume Monitor Well	January 2004 TCE Concentration (µg/L)	March 2010 TCE Concentration (µg/L)	Sampling Event TCE Concentration Decreased Below MCL (during FYR)	Original TCE Concentration (µg/L)
SIBW-28U	6.3	0.79	October 2004	0.6 (Apr 1993)

3.2.2 Central Plume

In the central plume, PCE is present in groundwater in the UAU. To evaluate the progress of the selected MNA remedy, a groundwater monitoring regimen was enacted to ensure that PCE concentrations are decreasing to meet the MCL and the plume remains contained within the compliance boundaries established in the ROD. This monitoring regimen included the installation of sentinel wells upgradient of the western plume boundary.

Original PCE concentrations in the selected wells of the central plume ranged from less than 1.0 µg/L to 15 µg/L as shown in the following table. In 1997, PCE in groundwater in the UAU was detected at 19 UAU monitor wells. Between January 1994 and February 1996, 194 of 355 samples analyzed from the UAU (approximately 55%) detected PCE concentrations, with the highest PCE concentration of 59 µg/L. In 2004, the highest PCE concentrations were detected at 5.2 µg/L at well SIBW-38U and 5.5 µg/L at well SW-1 , as presented on Figure 3-2. The PCE concentrations in these two wells decreased below the MCL in January 2005 and October 2004, respectively.

As of March 2010, the PCE concentrations in the UAU central plume ranged from non-detect to 2.7 µg/L, which is below the MCL. The area included within the 1.0 µg/L contour has been reduced dramatically from the 2004 configuration and has moved to the south-southwest. The 1997 SIBW FS described the migration of the UAU plumes to the south-southwest. The trend plots of the selected central plume wells illustrate the decreasing PCE concentrations in the central plume in Figures 3-5A through 3-5M.

Based on 2004 data, the total upper aquifer central PCE plume size was approximately 1,394 acres. In March 2010, the PCE concentrations in the upper aquifer central plume decreased to below the MCL with an observed PCE concentration of 2.7 µg/L. However, PCE concentrations tend to fluctuate from non-detect to slightly above the MCL from one sampling event to the next, at one or two central plume monitor wells. Because of this, there is insufficient data to provide a reasonable estimate of the area of groundwater containing low levels of VOCs.

The following table indicates the PCE concentrations for January 2004 and March 2010 for the 13 representative wells of the central plume, when the PCE concentration decreased to below the MCL, and the original PCE concentration of each well.

Central Plume Monitor Well	January-April 2004 PCE Concentration (µg/L)	March 2010 PCE Concentration (µg/L)	Sampling Event PCE Concentration Decreased Below MCL (during FYR)	Original PCE Concentration (µg/L)
SIBW-3U	0.32	Non-detect	N/A	5.0 (Nov 1990)
SIBW-5U	0.34	Non-detect	N/A	6.0 (Mar 1991)
SIBW-10U	0.64	0.35	N/A	7.0 (Nov 1990)
SIBW-23U	Non-detect	Non-detect	N/A	3.0 (Jul 1993)
SIBW-27U	3.0	0.27	N/A	5.0 (Apr 1993)
SIBW-31U	0.39	0.2	N/A	15 (Oct 1993)
SIBW-38U	5.2	0.23	January 2005	Non-detect (Apr 1994)
SIBW-39U	1.2	0.44	N/A	7.0 (Nov 1993)
SIBW-46U	Non-detect	Non-detect	N/A	6.0 (Dec 1993)
SIBW-60U	Non-detect	1.1	N/A	2.4 (Feb 2001)

Central Plume Monitor Well	January-April 2004 PCE Concentration (µg/L)	March 2010 PCE Concentration (µg/L)	Sampling Event PCE Concentration Decreased Below MCL (during FYR)	Original PCE Concentration (µg/L)
SIBW-61U	2.4	2.7	April 2007/April 2008	0.67 (Feb 2001)
SIBW-65U	Non-detect	0.88	July 2006	Non-detect (July 2005)
SW-1	5.5	0.41	October 2004	7.7 (May 2002)

3.2.3 Eastern Plume

In the eastern plume, TCE is present in the MAU groundwater. To evaluate the MNA remedy, a groundwater monitoring regimen was enacted to ensure that TCE concentrations are decreasing to meet the MCL and the plume remains contained within the compliance boundaries established in the ROD. This monitoring regimen included the installation of sentinel wells upgradient of the western plume boundary.

The original TCE concentrations in the selected wells of the eastern plume ranged from 3 µg/L to 12 µg/L as shown in the following table. In 1997, TCE in groundwater in the MAU was detected in three MAU monitor wells. Between January 1994 and February 1996, 116 of 258 samples analyzed from the MAU (approximately 45%) detected TCE concentrations, with the highest TCE concentration of 17.4 µg/L. As of January 2004, TCE was detected in four of the five wells selected as representative of the eastern plume, at concentrations above the MCL. Well SIBW-13MC detected a TCE concentration of 4.7 µg/L. Figure 3-2 illustrates the TCE MAU eastern plume in 2004. The March 2010 sampling results indicate TCE concentrations below the MCL in the eastern plume. Figure 3-3 shows the decrease in the area of the groundwater plume from its 2004 configuration. Figures 3-6A through 3-6E depict the decreasing TCE concentrations in the eastern plume as trend plots of each of the representative wells. Since the first quarter of 2009, the TCE concentrations at the five monitor wells selected to represent the eastern plume have been below the TCE MCL of 5 µg/L.

In 2004, the TCE middle aquifer eastern plume size was approximately 366 acres. As of March 2010, the TCE concentrations in the middle aquifer eastern plume decreased to below the MCL with observed concentrations between 1.2 µg/L and 3.7 µg/L. However, TCE concentrations tend to fluctuate from non-detect to slightly above the MCL from one sampling event to the next at one or two eastern plume monitor wells. Because of this, there is insufficient data to provide a reasonable estimate of the area of groundwater containing low levels of VOCs.

The following table indicates the TCE concentrations for January 2004 and March 2010 for the five representative wells of the central plume, when the TCE concentration decreased to below the MCL, and the original TCE concentration.

Eastern Plume Monitor Well	January 2004 TCE Concentration (µg/L)	March 2010 TCE Concentration (µg/L)	Sampling Event TCE Concentration Decreased Below MCL (during FYR)	Original TCE Concentration (µg/L)
SIBW-11MC	7.6	3.7	April 2005/ February 2009	8 (Apr 1991)
SIBW-13MC	4.3	1.2	N/A	7 (May 1991)
SIBW-56MC	6.2	1.8	April 2005/ April 2008	3 (Jul 1994)
SIBW-58MC	9.6	3.7	February 2009	12 (Jul 1994)
SW-3	8.5 (first sampled in July 2005)	3.1	July 2007/ March 2009	8.5 (Jul 2005)

3.3 Statistical Analysis of Groundwater Contamination Data

Although the SIBW groundwater is almost completely restored, statistical analyses were conducted on SIBW groundwater quality data. The TCE and PCE concentration data were analyzed using (1) the Kendall tau coefficient test (a non-parametric test used to measure the statistical dependence between two datum points), (2) a trend line fitted to the data plots using the LOWESS method of least squares regression, and (3) a regression analysis. These tests were performed using the statistical software package Minitab with the Ktau macro. A total of 19 monitor wells were selected for these analyses. The selection of these wells was based on professional judgment, site knowledge and a comparison of the 2004 plumes. Monitor wells were picked to allow for a representative cross section of each of the three plumes at the SIBW site. In addition, Mann-Kendall Statistical analyses were performed for a selected subset of wells shown in Attachment A.

The statistical analytic results are shown in Attachment A. While there is an observed decreasing trend in COC concentrations in all three plumes, the statistical results indicate that most wells do not show either an increasing or a decreasing trend. In order to statistically show an increasing or decreasing trend, the Kendall tau value of the Kendall tau coefficient test must have an absolute value of 0.5 to 1.0. The Kendall tau coefficient test also takes into account the rate at which the trend is occurring, or "slope" of the data. With monitor wells that have begun to stabilize below the MCLs of 5µg/L (the wells with slower decreasing rates), the Kendall tau value was not always above the required value of 0.5 to confirm a decreasing trend.

Statistically decreasing trends were found for TCE in the following wells: SIBW-13MC, SIBW-56MC and SIBW-58MC in the eastern plume and SIBW-28U in the western plume, with absolute values of Kendal tau coefficient closer to 0.5 than 1.0. Two wells in the central plume, SIBW-38U and SW-1, have statistically decreasing PCE trends. While only six of the 19 wells were statistically decreasing, the rest of the wells selected as part of this data review have had COC concentrations consistently below the MCL for several years; therefore, the rate of decrease in COC concentrations is not great enough to obtain a Kendall tau value representative of a statistically decreasing trend.

The Mann-Kendall statistical analysis was performed on the select wells mentioned above with Kendal tau values of 0.5 or greater to confirm the statistically decreasing trend. All wells with statistically decreasing trends, by way of the Kendall tau coefficient test, were positively confirmed by the Mann-Kendall statistical analysis.

3.4 Groundwater Elevations Review

Groundwater elevation contours for the UAU and the MAU were evaluated for any changes in elevation and flow direction between 2004 and 2010. Based on water elevation data from representative wells screened in the UAU and the MAU, water elevations appear to have been generally declining from at least 1994 to 2004. However, from 2004 to 2010, water elevations in representative SIBW wells screened in the UAU and the MAU have risen. Water elevations in the UAU have risen from 23 feet to 37 feet and the water elevations in the MAU have risen from 75 feet to 83 feet over the six-year period. These trends can be seen in the groundwater contaminant concentration plots included on Figures 3-4, 3-5A through 3-5M and 3-6A through 3-6E. Water elevation conditions in the UAU and the MAU are discussed in the following subsections.

3.4.1 Upper Alluvial Unit

The groundwater potentiometric map for the UAU in January 2004 is presented on Figure 3-7. The groundwater flow direction is to the southwest, while the flow direction in the March 2010, as shown on Figure 3-8, is southerly.

3.4.2 Middle Alluvial Unit

Groundwater elevations for select MAU monitor wells at SIBW from 2004 and 2010 are presented on Figures 3-9 and 3-10, respectively. The groundwater flow direction in the vicinity of the eastern plume is toward the east in 2004. Based on the March 2010 water elevations, the groundwater flow direction in the vicinity of the eastern plume ranges from a westerly direction to a northwesterly direction. This observed west-to-northwest groundwater flow direction in 2010 is most likely influenced by pumping centers associated with the Arizona Public Service Ocotillo Power Station and the City of Mesa which are in the vicinity of the SIBW area.

4.0 SUMMARY and CONCLUSIONS

ITSI prepared this Data Review Technical Memorandum summarizing the evaluation of the groundwater contamination concentrations and groundwater elevations for NIBW and SIBW as part of the First FYR. This Data Review Technical Memorandum compares the groundwater data since the time of the respective RODs as an appendix to the Five Year Review Report. Final conclusions and recommendations are presented in the Five Year Review Report.

NIBW

Groundwater data collected by the NIBW PCs and trend plots for NIBW available for the period from October 2001 through October 2009 were reviewed. The data set from 2001 was selected because the last ROD amendment for NIBW became effective in 2001. The data set from 2009 was selected because it was the most recent complete data set available when the FYR process began in early 2010. The NIBW primary COCs, TCE and PCE, are discussed in this memorandum.

In the UAU, the TCE plume size has decreased since October 2001, and TCE concentrations in monitor wells continue to decrease from 2.2 µg/L in October 2001 to 1.0 µg/L in October 2009. PCE was detected in only one well above the laboratory reporting limit but below the MCL for PCE.

In the MAU, although the TCE plume size has increased slightly since October 2001, the remedy is successful in minimizing migration of TCE to the southwest margin and the LAU. In addition, PCE concentrations in the MAU have decreased or stabilized since October 2001 and the PCE plume is significantly smaller than the TCE plume in the MAU.

In the LAU, the TCE plume has decreased slightly since October 2001 and TCE concentrations in the monitor wells are decreasing or remaining stable with the exception of three monitor wells near PCX-1 and the MRTF extraction wells. The PCE plume is significantly smaller than the TCE plume in the LAU and PCE concentrations have decreased or stabilized since October 2001.

Groundwater elevations at NIBW have shown seasonal variations in most wells with an overall increasing trend in all alluvial units since October 2004. Groundwater elevations have risen 9 feet to 13 feet in the UAU, 26 feet to 60 feet in the MAU, and 38 feet to 91 feet in the LAU. This general rise in water elevations reflects a regional trend, likely associated with decreased sitewide groundwater pumping.

This Data Review Technical Memorandum has evaluated the NIBW data and assessed whether the RAOs listed in the 2001 ROD Amendment for NIBW are being met. The data indicate:

- The remedy is effectively removing COCs from the groundwater and reducing COC concentrations in the upper, middle and lower alluvial units with the use of the groundwater extraction and treatment at the MRTF, CGTF, Area 7 and Area 12;
- The NIBW remedy is effectively containing the groundwater plume;
- TCE and PCE concentrations in groundwater in the UAU have decreased significantly, with limited number of wells exhibiting COC concentrations above the MCL, indicating that major sources of soil contamination that were contributing to groundwater contamination have been mitigated; and
- The continuing treatment of groundwater extraction and treatment systems is providing long-term management of the groundwater to improve the regional aquifer's suitability for potable use.

<u>SIBW</u>

The period of review for SIBW is from November 1990 through March 2010. Statistical analyses, groundwater elevation contours and groundwater contamination contours were prepared for the time period of January/February 2004 through March 2010. The data set from 1990 was selected for certain comparisons because the data were available in the SIBW database. The data set from 2004 was selected because the ROD amendment for SIBW became effective in 2004. The data set from March 2010 was selected because it was the most complete data set available when the FYR process began in early 2010. The western plume and central plumes are present in the UAU, with TCE identified as the primary COC in the western plume and PCE identified as the primary COC in the central plume. The eastern plume is located in the MAU where TCE identified as the primary COC.

In 2004, TCE was detected above the MCL in the western plume at well SIBW-28U with a concentration of 6.3 µg/L. In March 2010, SIBW-28U detected TCE concentrations below the MCL.

During 2004, the central plume was defined by wells SIBW-38U and SW-1 which detected PCE concentrations above the MCL of 5 µg/L at 5.2 µg/L and 5.5 µg/L, respectively. In March 2010, all wells representative of the central plume detected PCE concentrations below the MCL.

Since 2004, all TCE concentrations in monitor wells located in the eastern plume have been below the MCL, with the highest TCE concentrations detected at approximately 3 µg/L. The area of the eastern plume also has decreased.

The statistical analysis of the groundwater quality data in the western, central and eastern plumes do not show a statistically increasing or decreasing trend in most wells. Statistically decreasing trends were found for TCE in SIBW wells SIBW-13MC, SIBW-56MC and SIBW-58MC in the eastern plume and SIBW-28U in the western plume. Two wells in the central plume, SIBW-38U and SW-1, showed statistically decreasing PCE trends.

SIBW groundwater elevations in the UAU have risen from 23 feet to 37 feet and groundwater elevations in the MAU have risen from 75 feet to 83 feet over the six-year period between January 2004 and March 2010. Groundwater flows in 2004 were to the southwest in the UAU and west in the MAU. Groundwater flows as of 2010 were to the south in the UAU and ranged from westerly to northwesterly in the MAU, most likely due to pumping centers within the SIBW area.

This Data Review Technical Memorandum has evaluated the data of SIBW and assessed whether the RAOs identified in the1998 ROD for VOCs in the Groundwater Operable Unit and in the 2004 Groundwater ROD Amendment for SIBW are being met. The data indicate:

- COC concentrations in groundwater at the SIBW Site continue to decrease, with concentrations in most monitor wells below the MCL;
- Site cleanup and restoration has been expedited with the use of soil vapor extraction at source facilities;
- Use of monitored natural attenuation is a demonstrated, successful remedial approach for SIBW;
- SIBW groundwater is being restored to support existing and future beneficial uses; and
- Monitored natural attenuation has cost-effectively reduced VOCs in groundwater within a reasonable time frame.

The evaluation of the groundwater concentration and groundwater elevation data for the IBW Superfund Site indicates the decrease and/or stabilization of COC concentrations and the groundwater plume sizes over time.

5.0 REFERENCES

EPA, 1988. Final Record of Decision, Scottsdale Groundwater Operable Unit, Indian Bend Wash Superfund Site, Scottsdale, Arizona. September.

EPA, 1998. Record of Decision, VOCs in Groundwater Operable Unit, Indian Bend Wash Superfund Site, South Area, Tempe, Arizona. September.

EPA, 2001. Record of Decision Amendment for the North Indian Bend Wash Superfund Site, Final Operable Unit, Scottsdale, Arizona. September.

EPA, 2004. Record of Decision Amendment for the South Indian Bend Wash Superfund Site Groundwater Operable Unit, Tempe, Arizona. June.

NIBW PCs, 2002. Groundwater Monitoring and Evaluation Plan, North Indian Bend Wash Superfund Site, October 8.

NIBW PCs, 2005. 2004 Site Monitoring Report, North Indian Bend Wash Superfund Site, Volume I and Volume II. April 7.

NIBW PCs, 2006. Operation and Maintenance Plan–Groundwater Monitor Well Network, North Indian Bend Wash Superfund Site. June 5.

NIBW PCs, 2010. 2009 Site Monitoring Report, North Indian Bend Wash Superfund Site. February 28.

NIBW PCs, 2011. North Indian Bend Wash Superfund Site Five-Year Review Analysis of Groundwater Remedy Effectiveness. January.

<u>Figures</u>

Attachment A

N
Image not to scale

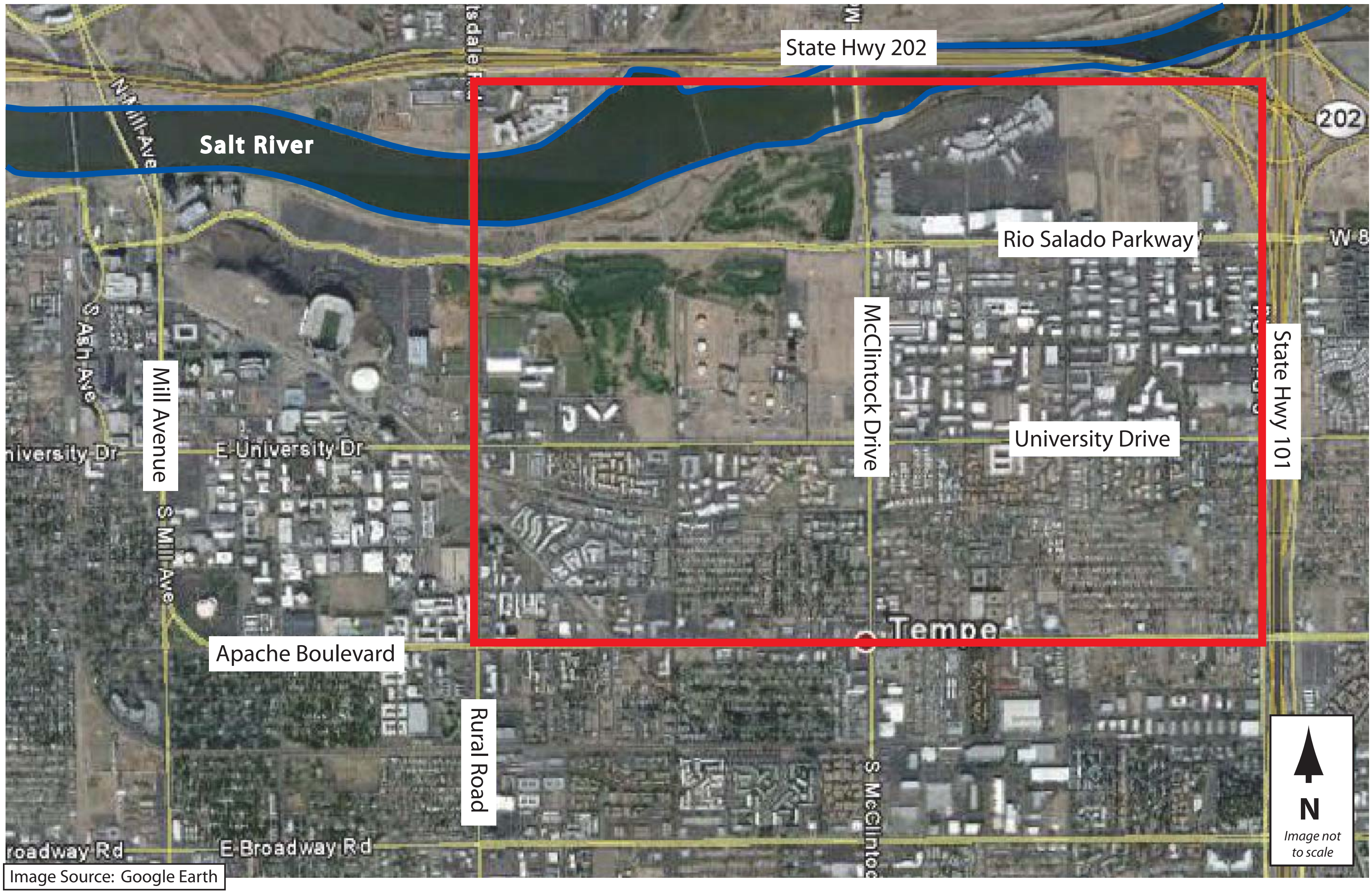
Image Source: Google Earth

\\Engineering3\eparg\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Figure 1-1 NIBW Area.ai

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
North Indian Bend Wash Superfund Area,
Approximate Location

Figure 1-1
North Indian Bend Wash Superfund Area, Approximate Location

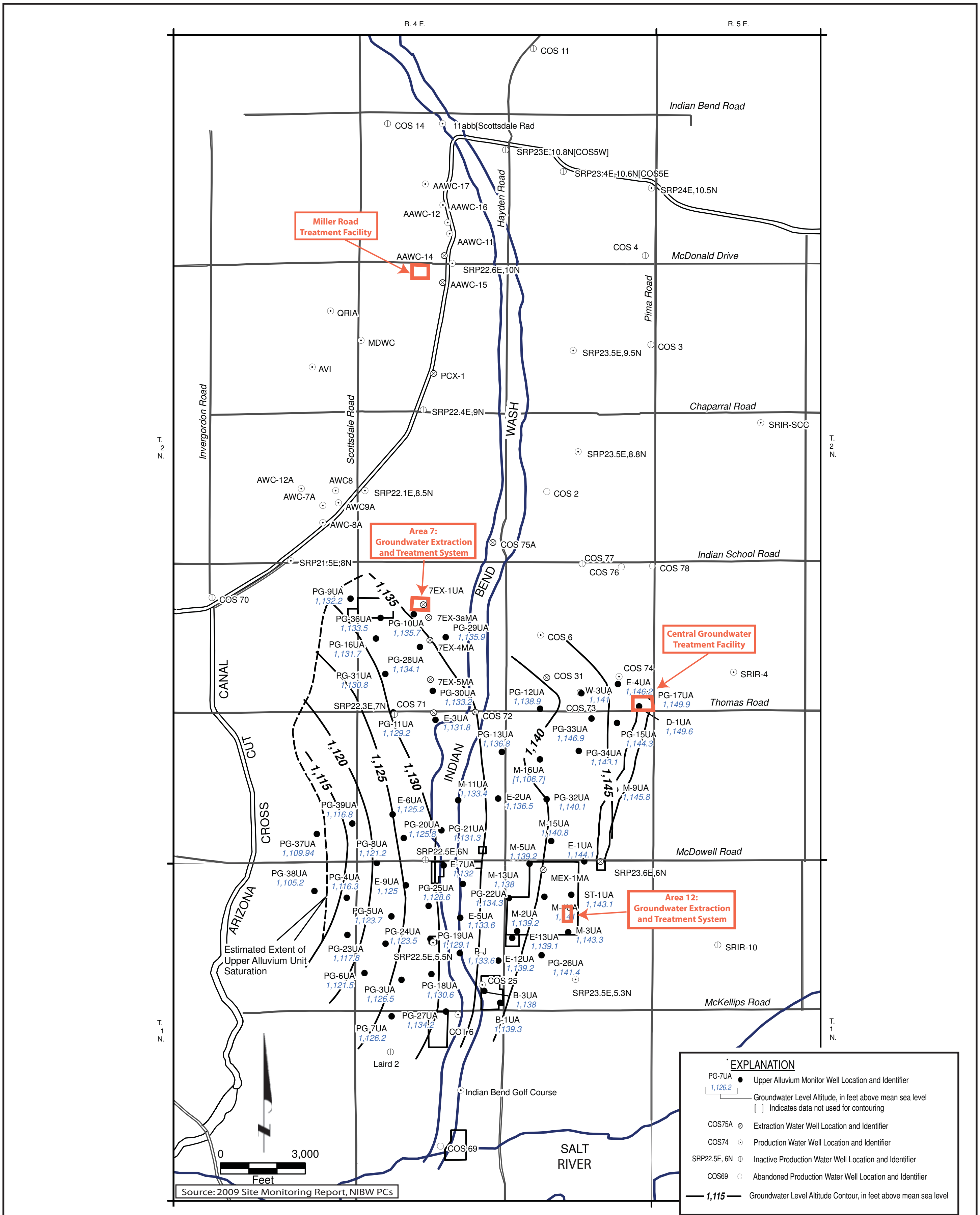


Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
South Indian Bend Wash Superfund Area,
Approximate Location

Figure 1-2
South Indian Bend Wash Superfund Area, Approximate Location

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Figure 1-2 SIBW Area.ai

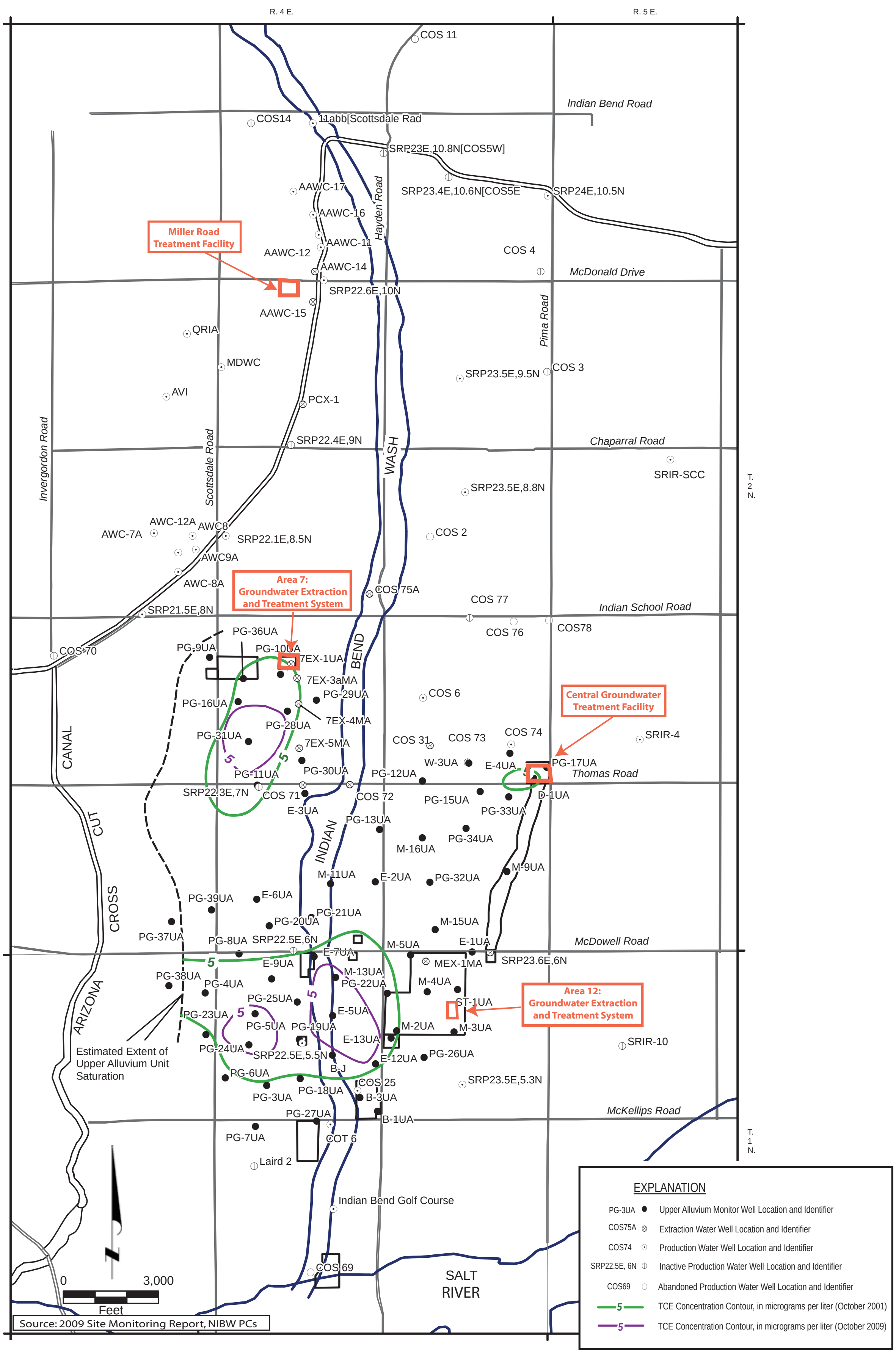


Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Groundwater Elevation Contours
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-1
Upper Alluvial Unit Wells
October 2009

O:\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\NIBW Graphs\Figure 2-1

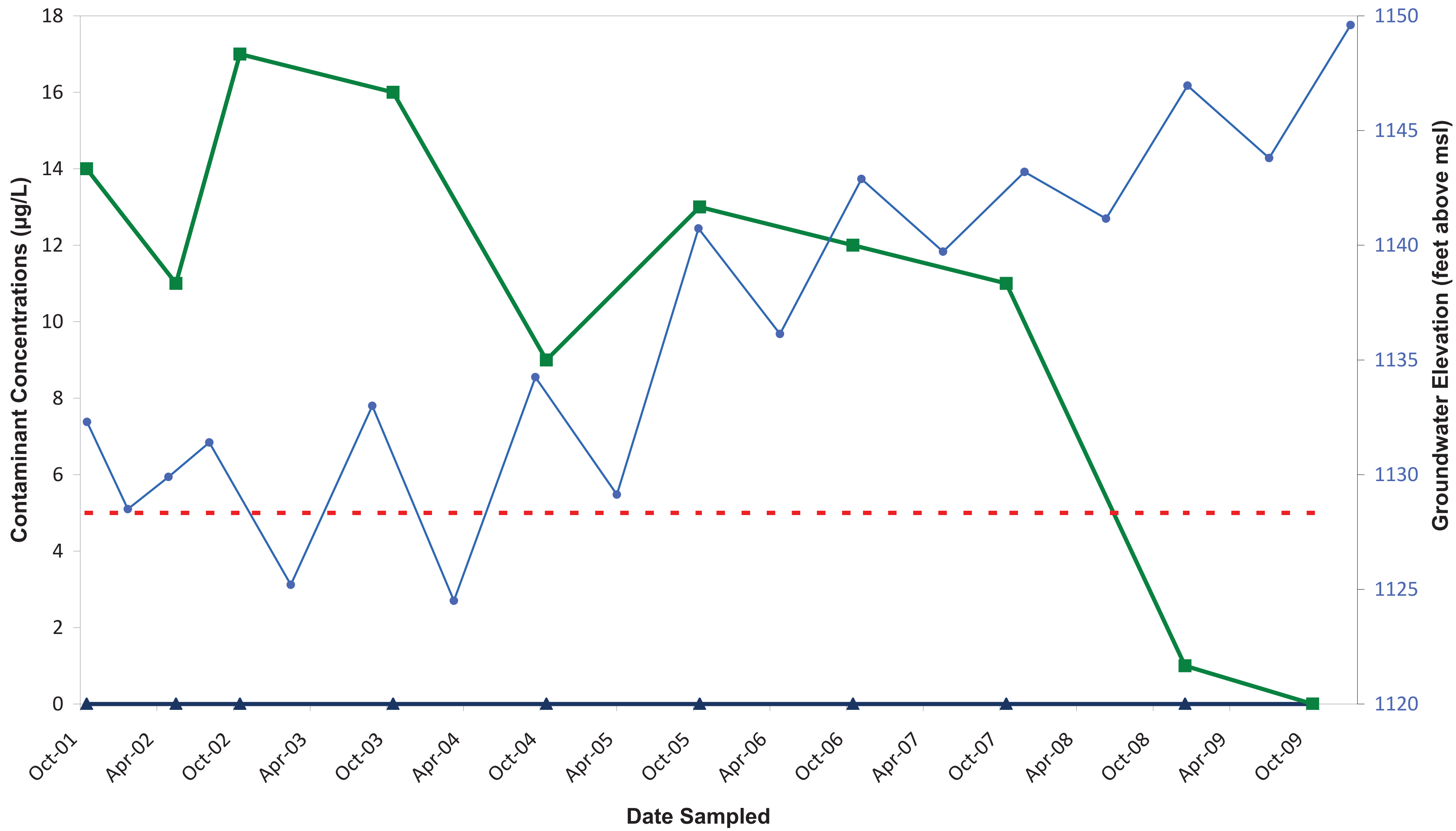


Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
TCE Concentration
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-2
Upper Alluvial Unit Wells
October 2001 and October 2009

O:\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\NIBW Graphs\Figure 2-2



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

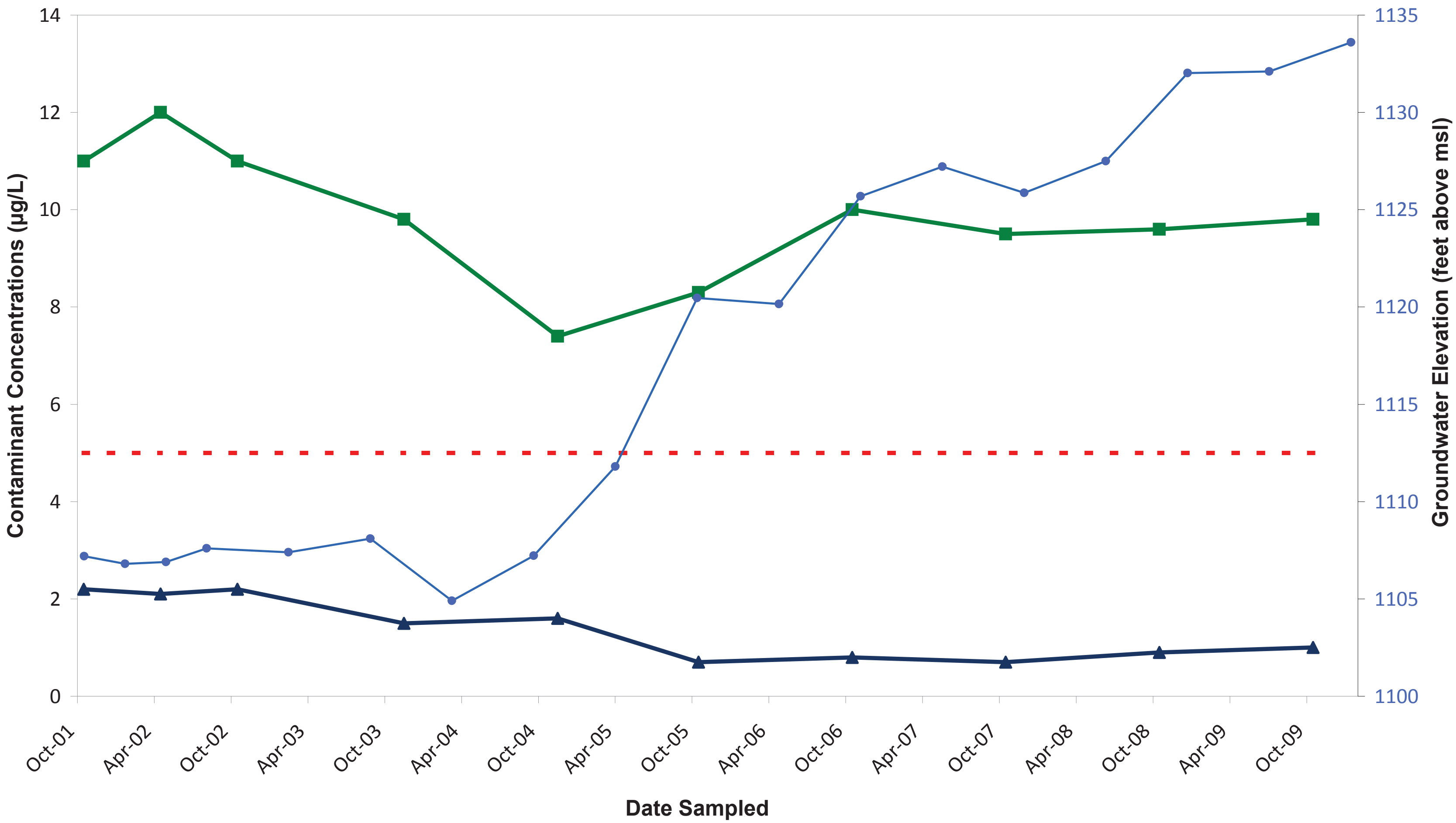
Tetrachloroethene (PCE)
Trichloroethene (TCE)
PCE MCL (5 µg/L)
TCE MCL (5 µg/L)
Groundwater Elevation

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-3A
NIBW D-1UA
Upper Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 1 UAU D-1



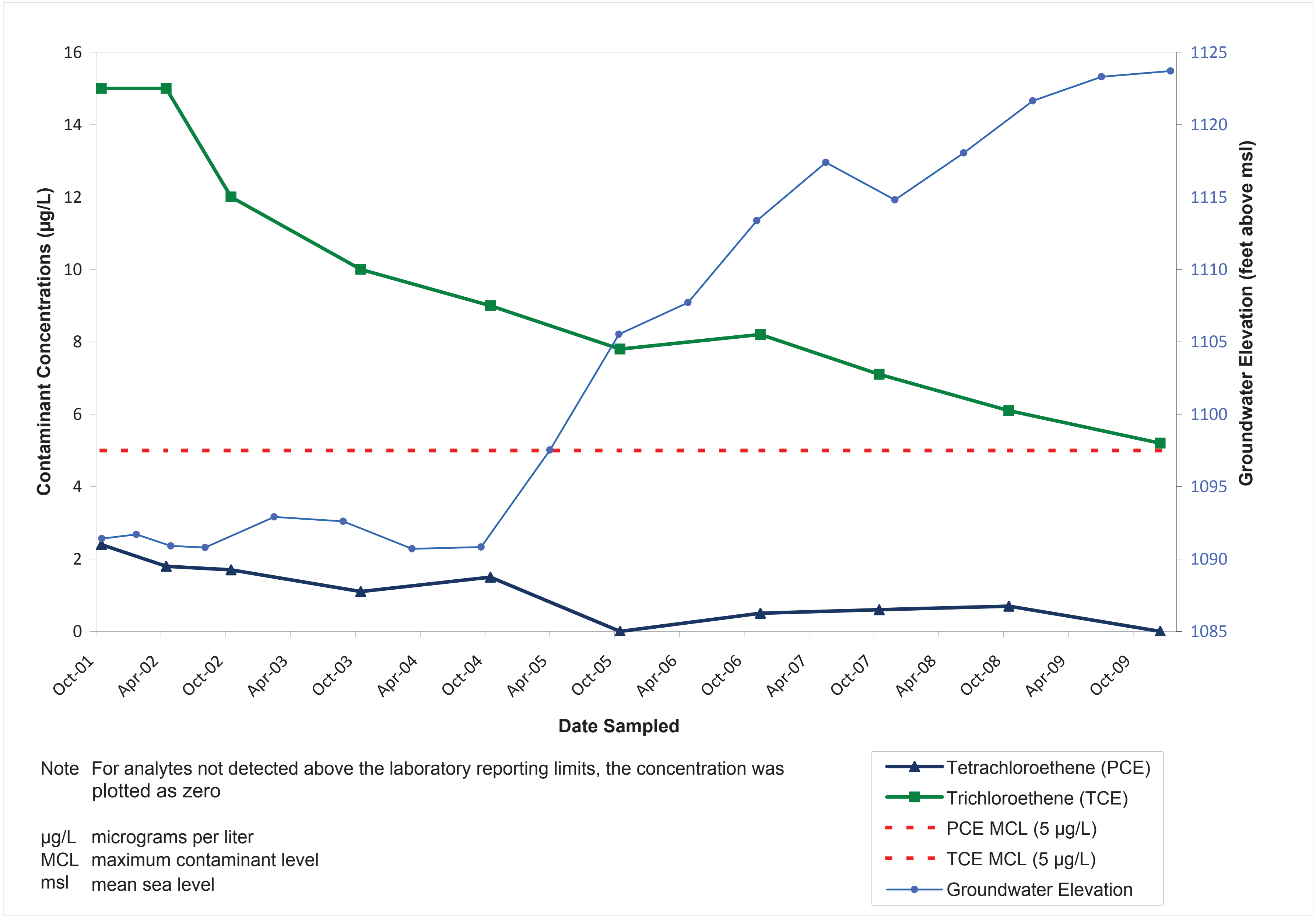
Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-3B
NIBW E-5UA
Upper Alluvial Unit
October 2001 - October 2009

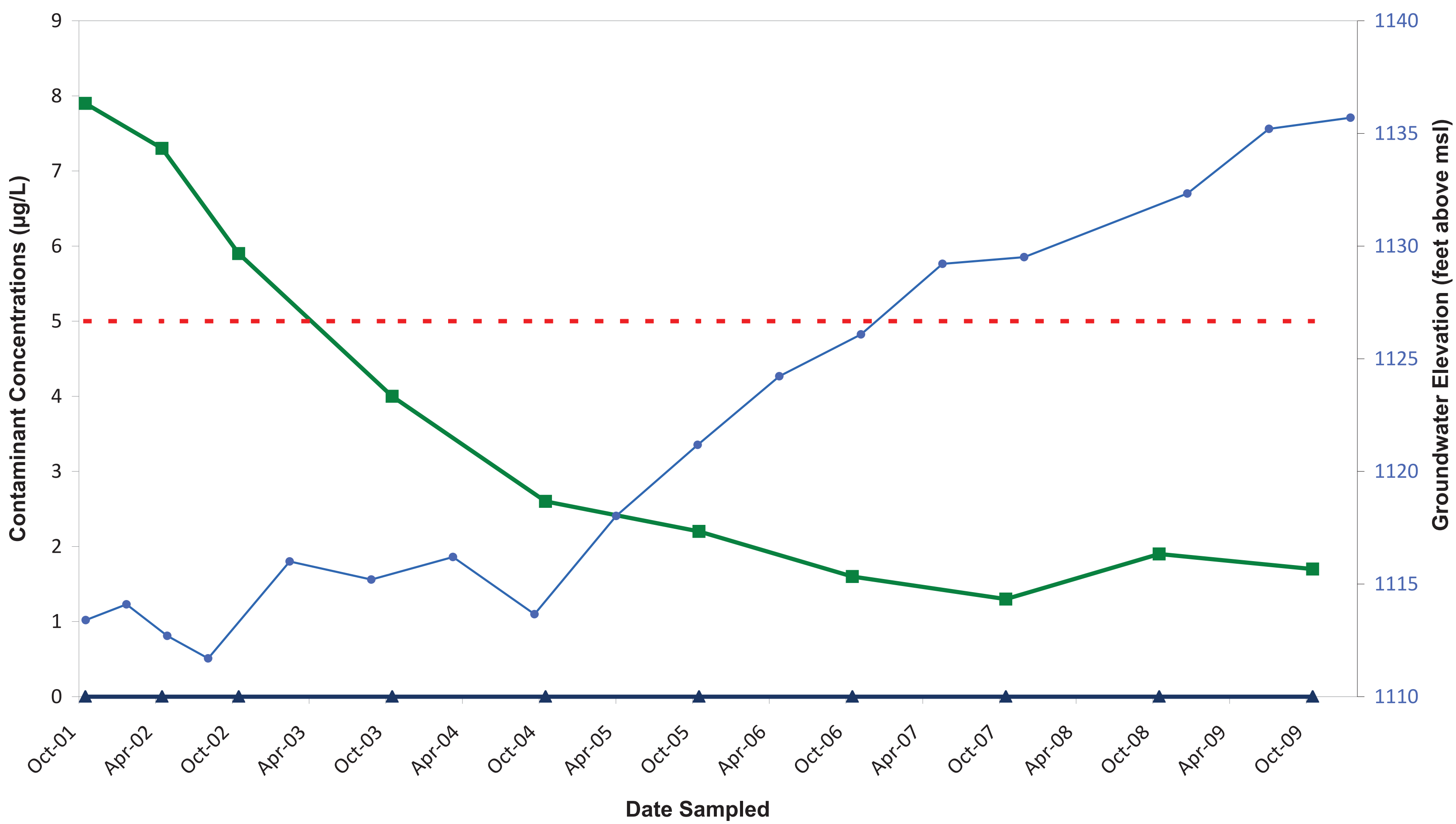


Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-3C
NIBW PG-5UA
Upper Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 3 UAU PG-5



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

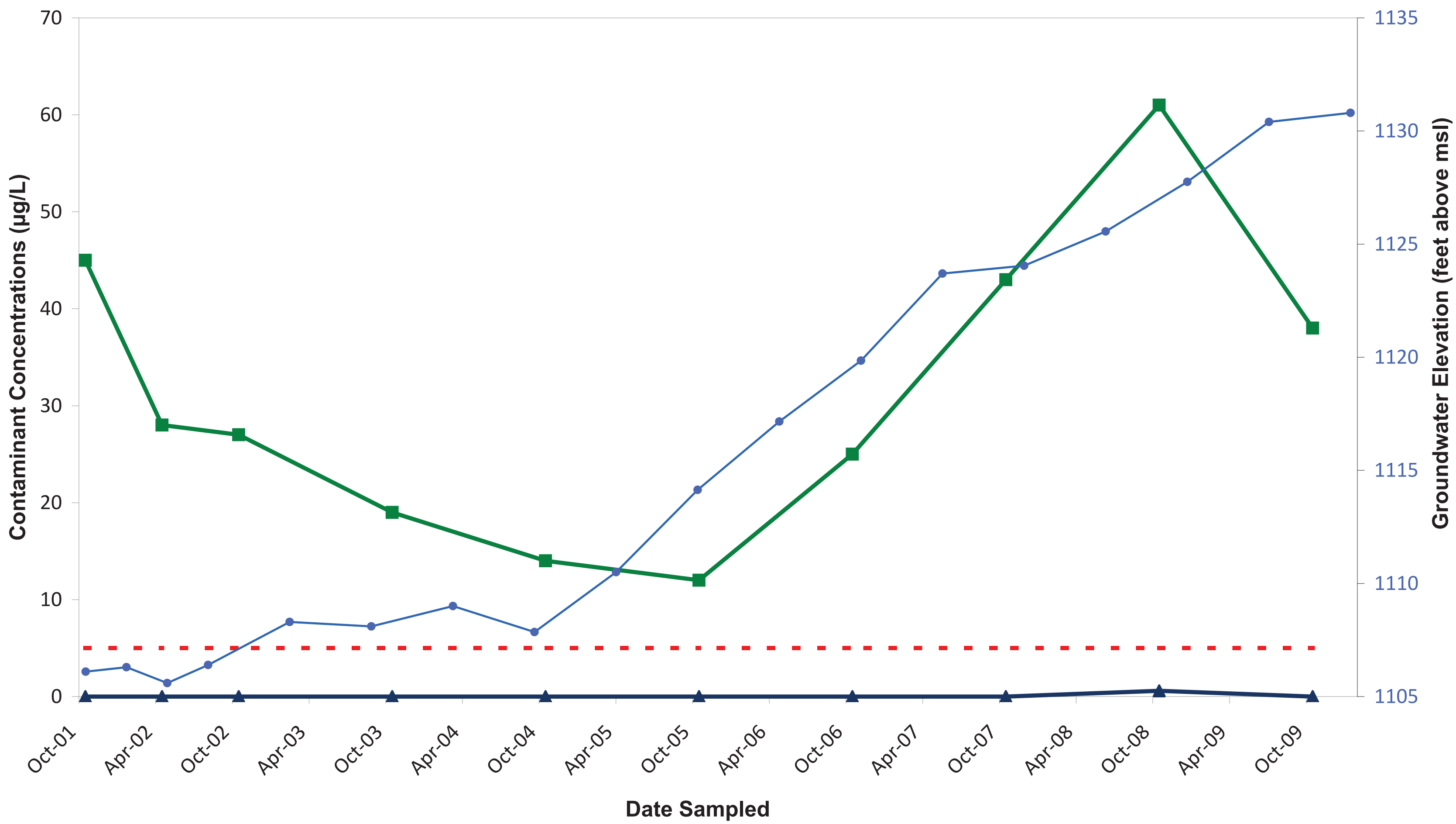
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-3D
NIBW PG-10UA
Upper Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 4 UAU PG-10



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

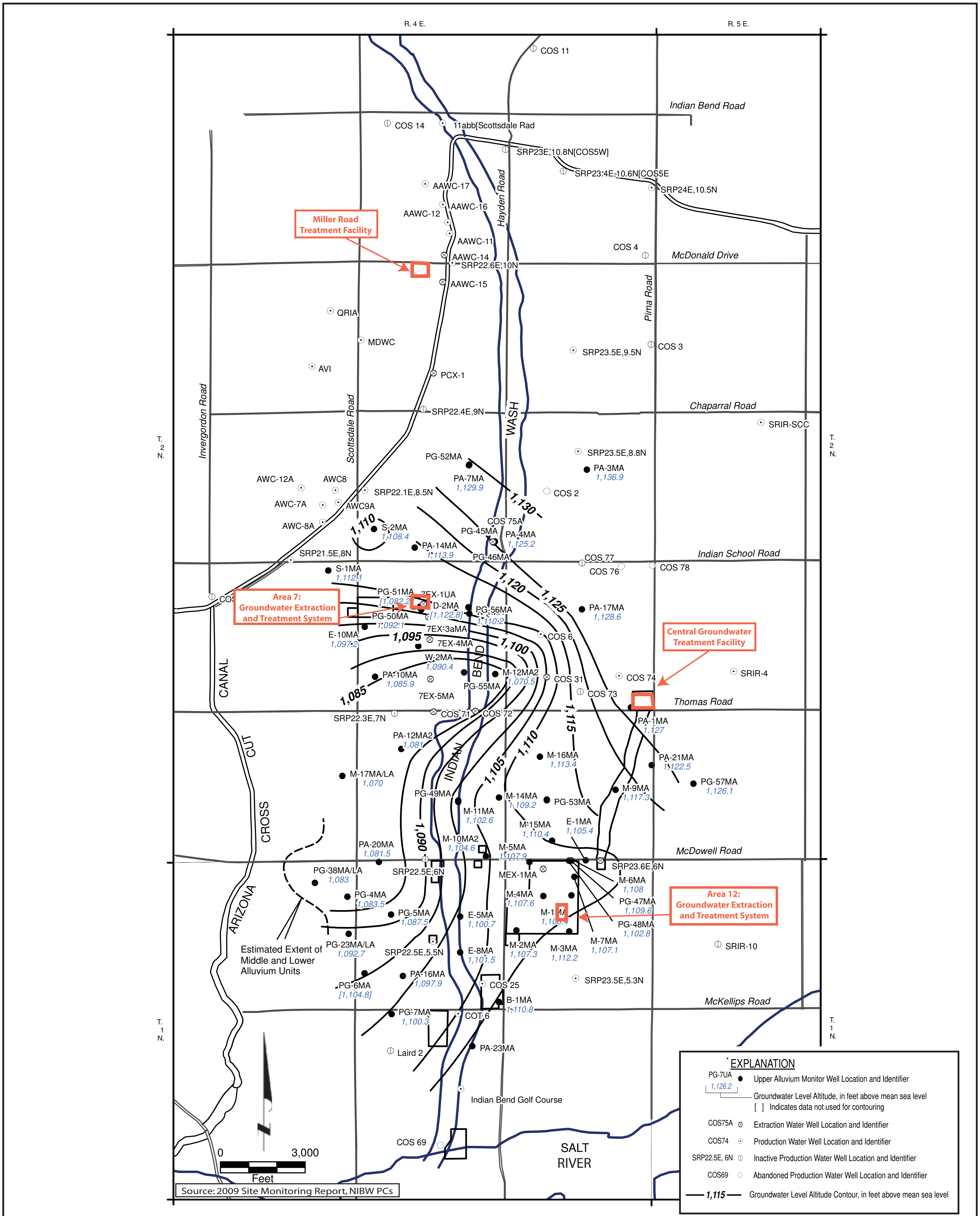
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-3E
NIBW PG-31UA
Upper Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 5 UAU PG-31

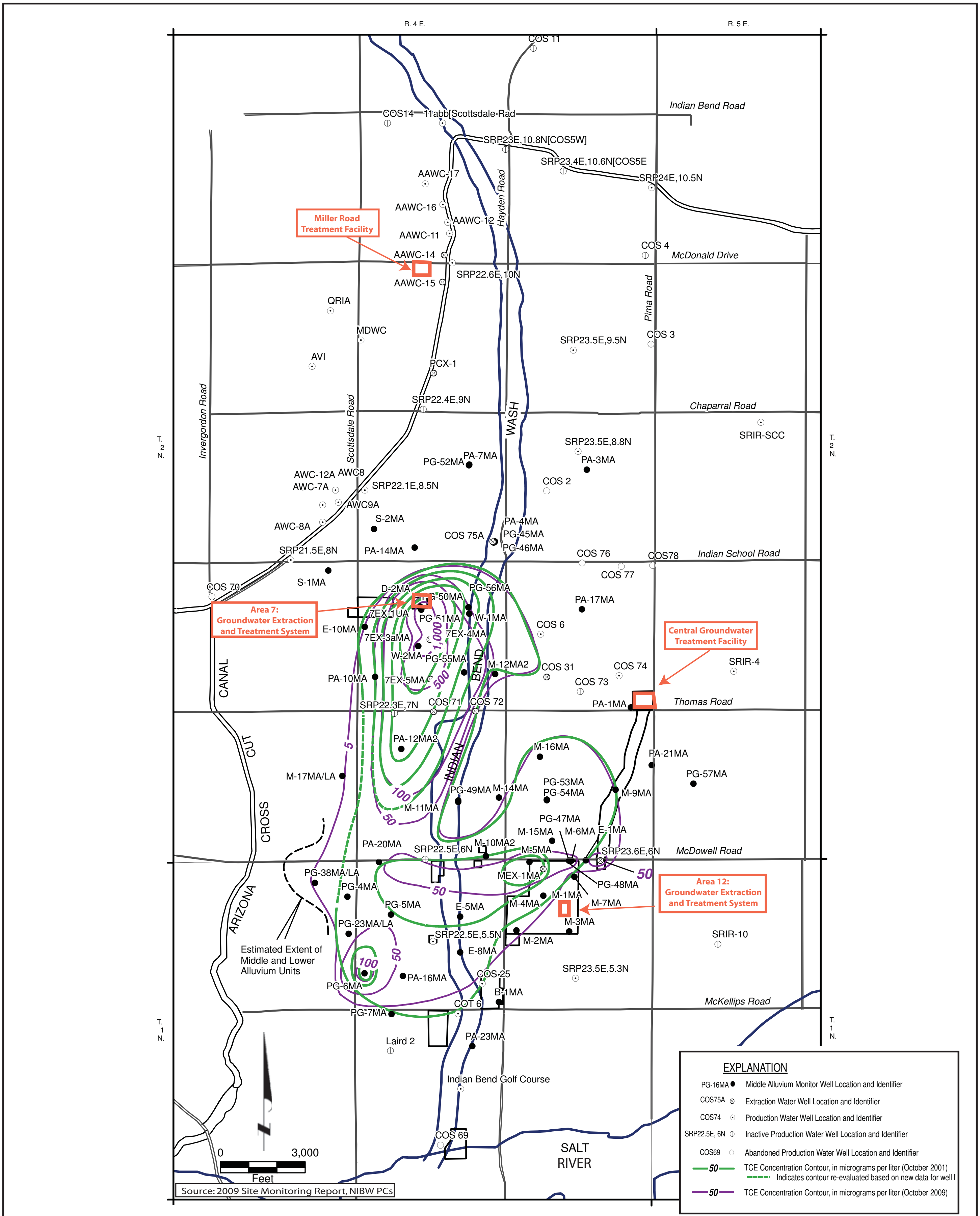


O:\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\NIBW Graphs\Figure 2-4

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Groundwater Elevation Contours
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-4
Middle Alluvial Unit Wells
October 2009

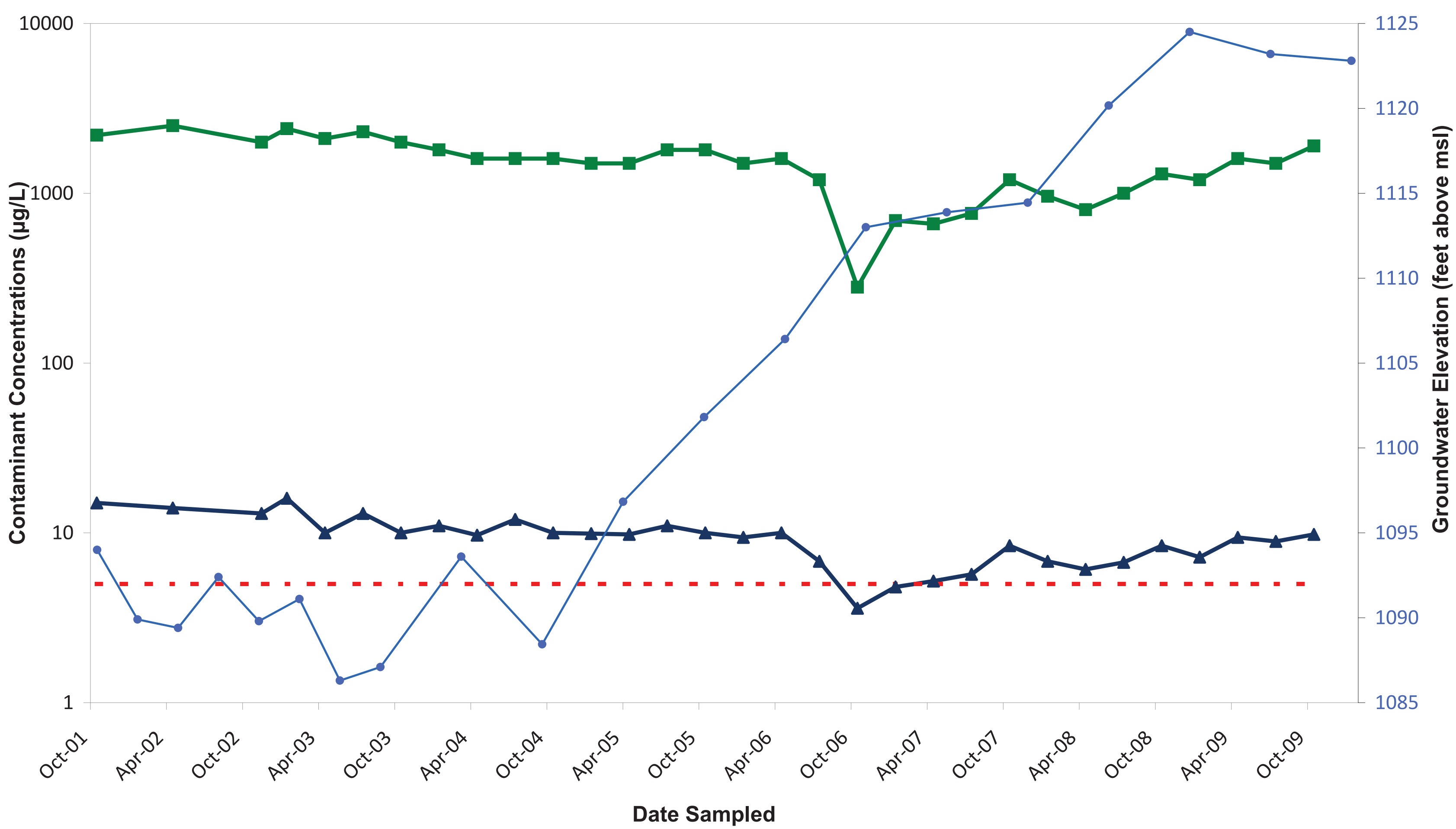


Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
TCE Concentration
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-5
Middle Alluvial Unit Wells
October 2001 and October 2009

O:0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\NIBW Graphs\Figure 2-5



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

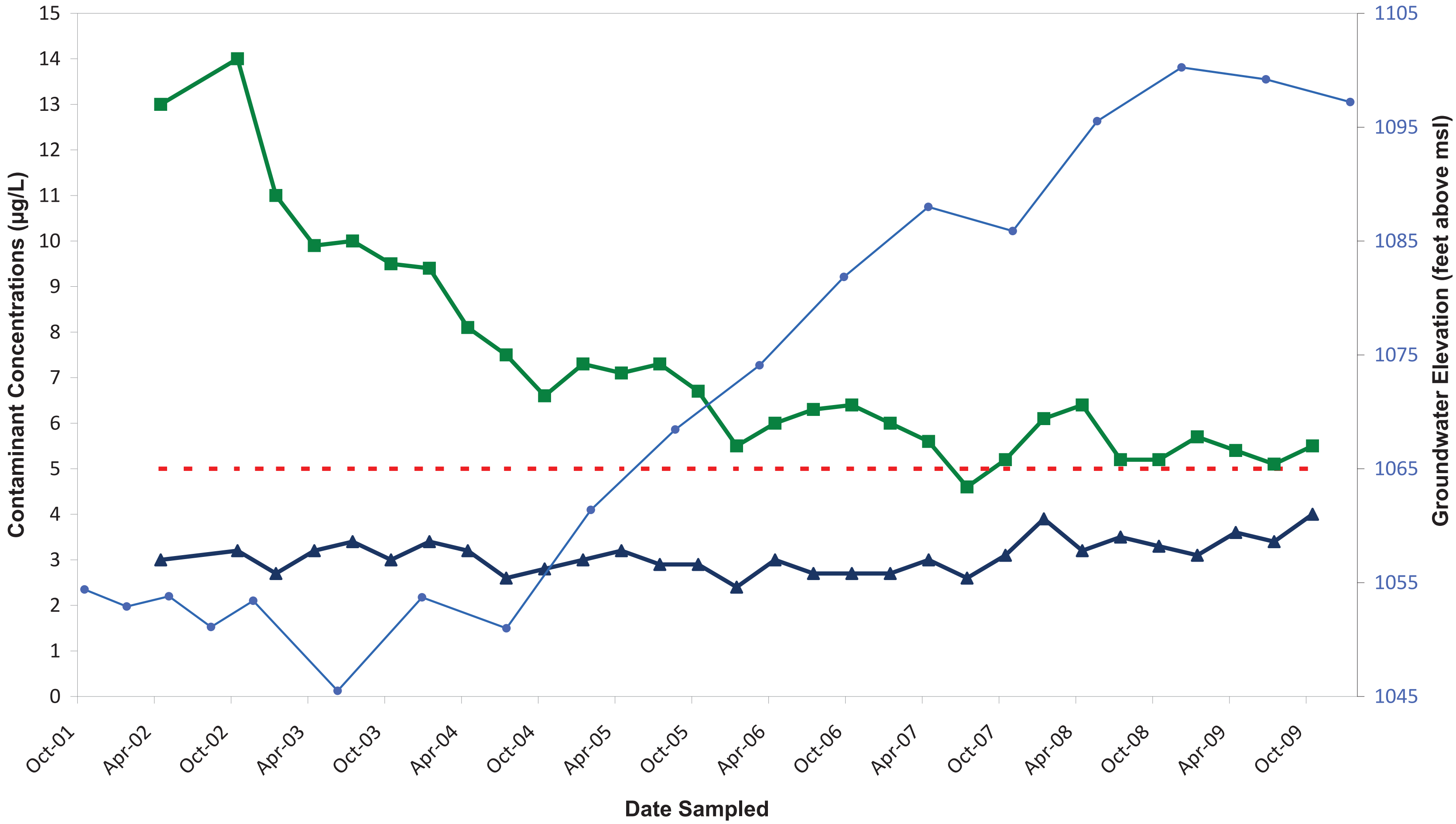
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6A
NIBW D-2MA
Middle Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure A MAU D-2



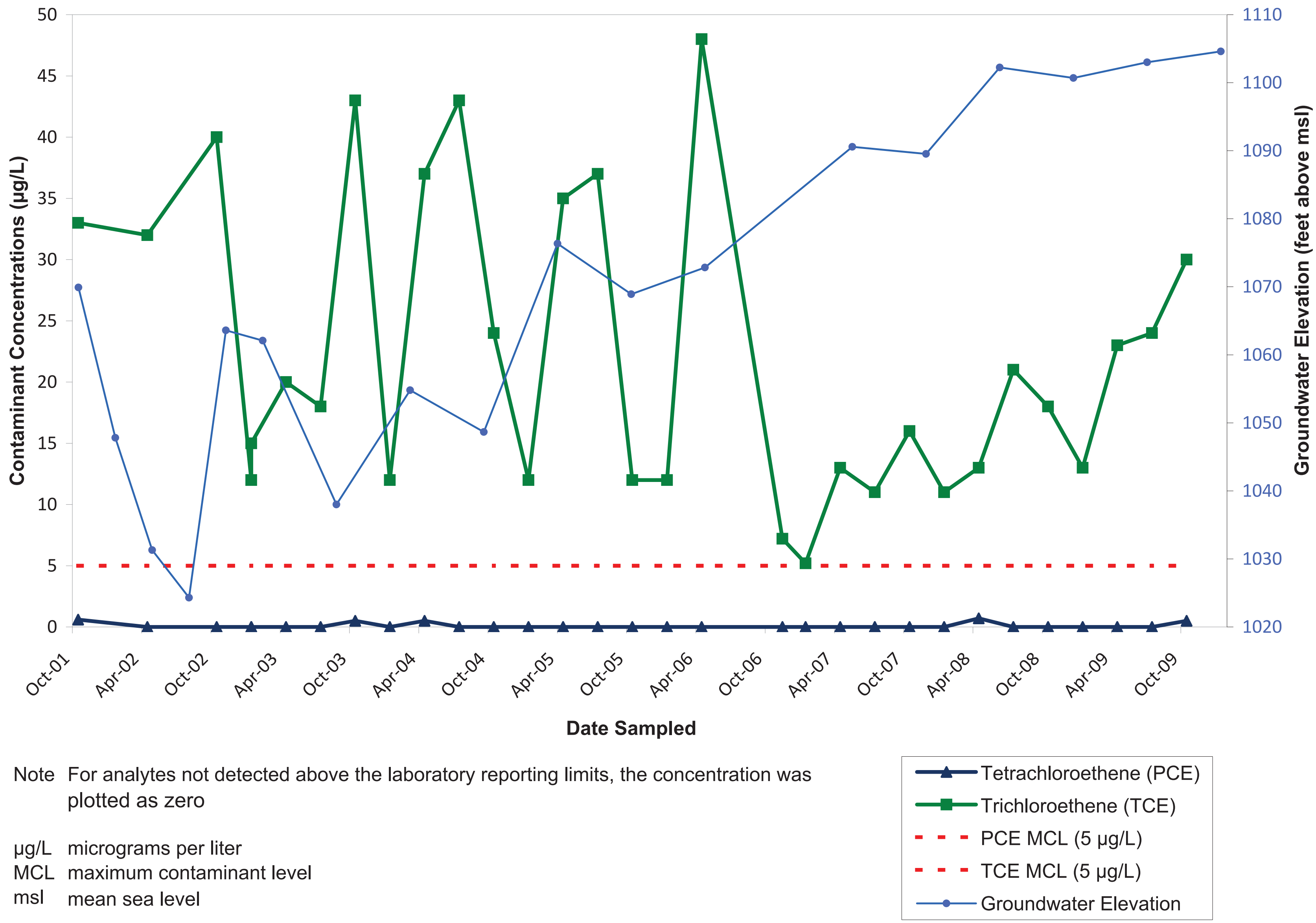
Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6B
NIBW E-10MA
Middle Alluvial Unit
October 2001 - October 2009



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

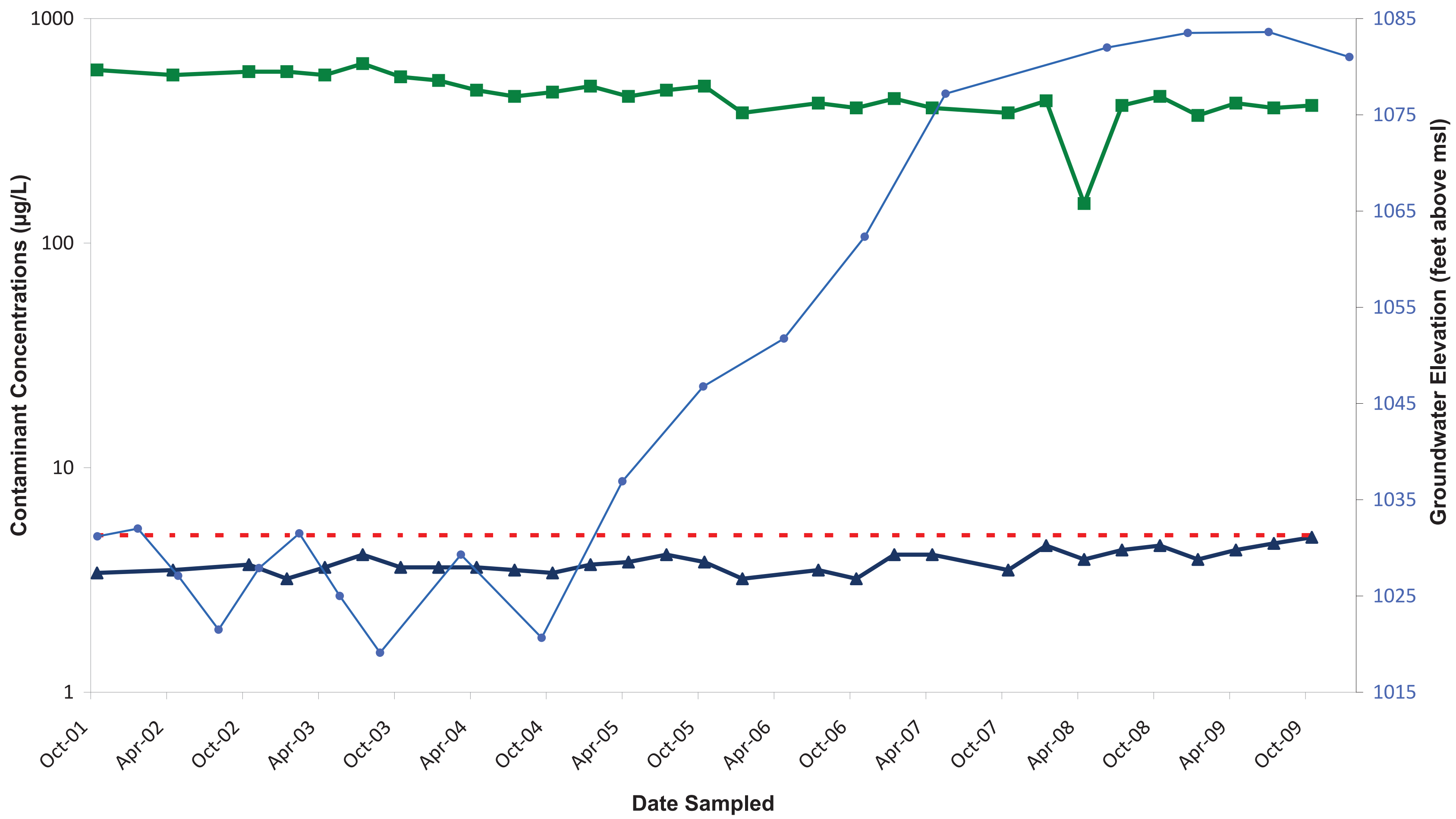
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure C MAU M-10

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6C
NIBW M-10MA2
Middle Alluvial Unit
October 2001 - October 2009

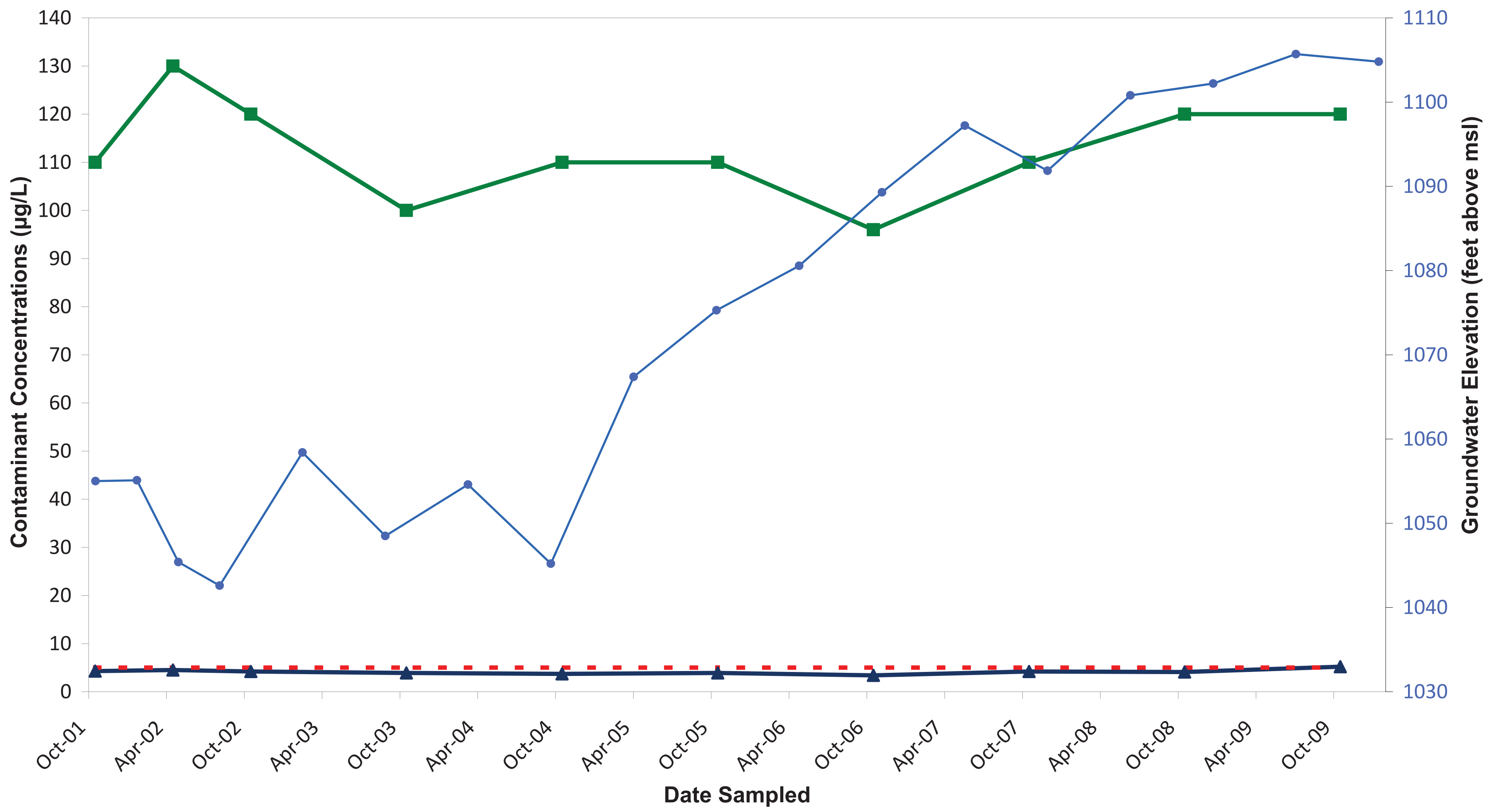


Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6D
NIBW PA-12MA2
Middle Alluvial Unit
October 2001 - October 2009



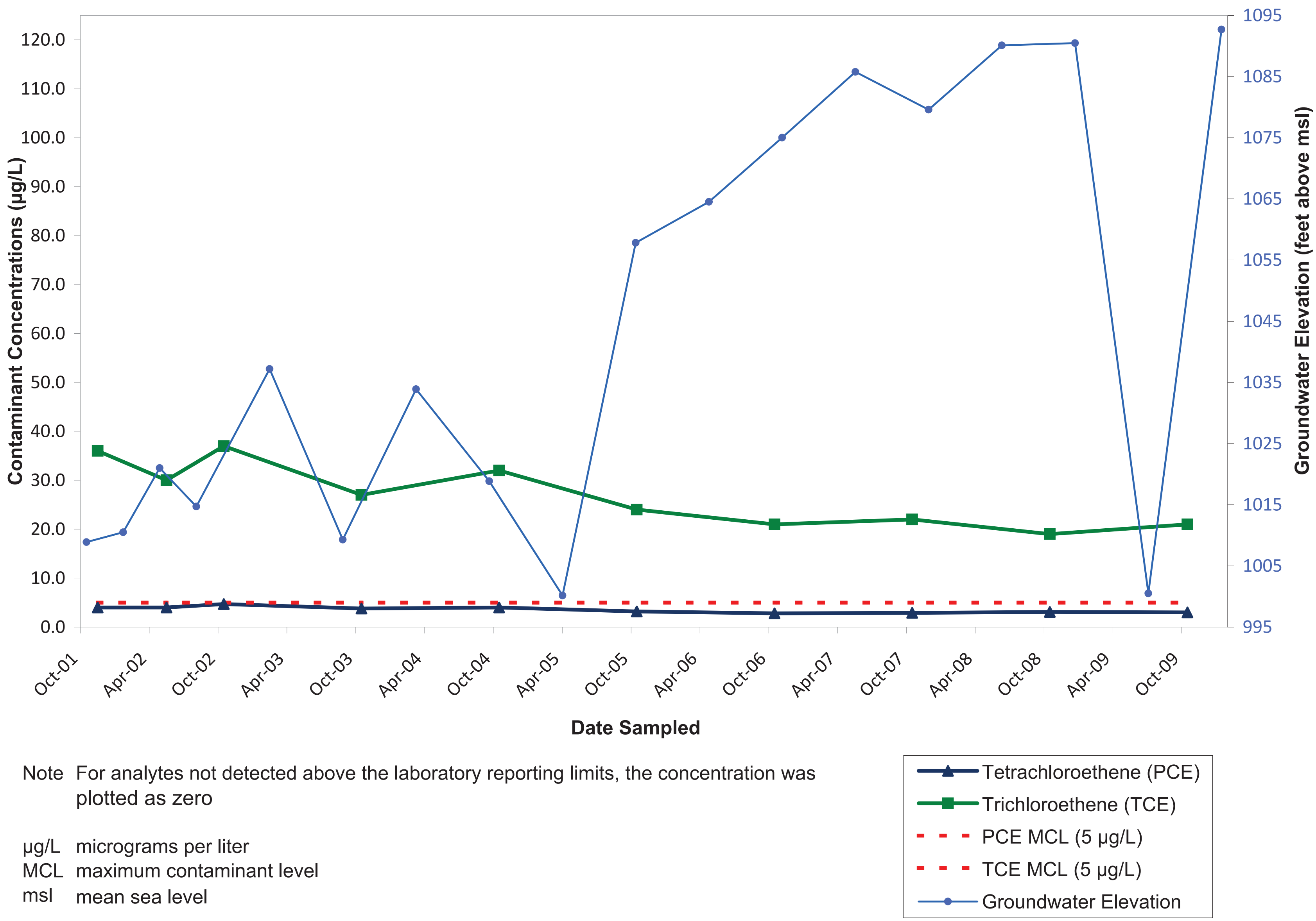
Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6E
NIBW PG-6MA
Middle Alluvial Unit
October 2001 - October 2009



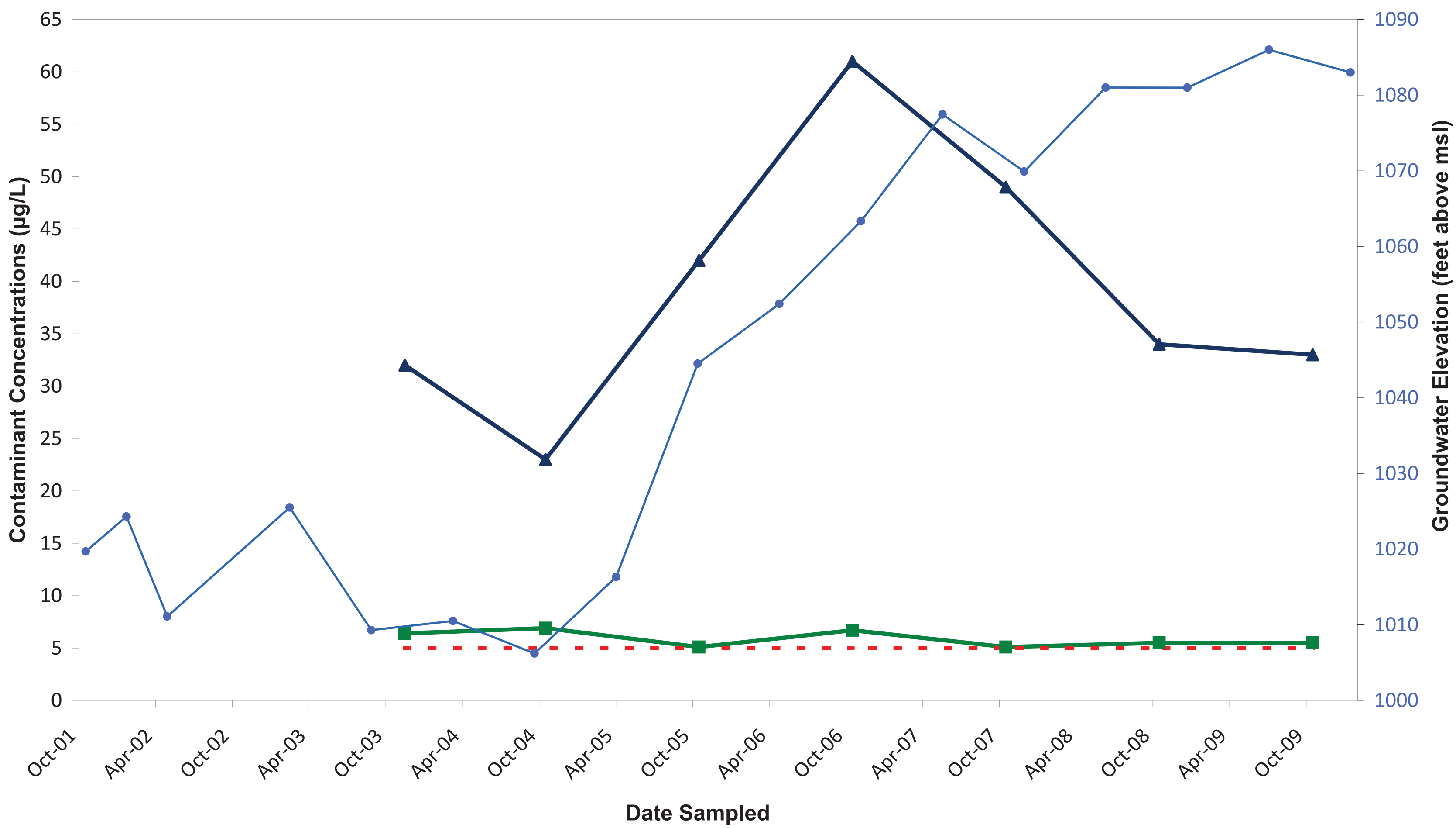
Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6F
NIBW PG-23MA/LA
Middle Alluvial Unit
October 2001 - October 2009



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

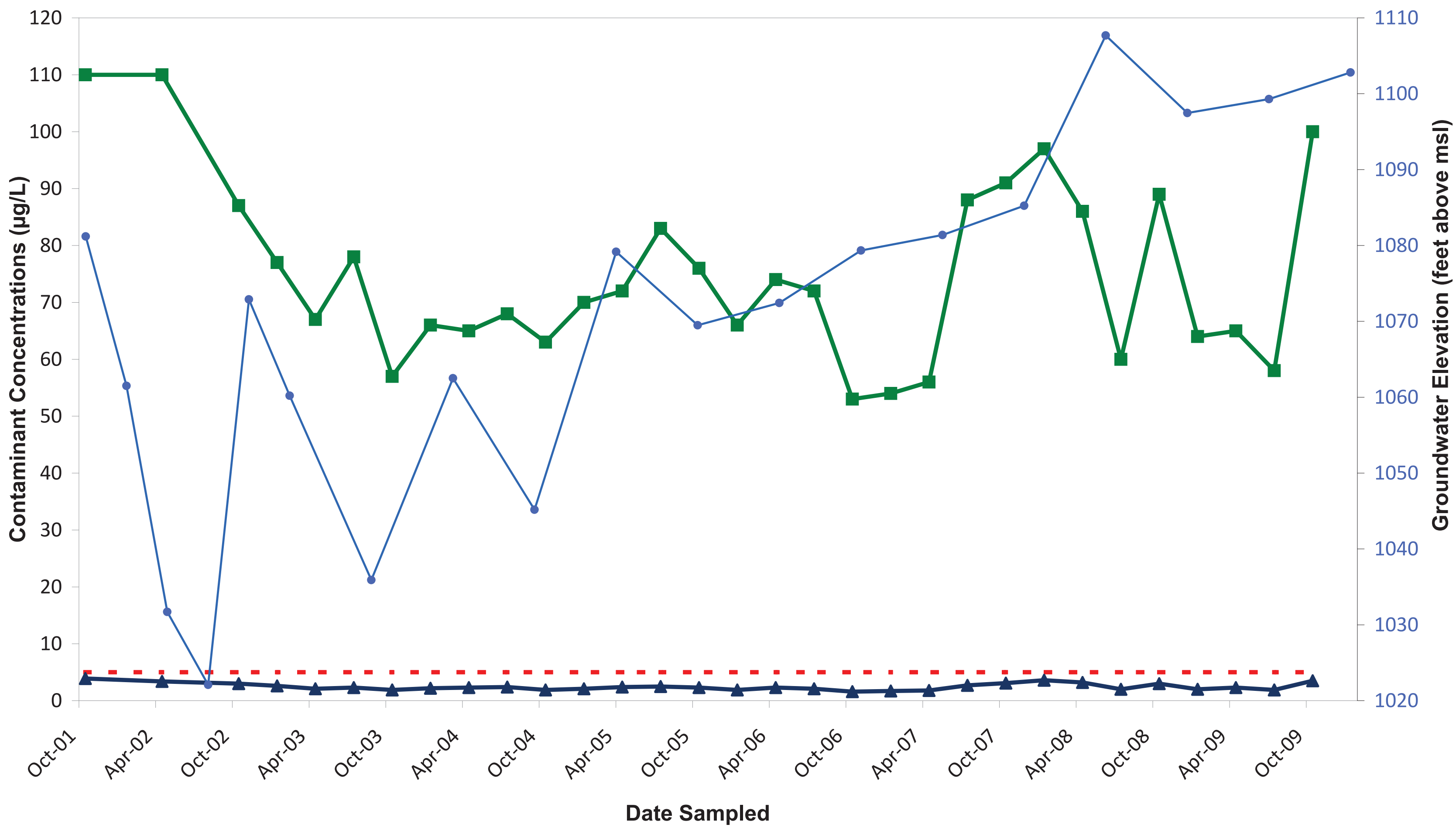
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6G
NIBW PG-38MA/LA
Middle Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure G MAU PG-38



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

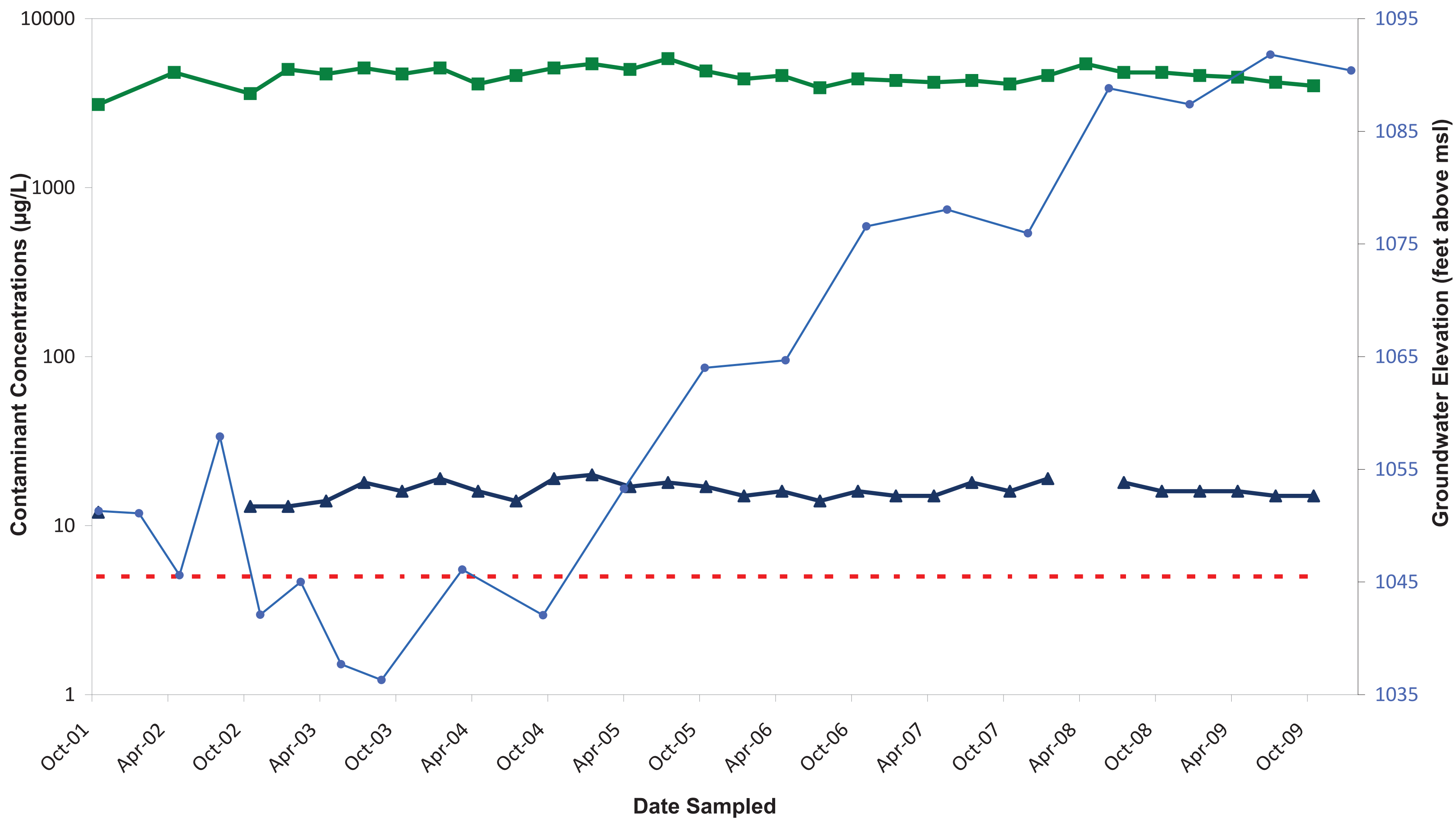
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6H
NIBW PG-48MA/LA
Middle Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure G MAU PG-48



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

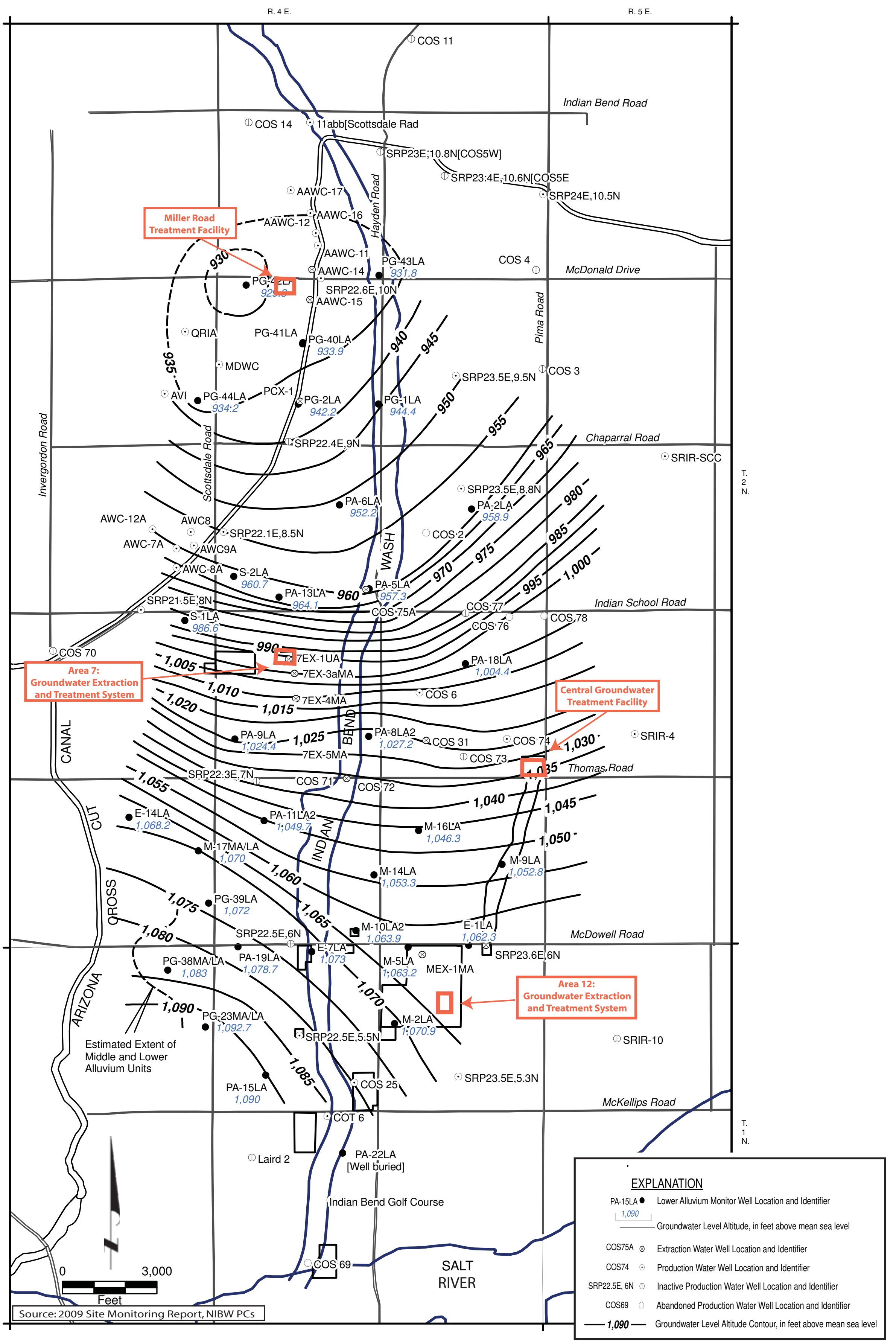
Tetrachloroethene (PCE)
Trichloroethene (TCE)
PCE MCL (5 µg/L)
TCE MCL (5 µg/L)
Groundwater Elevation

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-6I
NIBW W-2MA
Middle Alluvial Unit
October 2001 - October 2009

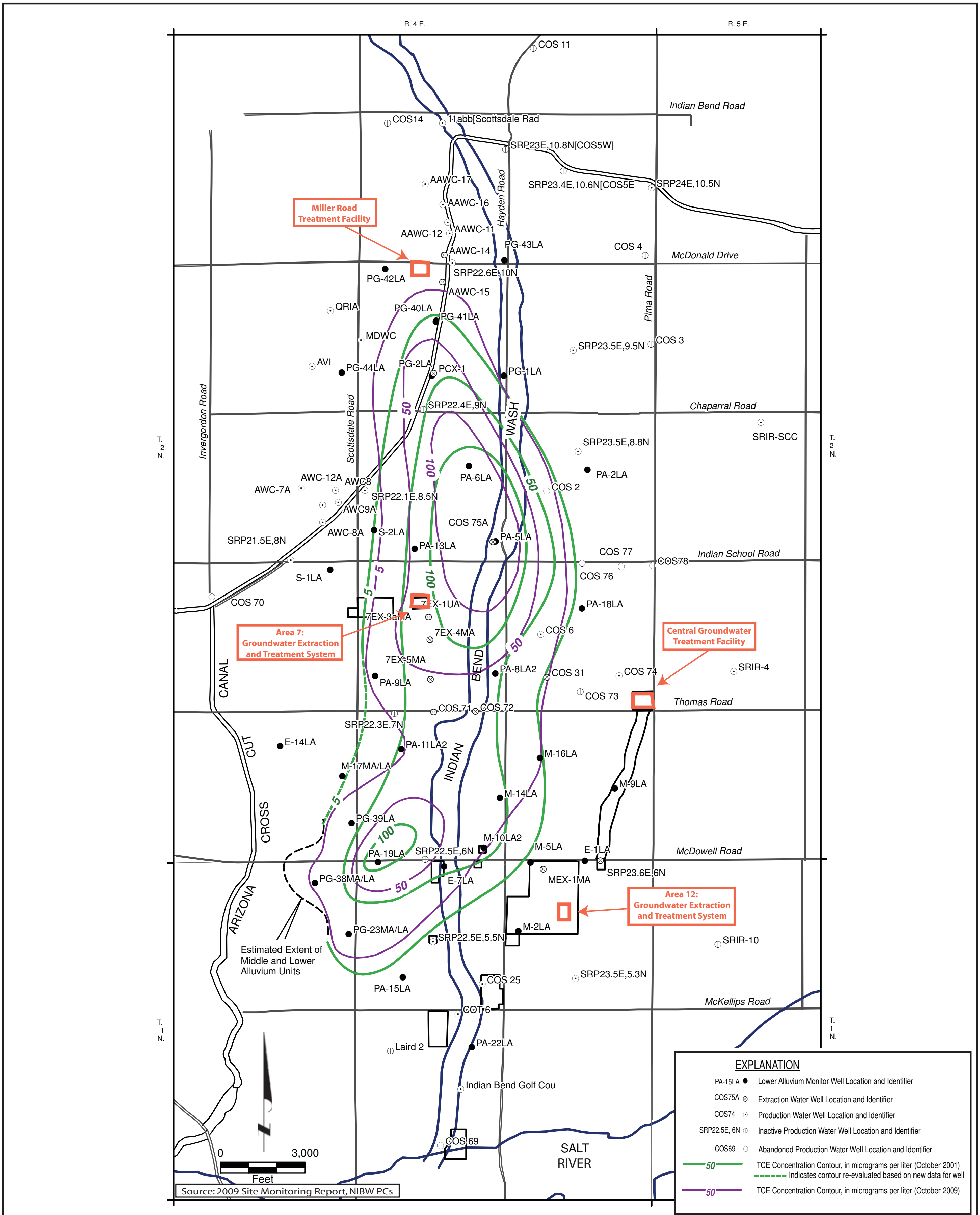
\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure I MAU W-2



Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Groundwater Elevation Contours
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-7
Lower Alluvial Unit Wells
October 2009

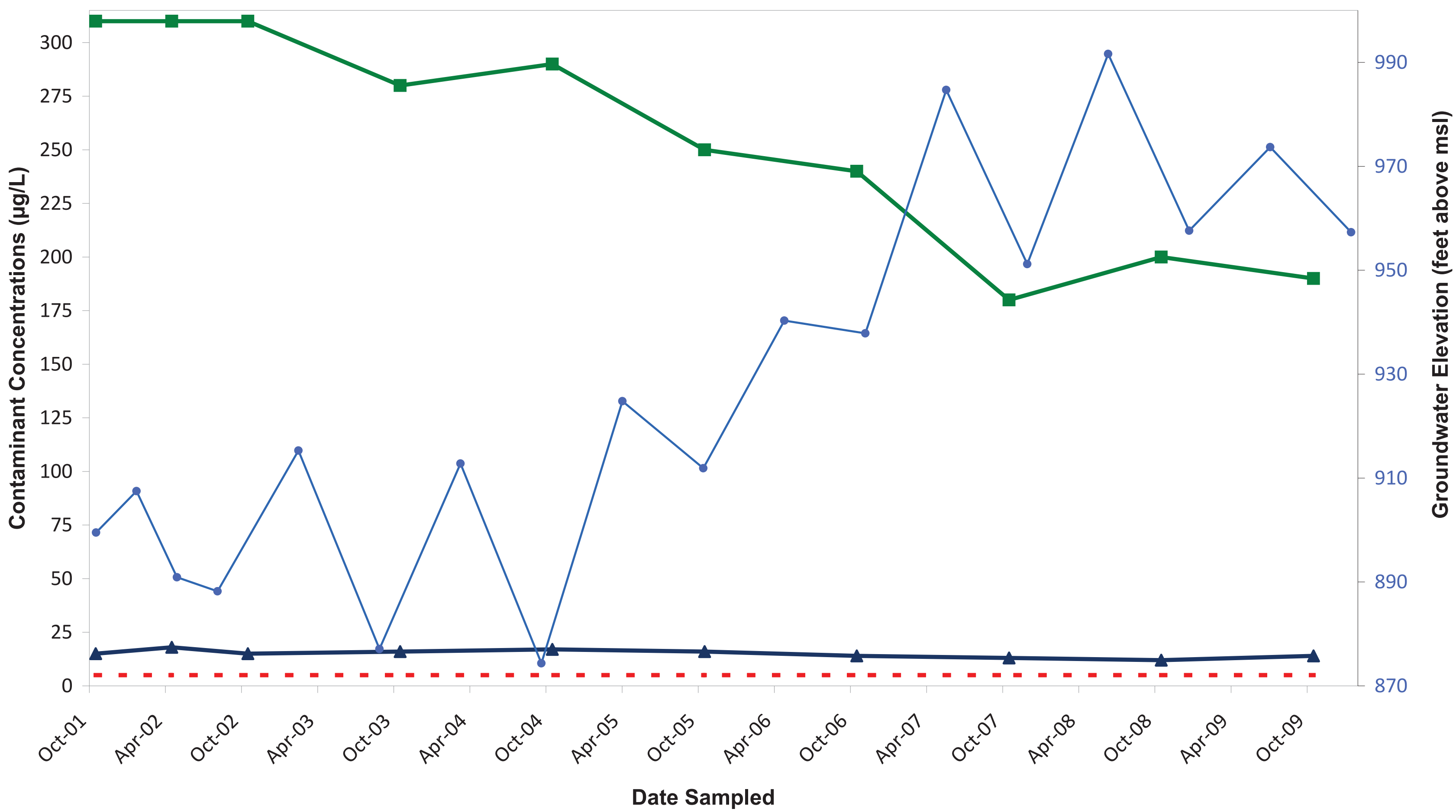


Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
TCE Concentration
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-8
Lower Alluvial Unit Wells
October 2001 and October 2009

O:\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\NIBW Graphs\Figure 2-8



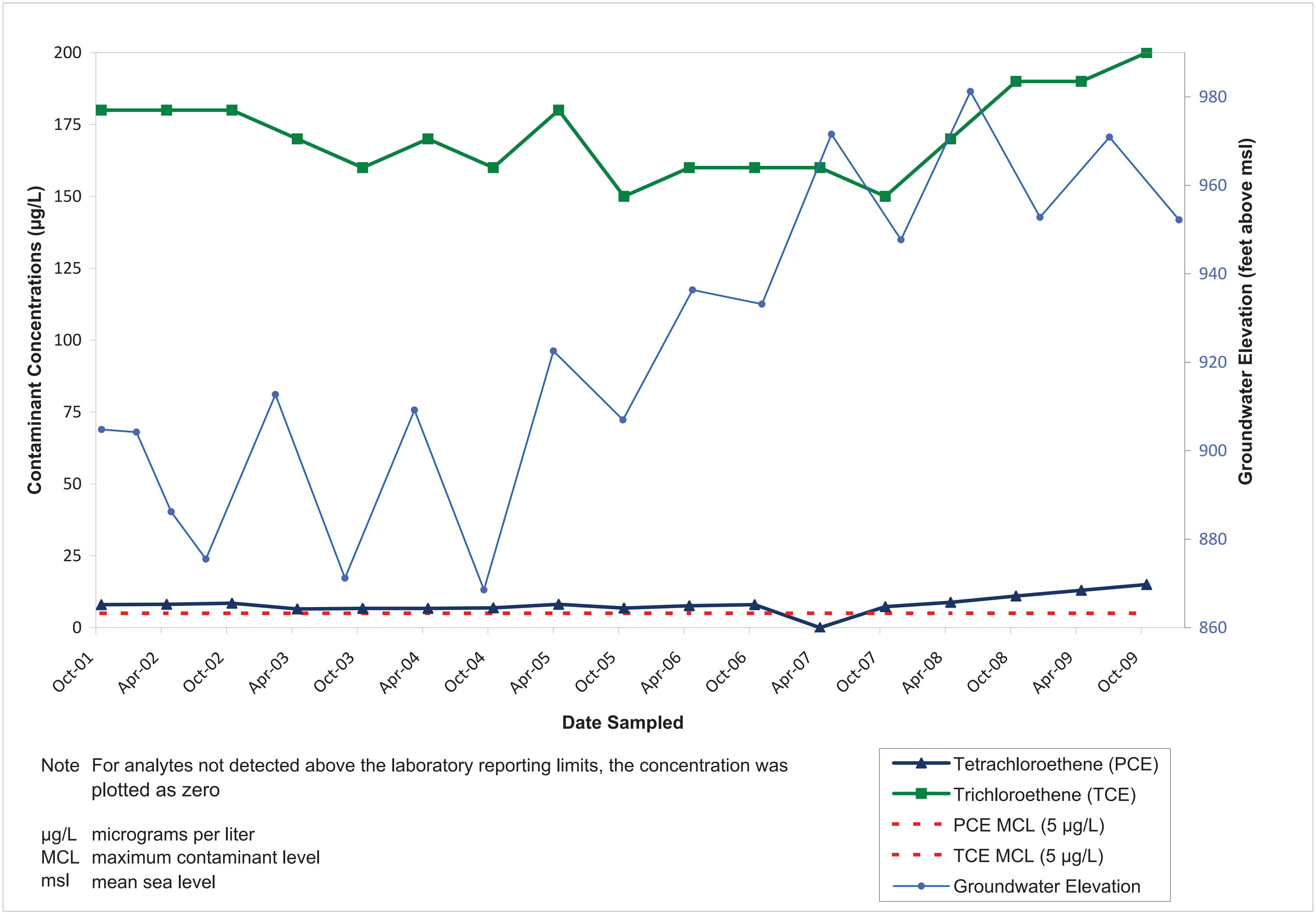
Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-9A
NIBW PA-5LA
Lower Alluvial Unit
October 2001 - October 2009

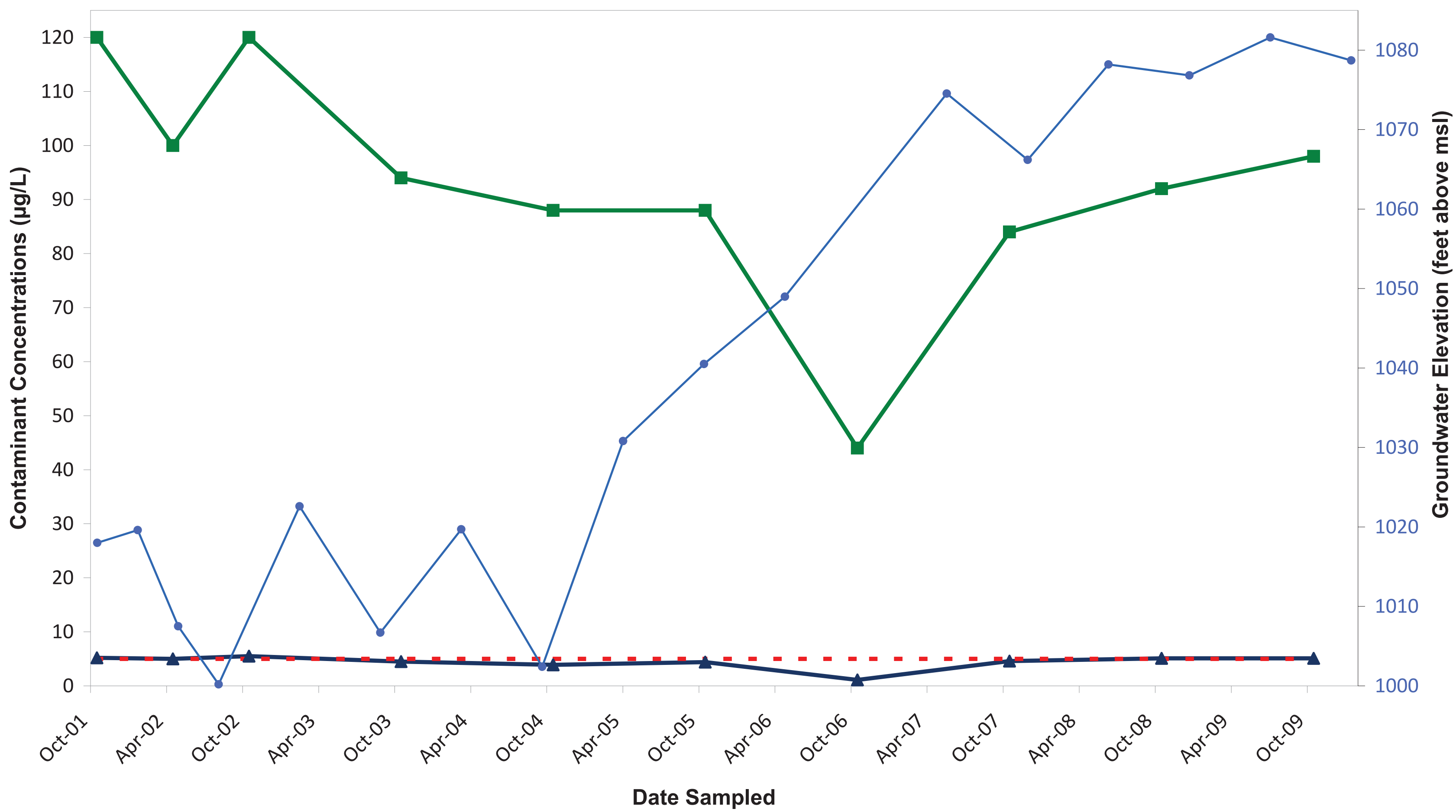


ITSI Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-9B
NIBW PA-6LA
Lower Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 2 LAU PA-6



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

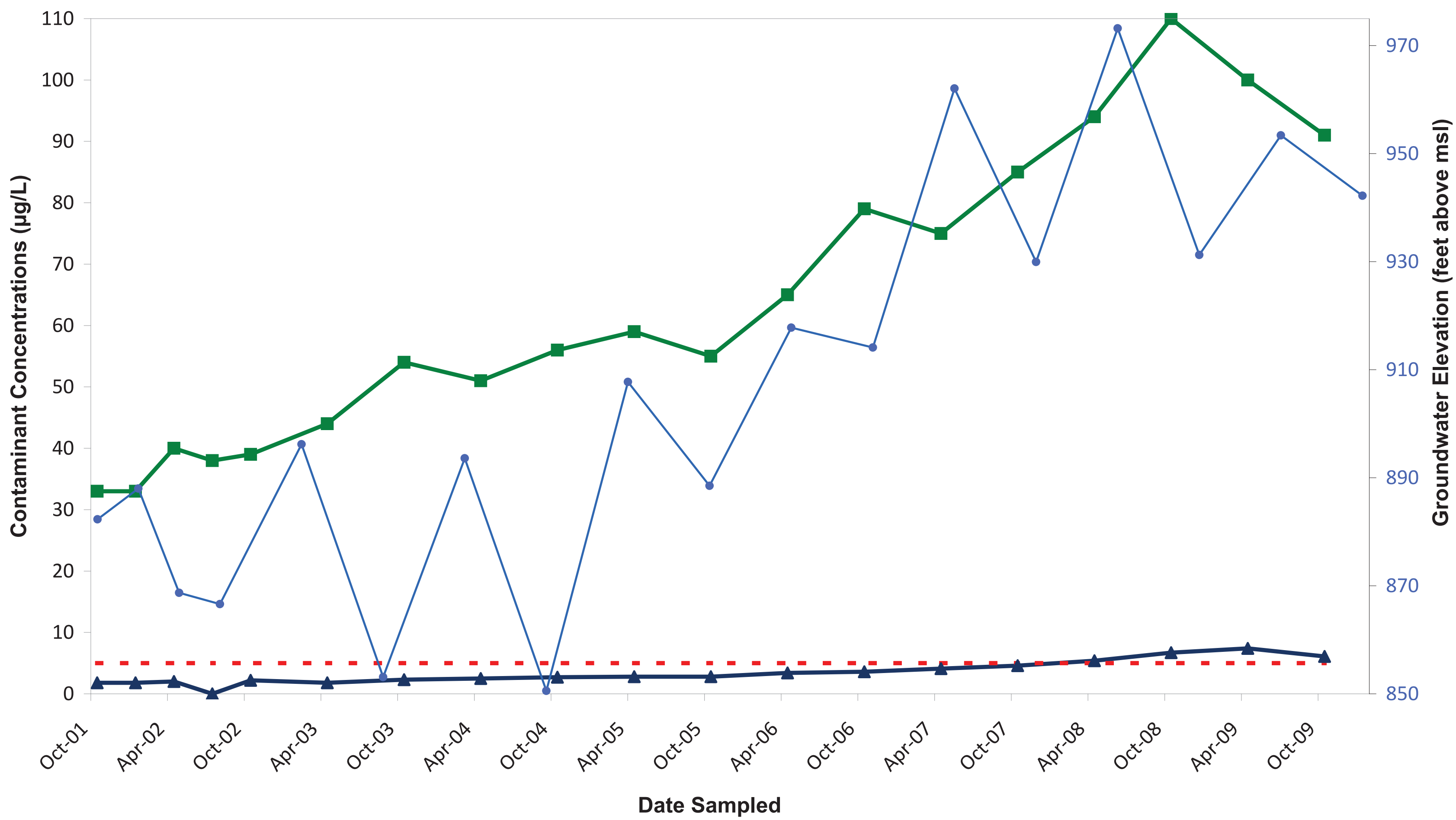
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-9C
NIBW PA-19LA
Lower Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920.IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 3 LAU PA-19



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

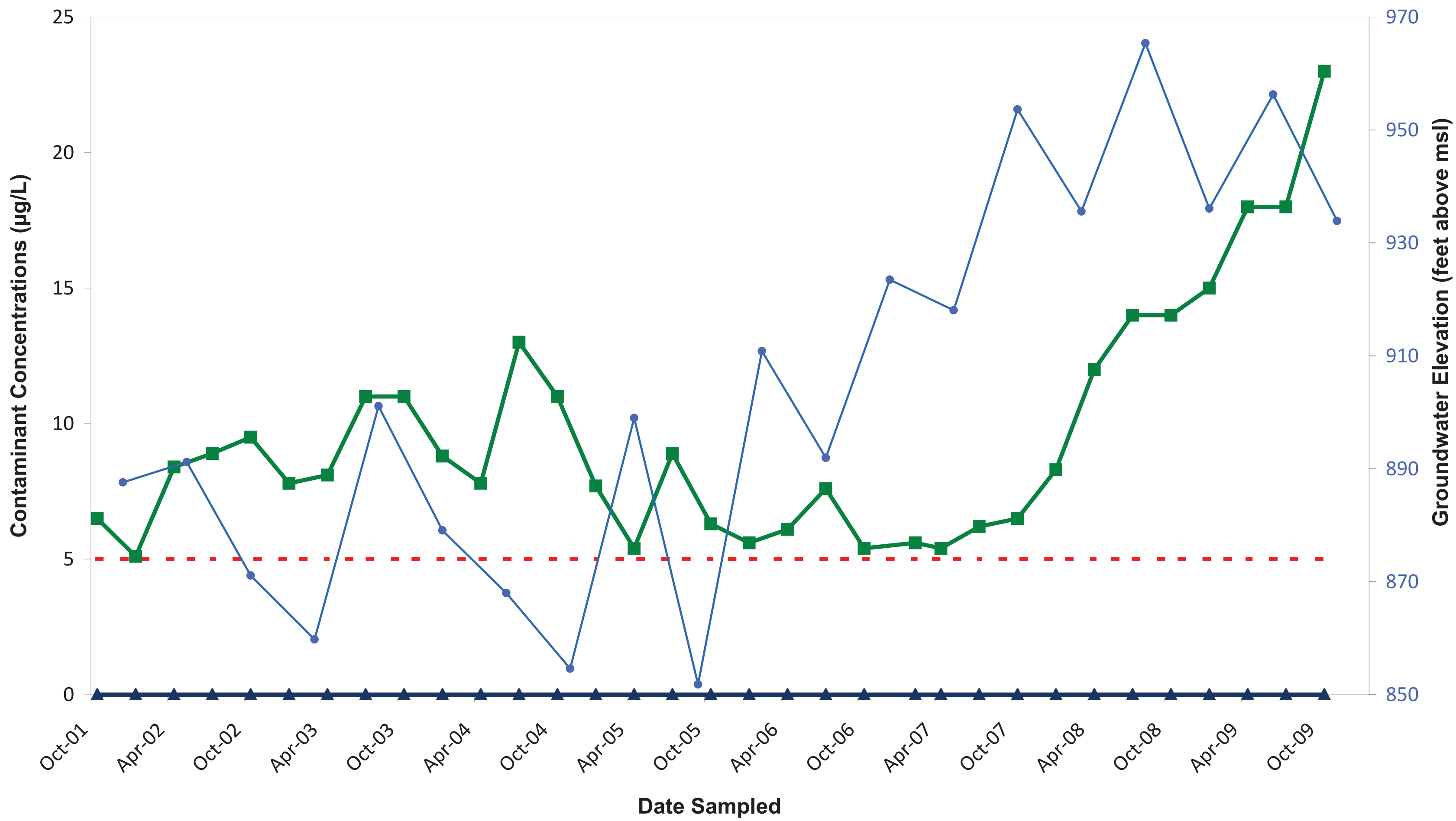
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-9D
NIBW PG-2LA
Lower Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 4 LAU PG-2



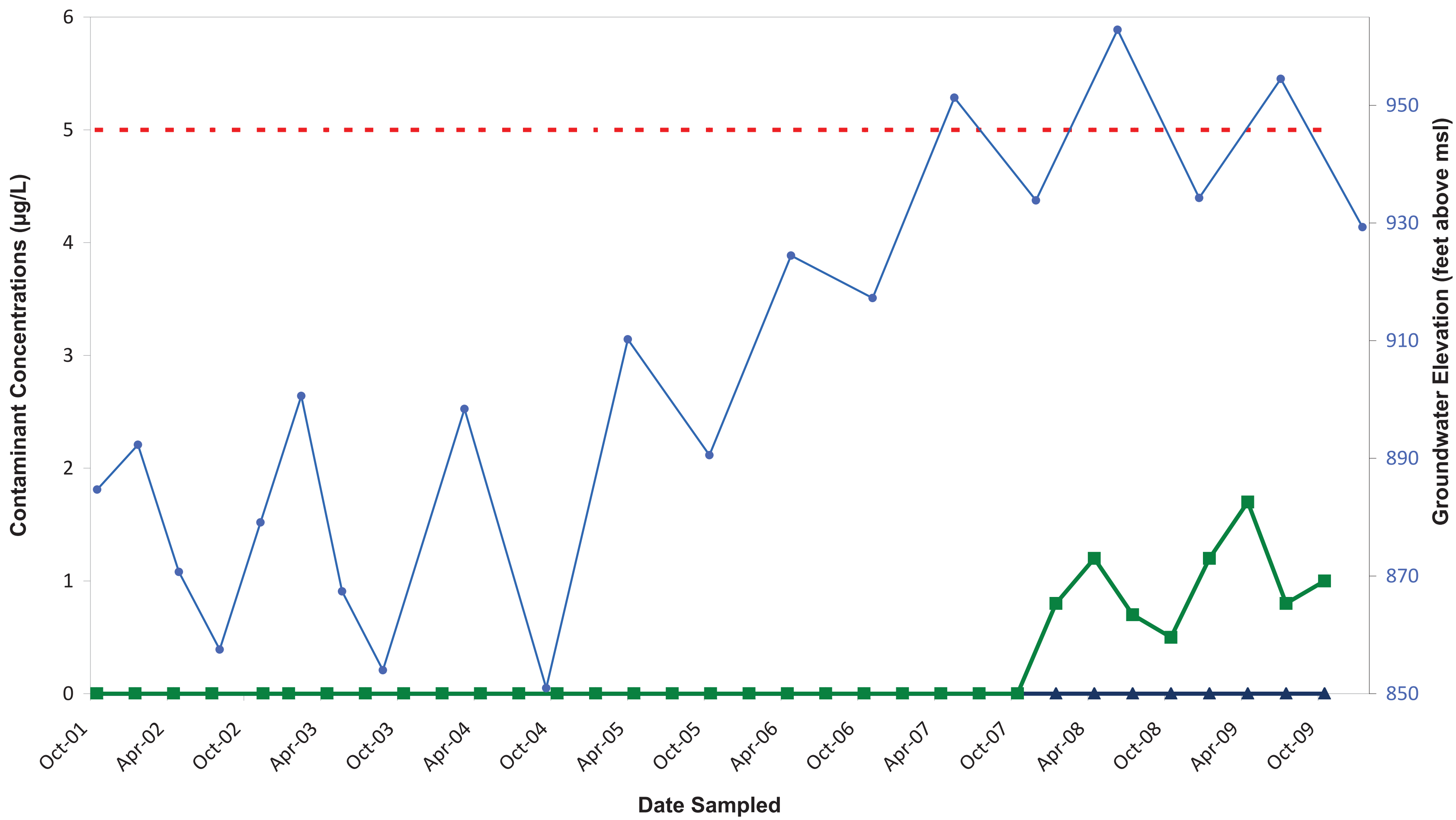
Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-9E
NIBW PA-40LA
Lower Alluvial Unit
October 2001 - October 2009



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

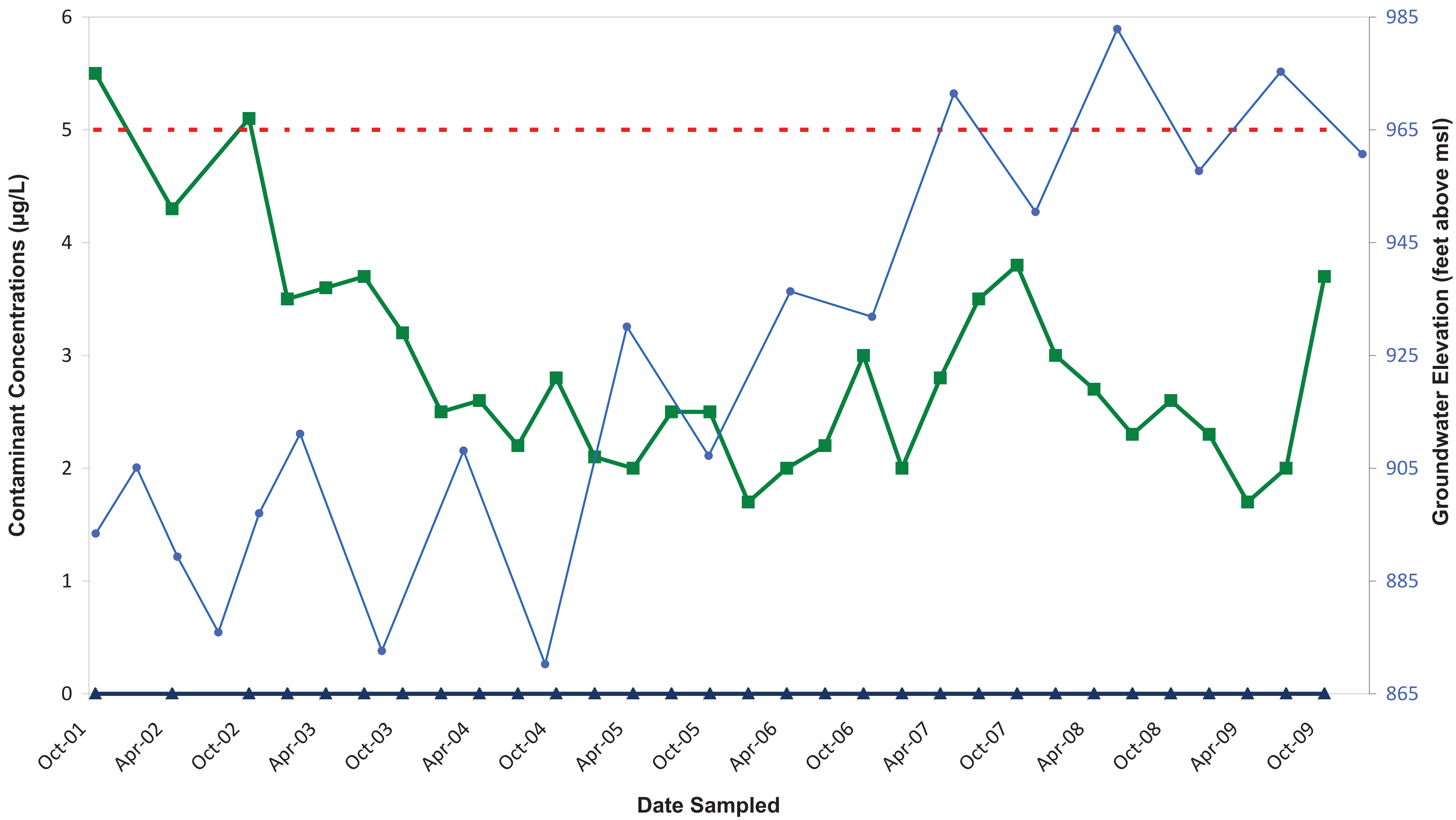
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-9F
NIBW PG-42LA
Lower Alluvial Unit
October 2001 - October 2009

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 6 LAU PG-42



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

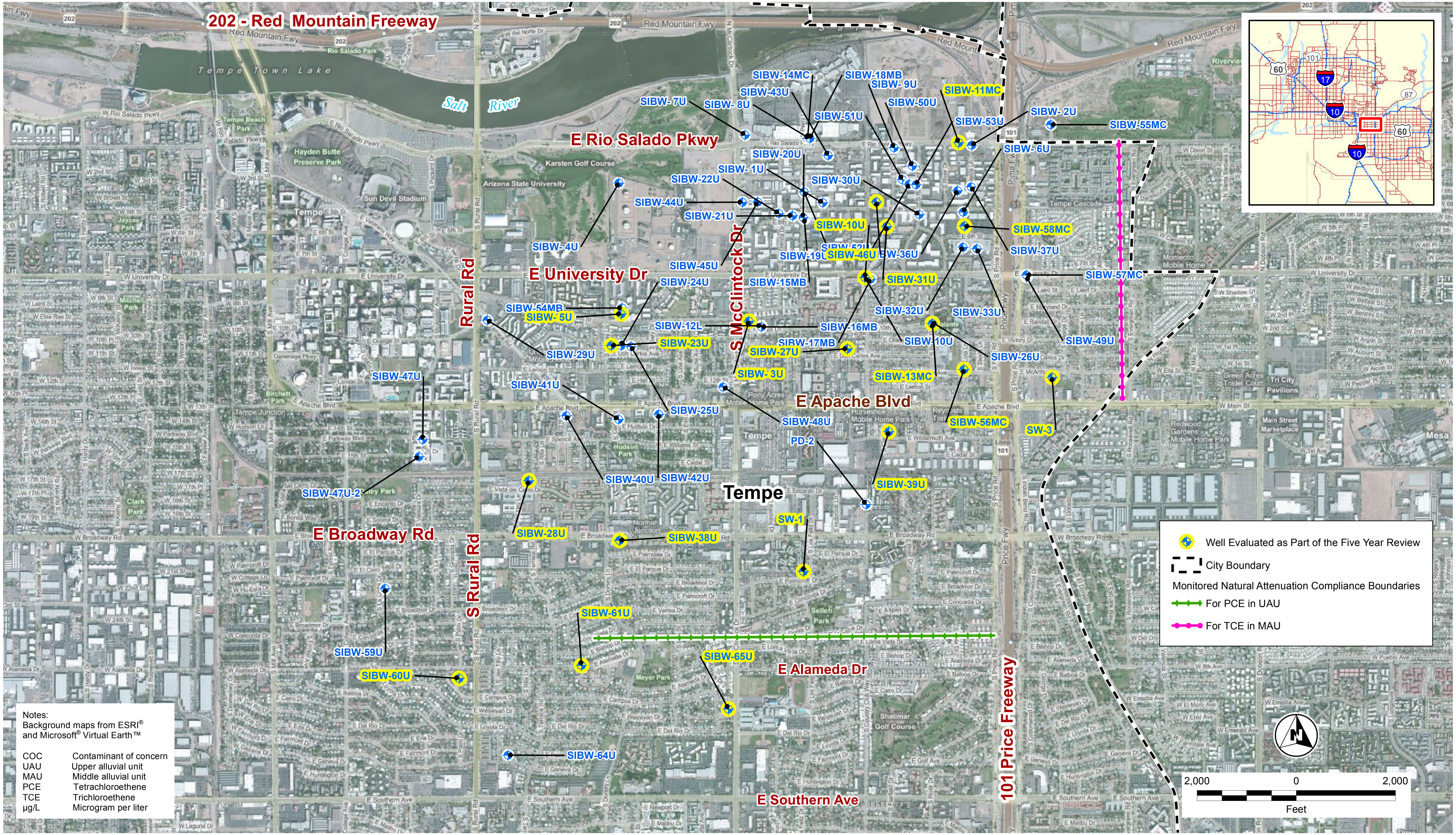
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\NIBW Graphs\LAU Figures\Figure 7 LAU S-2

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for NIBW Over Time
North Indian Bend Wash Superfund Area
Scottsdale, Arizona

Figure 2-9G
NIBW S-2LA
Lower Alluvial Unit
October 2001 - October 2009

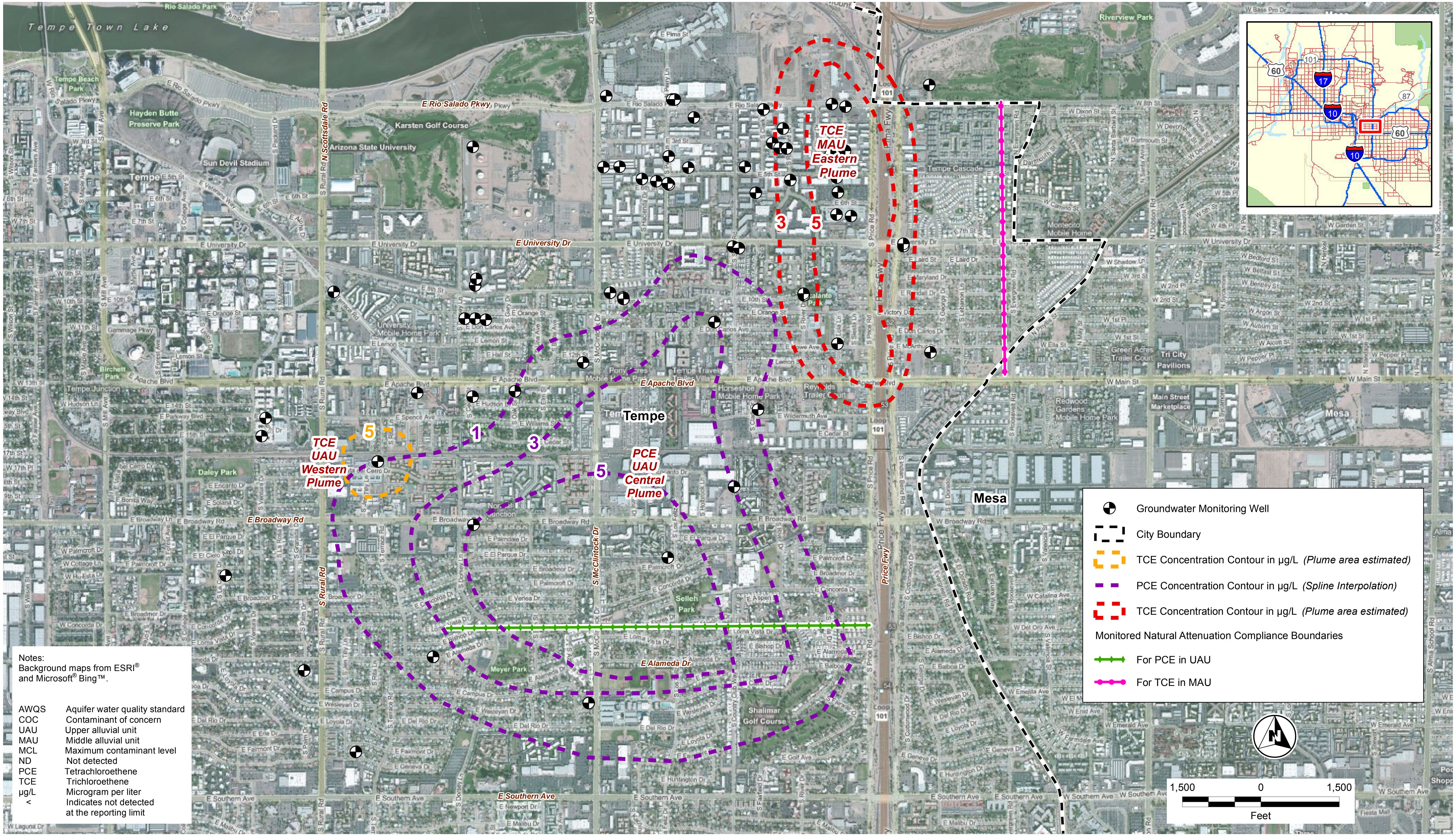


ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Well Location Map
South Indian Bend Wash Superfund Area
Tempe, Arizona

FIGURE 3-1
SIBW Well Location Map

G:\ArcGIS\EPA\SIBW\PROJECTS\FYR\Site_Loc.mxd 9/24/2010 ITSI-WC Laura Weber



Notes:
Background maps from ESRI® and Microsoft® Bing™.

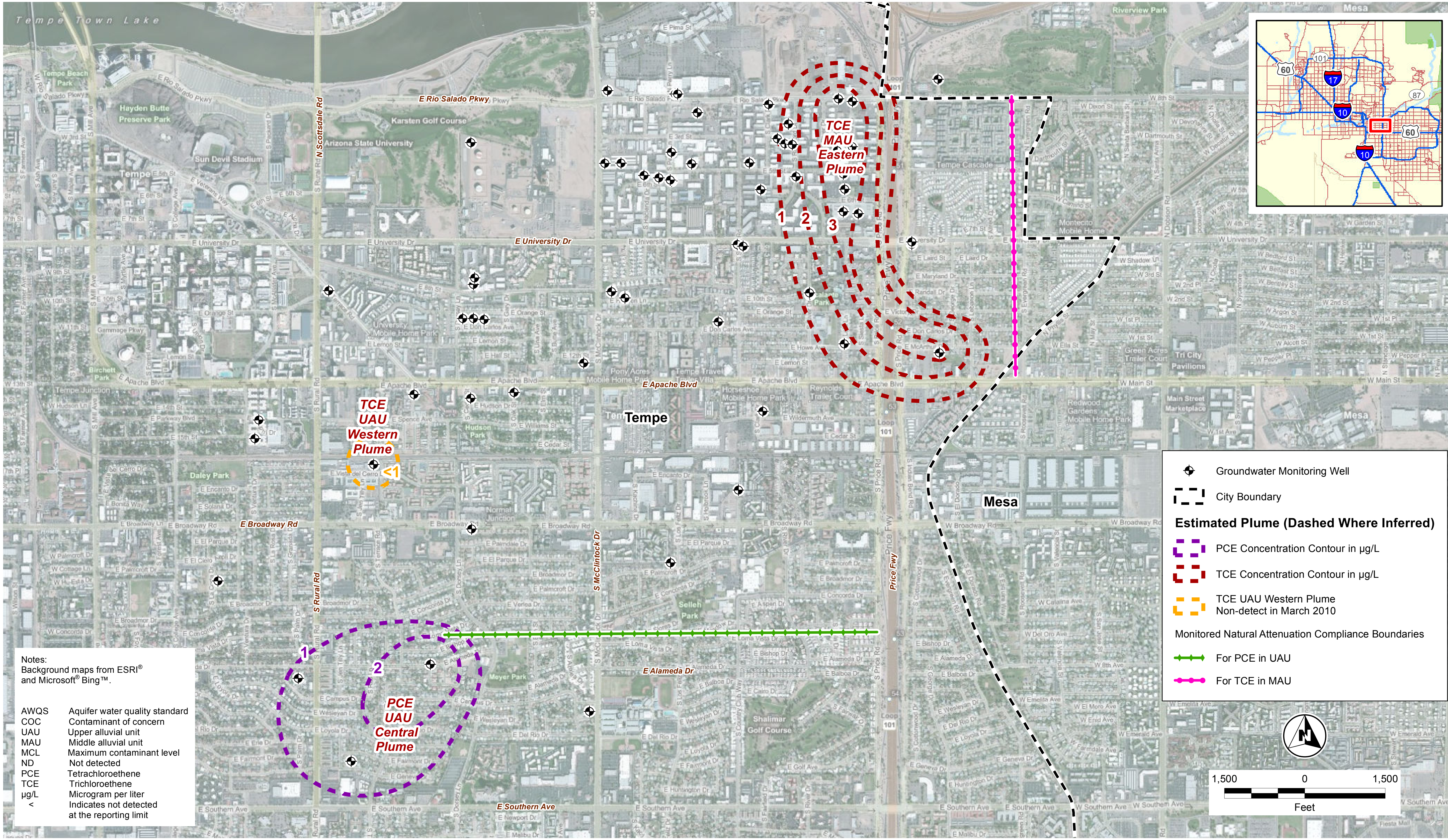
AWQS	Aquifer water quality standard
COC	Contaminant of concern
UAU	Upper alluvial unit
MAU	Middle alluvial unit
MCL	Maximum contaminant level
ND	Not detected
PCE	Tetrachloroethene
TCE	Trichloroethene
µg/L	Microgram per liter
<	Indicates not detected at the reporting limit

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Groundwater Contaminant Concentrations Map
South Indian Bend Wash Superfund Area
Tempe, Arizona

FIGURE 3-2
Middle and Upper Alluvial Units
2004

G:\ArcGIS\EPA\SIBW\PROJECTS\FYR\GW_Conc_2004.mxd 9/24/2010 ITSI-WC Laura Weber

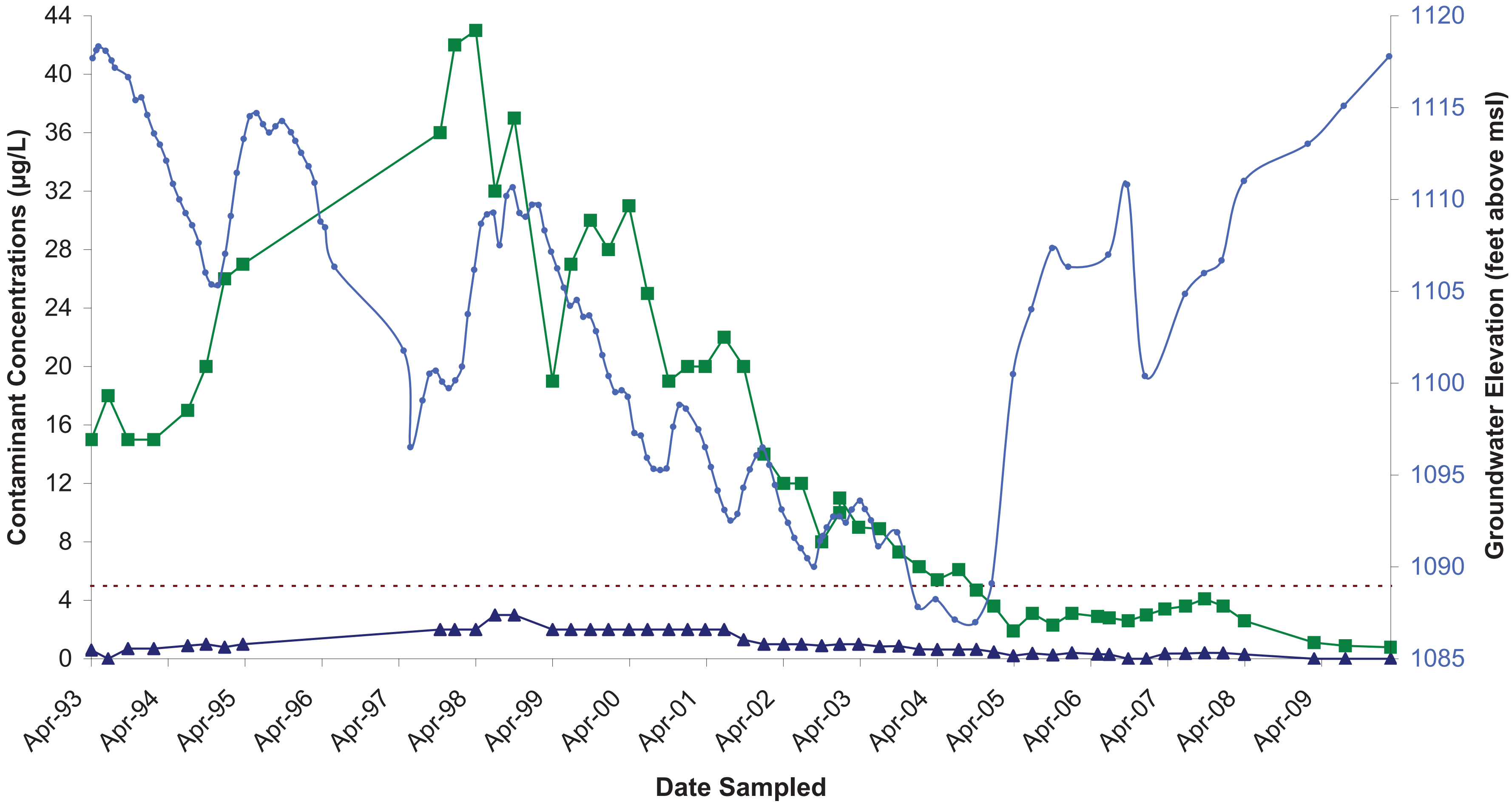


ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Groundwater Contaminant Concentrations Map
South Indian Bend Wash Superfund Area
Tempe, Arizona

FIGURE 3-3
Middle and Upper Alluvial Units
2010

G:\ArcGIS\EPA\SIBW\PROJECTS\FYR\GW_Conc_2010.mxd 9/24/2010 ITSI-WC Laura Weber



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

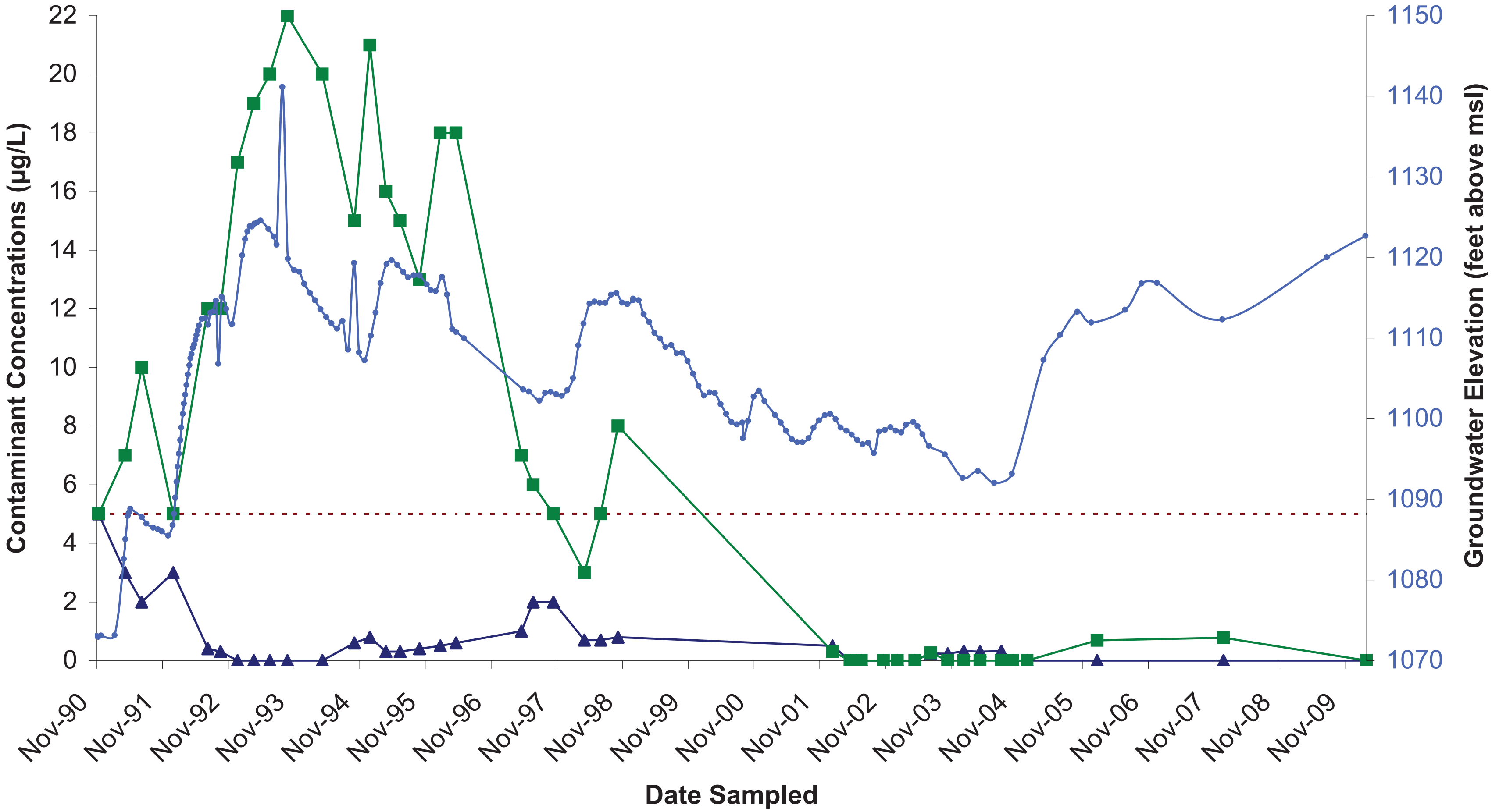
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-4
SIBW-28U
Western Plume
March 1993- March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-4 28U



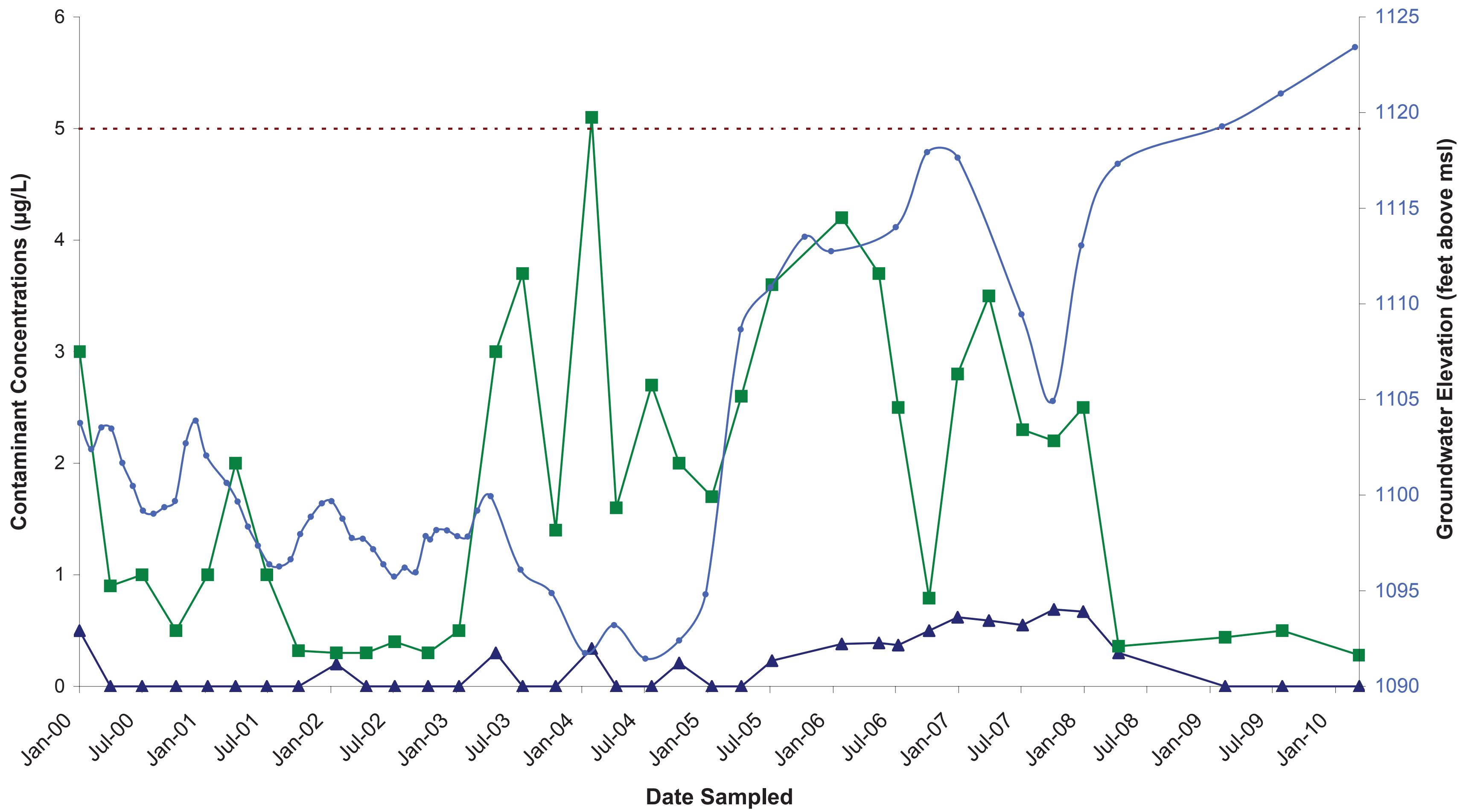
Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5A
SIBW-3U
Central Plume
November 1990- March 2010



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

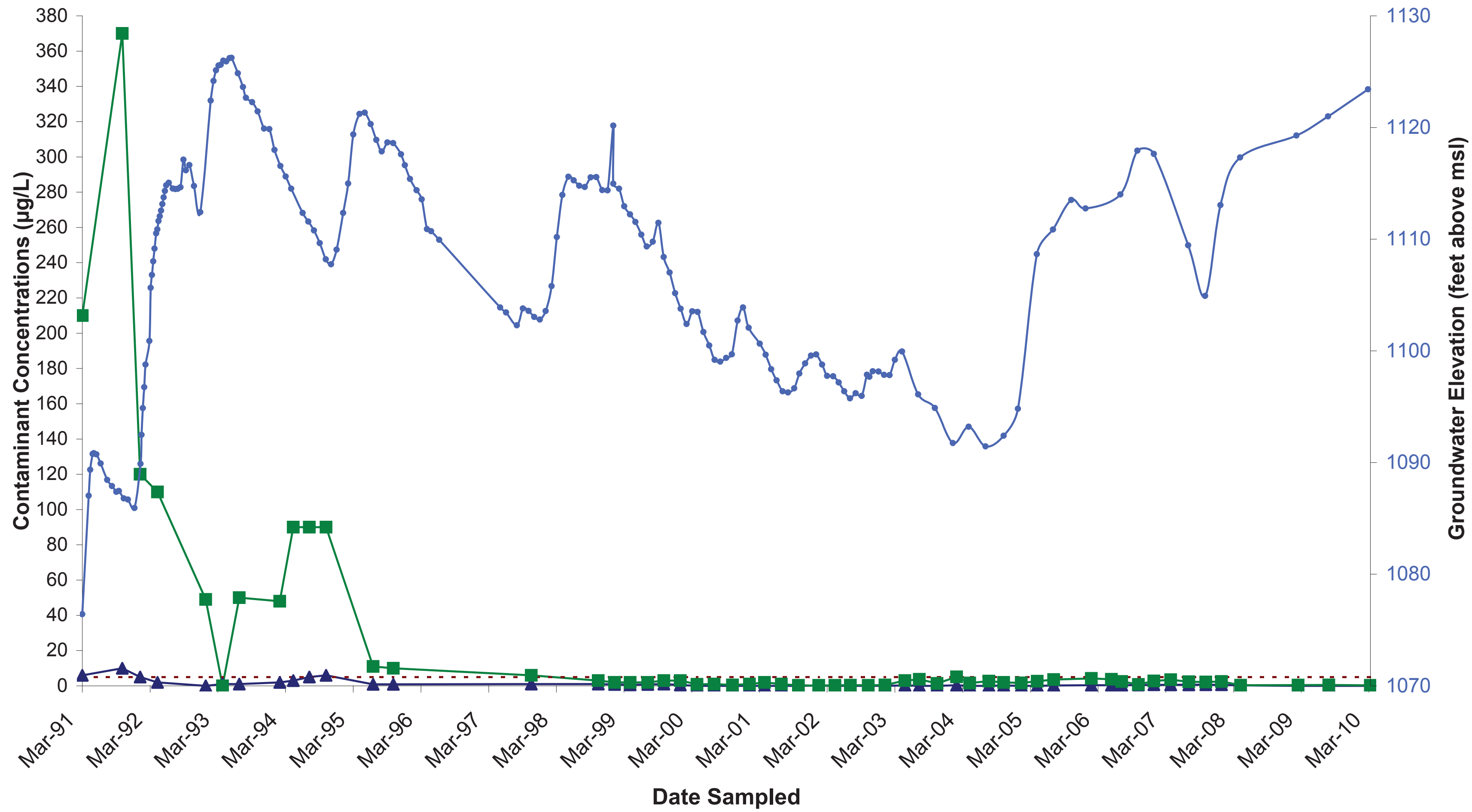
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5B1 5U

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5B-1
SIBW-5U
Central Plume
January 2000 - March 2010



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero.

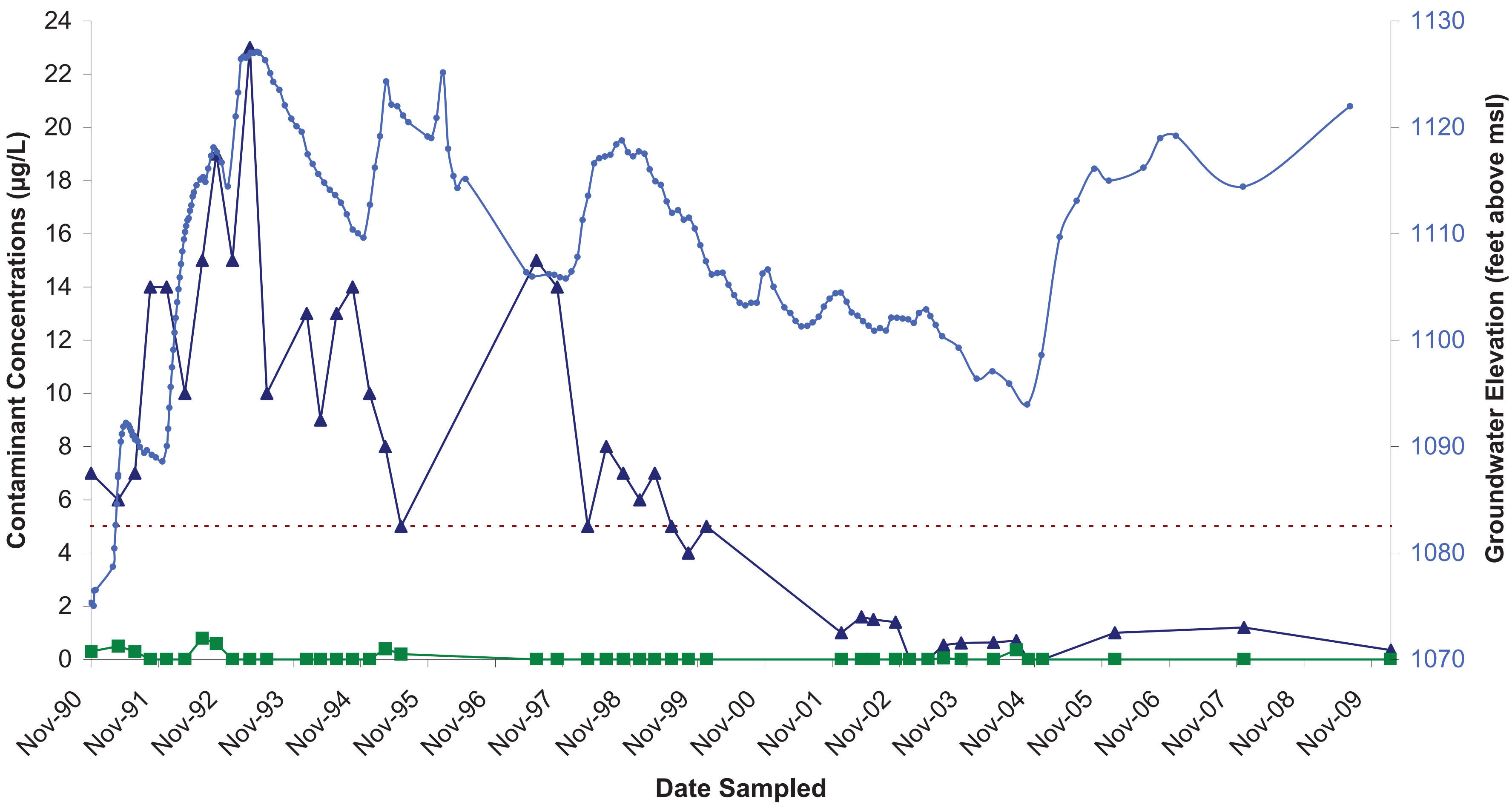
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920.IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5B2 5U

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5B-2
SIBW-5U
Central Plume
March 1991 - March 2010



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

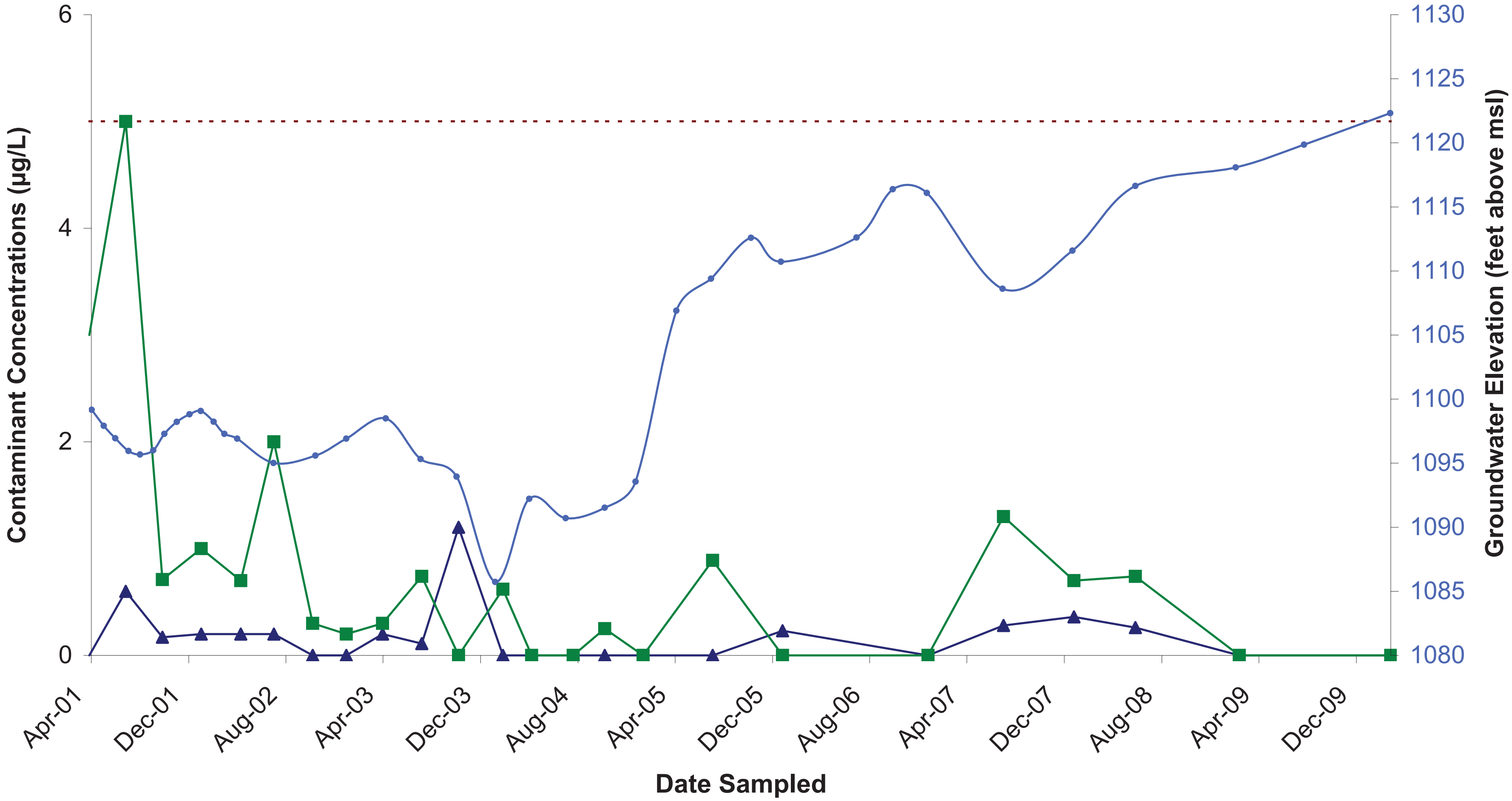
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5C
SIBW-10U
Central Plume
November 1990- March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5C 10U



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

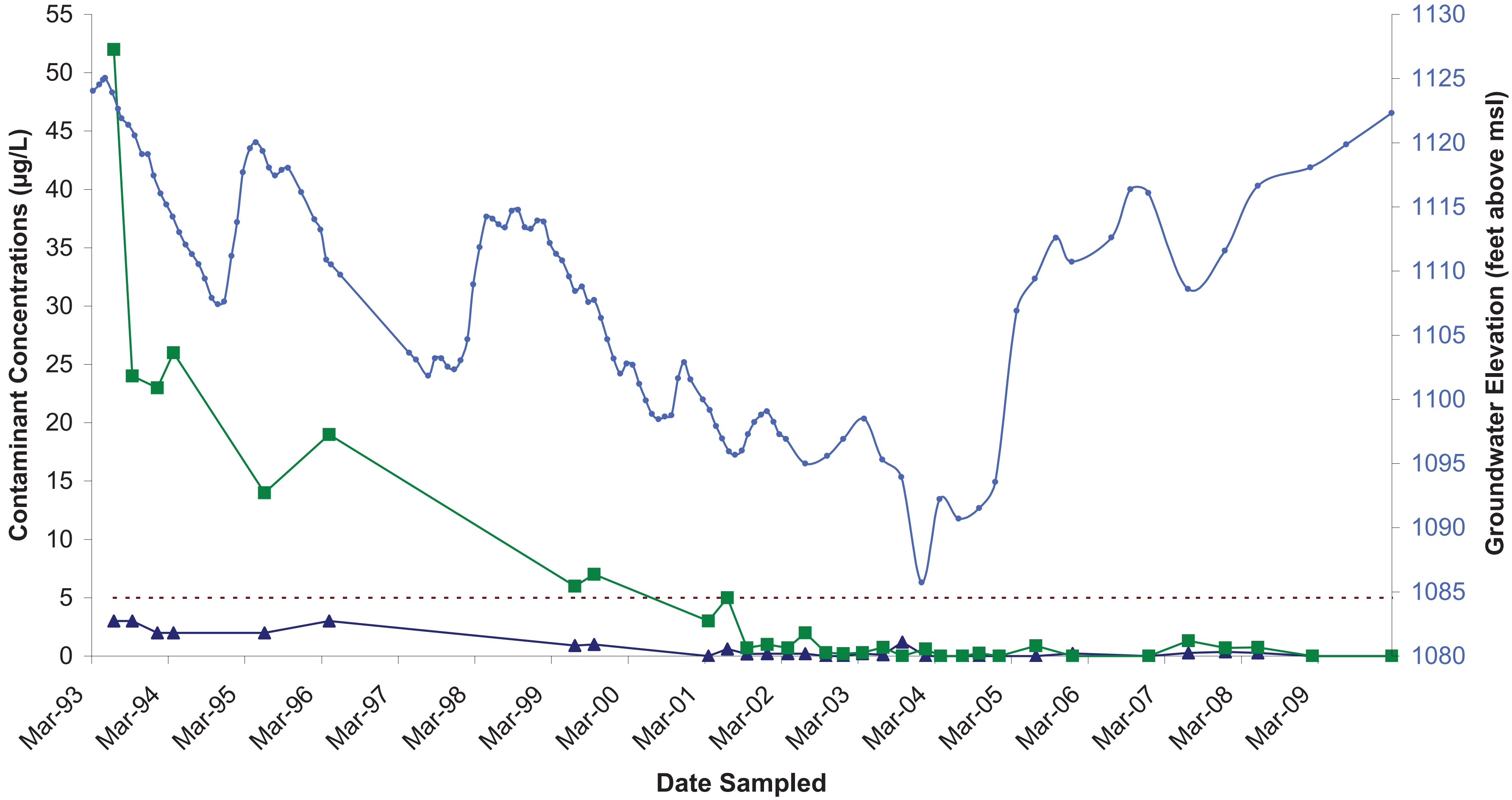
- Tetrachloroethene (PCE)
- Trichloroethene (TCE)
- PCE MCL (5 µg/L)
- TCE MCL (5 µg/L)
- Groundwater Elevation

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe , Arizona

Figure 3-5D-1
SIBW-23U
Central Plume
April 2001- March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5F1 23U



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

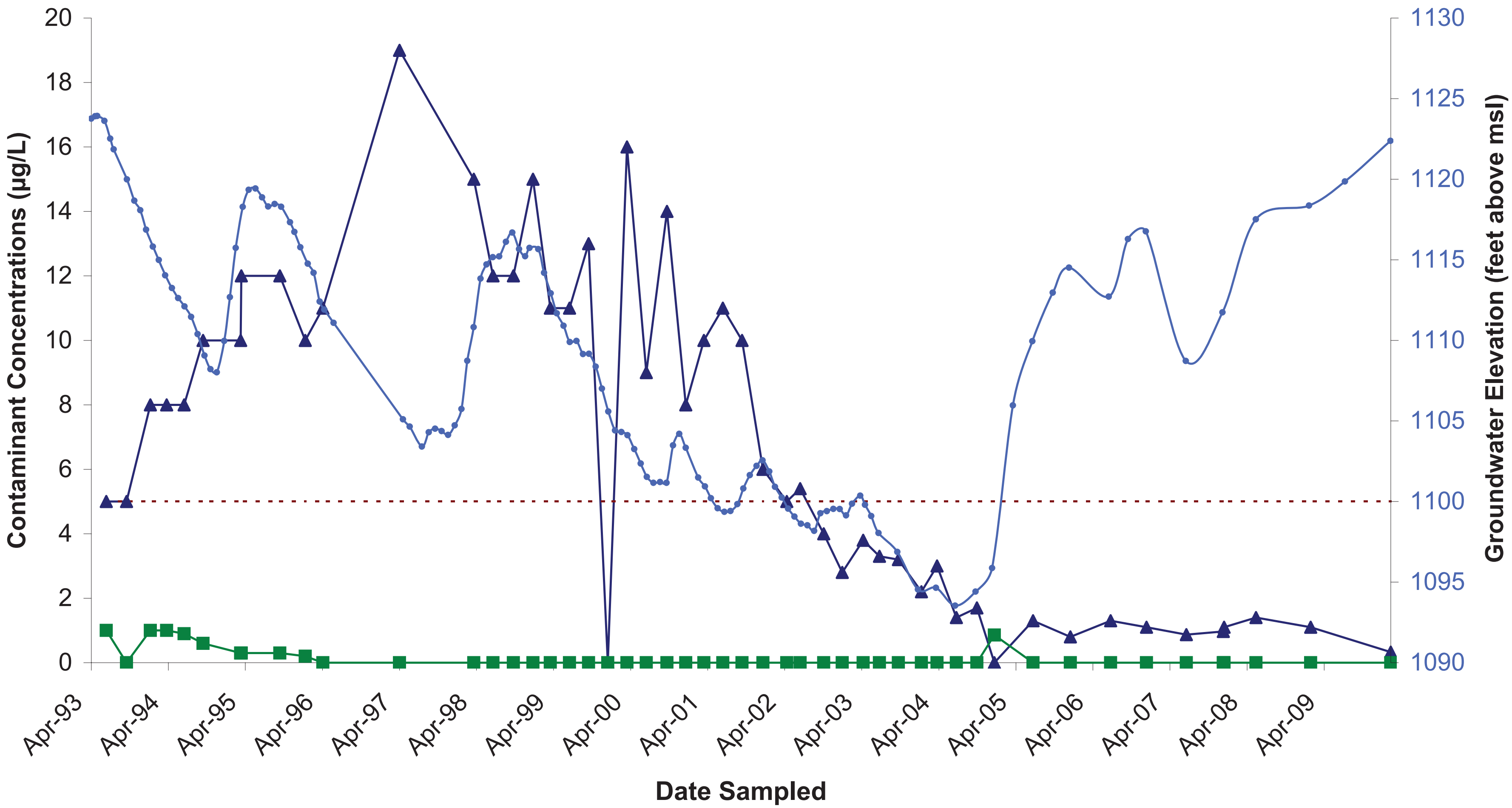
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

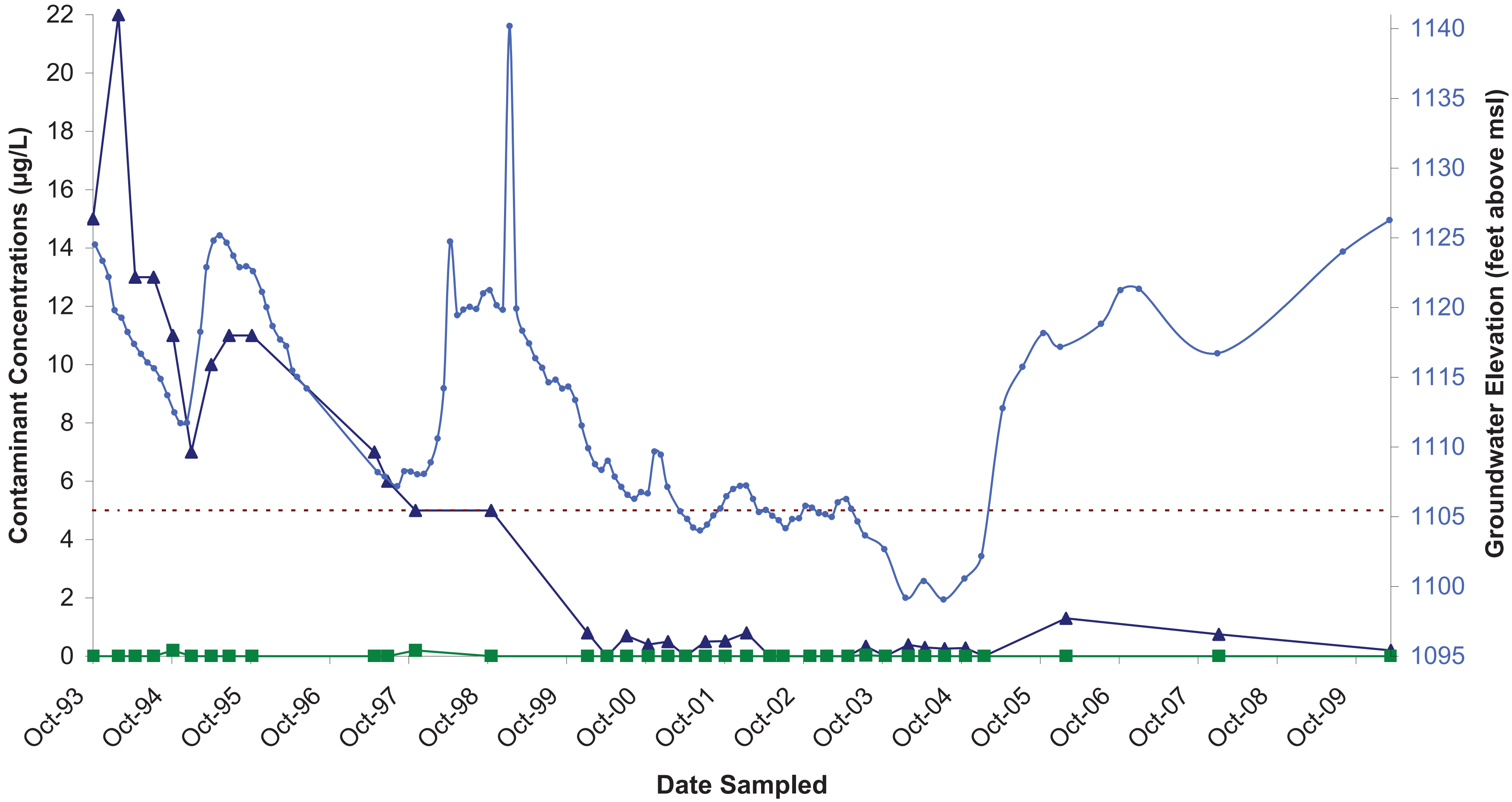
Figure 3-5D-2
SIBW-23U
Central Plume
March 1993- March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5D2 23U



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

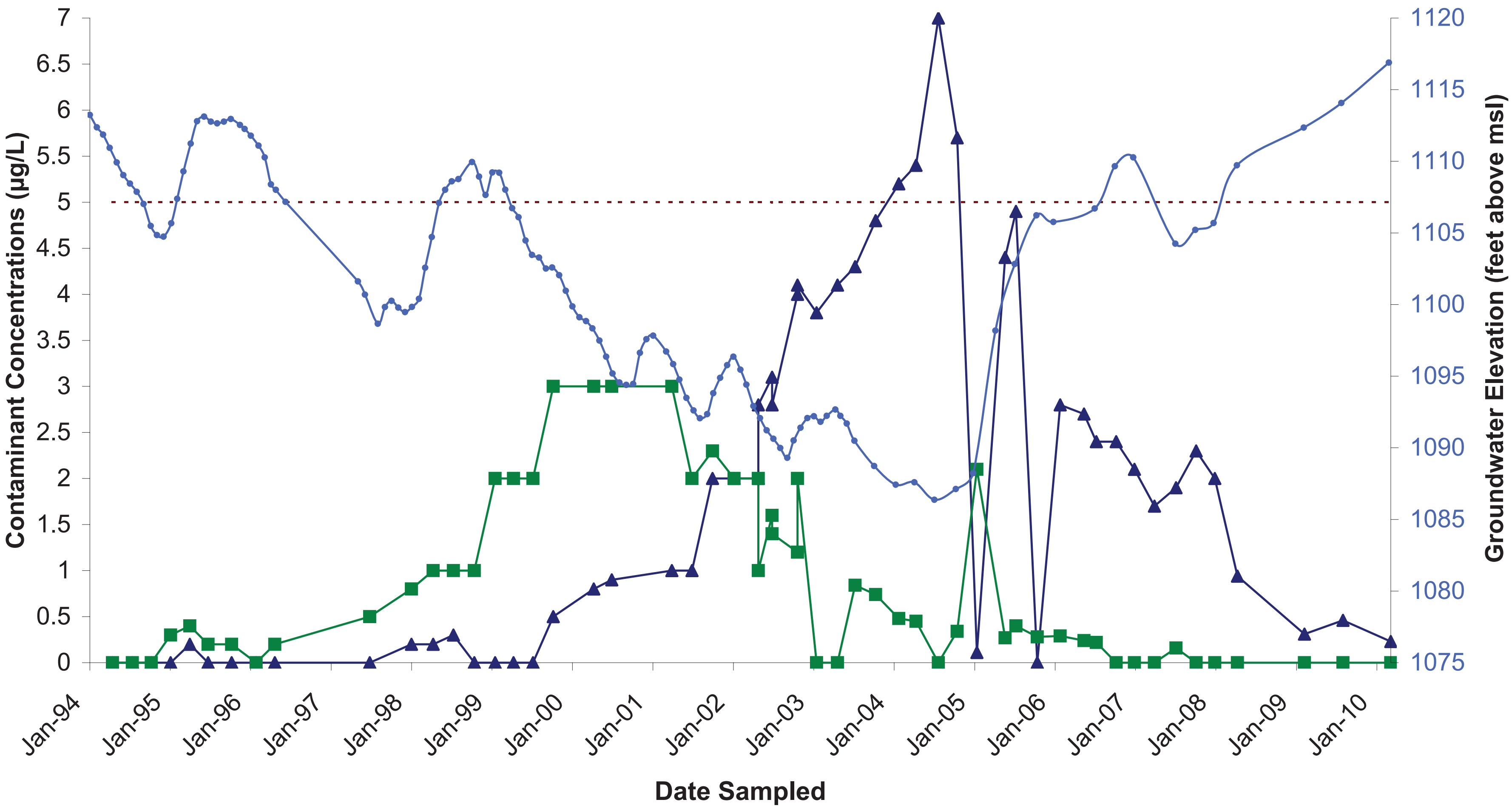
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5F
SIBW-31U
Central Plume
October 1993- March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5F 31U



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

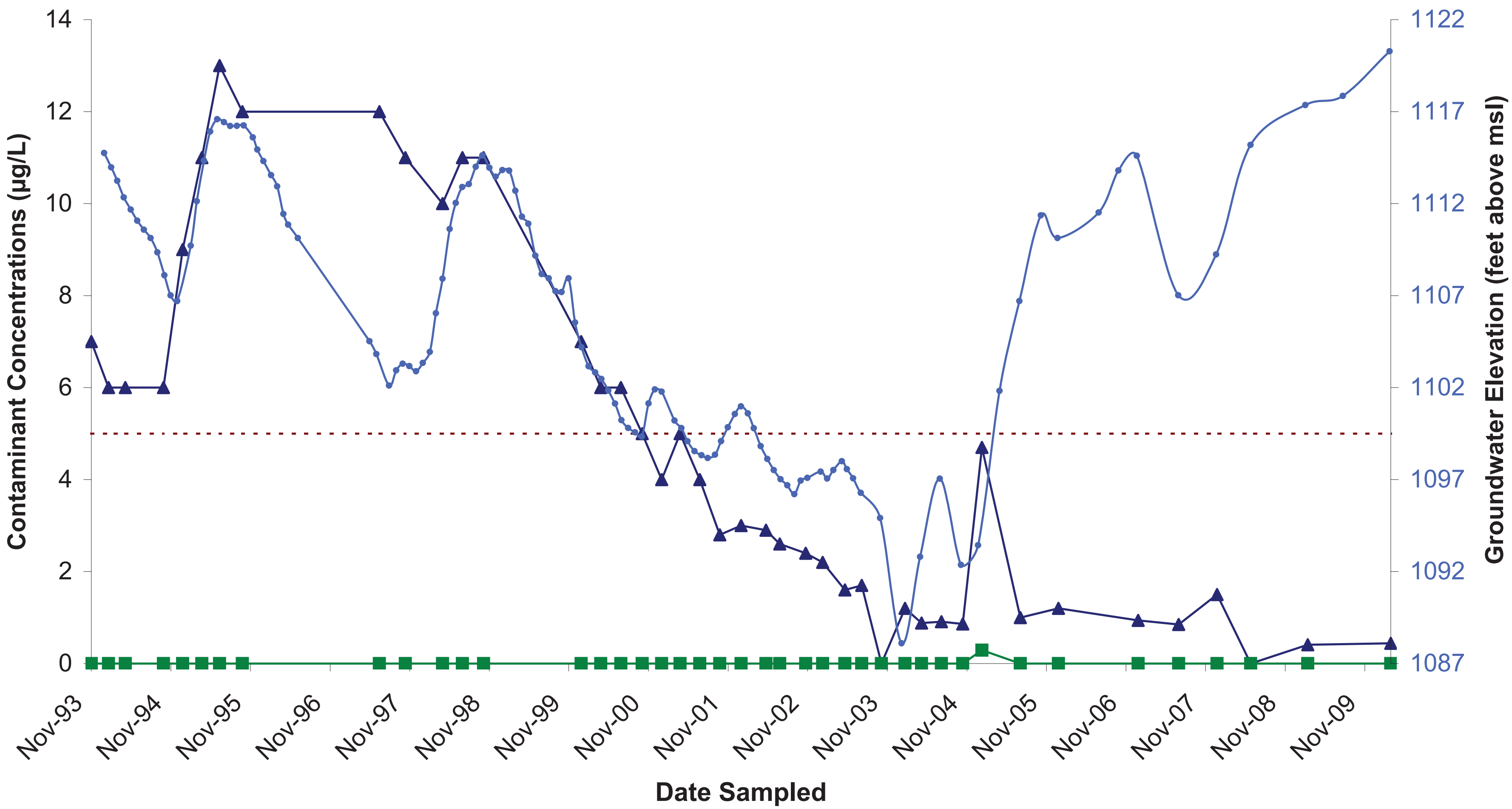
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5G
SIBW-38U
Central Plume
January 1994 - March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5G 38U



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

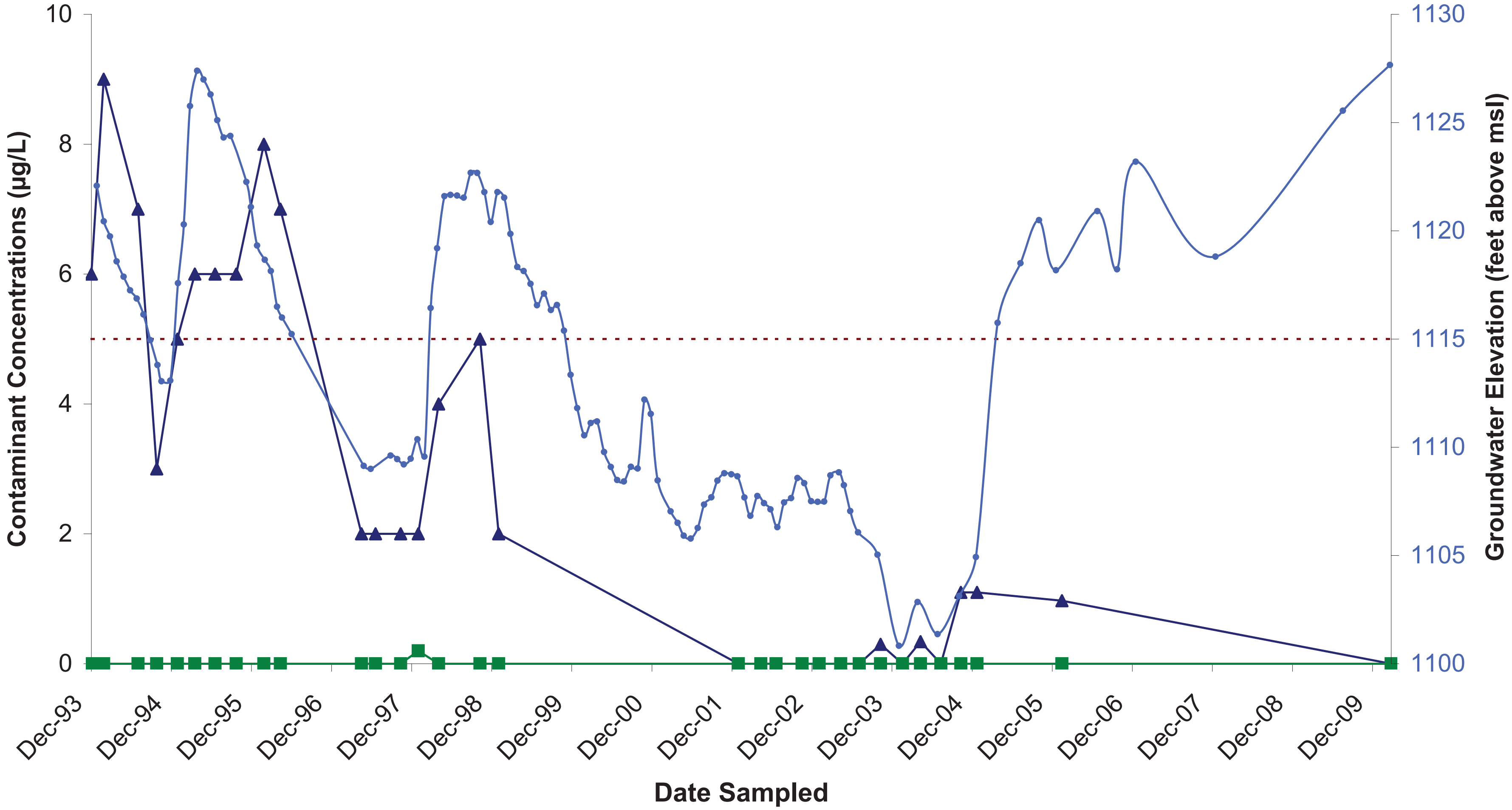
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5H 39U

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5H
SIBW-39U
Central Plume
November 1993 - March 2010



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

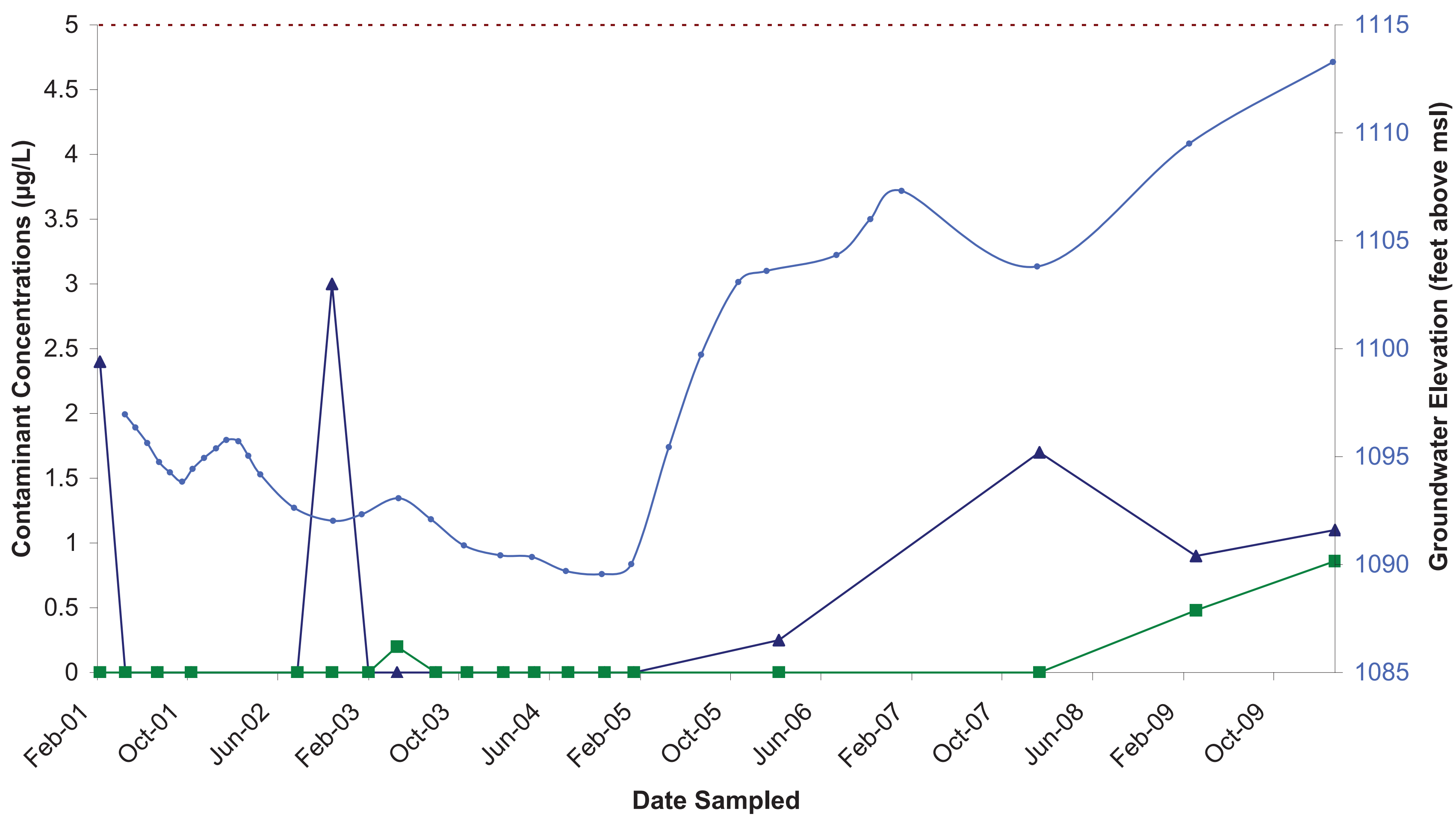
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5I 46U

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5I
SIBW-46U
Central Plume
December1993 - March 2010



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

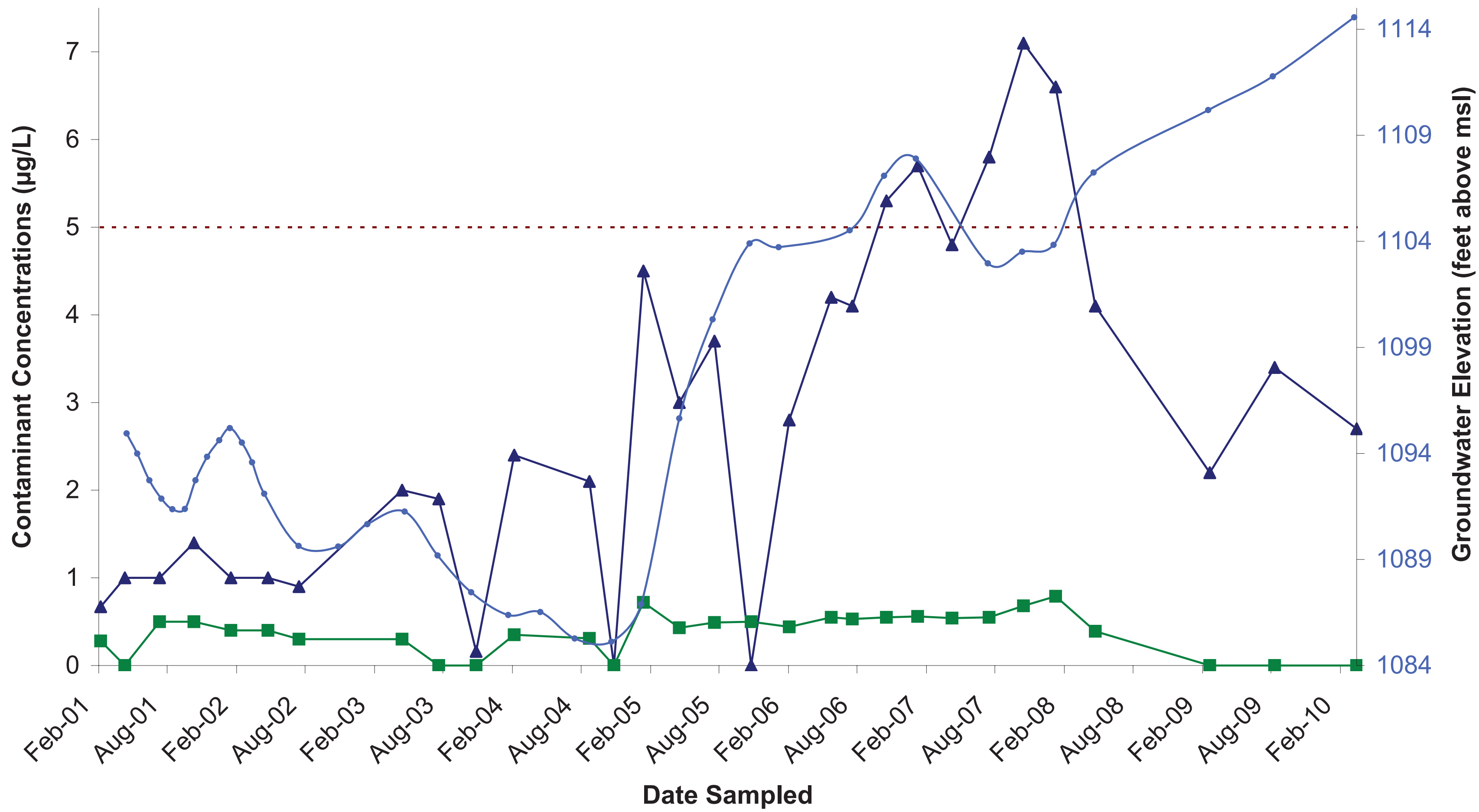
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Wash
Tempe, Arizona

Figure 3-5J
SIBW-60U
Central Plume
February 2001 - March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5J 60U



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

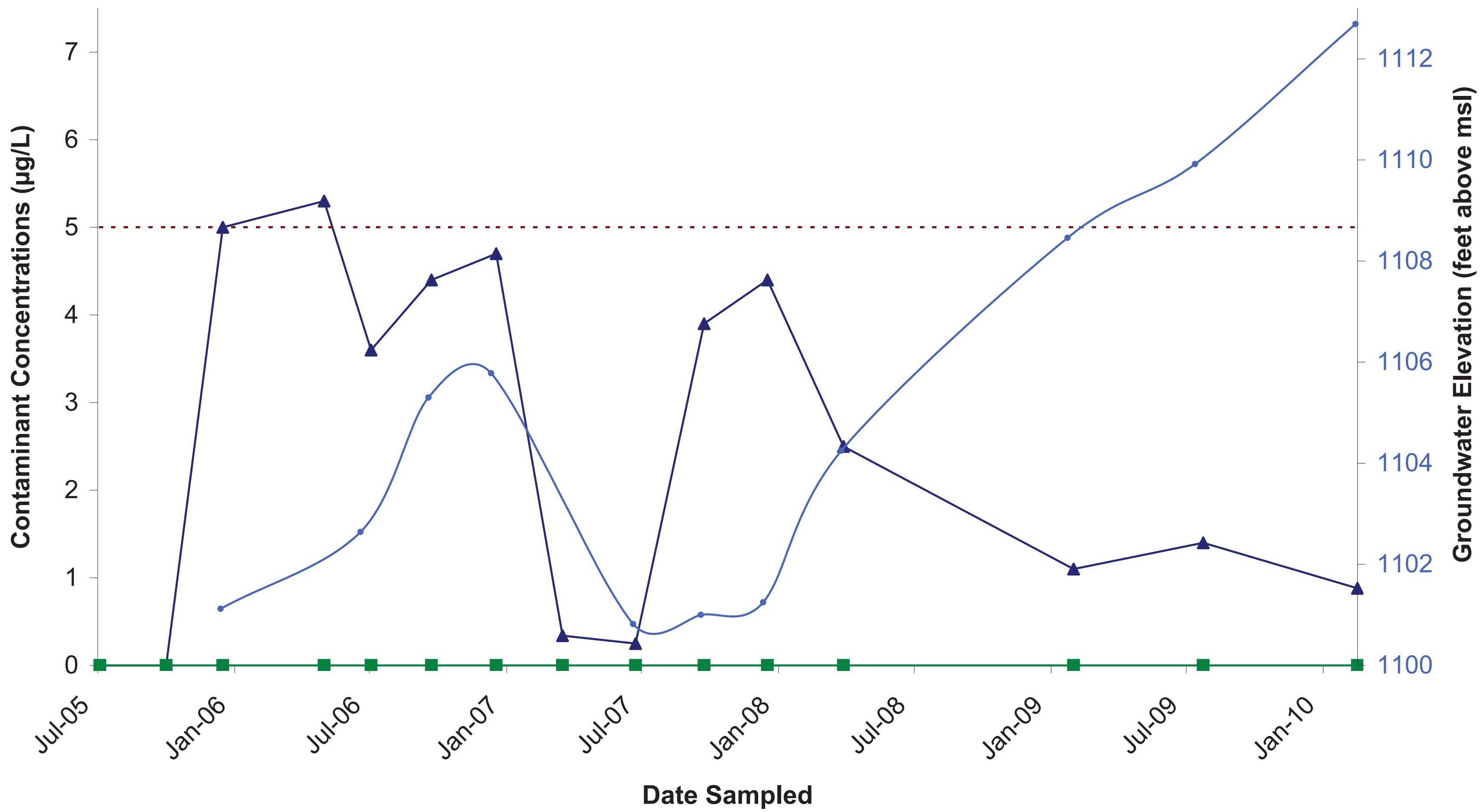
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5K 61U

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5K
SIBW 61U
Central Plume
February 2001 - March 2010



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

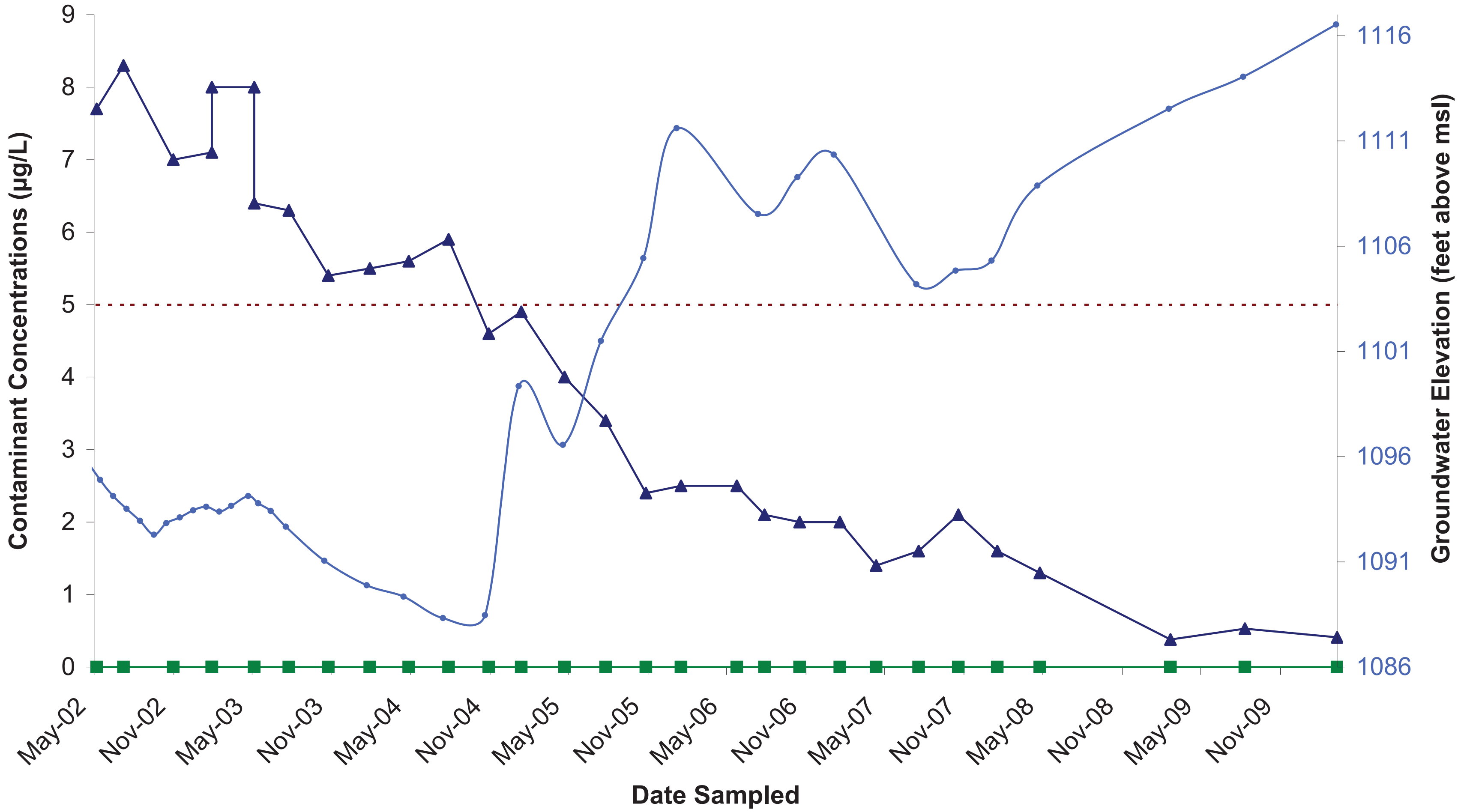
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe , Arizona

Figure 3-5L
SIBW-65U
Central Plume
July 2005 - March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5L 65U



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

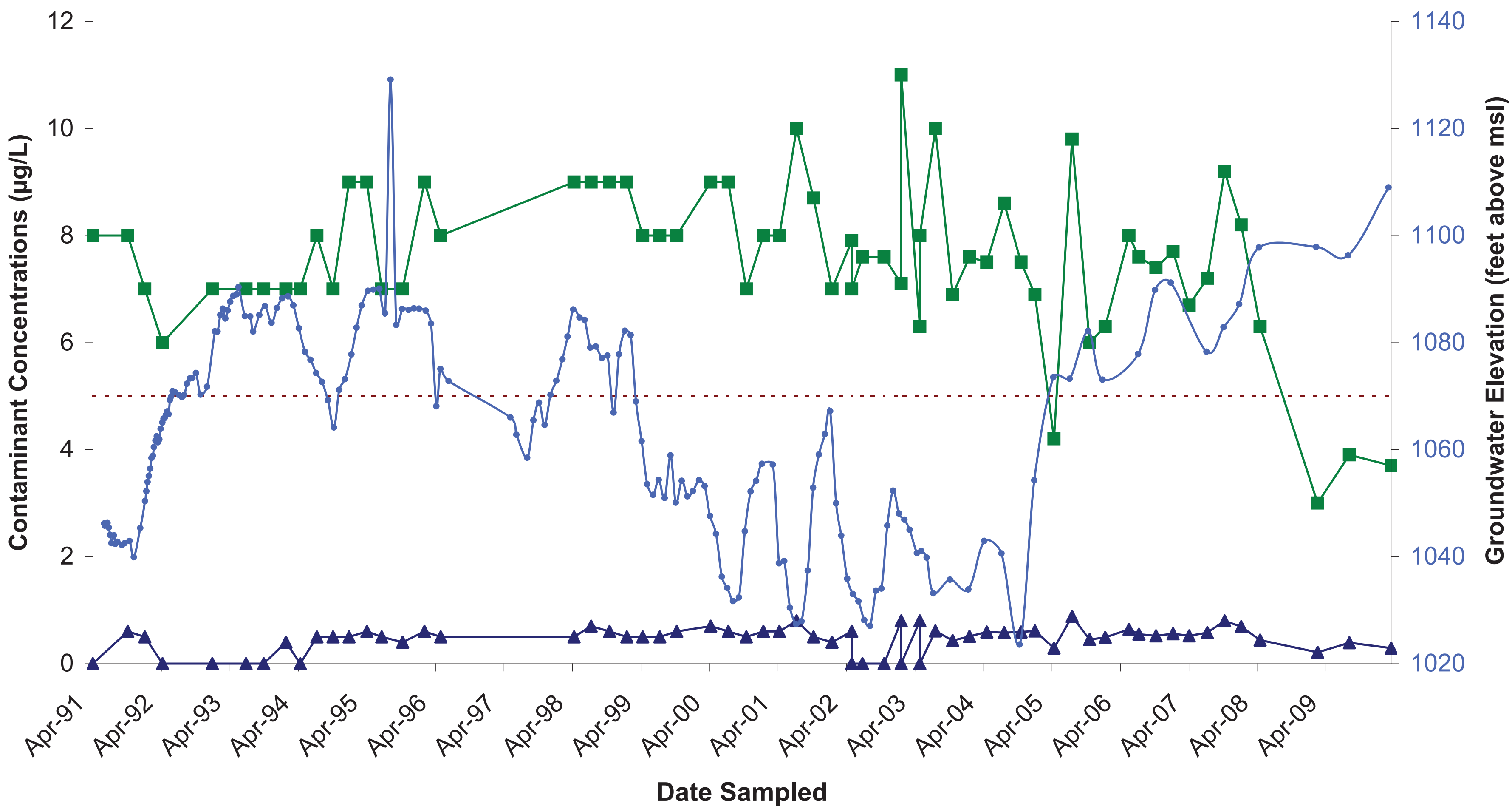
Tetrachloroethene (PCE)
Trichloroethene (TCE)
PCE MCL (5 µg/L)
TCE MCL (5 µg/L)
Groundwater Elevation

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-5M
SW-1
Central Plume
May 2002 - March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-5M SW1



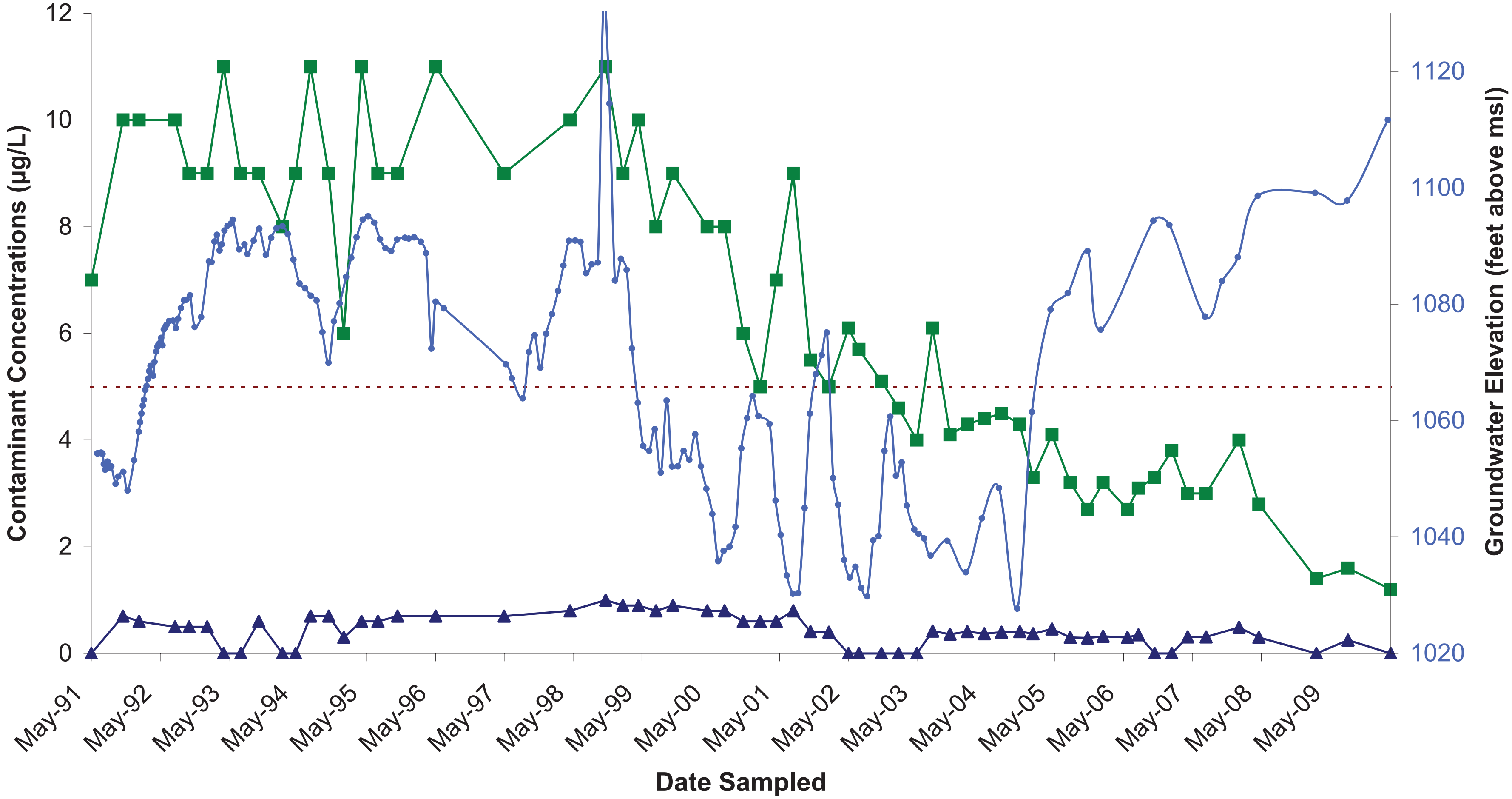
Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-6A
SIBW-11MC
Eastern Plume
June 1991- March 2010



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

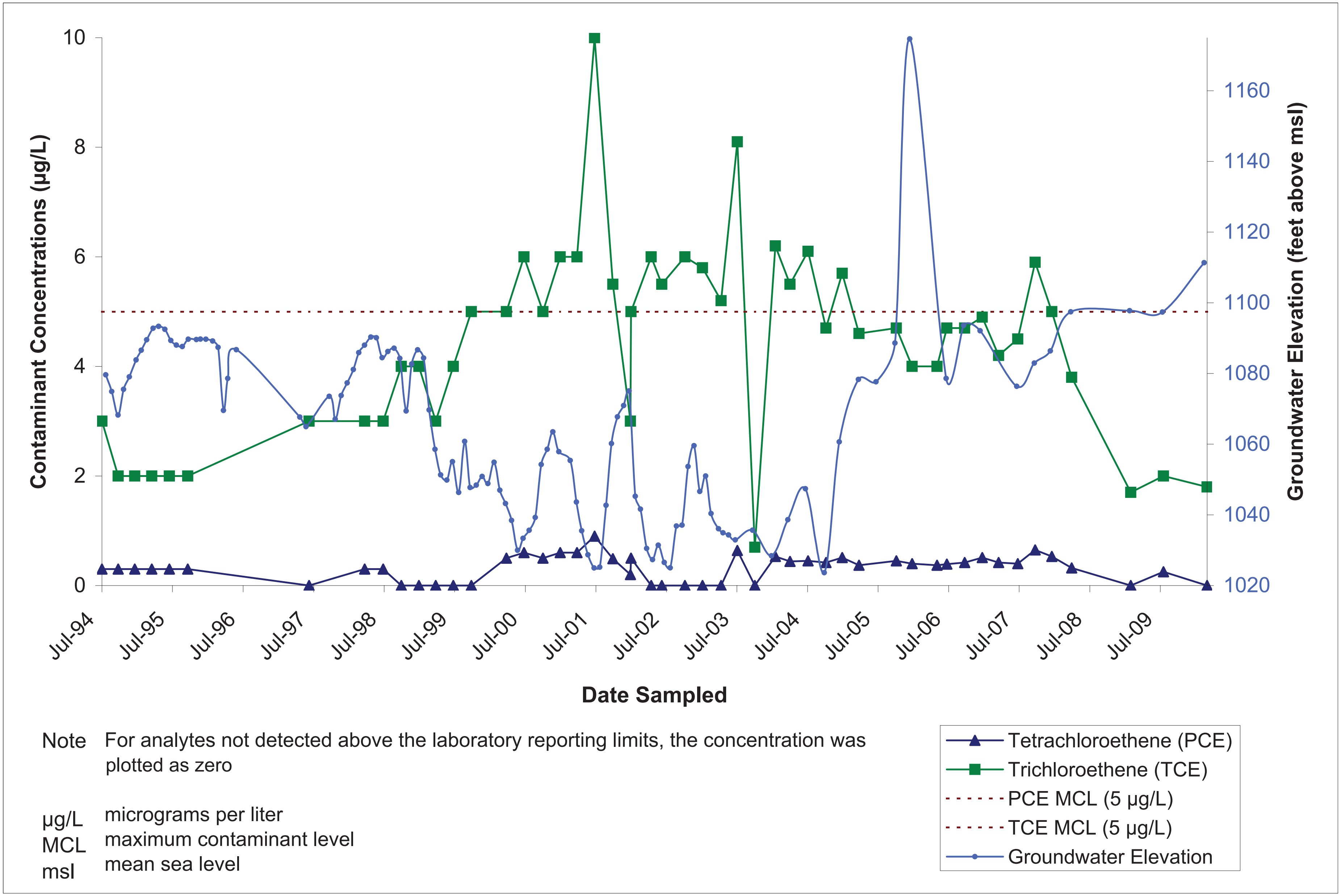
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-6B 13MC

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-6B
SIBW-13MC
Eastern Plume
June 1991- March 2010

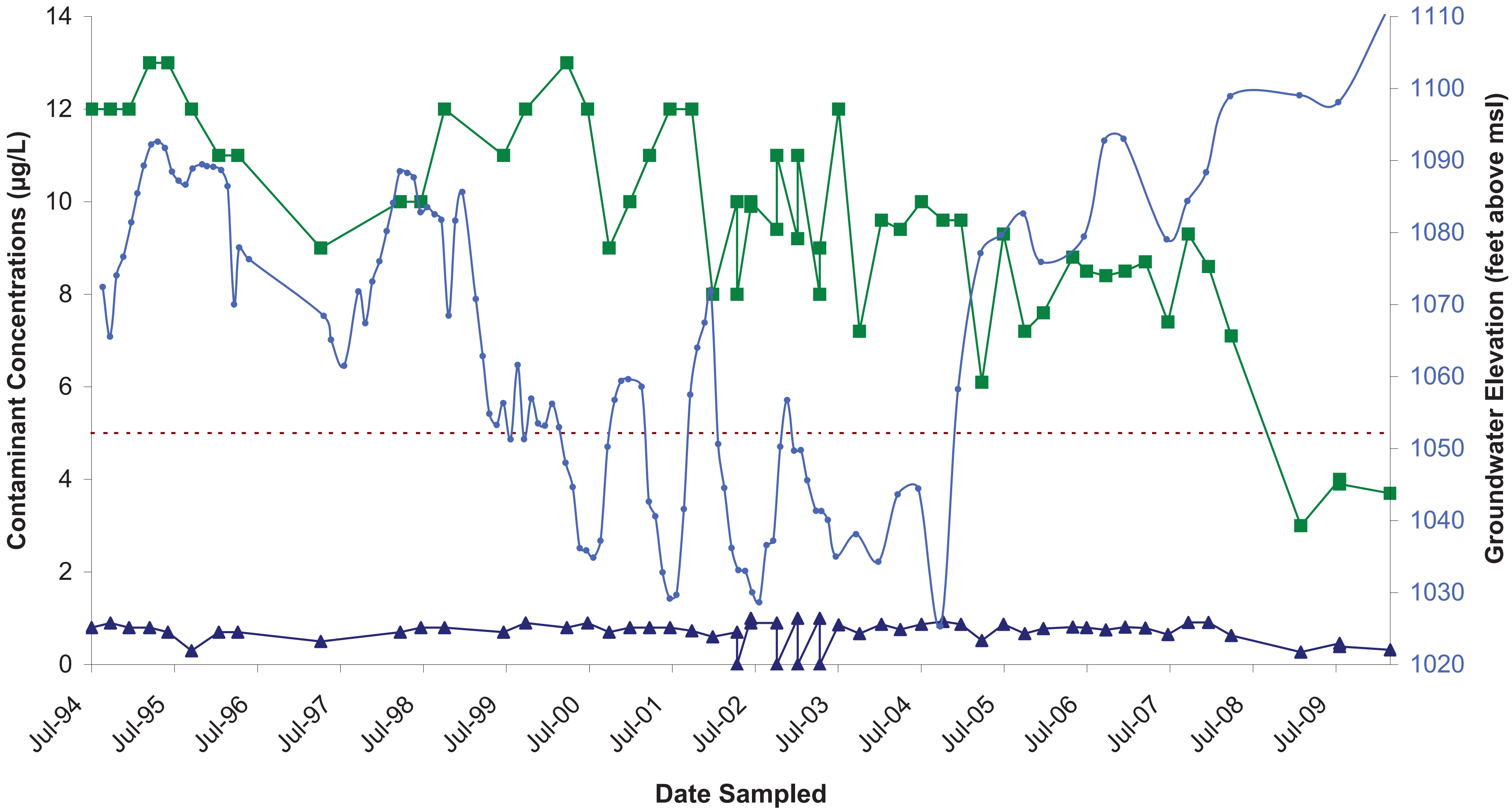


ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-6C
SIBW-56MC
Eastern Plume
July 1994 - March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-6C 56MC



Note For analytes not detected above the laboratory reporting limits, the concentration was plotted as zero

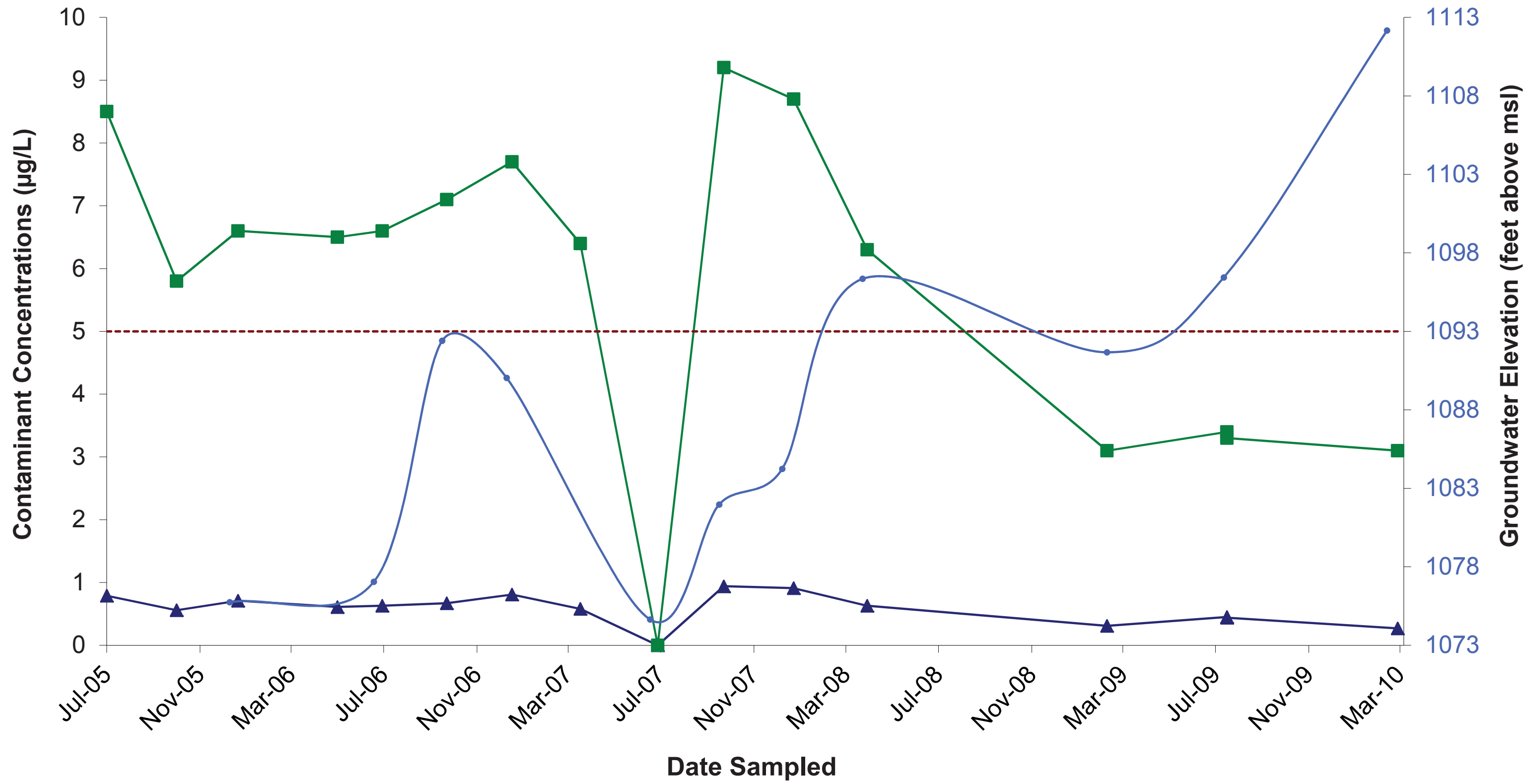
µg/L micrograms per liter
MCL maximum contaminant level
msl mean sea level

\\Engineering3\epar9\0045 TO 44 FRFE-0920,IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-6D 58MC

ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-6D
SIBW-58MC
Eastern Plume
July 1994 - March 2010



Note For analytes not detected above the laboratory reporting limits, the concentration was set to zero.

µg/L plotted as zero er liter
MCL maximum contaminant level
msl mean sea level

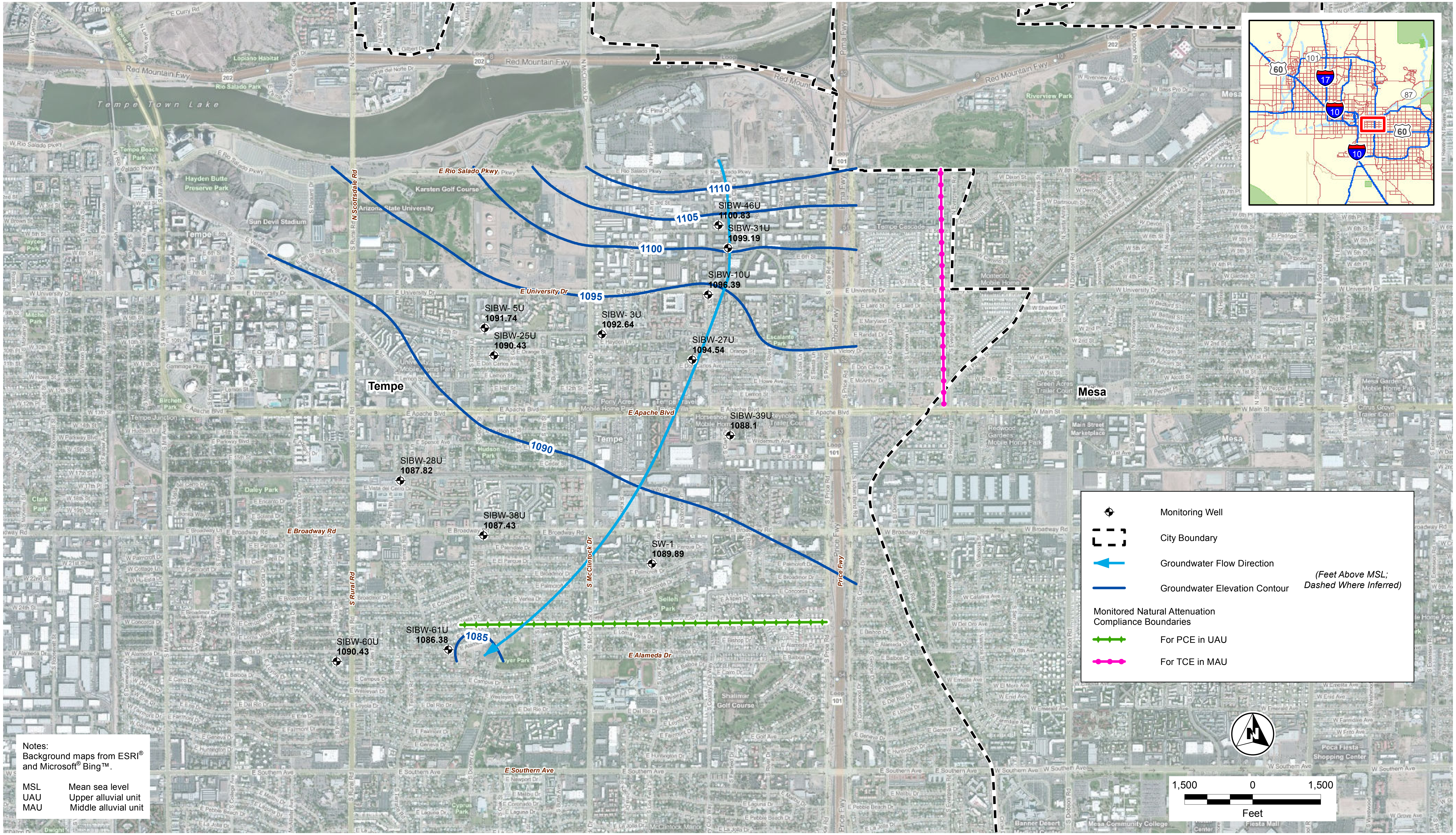
- Tetrachloroethene (PCE)
- Trichloroethene (TCE)
- PCE MCL (5 µg/L)
- TCE MCL (5 µg/L)
- Groundwater Elevation

Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Concentrations and Water Levels for SIBW Over Time
South Indian Bend Wash Superfund Area
Tempe, Arizona

Figure 3-6E
SW-3
Eastern Plume
July 2005 - March 2010

\\Engineering3\epar9\0045 TO 44 FRFE-0920, IBW North-South 5-Year Review\10.0 Working Files\SIBW Data Review TM\Graphs\Trend & Water Level Figures\Figure 3-6E SW3

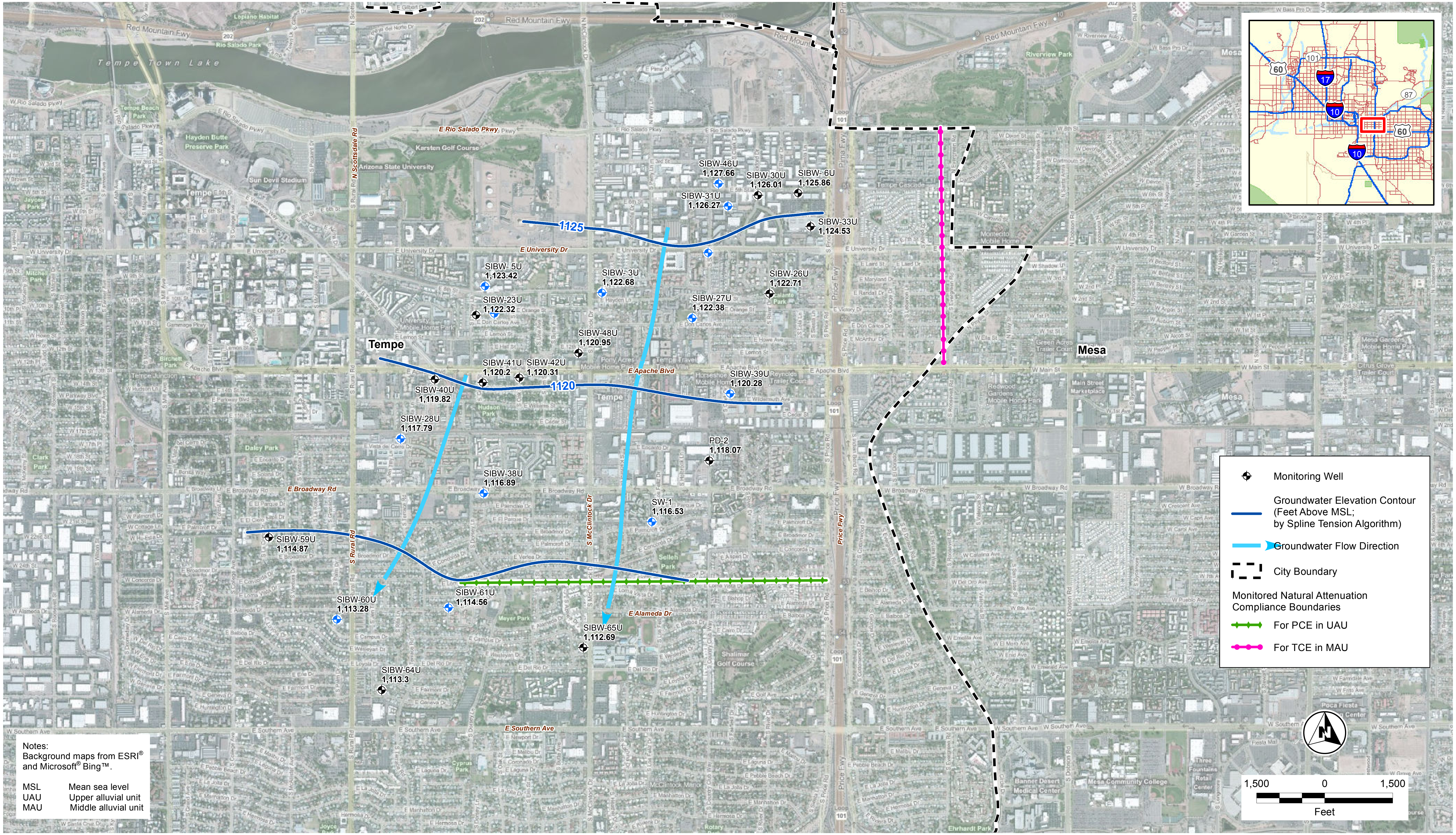


Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Groundwater Potentiometric Map
South Indian Bend Wash Superfund Area
Tempe, Arizona

FIGURE 3-7
Upper Alluvial Unit
2004

G:\ArcGIS\EPA\SIBW\PROJECTS\FYR\GW_Elev_UAU_2004.mxd 9/24/2010 ITSI-WC Laura Weber

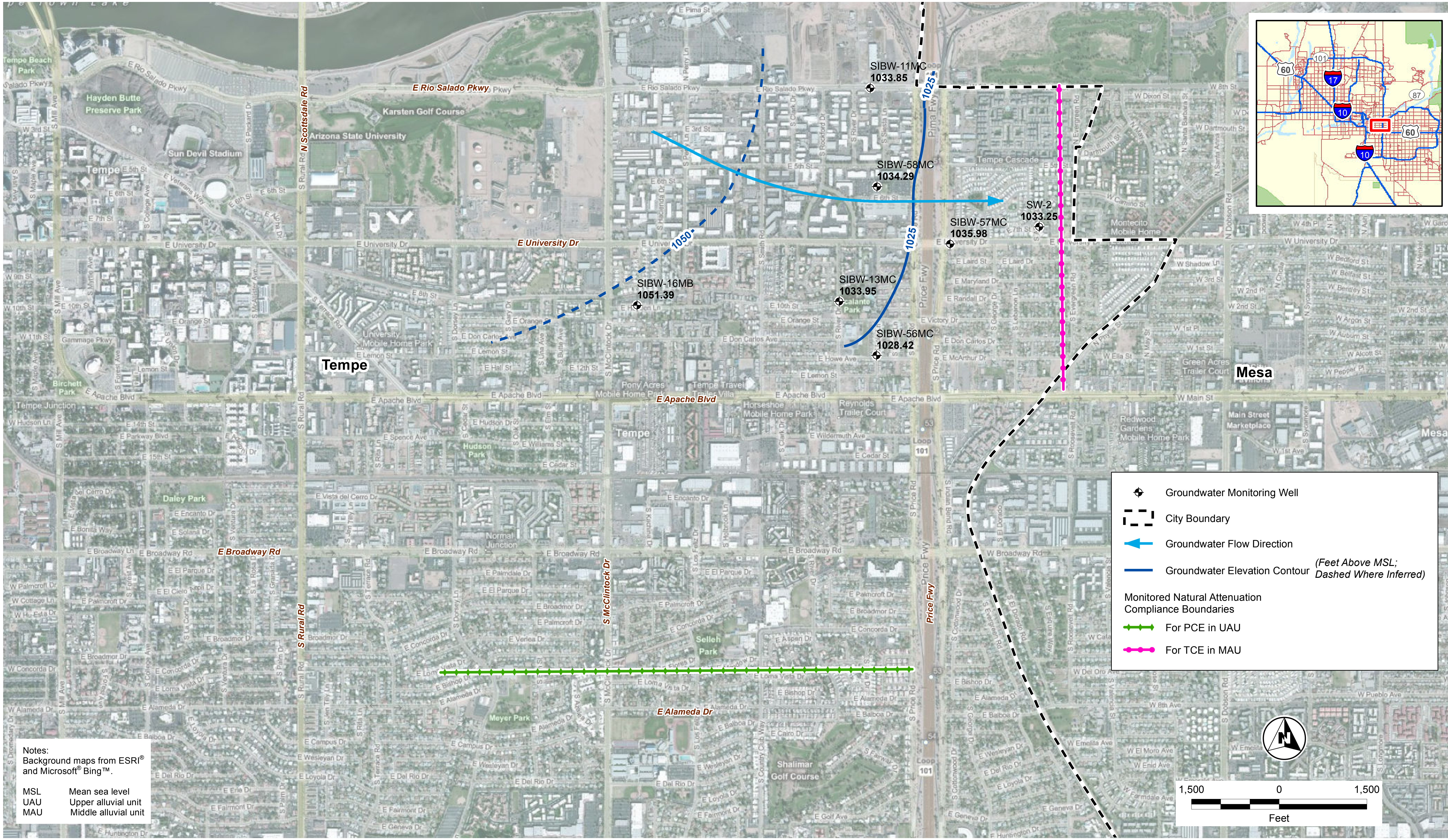


ITSI Innovative Technical Solutions, Inc.
A Gilbane Company

Data Review Technical Memorandum
Groundwater Potentiometric Map
South Indian Bend Wash Superfund Area
Tempe, Arizona

FIGURE 3-8
Upper Alluvial Unit
2010

G:\ArcGIS\EPA\SIBW\PROJECTS\Mar2010\GW_Elev_UAU.mxd 5/26/2010 ITSI-WC A. Zhuk

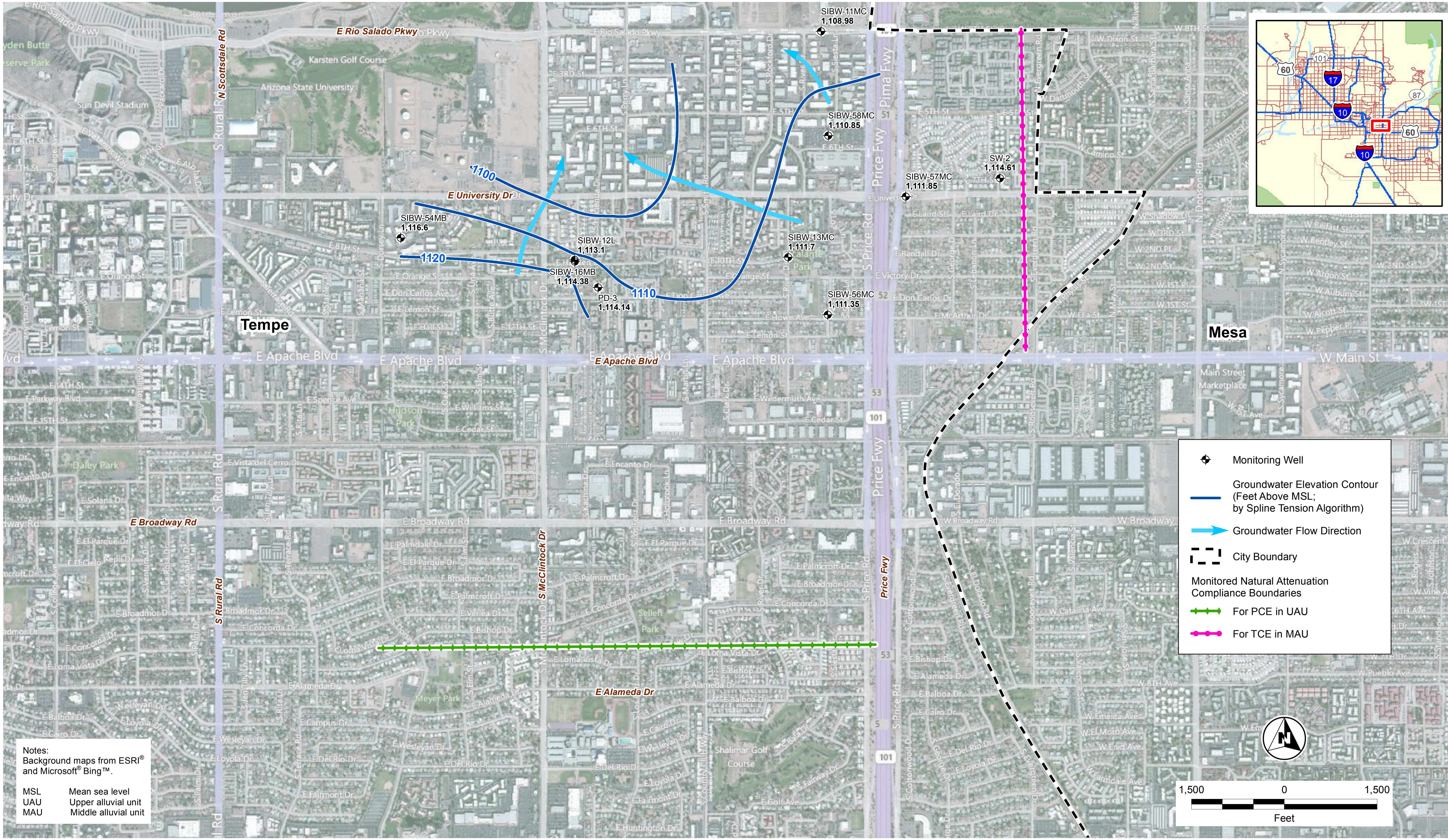


ITSI Innovative Technical Solutions, Inc. A Gilbane Company

Data Review Technical Memorandum
Groundwater Potentiometric Map
South Indian Bend Wash Superfund Area
Tempe, Arizona

FIGURE 3-9
Middle Alluvial Unit
2004

G:\ArcGIS\EPA\SIBW\PROJECTS\FYR\GW_Elev_MAU_20004.mxd 9/23/2010 ITSI-WC Laura Weber



Innovative Technical Solutions, Inc. ITSI A Gilbane Company

Data Review Technical Memorandum
Groundwater Potentiometric Map
South Indian Bend Wash Superfund Area
Tempe, Arizona

FIGURE 3-10
Middle Alluvial Unit
2010

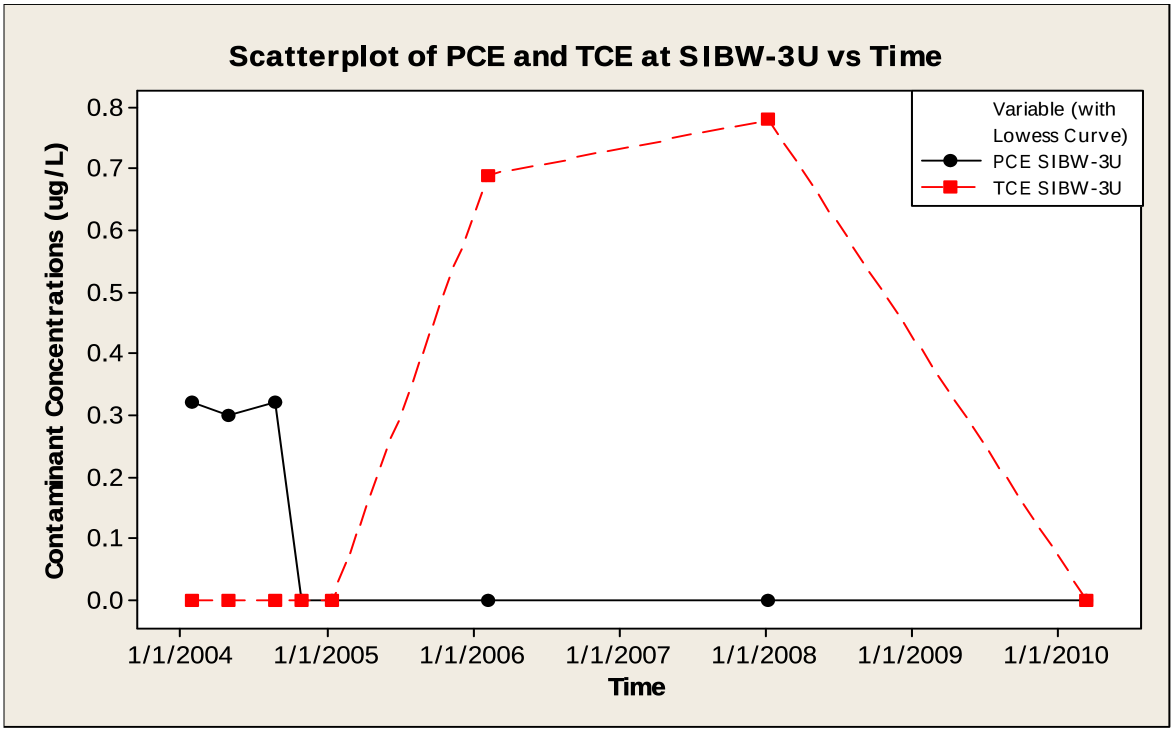
G:\ArcGIS\EPA\SIBW\PROJECTS\Mar2010\GW_Elev_MAU.mxd 5/26/2010 ITSI-WC A. Zhuk

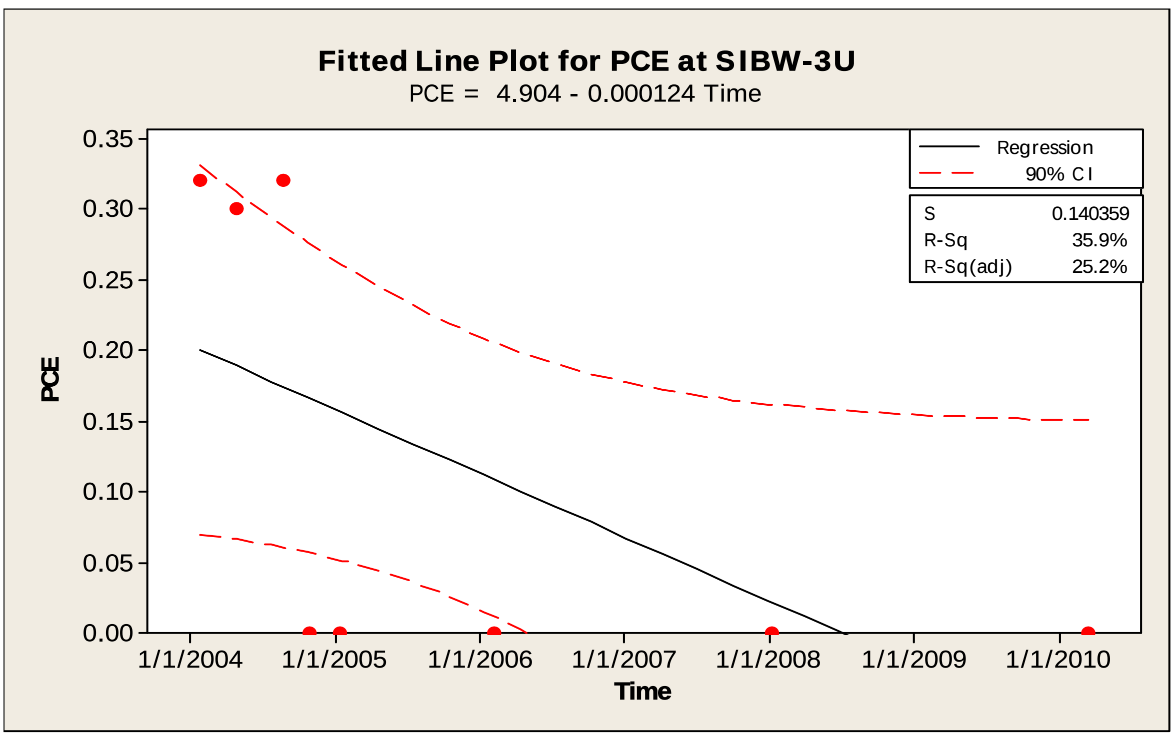
Attachment A

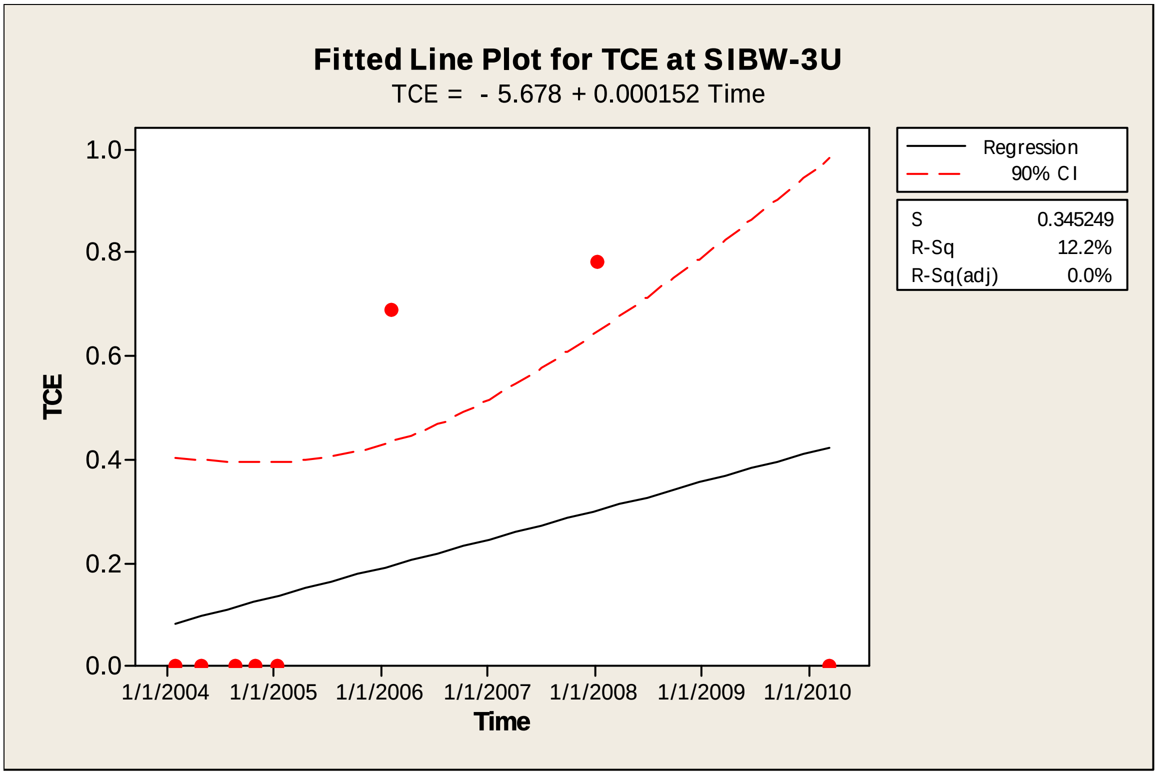
Statistical Analysis of Groundwater Contaminant Concentrations in SIBW

ATTACHMENT A: Statistical Analysis of Groundwater Contaminant Concentrations in SIBW

SIBW-3U







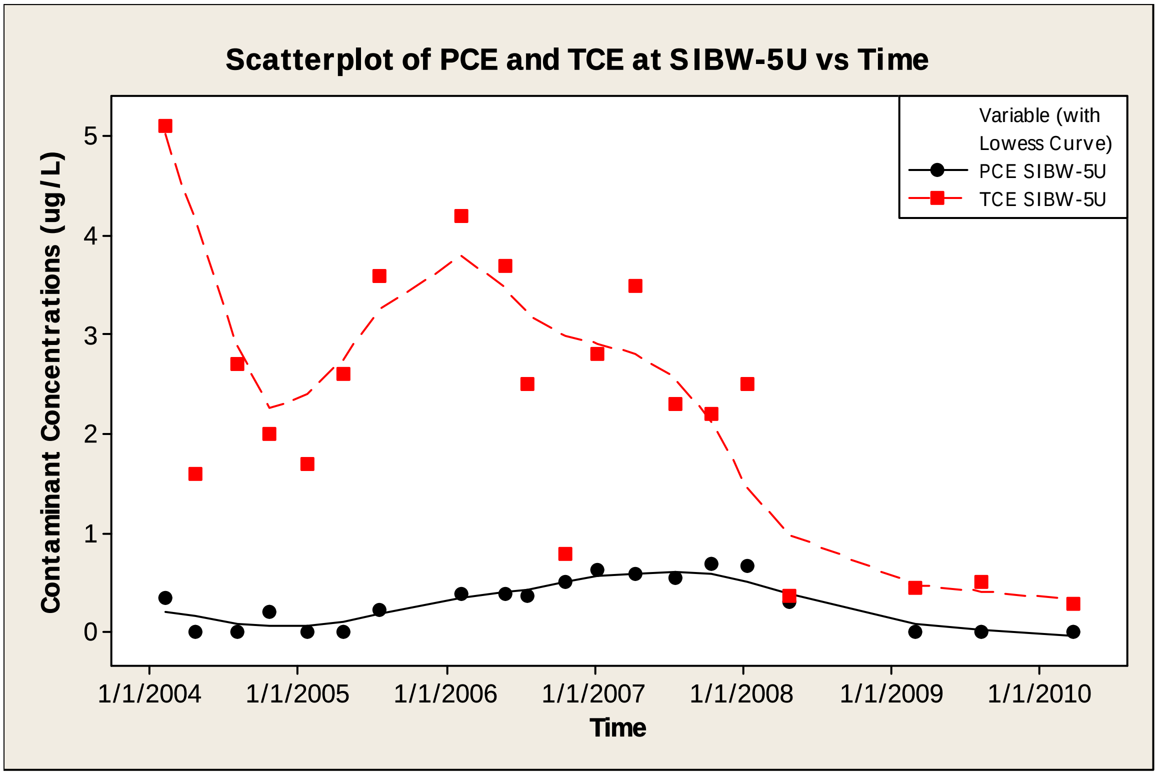
PCE vs Time: The value of Kendalls Tau is -0.14286
TCE vs Time: The value of Kendalls Tau is 0.85714

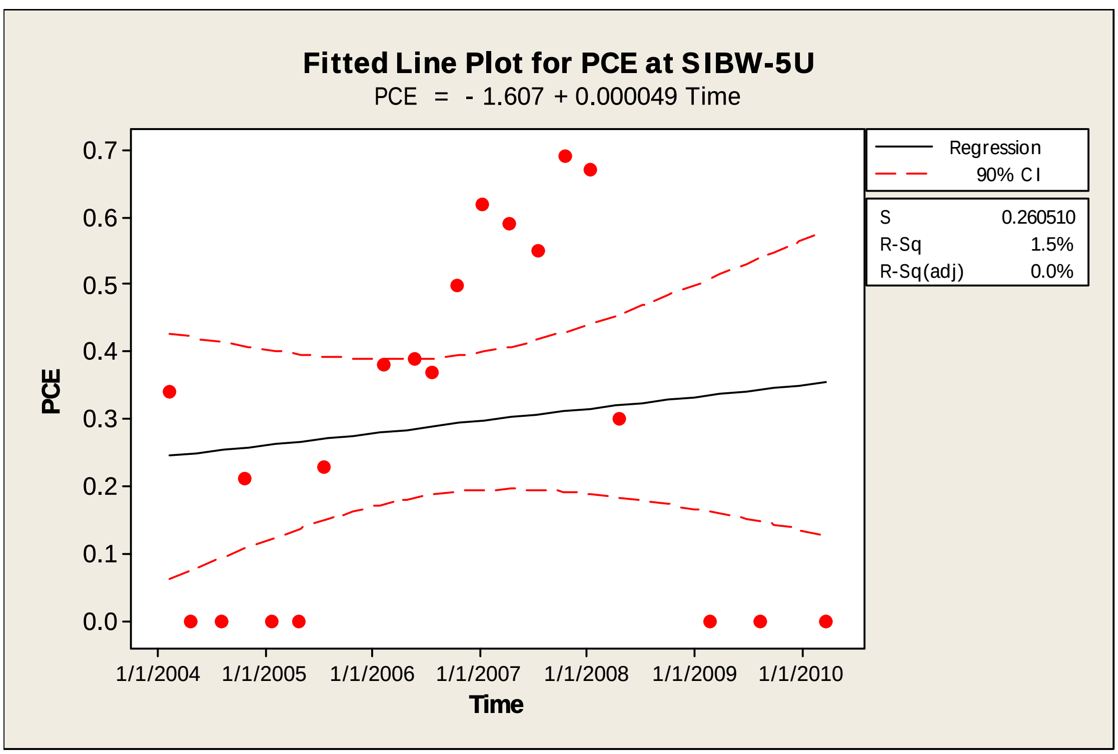
Descriptive Statistics: Time, PCE SIBW-3U, TCE SIBW-3U

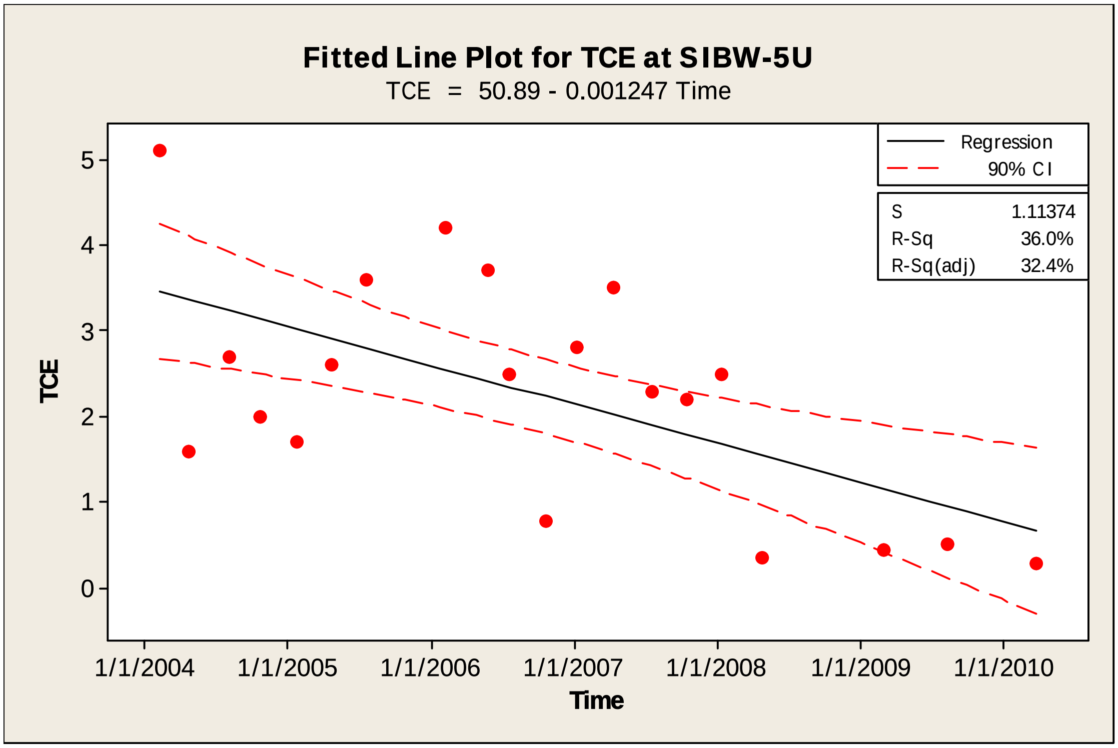
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	8	38682	278	786	38134	39281
PCE SIBW-3U	8	0.1175	0.0574	0.1623	0.0000	0.3150
TCE SIBW-3U	8	0.184	0.121	0.341	0.00	0.517

Variable	Minimum	Maximum	Median
Time	38013	40252	38326
PCE SIBW-3U	0.0000	0.3200	0.0000
TCE SIBW-3U	0.000	0.780	0.000

SIBW-5U


Scatterplot of PCE and TCE at SIBW-5U vs Time
Contaminant Concentrations (ug/L)
Variable (with Lowess Curve)
PCE SIBW-5U
TCE SIBW-5U
0
1
2
3
4
5
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time


Fitted Line Plot for PCE at SIBW-5U
PCE = - 1.607 + 0.000049 Time
Regression
90% CI
S 0.260510
R-Sq 1.5%
R-Sq(adj) 0.0%
PCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



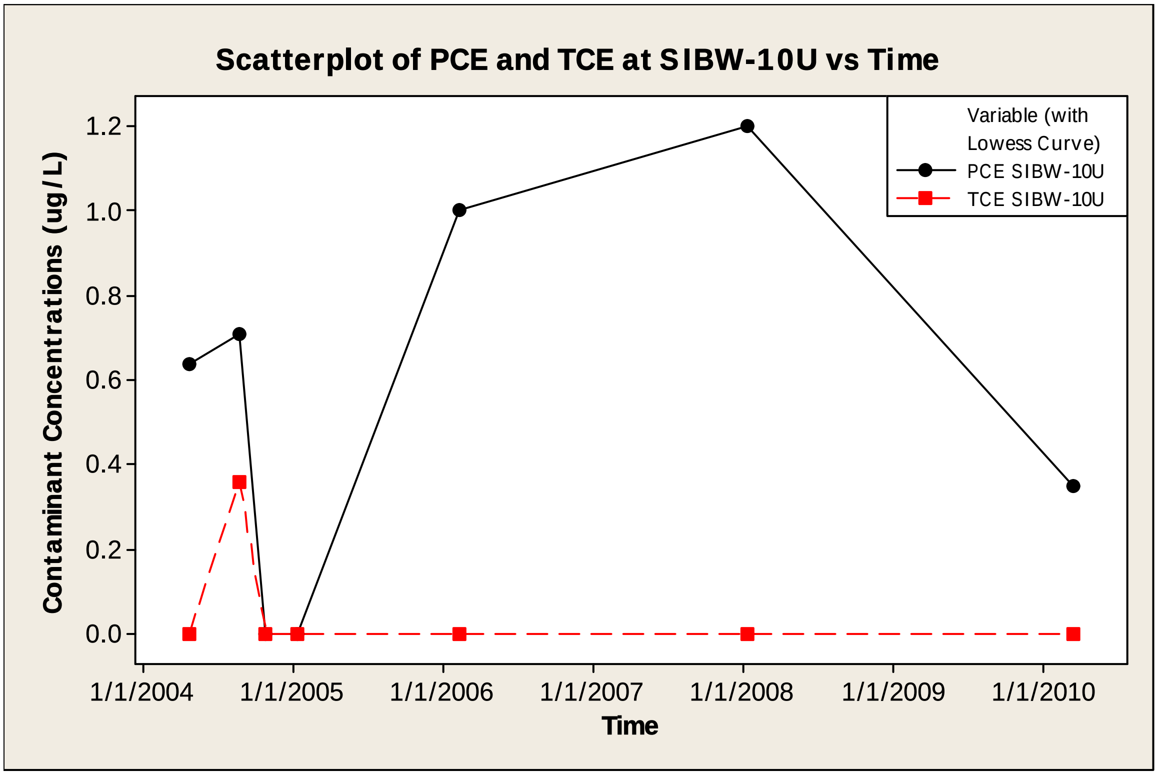
PCE vs Time: The value of Kendalls Tau is 0.33684
TCE vs Time: The value of Kendalls Tau is-0.37895

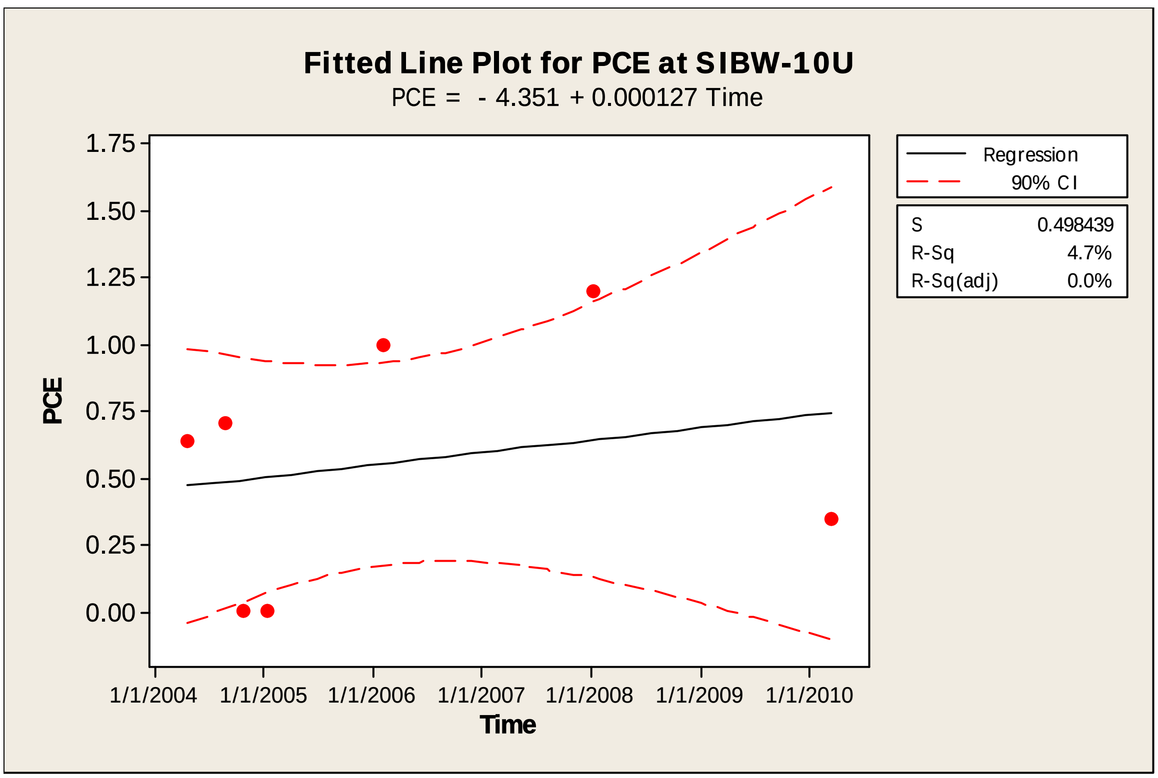
Descriptive Statistics: Time, PCE SIBW-5U, TCE SIBW-5U

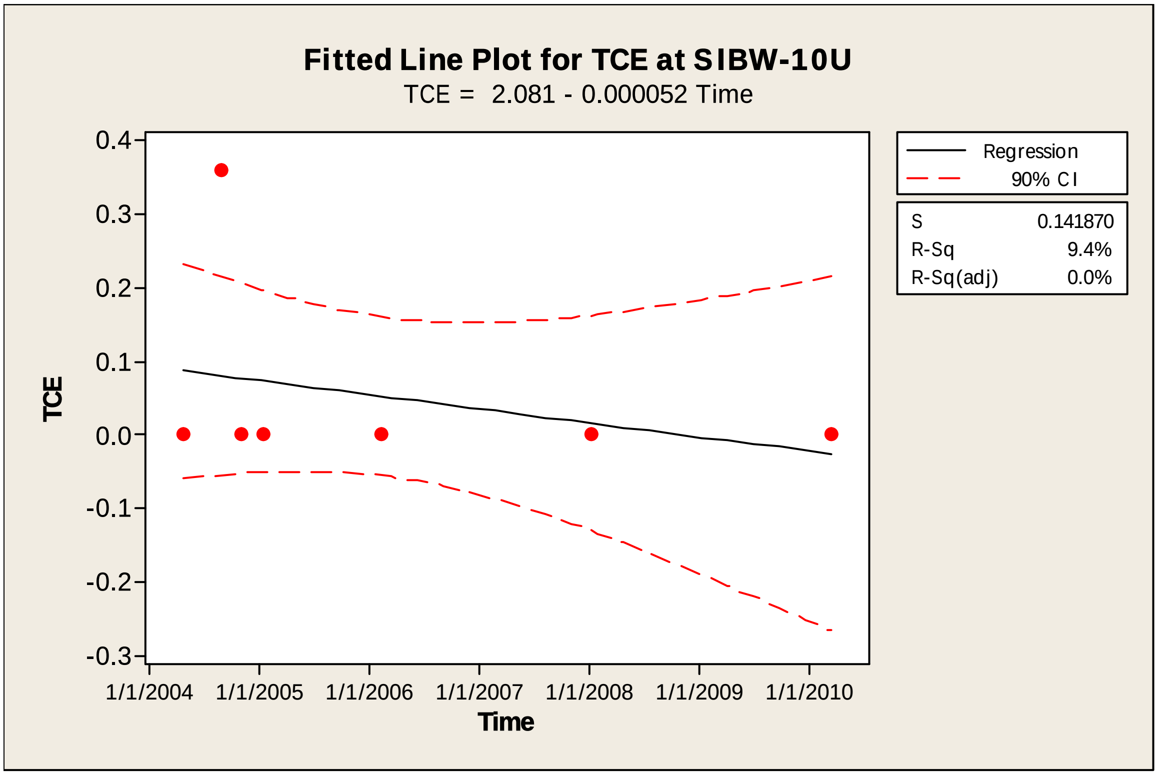
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	20	38982	146	652	38398	39435
PCE SIBW-5U	20	0.2920	0.0571	0.2555	0.0000	0.5375
TCE SIBW-5U	20	2.268	0.303	1.355	0.993	3.325

Variable	Minimum	Maximum	Median
Time	38027	40260	38963
PCE SIBW-5U	0.0000	0.6900	0.3200
TCE SIBW-5U	0.280	5.100	2.400

SIBW-10U


Scatterplot of PCE and TCE at SIBW-10U vs Time
Contaminant Concentrations (ug/L)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Variable (with Lowess Curve)
PCE SIBW-10U
TCE SIBW-10U


Fitted Line Plot for PCE at SIBW-10U
PCE = - 4.351 + 0.000127 Time
PCE
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Regression
90% CI
S 0.498439
R-Sq 4.7%
R-Sq(adj) 0.0%



PCE vs Time: The value of Kendalls Tau is 0.23810

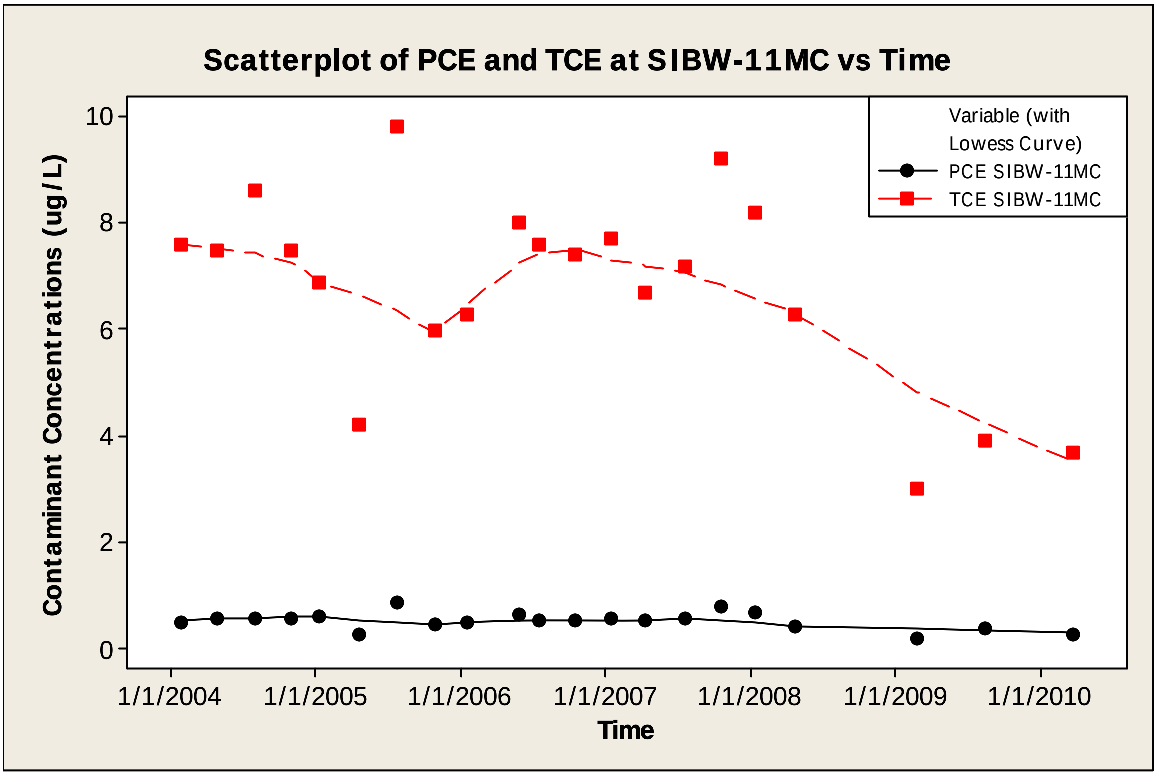
TCE vs Time: The value of Kendalls Tau is 0.52381

Descriptive Statistics: Time, PCE SIBW-10U, TCE SIBW-10U

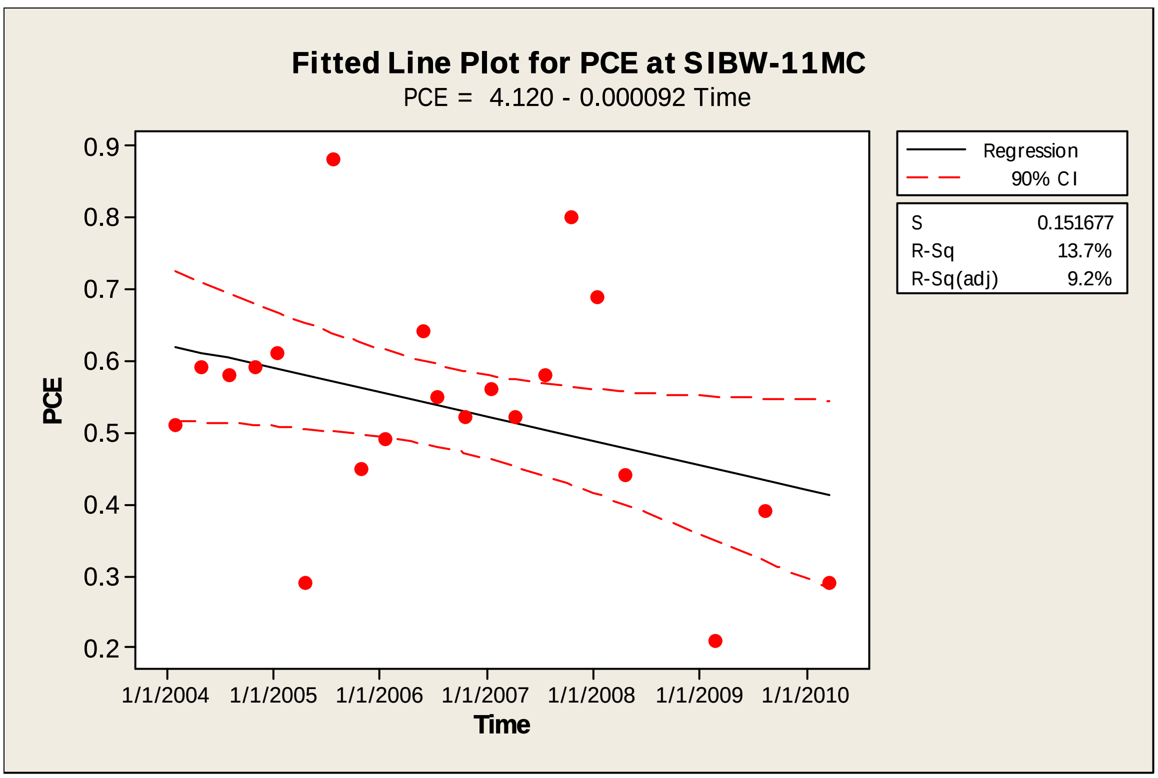
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	7	38777	301	797	38222	39457
PCE SIBW-10U	7	0.557	0.176	0.466	0.000	1.000
TCE SIBW-10U	7	0.0514	0.0514	0.1361	0.0000	0.0000

Variable	Minimum	Maximum	Median
Time	38099	40253	38366
PCE SIBW-10U	0.000	1.200	0.640
TCE SIBW-10U	0.0000	0.3600	0.0000

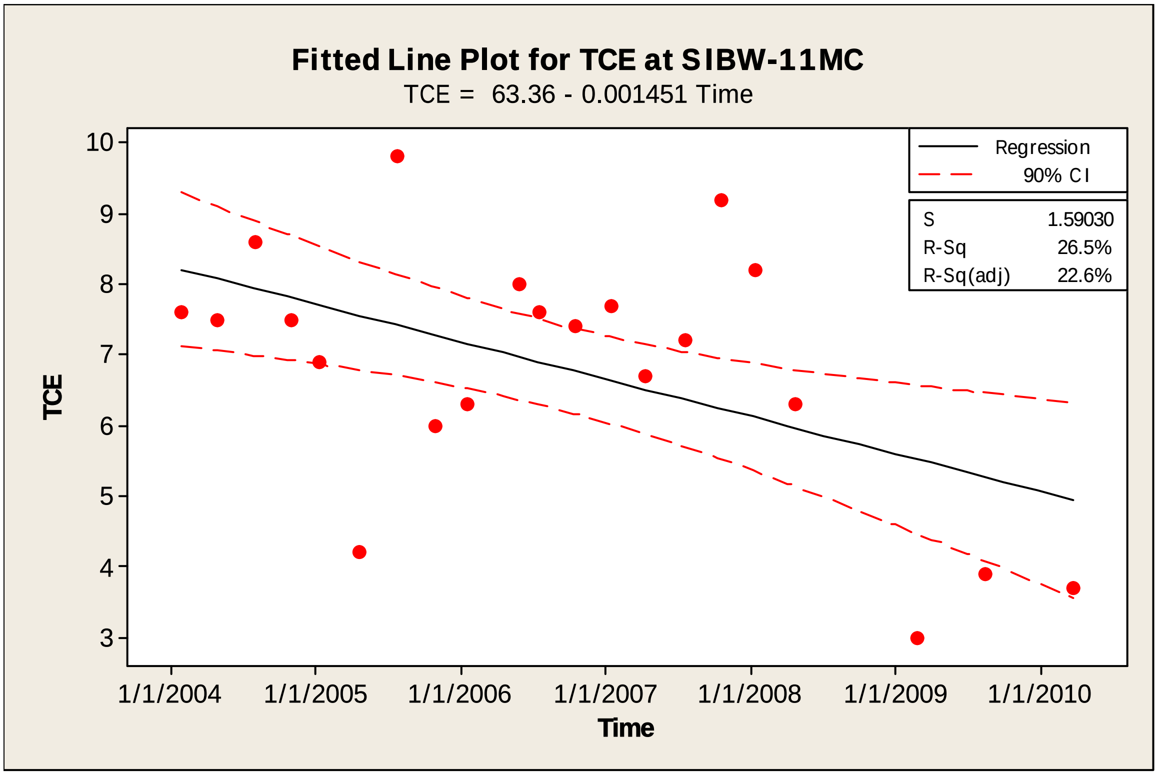
SIBW-11MC



Scatterplot of PCE and TCE at SIBW-11MC vs Time
Variable (with Lowess Curve)
PCE SIBW-11MC
TCE SIBW-11MC
Contaminant Concentrations (ug/L)
0
2
4
6
8
10
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



Fitted Line Plot for PCE at SIBW-11MC
PCE = 4.120 - 0.000092 Time
Regression
90% CI
S 0.151677
R-Sq 13.7%
R-Sq(adj) 9.2%
PCE
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



PCE vs Time: The value of Kendalls Tau is -0.17143

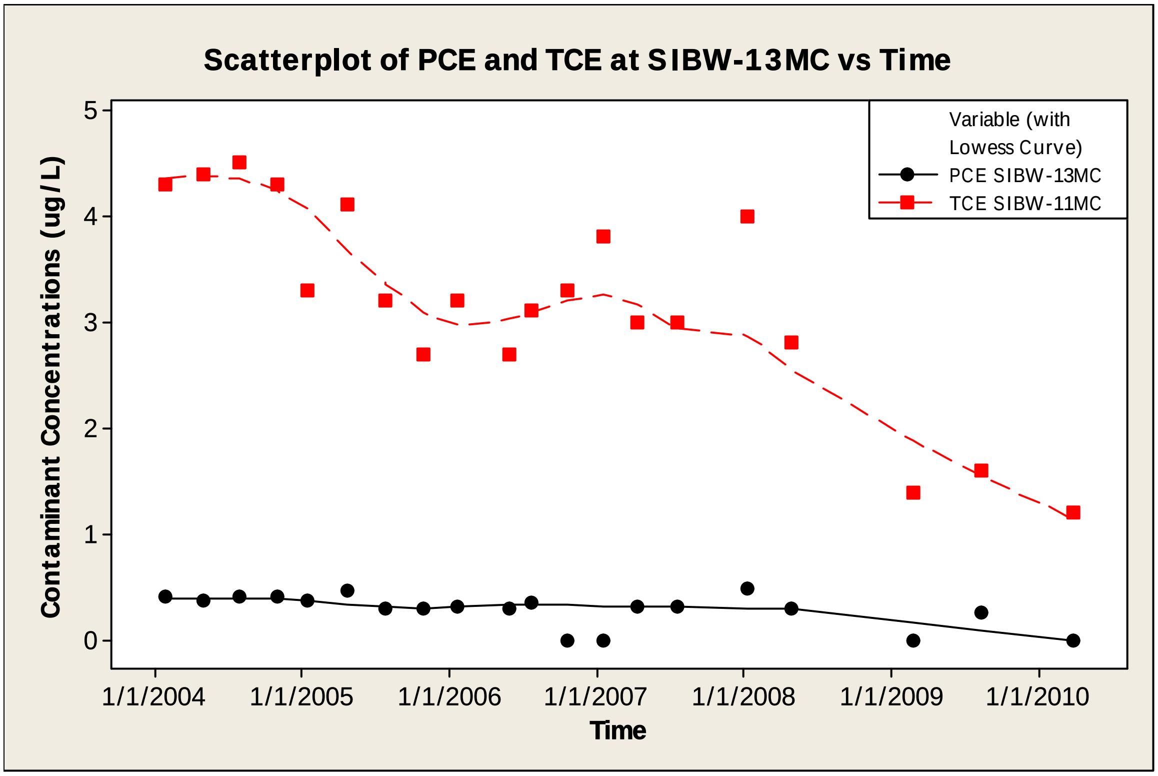
TCE vs Time: The value of Kendalls Tau is -0.24762

Descriptive Statistics: Time, PCE SIBW-11MC, TCE SIBW-11MC

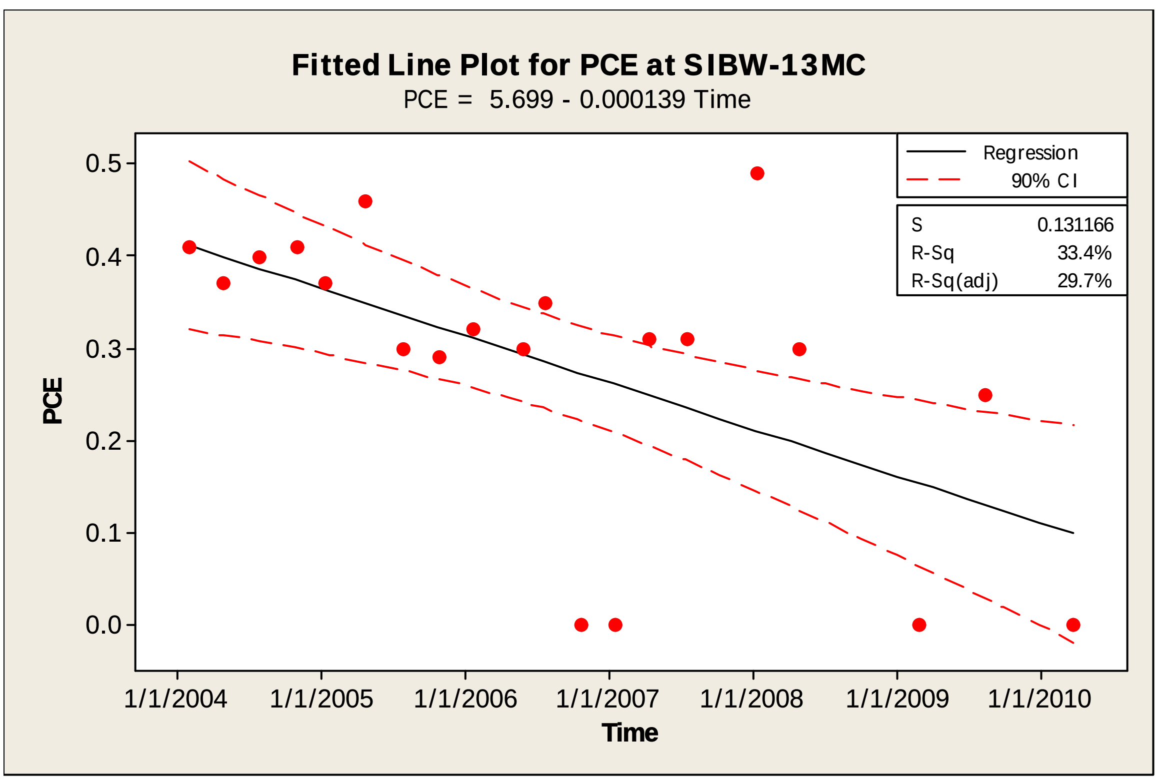
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	21	38967	140	641	38413	39417
PCE SIBW-11MC	21	0.5324	0.0347	0.1592	0.4450	0.6000
TCE SIBW-11MC	21	6.824	0.394	1.808	6.150	7.850

Variable	Minimum	Maximum	Median
Time	38013	40262	38916
PCE SIBW-11MC	0.2100	0.8800	0.5500
TCE SIBW-11MC	3.000	9.800	7.400

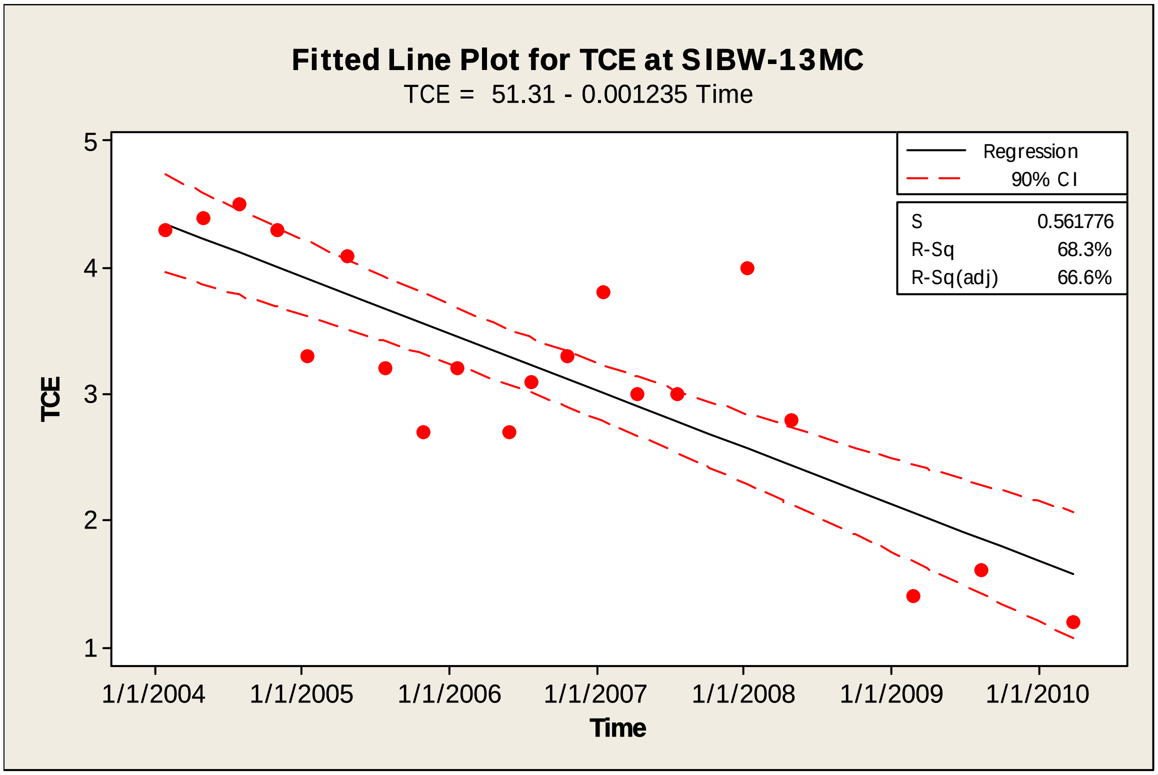
SIBW-13MC



Scatterplot of PCE and TCE at SIBW-13MC vs Time
Contaminant Concentrations (ug/L)
0
1
2
3
4
5
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Variable (with Lowess Curve)
PCE SIBW-13MC
TCE SIBW-11MC



Fitted Line Plot for PCE at SIBW-13MC
PCE = 5.699 - 0.000139 Time
PCE
0.0
0.1
0.2
0.3
0.4
0.5
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Regression
90% CI
S 0.131166
R-Sq 33.4%
R-Sq(adj) 29.7%



PCE vs Time: The value of Kendalls Tau is -0.38947

TCE vs Time: The value of Kendalls Tau is -0.56842

Descriptive Statistics: Time, PCE SIBW-13MC, TCE SIBW-13MC

Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	20	38947	145	650	38389	39414
PCE SIBW-13MC	20	0.2820	0.0350	0.1564	0.2600	0.3925
TCE SIBW-13MC	20	3.195	0.217	0.971	2.725	4.075

Variable	Minimum	Maximum	Median
Time	38015	40262	38894
PCE SIBW-13MC	0.0000	0.4900	0.3100
TCE SIBW-13MC	2.725	4.500	3.200

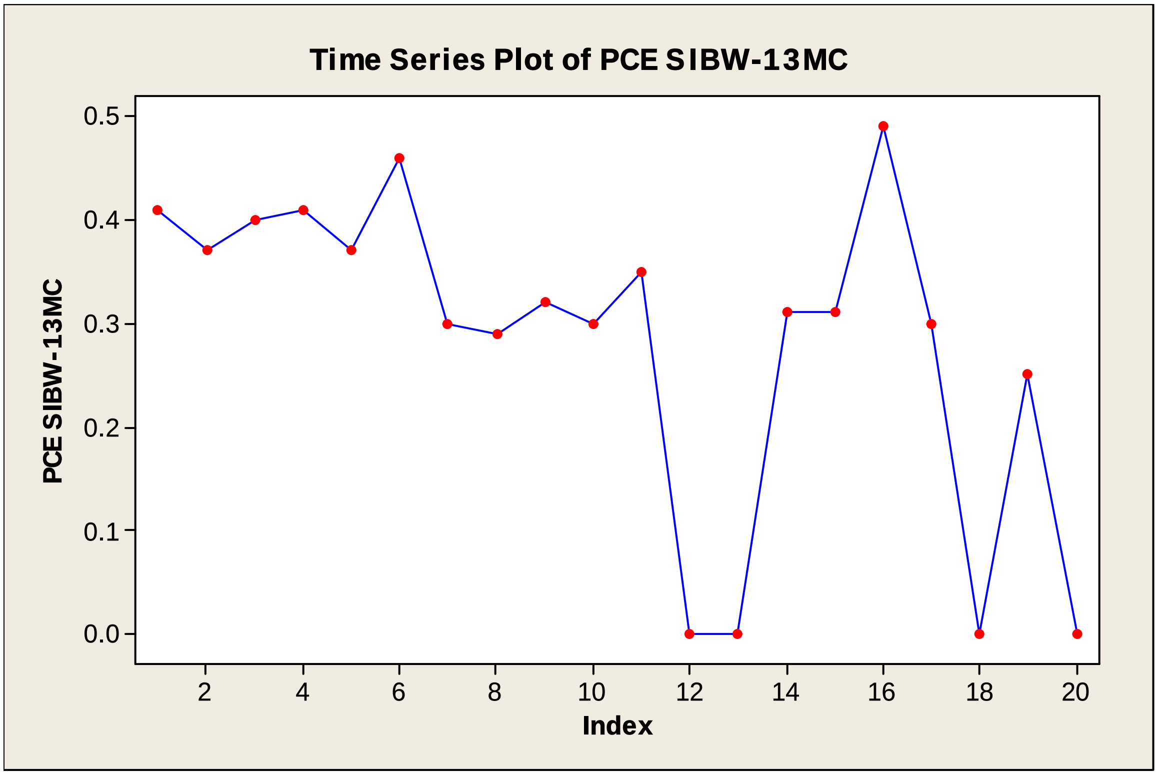
Mann-Kendall Trend Test by Normal Approximation

Ho: No trend in PCE SIBW-13MC

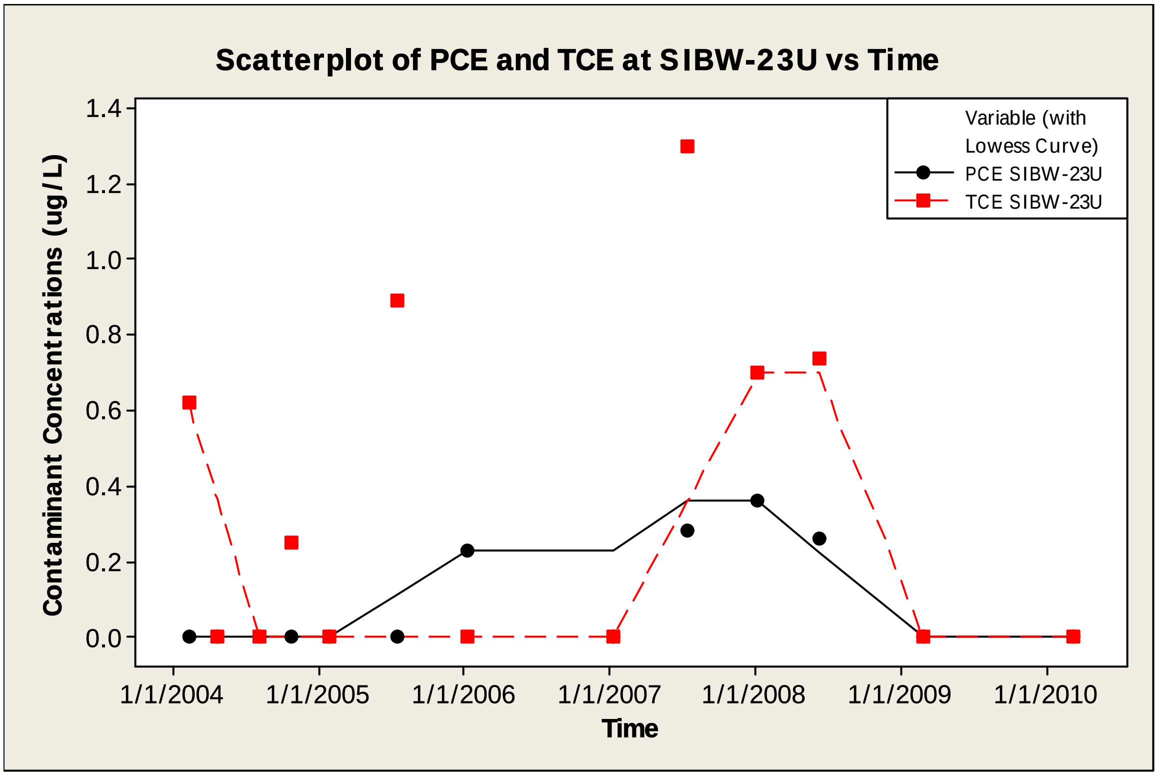
The calculated z = -2.78029

For Ha: Upperward trend, the p-value = 0.997285
At alpha = 0.05, there is not enough evidence to determine that there is an upward trend.

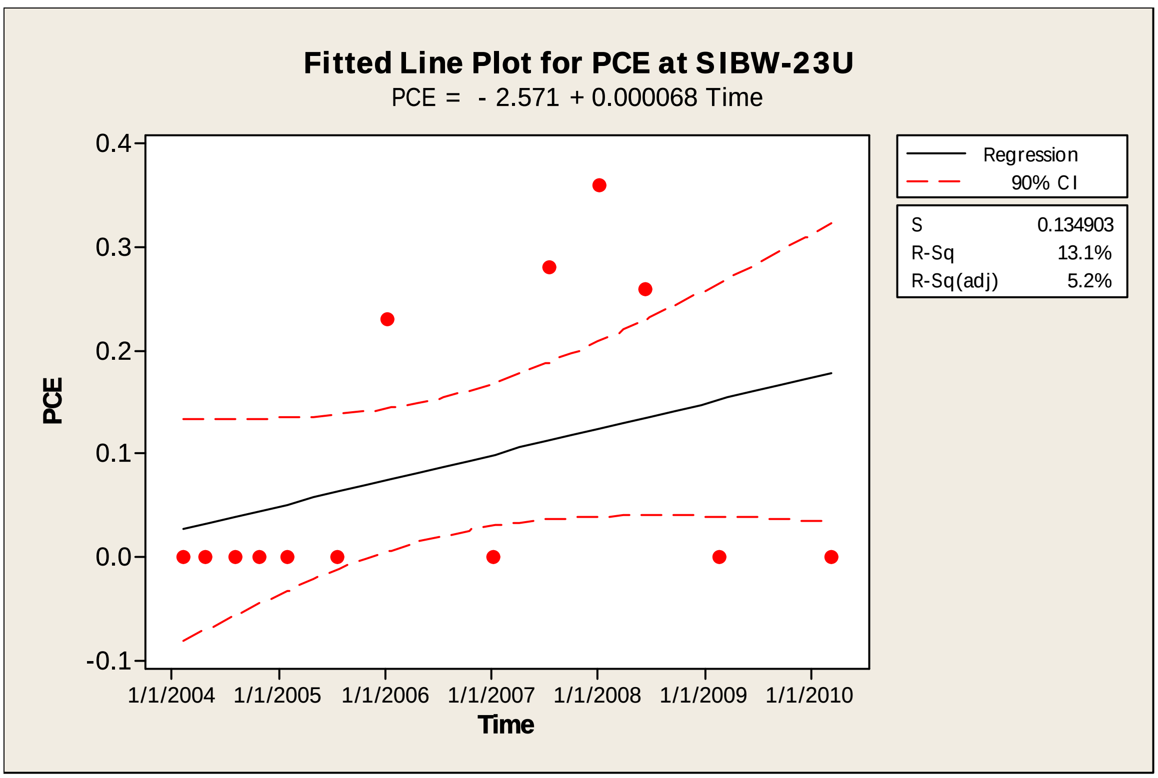
For Ha: Downward trend, the p-value = 0.0027155
At alpha = 0.05, there is enough evidence to determine that there is a downward trend.



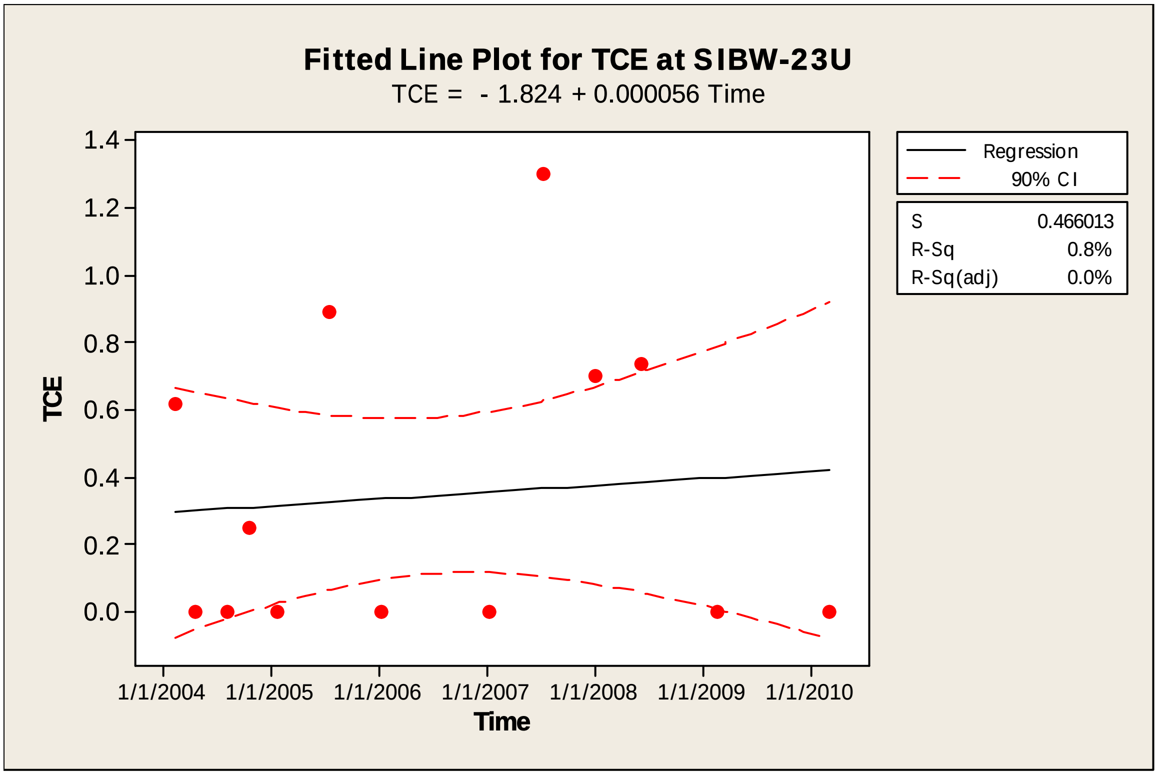
SIBW-23U



Scatterplot of PCE and TCE at SIBW-23U vs Time
Contaminant Concentrations (ug/L)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Variable (with Lowess Curve)
PCE SIBW-23U
TCE SIBW-23U



Fitted Line Plot for PCE at SIBW-23U
PCE = - 2.571 + 0.000068 Time
PCE
0.4
0.3
0.2
0.1
0.0
-0.1
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Regression
90% CI
S 0.134903
R-Sq 13.1%
R-Sq(adj) 5.2%



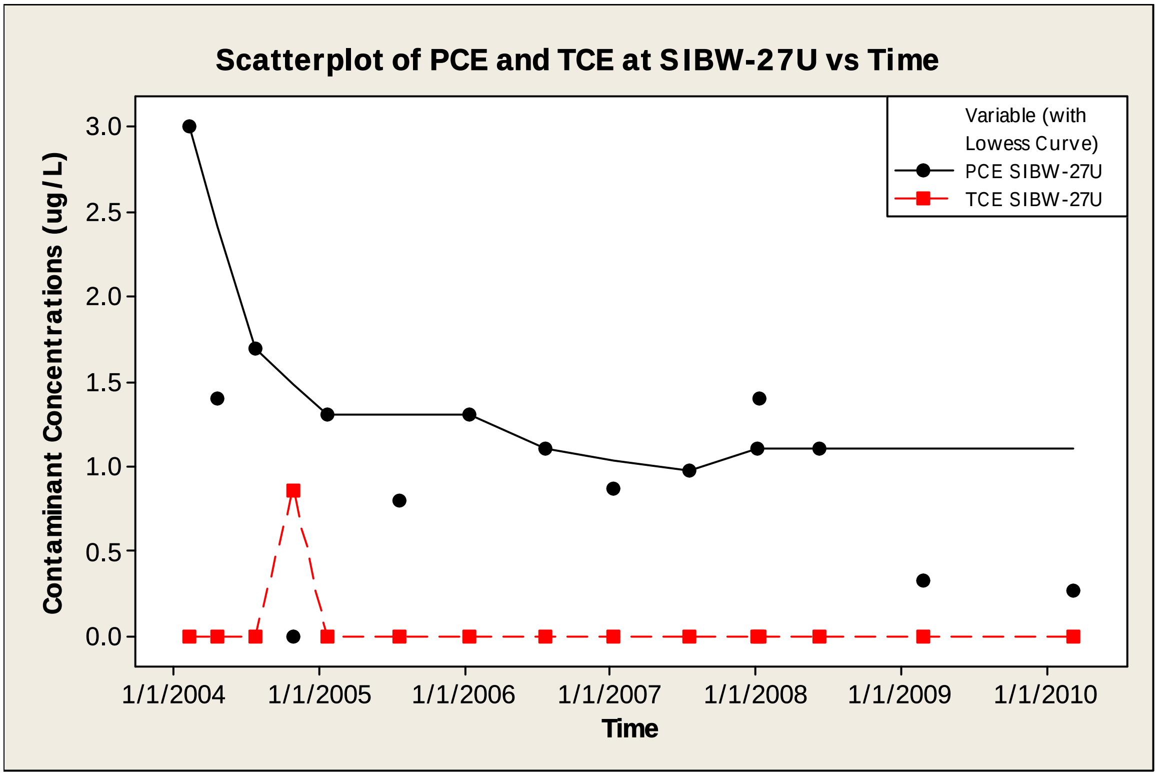
PCE vs. Time: The value of Kendalls Tau is 0.71795
TCE vs. Time: The value of Kendalls Tau is 0.30769

Descriptive Statistics: Time, PCE SIBW-23U, TCE SIBW-23U

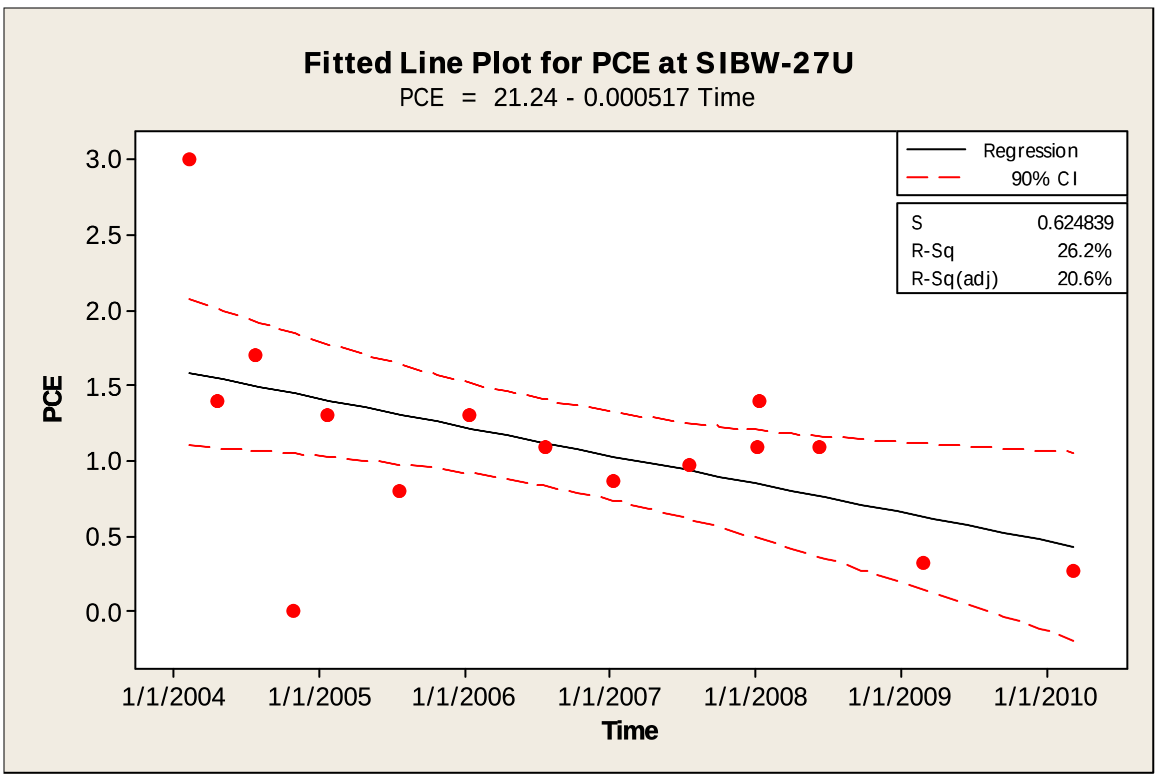
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	13	38909	203	733	38242	39533
PCE SIBW-23U	13	0.0869	0.0384	0.1385	0.0000	0.2450
TCE SIBW-23U	13	0.346	0.124	0.448	0.000	0.720

Variable	Minimum	Maximum	Median
Time	38026	40249	38726
PCE SIBW-23U	0.0000	0.3600	0.0000
TCE SIBW-23U	0.000	1.300	0.000

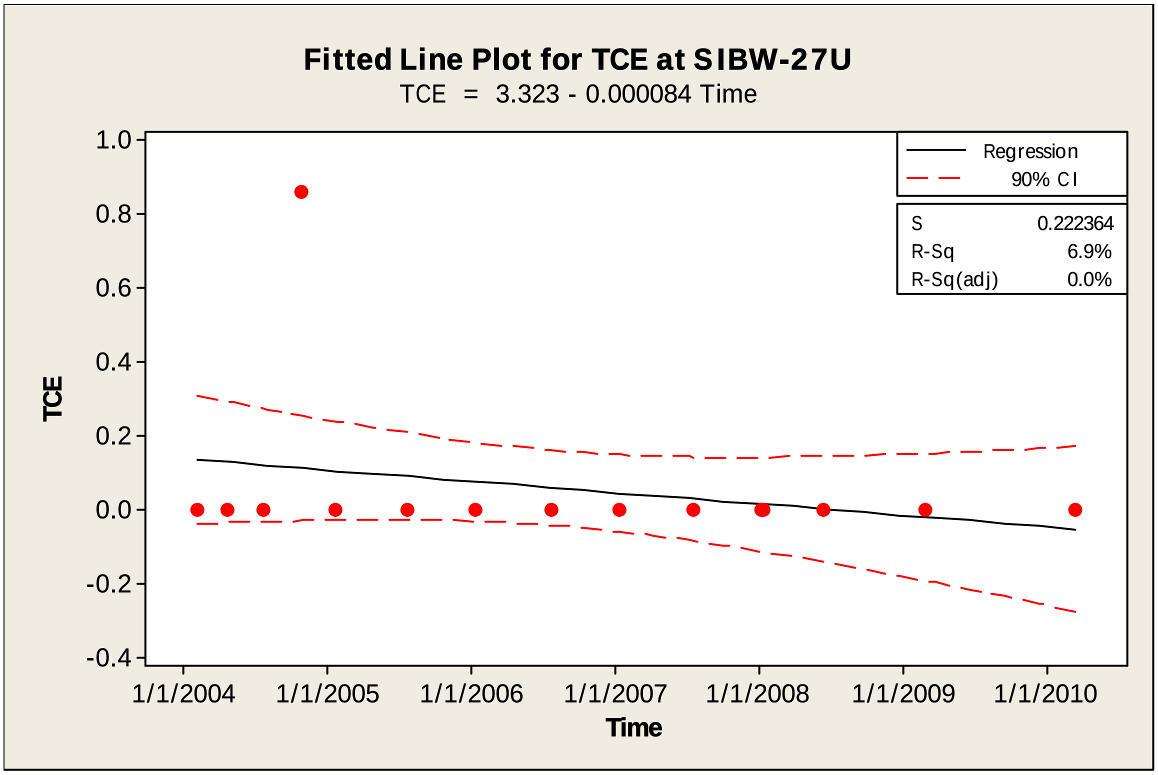
SIBW-27U



Scatterplot of PCE and TCE at SIBW-27U vs Time
Variable (with Lowess Curve)
PCE SIBW-27U
TCE SIBW-27U
Contaminant Concentrations (ug/L)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



Fitted Line Plot for PCE at SIBW-27U
PCE = 21.24 - 0.000517 Time
Regression
90% CI
S 0.624839
R-Sq 26.2%
R-Sq(adj) 20.6%
PCE
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



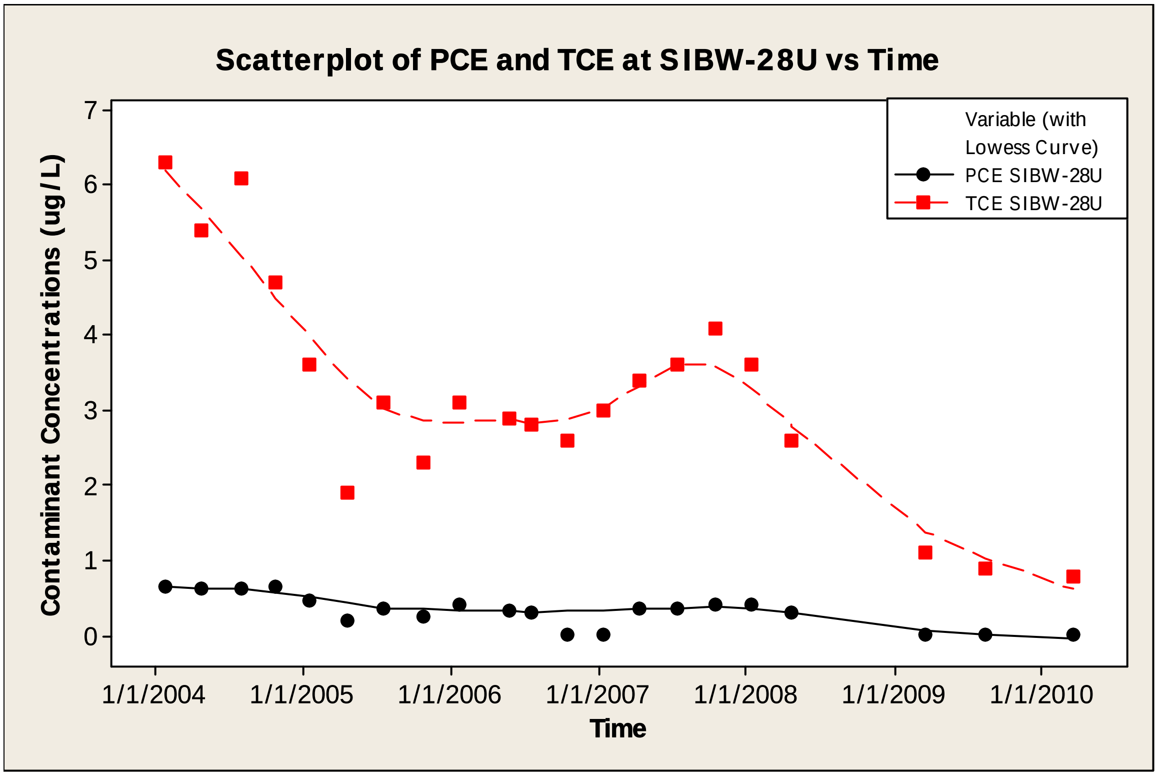
PCE vs Time: The value of Kendalls Tau is -0.33333
TCE vs Time: The value of Kendalls Tau is 0.79048

Descriptive Statistics: Time, PCE SIBW-27U, TCE SIBW-27U

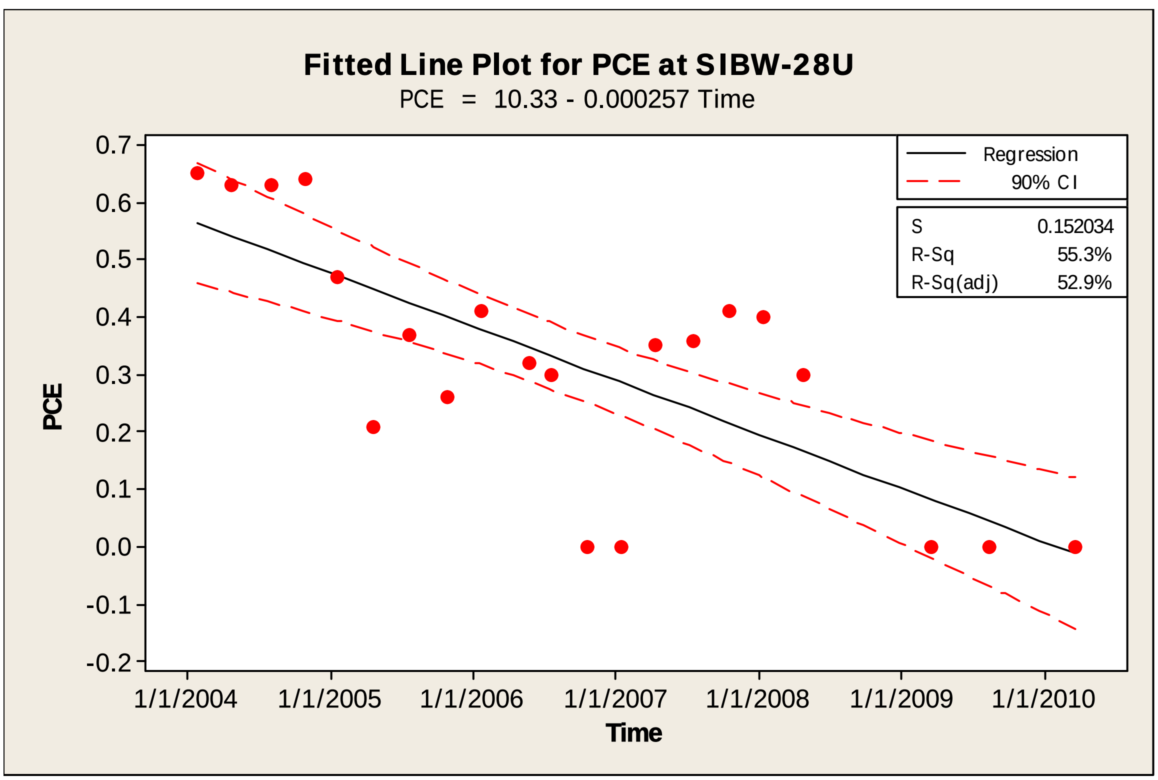
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	15	38945	179	695	38287	39458
PCE SIBW-27U	15	1.109	0.181	0.701	0.800	1.400
TCE SIBW-27U	15	0.0573	0.0573	0.2221	0.0000	0.0000

Variable	Minimum	Maximum	Median
Time	38023	40249	38920
PCE SIBW-27U	0.000	3.000	1.100
TCE SIBW-27U	0.0000	0.8600	0.0000

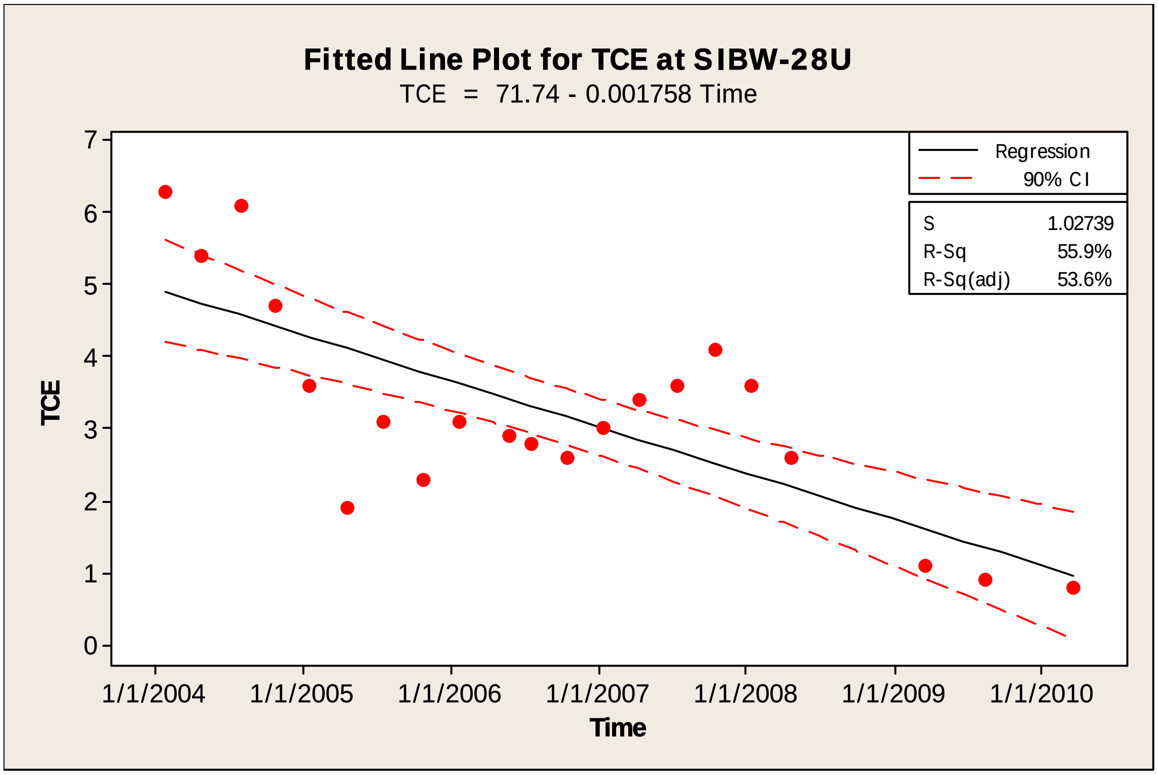
SIBW-28U



Scatterplot of PCE and TCE at SIBW-28U vs Time
Contaminant Concentrations (ug/L)
Variable (with Lowess Curve)
PCE SIBW-28U
TCE SIBW-28U
0
1
2
3
4
5
6
7
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



Fitted Line Plot for PCE at SIBW-28U
PCE = 10.33 - 0.000257 Time
PCE
Regression
90% CI
S 0.152034
R-Sq 55.3%
R-Sq(adj) 52.9%
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



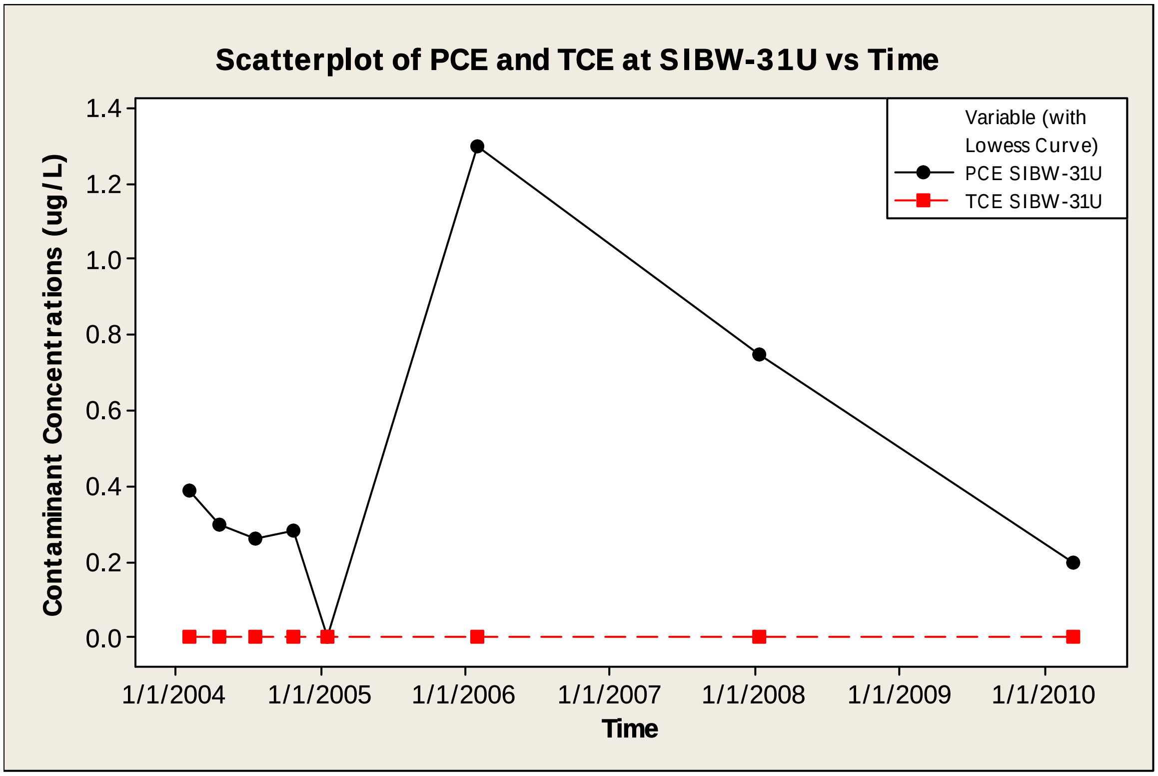
PCE vs Time: The value of Kendalls Tau is -0.43810
TCE vs Time: The value of Kendalls Tau is -0.42857

Descriptive Statistics: Time, PCE SIBW-28U, TCE SIBW-28U

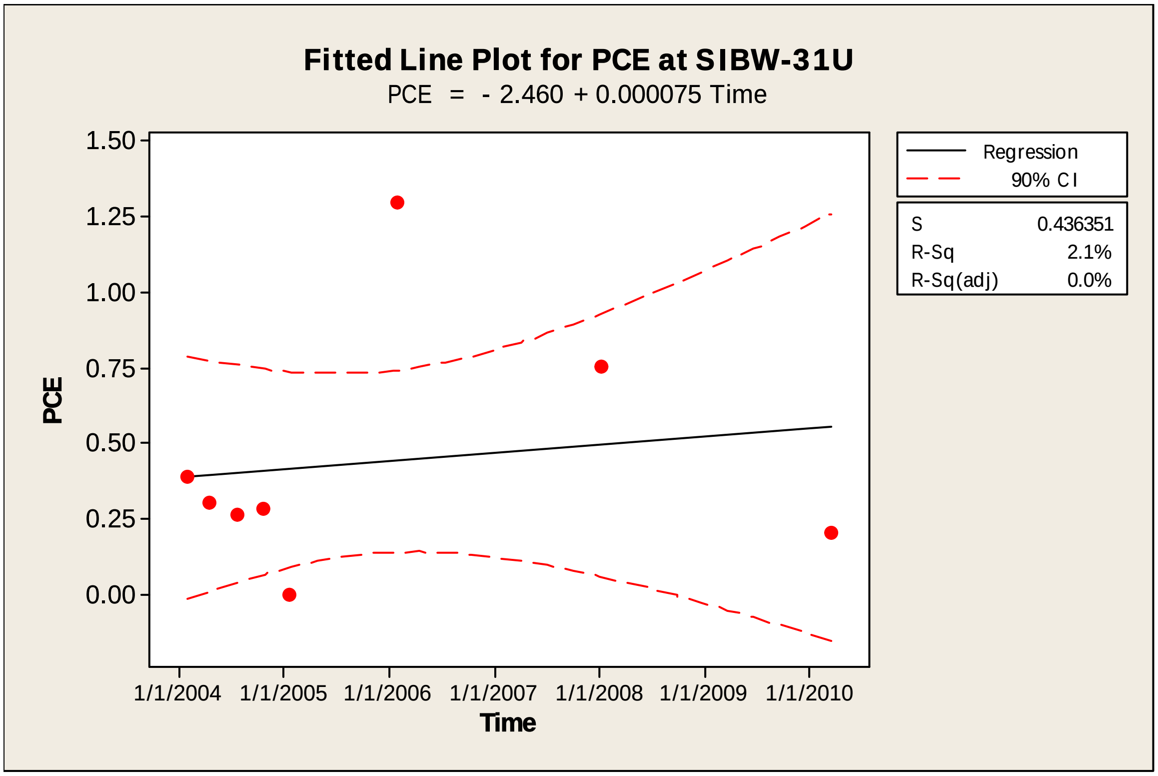
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	21	38966	140	642	38415	39415
PCE SIBW-28U	21	0.3195	0.0484	0.2216	0.1050	0.4400
TCE SIBW-28U	21	3.232	0.329	1.508	2.450	3.850

Variable	Minimum	Maximum	Median
Time	38014	40255	38917
PCE SIBW-28U	0.0000	0.6500	0.3500
TCE SIBW-28U	0.790	6.300	3.100

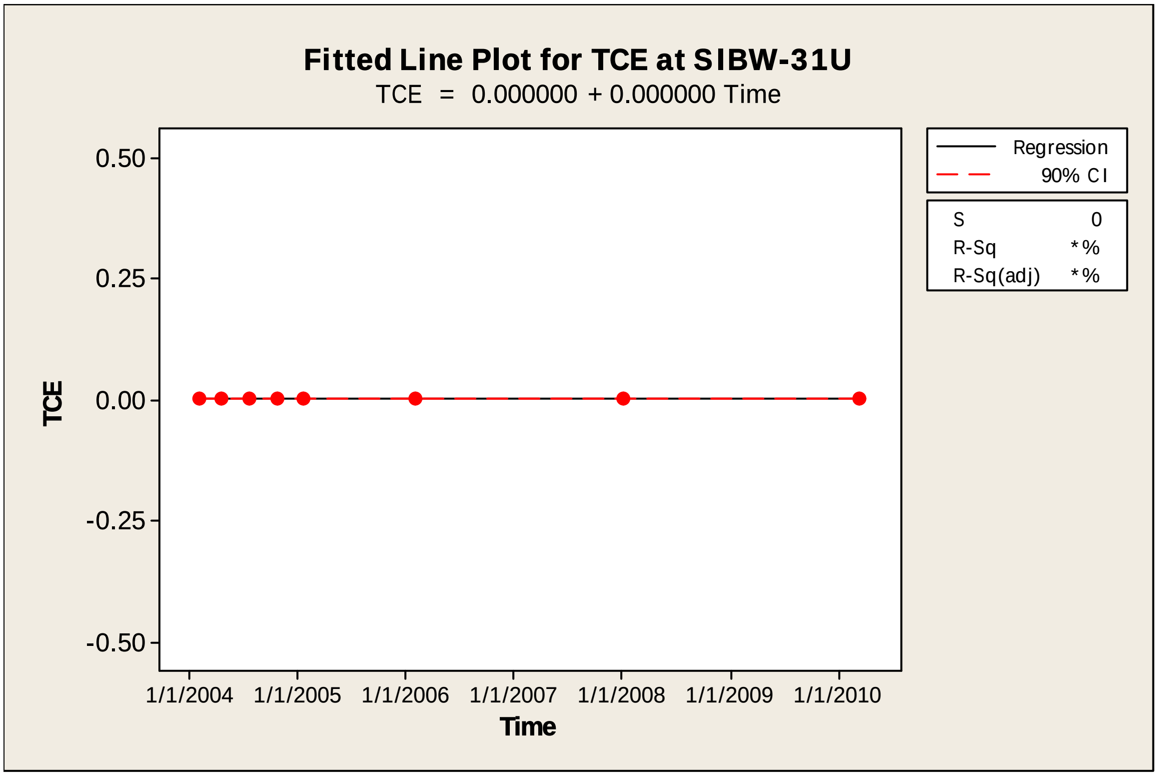
SIBW-31U



Scatterplot of PCE and TCE at SIBW-31U vs Time
Contaminant Concentrations (ug/L)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Variable (with Lowess Curve)
PCE SIBW-31U
TCE SIBW-31U



Fitted Line Plot for PCE at SIBW-31U
PCE = - 2.460 + 0.000075 Time
PCE
1.50
1.25
1.00
0.75
0.50
0.25
0.00
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Regression
90% CI
S 0.436351
R-Sq 2.1%
R-Sq(adj) 0.0%



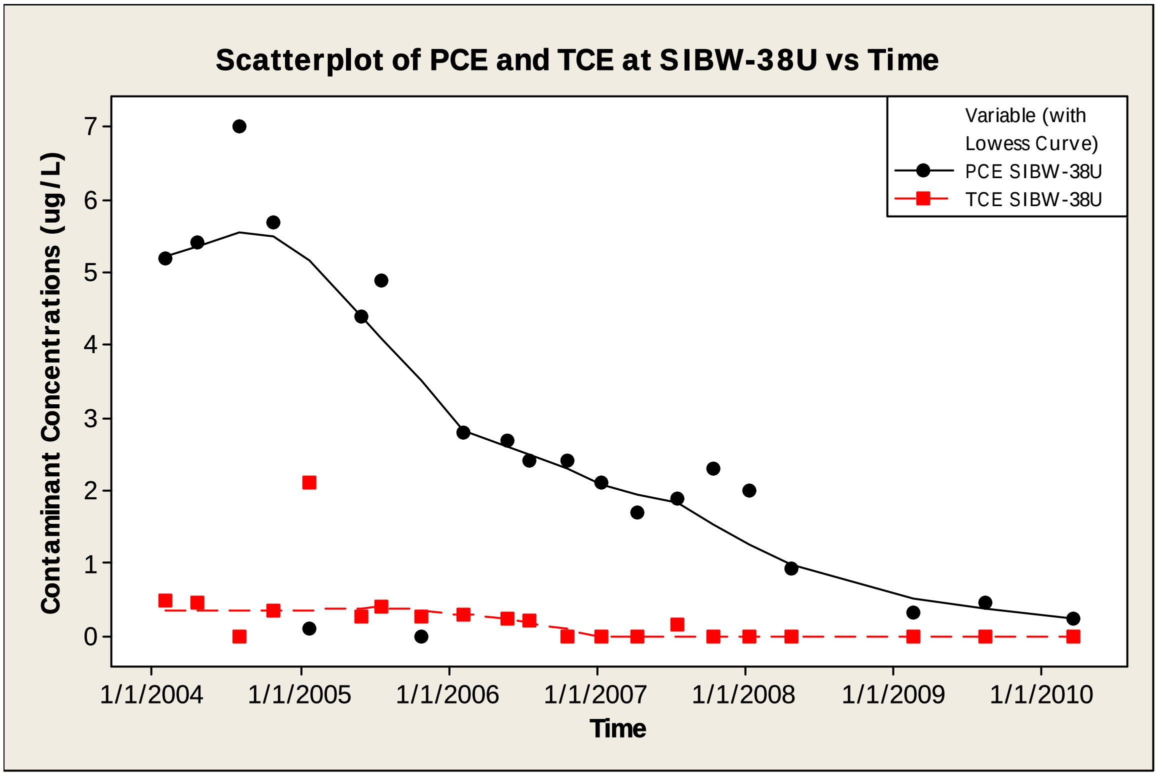

```
PCE vs Time: The value of Kendalls Tau is -0.14286
TCE vs Time: The value of Kendalls Tau is 1.00000
```

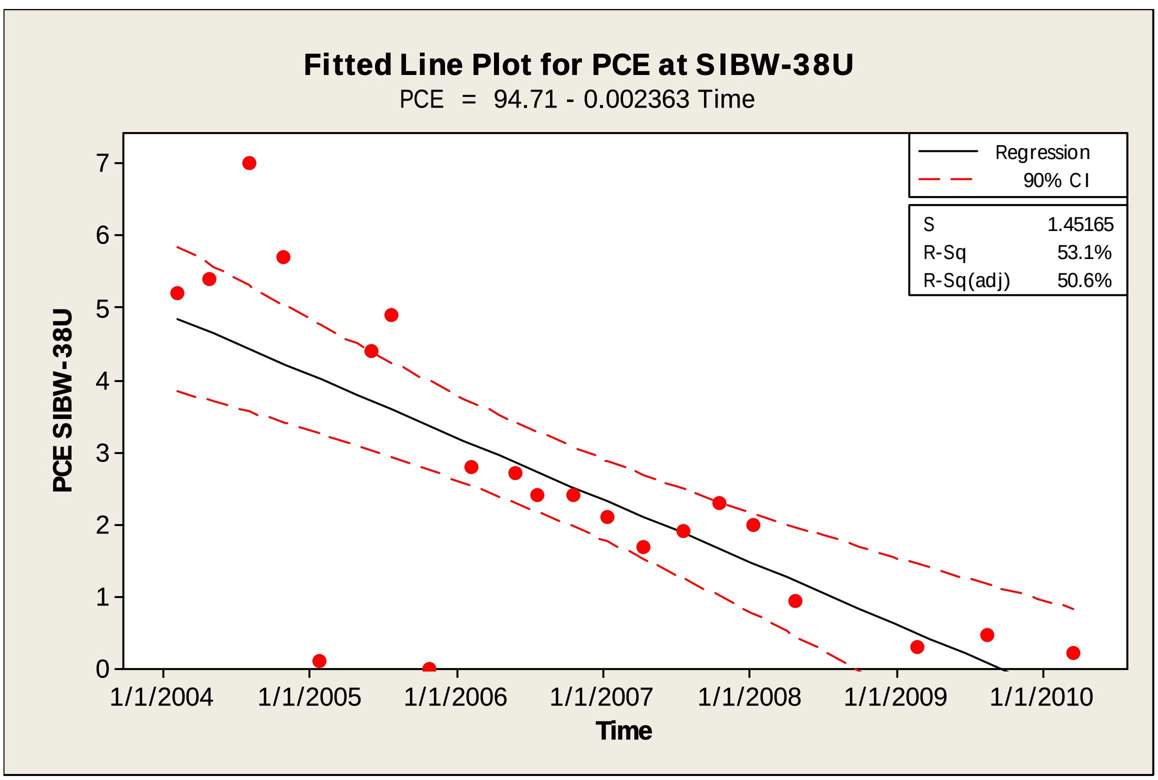
Descriptive Statistics: Time, PCE SIBW-31U, TCE SIBW-31U

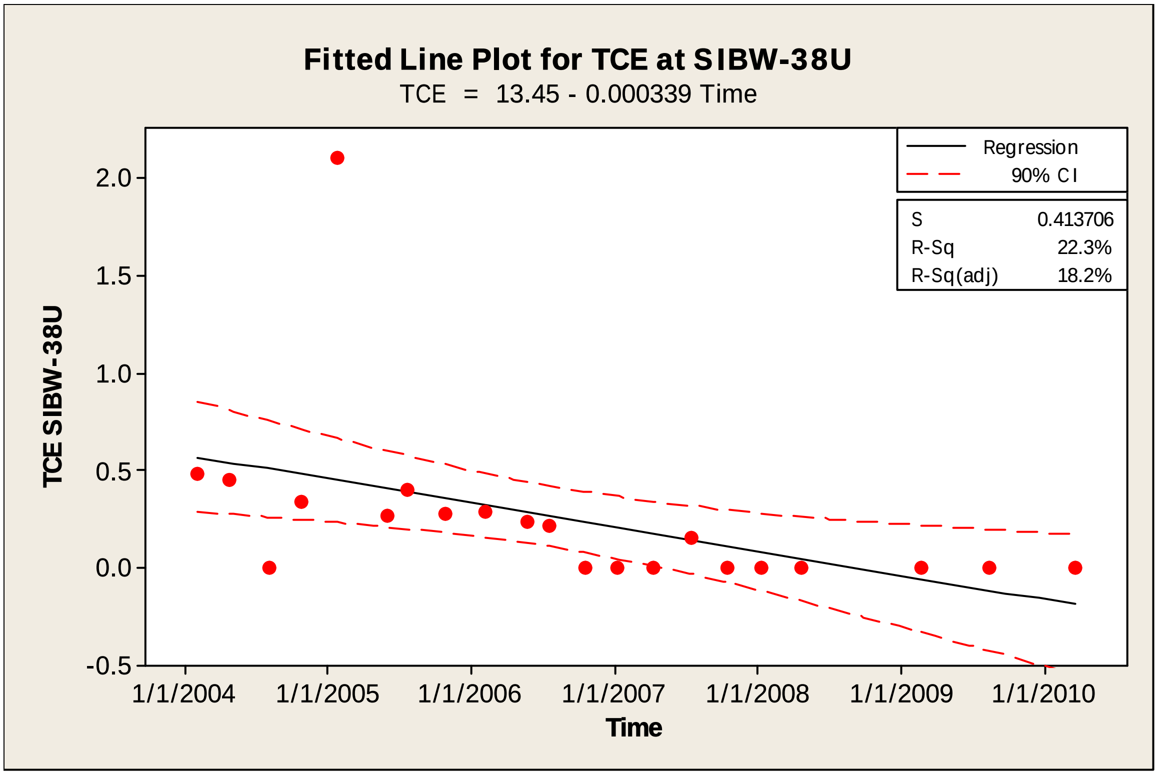
Variable	N	Mean	SE Mean	StDev	Q1
Time	8	38678	279	789	38120
PCE SIBW-31U	8	0.435	0.144	0.408	0.215
TCE SIBW-31U	8	0.000000	0.000000	0.000000	0.000000

Variable	Q3	Minimum	Maximum	Median
Time	39281	38020	40253	38328
PCE SIBW-31U	0.660	0.000	1.300	0.290
TCE SIBW-31U	0.000000	0.000000	0.000000	0.000000

SIBW-38U


Scatterplot of PCE and TCE at SIBW-38U vs Time
Contaminant Concentrations (ug/L)
Time
Variable (with Lowess Curve)
PCE SIBW-38U
TCE SIBW-38U
0
1
2
3
4
5
6
7
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010


Fitted Line Plot for PCE at SIBW-38U
PCE = 94.71 - 0.002363 Time
PCE SIBW-38U
Time
Regression
90% CI
S 1.45165
R-Sq 53.1%
R-Sq(adj) 50.6%
0
1
2
3
4
5
6
7
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010



PCE vs Time: The value of Kendalls Tau is -0.60000
TCE vs Time: The value of Kendalls Tau is -0.38095

Descriptive Statistics: Time, PCE SIBW-38U, TCE SIBW-38U

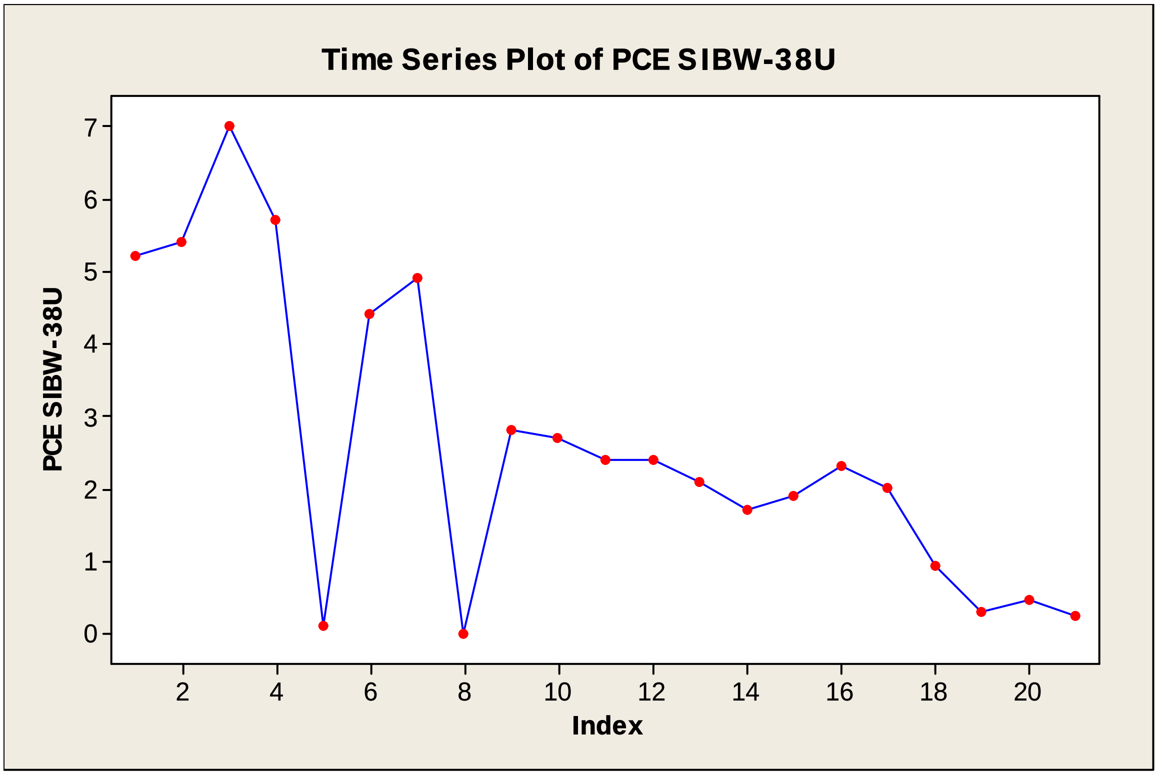
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	21	38968	139	637	38441	39414
PCE SIBW-38U	21	2.617	0.451	2.066	0.700	4.650
TCE SIBW-38U	21	0.2490	0.0998	0.4573	0.0000	0.3150

Variable	Minimum	Maximum	Median
Time	38021	40255	38918
PCE SIBW-38U	0.000	7.000	2.300
TCE SIBW-38U	0.0000	2.1000	0.1600

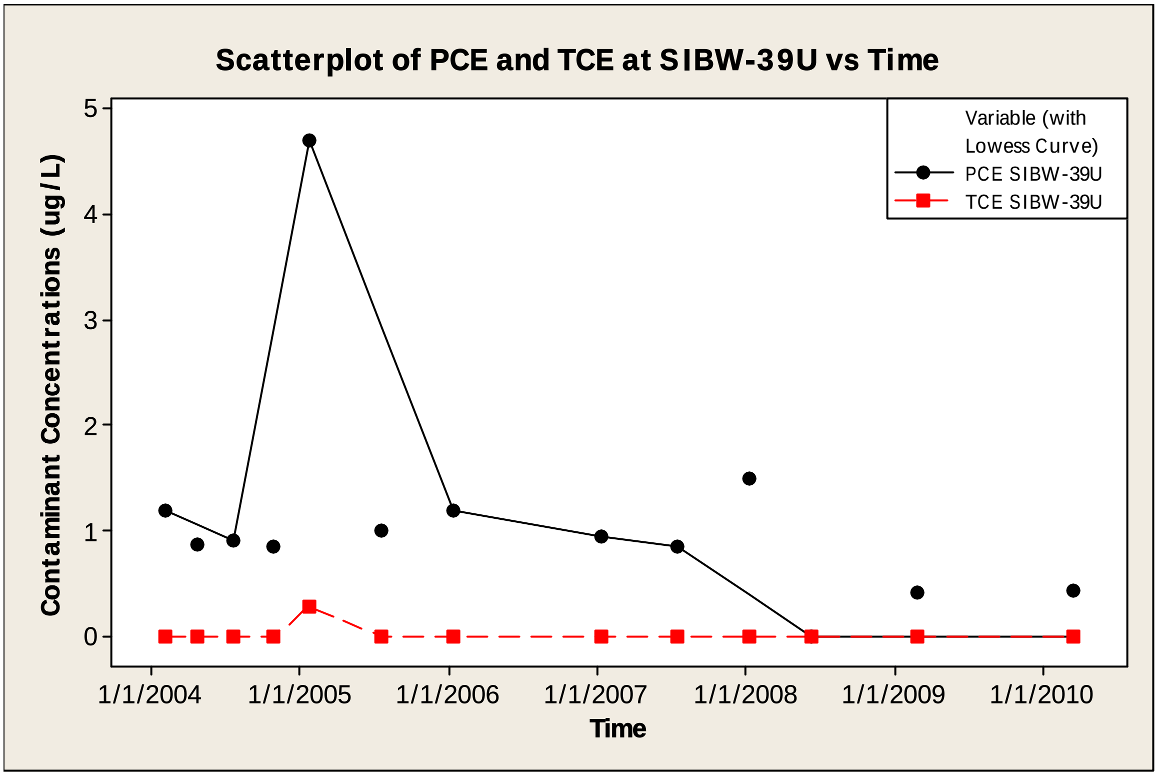
Mann-Kendall Trend Test by Normal Approximation

Ho: No trend in PCE SIBW-38U

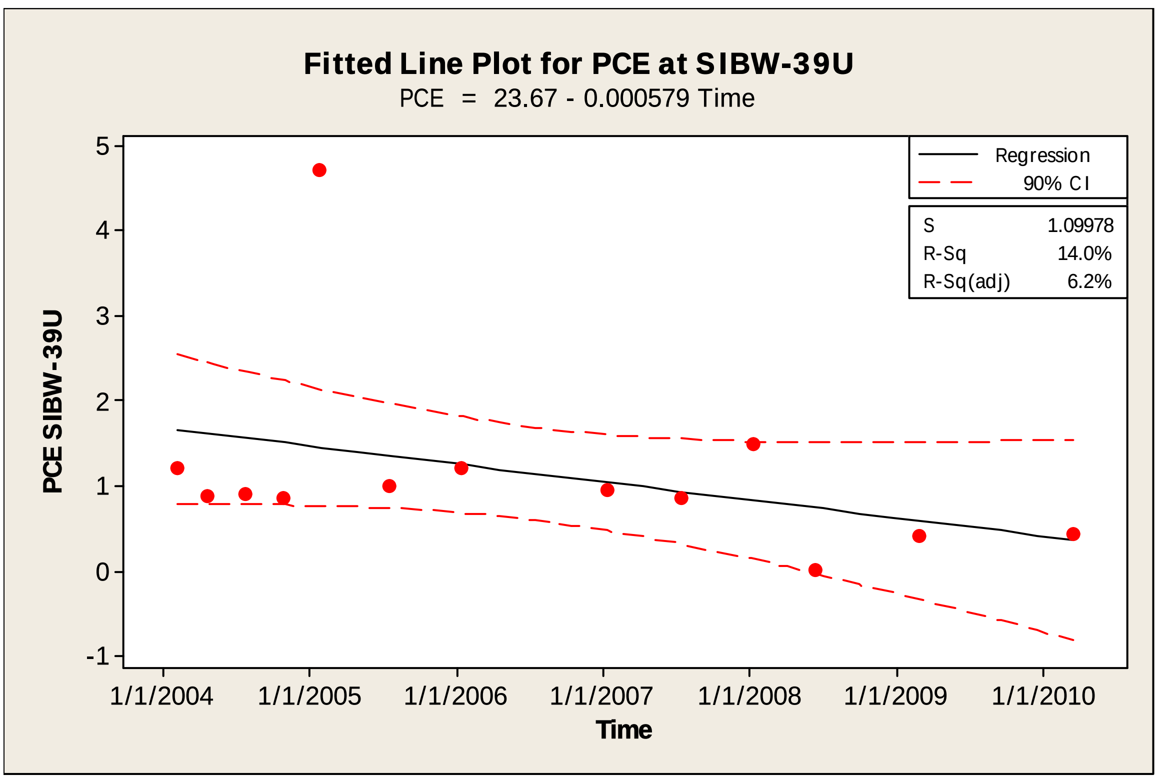
```
The calculated z = -3.80655


For Ha: Upperward trend, the p-value = 0.999930
At alpha = 0.05, there is not enough evidence to determine that
there is an upward trend.


For Ha: Downward trend, the p-value = 0.0000705
At alpha = 0.05, there is enough evidence to determine that
there is a downward trend.
```



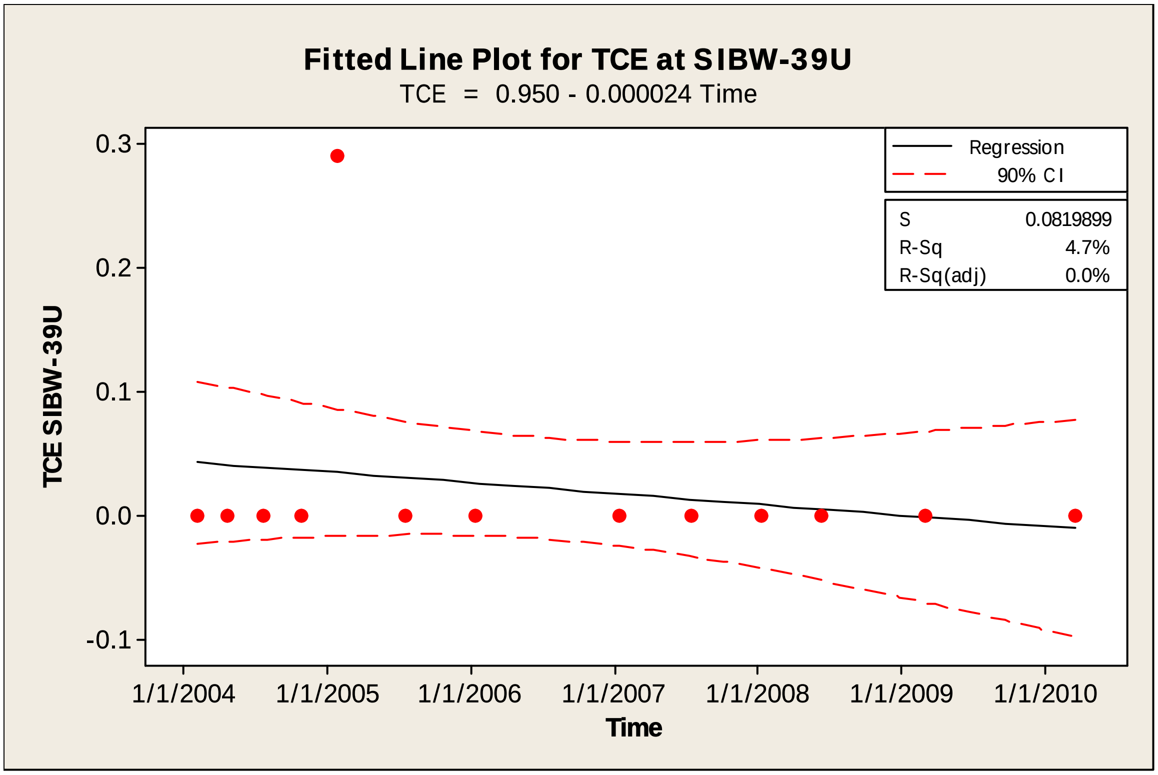
<u>**SIBW-39U**</u>



Scatterplot of PCE and TCE at SIBW-39U vs Time
Contaminant Concentrations (ug/L)
Variable (with Lowess Curve)
PCE SIBW-39U
TCE SIBW-39U
0
1
2
3
4
5
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



Fitted Line Plot for PCE at SIBW-39U
PCE = 23.67 - 0.000579 Time
PCE SIBW-39U
Regression
90% CI
S 1.09978
R-Sq 14.0%
R-Sq(adj) 6.2%
-1
0
1
2
3
4
5
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



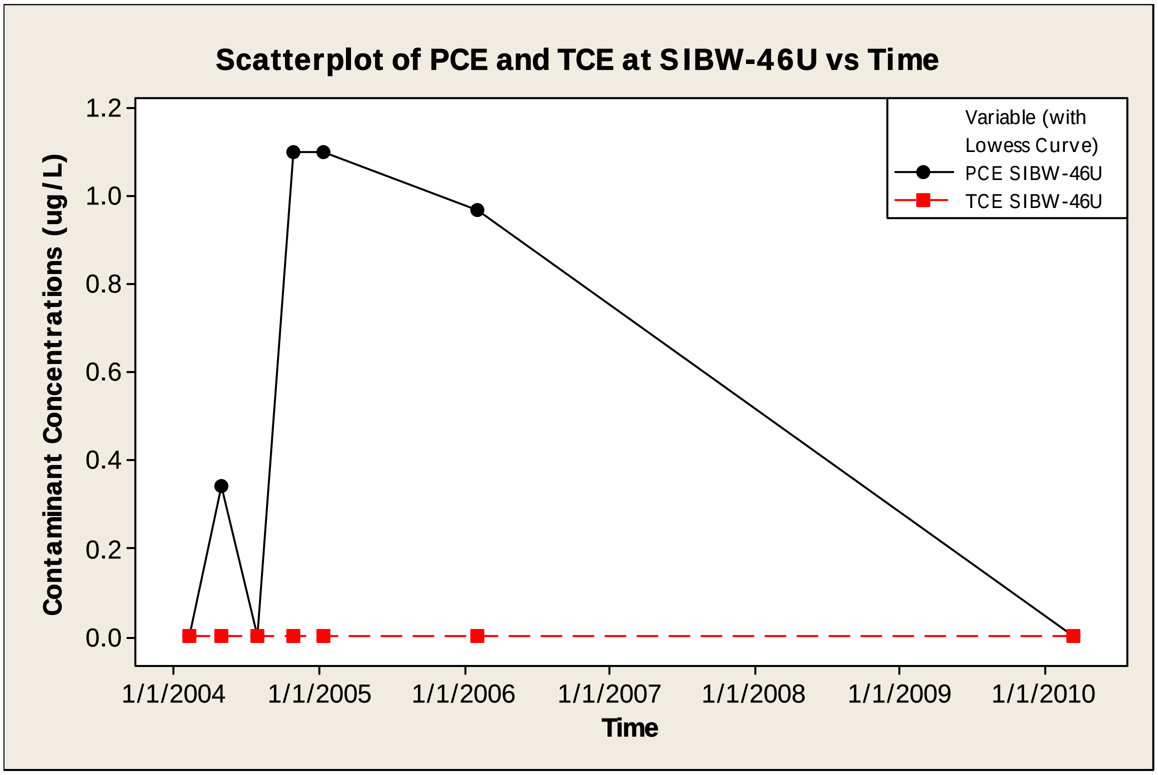
PCE vs Time: The value of Kendalls Tau is -0.30769
TCE vs Time: The value of Kendalls Tau is 0.79487

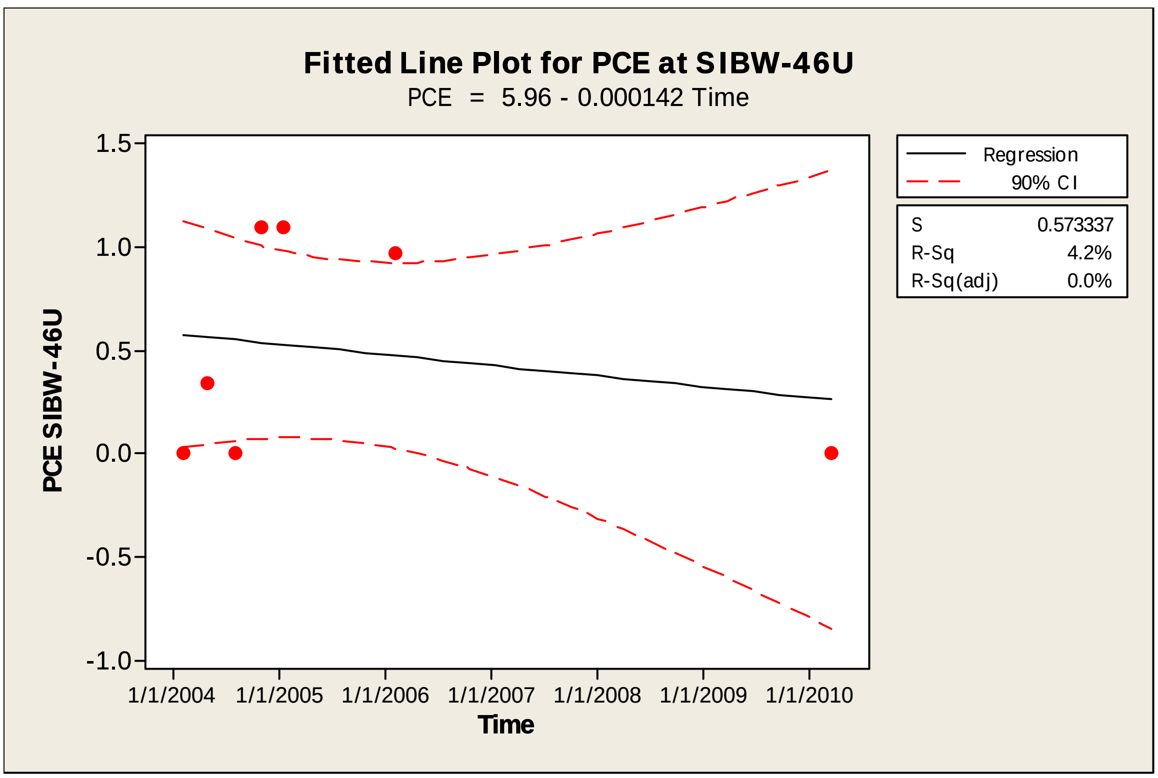
Descriptive Statistics: Time, PCE SIBW-39U, TCE SIBW-39U

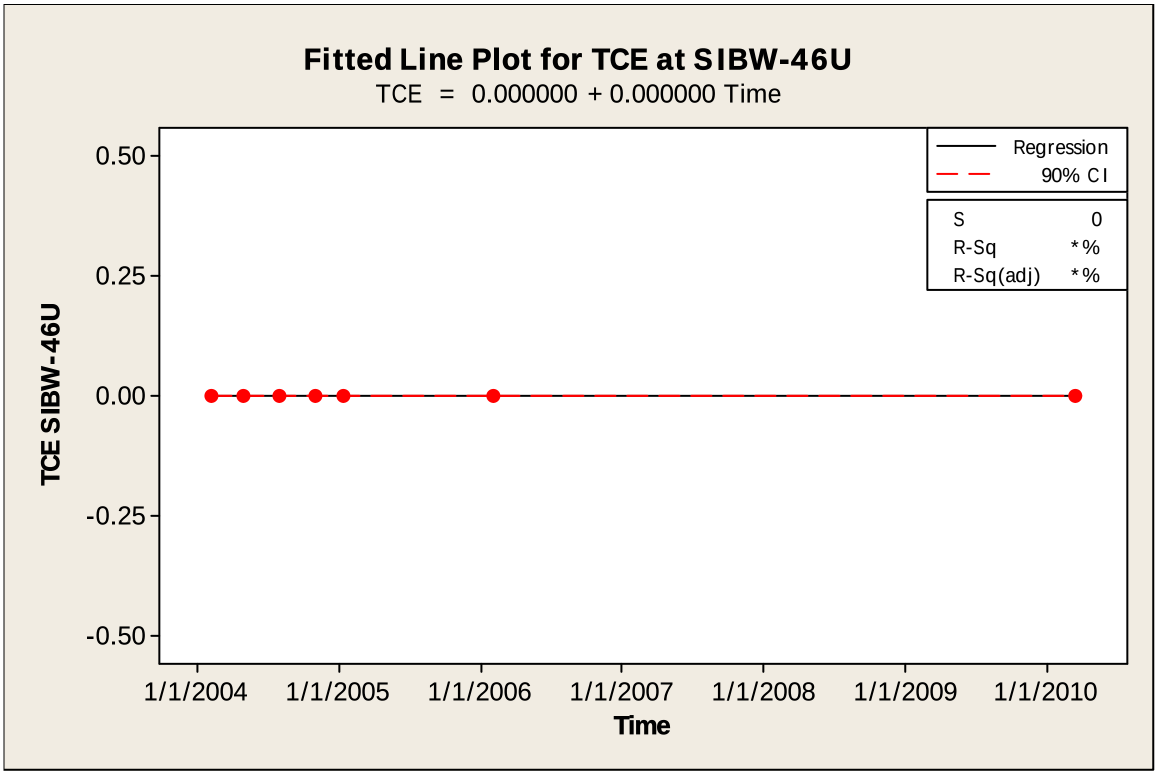
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	13	38909	204	735	38239	39533
PCE SIBW-39U	13	1.145	0.315	1.136	0.645	1.200
TCE SIBW-39U	13	0.0223	0.0223	0.0804	0.0000	0.0000

Variable	Minimum	Maximum	Median
Time	38023	40253	38727
PCE SIBW-39U	0.000	4.700	0.910
TCE SIBW-39U	0.0000	0.2900	0.0000

SIBW-46U


Scatterplot of PCE and TCE at SIBW-46U vs Time
Contaminant Concentrations (ug/L)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Variable (with Lowess Curve)
PCE SIBW-46U
TCE SIBW-46U
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time


Fitted Line Plot for PCE at SIBW-46U
PCE = 5.96 - 0.000142 Time
PCE SIBW-46U
1.5
1.0
0.5
0.0
-0.5
-1.0
Regression
90% CI
S 0.573337
R-Sq 4.2%
R-Sq(adj) 0.0%
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



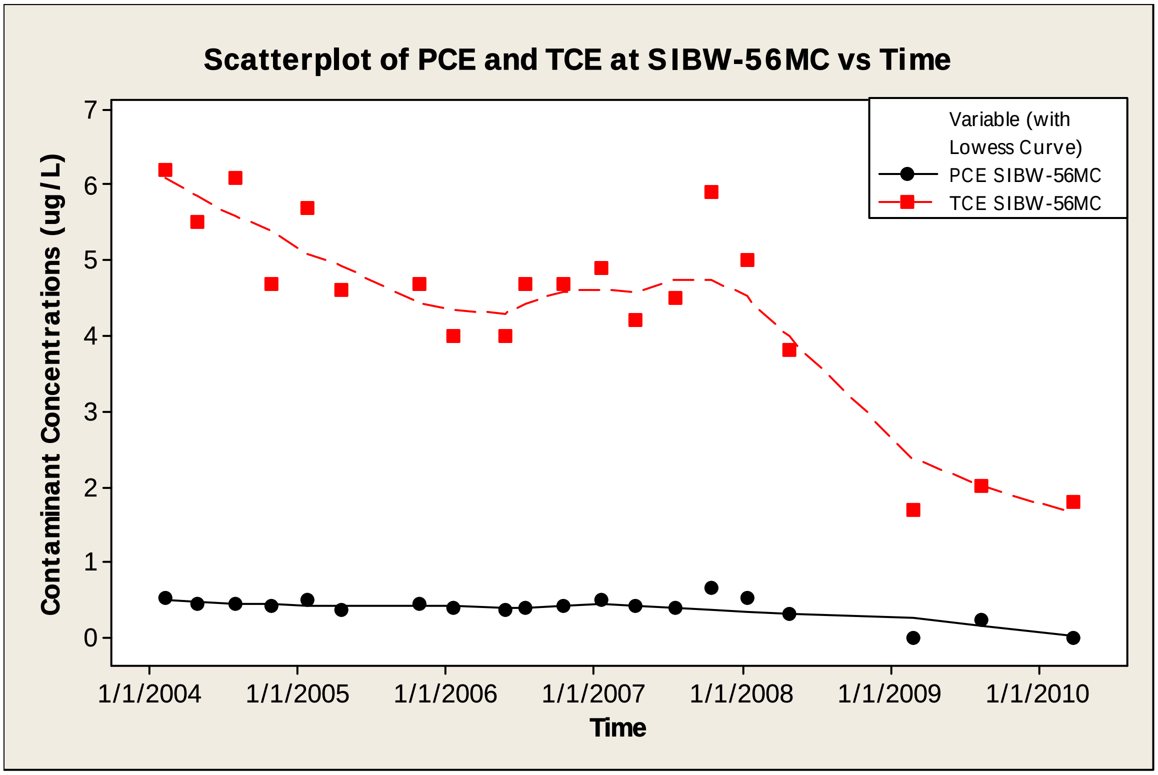
PCE vs Time: The value of Kendalls Tau is 0.33333
TCE vs Time: The value of Kendalls Tau is 1.00000

Descriptive Statistics: Time, PCE SIBW-46U, TCE SIBW-46U

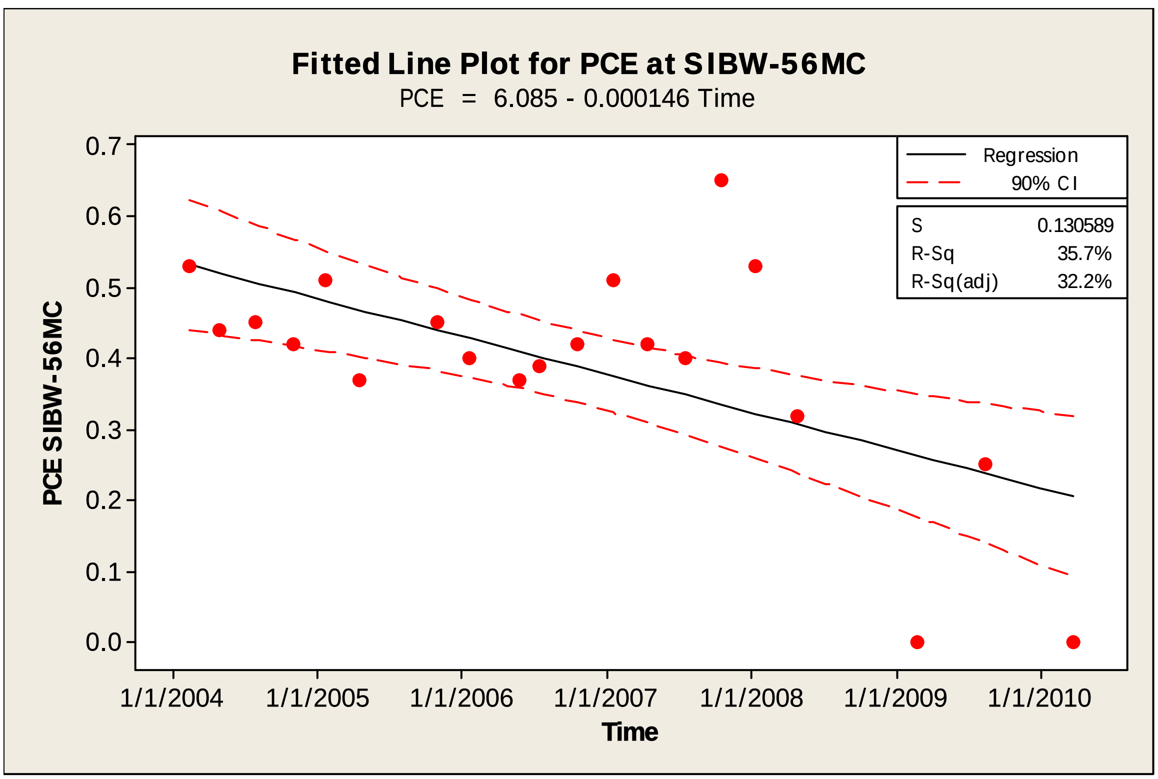
Variable	N	Mean	SE Mean	StDev	Q1
Time	7	38569	294	779	38105
PCE SIBW-46U	7	0.501	0.202	0.535	0.000
TCE SIBW-46U	7	0.000000	0.000000	0.000000	0.000000

Variable	Q3	Minimum	Maximum	Median
Time	38751	38023	40253	38289
PCE SIBW-46U	1.100	0.000	1.100	0.340
TCE SIBW-46U	0.000000	0.000000	0.000000	0.000000

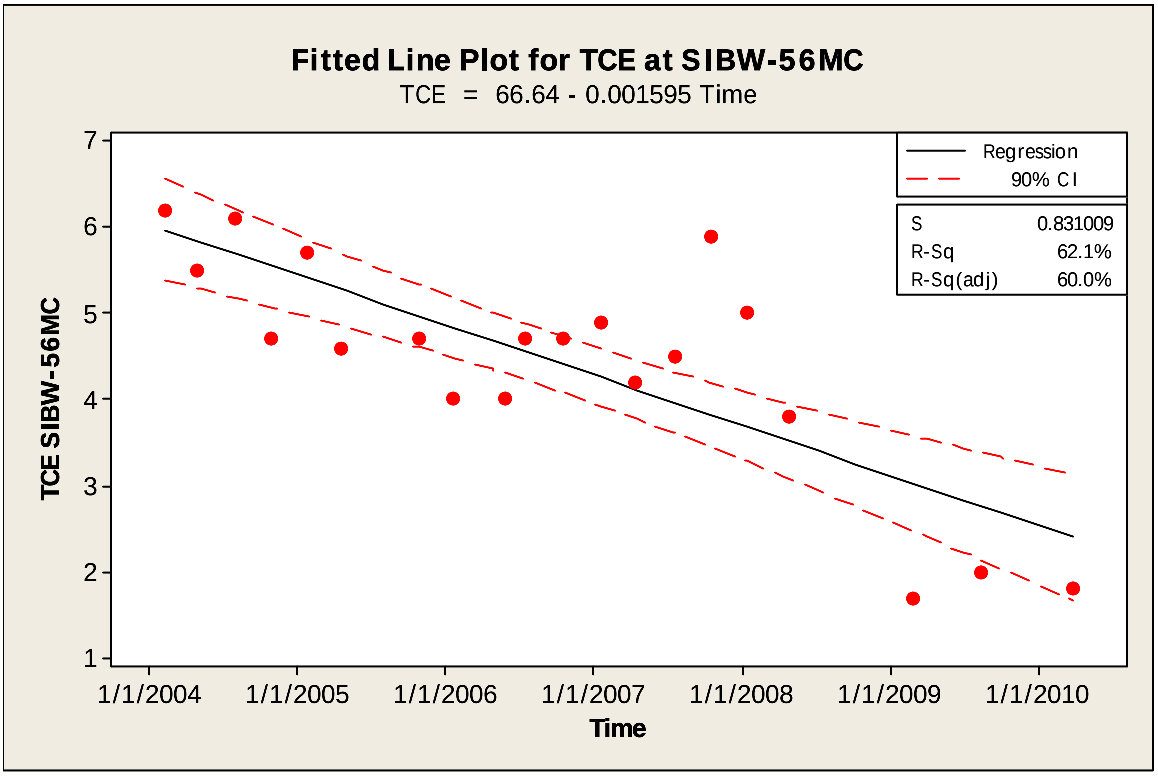
SIBW-56MC



Scatterplot of PCE and TCE at SIBW-56MC vs Time
Contaminant Concentrations (ug/L)
Variable (with Lowess Curve)
PCE SIBW-56MC
TCE SIBW-56MC
0
1
2
3
4
5
6
7
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



Fitted Line Plot for PCE at SIBW-56MC
PCE = 6.085 - 0.000146 Time
PCE SIBW-56MC
Regression
90% CI
S 0.130589
R-Sq 35.7%
R-Sq(adj) 32.2%
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



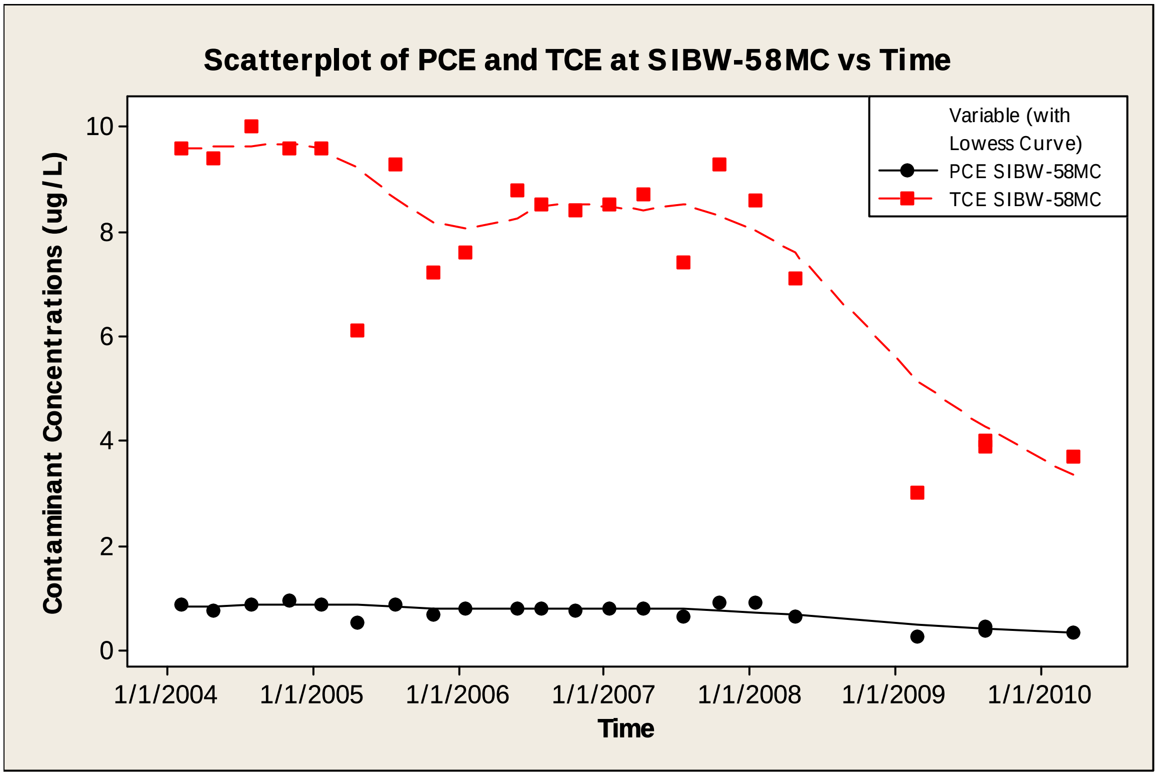
PCE vs Time: The value of Kendalls Tau is -0.29474
TCE vs Time: The value of Kendalls Tau is -0.44211

Descriptive Statistics: Time, PCE SIBW-56MC, TCE SIBW-56MC

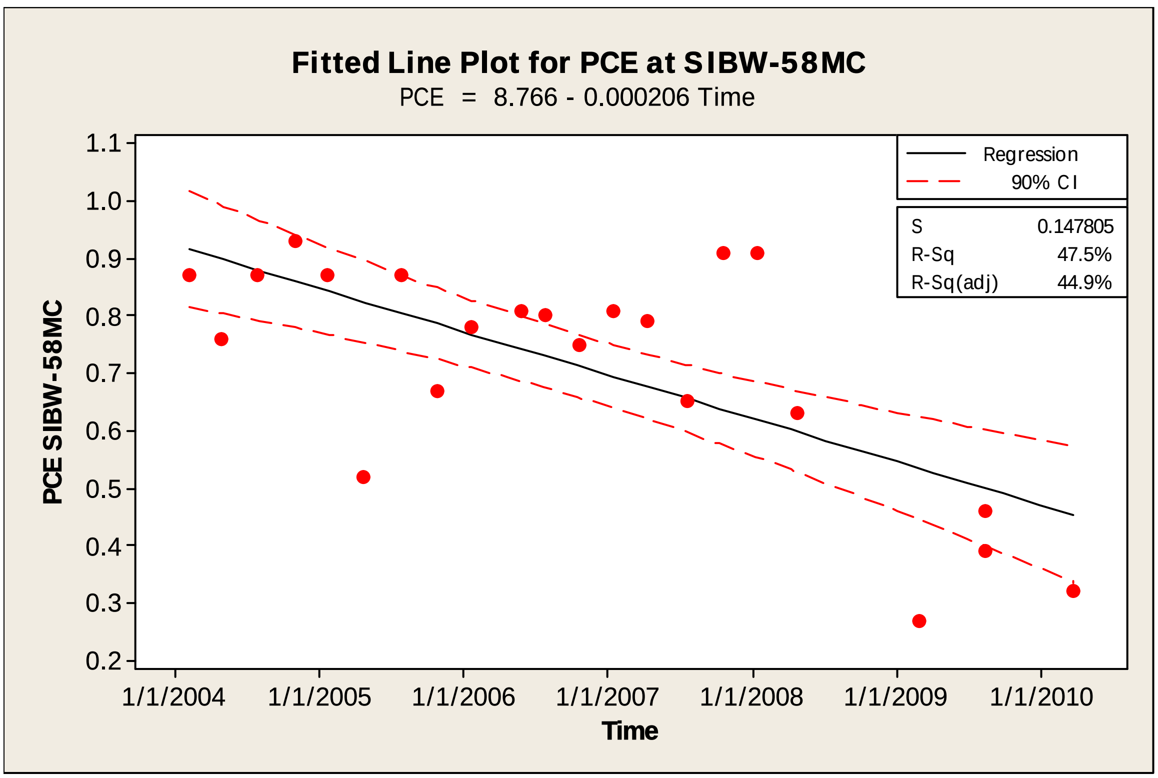
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	20	38988	145	649	38395	39437
PCE SIBW-56MC	20	0.3915	0.0355	0.1586	0.3700	0.4950
TCE SIBW-56MC	20	4.435	0.294	1.314	4.000	5.375

Variable	Minimum	Maximum	Median
Time	38027	40263	38961
PCE SIBW-56MC	0.0000	0.6500	0.4200
TCE SIBW-56MC	1.700	6.200	4.700

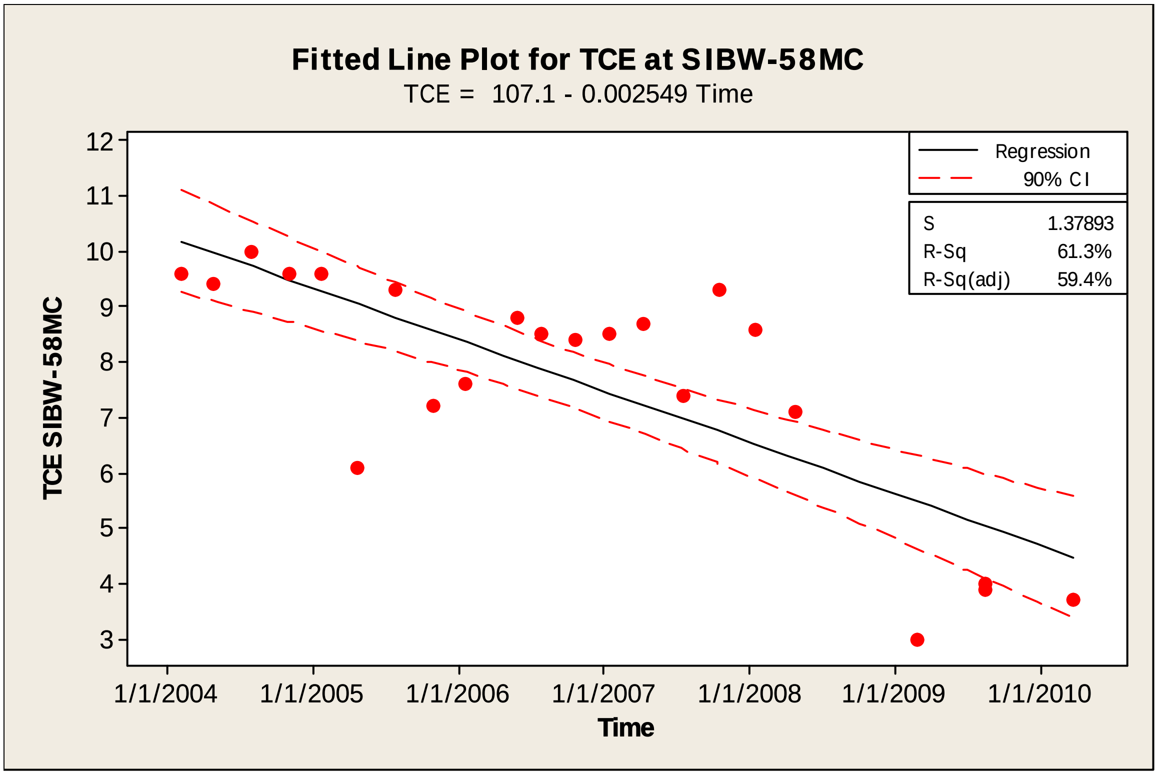
SIBW-58MC



Scatterplot of PCE and TCE at SIBW-58MC vs Time
Contaminant Concentrations (ug/L)
0
2
4
6
8
10
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Variable (with Lowess Curve)
PCE SIBW-58MC
TCE SIBW-58MC



Fitted Line Plot for PCE at SIBW-58MC
PCE = 8.766 - 0.000206 Time
PCE SIBW-58MC
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Regression
90% CI
S 0.147805
R-Sq 47.5%
R-Sq(adj) 44.9%



PCE vs Time: The value of Kendalls Tau is -0.36797
TCE vs Time: The value of Kendalls Tau is -0.53247

Descriptive Statistics: Time, PCE SIBW-58MC, TCE SIBW-58MC

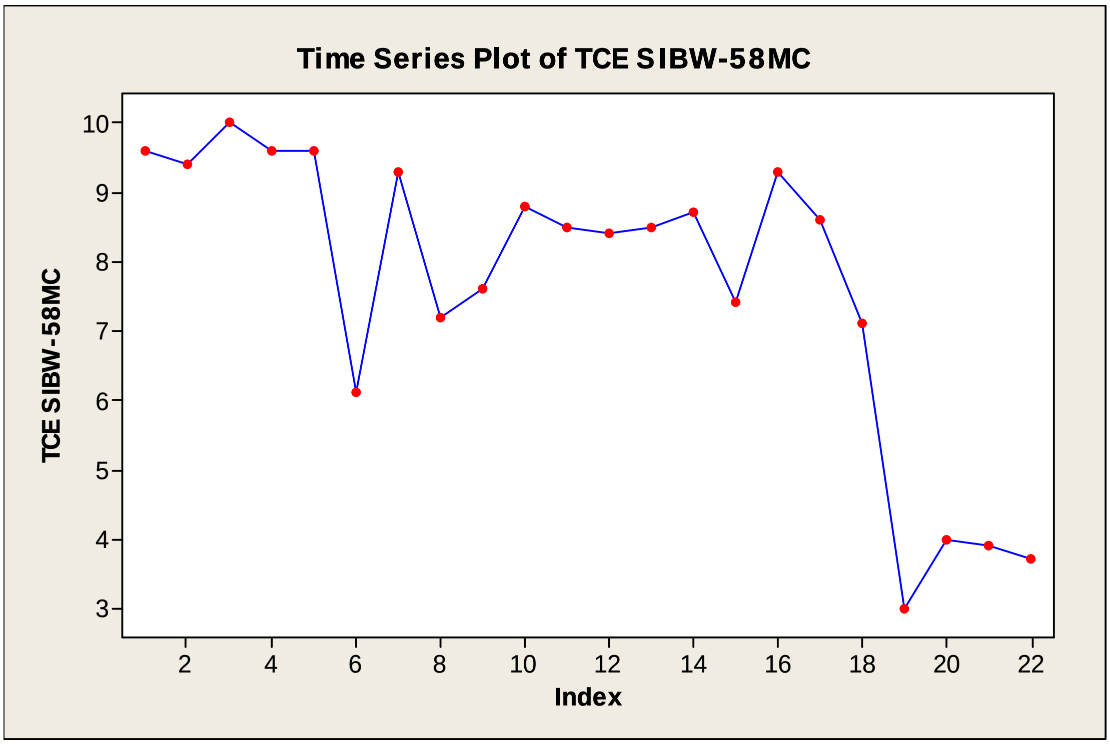
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	22	39016	142	665	38441	39486
PCE SIBW-58MC	22	0.7109	0.0425	0.1991	0.6025	0.8700
TCE SIBW-58MC	22	7.650	0.461	2.164	6.850	9.325

Variable	Minimum	Maximum	Median
Time	38021	40262	38967
PCE SIBW-58MC	0.2700	0.9300	0.7850
TCE SIBW-58MC	3.000	10.000	8.500

Mann-Kendall Trend Test by Normal Approximation

Ho: No trend in TCE SIBW-58MC

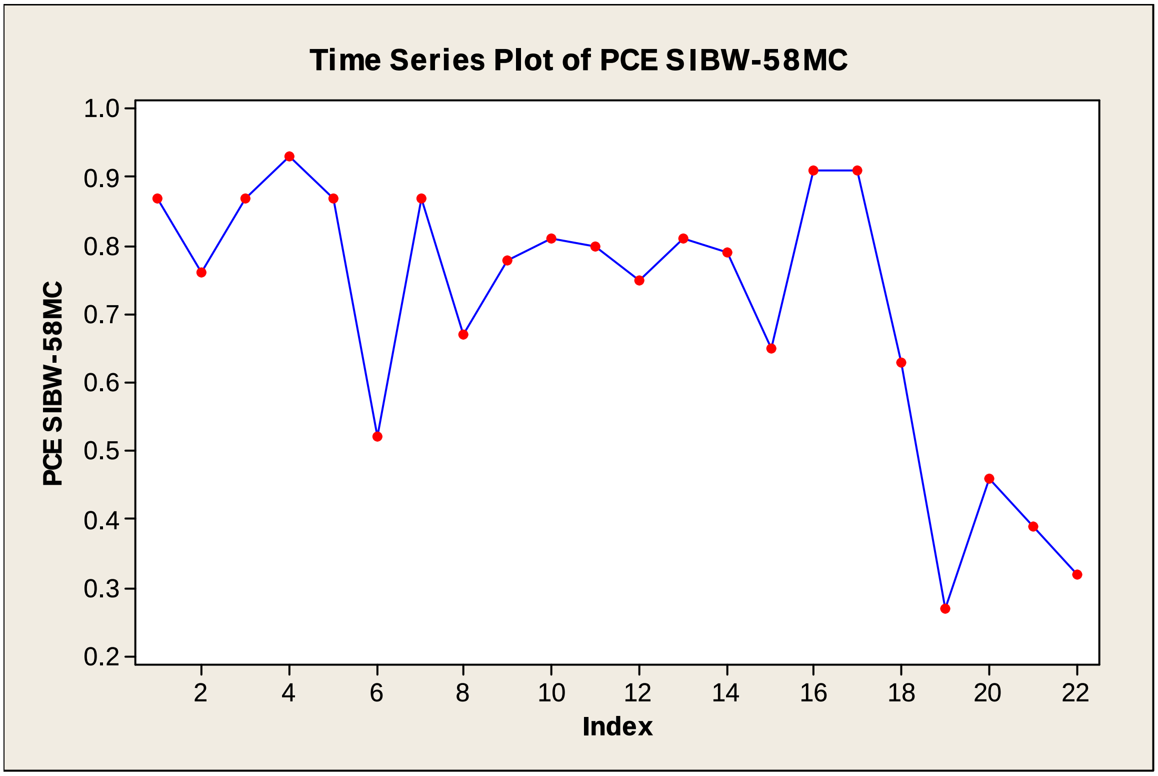
```
The calculated z = -3.58923


For Ha: Upperward trend, the p-value = 0.999834
At alpha = 0.05, there is not enough evidence to determine that
there is an upward trend.

For Ha: Downward trend, the p-value = 0.0001658
At alpha = 0.05, there is enough evidence to determine that
there is a downward trend.
```



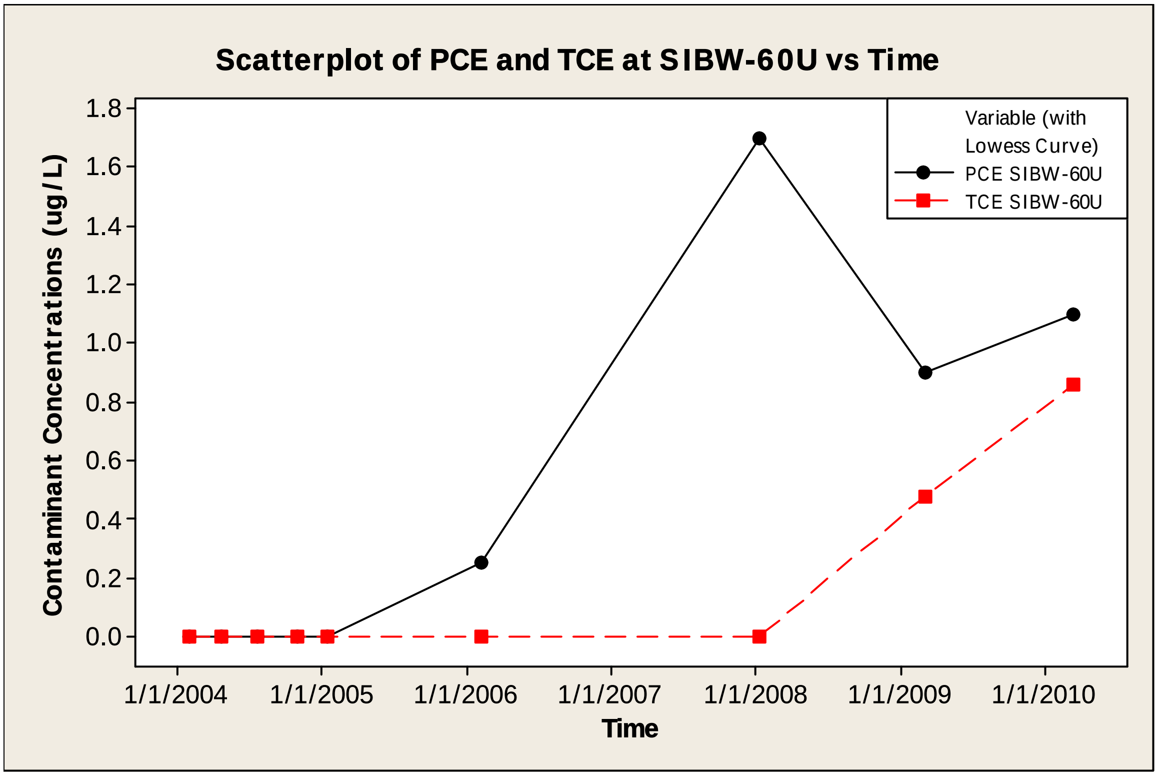
Mann-Kendall Trend Test by Normal Approximation

Ho: No trend in PCE SIBW-58MC

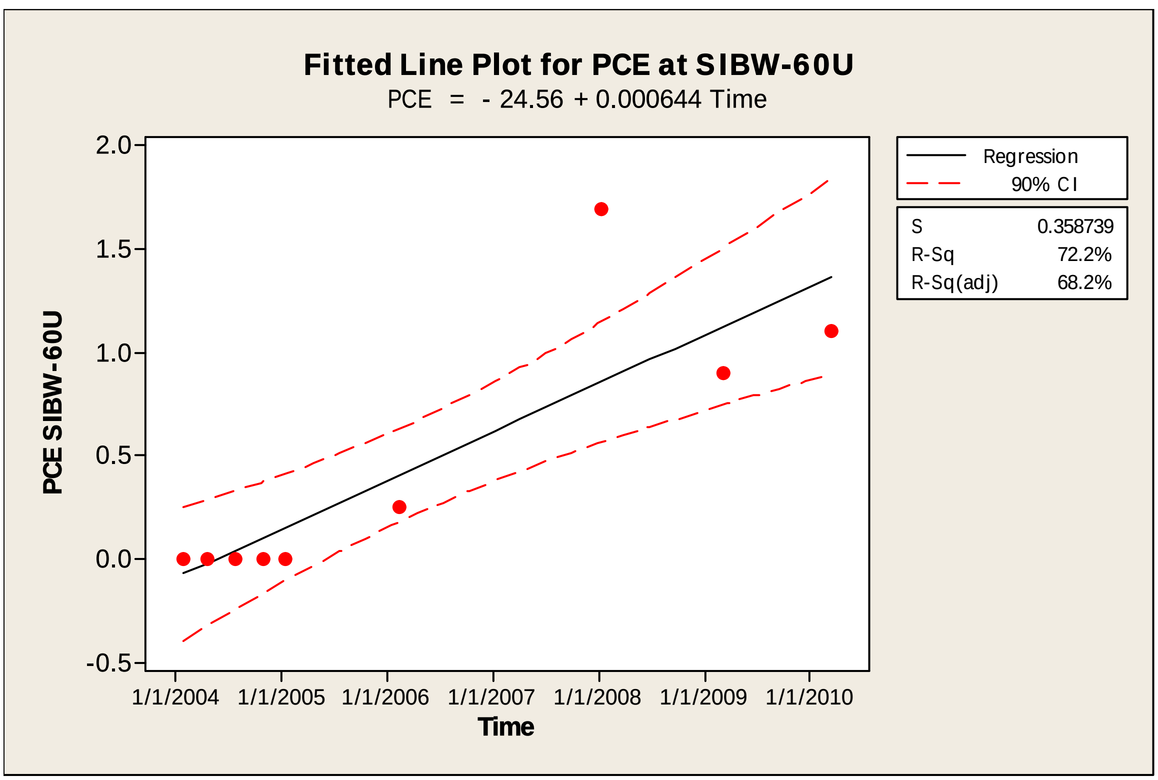
```
The calculated z = -2.60528


For Ha: Upperward trend, the p-value = 0.995410
At alpha = 0.05, there is not enough evidence to determine that
there is an upward trend.

For Ha: Downward trend, the p-value = 0.0045899
At alpha = 0.05, there is enough evidence to determine that
there is a downward trend.
```



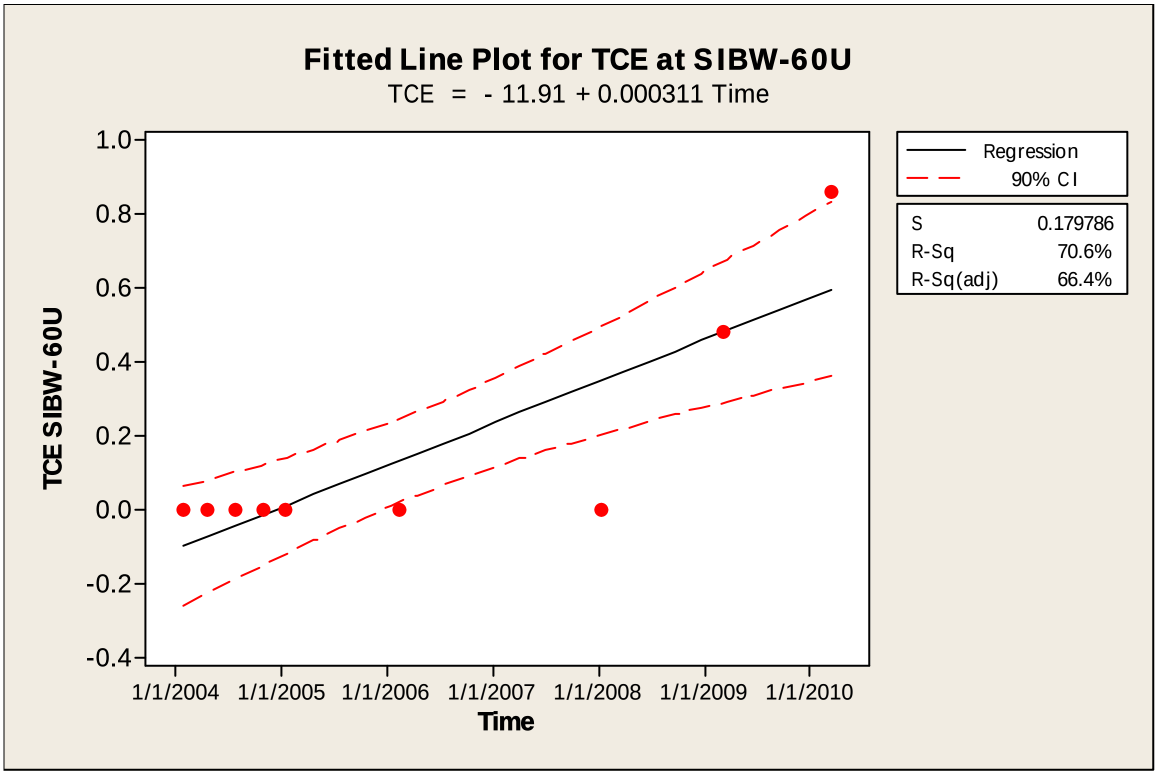
<u>**SIBW-60U**</u>



Scatterplot of PCE and TCE at SIBW-60U vs Time
Contaminant Concentrations (ug/L)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Variable (with Lowess Curve)
PCE SIBW-60U
TCE SIBW-60U



Fitted Line Plot for PCE at SIBW-60U
PCE = - 24.56 + 0.000644 Time
PCE SIBW-60U
2.0
1.5
1.0
0.5
0.0
-0.5
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Regression
90% CI
S 0.358739
R-Sq 72.2%
R-Sq(adj) 68.2%



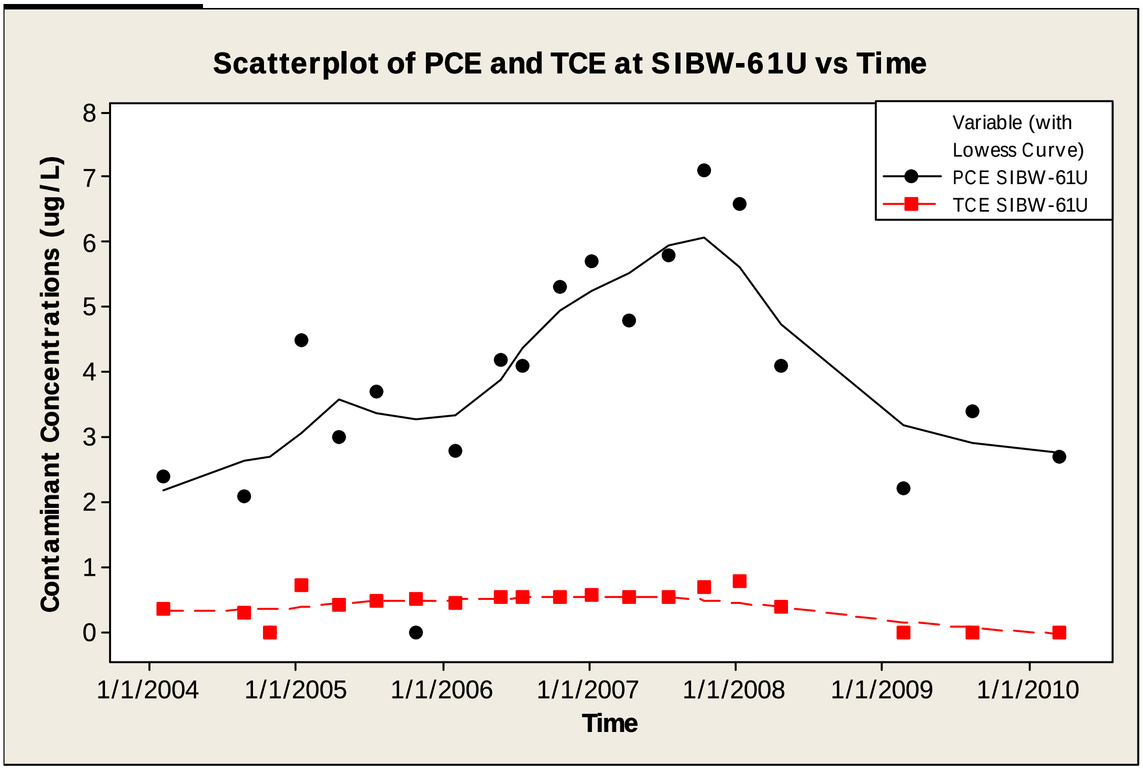
PCE vs Time: The value of Kendalls Tau is 0.88889
TCE vs Time: The value of Kendalls Tau is 1.00000

Descriptive Statistics: Time, PCE SIBW-60U, TCE SIBW-60U

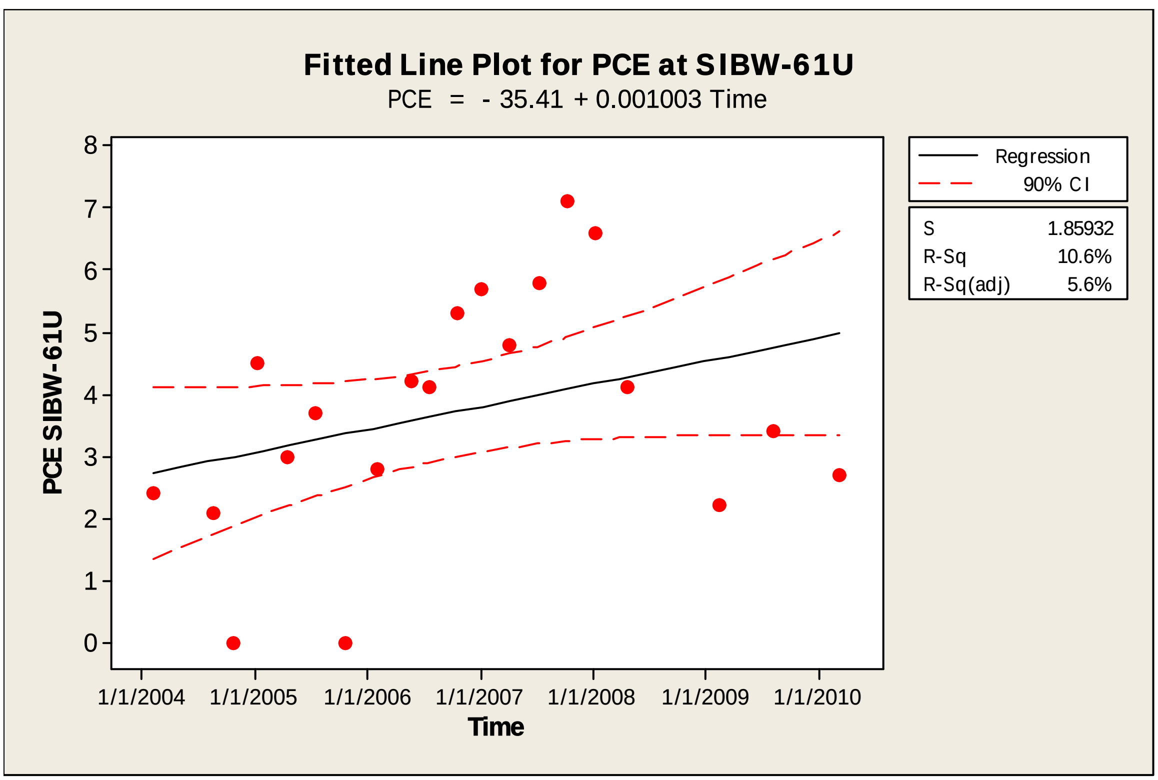
Variable	N	Mean	SE Mean	StDev	Minimum
Time	9	38811	280	839	38015
PCE SIBW-60U	9	0.439	0.212	0.636	0.000
TCE SIBW-60U	9	0.149	0.103	0.310	0.000

Variable	Q1	Median	Q3	Maximum
Time	38144	38366	39668	40252
PCE SIBW-60U	0.000	0.000	1.000	1.700
TCE SIBW-60U	0.000	0.000	0.240	0.860

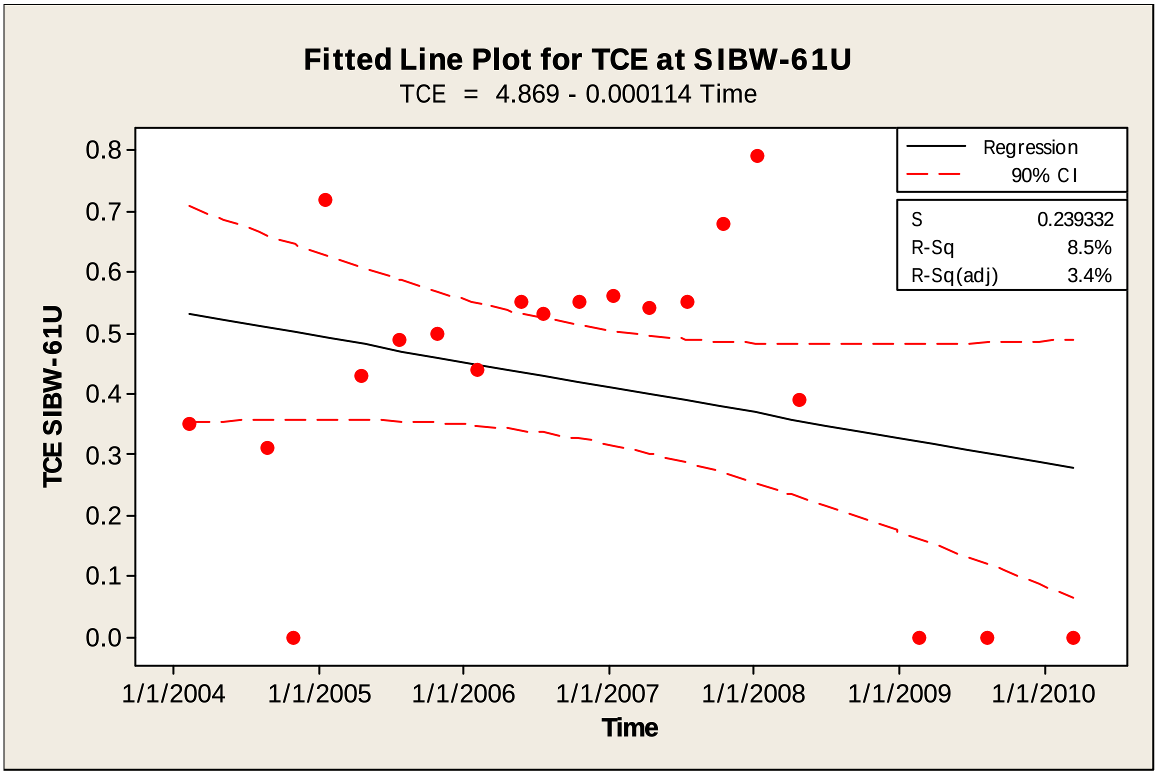
SIBW-61U



Scatterplot of PCE and TCE at SIBW-61U vs Time
Contaminant Concentrations (ug/L)
0
1
2
3
4
5
6
7
8
Variable (with Lowess Curve)
PCE SIBW-61U
TCE SIBW-61U
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



Fitted Line Plot for PCE at SIBW-61U
PCE = - 35.41 + 0.001003 Time
PCE SIBW-61U
0
1
2
3
4
5
6
7
8
Regression
90% CI
S 1.85932
R-Sq 10.6%
R-Sq(adj) 5.6%
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



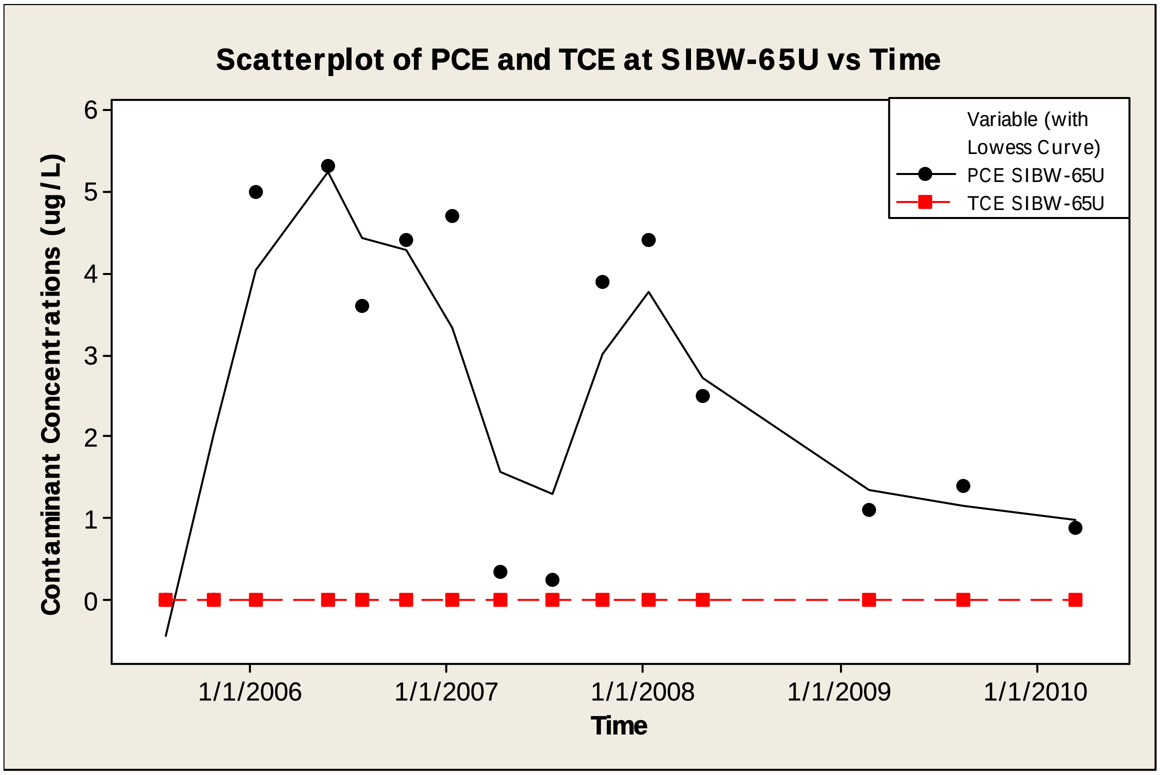
PCE vs Time: The value of Kendalls Tau is 0.30526
TCE vs Time: The value of Kendalls Tau is 0.13684

Descriptive Statistics: Time, PCE SIBW-61U, TCE SIBW-61U

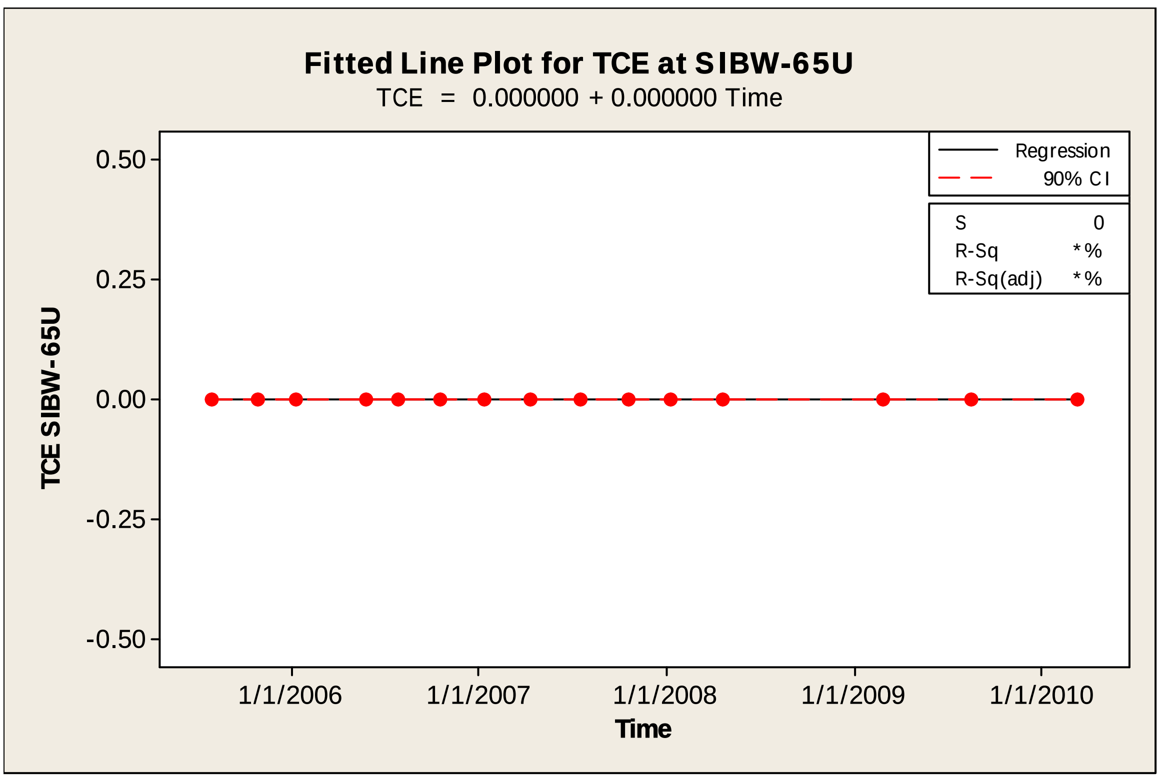
Variable	N	Mean	SE Mean	StDev	Q1	Q3
Time	20	39010	139	622	38484	39435
PCE SIBW-61U	20	3.725	0.428	1.914	2.475	5.175
TCE SIBW-61U	20	0.4190	0.0544	0.2435	0.3200	0.5500

Variable	Minimum	Maximum	Median
Time	38023	40253	38963
PCE SIBW-61U	0.000	7.100	3.900
TCE SIBW-61U	0.0000	0.7900	0.4950

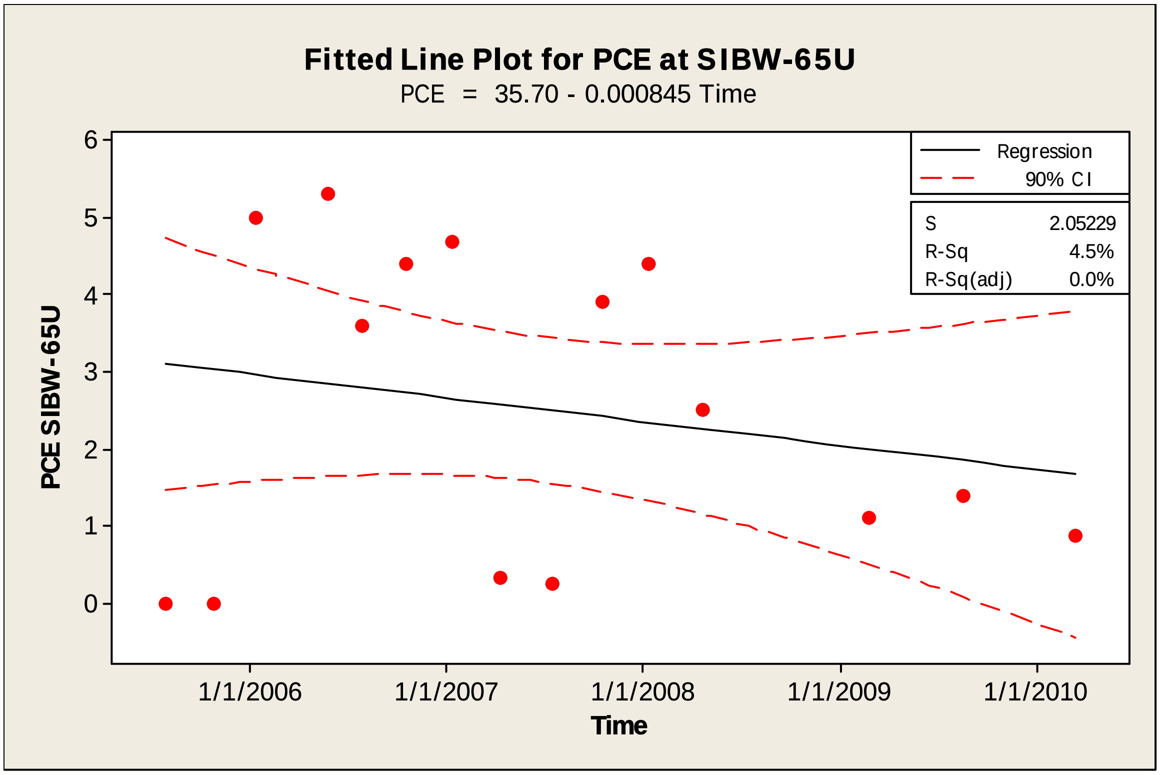
SIBW-65U



Scatterplot of PCE and TCE at SIBW-65U vs Time
Contaminant Concentrations (ug/L)
6
5
4
3
2
1
0
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Variable (with Lowess Curve)
PCE SIBW-65U
TCE SIBW-65U



Fitted Line Plot for TCE at SIBW-65U
TCE = 0.000000 + 0.000000 Time
TCE SIBW-65U
0.50
0.25
0.00
-0.25
-0.50
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time
Regression
90% CI
S 0
R-Sq *%
R-Sq(adj) *%



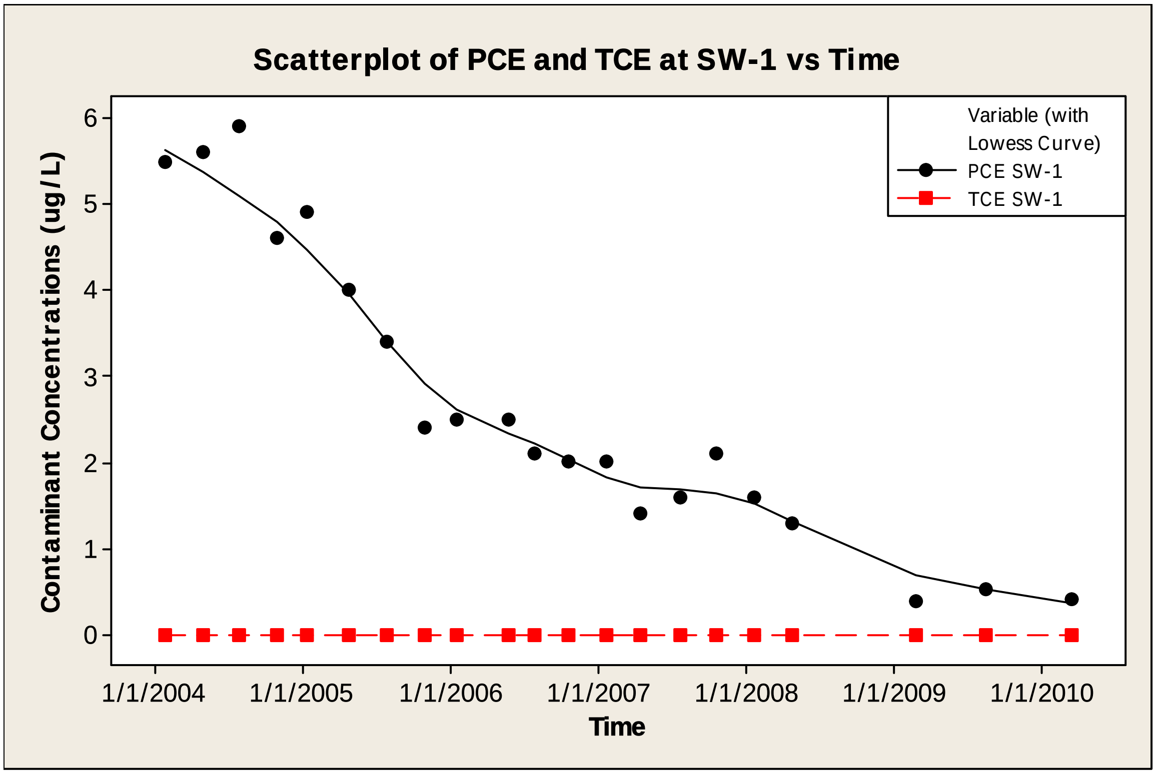
PCE vs Time: The value of Kendalls Tau is -0.08571
TCE vs Time: The value of Kendalls Tau is 1.00000

Descriptive Statistics: Time, PCE SIBW-65U, TCE SIBW-65U

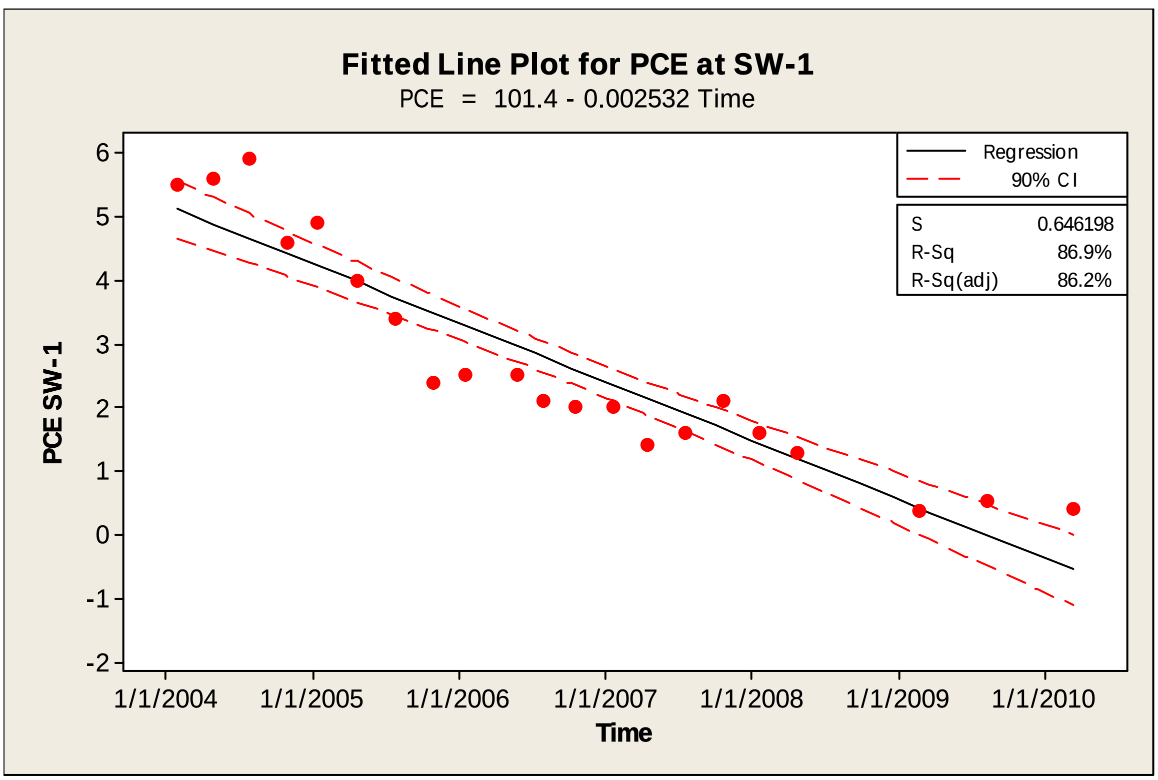
Variable	N	Mean	SE Mean	StDev	Q1
Time	15	39256	131	508	38862
PCE SIBW-65U	15	2.518	0.523	2.024	0.340
TCE SIBW-65U	15	0.000000	0.000000	0.000000	0.000000

Variable	Q3	Minimum	Maximum	Median
Time	39560	38562	40250	39183
PCE SIBW-65U	4.400	0.000	5.300	2.500
TCE SIBW-65U	0.000000	0.000000	0.000000	0.000000

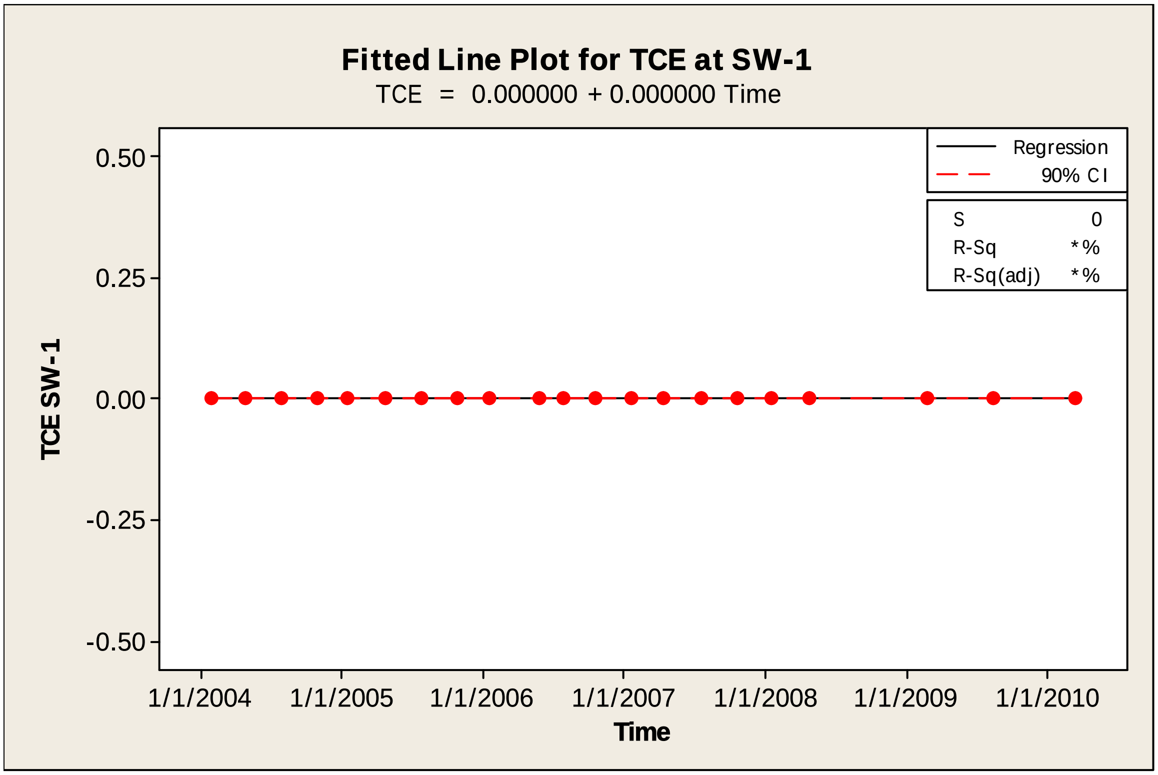
SW-1



Scatterplot of PCE and TCE at SW-1 vs Time
Contaminant Concentrations (ug/L)
Variable (with Lowess Curve)
PCE SW-1
TCE SW-1
0
1
2
3
4
5
6
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



Fitted Line Plot for PCE at SW-1
PCE = 101.4 - 0.002532 Time
PCE SW-1
Regression
90% CI
S 0.646198
R-Sq 86.9%
R-Sq(adj) 86.2%
-2
-1
0
1
2
3
4
5
6
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Time



PCE vs Time: The value of Kendalls Tau is -0.82857
TCE vs Time: The value of Kendalls Tau is 1.00000

Descriptive Statistics: Time, PCE SW-1, TCE SW-1

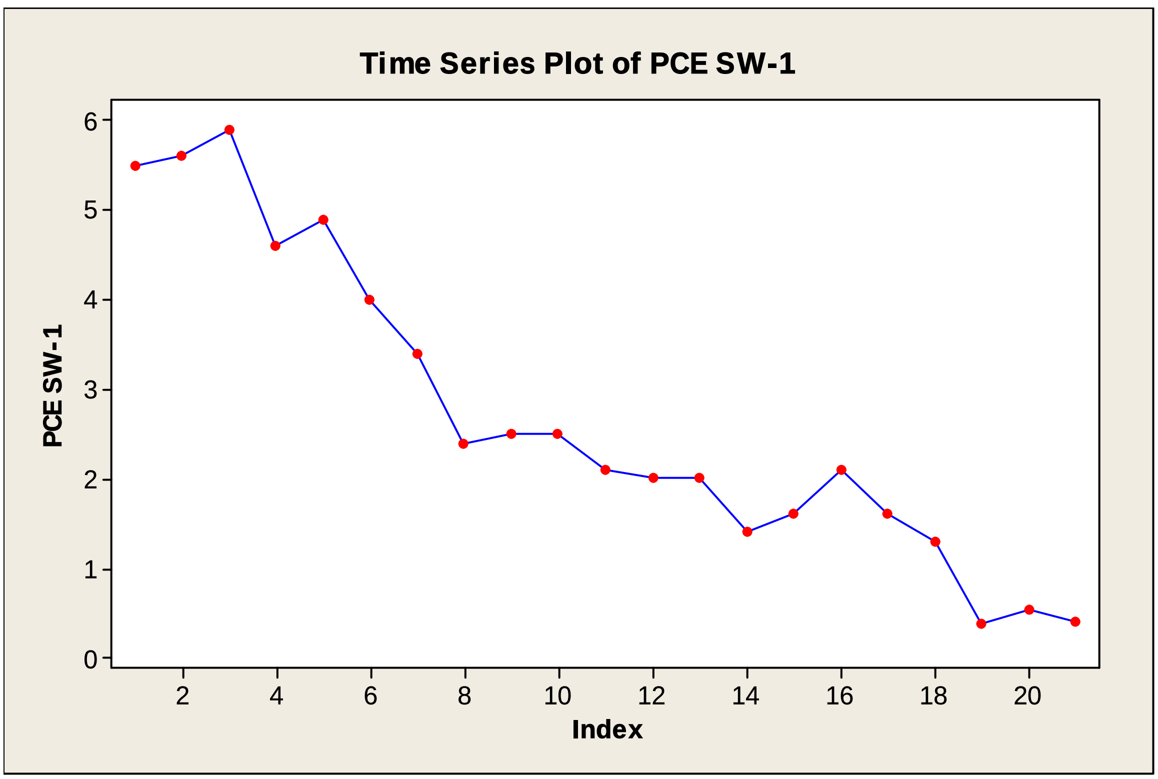
Variable	N	Mean	SE Mean	StDev	Q1
Time	21	38966	140	640	38415
PCE SW-1	21	2.701	0.379	1.7380	1.500
TCE SW-1	21	0.000000	0.000000	0.000000	0.000000

Variable	Q3	Minimum	Maximum	Median
Time	39419	38014	40250	38926
PCE SW-1	4.300	0.380	5.900	2.100
TCE SW-1	0.000000	0.000000	0.000000	0.000000

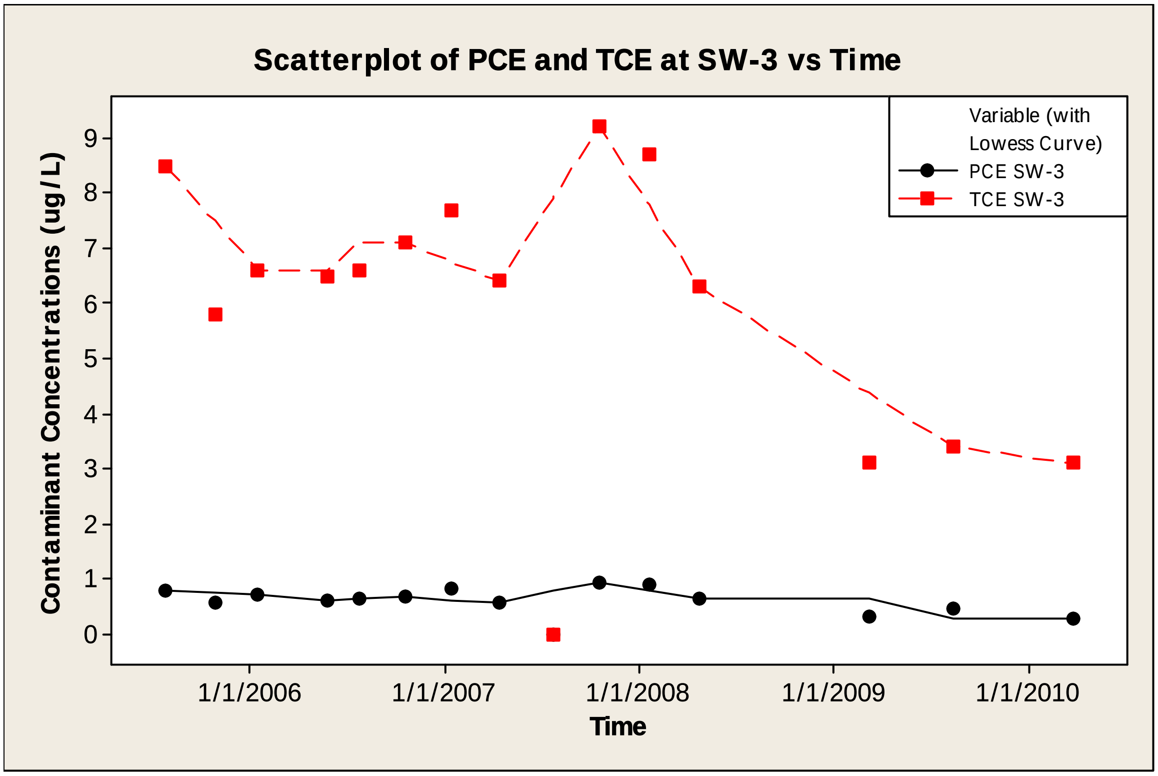
Mann-Kendall Trend Test by Normal Approximation

Ho: No trend in PCE SW-1

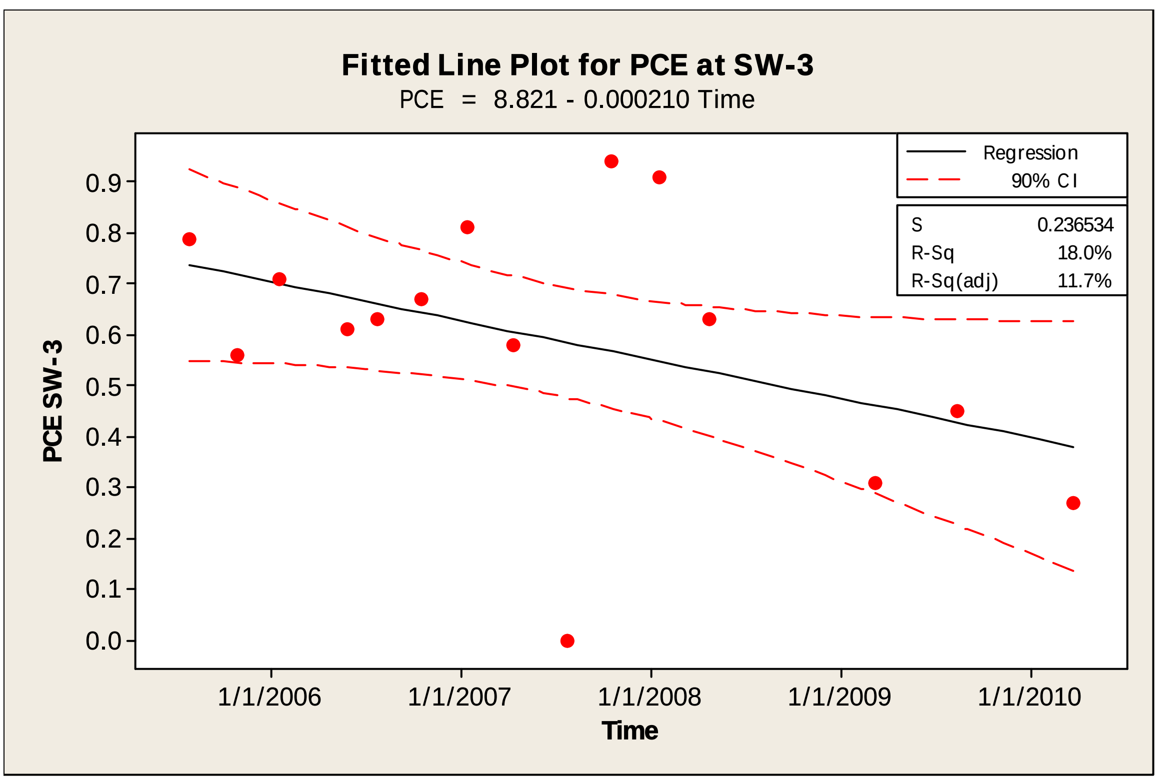
```
The calculated z = -5.35463


For Ha: Upperward trend, the p-value = 1.00000
At alpha = 0.05, there is not enough evidence to determine that
there is an upward trend.


For Ha: Downward trend, the p-value = 0.0000000
At alpha = 0.05, there is enough evidence to determine that
there is a downward trend.
```



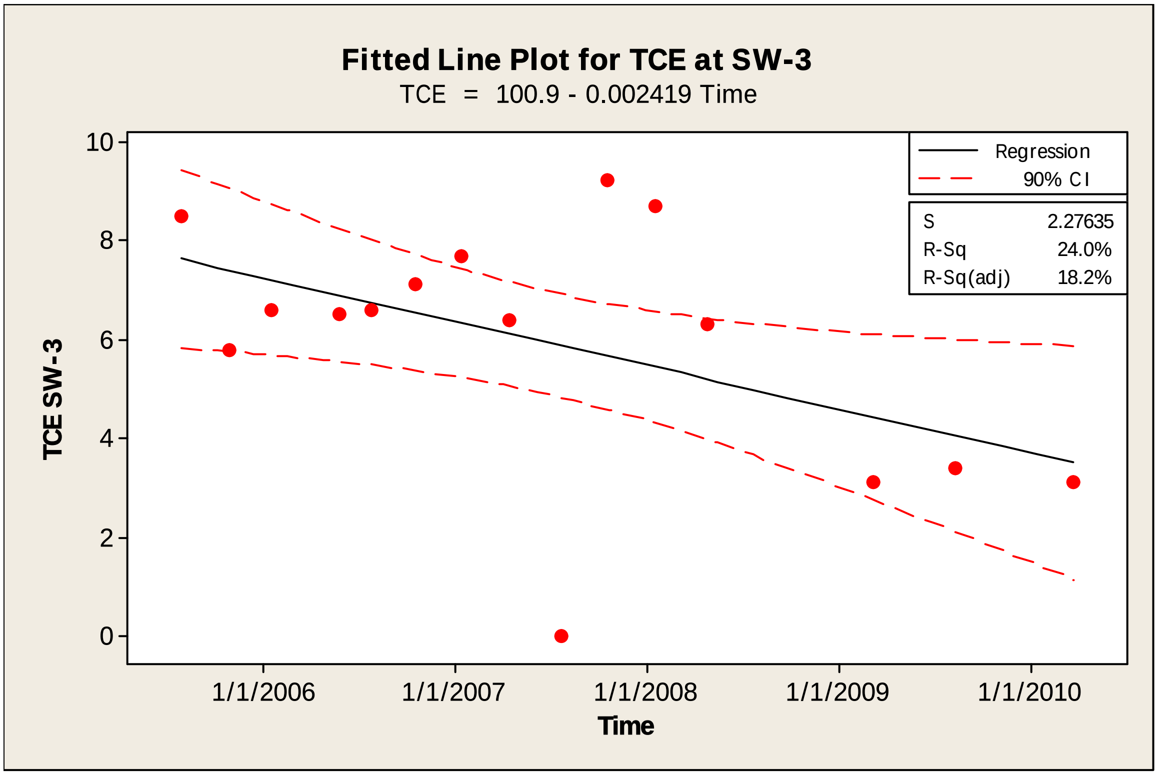
SW-3



Scatterplot of PCE and TCE at SW-3 vs Time
Contaminant Concentrations (ug/L)
Time
Variable (with Lowess Curve)
PCE SW-3
TCE SW-3
0 1 2 3 4 5 6 7 8 9
1/1/2006 1/1/2007 1/1/2008 1/1/2009 1/1/2010



Fitted Line Plot for PCE at SW-3
PCE = 8.821 - 0.000210 Time
PCE SW-3
Time
Regression
90% CI
S 0.236534
R-Sq 18.0%
R-Sq(adj) 11.7%
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
1/1/2006 1/1/2007 1/1/2008 1/1/2009 1/1/2010



PCE vs Time: The value of Kendalls Tau is -0.21905
TCE vs Time: The value of Kendalls Tau is -0.23810

Descriptive Statistics: Time, PCE SW-3, TCE SW-3

Variable	N	Mean	SE Mean	StDev	Minimum
Time	15	39259	132	510	38560
PCE SW-3	15	0.5913	0.0650	0.2517	0.0000
TCE SW-3	15	5.933	0.650	2.516	0.000

Variable	Q1	Median	Q3	Maximum
Time	38864	39185	39562	40261
PCE SW-3	0.4500	0.6300	0.7900	0.9400
TCE SW-3	3.400	6.500	7.700	9.200

Appendix C

Site Inspection Checklist

Five-Year Review Area 7 Site Inspection Checklist

I. SITE INFORMATION

Site name: North Indian Bend Wash, Area 7 Groundwater Extraction and Treatment System	**Date of inspection:** 11-17-2010
Location and Region: Scottsdale, Arizona	**EPA ID:** EP-S9-08-03
Agency, office, or company leading the five-year review: EPA, Region 9	**Weather/temperature:** Sunny, 75^{o}

Remedy Includes: (Check all that apply)

□ Landfill cover/containment
■ Access controls
□ Institutional controls
■ Groundwater pump and treatment
□ Surface water collection and treatment
■ Other: Soil Vapor Extraction____
____

□ Monitored natural attenuation
■ Groundwater containment
□ Vertical barrier walls

Inspection Team: **Doug Fisher, E.I.T., ITSI**
Stephanie Archabal, E.I.T., ITSI

Site Map: Included in FYR Report

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _Ryan O'Keefe_______ ___Environmental Scientist__ ___11/17/10___
Name Title Date
Interviewed ■ at site □ at office □ by phone Phone no. _602.295.6708___
Problems, suggestions; □ Report attached ____
____

2. **O&M staff** ____James Lutton, P.E.______ ___NIBW PCs Engineer__ ___11/17/10___
Name Title Date
Interviewed ■ at site □ at office □ by phone Phone no. _916.698.2726___
Problems, suggestions; □ Report attached ____
____

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency ____________________________ Contact ____________________________ __________________ ________ ____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ____________________________ Contact ____________________________ __________________ ________ ____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ____________________________ Contact ____________________________ __________________ ________ ____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ____________________________ Contact ____________________________ __________________ ________ ____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____
4.	**Other interviews** (optional) □ Report attached.
Interviews with the NIBW PCs, EPA, ADEQ, SRP, COS, and community members were conducted separately from the site inspection interviews, and are attached as an appendix to the FYR Report.	

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	**O&M Documents** ■ O&M manual ■ As-built drawings ■ Maintenance logs	 ■ Readily available ■ Readily available ■ Readily available	 □ Up to date □ Up to date ■ Up to date	 □ N/A □ N/A □ N/A
	Remarks: The O&M Plan includes a process description; interlocks and alarm controls; routine procedures for startup and shutdown, equipment maintenance, and process water and stripper off-gas performance monitoring; a spare parts list; reporting requirements; and incident procedures. The O&M Plan should be updated to include well rehabilitation schedules and procedures; updated drawings; and alarm testing schedules and procedures. A logbook is on-site and includes alarm testing history, site visits, and maintenance activities.			
2.	**Site-Specific Health and Safety Plan** ■ Contingency plan/emergency response plan	■ Readily available ■ Readily available	■ Up to date ■ Up to date	□ N/A □ N/A
	Remarks: HASP is on-site and adequate			
3.	**O&M and OSHA Training Records**	■ Readily available	■ Up to date	□ N/A
	Remarks:			
4.	**Permits and Service Agreements** □ Air discharge permit □ Effluent discharge □ Waste disposal, POTW □ Other permits______________________	 □ Readily available □ Readily available □ Readily available □ Readily available	 □ Up to date □ Up to date □ Up to date □ Up to date	 ■ N/A ■ N/A ■ N/A ■ N/A
	Remarks: Air discharge permit for emergency air generator			
5.	**Gas Generation Records**	□ Readily available	□ Up to date	■ N/A
	Remarks______________________________			
6.	**Settlement Monument Records**	□ Readily available	□ Up to date	■ N/A
	Remarks______________________________			
7.	**Groundwater Monitoring Records**	■ Readily available	■ Up to date	□ N/A
	Remarks: Quarterly and Annual reports kept electronically by NIBW PCs			
8.	**Leachate Extraction Records**	□ Readily available	□ Up to date	■ N/A
	Remarks______________________________			
9.	**Discharge Compliance Records** □ Air □ Water (effluent)	 □ Readily available □ Readily available	 □ Up to date □ Up to date	 ■ N/A ■ N/A
	Remarks______________________________			
10.	**Daily Access/Security Logs**	■ Readily available	■ Up to date	□ N/A
	Remarks: Roll-off gate secured with lock and key, the HMI is monitored daily___________________			

IV. O&M COSTS – Discussed in Section 4 of the FYR Report
1. **O&M Organization** □ State in-house □ Contractor for State □ PRP in-house □ Contractor for PRP □ Federal Facility in-house □ Contractor for Federal Facility □ Other____ ____
2. **O&M Cost Records** □ Readily available □ Up to date □ Funding mechanism/agreement in place Original O&M cost estimate____________________□ Breakdown attached Total annual cost by year for review period if available From__________ To__________ __________________ □ Breakdown attached Date Date Total cost From__________ To__________ __________________ □ Breakdown attached Date Date Total cost From__________ To__________ __________________ □ Breakdown attached Date Date Total cost From__________ To__________ __________________ □ Breakdown attached Date Date Total cost From__________ To__________ __________________ □ Breakdown attached Date Date Total cost
3. **Unanticipated or Unusually High O&M Costs During Review Period** Describe costs and reasons: ____ ____ ____ ____ ____ ____
V. ACCESS AND INSTITUTIONAL CONTROLS ■Applicable □ N/A
A. Fencing
1. **Fencing damaged** □ Location shown on site map ■ Gates secured □ N/A Remarks____ ____
B. Other Access Restrictions
1. **Signs and other security measures** □ Location shown on site map □ N/A Remarks: Access gate secured

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ■ Yes □ No □ N/A
Site conditions imply ICs not being fully enforced ■ Yes □No □ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) __Self-reporting______________________________
Frequency ____
Responsible party/agency __NIBW PCs____
Contact ________________________ ________________ ___________ ________________
Name Title Date Phone no.

Reporting is up-to-date ■ Yes □ No □ N/A
Reports are verified by the lead agency ■ Yes □ No □ N/A

Specific requirements in deed or decision documents have been met □ Yes □ No ■ N/A
Violations have been reported □ Yes □ No ■ N/A
Other problems or suggestions: □ Report attached
____
____
____
____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A
Remarks____
____
____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident
Remarks____
____

2. **Land use changes on site** ■ N/A
Remarks____
____

3. **Land use changes off site** ■ N/A
Remarks____
____

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable □ N/A

1. **Roads damaged** □ Location shown on site map ■ Roads adequate □ N/A

Remarks: Roads around the facility are nicely paved and clear of debris

B. Other Site Conditions

Remarks : The facility is very clean and good housekeeping is practiced. Everything is stored in its proper place.

____

____

____

____

____

VII. LANDFILL COVERS □ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) □ Location shown on site map □ Settlement not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

2. **Cracks** □ Location shown on site map □ Cracking not evident
   Lengths____________ Widths___________ Depths__________
   Remarks____
   ____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

4. **Holes** □ Location shown on site map □ Holes not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

5. **Vegetative Cover** □ Grass □ Cover properly established □ No signs of stress
   □ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks____
   ____

6. **Alternative Cover (armored rock, concrete, etc.)** □ N/A
   Remarks____
   ____

7. **Bulges** □ Location shown on site map □ Bulges not evident
   Areal extent______________ Height____________
   Remarks____
   ____

8.	**Wet Areas/Water Damage** □ Wet areas/water damage not evident □ Wet areas □ Location shown on site map Areal extent______________ □ Ponding □ Location shown on site map Areal extent______________ □ Seeps □ Location shown on site map Areal extent______________ □ Soft subgrade □ Location shown on site map Areal extent______________ Remarks____ ____
9.	**Slope Instability** □ Slides □ Location shown on site map □ No evidence of slope instability Areal extent______________ Remarks____ ____
B. Benches	□ Applicable □ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)
1.	**Flows Bypass Bench** □ Location shown on site map □ N/A or okay Remarks____ ____
2.	**Bench Breached** □ Location shown on site map □ N/A or okay Remarks____ ____
3.	**Bench Overtopped** □ Location shown on site map □ N/A or okay Remarks____ ____
C. Letdown Channels	□ Applicable □ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)
1.	**Settlement** □ Location shown on site map □ No evidence of settlement Areal extent______________ Depth____________ Remarks____ ____
2.	**Material Degradation** □ Location shown on site map □ No evidence of degradation Material type_______________ Areal extent_____________ Remarks____ ____
3.	**Erosion** □ Location shown on site map □ No evidence of erosion Areal extent______________ Depth____________ Remarks____ ____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
Areal extent______________ Depth____________
Remarks____
____

5. **Obstructions** Type_____________________ □ No obstructions
□ Location shown on site map Areal extent______________
Size_____________
Remarks____
____

6. **Excessive Vegetative Growth** Type____________________
□ No evidence of excessive growth
□ Vegetation in channels does not obstruct flow
□ Location shown on site map Areal extent______________
Remarks____
____

D. Cover Penetrations □ Applicable □ N/A

1. **Gas Vents** □ Active □ Passive
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ Evidence of leakage at penetration □ Needs Maintenance
□ N/A
Remarks____
____

2. **Gas Monitoring Probes**
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ Evidence of leakage at penetration □ Needs Maintenance □ N/A
Remarks____
____

3. **Monitoring Wells** (within surface area of landfill)
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ Evidence of leakage at penetration □ Needs Maintenance □ N/A
Remarks____
____

4. **Leachate Extraction Wells**
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ Evidence of leakage at penetration □ Needs Maintenance □ N/A
Remarks____
____

5. **Settlement Monuments** □ Located □ Routinely surveyed □ N/A
Remarks____
____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A	
1.	**Gas Treatment Facilities** ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs Maintenance Remarks____ ____
2.	**Gas Collection Wells, Manifolds and Piping** ☐ Good condition ☐ Needs Maintenance Remarks____ ____
3.	**Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs Maintenance ☐ N/A Remarks____ ____
F. Cover Drainage Layer ☐ Applicable ☐ N/A	
1.	**Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks____ ____
2.	**Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks____ ____
☐. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A	
1.	**Siltation** Areal extent______________ Depth____________ ☐ N/A ☐ Siltation not evident Remarks____ ____
2.	**Erosion** Areal extent______________ Depth____________ ☐ Erosion not evident Remarks____ ____
3.	**Outlet Works** ☐ Functioning ☐ N/A Remarks____ ____
4.	**Dam** ☐ Functioning ☐ N/A Remarks____ ____

H. Retaining Walls □ Applicable □ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
Horizontal displacement____________ Vertical displacement_______________
Rotational displacement____________
Remarks____
____

2. **Degradation** □ Location shown on site map □ Degradation not evident
Remarks____
____

I. Perimeter Ditches/Off-Site Discharge □ Applicable □ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
Areal extent______________ Depth____________
Remarks____
____

2. **Vegetative Growth** □ Location shown on site map □ N/A
□ Vegetation does not impede flow
Areal extent______________ Type____________
Remarks____
____

3. **Erosion** □ Location shown on site map □ Erosion not evident
Areal extent______________ Depth____________
Remarks____
____

4. **Discharge Structure** □ Functioning □ N/A
Remarks____
____

VIII. VERTICAL BARRIER WALLS □ Applicable ■ N/A

1. **Settlement** □ Location shown on site map □ Settlement not evident
Areal extent______________ Depth____________
Remarks____
____

2. **Performance Monitoring** Type of monitoring__________________________
□ Performance not monitored
Frequency_______________________________ □ Evidence of breaching
Head differential__________________________
Remarks____
____

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ■ Applicable □ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
■ Good condition ■ All required wells properly operating □ Needs Maintenance □ N/A
Remarks____
____
____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
■ Good condition □ Needs Maintenance
Remarks____
____

3. **Spare Parts and Equipment**
■ Readily available ■ Good condition □ Requires upgrade □ Needs to be provided
Remarks:
____

B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
□ Good condition □ Needs Maintenance
Remarks____
____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
□ Good condition □ Needs Maintenance
Remarks____
____

3. **Spare Parts and Equipment**
□ Readily available □ Good condition □ Requires upgrade □ Needs to be provided
Remarks____
____

C. Treatment System ■ Applicable □ N/A

1. **Treatment Train** (Check components that apply)
□ Metals removal □ Oil/water separation □ Bioremediation
■ Air stripping ■ Carbon adsorbers
□ Filters____
■ Additive (*e.g.*, chelation agent, flocculent): NaOCl for anti-scaling________________
■ Others: Hydrogen peroxide and UV/Ox________________________________
■ Good condition □ Needs Maintenance
■ Sampling ports properly marked and functional
■ Sampling/maintenance log displayed and up to date
■ Equipment properly identified
■ Quantity of groundwater treated annually: 2009 = 192 million gallons ______________
□ Quantity of surface water treated annually________________
Remarks____
____

2. **Electrical Enclosures and Panels** (properly rated and functional)
□ N/A ■ Good condition □ Needs Maintenance
Remarks: Clearly marked________________________________
____

3. **Tanks, Vaults, Storage Vessels**
□ N/A ■ Good condition ■ Proper secondary containment □ Needs Maintenance
Remarks: Hydrogen peroxide and sodium hypochlorite drums use secondary containment______
____

4. **Discharge Structure and Appurtenances**
■ N/A □Good condition □ Needs Maintenance
Remarks____
____

5. **Treatment Building(s)**
□ N/A ■ Good condition (esp. roof and doorways) □ Needs repair
■ Chemicals and equipment properly stored
Remarks ________________________
____

6. **Monitoring Wells** (pump and treatment remedy)
■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition
■ All required wells located □ Needs Maintenance □ N/A
Remarks____
____

D. Monitoring Data

1. Monitoring Data
■ Is routinely submitted on time ■ Is of acceptable quality

2. Monitoring data suggests:
■ Groundwater plume is effectively contained ■ Contaminant concentrations are declining

D. Monitored Natural Attenuation	
1.	**Monitoring Wells** (natural attenuation remedy) □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ All required wells located □ Needs Maintenance □ N/A Remarks____ ____
X. OTHER REMEDIES	
	If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.
XI. OVERALL OBSERVATIONS	
A.	**Implementation of the Remedy**
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The remedy is intended to remove VOC mass from the groundwater, contain the groundwater plume, and ultimately restore the groundwater to VOC levels below the MCLs for TCE and PCE. The remedy is effective and functioning as designed.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. The recent changes in the disinfection system to sodium hypochlorite have resulted in reduced O&M costs. Other O&M activities have been conducted as planned. The SVE system which is currently shut-off for rebound testing, is being evaluated in 2011. These O&M activities do not alter the current or future protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There have not been any unexpected changes in the cost or scope of O&M that suggest that the protectiveness of the remedy may be compromised in the future.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The evaluation of the SVE rebound test may identify opportunities for optimization.

Five-Year Review Area 12 Site Inspection Checklist

I. SITE INFORMATION	
Site name: North Indian Bend Wash, Area 12 Groundwater Extraction and Treatment System	**Date of inspection:** 11-16-2010
Location and Region: Scottsdale, Arizona	**EPA ID:** EP-S9-08-03
Agency, office, or company leading the five-year review: EPA, Region 9	**Weather/temperature:** Sunny, 75^{o}
Remedy Includes: (Check all that apply) □ Landfill cover/containment □ Monitored natural attenuation ■ Access controls ■Groundwater containment □ Institutional controls □ Vertical barrier walls ■ Groundwater pump and treatment □ Surface water collection and treatment □ Other______________________________________	
Inspection Team: **Doug Fisher, E.I.T., ITSI** **Stephanie Archabal, E.I.T., ITSI**	
Site Map: Included in FYR Report	
II. INTERVIEWS (Check all that apply)	
1. **O&M site manager** _Robert Lynch_______ ___Principal Engineer__ ___11/16/10___ Name Title Date Interviewed ■ at site □ at office □ by phone Phone no. _480-922-4954___ Problems, suggestions; □ Report attached ______________________________	
2. **O&M staff** ____James Lutton, P.E.______ ___NIBW PCs Engineer__ ___11/16/10___ Name Title Date Interviewed ■ at site □ at office □ by phone Phone no. _916-698-2726___ Problems, suggestions; □ Report attached ______________________________	

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency ______________________________ Contact ______________________________ ___________________ _________ _____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ Agency ______________________________ Contact ______________________________ ___________________ _________ _____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ Agency ______________________________ Contact ______________________________ ___________________ _________ _____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ Agency ______________________________ Contact ______________________________ ___________________ _________ _____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____
4.	**Other interviews** (optional) □ Report attached.
Interviews with the NIBW PCs, EPA, ADEQ, SRP, COS, and community members were conducted separately from the site inspection interviews, and are attached as an appendix to the FYR Report.	

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	**O&M Documents**			
	■ O&M manual	■ Readily available	□ Up to date	□ N/A
	■ As-built drawings	■ Readily available	□ Up to date	□ N/A
	■ Maintenance logs	■ Readily available	□ Up to date	□ N/A
	Remarks: The Site-Specific O&M Manual should be updated to include adequate discussions of process description, performance monitoring, routine and preventive maintenance, protocols for field instrumentation and alarm testing and calibration, well rehab SOPs and schedules, troubleshooting procedures, and a spare parts list. Hard copies of the Sampling and Analysis Plan and Health and Safety Plan, P&IDs, and as-builts should be maintained on site.			
2.	**Site-Specific Health and Safety Plan**	■ Readily available	■ Up to date	□ N/A
	■ Contingency plan/emergency response plan	■ Readily available	■ Up to date	□ N/A
	Remarks: General Dynamics administers the CERP, security cameras used on-site			
3.	**O&M and OSHA Training Records**	■ Readily available	■ Up to date	□ N/A
	Remarks: At MRTF			
4.	**Permits and Service Agreements**			
	□ Air discharge permit	□ Readily available	□ Up to date	■ N/A
	■ Effluent discharge	□ Readily available	■ Up to date	□ N/A
	□ Waste disposal, POTW	□ Readily available	□ Up to date	■ N/A
	□ Other permits______________________	□ Readily available	□ Up to date	■ N/A
	Remarks:			
5.	**Gas Generation Records**	□ Readily available	□ Up to date	■ N/A
	Remarks____			
6.	**Settlement Monument Records**	□ Readily available	□ Up to date	■ N/A
	Remarks____			
7.	**Groundwater Monitoring Records**	■ Readily available	■ Up to date	□ N/A
	Remarks: Quarterly and annual reports kept electronically by the NIBW PCs.			
8.	**Leachate Extraction Records**	□ Readily available	□ Up to date	■ N/A
	Remarks____			
9.	**Discharge Compliance Records**			
	□ Air	□ Readily available	□ Up to date	■ N/A
	□ Water (effluent)	□ Readily available	□ Up to date	■ N/A
	Remarks____			
10.	**Daily Access/Security Logs**	■ Readily available	■ Up to date	□ N/A
	Remarks: Controlled by General Dynamics______________________________			

IV. O&M COSTS – Discussed in Section 4 of the FYR Report

1. **O&M Organization**
□ State in-house □ Contractor for State
□ PRP in-house □ Contractor for PRP
□ Federal Facility in-house □ Contractor for Federal Facility
□ Other____
____

2. **O&M Cost Records**
□ Readily available □ Up to date
□ Funding mechanism/agreement in place
Original O&M cost estimate____________________ □ Breakdown attached

Total annual cost by year for review period if available

From__________ (Date)	To__________ (Date)	__________________ (Total cost)	□ Breakdown attached
From__________ (Date)	To__________ (Date)	__________________ (Total cost)	□ Breakdown attached
From__________ (Date)	To__________ (Date)	__________________ (Total cost)	□ Breakdown attached
From__________ (Date)	To__________ (Date)	__________________ (Total cost)	□ Breakdown attached
From__________ (Date)	To__________ (Date)	__________________ (Total cost)	□ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: ____
____
____
____
____
____

V. ACCESS AND INSTITUTIONAL CONTROLS ■Applicable □ N/A

A. Fencing

1. **Fencing damaged** □ Location shown on site map ■ Gates secured □ N/A
Remarks: Gates are secured by access code____________________________________
____

B. Other Access Restrictions

1. **Signs and other security measures** □ Location shown on site map □ N/A
Remarks: Gates are secured. Security cameras are used around the facility.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented	■ Yes	□ No	□ N/A
Site conditions imply ICs not being fully enforced	■ Yes	□No	□ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) __Self-reporting______________________________
Frequency ____
Responsible party/agency __NIBW PCs____
Contact _________________________ ________________ ___________ ________________
Name Title Date Phone no.

Reporting is up-to-date	■ Yes	□ No	□ N/A
Reports are verified by the lead agency	■ Yes	□ No	□ N/A
Specific requirements in deed or decision documents have been met	□ Yes	□ No	■ N/A
Violations have been reported	□ Yes	□ No	■ N/A

Other problems or suggestions: □ Report attached
____
____
____
____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A
Remarks____
____
____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident
Remarks____
____

2. **Land use changes on site** ■ N/A
Remarks____
____

3. **Land use changes off site** ■ N/A
Remarks____
____

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable □ N/A

1. **Roads damaged** □ Location shown on site map ■ Roads adequate □ N/A

Remarks: Roads around the facility are nicely paved and clear of debris

B. Other Site Conditions

Remarks : The facility is very clean and good housekeeping is practiced. Everything is stored in its proper place.

VII. LANDFILL COVERS □ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) □ Location shown on site map □ Settlement not evident
Areal extent______________ Depth____________
Remarks____

2. **Cracks** □ Location shown on site map □ Cracking not evident
Lengths____________ Widths___________ Depths__________
Remarks____

3. **Erosion** □ Location shown on site map □ Erosion not evident
Areal extent______________ Depth____________
Remarks____

4. **Holes** □ Location shown on site map □ Holes not evident
Areal extent______________ Depth____________
Remarks____

5. **Vegetative Cover** □ Grass □ Cover properly established □ No signs of stress
□ Trees/Shrubs (indicate size and locations on a diagram)
Remarks____

6. **Alternative Cover (armored rock, concrete, etc.)** □ N/A
Remarks____

7. **Bulges** □ Location shown on site map □ Bulges not evident
Areal extent______________ Height____________
Remarks____

8. **Wet Areas/Water Damage** □ Wet areas/water damage not evident
□ Wet areas □ Location shown on site map Areal extent______________
□ Ponding □ Location shown on site map Areal extent______________
□ Seeps □ Location shown on site map Areal extent______________
□ Soft subgrade □ Location shown on site map Areal extent______________
Remarks____

9.	**Slope Instability** □ Slides □ Location shown on site map □ No evidence of slope instability Areal extent_______________ Remarks____ ____
B. Benches	□ Applicable □ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)
1.	**Flows Bypass Bench** □ Location shown on site map □ N/A or okay Remarks____ ____
2.	**Bench Breached** □ Location shown on site map □ N/A or okay Remarks____ ____
3.	**Bench Overtopped** □ Location shown on site map □ N/A or okay Remarks____ ____
C. Letdown Channels	□ Applicable □ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)
1.	**Settlement** □ Location shown on site map □ No evidence of settlement Areal extent_______________ Depth_____________ Remarks____ ____
2.	**Material Degradation** □ Location shown on site map □ No evidence of degradation Material type________________ Areal extent______________ Remarks____ ____
3.	**Erosion** □ Location shown on site map □ No evidence of erosion Areal extent_______________ Depth_____________ Remarks____ ____

4.	**Undercutting** □ Location shown on site map □ No evidence of undercutting Areal extent______________ Depth____________ Remarks____ ____
5.	**Obstructions** Type_____________________ □ No obstructions □ Location shown on site map Areal extent______________ Size____________ Remarks____ ____
6.	**Excessive Vegetative Growth** Type____________________ □ No evidence of excessive growth □ Vegetation in channels does not obstruct flow □ Location shown on site map Areal extent______________ Remarks____ ____
D. Cover Penetrations □ Applicable □ N/A	
1.	**Gas Vents** □ Active □ Passive □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
2.	**Gas Monitoring Probes** □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
3.	**Monitoring Wells** (within surface area of landfill) □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
4.	**Leachate Extraction Wells** □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
5.	**Settlement Monuments** □ Located □ Routinely surveyed □ N/A Remarks____ ____

E. Gas Collection and Treatment	□ Applicable □ N/A	
1.	**Gas Treatment Facilities** □ Flaring □ Thermal destruction □ Collection for reuse □ Good condition □ Needs Maintenance Remarks____	
2.	**Gas Collection Wells, Manifolds and Piping** □ Good condition □ Needs Maintenance Remarks____	
3.	**Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) □ Good condition □ Needs Maintenance □ N/A Remarks____	
F. Cover Drainage Layer	□ Applicable □ N/A	
1.	**Outlet Pipes Inspected** □ Functioning □ N/A Remarks____	
2.	**Outlet Rock Inspected** □ Functioning □ N/A Remarks____	
□. Detention/Sedimentation Ponds	□ Applicable □ N/A	
1.	**Siltation** Areal extent______________ Depth____________ □ N/A □ Siltation not evident Remarks____	
2.	**Erosion** Areal extent______________ Depth____________ □ Erosion not evident Remarks____	
3.	**Outlet Works** □ Functioning □ N/A Remarks____	
4.	**Dam** □ Functioning □ N/A Remarks____	

H. Retaining Walls	□ Applicable	□ N/A	
1.	**Deformations** □ Location shown on site map □ Deformation not evident Horizontal displacement_____________ Vertical displacement________________ Rotational displacement_____________ Remarks____ ____		
2.	**Degradation** □ Location shown on site map □ Degradation not evident Remarks____ ____		
I. Perimeter Ditches/Off-Site Discharge	□ Applicable	□ N/A	
1.	**Siltation** □ Location shown on site map □ Siltation not evident Areal extent_______________ Depth_____________ Remarks____ ____		
2.	**Vegetative Growth** □ Location shown on site map □ N/A □ Vegetation does not impede flow Areal extent_______________ Type_____________ Remarks____ ____		
3.	**Erosion** □ Location shown on site map □ Erosion not evident Areal extent_______________ Depth_____________ Remarks____ ____		
4.	**Discharge Structure** □ Functioning □ N/A Remarks____ ____		
VIII. VERTICAL BARRIER WALLS	□ Applicable	■ N/A	
1.	**Settlement** □ Location shown on site map □ Settlement not evident Areal extent_______________ Depth_____________ Remarks____ ____		
2.	**Performance Monitoring** Type of monitoring____________________________ □ Performance not monitored Frequency_________________________________ □ Evidence of breaching Head differential____________________________ Remarks____ ____		

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines ■ Applicable □ N/A	
1.	**Pumps, Wellhead Plumbing, and Electrical** ■ Good condition ■ All required wells properly operating □ Needs Maintenance □ N/A Remarks____
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ■ Good condition □ Needs Maintenance Remarks____
3.	**Spare Parts and Equipment** ■ Readily available □ Good condition □ Requires upgrade □ Needs to be provided Remarks: No spare parts were noted on site, spare parts located at MRTF.
B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A	
1.	**Collection Structures, Pumps, and Electrical** □ Good condition □ Needs Maintenance Remarks____
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** □ Good condition □ Needs Maintenance Remarks____
3.	**Spare Parts and Equipment** □ Readily available □ Good condition □ Requires upgrade □ Needs to be provided Remarks____

C. Treatment System	■ Applicable ☐ N/A
1.	**Treatment Train** (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ■ Air stripping ■ Carbon adsorbers ☐ Filters______________________________________ ☐ Additive (*e.g.*, chelation agent, flocculent): ______________________ ☐ Others: ______________________________ ■ Good condition ☐ Needs Maintenance ■ Sampling ports properly marked and functional ■ Sampling/maintenance log displayed and up to date ■ Equipment properly identified ■ Quantity of groundwater treated annually: 2009 = 474 million gallons ____________ ☐ Quantity of surface water treated annually_____________ Remarks: Maintenance log sheets are maintained on-site in computer______________ ____
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ■ Good condition ☐ Needs Maintenance Remarks: Clearly marked__________________________________ ____
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A ■ Good condition ■Proper secondary containment ☐ Needs Maintenance Remarks: Air stripper tower has secondary containment._____________________ ____
4.	**Discharge Structure and Appurtenances** ☐ N/A ■ Good condition ☐ Needs Maintenance Remarks____ ____
5.	**Treatment Building(s)** ■ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair ☐ Chemicals and equipment properly stored Remarks: Area 12 is located outdoors with only a roof for shading. Roof is in good condition._____ ____
6.	**Monitoring Wells** (pump and treatment remedy) ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ All required wells located ☐ Needs Maintenance ☐ N/A Remarks____ ____
D. Monitoring Data	
1.	Monitoring Data ■ Is routinely submitted on time ■ Is of acceptable quality
2.	Monitoring data suggests: ■ Groundwater plume is effectively contained ■ Contaminant concentrations are declining

D. Monitored Natural Attenuation
1. **Monitoring Wells** (natural attenuation remedy) □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ All required wells located □ Needs Maintenance □ N/A Remarks____ ____
X. OTHER REMEDIES
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.
XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The remedy is intended to remove VOC mass from the groundwater, contain the groundwater plume, and ultimately restore the groundwater to VOC levels below the MCLs for TCE and PCE. The remedy is effective and functioning as designed.
B. Adequacy of O&M
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. Area 12 operates at approximately 98% uptime annually. Optimization of the system in 2006 included the removal of the resin absorption system. These O&M activities do not alter the current or future protectiveness of the remedy.
C. Early Indicators of Potential Remedy Problems
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There have been no significant issues at Area 12 in relation to protectiveness of the remedy.
D. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The O&M Manual is currently under review for updates and revisions, including a potential change in the frequency of carbon change-outs to ensure change-outs are based on performance data.

Five-Year Review CGTF Site Inspection Checklist

<table>
<tr><th colspan="2">I. SITE INFORMATION</th></tr>
<tr><td>Site name: North Indian Bend Wash, Central Groundwater Treatment Facility</td><td>Date of inspection: 11-17-2010</td></tr>
<tr><td>Location and Region: Scottsdale, Arizona</td><td>EPA ID: EP-S9-08-03</td></tr>
<tr><td>Agency, office, or company leading the five-year review: EPA, Region 9</td><td>Weather/temperature: Sunny, 75°</td></tr>
<tr><td colspan="2">Remedy Includes: (Check all that apply)
□ Landfill cover/containment   □ Monitored natural attenuation
■ Access controls   ■ Groundwater containment
□ Institutional controls   □ Vertical barrier walls
■ Groundwater pump and treatment
□ Surface water collection and treatment
□ Other____</td></tr>
<tr><td colspan="2">Inspection Team: Doug Fisher, E.I.T., ITSI
Stephanie Archabal, E.I.T., ITSI</td></tr>
<tr><td colspan="2">Site Map: Included in FYR Report</td></tr>
<tr><th colspan="2">II. INTERVIEWS (Check all that apply)</th></tr>
<tr><td colspan="2">1. O&M site manager _Craig Miller_______ (Name) ___COS Water Quality Coordinator__ (Title) ___11/17/10___ (Date)
Interviewed ■ at site □ at office □ by phone Phone no. _480.312.8743___
Problems, suggestions; □ Report attached ____</td></tr>
<tr><td colspan="2">2. O&M staff ____James Lutton, P.E.______ (Name) ___NIBW PCs Engineer__ (Title) ___11/16/10___ (Date)
Interviewed ■ at site □ at office □ by phone Phone no. _916.698.2726___
Problems, suggestions; □ Report attached ____</td></tr>
</table>

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency ___________________________ Contact ___________________________ __________________ ________ ____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ___________________________ Contact ___________________________ __________________ ________ ____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ___________________________ Contact ___________________________ __________________ ________ ____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ___________________________ Contact ___________________________ __________________ ________ ____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____
4.	**Other interviews** (optional) □ Report attached.
Interviews with the NIBW PCs, EPA, ADEQ, SRP, COS, and community members were conducted separately from the site inspection interviews, and are attached as an appendix to the FYR Report.	

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

■ O&M manual ■ Readily available □ Up to date □ N/A
■ As-built drawings ■ Readily available □ Up to date □ N/A
■ Maintenance logs ■ Readily available □ Up to date □ N/A

Remarks: The Site-Specific O&M plan includes the following: discussion of process and controls; startup, shutdown, and routine cleaning and disinfection operation procedures; routine system performance monitoring of process water and stripper off-gas and process instrumentation; spare parts list. This plan should be updated to include current figures, list of alarms, a troubleshooting section, and reporting requirements. The Site Wide O&M Plan discusses the well rehabilitation program, and should be referenced in the Site-Specific O&M Plan. Documentation of alarm testing and results is maintained on site.

2. **Site-Specific Health and Safety Plan** ■ Readily available ■ Up to date □ N/A
■ Contingency plan/emergency response plan ■ Readily available ■ Up to date □ N/A

Remarks: On-site

3. **O&M and OSHA Training Records** ■ Readily available ■ Up to date □ N/A

Remarks: On-site

4. **Permits and Service Agreements**

□ Air discharge permit ■ Readily available □ Up to date □ N/A
□ Effluent discharge □ Readily available □ Up to date ■ N/A
□ Waste disposal, POTW □ Readily available □ Up to date ■ N/A
□ Other permits_____________________ □ Readily available □ Up to date ■ N/A

Remarks: The air discharge permit for an emergency air generator is maintained on site.

5. **Gas Generation Records** □ Readily available □ Up to date ■ N/A
Remarks____

6. **Settlement Monument Records** □ Readily available □ Up to date ■ N/A
Remarks____

7. **Groundwater Monitoring Records** ■ Readily available ■ Up to date □ N/A

Remarks: Quarterly and annual reports are kept electronically by NIBW PCs.

8. **Leachate Extraction Records** □ Readily available □ Up to date ■ N/A
Remarks____

9. **Discharge Compliance Records**

□ Air □ Readily available □ Up to date ■ N/A
□ Water (effluent) □ Readily available □ Up to date ■ N/A
Remarks____

10. **Daily Access/Security Logs** ■ Readily available ■ Up to date □ N/A
Remarks____

IV. O&M COSTS – Discussed in Section 4 of the FYR Report

1. **O&M Organization**
□ State in-house □ Contractor for State
□ PRP in-house □ Contractor for PRP
□ Federal Facility in-house □ Contractor for Federal Facility
□ Other____
____

2. **O&M Cost Records**
□ Readily available □ Up to date
□ Funding mechanism/agreement in place
Original O&M cost estimate____________________□ Breakdown attached

Total annual cost by year for review period if available

From__________ To__________ __________________ □ Breakdown attached
Date Date Total cost
From__________ To__________ __________________ □ Breakdown attached
Date Date Total cost
From__________ To__________ __________________ □ Breakdown attached
Date Date Total cost
From__________ To__________ __________________ □ Breakdown attached
Date Date Total cost
From__________ To__________ __________________ □ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: ____
____
____
____
____
____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable □ N/A

A. Fencing

1. **Fencing damaged** □ Location shown on site map ■ Gates secured □ N/A
Remarks____
____

B. Other Access Restrictions

1. **Signs and other security measures** □ Location shown on site map □ N/A
Remarks: Gates secured. Cameras around site. Call button used at access gate during non-business hours.

C. Institutional Controls (ICs)		
1.	**Implementation and enforcement**	
	Site conditions imply ICs not properly implemented	■ Yes □ No □ N/A
	Site conditions imply ICs not being fully enforced	■ Yes □No □ N/A
	Type of monitoring (*e.g.*, self-reporting, drive by) __Self-reporting____________________________	
	Frequency ____	
	Responsible party/agency __NIBW PCs____	
	Contact ________________________ Name ________________ Title __________ Date ________________ Phone no.	
	Reporting is up-to-date	■ Yes □ No □ N/A
	Reports are verified by the lead agency	■ Yes □ No □ N/A
	Specific requirements in deed or decision documents have been met	□ Yes □ No ■ N/A
	Violations have been reported	□ Yes □ No ■ N/A
	Other problems or suggestions: □ Report attached	
2.	**Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A Remarks____	
D. General		
1.	**Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident Remarks____	
2.	**Land use changes on site** ■ N/A Remarks____	
3.	**Land use changes off site** ■ N/A Remarks____	
VI. GENERAL SITE CONDITIONS		
A. Roads ■ Applicable □ N/A		
1.	**Roads damaged** □ Location shown on site map ■ Roads adequate □ N/A Remarks: Roads around the facility are nicely paved and clear of debris	

B. Other Site Conditions

Remarks : The facility is very clean, and good housekeeping is practiced. Everything is stored in its proper place. An outdoor storage unit for spare parts is located on site.
____
____
____
____
____

VII. LANDFILL COVERS □ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) □ Location shown on site map □ Settlement not evident
Areal extent______________ Depth____________
Remarks____
____

2. **Cracks** □ Location shown on site map □ Cracking not evident
Lengths____________ Widths___________ Depths__________
Remarks____
____

3. **Erosion** □ Location shown on site map □ Erosion not evident
Areal extent______________ Depth____________
Remarks____
____

4. **Holes** □ Location shown on site map □ Holes not evident
Areal extent______________ Depth____________
Remarks____
____

5. **Vegetative Cover** □ Grass □ Cover properly established □ No signs of stress
□ Trees/Shrubs (indicate size and locations on a diagram)
Remarks____
____

6. **Alternative Cover (armored rock, concrete, etc.)** □ N/A
Remarks____
____

7. **Bulges** □ Location shown on site map □ Bulges not evident
Areal extent______________ Height____________
Remarks____
____

8.	**Wet Areas/Water Damage**	□ Wet areas/water damage not evident	
	□ Wet areas	□ Location shown on site map	Areal extent______________
	□ Ponding	□ Location shown on site map	Areal extent______________
	□ Seeps	□ Location shown on site map	Areal extent______________
	□ Soft subgrade	□ Location shown on site map	Areal extent______________
	Remarks____		
9.	**Slope Instability** □ Slides	□ Location shown on site map	□ No evidence of slope instability
	Areal extent______________		
	Remarks____		
B. Benches	□ Applicable □ N/A		
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	□ Location shown on site map	□ N/A or okay
	Remarks____		
2.	**Bench Breached**	□ Location shown on site map	□ N/A or okay
	Remarks____		
3.	**Bench Overtopped**	□ Location shown on site map	□ N/A or okay
	Remarks____		
C. Letdown Channels	□ Applicable □ N/A		
	(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement**	□ Location shown on site map	□ No evidence of settlement
	Areal extent______________	Depth____________	
	Remarks____		
2.	**Material Degradation**	□ Location shown on site map	□ No evidence of degradation
	Material type_______________	Areal extent_____________	
	Remarks____		
3.	**Erosion**	□ Location shown on site map	□ No evidence of erosion
	Areal extent______________	Depth____________	
	Remarks____		

4.	**Undercutting** □ Location shown on site map □ No evidence of undercutting Areal extent______________ Depth____________ Remarks____ ____
5.	**Obstructions** Type_____________________ □ No obstructions □ Location shown on site map Areal extent______________ Size____________ Remarks____ ____
6.	**Excessive Vegetative Growth** Type____________________ □ No evidence of excessive growth □ Vegetation in channels does not obstruct flow □ Location shown on site map Areal extent______________ Remarks____ ____
D. Cover Penetrations □ Applicable □ N/A	
1.	**Gas Vents** □ Active□ Passive □ Properly secured/locked□ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
2.	**Gas Monitoring Probes** □ Properly secured/locked□ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
3.	**Monitoring Wells** (within surface area of landfill) □ Properly secured/locked□ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
4.	**Leachate Extraction Wells** □ Properly secured/locked□ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
5.	**Settlement Monuments** □ Located □ Routinely surveyed □ N/A Remarks____ ____

E. Gas Collection and Treatment □ Applicable □ N/A

1. **Gas Treatment Facilities**
□ Flaring □ Thermal destruction □ Collection for reuse
□ Good condition □ Needs Maintenance
Remarks____
____

2. **Gas Collection Wells, Manifolds and Piping**
□ Good condition □ Needs Maintenance
Remarks____
____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
□ Good condition □ Needs Maintenance □ N/A
Remarks____
____

F. Cover Drainage Layer □ Applicable □ N/A

1. **Outlet Pipes Inspected** □ Functioning □ N/A
Remarks____
____

2. **Outlet Rock Inspected** □ Functioning □ N/A
Remarks____
____

□. Detention/Sedimentation Ponds □ Applicable □ N/A

1. **Siltation** Areal extent______________ Depth____________ □ N/A
□ Siltation not evident
Remarks____
____

2. **Erosion** Areal extent______________ Depth____________
□ Erosion not evident
Remarks____
____

3. **Outlet Works** □ Functioning □ N/A
Remarks____
____

4. **Dam** □ Functioning □ N/A
Remarks____
____

H. Retaining Walls	□ Applicable	□ N/A	
1.	**Deformations**	□ Location shown on site map	□ Deformation not evident
	Horizontal displacement____________ Vertical displacement_______________ Rotational displacement____________ Remarks____ ____		
2.	**Degradation**	□ Location shown on site map	□ Degradation not evident
	Remarks____ ____		
I. Perimeter Ditches/Off-Site Discharge	□ Applicable	□ N/A	
1.	**Siltation**	□ Location shown on site map	□ Siltation not evident
	Areal extent______________ Depth____________ Remarks____ ____		
2.	**Vegetative Growth**	□ Location shown on site map	□ N/A
	□ Vegetation does not impede flow Areal extent______________ Type____________ Remarks____ ____		
3.	**Erosion**	□ Location shown on site map	□ Erosion not evident
	Areal extent______________ Depth____________ Remarks____ ____		
4.	**Discharge Structure**	□ Functioning	□ N/A
	Remarks____ ____		
VIII. VERTICAL BARRIER WALLS	□ Applicable	■ N/A	
1.	**Settlement**	□ Location shown on site map	□ Settlement not evident
	Areal extent______________ Depth____________ Remarks____ ____		
2.	**Performance Monitoring**	Type of monitoring__________________________	
	□ Performance not monitored Frequency_______________________________ □ Evidence of breaching Head differential__________________________ Remarks____ ____		

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines ■ Applicable □ N/A	
1.	**Pumps, Wellhead Plumbing, and Electrical** ■ Good condition ■ All required wells properly operating □ Needs Maintenance □ N/A Remarks____ ____ ____
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ■ Good condition □ Needs Maintenance Remarks____ ____
3.	**Spare Parts and Equipment** ■ Readily available ■ Good condition □ Requires upgrade □ Needs to be provided Remarks: Spare parts are kept in an outdoor storage unit located on site. ____
B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A	
1.	**Collection Structures, Pumps, and Electrical** □ Good condition □ Needs Maintenance Remarks____ ____
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** □ Good condition □ Needs Maintenance Remarks____ ____
3.	**Spare Parts and Equipment** □ Readily available □ Good condition □ Requires upgrade □ Needs to be provided Remarks____ ____

C. Treatment System ■ Applicable □ N/A
1. **Treatment Train** (Check components that apply) □ Metals removal □ Oil/water separation □ Bioremediation ■ Air stripping ■ Carbon adsorbers □ Filters____ □ Additive (*e.g.*, chelation agent, flocculent):________________________ ■ Others: Acid Wash system________________________________ ■ Good condition □ Needs Maintenance ■ Sampling ports properly marked and functional ■ Sampling/maintenance log displayed and up to date ■ Equipment properly identified ■ Quantity of groundwater treated annually: 2009 = 2,693 million gallons ____________ □ Quantity of surface water treated annually______________ Remarks____
2. **Electrical Enclosures and Panels** (properly rated and functional) □ N/A ■ Good condition □ Needs Maintenance Remarks: Clearly marked________________________________
3. **Tanks, Vaults, Storage Vessels** □ N/A ■ Good condition ■ Proper secondary containment □ Needs Maintenance Remarks____
4. **Discharge Structure and Appurtenances** □ N/A ■ Good condition □ Needs Maintenance Remarks____
5. **Treatment Building(s)** □ N/A ■ Good condition (esp. roof and doorways) □ Needs repair ■ Chemicals and equipment properly stored Remarks: Acid washing drums had secondary containment__________________
6. **Monitoring Wells** (pump and treatment remedy) ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ All required wells located □ Needs Maintenance □ N/A Remarks____
D. Monitoring Data
1. Monitoring Data ■ Is routinely submitted on time ■ Is of acceptable quality
2. Monitoring data suggests: ■ Groundwater plume is effectively contained ■ Contaminant concentrations are declining

D. Monitored Natural Attenuation	
1.	**Monitoring Wells** (natural attenuation remedy) □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ All required wells located □ Needs Maintenance □ N/A Remarks____ ____

X. OTHER REMEDIES
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS	
A.	**Implementation of the Remedy**
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The remedy is intended to remove VOC mass from the groundwater, contain the groundwater plume, and ultimately restore the groundwater to VOC levels below the MCLs for TCE and PCE. The remedy is effective and functioning as designed.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. COS uses inventory tracking software to maintain assets and equipment owned by the city including CGTF. The database includes detail of individual system components (i.e. flow meters, pumps) and the tag name associated with each piece of equipment is matched with the as-builts and field labeling. The preventative maintenance module produces a work order with an SOP based on OEM recommendations. The system tracks maintenance history for each piece of equipment including fields for notes, observations, and calibration results. The system manager is the one to decide frequency of calibration checks and will be completed by the end of the year. These O&M procedures enhance the current and future reliability of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. Air-relief valve failures caused the replacement of all the air-relief values and piping from galvanized PVC and copper to hard copper. A recommendation from the Environ report to rehabilitate the air ducts from the blowers to the top of the air strippers was implemented by sandblasting the air ducts. These unscheduled repairs have enhanced the current and future reliability of the remedy.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The O&M Manual is currently under review for updates and revisions, including a potential change in the frequency of carbon change-outs for the onsite GAC units to maximize use of the carbon based on performance data.

Five-Year Review MRTF Site Inspection Checklist – Treatment Trains 1 & 3

I. SITE INFORMATION	
Site name: North Indian Bend Wash, Miller Road Treatment Facility (Treatment Trains 1 and 3)	**Date of inspection:** 11-16-2010
Location and Region: Scottsdale, Arizona	**EPA ID:** EP-S9-08-03
Agency, office, or company leading the five-year review: EPA, Region 9	**Weather/temperature:** Sunny, 75^{o}

Remedy Includes: (Check all that apply)

- □ Landfill cover/containment
- ■ Access controls
- □ Institutional controls
- ■ Groundwater pump and treatment
- □ Surface water collection and treatment
- ■ Other_Treatment Trains 1 and 3 and infrastructure for wells PV-14 and PV-15____________
- □ Monitored natural attenuation
- ■ Groundwater containment
- □ Vertical barrier walls

Inspection Team: **Doug Fisher, E.I.T., ITSI**
Stephanie Archabal, E.I.T., ITSI

Site Map: Included in FYR Report

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** _Todd Farrell___________ ___Production Foreman_____ ___11/16/10___
   Name / Title / Date
   Interviewed ■ at site □ at office □ by phone Phone no. _623.445.2463___
   Problems, suggestions; □ Report attached ______________________________

2. **O&M staff** ____________________ ______________ ____________
   Name / Title / Date
   Interviewed □at site □ at office □ by phone Phone no. _____________
   Problems, suggestions; □ Report attached ______________________________

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency ______________________________ Contact ______________________________ ___________________ ________ _____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ______________________________ Contact ______________________________ ___________________ ________ _____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ______________________________ Contact ______________________________ ___________________ ________ _____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____ Agency ______________________________ Contact ______________________________ ___________________ ________ _____________ Name Title Date Phone no. Problems; suggestions; □ Report attached ____ ____
4.	**Other interviews** (optional) □ Report attached.
Interviews with the NIBW PCs, EPA, ADEQ, SRP, COS, and community members were conducted separately from the site inspection interviews, and are attached as an appendix to the FYR Report.	

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	**O&M Documents**			
	■ O&M manual	■ Readily available	□ Up to date	□ N/A
	■ As-built drawings	■ Readily available	□ Up to date	□ N/A
	■ Maintenance logs	■ Readily available	■ Up to date	□ N/A
	Remarks: The O&M manual is currently being revised/developed to include preventive maintenance tasks, procedures, and schedule subsequent to recent rehabilitation activities. Acid washing procedures are not included, as that task is subcontracted out. The Emergency Plan is located at the Paradise Valley Arsenic Removal Facility. Manufacturers' info/specifications (switches, plumbing, valves, etc.) are maintained on site.			
2.	**Site-Specific Health and Safety Plan**	■ Readily available	■ Up to date	□ N/A
	■ Contingency plan/emergency response plan	■ Readily available	■ Up to date	□ N/A
	Remarks: CERP is on the Site computer, no hard copy was available on site.			
3.	**O&M and OSHA Training Records**	■ Readily available	■ Up to date	□ N/A
	Remarks: Kept on site			
4.	**Permits and Service Agreements**			
	□ Air discharge permit	□ Readily available	□ Up to date	■ N/A
	□ Effluent discharge	□ Readily available	□ Up to date	■ N/A
	□ Waste disposal, POTW	□ Readily available	□ Up to date	■ N/A
	□ Other permits______________________	□ Readily available	□ Up to date	■ N/A
	Remarks______________________________			
5.	**Gas Generation Records**	□ Readily available	□ Up to date	■ N/A
	Remarks______________________________			
6.	**Settlement Monument Records**	□ Readily available	□ Up to date	■ N/A
	Remarks______________________________			
7.	**Groundwater Monitoring Records**	■ Readily available	■ Up to date	□ N/A
	Remarks: Quarterly and Annual reports are kept electronically			
8.	**Leachate Extraction Records**	□ Readily available	□ Up to date	■ N/A
	Remarks______________________________			
9.	**Discharge Compliance Records**			
	□ Air	□ Readily available	□ Up to date	■ N/A
	□ Water (effluent)	□ Readily available	□ Up to date	■ N/A
	Remarks______________________________			
10.	**Daily Access/Security Logs**	■ Readily available	■ Up to date	□ N/A
	Remarks______________________________			

IV. O&M COSTS – Discussed in Section 4 of the FYR Report

1. **O&M Organization**
   - □ State in-house □ Contractor for State
   - □ PRP in-house □ Contractor for PRP
   - □ Federal Facility in-house □ Contractor for Federal Facility
   - □ Other____

2. **O&M Cost Records**
   - □ Readily available □ Up to date
   - □ Funding mechanism/agreement in place
   - Original O&M cost estimate____________________ □ Breakdown attached

   Total annual cost by year for review period if available

From (Date)	To (Date)	Total cost	
From__________	To__________	__________________	□ Breakdown attached
From__________	To__________	__________________	□ Breakdown attached
From__________	To__________	__________________	□ Breakdown attached
From__________	To__________	__________________	□ Breakdown attached
From__________	To__________	__________________	□ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: ____

V. ACCESS AND INSTITUTIONAL CONTROLS ■Applicable □ N/A

A. Fencing

1. **Fencing damaged** □ Location shown on site map ■ Gates secured □ N/A
   Remarks____

B. Other Access Restrictions

1. **Signs and other security measures** □ Location shown on site map □ N/A
   Remarks: Gates secured. Must use buzzer to access site. Security cameras used.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ■ Yes □ No □ N/A

Site conditions imply ICs not being fully enforced ■ Yes □No □ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) __Self-reporting______________________________

Frequency ____

Responsible party/agency __NIBW PCs____

Contact ____James Lutton, P.E.____ ___Engineer____ _________ _916.698.2726___

Name Title Date Phone no.

Reporting is up-to-date ■ Yes □ No □ N/A

Reports are verified by the lead agency ■ Yes □ No □ N/A

Specific requirements in deed or decision documents have been met □ Yes □ No ■ N/A

Violations have been reported □ Yes □ No ■ N/A

Other problems or suggestions: □ Report attached

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks____

2. **Land use changes on site** ■ N/A

Remarks____

3. **Land use changes off site** ■ N/A

Remarks____

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable □ N/A

1. **Roads damaged** □ Location shown on site map ■ Roads adequate □ N/A

Remarks: Roads around the facility recently were repaved.

B. Other Site Conditions

Remarks : Facility was very clean, and good housekeeping is practiced. Everything was stored in its proper place. O&M manuals, HSP, manufacturer specs were easily identifiable in a convenient, easy to locate bookcase.

____

____

____

____

VII. LANDFILL COVERS □ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) □ Location shown on site map □ Settlement not evident
Areal extent______________ Depth____________
Remarks____
____

2. **Cracks** □ Location shown on site map □ Cracking not evident
Lengths____________ Widths___________ Depths__________
Remarks____
____

3. **Erosion** □ Location shown on site map □ Erosion not evident
Areal extent______________ Depth____________
Remarks____
____

4. **Holes** □ Location shown on site map □ Holes not evident
Areal extent______________ Depth____________
Remarks____
____

5. **Vegetative Cover** □ Grass □ Cover properly established □ No signs of stress
□ Trees/Shrubs (indicate size and locations on a diagram)
Remarks____
____

6. **Alternative Cover (armored rock, concrete, etc.)** □ N/A
Remarks____
____

7. **Bulges** □ Location shown on site map □ Bulges not evident
Areal extent______________ Height____________
Remarks____
____

8.	**Wet Areas/Water Damage** □ Wet areas/water damage not evident □ Wet areas □ Location shown on site map Areal extent______________ □ Ponding □ Location shown on site map Areal extent______________ □ Seeps □ Location shown on site map Areal extent______________ □ Soft subgrade □ Location shown on site map Areal extent______________ Remarks____ ____
9.	**Slope Instability** □ Slides □ Location shown on site map □ No evidence of slope instability Areal extent______________ Remarks____ ____
B. Benches	□ Applicable □ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)
1.	**Flows Bypass Bench** □ Location shown on site map □ N/A or okay Remarks____ ____
2.	**Bench Breached** □ Location shown on site map □ N/A or okay Remarks____ ____
3.	**Bench Overtopped** □ Location shown on site map □ N/A or okay Remarks____ ____
C. Letdown Channels	□ Applicable □ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)
1.	**Settlement** □ Location shown on site map □ No evidence of settlement Areal extent______________ Depth____________ Remarks____ ____
2.	**Material Degradation** □ Location shown on site map □ No evidence of degradation Material type_______________ Areal extent_____________ Remarks____ ____
3.	**Erosion** □ Location shown on site map □ No evidence of erosion Areal extent______________ Depth____________ Remarks____ ____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
Areal extent______________ Depth____________
Remarks____
____

5. **Obstructions** Type_____________________ □ No obstructions
□ Location shown on site map Areal extent______________
Size____________
Remarks____
____

6. **Excessive Vegetative Growth** Type____________________
□ No evidence of excessive growth
□ Vegetation in channels does not obstruct flow
□ Location shown on site map Areal extent______________
Remarks____
____

D. Cover Penetrations □ Applicable □ N/A

1. **Gas Vents** □ Active □ Passive
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ Evidence of leakage at penetration □ Needs Maintenance
□ N/A
Remarks____
____

2. **Gas Monitoring Probes**
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ Evidence of leakage at penetration □ Needs Maintenance □ N/A
Remarks____
____

3. **Monitoring Wells** (within surface area of landfill)
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ Evidence of leakage at penetration □ Needs Maintenance □ N/A
Remarks____
____

4. **Leachate Extraction Wells**
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ Evidence of leakage at penetration □ Needs Maintenance □ N/A
Remarks____
____

5. **Settlement Monuments** □ Located □ Routinely surveyed □ N/A
Remarks____
____

E. Gas Collection and Treatment □ Applicable □ N/A

1. **Gas Treatment Facilities**
□ Flaring □ Thermal destruction □ Collection for reuse
□ Good condition □ Needs Maintenance
Remarks____
____

2. **Gas Collection Wells, Manifolds and Piping**
□ Good condition □ Needs Maintenance
Remarks____
____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
□ Good condition □ Needs Maintenance □ N/A
Remarks____
____

F. Cover Drainage Layer □ Applicable □ N/A

1. **Outlet Pipes Inspected** □ Functioning □ N/A
Remarks____
____

2. **Outlet Rock Inspected** □ Functioning □ N/A
Remarks____
____

□. Detention/Sedimentation Ponds □ Applicable □ N/A

1. **Siltation** Areal extent______________ Depth____________ □ N/A
□ Siltation not evident
Remarks____
____

2. **Erosion** Areal extent______________ Depth____________
□ Erosion not evident
Remarks____
____

3. **Outlet Works** □ Functioning □ N/A
Remarks____
____

4. **Dam** □ Functioning □ N/A
Remarks____
____

H. Retaining Walls □ Applicable □ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
Horizontal displacement_____________ Vertical displacement________________
Rotational displacement_____________
Remarks____
____

2. **Degradation** □ Location shown on site map □ Degradation not evident
Remarks____
____

I. Perimeter Ditches/Off-Site Discharge □ Applicable □ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
Areal extent_______________ Depth_____________
Remarks____
____

2. **Vegetative Growth** □ Location shown on site map □ N/A
□ Vegetation does not impede flow
Areal extent_______________ Type_____________
Remarks____
____

3. **Erosion** □ Location shown on site map □ Erosion not evident
Areal extent_______________ Depth_____________
Remarks____
____

4. **Discharge Structure** □ Functioning □ N/A
Remarks____
____

VIII. VERTICAL BARRIER WALLS □ Applicable ■ N/A

1. **Settlement** □ Location shown on site map □ Settlement not evident
Areal extent_______________ Depth_____________
Remarks____
____

2. **Performance Monitoring** Type of monitoring____________________________
□ Performance not monitored
Frequency_________________________________ □ Evidence of breaching
Head differential____________________________
Remarks____
____

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines ■ Applicable □ N/A	
1.	**Pumps, Wellhead Plumbing, and Electrical** ■ Good condition ■ All required wells properly operating □ Needs Maintenance □ N/A Remarks
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ■ Good condition □ Needs Maintenance Remarks
3.	**Spare Parts and Equipment** ■ Readily available ■ Good condition □ Requires upgrade □ Needs to be provided Remarks: Spare blower and blower motor onsite
B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A	
1.	**Collection Structures, Pumps, and Electrical** □ Good condition □ Needs Maintenance Remarks
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** □ Good condition □ Needs Maintenance Remarks
3.	**Spare Parts and Equipment** □ Readily available □ Good condition □ Requires upgrade □ Needs to be provided Remarks

C. Treatment System	■ Applicable ◻ N/A
1.	**Treatment Train** (Check components that apply) ◻ Metals removal ◻ Oil/water separation ◻ Bioremediation ■ Air stripping ■ Carbon adsorbers ◻ Filters________ ■ Additive (*e.g.*, chelation agent, flocculent): NaOCl for anti-scaling________ ■ Others: Acid Wash system________ ■ Good condition ◻ Needs Maintenance ■ Sampling ports properly marked and functional ■ Sampling/maintenance log displayed and up to date ■ Equipment properly identified ■ Quantity of groundwater treated annually: 2009 = 886 million gallons from well PV-15________ ◻ Quantity of surface water treated annually________ Remarks________
2.	**Electrical Enclosures and Panels** (properly rated and functional) ◻ N/A ■ Good condition ◻ Needs Maintenance Remarks: Clearly marked________
3.	**Tanks, Vaults, Storage Vessels** ◻ N/A ■ Good condition ■Proper secondary containment ◻ Needs Maintenance Remarks________
4.	**Discharge Structure and Appurtenances** ◻ N/A ■ Good condition ◻ Needs Maintenance Remarks________
5.	**Treatment Building(s)** ◻ N/A ■ Good condition (esp. roof and doorways) ◻ Needs repair ■ Chemicals and equipment properly stored Remarks________
6.	**Monitoring Wells** (pump and treatment remedy) ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ All required wells located ◻ Needs Maintenance ◻ N/A Remarks________
D. Monitoring Data	
1.	Monitoring Data ■ Is routinely submitted on time ■ Is of acceptable quality
2.	Monitoring data suggests: ■ Groundwater plume is effectively contained ■ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ All required wells located □ Needs Maintenance □ N/A
Remarks____
____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy is intended to remove VOC mass from the groundwater, contain the groundwater plume, and ultimately restore the groundwater to VOC levels below the MCLs for TCE and PCE. The remedy is effective and functioning as designed.

The rehabilitation of the MRTF after the untreated water incidents, as noted in the FYR, has allowed the remedy to continue to be effective and function as it was designed. Review of the routine monitoring data for the remedy indicates sufficient data are being collected to document the overall hydraulic containment and changes in concentrations of contaminants within the zone of MAU/LAU contamination.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The O&M Manual is currently under review for updates and revisions based on rehabilitation efforts and repairs completed in 2009 and 2010. The repairs and rehabilitation efforts enhance the current and future reliability of the remedy.

AAWC currently is using computerized maintenance management software (CMMS) to automatically generate a work order to log and store information gathered. Alarms and field instrumentation are checked semi-annually and entered into the CMMS for logging and tracking.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

The O&M costs and activities were increased unexpectedly following repairs and rehabilitation of the MRTF following the incidents in 2007 and 2009 (described in FYR). The repairs and rehabilitation efforts are consistent with the ROD and enhance the current and future reliability of the remedy.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The O&M Manual is currently under review for updates and revisions, including a potential change in the frequency of carbon change-outs to maximize use of the carbon based on performance data.

Five-Year Review MRTF Site Inspection Checklist – Treatment Train 2

<table>
<tr><th colspan="2">I. SITE INFORMATION</th></tr>
<tr><td>Site name: North Indian Bend Wash, Miller Road Treatment Facility (Treatment Train 2)</td><td>Date of inspection: 11-16-2010</td></tr>
<tr><td>Location and Region: Scottsdale, Arizona</td><td>EPA ID: EP-S9-08-03</td></tr>
<tr><td>Agency, office, or company leading the five-year review: EPA, Region 9</td><td>Weather/temperature: Sunny, 75°</td></tr>
<tr><td colspan="2">Remedy Includes: (Check all that apply)
□ Landfill cover/containment   □ Monitored natural attenuation
■ Access controls   ■Groundwater containment
□ Institutional controls   □ Vertical barrier walls
■ Groundwater pump and treatment
□ Surface water collection and treatment
■ Other___ Treatment Train 2 and infrastructure for well PCX-1_________________________
____</td></tr>
<tr><td colspan="2">Inspection Team: Doug Fisher, E.I.T., ITSI
Stephanie Archabal, E.I.T., ITSI</td></tr>
<tr><td colspan="2">Site Map: Included in FYR Report</td></tr>
<tr><th colspan="2">II. INTERVIEWS (Check all that apply)</th></tr>
<tr><td colspan="2">1. O&M site manager _Robert Lynch, P.E.___________ ___On-site operator_____ ___11/16/10___
Name Title Date
Interviewed ■ at site □ at office □ by phone Phone no. _480-922-4954___
Problems, suggestions; □ Report attached ____
____</td></tr>
<tr><td colspan="2">2. O&M staff ____James Lutton, P.E.______ ___NIBW PCs Engineer__ ___11/16/10___
Name Title Date
Interviewed ■ at site □ at office □ by phone Phone no. _916.698.2726___
Problems, suggestions; □ Report attached ____
____</td></tr>
</table>

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency ______________________________ Contact ______________________________ ____________________ _________ _____________ Name Title Date Phone no. Problems; suggestions; ◻ Report attached ____ ____ Agency ______________________________ Contact ______________________________ ____________________ _________ _____________ Name Title Date Phone no. Problems; suggestions; ◻ Report attached ____ ____ Agency ______________________________ Contact ______________________________ ____________________ _________ _____________ Name Title Date Phone no. Problems; suggestions; ◻ Report attached ____ ____ Agency ______________________________ Contact ______________________________ ____________________ _________ _____________ Name Title Date Phone no. Problems; suggestions; ◻ Report attached ____ ____
4.	**Other interviews** (optional) ◻ Report attached.
Interviews with the NIBW PCs, EPA, ADEQ, SRP, COS, and community members were conducted separately from the site inspection interviews, and are attached as an appendix to the FYR Report.	

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

■ O&M manual	■ Readily available	□ Up to date	□ N/A
■ As-built drawings	■ Readily available	□ Up to date	□ N/A
■ Maintenance logs	■ Readily available	□ Up to date	□ N/A

Remarks: The O&M manual lacked process descriptions; preventive maintenance tasks, procedures and schedules; field sensor calibration procedures and schedules; current drawings such as Mechanical PFD, P&IDs; a coherent troubleshooting guide; startup, shutdown, and routine operation SOPs; a spare parts list; reporting requirements; and a well maintenance and rehab schedule and SOPs. P&IDs do not show the acid wash piping. The Interim Operating Plan has outdated drawings, showing Treatment Train (TT) 2 connected to TT1 and TT3 and clearwell. No P&IDs exist on site for PCX-1. The current Sampling and Analysis Plan was not on site.

Manufacturers' information and specifications (switches, plumbing, valves, etc.) is on site.

It is recommended that a copy of the NIBW Sitewide O&M Plan (June 5, 2006) be maintained on site and referenced in the Site-Specific O&M Manual.

2. **Site-Specific Health and Safety Plan** ■ Readily available ■ Up to date □ N/A

■ Contingency plan/emergency response plan ■ Readily available ■ Up to date □ N/A

Remarks: The CERP is on the Site computer; no hard copy is maintained on site.

3. **O&M and OSHA Training Records** ■ Readily available ■ Up to date □ N/A

Remarks: Kept on site.

4. **Permits and Service Agreements**

□ Air discharge permit	□ Readily available	□ Up to date	■ N/A
■ Effluent discharge	□ Readily available	■ Up to date	□ N/A
□ Waste disposal, POTW	□ Readily available	□ Up to date	■ N/A
□ Other permits______________________	□ Readily available	□ Up to date	■ N/A

Remarks____

5. **Gas Generation Records** □ Readily available □ Up to date ■ N/A

Remarks____

6. **Settlement Monument Records** □ Readily available □ Up to date ■ N/A

Remarks____

7. **Groundwater Monitoring Records** ■ Readily available ■ Up to date □ N/A

Remarks: Quarterly and annual reports are kept electronically.

8. **Leachate Extraction Records** □ Readily available □ Up to date ■ N/A

Remarks____

9. **Discharge Compliance Records**

□ Air	□ Readily available	□ Up to date	■ N/A
□ Water (effluent)	□ Readily available	□ Up to date	■ N/A

Remarks____

10. **Daily Access/Security Logs** ■ Readily available ■ Up to date □ N/A

Remarks____

IV. O&M COSTS – Discussed in Section 4 of the FYR Report

1. **O&M Organization**
   - □ State in-house
   - □ Contractor for State
   - □ PRP in-house
   - □ Contractor for PRP
   - □ Federal Facility in-house
   - □ Contractor for Federal Facility
   - □ Other____

2. **O&M Cost Records**
   - □ Readily available
   - □ Up to date
   - □ Funding mechanism/agreement in place

   Original O&M cost estimate____________________ □ Breakdown attached

   Total annual cost by year for review period if available

From (Date)	To (Date)	Total cost	
__________	__________	__________________	□ Breakdown attached
__________	__________	__________________	□ Breakdown attached
__________	__________	__________________	□ Breakdown attached
__________	__________	__________________	□ Breakdown attached
__________	__________	__________________	□ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**

   Describe costs and reasons: ____

V. ACCESS AND INSTITUTIONAL CONTROLS ■Applicable □ N/A

A. Fencing

1. **Fencing damaged** □ Location shown on site map ■ Gates secured □ N/A

   Remarks____

B. Other Access Restrictions

1. **Signs and other security measures** □ Location shown on site map □ N/A

   Remarks: Gates are secured. Camera and call button used at access gate for entry.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ■ Yes □ No □ N/A
Site conditions imply ICs not being fully enforced ■ Yes □ No □ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) __Self-reporting______________________________
Frequency ____
Responsible party/agency __NIBW PCs____
Contact ____James Lutton, P.E.____ ___Engineer____ _________ _916.698.2726___
Name Title Date Phone no.

Reporting is up-to-date ■Yes □ No □ N/A
Reports are verified by the lead agency ■ Yes □ No □ N/A

Specific requirements in deed or decision documents have been met □ Yes □ No ■ N/A
Violations have been reported □ Yes □ No ■ N/A
Other problems or suggestions: □ Report attached

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A
Remarks____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident
Remarks____

2. **Land use changes on site** ■ N/A
Remarks____

3. **Land use changes off site** ■ N/A
Remarks____

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable □ N/A

1. **Roads damaged** □ Location shown on site map ■ Roads adequate □ N/A

Remarks: The roads around the facility recently were repaved.

B. Other Site Conditions

Remarks : The facility was very clean, and good housekeeping is practiced. Everything is stored in its proper place.

____

____

____

____

____

VII. LANDFILL COVERS □ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) □ Location shown on site map □ Settlement not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

2. **Cracks** □ Location shown on site map □ Cracking not evident
   Lengths____________ Widths___________ Depths__________
   Remarks____
   ____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

4. **Holes** □ Location shown on site map □ Holes not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

5. **Vegetative Cover** □ Grass □ Cover properly established □ No signs of stress
   □ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks____
   ____

6. **Alternative Cover (armored rock, concrete, etc.)** □ N/A
   Remarks____
   ____

7. **Bulges** □ Location shown on site map □ Bulges not evident
   Areal extent______________ Height____________
   Remarks____
   ____

8. **Wet Areas/Water Damage** □ Wet areas/water damage not evident
□ Wet areas □ Location shown on site map Areal extent______________
□ Ponding □ Location shown on site map Areal extent______________
□ Seeps □ Location shown on site map Areal extent______________
□ Soft subgrade □ Location shown on site map Areal extent______________
Remarks____
____

9. **Slope Instability** □ Slides □ Location shown on site map □ No evidence of slope instability
Areal extent______________
Remarks____
____

B. Benches □ Applicable □ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map □ N/A or okay
Remarks____
____

2. **Bench Breached** □ Location shown on site map □ N/A or okay
Remarks____
____

3. **Bench Overtopped** □ Location shown on site map □ N/A or okay
Remarks____
____

C. Letdown Channels □ Applicable □ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
Areal extent______________ Depth____________
Remarks____
____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
Material type_______________ Areal extent_____________
Remarks____
____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
Areal extent______________ Depth____________
Remarks____
____

4.	**Undercutting** □ Location shown on site map □ No evidence of undercutting Areal extent______________ Depth____________ Remarks____ ____
5.	**Obstructions** Type_____________________ □ No obstructions □ Location shown on site map Areal extent______________ Size____________ Remarks____ ____
6.	**Excessive Vegetative Growth** Type____________________ □ No evidence of excessive growth □ Vegetation in channels does not obstruct flow □ Location shown on site map Areal extent______________ Remarks____ ____
D. Cover Penetrations	□ Applicable □ N/A
1.	**Gas Vents** □ Active □ Passive □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
2.	**Gas Monitoring Probes** □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
3.	**Monitoring Wells** (within surface area of landfill) □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
4.	**Leachate Extraction Wells** □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition □ Evidence of leakage at penetration □ Needs Maintenance □ N/A Remarks____ ____
5.	**Settlement Monuments** □ Located □ Routinely surveyed □ N/A Remarks____ ____

E. Gas Collection and Treatment	□ Applicable □ N/A
1.	**Gas Treatment Facilities** □ Flaring □ Thermal destruction □ Collection for reuse □ Good condition □ Needs Maintenance Remarks____ ____
2.	**Gas Collection Wells, Manifolds and Piping** □ Good condition □ Needs Maintenance Remarks____ ____
3.	**Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) □ Good condition □ Needs Maintenance □ N/A Remarks____ ____
F. Cover Drainage Layer	□ Applicable □ N/A
1.	**Outlet Pipes Inspected** □ Functioning □ N/A Remarks____ ____
2.	**Outlet Rock Inspected** □ Functioning □ N/A Remarks____ ____
□. Detention/Sedimentation Ponds	□ Applicable □ N/A
1.	**Siltation** Areal extent______________ Depth____________ □ N/A □ Siltation not evident Remarks____ ____
2.	**Erosion** Areal extent______________ Depth____________ □ Erosion not evident Remarks____ ____
3.	**Outlet Works** □ Functioning □ N/A Remarks____ ____
4.	**Dam** □ Functioning □ N/A Remarks____ ____

H. Retaining Walls □ Applicable □ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
Horizontal displacement_____________ Vertical displacement________________
Rotational displacement_____________
Remarks____
____

2. **Degradation** □ Location shown on site map □ Degradation not evident
Remarks____
____

I. Perimeter Ditches/Off-Site Discharge □ Applicable □ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
Areal extent_______________ Depth_____________
Remarks____
____

2. **Vegetative Growth** □ Location shown on site map □ N/A
□ Vegetation does not impede flow
Areal extent_______________ Type_____________
Remarks____
____

3. **Erosion** □ Location shown on site map □ Erosion not evident
Areal extent_______________ Depth_____________
Remarks____
____

4. **Discharge Structure** □ Functioning □ N/A
Remarks____
____

VIII. VERTICAL BARRIER WALLS □ Applicable ■ N/A

1. **Settlement** □ Location shown on site map □ Settlement not evident
Areal extent_______________ Depth_____________
Remarks____
____

2. **Performance Monitoring** Type of monitoring____________________________
□ Performance not monitored
Frequency_________________________________ □ Evidence of breaching
Head differential____________________________
Remarks____
____

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines ■ Applicable □ N/A	
1.	**Pumps, Wellhead Plumbing, and Electrical** ■ Good condition ■ All required wells properly operating □ Needs Maintenance □ N/A Remarks______________________________
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ■ Good condition □ Needs Maintenance Remarks______________________________
3.	**Spare Parts and Equipment** ■ Readily available ■ Good condition □ Requires upgrade □ Needs to be provided Remarks: A spare blower and blower motor are kept on site.
B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A	
1.	**Collection Structures, Pumps, and Electrical** □ Good condition □ Needs Maintenance Remarks______________________________
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** □ Good condition □ Needs Maintenance Remarks______________________________
3.	**Spare Parts and Equipment** □ Readily available □ Good condition □ Requires upgrade □ Needs to be provided Remarks______________________________

C. Treatment System ■ Applicable □ N/A
1. **Treatment Train** (Check components that apply) □ Metals removal □ Oil/water separation □ Bioremediation ■ Air stripping ■ Carbon adsorbers □ Filters___ ■ Additive (*e.g.*, chelation agent, flocculent): NaOCl for anti-scaling___ ■ Others: Acid Wash system___ ■ Good condition □ Needs Maintenance ■ Sampling ports properly marked and functional ■ Sampling/maintenance log displayed and up to date ■ Equipment properly identified ■ Quantity of groundwater treated annually: 2009 = 989 million gallons from PCX-1___ □ Quantity of surface water treated annually___ Remarks___
2. **Electrical Enclosures and Panels** (properly rated and functional) □ N/A ■ Good condition □ Needs Maintenance Remarks: Clearly marked___
3. **Tanks, Vaults, Storage Vessels** □ N/A ■ Good condition ■Proper secondary containment □ Needs Maintenance Remarks___
4. **Discharge Structure and Appurtenances** □ N/A ■ Good condition □ Needs Maintenance Remarks___
5. **Treatment Building(s)** □ N/A ■ Good condition (esp. roof and doorways) □ Needs repair ■ Chemicals and equipment properly stored Remarks___
6. **Monitoring Wells** (pump and treatment remedy) ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ All required wells located □ Needs Maintenance □ N/A Remarks___
D. Monitoring Data
1. Monitoring Data ■ Is routinely submitted on time ■ Is of acceptable quality
2. Monitoring data suggests: ■ Groundwater plume is effectively contained ■ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ All required wells located □ Needs Maintenance □ N/A
Remarks____
____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy is intended to remove VOC mass from the groundwater, contain the groundwater plume, and ultimately restore the groundwater to VOC levels below the MCLs for TCE and PCE. The remedy is effective and functioning as designed.

The rehabilitation of the MRTF after the untreated water incidents has allowed the remedy to continue to be effective and function as it was designed. Review of the routine monitoring data for the remedy indicates sufficient data are being collected to document the overall hydraulic containment and changes in concentrations of contaminants within the zone of MAU/LAU contamination.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The O&M Manual is currently under review for updates and revisions based on rehabilitation efforts and repairs completed in 2009 and 2010. The repairs and rehabilitation efforts enhance the current and future reliability of the remedy.

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. The O&M costs and activities were increased unexpectedly following repairs and rehabilitation of the MRTF following the incidents in 2007 and 2009 (described in FYR). The repairs and rehabilitation efforts are consistent with the ROD and enhance the current and future reliability of the remedy.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The O&M Manual is currently under review for updates and revisions, including a potential change in the frequency of carbon change-outs to maximize use of the carbon based on performance data.

Appendix D

Site Inspection Photographs

Central Groundwater Treatment Facility

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 1

Date: 11/17/2010

Direction: Northwest

Description: Central Groundwater Treatment Facility building.

Photograph No. 2

Date: 11/17/2010

Direction: NA

Description: Air stripper process air duct and air stripper column drainpipe.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 3

Date: 11/17/2010

Direction: East

Description: Air stripper process air blower.

Photograph No. 4

Date: 11/17/2010

Direction: South

Description: Air stripper column raw water drain pipes.

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 5

Date: 11/17/2010

Direction: NA

Description: Air stripper process air blower motor local control panel.

Photograph No. 6

Date: 11/17/2010

Direction: Southwest

Description: Air stripper raw water inlet piping.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 7

Date: 11/17/2010

Direction: NA

Description: Process air duct with flow switch (yellow box at top-center) and air stripper column raw water drain pipe with motor-actuated valve.

Photograph No. 8

Date: 11/17/2010

Direction: East

Description: Air stripper process air blower.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 9

Date: 11/17/2010

Direction: North

Description: CGTF Compound (east side).

Photograph No. 10

Date: 11/17/2010

Direction: West

Description: Air stripper process air outlet duct and inlet to gas-fired process air heaters (used for humidity control).

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 11

Date: 11/16/2010

Direction: West

Description: Gas-fired process air heater and local control panel for heater.

Photograph No. 12

Date: 11/17/2010

Direction: NA

Description: Process air duct between gas-fired heater and vapor phase carbon vessels.

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 13

Date: 11/17/2010

Direction: North

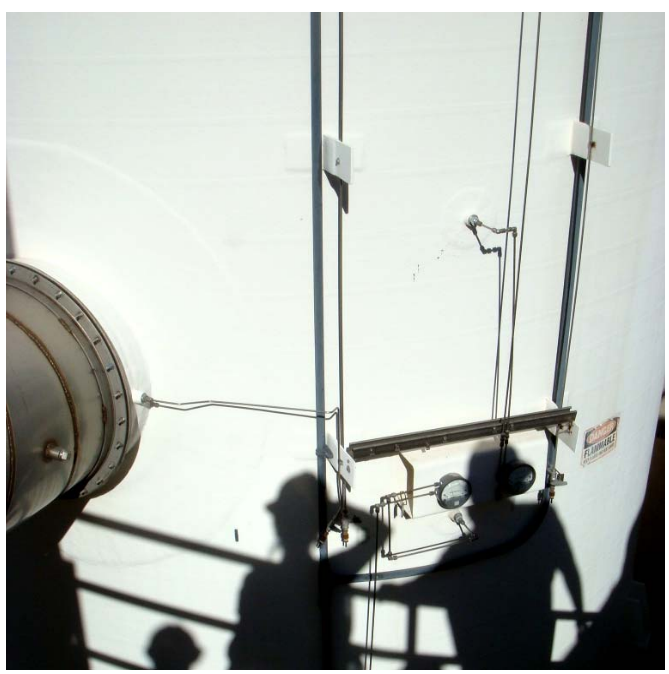
Description: Vapor phase carbon vessel for air stripper off-gas treatment, showing motor-actuated exhaust valves.

Photograph No. 14

Date: 11/17/2010

Direction: North

Description: Vapor phase carbon vessel, showing differential pressure indicator.



Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 15

Date: 11/17/2010

Direction: North

Description: Vapor phase carbon vessels.

Photograph No. 16

Date: 11/17/2010

Direction: NA

Description: Raw water inlet flow indicator/transmitter and example of field device identification tag.

Innovative Technical Solutions, Inc.
A Gilbane Company

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 17

Date: 11/17/2010

Direction: NA

Description: Air stripper process air outlet at top of air stripper columns. Reason for photo: refurbished the outlet columns

Photograph No. 18

Date: 11/17/2010

Direction: Northwest

Description: Top of air stripper columns and RF transceiver.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Central Groundwater Treatment Facility

Photograph No. 19

Date: 11/17/2010

Direction: North

Description: Hydro-pneumatic equalization tank.

Photograph No. 20

Date: 11/17/2010

Direction: East-southeast

Description: CGTF administration building.

North Indian Bend Wash
Miller Road Treatment Facility

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 1

Date: 11/16/2010

Direction: North

Description: MRTF Treatment Train 2 (TT2) air pressure/differential pressure and flow switches, transmitters, and indicators.

Photograph No. 2

Date: 11/16/2010

Direction: NA

Description: TT2 air stripper tower air flow switch.

Innovative Technical Solutions, Inc.
A Gilbane Company

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

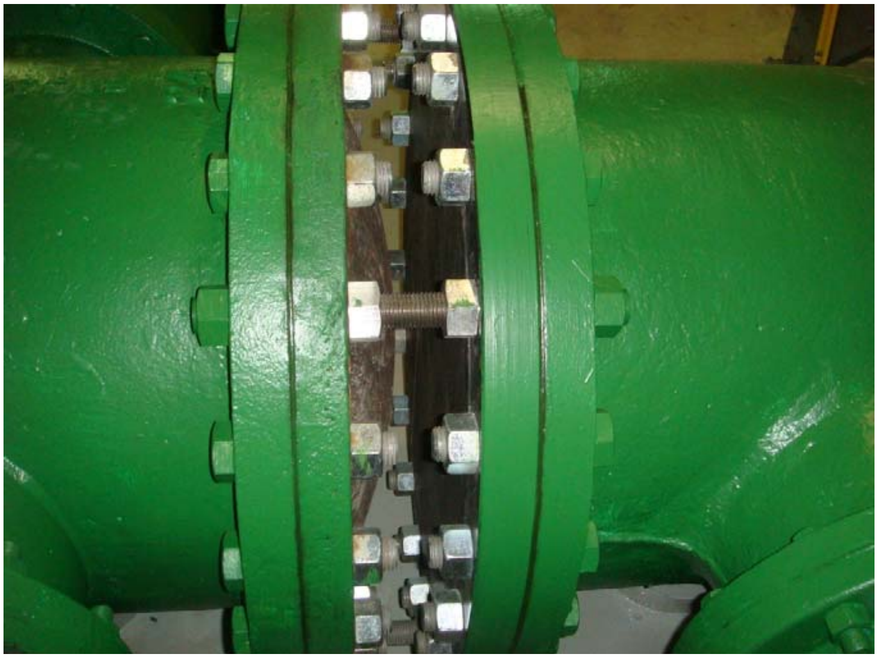
Photograph No. 3

Date: 11/16/2010

Direction: Northeast

Description: TT2 air stripper tower blower and process air duct at tower inlet.

Photograph No. 4



Date: 11/16/2010

Direction: NA

Description: Blind flanges separating PCX-1/TT 2 and TT 1 and TT 3.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 5

Date: 11/16/2010

Direction: South

Description: Additional blind flanges PCX-1/TT 2 and TT 1 and TT 3.

Photograph No. 6

Date: 11/16/2010

Direction: East

Description: Raw water process piping.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 7

Date: 11/16/2010

Direction: North

Description: TT 2 motor-actuated valve (MOV-1) and TT 2 inlet process pipe.

Photograph No. 8

Date: 11/16/2010

Direction: NA

Description: TT 2 inlet process water flow transmitter and indicator.

Innovative Technical Solutions, Inc.
A Gilbane Company

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 9

Date: 11/16/2010

Direction: Southeast

Description: TT 2 air stripper tower showing outlet piping for acid wash system (lower right in photo).

Photograph No. 10

Date: 11/16/2010

Direction: West

Description: TT 2 air stripper blower electrical disconnect.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 11

Date: 11/16/2010

Direction: West

Description: TT 2 air stripper blower and vibration sensor/transmitter.

Photograph No. 12

Date: 11/16/2010

Direction: NA

Description: TT 2 differential pressure indicator.

Innovative Technical Solutions, Inc.
A Gilbane Company

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 13

Date: 11/16/2010

Direction: NA

Description: TT 2 acid wash discharge piping.

Photograph No. 14

Date: 11/16/2010

Direction: NA

Description: Spare blower motor and pulleys.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 15

Date: 11/16/2010

Direction: NA

Description: Spare air stripper blower.

Photograph No. 16

Date: 11/16/2010

Direction: NA

Description: Spare vertical shaft wellhead pump motors.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 17

Date: 11/16/2010

Direction: West

Description: Vapor phase carbon vessels for air stripper off-gas treatment.

Photograph No. 18

Date: 11/16/2010

Direction: NA

Description: Air stripper column acid wash pump and controls.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 19

Date: 11/16/2010

Direction: NA

Description: Air stripper column acid wash conveyance pipe header.

Photograph No. 20

Date: 11/16/2010

Direction: South

Description: South end of MRTF compound.

Innovative Technical Solutions, Inc.
A Gilbane Company

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 21

Date: 11/16/2010

Direction: West

Description: MRTF compound showing south access gate and vapor phase carbon vessels. (Vessels also shown in photo 17.)

Photograph No. 22

Date: 11/16/2010

Direction: South-southeast

Description: Process piping from Well PV-15, located within the MRTF compound.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 23

Date: 11/16/2010

Direction: North

Description: MRTF compound showing north access gate and newly paved parking lot.

Photograph No. 24

Date: 11/16/2010

Direction: East

Description: Sump pump control panel for vapor phase carbon vessels containment area.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 25

Date: 11/16/2010

Direction: NA

Description: TT 1 air stripper tower.

Photograph No. 26

Date: 11/16/2010

Direction: NA

Description: TT 1 air stripper tower acid wash return line.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 27

Date: 11/16/2010

Direction: NA

Description: TT 1 process water inlet, motor-operated valve, and inlet process water flow transmitter/indicator

Photograph No. 28

Date: 11/16/2010

Direction: North

Description: TT 1 air pressure/differential pressure and flow switches, transmitters, and indicators.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

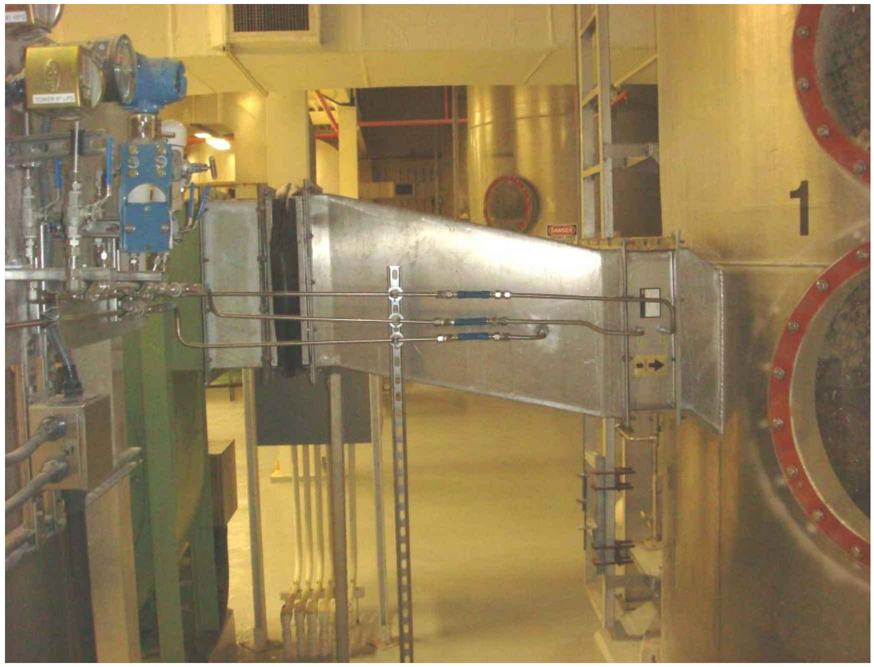
Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 29

Date: 11/16/2010

Direction: East

Description: TT 1 air stripper tower process air inlet.



Photograph No. 30

Date: 11/16/2010

Direction: West

Description: TT 1 process air blower motor disconnect and inlet air pressure indicator.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 31

Date: 11/16/2010

Direction: West

Description: TT 1 process air blower.

Photograph No. 32

Date: 11/16/2010

Direction: West

Description: TT 1 process air blower vibration sensor/ transmitter.

Innovative Technical Solutions, Inc.
A Gilbane Company

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 33

Date: 11/16/2010

Direction: NA

Description: TT 1 motor-operated valve, process water inlet piping, acid wash discharge piping, and raw water sample port.

Photograph No. 34

Date: 11/16/2010

Direction: NA

Description: TT 3 air stripper tower.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 35

Date: 11/16/2010

Direction: NA

Description: TT 3 acid wash return line.

Photograph No. 36

Date: 11/16/2010

Direction: NA

Description: TT 3 treated water sample port.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 37

Date: 11/16/2010

Direction: NA

Description: TT 3 process water inlet, motor-operated valve, and inlet process water flow transmitter/indicator

Photograph No. 38

Date: 11/16/2010

Direction: North

Description: TT 3 air pressure/differential pressure and flow switches, transmitters, and indicators.

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 39

Date: 11/16/2010

Direction: East

Description: TT 3 process air blower motor disconnect and inlet air pressure indicator.

Photograph No. 40

Date: 11/16/2010

Direction: West

Description: TT 3 process air blower vibration sensor/ transmitter.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 41

Date: 11/16/2010

Direction: NA

Description: TT 3 air stripper column differential pressure indicator and acid wash process piping.

Photograph No. 42

Date: 11/16/2010

Direction: NA

Description: TT 3 raw water sample port.

Innovative Technical Solutions, Inc.
A Gilbane Company

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

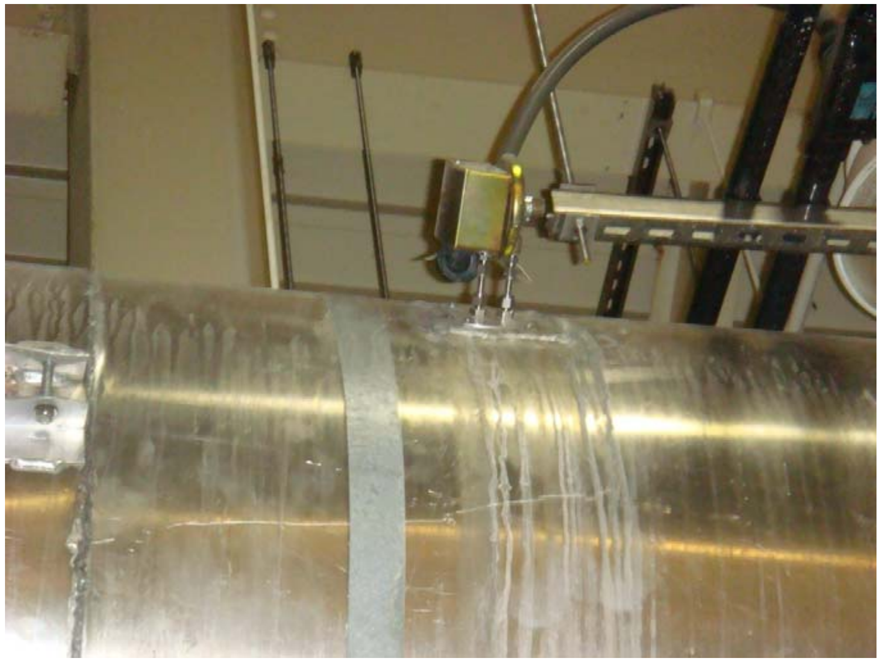
Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 43

Date: 11/16/2010

Direction: NA

Description: TT 2 air stripper process air effluent pressure sensing switch.



Photograph No. 44

Date: 11/16/2010

Direction: NA

Description: TT 2 motor control center (MCC). Switch gear is identical to equipment at TT 2 and TT 3.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 45

Date: 11/16/2010

Direction: NA

Description: Uninterruptible power supply (UPS) for motor-operated valves.

Photograph No. 46

Date: 11/16/2010

Direction: East-southeast

Description: Participating Companies' (PCs) local control panel (LCP) for extraction well PCX-1.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Miller Road Treatment Facility

Photograph No. 47

Date: 11/16/2010

Direction: East-southeast

Description: Salt River Project (SRP) LCP for extraction well PCX-1.

Photograph No. 48

Date: 11/16/2010

Direction: North-northeast

Description: Extraction well PCX-1 wellhead.

North Indian Bend Wash
Area 7 Groundwater Extraction and Treatment Facility

ITSI Innovative Technical Solutions, Inc.
A Gilbane Company

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

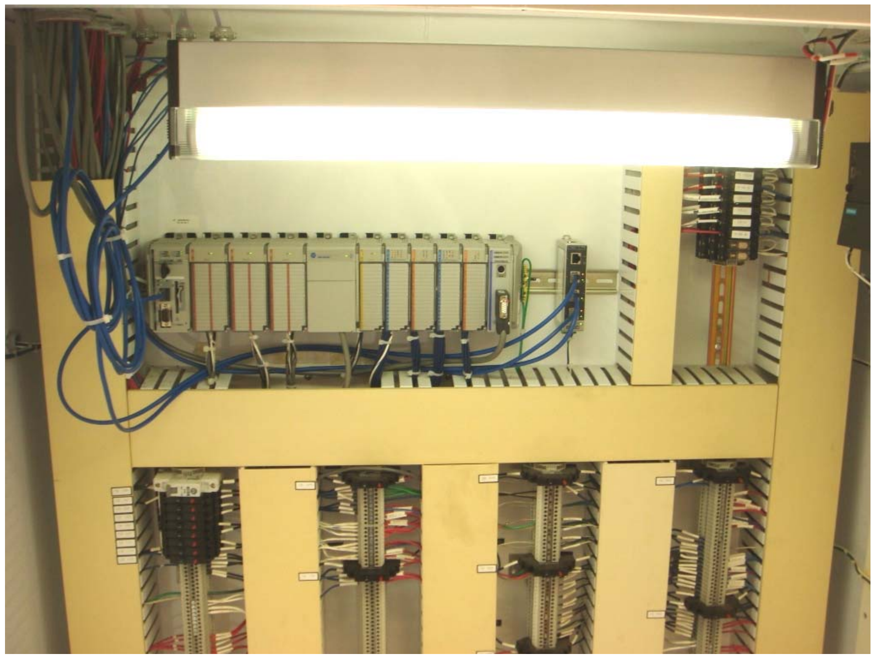
Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 7 Groundwater Treatment System

Photograph No. 1

Date: 11/17/2010

Direction: NA

Description: Primary Logic Controller (PLC)



Photograph No. 2

Date: 11/17/2010

Direction: NA

Description: Groundwater and process pump variable frequency drives (VFDs) and disconnects

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 7 Groundwater Treatment System

Photograph No. 3

Date: 11/17/2010

Direction: Southwest

Description: 5,000 gallon tank to equilibrate flows from extraction wells prior to treatment.

Photograph No. 4

Date: 11/17/2010

Direction: West

Description: Process pump and raw water sample port

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 7 Groundwater Treatment System

Photograph No. 5

Date: 11/17/2010

Direction: NA

Description: Polyphosphate storage and injection system; used to prevent scaling in air strippers and injection wells.

Photograph No. 6

Date: 11/17/2010

Direction: East

Description: UV/Ox system, showing reactors and inlet and outlet process pipes. (Poly-phosphate system is visible in background.)

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 7 Groundwater Treatment System

Photograph No. 7

Date: 11/17/2010

Direction: North

Description: UV/Ox electrical control cabinet (UV/Ox system is behind cabinet).

Photograph No. 8

Date: 11/17/2010

Direction: South

Description: H_2O_2 injection pump (part of the UV/Ox system).

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 7 Groundwater Treatment System

Photograph No. 9

Date: 11/17/2010

Direction: North

Description: Low-profile air stripper showing outlet piping (white pipe at top/center of picture) and sump level sensors.

Photograph No. 10

Date: 11/17/2010

Direction: NA

Description: Air stripper process air blower

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

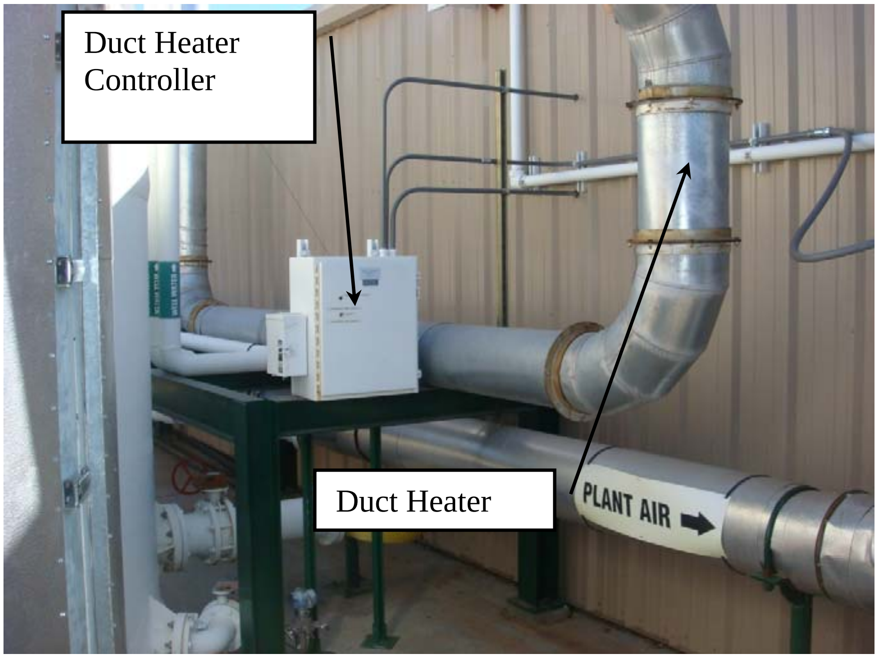
Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 7 Groundwater Treatment System

Photograph No. 11

Date: 11/17/2010

Direction: East

Description: Process air duct showing duct heater and heater controller.



Photograph No. 12

Date: 11/17/2010

Direction: North

Description: Vapor-phase carbon vessels (used to treat air stripper off-gas and soil vapor from SVE system).

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 7 Groundwater Treatment System

Photograph No. 13

Date: 11/17/2010

Direction: Southwest

Description: Process air outlet (receives effluent from vapor phase carbon vessels shown in Photo 12)

Photograph No. 14

Date: 11/17/2010

Direction: East

Description: Soil vapor extraction (SVE) system skids and manifolds

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 17, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 7 Groundwater Treatment System

Photograph No. 15

Date: 11/17/2010

Direction: South-southeast

Description: SVE system aftercooler for temperature control of extracted soil vapor.

North Indian Bend Wash
Area 12 Groundwater Extraction and Treatment Facility

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 12 Groundwater Treatment System

Photograph No. 1

Date: 11/16/2010

Direction: West

Description: Air stripper process air blower (10 hp)

Photograph No. 2

Date: 11/16/2010

Direction: West

Description: Air stripper process air blower (40 hp)

Innovative Technical Solutions, Inc.
A Gilbane Company

Photographic Documentation

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 12 Groundwater Treatment System

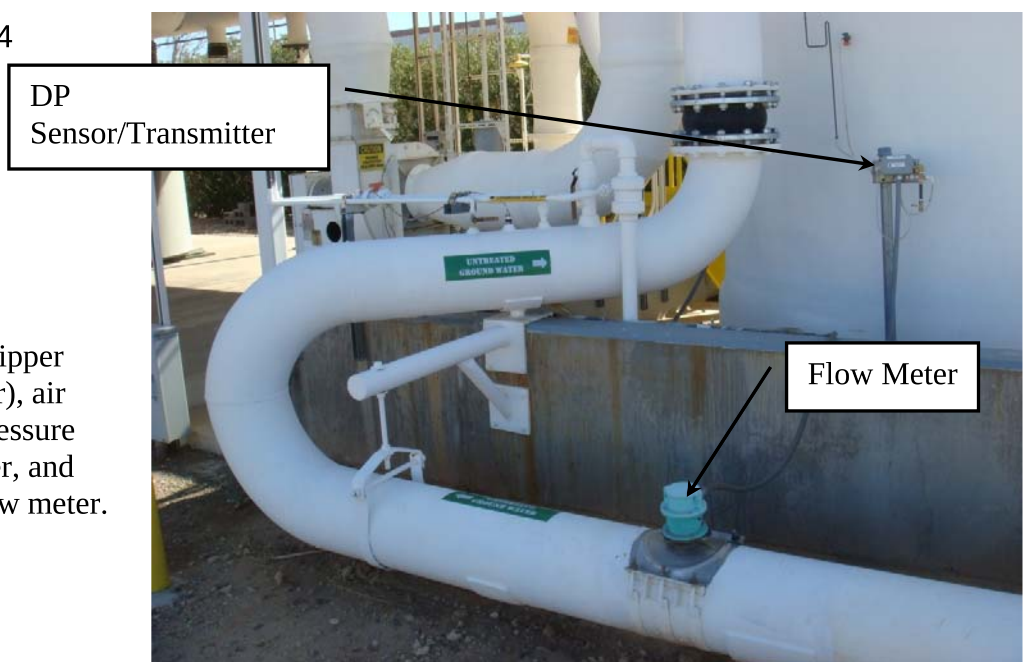
Photograph No. 3

Date: 11/16/2010

Direction: South

Description: Motor Control Center (MCC) for the groundwater treatment system.

Photograph No. 4



Date: 11/16/2010

Direction: South

Description: Air stripper inlet piping (raw water), air stripper differential pressure (DP) sensor/transmitter, and process water inlet flow meter.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 12 Groundwater Treatment System

Photograph No. 5

Date: 11/16/2010

Direction: South

Description: Air stripper discharge piping (treated water). Inlet piping is seen in background.

Photograph No. 6

Date: 11/16/2010

Direction: East

Description: Vapor phase carbon vessel effluent sample port (treated process air).

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 12 Groundwater Treatment System

Photograph No. 7

Date: 11/16/2010

Direction: Southeast

Description: Air stripper tower.

Photograph No. 8

Date: 11/16/2010

Direction: Southeast

Description: Air stripper tower showing secondary containment and acid wash piping located in front of the air stripper tower.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 12 Groundwater Treatment System

Photograph No. 9

Date: 11/16/2010

Direction: Northwest

Description: Air stripper acid wash conveyance pipe and process pump.

Photograph No. 10

Date: 11/16/2010

Direction: West-Southwest

Description: Vapor phase carbon vessels for treatment of air stripper off-gas.

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 12 Groundwater Treatment System

Photograph No. 11

Date: 11/16/2010

Direction: NA

Description: Human Machine Interface (HMI) providing system control to operator.

Photograph No. 12

Date: 11/16/2010

Direction: NA

Description: Process Air Flow Sensor

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 12 Groundwater Treatment System

Photograph No. 13

Date: 11/16/2010

Direction: NA

Description: Differential pressure sensor/indicator/ transmitter (measures change in pressure across carbon vessels).

Photograph No. 14

Date: 11/16/2010

Direction: NA

Description: Air stripper raw water inlet sample port (WSP-1).

Client: United States Environmental Protection Agency
Location: Scottsdale, Arizona
Photograph Dates: November 16, 2010

Prepared by: ITSI
Photographer: D. Fisher/ S. Archabal
Project: Indian Bend Wash Superfund Site
Site: Area 12 Groundwater Treatment System

Photograph No. 15

Date: 11/16/2010

Direction: West

Description: Air stripper treated water outlet sample port (WSP-2) and pH sensor (at top of pipe).

Photograph No. 16

Date: 11/16/2010

Direction: North

Description: Well MEX-1 Electrical service and Local Control Panel (LCP)

Appendix E

Five-Year Review Interview Forms

INTERVIEW RECORD

Site Name: Indian Bend Wash Superfund Site		**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review		**Time:** 1:00	**Date:** 12/07/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Environmental Protection Agency		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9	
Individual Contacted:			
Name: Rich Muza	**Title:** DCE Circuit Site - Remedial Project Manager	**Organization:** EPA Region 9	
Telephone No: **Fax No:** **E-Mail Address:** Muza.Richard@epa.gov		**Street Address:** **City, State, Zip:**	
Summary Of Conversation			

1. **What is your overall impression of the SIBW DCE Circuits site project?**

   The focus of the DCE Circuits remedy is primarily to mitigate potential vapor intrusion at 2 units in a building where people work. There is soil contamination underneath asphalt and the building making this site difficult to achieve final clean up. The remedy is soil vapor monitoring and the vapor intrusion pathway is a potential concern. This is a low key site that poses a potential vapor intrusion pathway, but there is no major public concern.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

   The remedy was augmented in 2009 when ventilation units were added to 4 units in the two onsite buildings. One building is no longer occupied therefore it currently no longer presents a potential vapor intrusion pathway. The other building has 2 units which are used for business purposes. The tenants operate the ventilation units and air conditioning when the workers are present to minimize a potential indoor air pathway. Additional indoor air samples are needed to evaluate the remedy's performance regarding the potential vapor intrusion pathway.

3. **Do you feel well informed about the site's activities and progress?**

   Yes.

4. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.

We discovered a soil vapor well in Suite 117 in February 2010. At the tenant's request, we sampled then formally abandoned that well on April 1, 2010.

5. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

We sample the soil vapor monitoring wells in the parking lots and indoor air at the 4 units semi-annually. Before each sampling event, we conduct a pre-monitoring site check and visit to evaluate if there have been any changes at the site.

6. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

We changed the sampling routine in 2008. From 2005-2007, sampling included monitoring at all 4 monitoring ports at each soil vapor monitoring well. We have since focused the sampling on the 2 shallow monitoring ports at each soil vapor monitoring well. With the new ventilation units installed in 2009, we also began monitoring the indoor air in the buildings at more locations to evaluate a potential vapor intrusion pathway.

7. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

No.

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

We know there is soil contamination at depth, but it is covered with buildings and asphalt so there is no direct exposure. The focus is on evaluating whether there is an indoor air pathway to the 4 units in the two onsite buildings. This project will likely require monitoring for a very long time.

INTERVIEW RECORD

Site Name: Indian Bend Wash Superfund Site	**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review	**Time:** 10:00	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Scottsdale Water Campus	☐ Incoming ☐ Outgoing	

Contact Made By:

Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9

Individual Contacted:

Name: Suzanne Grendahl	**Title:** Water Quality Director	**Organization:** City of Scottsdale
Telephone No: 480.312.8719 **Fax No:** **E-Mail Address:** sgrendahl.scottsdaleaz.gov		**Street Address:** **City, State, Zip:**

Summary Of Conversation

<u>Agency Officials</u>

1. **Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.**

   There were several incidents in NIBW over the last three years, including those at the MRTF. There has been a lot of time and effort spent on addressing those issues along with other items such as the air-release valve incident at CGTF.

2. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.**

   There are inspections by staff at the facilities. From the Environ inspection recommendations, we have looked at carbon change-out schedules and control systems to evaluate performance optimization.

3. **Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.**

   We conducted all the rehab work at the CGTF. The City has also been involved in the long term measures to address the incidents at the MRTF. At the CGTF, the City has conducted preventive maintenance as well as routine maintenance with the costs covered by Motorola. All routine maintenance has been as expected.

4. **Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?**

   No.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

The City sees the NIBW groundwater as a precious resource. Surface water is an issue in this area and groundwater is an important resource. The NIBW project is intended to treat the groundwater so we can continue to use it. The remedy has been successful with the VOC concentrations in groundwater declining. This is what the City needs since groundwater has to be used locally.

At times the relationship between all stakeholders has been strained. The City would like to be more involved in a partnership relationship with the agencies. The City wants to be viewed as a governing party and not a responsible party like the PCs. Issues are handled and the water is safe and secure. There was spin off from the MRTF incident in 2008 and the City was not involved in that incident. We want more of a partnership role moving forward.

The City has worked very hard to be in contact with the citizens of Scottsdale. For the City, there is a question with what defines "citizens": is it the community involvement group (CIG) members, or the broader/entire community. The CIG members are concerned with certain causes that are important to them. The City recommends outreach to the entire community to capture the perspective of the broader community.

Sustainability is important to the City and we want to carefully manage the Central Arizona Project (CAP) water. We do not want to rely solely on the groundwater.

6. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

The revised O&M plan and GAC change-outs need to be reviewed. These documents meet the original site requirements, but with changes over time, they need to be reviewed and updated. This will result in operational efficiencies and cost savings.

INTERVIEW RECORD			
Site Name: Indian Bend Wash Superfund Site		**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review		**Time:** 1335	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Arizona Department of Environmental Quality		☐ Incoming ☐ Outgoing	

Contact Made By:		
Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9

Individual Contacted:		
Name: Karol Wolf	**Title:** Environmental Scientist	**Organization:** Salt River Project
Telephone No: 602.236.5767 **Fax No:** **E-Mail Address:** karol.wolf@srpnet.com	**Street Address:** **City, State, Zip:**	

Summary Of Conversation

1. **What is your overall impression of the IBW Site project?**

   The remedy is working well and the conditions that were established for the cleanup are being met.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

   SRP is concerned with advancement of the plume in the northern LAU region. Any loss of supplies to SRP will be cause for concern.

3. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?**

   Of course, SRP will be carefully monitoring the plume at the northern edge to make sure the water supply in this area is safe guarded.

<u>Facility Personnel</u>

4. **Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.**

   SRP has pump maintenance personnel that visit SRP's operating well sites (including PCX-1, Granite Reef, and 23.3E7.3N (COS-31) regularly. They perform visual inspections and equipment testing to check operating parameters for efficiency, normal operation, safety, leakage, or any other condition that impacts pump and well equipment operation.

5. **Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.**

   No, there have been minor changes in equipment in response to technology advancements or problems but nothing significant.

   There was a release of untreated groundwater that occurred from PCX-1 on September 23, 2009. The release occurred because the cast aluminum housing of the air relief valve failed, which has since been replaced.

6. **Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.**

   In response to the air relief valve incident described above, a water level sensor in the PCX-1 piping vault was installed. The sensor includes an alarm system and controls that will automatically shut down the pump and send a notification to SRP's Association Dispatch Center when there is excess water in the vault.

   SRP also has replaced its flow measuring devices with high pressure meters as a precaution against leaks at the operating well sites.

7. **Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?**

   No.

<u>**Agency Officials**</u>

8. **Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.** .

   In September 2009, PCX-1 had a release of untreated groundwater from the well site. That was documented in a report and the recommendations to mitigate this from happening in the future have been implemented.

9. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.**

   There are three operating SRP well sites which are part of the NIBW remedy: PCX-1, COS-31 and Granite Reef wells (part of Area 12). We have staff routinely conduct inspections for operating parameters, safety, signs of leakage, and any other conditions related to the equipment.

   As a result of the PCX-1 incident, there were upgrades such as a water level sensor alarm system and controls that send notifications to the well center. There are also flow measuring devices with high flow meters at the well sites.

10. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?**

   To continue monitoring at the northern plume boundary and implement measures to address containment if the data show that plume capture is jeopardized.

INTERVIEW RECORD

Site Name: Indian Bend Wash Superfund Site - NIBW		**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review		**Time:** 9:30	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Scottsdale Water Campus		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9	
Individual Contacted:			
Name: Craig Miller	**Title:** Water Quality Coordinator	**Organization:** City of Scottsdale	
Telephone No: **Fax No:** **E-Mail Address:**	**Street Address:** **City, State, Zip:**		
Summary Of Conversation			

1. **What is your overall impression of the IBW Site project?**

Overall, I feel the work that is being done to clean-up the groundwater contamination is going well.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

I would say for the most part, yes. The remedy seems to be performing very well when the treatment facilities are in operation.

3. **Are you aware of any ongoing community concerns regarding the site or its operation and administration?**

We want this project to be managed appropriately. It works very well when it is operating. CGTF wells COS-71 and COS-75 do have higher VOC concentrations after a shut off, however concentrations decrease soon after the system is back online.

4. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?**

Regarding the wells that feed into the CGTF, I have noticed drops in the TCE levels from both wells COS-75a and COS-71 when they have been in constant operation. If they are down for a month for annual cleaning at the CGTF, I have noticed that initial start-up TCE levels have increased.

Agency Officials

5. **Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.** .

We have had to address a complaint about an incidental release. The golf course owner of the Coronado Golf Course was concerned about the golf patrons walking through contaminated water. The City addressed the release and made improvements. A report was submitted to EPA, ADEQ and the NIBW parties.

6. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

Yes. Our office prepares and submits the quarterly CMR.

7. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

We have made some changes in the alarm testing that is done each time a contractor is taken off-line for carbon replacement. We have also increased our weekly water sampling to three times per week. I believe these changes to the alarm controls provide greater protection and a quicker response time for any unforeseen upsets in the treatment process.

Annual acid cleaning needs to take place to remove calcium carbonate that builds up on the aeration media. Not sure if this was expected or not but the HCl used in the cleaning has caused affected areas of the piping to corrode requiring rehabilitation or replacement such as recoating of piping and corrosion in the air duct.

8. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

No.

9. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Are soil tests necessary if the water contamination is at 70-100 ppb? It would presume some sort of cleanup is needed if soil tests were conducted but the contamination levels are at such a low level. Of all the sites, we treat Area 7 very cautiously due to its higher contamination levels relative to the other sites. The other sites can be treated a lot differently.

10. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

The City has been exploring extending the usage of the GAC contactors. Due to lower concentrations of TCE at the CGTF, we are looking into changing the frequency of air monitoring and GAC replacement. These changes should provide a cost savings and still maintain efficient air treatment. The PCs submitted a revised CGTF O&M Plan in January 2009 and we have not received approval. We have since revised this plan and made some changes regarding the removal of the chlorine gas and the installation of the on-site chlorination system.

Facility Personnel

11. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

There is O&M presence Monday thru Friday during the day time hours. Staff take daily readings and perform any scheduled maintenance that may be necessary. The CGTF is monitored 24 hours 7 days a week using the City's SCADA system.

INTERVIEW RECORD			
Site Name: Indian Bend Wash Superfund Site - NIBW		**EPA ID No.:**	
Subject: Five-Year Review		**Time:** 0900	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Scottsdale Water Campus		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9	
Individual Contacted:			
Name: Brian Paulson	**Title:** Water Production Manager	**Organization:** City of Scottsdale	
Telephone No: 480.312.8722 **Fax No:** **E-Mail Address:** bpaulson@scottsdaleaz.gov		**Street Address:** **City, State, Zip:**	
Summary Of Conversation			

1. **What is your overall impression of the IBW Site project?**

   Historically, this site is working pretty well, especially compared to other superfund sites around the country.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

   The remedy is functioning and working.

Agency Officials

3. **Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.** .

   An air release valve failed at the Coronado Golf Course. The air release valve has been replaced.

4. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.**

   Yes, there are routine monthly meetings with the PCs that cover operation, equipment, regulations, and planned and completed work. There are daily safety inspections at CGTF as well as more specific inspections. Staff is at the CGTF seven days a week.

5. **Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?**

   No.

6. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

There have not been any significant changes to maintenance schedules however there have been some equipment changes. The blowers were replaced in the 2007 rehab of the CGTF facility. With the new blowers came new variable frequency drives (VFDs), which need more electrical maintenance, inspections, and cleanings. The water quality department increased the sampling frequency from sampling weekly to sampling three times a week since the MRTF incident. This has increased the costs.

7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

I would like to see an opportunity for the City of Scottsdale to have input in the management of the facilities and entire IBW remedy. If there is an opportunity, it would be nice to get the city's perspective on how the remedy is governed.

The remedy as a whole is working pretty well. I have looked at the history of the remedy and by design how things have evolved with Jim Lutton, Terry Lockwood, and Dennis Shirley. Looking at the design, well locations, and the steady decline over the years, the remedy is working even though it will take a long time to remediate. The key issues of this site are water supply, water quality, and meeting/exceeding regulatory requirements.

8. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

This site is a good simple, stable process with very few places to optimize. This question could be better answered by Craig Miller and the senior operator. From an operational standpoint, the VFDs of the blower was an optimization and one refinement that would save on electrical costs. To date we have not instituted their use. The blowers are at 100% speed. The optimization of these blowers, and an update of the Piping &Instrumentation Drawings (P&IDs) need to be done still. At the request of the PCs, we have put the facility at 100% green energy. Where the energy really comes from, we don't know, but we do know that the costs come from 100% green renewable energy source.

From a sampling and water quality standpoint, the question would be best answered by Suzanne Grendahl.

__Facility Personnel__

9. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

There is maintenance, mechanical, electrical, and technology staff for the CGTF. The operation staff rotates ten hour shifts, seven days a week. There is one staff member on-call every night by pager. There is a senior operator at the CGTF facility Monday through Thursday and there are typically at least two people at the facility seven days a week. The system is monitored 24 hours a day by the SCADA at the Chaparral and Scottsdale water campus.

INTERVIEW RECORD			
Site Name: Indian Bend Wash Superfund Site- NIBW		**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review		**Time:** 9:45	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Scottsdale Water Campus		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9	
Individual Contacted:			
Name: Chris Whitmer	**Title:** Senior Treatment Plant Operator	**Organization:** City of Scottsdale	
Telephone No: 480.312.0390 **Fax No:** 480.312.0393 **E-Mail Address:** cwhitmer@scottsdaleaz.gov		**Street Address:** 8650 E. Thomas Road **City, State, Zip:** Scottsdale, AZ 85251	
Summary Of Conversation			

Agency Officials

1. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.

There is a neighbor to the north of the CGTF who I stay in contact with during the scheduled carbon change-outs. The neighbor is concerned about the noise that occurs during the carbon change-out process. I notify this neighbor prior to the activities and do not start the process until 7am.

There have also been complaints made by city water meter personnel about scale forming on the meters. We now blend the water to reduce the scale.

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

The PCs conduct an annual inspection and the City conducts inspections daily. There are also the county, EPA, and ADEQ inspections that occur.

3. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

No.

4. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

We are currently in the process of updating the CGTF O&M plan. We have increased sampling in light of the MRTF incident in 2008. The sampling occurred on Mondays; since 2008 sampling is conducted on Monday, Wednesday, and Friday.

There were upgrades at CGTF in 2007, where we changed packing material, recoated the towers and piping, added new blowers, duct heaters, cleaning system, and pumps. With all the new equipment and infrastructure, the maintenance plan needed updating.

We are also in the process of updating our maintenance database for work orders and tracking system. The Hanson-based system is being upgraded. The RTU system was updated in follow up to recommendations in the Environ report. We implemented most of suggestions from the Environ engineering evaluation, such as adding redundant system notification signals and alarms.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

The incidents at MRTF have made NIBW harder to deal with. The City tries to be a good player and wants to be given the benefit of the doubt, and not viewed the same as a responsible party. The City's perception is that we are viewed as a responsible party. The public doesn't seem to appreciate what we are doing. We are trying to give the water the most beneficial use. We have managed the site well. This is a model superfund site. Responsible parties have paid for the cleanup and there is a good plan for the long term clean up. We are putting the groundwater resource to the best use. The remedy seems to be doing well as a whole, containing the plume and treating it.

6. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

The City has made recent improvements and added new equipment. The sampling change to three times per week was an optimal change.

INTERVIEW RECORD

Site Name: Indian Bend Wash Superfund Site	**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review	**Time:** 3:30	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Arizona Department of Environmental Quality	☐ Incoming ☐ Outgoing	

Contact Made By:

Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9

Individual Contacted:

Name: Don Atkinson	**Title:** Project Hydrologist	**Organization:** Arizona Department of Environmental Quality

Telephone No: **Fax No:** **E-Mail Address:** dea@azdeq.gov	**Street Address:** **City, State, Zip:**

Summary Of Conversation

1. What is your overall impression of the IBW Site project?

With the exception of having allowed parties that are not subject to the requirements of the RODs to own and operate treatment systems, the overall management, design, and operation of the remedial systems has been exemplary. Maintenance in some instances has been lacking.

2. Is the remedy functioning as expected? How well is the remedy performing?

Yes, it has performed well until recent incidents which are indicative of an aging infrastructure and, to some degree, complacency.

3. From your perspective, what effect has continued cleanup operations at the site had on the surrounding community?

Very little negative impact except during construction phases and recent "scares" due to the two incidents at the MRTF.

4. Are you aware of any ongoing community concerns regarding the site or its operation and administration?

Recent incidents at the MRTF have, of course, upset AAWC customers. The subsequent discharge of PCX-1 water into SRP's canal system has caused concern for other parties working to assure a sustainable groundwater supply in the area.

5. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism or anything that required emergency response from local authorities? If so, please give details.

No.

6. Do you feel well-informed about the site's activities and progress?

Yes.

Agency Officials

7. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.

There have been six incidents, two of which were major (affecting drinking water) events. The other four involved releases of untreated water to the ground. ADEQ was out there immediately after five of the incidents. The only one we did not respond to is the one where the untreated water did not exit the well vault. I have not dealt with any complaints from the public.

8. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

ADEQ has responded or participated in follow-up inspections of all except one incident where the untreated water did not leave the well vault.

9. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

The incidents mentioned previously have precipitated a thorough review of the two drinking water systems (MRTF & CGTF), upgrades (both planned & unplanned), more frequent sampling at the MRTF and exploration of alternative end-use of the treated water from well PCX-1.

10. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

None that have not been dealt with immediately. The NPDES permit requirements have added monitoring and reporting requirements for Area 12 and MRTF.

11. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Inspections and maintenance should be more in-depth and frequent due to the aging infrastructure of the NIBW extraction wells, conveyance, and treatment systems.

12. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

Many options for optimizing operations at the MRTF are currently being evaluated by all parties. Maintenance procedures will be re-evaluated as a result of the recent incidents. Optimization of site-wide groundwater sampling efforts has been ongoing to eliminate unnecessary sampling points. Routine use of PDB samplers has been suggested by ADEQ.

INTERVIEW RECORD		
Site Name: Indian Bend Wash Superfund Site	**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review	**Time:** 3:00	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Arizona Department of Environmental Quality	☐ Incoming ☐ Outgoing	

Contact Made By:		
Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9

Individual Contacted:		
Name: Wendy Flood	**Title:** Project Manager	**Organization:** Arizona Department of Environmental Quality

Telephone No: 602-771-4410 **Fax No:** **E-Mail Address:** Flood.Wendy@azdeq.gov	**Street Address:** **City, State, Zip:**

Summary Of Conversation

1. What is your overall impression of the IBW Site project?

The project is currently in the cleanup phase; it is moving along well and is following the conceptual site model.

2. Is the remedy functioning as expected? How well is the remedy performing?

For the most part it has; it was functioning as it should up until a few years ago.

3. From your perspective, what effect has continued cleanup operations at the site had on the surrounding community?

As a whole, there has not been any negative effect in this area which is well sought after. Once the idea of a superfund site was explained to community members, there wasn't much of a concern.

4. Are you aware of any ongoing community concerns regarding the site or its operation and administration?

Mainly the community wants to keep the system functioning and functioning properly. The community feels that the water is being wasted and wants an answer to the long term measures. Some are concerned about the health effects they may deal with in the future, but not about what is happening right now. Air emissions have also been a concern in the past.

5. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism or anything that required emergency response from local authorities? If so, please give details.

No.

6. Do you feel well-informed about the site's activities and progress?

Absolutely, I feel well informed.

Agency Officials

7. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result. .

The long-term measures response should be implemented faster. The water quality department fined the PCs for the two major incidents. Our section also responded to the incidents with numerous e-mail, meetings and site visits. When well 42 had a "hit" and there was possible migration to the west, the contingency plan actions were implemented.

8. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

ADEQ works with EPA and coordinates very well. All activities are coordinated in order to keep the remedy moving forward. ADEQ has an ongoing communication with the PCs with calls, reports, updates, so we already know what is going on when we receive the reports. This site is a model of superfund sites due to the communications and reporting.

9. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

Yes, preventative maintenance has caused most of the problems at the site. O&M is important, and a full evaluation of the entire system as a whole will be asked of the PCs. They have responded well to the incidents by going above and beyond the original O&M updates.

10. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

No.

11. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

There are very good open lines of communication. This project is forward moving, there are open lines of communications and collaboration. Operationally some of the operations could have moved quicker if there weren't so many side agreements. ADEQ has concerns with the potential northwest plume expansion. There are also still questions regarding Area 7 at the Rolamech property. Overall, we must keep the momentum going, especially with implementing the long-term improvements.

12. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

We are concerned with the effectiveness of the remedy, first – then look at ways to implement cost savings, secondly.

13. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

From what we know, yes there is a continuous on-site O&M presence.

INTERVIEW RECORD			
Site Name: Indian Bend Wash Superfund Site		**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review		**Time:** 1:30	**Date:** 11/02/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** ADEQ Phoenix Office		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9	
Individual Contacted:			
Name: Julie Riemenschneider	**Title:** Manager Remedial Projects Section	**Organization:** Arizona Department of Environmental Quality	
Telephone No: 602.771.4411 or 800.234.5677 **Fax No:** 602.771.4236 **E-Mail Address:** jjr@azdeq.gov		**Street Address:** 1110 West Washington Street **City, State, Zip:** Phoenix, AZ, 85007	

Summary Of Conversation

1. What is your overall impression of the IBW Site project?

The project is working really well. The MRTF is working well at this interim operations stage; however, ADEQ would like to see the MRTF long-term measures implemented soon.

2. Is the remedy functioning as expected? How well is the remedy performing?

The remedy is functioning as designed but there are outside influences that are affecting the planned changes for the design. These outside influences are not just natural occurrences but influences such as side agreements with the water companies. These side agreements have added nearly three years to implementing the long-term measures. We know they need to continue to be managed properly, but also in a more timely way.

3. Do you feel well-informed about the site's activities and progress?

Yes.

<u>**Agency Officials**</u>

4. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.

There have been six incidents from 2007-2010, out of those there are several improvements that still need to be done. While some improvements have been made in response to the incidents, other issues will need to be addressed by the Participating Companies (PCs) as part of the Five Year Review process. For example, instead repairing an o-ring after it breaks, the PCs need to be more proactive and work on preventing these types of ruptures before they break. These types of incidents are preventable with proactive operation and maintenance (O&M).

5. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

Yes, the ADEQ is active in site visits, regular meetings with the PCs, stakeholders, and annual community meetings. ADEQ also coordinates with EPA on aspects of the site that involve ADEQ's Water Quality group, such as permits, and responses to calls we receive from residents or community members.

6. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

The entire system needs to be updated at all facilities, which includes the pipelines and valves and not just the facility itself. Preventative maintenance and O&M must be completed at all the pipelines. This effects the protectiveness of the remedy in that if something is not operating properly or breaks, the system is down for a period of time longer than if there was proactive O&M. There are many simple measures that can be taken to have a higher operating run-time. All of the treatment systems in the NIBW have had an issue due to these systems getting older.

When extraction well PCX-1 was down for a long time, the overall contamination plume in the groundwater began to migrate again to the north-northwest. There is always concern when a plume moves and we want to be sure to monitor this area closely.

7. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

No.

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

There needs to be an update of all the systems. The MRTF needs the long-term measures implemented. Side agreements are complicating the remedy, which in turn affects the longer term aspects of the remedy.

EPA's comments on the information for ADEQ's MRTF consent order is a positive step. EPA and ADEQ have worked well together, and this relationship is getting better. ADEQ is very appreciative of the good communication lines EPA has built with them.

9. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Yes.

10. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

In the upper alluvial unit (UAU), the contaminant concentrations are definitely decreasing. In the lower alluvial unit (LAU), contaminant concentrations are not decreasing as much and this was seen when extraction well PCX-1 was not operating. When extraction well PCX-1 was not in operation, the plume began to move to the north-northwest.

11. Are you familiar with the EPA and ADEQ web sites? Do you know where to find the Indian Bend Wash site information on them?

Yes to both questions. ADEQ was glad to see that EPA recently updated the ADEQ portion of their site.

12. Are you aware of the information repositories for the site? Have you ever used them to find information for the site?

Yes, the Scottsdale Public Library and ADEQ.

INTERVIEW RECORD				
Site Name: Indian Bend Wash Superfund Site - NIBW			**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review			**Time:**	**Date:** 10/22/2010
Type: ☐ Telephone ☐ Visit ■ Other **Location of Visit:** Email			☐ Incoming ☐ Outgoing	
Contact Made By:				
Name: Vicki Rosen	**Title:** Community Involvement Coordinator		**Organization:** EPA Region 9	
Individual Contacted:				
Name: Archie Mones	**Title:** Community Member		**Organization:** Community Involvement Group	
Telephone No: **Fax No:** **E-Mail Address:** rsahm51@cox.net		**Street Address:** **City, State, Zip:**		
Summary Of Conversation				

It's not improbable that at some point the EPA, the FDA or some agency will conclude that TCE is in fact "dangerous" to our health. Consider the 1964 announcement made by the Surgeon General concerning cigarette smoking. It is not improbable that TCE exposure or ingestion at levels below, maybe well below, the present MCL will require the designation "dangerous to our health."

If that happens will we be able to say that we did enough about TCE at NIBW? "We" includes all of us. Did we do what was acceptable or practical at the time? Was cost a determining consideration? Or did we actually do everything possible to:

- Install fail safe devices to prevent or minimize leaks and escape of contaminated water?

- Develop real time analysis for TCE to help minimize the possibility of contaminated water reaching consumers?

- Institute and enforce a reduction in the MCL? (Levels below 1 ppb have been achieved for some time and analysis down to 0.5 ppb appears to be feasible.)

- Deal with cumulative effects from other pollutants such as arsenic?

- Determine the effect of TCE on DNA in view of recent work on DNA?

- Initiate a comprehensive study of the health of people drinking and bathing in the water containing TCE in Scottsdale and Paradise Valley etc.? Reference what was done or is still being done at Camp Lejeune?

- Deal with TCE vapor emissions associated with the clean-up.

This doesn¹t reflect on the significant technical, operational, legal, management and administrative efforts and successes at NIBW.

It reflects largely on policy, which goes beyond EPA, Region 9. There is no mandate, for example, to deal with cumulative effects. There is no requirement for real time analysis. There is no requirement yet to reduce the MCL. There is probably no funding in place or contemplated for medical and scientific studies. We have to hope that exposure to TCE will not amount to anything more than a possible health risk or whatever the most recent designation is.

INTERVIEW RECORD			
Site Name: Indian Bend Wash Superfund Site		**EPA ID No.:**	
Subject: Five-Year Review		**Time:** 2:50	**Date:** 11/02/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Scottsdale Public Library		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Vicki Rosen	**Title:** Community Involvement Coordinator	**Organization:** EPA Region 9	
Individual Contacted:			
Name: Jim Lemmon	**Title:** Community Member	**Organization:**	
Telephone No: **Fax No:** **E-Mail Address:** jlemmon@azdot.gov		**Street Address:** **City, State, Zip:**	

Summary Of Conversation

1. **What is your overall impression of the IBW Site project?**

   From a technology standpoint, we understand this system more than any other and it is appreciated. With the City of Scottsdale relying on the groundwater for drinking water, this site has great community involvement. EPA and the community involvement coordinators have helped make this site have great community involvement by keeping the public engaged. This superfund site has the most engaged public and we have to make sure we stay invested.

   However, I believe this remedy could be expanded based on the magnitude of the contamination. There should be more rapid resolution to issues that arise. Progress is slowed with the use of private water companies, such as AAWC, and the problems with interconnects, safety devices, etc. It is a difficult situation to have to rely on a private party to fix problems that arise. EPA does not operate this system, they only can ask the private companies to fix the issues. Twenty years ago this site would have been the Cadillac model of superfund sites.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

   The remedy is functioning as I expected it would.

3. **From your perspective, what effect has continued cleanup operations at the site had on the surrounding community?**

   There is a general awareness of using treated effluent as drinking water and people seem resigned to the idea.

4. **Are you aware of any ongoing community concerns regarding the site or its operation and administration?**

   I have not actively engaged myself in the last three years.

5. Do you feel well-informed about the site's activities and progress?

Yes.

<u>**Community Involvement**</u>

6. Are you familiar with the EPA and ADEQ web sites? Do you know where to find the Indian Bend Wash site information on them?

Yes I am familiar with the web sites and know where to find information on them.

7. Are you aware of the information repositories for the site? Have you ever used them to find information for the site?

Yes.

8. Have you contacted EPA or ADEQ in the past to inquire about the site? If so, did you feel that your questions or concerns were answered to your satisfaction?

In the last decade, yes I have contacted EPA or ADEQ about this site.

9. What is the best way for EPA to communicate with you about this site in the future?

What EPA is doing now is sufficient as well as most cost effective.

10. **Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.**

    N/A

11. **Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?**

    N/A

12. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?**

    N/A

13. **Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.**

    N/A

Facility Personnel

14. **Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.**

    N/A

INTERVIEW RECORD

Site Name: Indian Bend Wash Superfund Site	**EPA ID No.:** EP-S9-08-03
Subject: Five-Year Review	**Time: 2:**00 / **Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Arizona Department of Environmental Quality	☐ Incoming ☐ Outgoing

Contact Made By:

Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9

Individual Contacted:

Name: Terry Lockwood	**Title:**	**Organization:** Motorola Solutions

Telephone No: 602.760.4763 **Fax No:** **E-Mail Address:** terry.lockwood@motorolasolutions.com	**Street Address:** **City, State, Zip:**

Summary Of Conversation

1. **What is your overall impression of the IBW Site project?**

There has been notable progress on the site. With this site being such a complex site, to see measurable successes in such a short time frame is rewarding, especially with the magnitude of the site.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

The remedy is functioning better than expected. The source controls are working, the treatment systems are removing mass, and the concentrations are decreasing. A lot of credit needs to go to our hydrologists; our understanding of the site is based on the site conceptual model.

3. **From your perspective, what effect has continued cleanup operations at the site had on the surrounding community?**

There has been very little impact. We make sure the community understands the actions, the purpose of the actions, and the protectiveness of the actions. We keep everyone updated with websites, meetings, etc.

4. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?**

In general we are see decreasing trends where we should, like in the UAU. The LAU fits the site conceptual model: there were increases in COC concentrations and then stabilization. Eventually we will see the decrease in COC concentrations.

5. **Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.** .

No.

6. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

In general, in any system upset, there is always a focused site evaluation. Improvements are made based on the findings so that a similar situation will not occur. This is seen with the air relief valve failures and changeout frequencies. A detailed investigation was performed after the MRTF incident and safeguards were added. Proactive updates were planned. We try to be proactive with everything that happens at the site; with that we can all have confidence in the treatment. Now we begin to question whether the continued costs of MRTF on site round the clock staffing are still warranted, or whether remote operation is appropriate. My direction from management has always been to do the right thing.

7. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

No.

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

We want to look further at optimization of the treatment systems such as the UV-OX system at Area 7. We look at the use of energy intensive equipment relative to environmental footprint. If it isn't needed any longer for the remedy we need to discuss the removal or reduction of that operation. We will also want to discuss the GAC changeout frequency since that is always an energy intensive process.

9. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

Our optimization has focused on the groundwater monitoring network in the last five years. In the beginning, the focus was on getting the MRTF, CGTF, and PCX-1 built. OU-1 included building the CGTF and OU-2 is the remedy for the vadose zone. The building of MRTF and the source control systems were originally outside the Superfund process. We have proactively added these pieces to the remedy. The FSA was written to put on record these additions to the remedy. In the amended ROD, EPA confirmed the source control programs, MRTF, CGTF, and one additional extraction well at Area 7 as the revised remedy.

INTERVIEW RECORD

Site Name: Indian Bend Wash Superfund Site	**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review	**Time: 2:**00	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Arizona Department of Environmental Quality	☐ Incoming ☐ Outgoing	

Contact Made By:

Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9

Individual Contacted:

Name: Dennis Shirley	**Title:** Professional Geologist	**Organization:** Synergy Environmental, LLC

Telephone No: 602.319.2977 **Fax No:** **E-Mail Address:** dennis.shirley@synergyenvironment.com	**Street Address:** 10645 N. Tatum Blvd. Suite 200-437 **City, State, Zip:** Phoenix, AZ 85028-3053

Summary Of Conversation

1. **What is your overall impression of the IBW Site project?**

The companies took actions as quickly and effectively as they could. They have been proactive. We confirmed that with the Feasibility Study. Cooperation and proactiveness are the keys to our effectiveness. I like where EPA and ADEQ are right now.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

You can look at the soil, UAU, MAU, and LAU and see measurable progress. The progress is documented. The UAU is almost down to cleanup levels now. From a technical point of view, we are very pleased. With the complexity of the site, we couldn't have done what has been accomplished without the cooperation of the water companies. The relationships we have between SRP, COS and AAWC are critical.

3. **From your perspective, what effect has continued cleanup operations at the site had on the surrounding community?**

Over the years, the issues that drive the public concerns are besides the site being a superfund site.

4. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?**

The data shows real sound decision making. There was debate on the whether there should be remedy in the UAU. The data show that the decision not to require active pump and treat remedy in the UAU was appropriate. There are good indications that the source of UAU contamination is being effectively addressed. Data has driven this remedy.

5. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result. .

No.

6. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

It is important to note that cost is not a driving force for the PCs. The goal is always to get the system back online as quickly as possible for the remedy. This project has been unique in that the PRPs are under the lead of a single company, Motorola. This is an efficient way to manage a superfund site.

7. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

No.

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

This question was answered by Terry Lockwood.

9. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

We are always looking for continuous improvement. The groundwater monitoring program was revised in 2003 to optimize data acquisition and focus on the effectiveness of the remedy. Let's collect data that matters and not just collect data for the sake of collecting data. Process wise, we are always looking for opportunities to optimize.

<u>Facility Personnel</u>

10. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

This question was answered by Jim Lutton.

INTERVIEW RECORD		
Site Name: Indian Bend Wash Superfund Site	**EPA ID No.:** EP-S9-08-03	
Subject: Five-Year Review	**Time:** 1400	**Date:** 11/03/2010
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** ADEQ Conference Room	☐ Incoming ☐ Outgoing	

Contact Made By:		
Name: Rachel Loftin	**Title:** Remedial Project Manager	**Organization:** EPA Region 9

Individual Contacted:		
Name: Jim Lutton	**Title:** Professional Engineer	**Organization:** Consultant to Motorola
Telephone No: 916.452.5352 **Fax No:** 916.452.1617 **E-Mail Address:** james.lutton@rcip.com	**Street Address:** 4756 Brand Way **City, State, Zip:** Sacramento, CA 95819	

Summary Of Conversation

1. **What is your overall impression of the IBW Site project?**

   The systems are functioning as designed. We went through all the planning and now we are seeing the remedy work. We are all working towards the same goal and we are making it happen.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

   The PCs have taken responsibility and are doing more than other responsible parties at other Superfund sites. We continue to pump groundwater at appropriate locations.

3. **From your perspective, what effect has continued cleanup operations at the site had on the surrounding community?**

   The design of the treatment systems, esthetically, fit in with the design of the neighborhood. This was important to the residents.

Agency Officials

4. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?**

   This question was answered by Terry Lockwood and Dennis Shirley.

5. **Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result. .**

   No.

6. Are you aware of any problems, difficulties, costs or significant changes in the O&M requirements, maintenance schedules, or sampling routines encountered since 2005 which have impacted progress or resulted in a change in operations and maintenance procedures? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

O&M requirements have been consistent over the last five years including increased monitoring of the well network, number of the wells being used, on-site presence of the operators, and presence of the agencies due to the MRTF incident. Control systems at PCX-1, MRTF, CGTF, Area 7, and Area 12 have all been updated. A comprehensive engineering evaluation at MRTF and CGTF was completed in 2008. There have been treatment system rehabilitations costing over $2 million and taking over a year to complete for each of the MRTF and CGTF.

There have been minor incidents, and we have responded quickly - like with the PCX-1 valve break and Area 7 valve break. These incidents have been appropriately documented. There were focused investigations to see what needed to be done to prevent them in the future. With the air valve break at CGTF a couple years ago, The City increased the frequency of O&M on the air valves. With respect to the water quality incidents at MRTF, there were significant costs, increased sampling, repairs to the system, and increased operator presence. We are still going through the aftermath of that incident. At the time of the FSA we estimated that the PCs costs were about $60-80 million for the implementation of the remedy at NIBW. The small incidents, like the valve breaks, cost around $10,000 to $20,000. With the MRTF incident, the cost was a seven-figure number; that has been significant. The importance is to do it right.

7. Are you aware of any changes to City, state, or federal regulations or ordinances since 2005 which may impact current operations, protectiveness or effectiveness of the remedial action?

No.

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

This question was answered by Terry Lockwood.

9. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted? Please describe changes and resultants or desired cost savings or improved efficiency.

This question was answered by Terry Lockwood and Dennis Shirley.

10. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

The treatment systems are monitored electronically with redundant control features, alarm conditions to shut down, call out features, and remote access to see what is going on at the site (through the use of Human Machine Interface). There is continuous on-site presence at MRTF, daily visits to CGTF and Area 12, and weekly visits to Area 7.

Appendix F

ARARs Memorandum

Innovative Technical Solutions, Inc.
A Gilbane Company

Draft Technical Memorandum

To:	Rachel Loftin, Remedial Project Manager, United States Environmental Protection Agency, Region 9
From:	Innovative Technical Solutions, Inc.
Date:	July 20, 2011
Subject:	**Indian Bend Wash Superfund Site Five Year Review Draft ARARs Evaluation**
Contract/TO:	EP-S9-08-03/0044 **ITSI DCN:** 07163.0045.0017

Innovative Technical Solutions Inc. (ITSI) has prepared this Technical Memorandum (TM) summarizing the evaluation of the Applicable or Relevant and Appropriate Requirements (ARARs) for the Indian Bend Wash Superfund Site as part of the Five Year Review (FYR) process on behalf of United States Environmental Protection Agency (EPA) Region 9. The Indian Bend Wash Superfund Site is comprised of both North Indian Bend Wash (NIBW) and South Indian Bend Wash (SIBW) sites located in Scottsdale and Tempe, Arizona. The FYR for each of these sites is being conducted to meet the statutory mandate established under the Comprehensive Environmental Response, Compensation and Recovery Act (CERCLA) § 121. ITSI is conducting these activities under the Remedial Action Contract (RAC); contract number EP-S9-08-03, Task Order 0044.

1.0 INTRODUCTION

Section 121 of CERCLA requires that remedial actions resulting in any hazardous substances, pollutants, or contaminants remaining at the site be subject to a FYR. Additionally the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) further states "remedial actions that result in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure be reviewed every five years to ensure protection of human health and the environment". The purpose of performing an ARARs review as part of the FYR is to determine if the exposure assumptions, toxicity data, cleanup levels, and remedial actions are still valid and to identify any additional information which has come to light that would call into question the protectiveness of the remedy. As such, this TM lists the initial set of ARARs used in development of the current remedies for both the NIBW and SIBW sites in addition to changes to the initial ARARs and identifies new ARARs enacted since the original remedial actions which could potentially apply to current remedial actions at one or both sites.

1501 West Fountainhead Parkway, Suite 350
Tempe, AZ 85282
(480) 706-6488
fax (480) 704-2952
www.itsi.com

Remedial actions performed under CERCLA must be evaluated for applicable or relevant and appropriate requirements of environmental laws. The identification of ARARs provides a regulatory basis for developing and performing a detailed analysis of remedial alternatives.

When evaluating a regulation for a remedial action under CERCLA, it must first be determined if the law is applicable. If it is not applicable, then a determination is made as to whether it is relevant and appropriate. Only the substantive portions of a law or regulation are to be considered as potential ARARs. Administrative requirements, such as record keeping and permitting, are not considered ARARs. Once a requirement is determined to be an ARAR for a site, any remedial action selected for that site must be in compliance with that requirement unless the EPA requests and receives a waiver to that specific rule or standard.

ARARs consist of two sets of requirements, those that are applicable and those that are relevant and appropriate.

Applicable
Applicable requirements are those substantive mandatory environmental regulations or standards that are promulgated under federal or state laws that specifically address contaminants or hazardous substances and remedial actions at the site. Even if a requirement is not legally applicable, it may be relevant and appropriate.

Relevant and Appropriate
Relevant and appropriate requirements are those substantive environmental, regulations or standards that are promulgated under federal or state laws that do not completely address site conditions, but would involve similar problems or situations encountered at CERCLA sites.

To Be Considered Criteria
Conditions may occur where ARARs may not be sufficient to protect human health or the environment. Should these conditions exist, non-promulgated standards, criteria, guidance, and advisories must be evaluated along with the selected ARARs to help provide protective target cleanup levels and to develop CERCLA remedies. These types of standards are commonly referred to as "To Be Considered" (TBC) requirements and are not legally binding.

Types of ARARs
The EPA has classified ARARs into three categories: (1) chemical-specific, (2) location-specific, and (3) action-specific, depending on whether the requirement is triggered by the presence or emission of a chemical, by a vulnerable or protected location, or by a particular action. It is important to note that these classifications are not a regulatory requirement.

Chemical-specific ARARs
Chemical-specific ARARs are typically health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, are expressed as numerical values that represent cleanup standards (i.e., the acceptable concentration of a chemical at the site). Examples of chemical-specific ARARs include non-zero maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) established under the Safe Drinking Water Act, and federal water quality criteria (FWQC) established under the Clean Water Act (CWA). As a

general rule, if more than one chemical-specific ARAR exists for a particular contaminant, the most stringent should be applied.

Location-specific ARARs
Location-specific ARARs are restrictions on the concentration of hazardous substances or the conduct of activities in environmentally sensitive areas. An example of a location-specific restriction on the concentration of hazardous substances is the Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDR) prohibiting hazardous waste placement into or onto the land (e.g., landfills and salt domes) until waste-specific treatment standards are met. Examples of restrictions on the conduct of activities in environmentally sensitive areas include floodplains, wetlands, and locations where endangered species or historically significant cultural resources are present.

Action-specific ARARs
Action-specific ARARs are generally technology- or activity-based requirements or limitations on actions or conditions taken with respect to specific hazardous substances. An example is the treatment of extracted groundwater to MCLs prior to discharge to comply with the CWA and the Arizona State Water Quality Standards for Surface Waters. Action-specific ARARs do not determine the remedial alternative; rather, they indicate how a selected alternative must be achieved. RCRA and the Clean Water Act provide the majority of action-specific ARARs.

2.0 ARAR DISCUSSION FOR NIBW

Table 1 provides a summary of the ARARs that were listed in the 1991 Record of Decision (ROD) addressing contamination in shallow groundwater and soils at the sites (EPA, 1991) and the 2001 ROD Amendment (EPA, 2001). Table 1 also identifies those ARARs which have been amended or repealed and provides the date (month and year) of the change. Current guidance on the identification of ARARs would likely exclude some of the ARARs identified in the 1991 ROD and the 2001 ROD Amendment. Even though some of the ARARs have been amended, none of the changes are substantive and they do not impact the protectiveness of the remedy. Therefore changes are not required to the ARARs for NIBW.

Table 3 identifies potential ARARs that could be deemed applicable or relevant and appropriate to the NIBW site based on current environmental laws and standards. However, the addition of these to the NIBW ARARs would not impact the protectiveness of the remedy. Therefore the addition of the potential ARARs in Table 3 is not required.

3.0 ARAR DISCUSSION FOR SIBW

Table 2 provides a summary of the ARARs that were listed in the ROD for volatile organic compounds in the Vadose Zone (EPA, 1993); the ROD for volatile organic compounds (VOCs) in Groundwater Operable Unit, Indian Bend Wash Superfund Site, South Area, Tempe, AZ (EPA, 1998); and the ROD Amendment for the SIBW Superfund Site Groundwater Operable Unit (EPA, 2004). Table 2 also identifies those ARARs which have been amended or repealed and provides the date (month and year) of the change. Even though some of the ARARs have been amended, none of the changes are substantive and they do not impact the protectiveness of the remedy. Therefore changes are not required to the ARARs for SIBW.

Table 3 identifies potential ARARs which could be deemed applicable or relevant and appropriate to the SIBW site based on current environmental laws and standards. However, the addition of these to the SIBW ARARs would not impact the protectiveness of the remedy. Therefore the addition of the potential ARARs in Table 3 is not required.

4.0 SUMMARY and CONCLUSIONS

ITSI conducted this review and evaluation of new and original ARARs as part of the FYR process for the IBW Superfund Sites located in Scottsdale and Tempe AZ. Changes and amendments (if any) to original ARARs for both NIBW and SIBW were identified and noted during this review along with the latest revision date (Tables 1 and 2).

As part of the FYR process, it is necessary to identify new data, policies and guidelines that have come to light or have been enacted since the initial remedial action(s) took place at the site and the original ARARs identified. ITSI has identified and presented two additional ARARs which were either not included in the original ARARs list or have been revised or enacted since initial remedial activities at the site (Table 3). The addition of these two ARARs to the list of ARARs for the IBW sites would not increase the protectiveness of the remedy. Therefore additions to ARARs for NIBW and SIBW are not required.

There were no criteria, advisories, guidance, or proposed standards that were identified as helpful or necessary for the protection of the public health or the environment that were not adequately addressed by the original set of ARARs in Table 1 and 2 or the list of new ARARs listed in Table 3. There were no new ARARs identified that would have an impact on the protectiveness of the remedy for either the NIBW or SIBW Superfund Sites. The amendments to the existing ARARs listed in Tables 1 and 2 would not have an impact on the protectiveness of the remedy for either the NIBW or SIBW Superfund Sites.

The current ARARs for NIBW and SIBW are considered protective and changes are not recommended at this time.

5.0 REFERENCES

EPA, 1991. *Record of Decision, North Indian Bend Wash Superfund Site, Scottsdale, AZ.* September, 1991.

EPA, 2001. *Record of Decision Amendment for the North Indian Bend Wash Superfund Site, Final Operable Unit, Scottsdale AZ.* September, 2001.

EPA, 1988. *Final Record of Decision, Scottsdale Operable Unit, Indian Bend Wash Superfund Site, Scottsdale, AZ.* September, 1988.

EPA 1998. *Record of Decision, VOCs in Groundwater Operable Unit, Indian Bend Wash Superfund Site, South Area, Tempe, AZ.* September, 1998.

EPA 2004. *Record of Decision Amendment for the South Indian Bend Wash Superfund Site Groundwater Operable Unit, Tempe, AZ.* June, 2004.

6.0 ATTACHMENTS

Table 1: Original Applicable or Relevant and Appropriate Requirements – North Indian Bend Wash Superfund Site

Table 2: Original Applicable or Relevant and Appropriate Requirements Evaluation – South Indian Bend Wash Superfund Site

Table 3: Potential New Applicable or Relevant and Appropriate Requirements – Indian Bend Wash Superfund Sites

DRAFT TABLE 1
ORIGINAL ARARs
NORTH INDIAN BEND WASH SUPERFUND SITE

ORIGINAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION				
Authority/Citation	**Document**	**Description**	**Comments**	**Amendment Date (Month, Year)**
CHEMICAL-SPECIFIC ARARs				
Federal Safe Drinking Water Act 42 U.S.C 300g-1, 40 CFR 141.161	1991 ROD 2001 AROD	Establishes Maximum Contaminant Levels (MCLs) for drinking water supplies	MCLs have been established for a number of common organic and inorganic contaminants. These levels regulate the concentrations of contaminants in public drinking water supplies. The selected remedy must comply with these requirements. Required cleanup levels for VOCs in the aquifer are set as the MCLs.	42 U.S.C 300g-1 - NC 40 CFR 141.161-July, 2007
Clean Water Act (CWA) 33 U.S.C 1311-1387	1991 ROD 2001 AROD	Establishes Water Quality Criteria for surface waters	The CWA Water Quality Criteria are designed to protect aquatic life (Marine and freshwater). These standards are expressed on the basis of acute and chronic toxicity levels. The selected remedy complies with these criteria. Any treated groundwater discharged to a surface water body must meet the CWA Quality Criteria.	33 U.S.C 1311-1387 - January 2009
Clean Water Act 40 CFR 402, 405-471; 40 CFR 125; AAC Section R18-9-A901	1991 ROD 2001 AROD	Establishes the National Pollutant Elimination Discharge System (NPDES) Permit Program	The NPDES permit program regulates discharges into "waters of the United States" by establishing numeric limits and monitoring requirements for such discharge. The discharge of treated water to Arizona Canal System must meet the substantive requirements of the NPDES permit	40 CFR 402 - NC 40 CFR 40-471 - NC 40 CFR 125 - NC AAC Section R18-9-A901 - September 2005
LOCATION-SPECIFIC ARARs				
Clean Air Act (CAA) 42 U.S.C 7401 et seq.	2001 AROD	Establishes National Ambient Air Quality Standards (NAAQS)	NAAQS are quantitative limits for ambient air quality and air emissions. These standards apply to all treatment systems which discharge air emissions. Air emissions from treatment systems must meet these standards.	42 U.S.C 7401 - NC
Exec. Order 11988; 40 CFR 6.302 (b)	1991 ROD	Remedial Actions to Account for activities occurring in floodplain	Ensure planning programs and budgets reflect consideration of floodplain including restoration and preservation of such land as natural undeveloped land. New facilities built on floodplain shall be flood proofed and other flood control measure to be utilized to ensure flood protection.	Exec. Order 11988 - NC 40 CFR 6.302 (b) - NC
Exec. Order 11990; 40 CFR 6, Appendix A CWA Section 404 40 CFR 230 & 231	1991 ROD	Action to minimize the destruction, loss or degradation of Wetlands	If wetlands are located within the area of proposed activities, the agency must perform a wetlands assessment to identify means of reducing impacts.	Exec. Order 11990 - NC 40 CFR 6, Appendix A - July, 2010 CWA Section 404 - January, 2010 40 CFR 230 & 231- July, 2010
Arizona Dept. of Environmental Quality ARS. § 49-104(11)	2001 AROD	Regulates Air Emissions	Air stripping equipment must be operated so that no gaseous or odorous emissions are emitted in concentrations that cause air pollution harmful to human health and the environment, causes damage to property, or unreasonably interferes with comfortable enjoyment of life and property. Air stripping units at NIB must comply with these air emissions standards.	ARS. § 49-104(11) - *

DRAFT TABLE 1
ORIGINAL ARARs
NORTH INDIAN BEND WASH SUPERFUND SITE

ORIGINAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION				
Authority/Citation	**Document**	**Description**	**Comments**	**Amendment Date (Month, Year)**
LOCATION-SPECIFIC ARARs (continued)				
Maricopa County Air Pollution Control District Rule 330, § 301	1991 ROD 2001 AROD	Regulates Air Emissions in Maricopa County	VOC emission controls must be at least 85% efficient and must not emit more then 3 lbs./day of VOCs. Treatment systems must meet these standards.	MCAPCD Rule 330, § 301
42 U.S.C. 6901 et, seq.; 40 CFR 264.18(a) & (b)	1991 ROD 2001 AROD	Regulates activities in earthquake zones and 100-year flood plains	A RCRA facility located in areas where earthquakes could occur and 100-year floodplains exist must be designed, constructed, operated and maintained to prevent damage due to earthquakes or washout of any hazardous waste by a 100-year flood. Since treatment systems will generate hazardous waste, all facilities constructed within an earthquake zone or 100-year floodplain shall comply with this requirement.	42 U.S.C. 6901 et, seq - NC 40 CFR 264.18(a) & (b) - August 2005
National Archeological & Historical Preservation Act 16 U.S.C. 469; 36 CFR Part 65	1991 ROD 2001 AROD	Protection of archeological and historical artifacts	Alteration of terrain that threatens significant scientific, prehistoric, historic or archeological data may require actions to recover and preserve artifacts. The selected remedy will not alter or destroy any known prehistoric or historic archeological features at or near the NIBW site. The areas in and around NIBW are essentially completely developed. However, because there is always the possibility that buried historic or prehistoric remains could be discovered during construction, this regulation would require action to preserve such artifacts.	16 U.S.C 469 - NC 36 CFR Part 65 - September 2005
28 CFR 1910	1991 ROD	Protection of workers	Actions to protect workers from exposure to hazardous materials through monitoring and training	28 CFR 1910 - July, 2005
Endangered Species Act 16 U.S.C. 1531-1544; 50 CFR Part 200 and 50 CFR Part 402	1991 ROD 2001 AROD	Protects critical habitats upon which endangered species or threatened species depend	Requires action to conserve endangered species or threatened species, including consultation with the Dept. of Interior and the Fish and Wildlife Service. There are currently no known endangered species existing at NIBW. However, because there is always a possibility that endangered species could be discovered during implementation of the selected remedy, any action that may impact or threaten the impact of an endangered species shall comply with this requirement.	16 U.S.C. 1531 - NC 50 CFR Part 200 - November 2005 50 CFR Part 402 - November 2005
AAC Section R18-4-501	2001 AROD	Identifies siting requirements for new treatment units	In the event that it is necessary to construct a treatment plant to replace the MART, the siting requirements identified in these regulations would have to be complied with.	AAC Section R18-4-501 - Expired February 2000
16 USC 661 et. Seq. 40 CFR 6.302 (b)	1991 ROD	Remedial Actions to account for activities occurring in floodplain	Ensure planning programs and budgets reflect consideration of floodplain including restoration and preservation of such land as natural undeveloped land. New facilities built on floodplain shall be flood proofed and other flood control measure to be utilized to ensure flood protection. Coordination with US Dept. of Fish & Wildlife prior to undertaking any activity that would alter a body of water at the site.	16 USC 661 et. Seq. - NC 40 CFR 6.302 (b) - NC
40 CFR Part 50 & 40 CFR Part 52 Subpart D; AAC § Rl 8-2-201 to 220 and § R-18-2-730 (D)&(G)	2001 AROD	Requires Compliance with local air standards	Any source of criteria pollutants located in an NAAQS non-attainment area must comply with local air quality regulations. NIBW is located in Maricopa County which is a non-attainment area for ozone, carbon monoxide (CO) and particulate matter less that 10 microns in size. The selected remedy will comply with these emissions standards.	40 CFR Part 50 - NC 40 CFR Part 52 Subpart D - NC AAC § Rl 8-2-201 to 220 - NC R-18-2-730 (D)&(G) - NC

DRAFT TABLE 1
ORIGINAL ARARs
NORTH INDIAN BEND WASH SUPERFUND SITE

ORIGINAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION				
Authority/Citation	**Document**	**Description**	**Comments**	**Amendment Date (Month, Year)**
ACTION-SPECIFIC ARARs				
40 CFR Part 261 and AAC Section R18-8-261	1991 ROD 2001 AROD	Identification and listing of hazardous wastes	Establishes procedures and numeric limits for identification and management of characteristic hazardous wastes, listed hazardous wastes, and State-only (non-CAR) hazardous wastes. These requirements are relevant to management of waste materials generated as a result of construction and operation of the selected remedial action.	40 CFR Part 261 - September 2005 AAC Section R18-8-261 - March 2008
40 CFR Section 262.11 and AAC Section R18-8-262	1991 ROD 2001 AROD	Generation of waste from construction & operation due to implementation of remedial action selected	Requires waste generators to determine if wastes are hazardous wastes and establishes procedures for such determinations. These requirements are applicable to management of waste materials generated as a result of construction of the selected remedial action or operation of any of the groundwater treatment facilities at NIB	40 CFR Part 262.11 - September 2005 AAC Section R18-8-262 - March 2008
40 CFR Part 264.171 through 178	1991 ROD 2001 AROD	Establishes standards for owners and operators of treatment, storage and disposal facilities	The owners and operators of facilities required by this Remedial Action must comply with the applicable portions of RCRA Part 264. Containers of hazardous waste must be: (1) maintained in good condition; (2) compatible with hazardous waste to be stored; and (3) closed during storage (except to add or remove waste) These requirements would be applicable at NIBW for any contaminated soils or groundwater or treatment system waste that might be containerized and stored onsite prior to treatment or final disposal. If it becomes necessary to verify exceedances of MCLs at any of the NIBW groundwater treatment plants, these procedures shall be used to ensure that the data is accurate and to avoid false negatives or false positives	40 CFR Part 264 - September 2005
40 CFR Section 262.34	1991 ROD 2001 AROD	Regulates shipment of hazardous wastes for treatment or disposal activities	Specifies maximum amounts and maximum periods of accumulation of hazardous waste onsite under generator status. These requirements are potentially applicable to management of waste materials generated as a result of construction of the remedial action at NIBW and operation of any of the groundwater treatment plants if the waste materials generated are hazardous wastes.	40 CFR Section 262.34 - September 2005
AAC R18-8-264.(171, 172, 173, 175, 178)	2001 AROD	Guidelines for containers used for storage of hazardous waste	Establishes standards, procedures and requirements for containers used to store hazardous waste left onsite for more the 90 days.	AAC R18-8-264 - March, 2008
A.R.S. Section 49-221 50 FR 3078	1991 ROD 2001 AROD	Regulates discharges to surface waters	Discharge from treatment systems must comply with Arizona State Water Quality Standards for Surface Waters. This requirement is applicable at times when treated water is discharged to surface water (Arizona Canal System).	A.R.S. Section 49-221 - NC 50 FR 3078 - February, 1993

DRAFT TABLE 1
ORIGINAL ARARs
NORTH INDIAN BEND WASH SUPERFUND SITE

ORIGINAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION				
Authority/Citation	**Document**	**Description**	**Comments**	**Amendment Date (Month, Year)**
ACTION-SPECIFIC ARARs (continued)				
A.R.S. Section 49-222	2001 AROD	Provides standards for navigable waters	These standards assure water quality for protection of public health and takes into consideration its use and value for public water supplies, the propagation of fish and wildlife, recreational, agricultural, industrial and other purposes including navigation	A.R.S. Section 49-222 - NC
A.R.S. Section 49-224	2001 AROD	Aquifer identification and classification	All aquifers in the state identified under Section 49-222(A) and any other aquifers subsequently discovered shall be classified for drinking water protected use.	A.R.S. Section 49-224 - NC
40 CFR Subparts AA & BB (MCAPCD) Rule 210, 320 & 330	1991 ROD	Regulates Air Emissions in Maricopa County	In the event that the contingency remedy was determined to be necessary, since the means are available to reduce effectively the contribution to air pollution from being discharged from the air stripping units the installation and use of such control methods, devices or equipment shall be mandatory.	(MCAPCD) Rule210 - June, 2007 (MCAPCD) Rule 320 - July, 2003 (MCAPCD) Rule 330 - June, 1996 40 CFR Subparts AA & BB - October, 2006
RCRA Contained in Principle	1991 ROD	Non-waste materials containing listed hazardous waste	Any non-waste material (e.g. soil, groundwater) containing hazardous materials must be managed as a hazardous waste.	RCRA Contained in Principle - October, 1998
40 CFR Subpart F	1991 ROD	Groundwater Monitoring	Groundwater disposal unit at new RCRA sites	40 CFR Subpart F - NC
40 CFR Part 122 and Part 125	2001 AROD	Regulates discharges to surface waters	Establishes treatment and monitoring requirements for discharges to surface water. The substantive requirements of the NPDES program are applicable when treated groundwater is discharged to surface water (Arizona Canal System)	40 CFR Part 122 and Part 125 - NC
40 CFR 264 (Subpart X) 40 CFR (Subpart D) 40 CFR (Subpart S; Revised) 264.600, 264.601, 264.602, 264.603 AAC Section R18-8-264	1991 ROD 2001 AROD	Establishes requirements for owners and operators of treatment, storage, and disposal facilities	Miscellaneous treatment units must satisfy environmental performance standards by protection of groundwater, surface water, and air quality, and by limiting surface and subsurface migration. Air stripping towers and soil vapor extraction (SVE) treatment units are considered miscellaneous RCRA units; therefore the substantive portions of these requirements would be applicable in the construction, operation, and maintenance and closure of air stripping and SVE units at NIBW.	40 CFR 264 (Subpart X) - September 2005 40 CFR (Subpart D) - June, 2005 40 CFR (Subpart S; Revised) - June, 2005 40 CFR Parts 264.600, 264.601, 264.602, 264.603 - September 2005 AAC Section R18-8-264 - NC
40 CFR Section 144.12-144.16	2001 AROD	Regulates the reinjection of groundwater	Criteria and standards for the Underground Injection Control (UIC) Program. These criteria include current and future use, yield and water quality characteristics and are applicable at NIBW for determining exempt aquifers. Injection wells at NIBW will comply with these design, construction, operation and maintenance requirements.	40 CFR Parts 144.12-144.16 - October 2005

DRAFT TABLE 1
ORIGINAL ARARs
NORTH INDIAN BEND WASH SUPERFUND SITE

ORIGINAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION				
Authority/Citation	**Document**	**Description**	**Comments**	**Amendment Date (Month, Year)**
ACTION-SPECIFIC ARARs (continued)				
40 CFR Part 265 Subparts AA and BB; AAC § R18-8-265(A)	2001 AROD	Regulates Air emissions	RCRA requirements apply to air emission standards for process vents and equipment leaks associated with distillation, solvent extraction, or air stripping operations	40 CFR Part 265 Subparts AA and BB - NC AAC § R18-8-265(A) - NC
40 CFR § 270	2001 AROD	RCRA permit requirements	Environmental media containing RCRA listed hazardous waste must be managed as a RCRA hazardous waste. To the extent, if at all, that purge water associated with groundwater monitoring activities, contains RCRA listed hazardous waste, then the purge water at NIBW must be managed as a RCRA hazardous waste.	40 CFR § 270 - NC
A.R.S. Section 45-454.01	2001 AROD	Requirements for wells, groundwater withdrawal, treatment, and reinjection	Exempts new well construction, withdrawal, treatment, and reinjection into the aquifer of groundwater that occur as part of a CERCLA Remedial Action from requirements of Arizona Groundwater Code, except that they must comply with the substantive requirements of: ARS 45-594 (well construction standards) ARS 45-595 (well construction requirements) ARS 45-596 (notice of intent to drill a well) ARS 45-600 (filing of log by driller of well)	A.R.S. Section 49-454.01 - NC
Arizona Well Spacing and Well Impact Rules AAC Section R12-15-830	1991 ROD 2001 AROD	Regulates the placement of new production wells in the state of Arizona	New production wells will not be permitted in the NIBW area that may have an adverse impact on the groundwater remediation systems or hydraulic capture of the contaminated plumes.	AAC Section R12-15-830 - Replaced by R12-15-1301-1308 August 2006
AAC Section R18-4-502	2001 AROD	Identifies minimum design criteria for treatment units	In the event that it is necessary to construct a drinking water treatment plant to replace the MRTF, the minimum design criteria identified in these regulations would have to be complied with.	AAC Section R18-4-502 - January 2004
AAC Section R18-4-701 to R18-4-704 and R18-4-706	2001 AROD	Identifies requirements for annual consumer confidence reports	Requires MRTF and CGTF to comply with the notification requirements to these regulations.	AAC Section R18-4-701 to R18-4-704 and R18-4-706 - Repealed May 2000

CFR – Code of Federal Regulations
RCRA - Resource Conservation & Recovery Act
USC – United States Code
SRL – Soil Remediation Level
AAC - Arizona Administrative Code
NC - No Change

DRAFT TABLE 2
ORIGINAL ARARs
SOUTH INDIAN BEND WASH SUPERFUND SITE

ORIGINAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION				
Authority/Citation	**Document**	**Description**	**Comments**	**Amendment Date (Month, Year)**
CHEMICAL-SPECIFIC ARARs				
Federal Safe Drinking Water Act 42 U.S.C 300g-1, 40 CFR 141.161	2004 AROD	Establishes Maximum Contaminant Levels (MCLs) for drinking water supplies	MCLs have been established for a number of common organic and inorganic contaminants. These levels regulate the concentrations of contaminants in public drinking water supplies. The selected remedy must comply with these requirements. The cleanup levels for the VOCs in the aquifer are set at MCLs.	42 U.S.C 300g-1 - NC 40 CFR 141.161-July, 2007
Clean Water Act (CWA) 33 U.S.C 1311-1387	2004 AROD, 1998 ROD	Establishes Water Quality Criteria for surface waters	The CWA Water Quality Criteria are designed to protect aquatic life (both marine and freshwater). These standards are expressed on the basis of acute and chronic toxicity levels. In the event that the contingency remedy was determined to be necessary, the contingency remedy would comply with these requirements. Any treated groundwater that would be discharged into a surface water body must meet the CWA Water Quality Criteria.	33 U.S.C 1311-1387 - January 2009
Clean Water Act 40 CFR 402, 405-471; 40 CFR 125; AAC Section R18-9-A901	2004 AROD	Establishes the National Pollutant Elimination Discharge System (NPDES) Permit Program	The NPDES permit program regulates discharges into "waters of the United States" by establishing numeric limits and monitoring requirements for such discharge. In the event that the contingency remedy was determined to be necessary, the contingency remedy would comply with these requirements. The discharge of treated water to any surface water body shall meet the substantive requirements of an AZPDES permit.	40 CFR 402 - NC 40 CFR 40-471 - NC 40 CFR 125 - NC AAC Section R18-9-A901 - September 2005
LOCATION-SPECIFIC ARARs				
Clean Air Act (CAA) 42 U.S.C 7401 et seq.	2004 AROD	Establishes National Ambient Air Quality Standards (NAAQS)	NAAQS are numeric limits for contaminants in air emissions. These requirements apply to all treatment systems which discharge emissions. In the event that the contingency remedy was determined to be necessary, the remedy shall comply with the air discharge requirements of the CAA (NAAQS).	42 U.S.C 7401 - NC
40 CFR Part 40 & 50; CFR Part 52, Subpart D; CFR Part 52, Subpart D; AAC § R18 -2-201 to 220 and § R1-18-2-730 (D) and (G)	2004 AROD 1993 ROD	Requires compliance with local air standards	Any source of criteria pollutants located in a NAAQS non-attainment area must comply with local air quality regulations. SIBW is located within Maricopa county which is a non-attainment area for 8-hour ozone, carbon monoxide, and PM_{10}. In the event that the contingency remedy was determined to be necessary, the selected remedy would comply with these emissions standards	40 CFR Part 40 - September 2005 40 CFR Part 50 October 2005 AAC § R18 -2-201 to 220 - NC R1-18-2-730 - NC
Maricopa County Air Pollution Control District (MCAPCD) Rule 320, § 302	2004 AROD	Regulates Air Emissions in Maricopa County	In the event that the contingency remedy was determined to be necessary, since the means are available to reduce effectively the contribution to air pollution from being discharged from the air stripping units the installation and use of such control methods, devices or equipment shall be mandatory.	(MCAPCD) Rule 320 - NC
40 CFR 264.18 (b) 42 USC 6901 et. Seq. ARS R18-8-264	2004 AROD, 1998 ROD	Regulates activities in earthquake zones and 100-year flood plains	A RCRA facility located in areas where earthquakes could occur and 100-year floodplains exist must be designed, constructed, operated and maintained to prevent damage due to earthquakes or washout of any hazardous waste by a 100-year flood. Since the treatment facilities will generate hazardous waste, any facility constructed within an earthquake zone or a 100-year floodplain shall comply with this requirement.	40 CFR 264.18(a) & (b) - August 2005 42 USC 6901 et. Seq. - November, 1984 ARS R18-8-264 - NC
Exec. Order 11988; 40 CFR 6.302 (b)	1998 ROD	Remedial Actions to Account for activities occurring in floodplain	Ensure planning programs and budgets reflect consideration of floodplain including restoration and preservation of such land as natural undeveloped land. New facilities built on floodplain shall be flood proofed and other flood control measure to be utilized to ensure flood protection.	Exec. Order 11988 - NC 40 CFR 6.302 (b) - NC
Exec. Order 11990; 40 CFR 6, Appendix A CWA Section 404 40 CFR 230.10	1998 ROD	Action to Minimize the destruction, loss or degradation of Wetlands	If wetlands are located within the area of proposed activities, the agency must perform a wetlands assessment to identify means of reducing impacts.	Exec. Order 11990 - NC 40 CFR 6, Appendix A - July, 2010 CWA Section 404 - January, 2010 40 CFR 230.10- July, 2010

DRAFT TABLE 2
ORIGINAL ARARs
SOUTH INDIAN BEND WASH SUPERFUND SITE

ORIGINAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION				
Authority/Citation	**Document**	**Description**	**Comments**	**Amendment Date (Month, Year)**
LOCATION-SPECIFIC ARARs (Continued)				
National Archeological & Historical Preservation Act 16 U.S.C 469; 36 CFR Part 65	2004 AROD 1998 ROD	Protection of Archeological and historical artifacts	Alteration of terrain that threatens significant scientific, prehistoric, historic or archeological data may require actions to recover and preserve artifacts. The selected remedy will not alter or destroy any known prehistoric or historic archeological features at or near the SIBW site. The areas in and around SIBW are essentially completely developed. The building on the DCE Circuits subsite is included in the National Register of Historic Places (inventory No. 151). The groundwater remedy at SIBW will not affect this building. The areas in and around SIBW are essentially completely developed. However, because there is always the possibility that buried historic or prehistoric remains could be discovered during construction, this regulation would require action to preserve such artifacts.	16 U.S.C 469 - NC 36 CFR Part 65 - September 2005
ARS 41-841 through 844	1998 ROD	Requirements for archeological discovery and preservation	The IBW South site is essentially developed, however artifacts have been located in areas near IBW South. The potential impacts to artifacts will need to be considered and addressed during design and implementation of the remedial action.	ARS 41-841 through 844 - NC
16 USC 470 et seq. 36 CFR Part 800 40 CFR 6.301	1998 ROD	Action to preserve historic properties; planning of action to minimize harm to national historic landmarks	The DCE Circuits building is included in the National Register of historic Places (Inventory No. 151). The groundwater remedy will not impact this building.	16 USC 470 et seq. - September, 1992 36 CFR Part 800 August, 2004 40 CFR 6.301 July, 2009
Endangered Species Act 16 U.S.C. 1531-1544; 50 CFR Part 200 and 50 CFR Part 402	2004 AROD 1998 ROD	Protects critical habitats upon which endangered species or threatened species depend	Requires action to conserve endangered species or threatened species, including consultation with the Dept. of Interior and the Fish and Wildlife Service. There are currently no known endangered species existing at SIBW. However, because there is always a possibility that endangered species could be discovered during implementation of the selected remedy, any action that may impact or threaten the impact of an endangered species shall comply with this requirement.	16 U.S.C. 1531 - NC 50 CFR Part 200 - November 2005 50 CFR Part 402 - November 2005
ACTION-SPECIFIC ARARs				
Arizona Groundwater Management Act A.R.S. § 45-454.01, 45-494, 45-495, 45-496, and 45-600	2004 AROD 1998 ROD	Requirements for wells, groundwater withdrawal, treatment, and reinjection	Subject to compliance with certain substantive provisions, this regulation exempts new well construction, withdrawal, treatment, and injection wells at CERCLA sites from obtaining ADWR approval. The substantive standards set forth in these sections will be complied with in construction and logging of new wells.	A.R.S. § 45-454.01 - NC A.R.S. § 45-494 - NC A.R.S. § 45-495 - NC A.R.S. § 45-496 - NC A.R.S. § 45-600 - NC
RCRA Subtitle C: A.R.S. § 49-921 et seq., 40 CFR § 264.1(j)(2-5, 10-12); AAC § R18-8-264.1 (j)(2-5, 10-12)	2004 AROD	Requirements for remediation waste management sites	In the event that the contingency remedy was determined to be necessary, these regulations would require waste analysis, inspections, personnel training, and contingency & emergency plans	A.R.S. § 49-921 et seq. - NC 40 CFR § 264.1(j)(2-5, 10-12) - September, 2005 AAC § R18-8-264.1 (j)(2-5, 10-12) - March, 2008
RCRA Subtitle C: ARS § 49-921 et seq., 40 CFR Part 264, Subpart G, § 264.111 (a & b) and 264.114; AAC § R18-8-264.111 (a&b) and 264.114	2004 AROD	Closure performance standards and requirements	In the event that the contingency remedy was determined to be necessary, these requirements would be relevant to the closure of the groundwater treatment plant.	ARS § 49-921 et seq. - NC 40 CFR Part 264, Subpart G § 264.111 (a&b) and 264.114 - September, 2005 AAC § R18-8-264.111 (a&b) and 264.114-March, 2008
RCRA Subtitle C: ARS § 49-921 et seq., 40 CFR § 264.601(a),(b), and (c); AAC § R18-8-264.601(a), (b), and (c)	2004 AROD 1998 ROD 1993 ROD	Establishes performance standard requirements for owners and operators of miscellaneous treatment units	Miscellaneous treatment units must satisfy environmental performance standards by protection of groundwater, surface water, and air quality, and by limiting surface and subsurface migration. Air stripping towers are considered to be miscellaneous RCRA units. Therefore, in the event that the contingency remedy was determined to be necessary, the substantive portions of these requirements would be relevant in the construction, operation and maintenance and closure of air stripping units at SIBW.	RCRA Subtitle C: ARS § 49-921 et seq. - NC 40 CFR § 264.601(a),(b), and (c) - September 2005 AAC § R18-8-264.601(a), (b), and (c) - NC

DRAFT TABLE 2
ORIGINAL ARARs
SOUTH INDIAN BEND WASH SUPERFUND SITE

ORIGINAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION				
Authority/Citation	**Document**	**Description**	**Comments**	**Amendment Date (Month, Year)**
ACTION-SPECIFIC ARARs (continued)				
A.R.S.§ 49.221: AAC § R18-11-101 et seq.	2004 AROD	Regulates discharges to surface water	Discharge from treatment systems must comply with Arizona State Water Quality Standards for Surface Waters. In the event that the contingency remedy was determined to be necessary, this requirement may be relevant if treated water is discharged to surface water (Arizona Canal System).	A.R.S.§ 49.221 - NC AAC § R18-11-101 et seq. - NC
A.R.S. § 49.224	2004 AROD, 1998 ROD	Aquifer identification and classification	All aquifers in the state identified under Section 49-222(A) and any other aquifers subsequently discovered shall be classified for drinking water protected use.	A.R.S. § 49.224 - NC
40 CFR Part 122 and Part 125	2004 AROD	Regulates discharges to surface water	Establishes, treatment and monitoring requirements for discharges to surface water. In the event that the contingency remedy was determined to be necessary, the substantive requirements of the NPDES program would be applicable if treated groundwater is discharged to surface water (Arizona Canal System).	40 CFR Part 122 and Part 125 - NC
AAC R18-8-264.(171, 172, 173, 175, 178,) AAC R18-8-262.30 through 33	1998 ROD 1993 ROD	Guidelines for containers used for storage of hazardous waste	Establishes standards, procedures and requirements for containers used to store hazardous waste left onsite for more the 90 days.	AAC R18-8-264 - March, 2008 AAC R18-8-262 - March, 2008
40 CFR 268.50	1998 ROD 1993 ROD	Wastes subject to Land Disposal Restrictions (LDRs)	Establishes restrictions on storage and requirements for marking and dating drum, tanks, etc.	40 CFR 268.50 - July, 2006
MCAPCD Rule 310	1998 ROD	Construction activities which generate dust	Limits fugitive dust emissions during construction	MCAPCD Rule 310 - January, 2010
MCAPCD Rule 320	1998 ROD	Limits gaseous or odorous emissions during construction	Where means are available to reduce air pollution from leaks, discharge or evaporation the use of such controls is mandatory.	MCAPCD Rule 320 - July, 2003
MCAPCD Rule 200, 270 & 330	1998 ROD	Emissions of VOCs or gaseous air contaminants	Rules to control air emissions for the air stripping and vapor phase activated carbon off gas treatment option for remedial action.	MCAPCD Rule 200 - March, 2008 MCAPCD Rule 270 - November, 1993 MCAPCD Rule 330 - June, 1996
OSWER Directive No. 9355.0-28	1998 ROD	Control of air emissions from air strippers at Superfund sites	Rules to control air emissions for the air stripping and vapor phase activated carbon off gas treatment option for remedial action.	OSWER Directive No. 9355.0-28 - June, 1989
40 CFR § 144.12-144.16	2004 AROD 1998 ROD	Criteria and standards for the Underground Injection Control (UIC) Program	These criteria include current and future use, yield and water quality characteristics and are relevant at SIBW for determining exempt aquifers. In the event that the contingency remedy was determined to be necessary, injection wells (if used at SIBW) would comply with these design, construction, operation and maintenance requirements.	40 CFR Parts 144.12-144.16 - October 2005
Arizona Well Spacing and Well Impact Rules AAC § R12-15-830	2004 AROD	Regulates the placement of new production wells in the state of Arizona	New production wells may not be permitted in the SIBW area, if it is determined that operation of such wells may have cause groundwater contamination at SIBW to migrate.	AAC Section R12-15-830 - Replaced by R12-15-1301-1308 August 2006
Arizona Well Notification AAC § R12-15-850	2004 AROD	Requires notifications to well permit applicants	If an application for a well permit is submitted for an area near a contaminated site, the applicant shall be notified of the location of the contamination.	AAC Section R12-15-830 - Replaced by R12-15-1301-1308 August 2006
AAC § R18-4-(501-502)	2004 AROD	Identifies minimum design criteria for treatment units	In the event the contingency remedy was determined to be necessary, the minimum design criteria identified in these regulations would have to be complied with while constructing the groundwater treatment plant.	AAC Section R18-4-501 - Expired; February, 2000 AAC Section R18-4-502 - NC

CFR – Code of Federal Regulations
RCRA - Resource Conservation & Recovery Act
USC – United States Code
SRL – Soil Remediation Level

ARS - Arizona Revised Statutes
AAC - Arizona Administrative Code
NC - No Change

DRAFT TABLE 3
NEW ARARs
INDIAN BEND WASH SUPERFUND SITE

LIST OF POTENTIAL ADDITIONAL APPLICABLE OR RELEVANT & APPROPRIATE REQUIREMENTS EVALUATION						
Authority/Citation	**Description**	**Preliminary Determination**	**Comments**	**Applicable to**		**Amendment Date**
				NIBW	**SIBW**	**(Month, Year)**
CHEMICAL-SPECIFIC ARARs						
NA	NA	NA	NA	NA	NA	NA
LOCATION-SPECIFIC ARARs						
NA	NA	NA	NA	NA	NA	NA
ACTION -SPECIFIC ARARs						
AAC R12-15-1302	Well Spacing Requirements	Applicable	Applicants to construct new wells or replacement wells in new locations under A.R.S. Locations Under A.R.S. § 45-599	Yes	Yes	August, 2006
AAC R18-9-A904 & A905	AZPDES Standards	Relevant & Appropriate	Substantive portions are relevant and appropriate to discharge of treated groundwater to surface/navigable waters	Yes	No	February, 2004

CFR – Code of Federal Regulations
RCRA - Resource Conservation & Recovery Act
USC – United States Code
SRL – Soil Remediation Level
AAC - Arizona Administrative Code
* - With the exception of the DCE Circuits site

ADEQ – Arizona Department of Environmental Quality
NSPS – New Source Performance Standards
MCLs - Maximum Contaminant Levels
ARS - Arizona Revised Statutes
CERCLA - Comprehensive Environmental Response Compensation and Liability Act
NA - Not Applicable

Appendix G

Human Health Risk Assessment Review Memorandum

Technical Memorandum

To:	Rachel Loftin, Remedial Project Manager, United States Environmental Protection Agency, Region 9
From:	Innovative Technical Solutions, Inc.
Date:	31 August 2011
Subject:	**Indian Bend Wash Superfund Site Five Year Review– Risk Assessment and Toxicology Analysis**
Contract/TO:	EP-S9-08-03/0044 **ITSI DCN:** 07163.0045.0009R

Innovative Technical Solutions, Inc. (ITSI) has prepared this Technical Memorandum as part of the Five Year Review (FYR) process conducted on behalf of United States Environmental Protection Agency (EPA) Region 9. The purpose of this review is to determine whether changes in risk assessment methodologies, toxicity criteria, and/or groundwater contaminant concentrations could result in modifications of the risk analyses conducted for the Indian Bend Wash Superfund Site (Site). The Site covers approximately 13 square miles and is located in Scottsdale and Tempe, Arizona. EPA divided the site into two main areas, North Indian Bend Wash (NIBW) and South Indian Bend Wash (SIBW). The FYR for the Site is being conducted to meet the statutory requirement under the Comprehensive Environmental Response, Compensation and Recovery Act (CERCLA), Section 121. ITSI is conducting these activities under Remedial Action Contract (RAC) number EP-S9-08-03, Task Order 0044. This analysis of the human health risk assessment (HHRA) and toxicology values was conducted based on EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03-B-P, Comprehensive Five-Year Review Guidelines, Appendix G.

1.0 INTRODUCTION

Section 121 of CERCLA requires that remedial actions resulting in any hazardous substances, pollutants or contaminants remaining at the Site be subject to a FYR. Additionally, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) states that "remedial actions that result in any hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure be reviewed every five years to ensure protection of human health and the environment." The review of previous HHRAs is conducted as part of the FYR in order to determine if the exposure assumptions, toxicity data and cleanup levels are still valid. Risk assessment

1501 West Fountainhead Parkway, Suite 350
Tempe, AZ 85282
(480) 706-6488
fax (480) 704-2952
www.itsi.com

methodologies for estimating exposures and cancer risks, as well as toxicity criteria for specific chemicals have changed since the risk assessments conducted for the Sites.

These comments also apply to the following HHRA:

- NIBW Superfund Site - HHRA for Air Emissions from Groundwater, 2007
- Draft Preliminary Risk Assessment, Miller Road Treatment Facility - NIBW, 2004
- Preliminary Risk Assessment – Area 12, 2005

The following specific comments apply to the HHRA for Air Emissions from Groundwater, 2007:

- The document compared the modeled annual offsite concentrations for the NIBC COCs to the 2004 EPA Region 9 ambient air Preliminary Remediation Goals (PRGs). However, the cited value of 0.96 µg/m^3 was the 2004 CAL-Modified PRG, but incorrectly cited as the 2004 EPA Region 9 PRG for TCE. The 2004 EPA Region 9 ambient air PRG for TCE is 0.017 µg/m^3, which is approximately 50 times lower than the CAL-Modified PRG for TCE. The 2004 PRGs have been superseded by the 2011 EPA Regional Screening Levels (RSLs). Unlike the 2004 PRGs that did not differentiate ambient PRGs for residential and industrial structures, the current ambient air RSL (EPA, 2011) for TCE is 1.2 µg/m^3 for residential structures and 6.1 µg/m^3 for industrial structures. The document reported that the modeled offsite concentrations of TCE were below 0.96 µg/m^3. Therefore, the modeled offsite concentrations are also below the 2011 EPA RSLs of either 1.2 1.2 µg/m^3 or 6.1 µg/m^3.

2.0 EXPOSURE ASSESSMENT

This section discusses the current methodology for estimating exposures through inhalation (EPA, 2009) in comparison to the previous methodology (EPA, 1989), which was applied in the risk assessments conducted previously for NIBW and SIBW.

2.1 Previous Methodology

The previous approach (EPA, 1989) calculates average daily intake as follows:

$$ADD = \frac{CA\ x\ InhR\ x\ ET\ x\ EF\ xED}{BW\ x\ AT}$$

where:

ADD = average daily intake (milligrams per kilogram per day [mg/kg-day])

CA = concentration in air (milligrams per cubic meter [mg/m^3])

InhR = inhalation rate (cubic meters per day [m^3/day])

ET = exposure time (hours/day)

EF = exposure frequency (days/year)

ED = exposure duration (years)

BW = body weight (kilograms)

AT = averaging time (days)

2.2 Current Methodology

The updated approach (EPA, 2009) applies the following equation:

$$EC = \frac{CA\ x\ ET\ x\ EF\ x\ ED}{AT}$$

where:

EC = exposure concentration (mg/m^3)

CA = concentration in air (mg/m^3)

ET = exposure time (hours/day)

EF = exposure frequency (days/year)

ED = exposure duration (years)

AT = averaging time (days)

3.0 TOXICOLOGY ASSESSMENT

Table 1 and Table 2 present the previous and current toxicity criteria for carcinogens and noncarcinogens detected at NIBW and SIBW, respectively. Differences between previous and updated toxicity criteria are highlighted in gray.

It is also noted that the oral slope factors or cancer potency factors used for chloroform in the previous NIBW and SIBW risk assessments were inconsistent. Table 4 in the Record of Decision (ROD) for NIBW (EPA, 1991) shows an oral cancer potency slope factor of 6.1E-02 for chloroform, whereas Table 2 in the ROD Amendment for NIBW (EPA, 2001) shows the updated inhalation cancer slope factor of 8.1E-02. Since the 2001 ROD Amendment states "only ingestion was considered when calculating risks," it is unclear whether the updated inhalation cancer slope factor was used, rather than the oral cancer slope factor, to estimate potential cancer risk due to ingestion. On the other hand, Table A-7 in Appendix A, Groundwater Risk Assessment (included in the *Final IBW-South Groundwater Feasibility Study*, August 1997, shows an oral slope factor of 6.1E-03 for chloroform. Since recalculation of risk values is not within the scope of this review, it is not possible to evaluate the validity or accuracy of the presented cancer risk estimates.

Another change in the toxicity assessment pertains to ethylbenzene, which previously was classified as a noncarcinogen. Updated toxicity information resulted in the reclassification of ethylbenzene as a carcinogen.

Table 2 of the ROD Amendment (EPA, 2001) identified 1,1-dichloroethene (1,1-DCE) as a Group C possible human carcinogen, but indicated that there is no cancer potency factor (or slope factor) associated with 1,1-DCE. It is noted that an oral cancer potency factor or slope factor for 1,1-DCE is available, but there is no available inhalation cancer potency factor or slope factor. Table A-7 in Appendix A, Groundwater Risk Assessment (included in the Final IBW-South Groundwater Feasibility Study, August 1997), listed an oral slope factor of 6E-01 for 1,1-DCE. Under the 1986 cancer guidelines (EPA, 1986), 1,1-DCE was identified as a Group C, possible human carcinogen. Under the draft revised guidelines for carcinogen risk assessment (EPA, 1999), however, EPA concluded that there is insufficient evidence on the human carcinogenic potential of 1,1-DCE. Therefore, there are no current toxicity criteria for 1,1-DCE as a carcinogen.

4.0 RISK CHARACTERIZATION

Risk was characterized by comparing and contrasting how the cancer risk and hazard index through the inhalation pathway are calculated based on previous and current methodologies.

Whereas the previous approach multiplies ADD with the inhalation slope factor (SF_i) to estimate cancer risk, the updated approach multiplies the concentration in air (CA) with the inhalation unit risk (IUR). In the previous approach (EPA, 1989), cancer risk due to inhalation exposure is calculated through the following equation:

Cancer Risk = ADD x Inhalation Slope Factor

where:

ADD = average daily intake (see Section 2)

In the updated approach (EPA, 2009), cancer risk due to inhalation exposure is calculated as follows:

Cancer Risk = EC x Inhalation Unit Risk

where:

EC = exposure concentration (see Section 2)

For noncarcinogens, the previous approach calculated the hazard quotient due to inhalation by using the following equation:

$$Hazard\ Quotient = \frac{ADD}{RfD}$$

where:

RfD = reference dose (threshold chemical intake through ingestion that would not cause health effects.

In the updated approach, the hazard quotient is calculated through the following equation:

$$Hazard\ Quotient = \frac{ADD}{RfC}$$

where:

RfC = reference concentration (concentration in air that would not result in health effects).

Overall, changes in toxicity criteria and in the methodology for calculating cancer risk and hazard index could lead to potential changes in (a) baseline cancer risk and hazard index estimates and in (b) percent contributions of chemicals of concern (COCs) to the total risk.

At the time that these risk assessments were conducted, calculation of potential risk was limited to exposures through ingestion of groundwater, because of significant uncertainties that had been associated with evaluating inhalation exposures to volatile organic compounds (VOCs). Over the years, several studies have been conducted on vapor intrusion, and EPA has published guidelines on how to evaluate exposures to vapor emissions from VOCs. Factors that are critical in the evaluation of vapor intrusion are depth to groundwater and site-specific soil properties. NIBW and SIBW Site-specific risk characterizations are discussed further in the following subsections.

5.0 NIBW

The following presents risk characterization, concentration trends and source control remedial actions for NIBW. The groundwater is present in three distinct zones at NIBW. These are the upper alluvial unit (UAU), middle alluvial unit (MAU), and lower alluvial unit (LAU).

5.1 Risk Characterization

EPA recommends that the possibility of exposure through vapor intrusion be evaluated if groundwater is 100 feet or less below ground surface (bgs) (EPA, 2002). The shallowest depth to groundwater beneath NIBW was 52 feet bgs in the UAU in 2009; however this was outside the footprint of the UAU contaminant plume. Within the UAU trichloroethene (TCE) plume, depths to groundwater ranged from 65 feet bgs to 104 feet bgs in 2009. The highest TCE concentration, 38 µg/L, was detected in monitor well PG-31UA, in which the depth to groundwater was 104 feet bgs. In the MAU, the depth to groundwater was generally greater than 100 feet bgs, except in monitor well E-8MA where groundwater was approximately 92 feet bgs and the TCE concentration was 22 µg/L. The depth to groundwater in the LAU was greater than 100 feet. Potential risk due to vapor intrusion from the UAU and the MAU was evaluated based on the highest detected concentrations of TCE in the UAU and the shallowest depth to groundwater in the MAU, respectively. The Johnson and Ettinger (JEM) screening predictive model (Johnson and Ettinger, 1991) was used in the evaluation. Site-specific information on the 2009 groundwater level and parameter values of the vadose-zone sediments at the NIBW area were incorporated into the model. Default parameters in the model were used when applicable site-specific information was not available.

The lithology of the vadose zone at NIBW is mostly course grained, with the majority of the sediment composed of gravel and sand (Montgomery and Associates, 1993 and 1994). Based on the JEM screening predictive model, a TCE concentration of 38 µg/L in the UAU from a depth of 104 feet bgs has an associated risk of 9.98E-07 and a hazard quotient (HQ) of 0.2. In the MAU, a TCE concentration of 22 µg/L at a groundwater depth of 92 feet bgs has an associated risk of 6E-07 and an HQ of 0.12. The risk estimates are below the point of departure of 1E-06, and below the threshold level of 1. These results indicate that vapor intrusion from groundwater is not a pathway of concern.

5.2 Concentration Trends

At NIBW, TCE concentrations in the UAU showed the most significant decline (NIBW PCs, 2010). The current TCE concentration in PG31-UA is 38 µg/L; this is the only UAU well in NIBW that exceeds 10 µg/L. TCE concentrations also continue to decline in the MAU and in the LAU. There is a continuing decline of TCE concentrations in the southern portion of the plume; TCE levels generally are stable in the northern portion of the plume. A more comprehensive evaluation on the TCE concentration trends at NIBW can be found in the Data Review Technical Memorandum (ITSI, 2010), an appendix to the IBW FYR report.

5.3 Source Control Remedial Actions

As summarized in the Feasibility Study Addendum (NIBW PCs, 2001), the Operable Unit (OU) II Consent Decree (CD) required soil vapor extraction (SVE) technology to remove VOCs from soils in specified areas and an evaluation and characterization of soil contamination in other areas of NIBW. Twelve areas were originally identified as potential source areas. A 13th area in the vicinity of the City of Scottsdale (COS) production wells was also considered as part of OU II. Area 5 was subdivided into Areas 5A, 5B and 5C, increasing the total potential source areas to 15. Figure 1 shows these sources areas. For each area, a vadose zone characterization was conducted to determine if vadose zone remediation was required. After field investigations were completed, EPA grouped the potential vadose zone source areas into three categories:

1. Areas that did not appear to significantly threaten groundwater;
2. Areas that appear to threaten groundwater; and
3. Areas that require further characterization and analysis to evaluate potential threat to groundwater.

The approach for evaluating the potential for vadose zone contamination to threaten groundwater was outlined in the Remedial Investigation (RI)/Feasibility Study (FS) Report. The VLEACH model, a one-dimensional, finite difference model, was used to estimate the potential mass flux of each contaminant of concern (COC) through the vadose zone into groundwater. Simplifications in this modeling approach were:

1. Estimates of initial VOC mass in the vadose zone are derived by extending conservatively large VOC concentrations detected in soil vapor monitoring wells over large polygon areas.
2. Conservatively large values for recharge rates were used to simulate advective transport of VOCs through the vadose zone into groundwater.
3. VLEACH does not account for several processes that limit the loading of VOC mass to groundwater, including mineral adsorption, degradation, horizontal vapor diffusion, and horizontal liquid advection.

For Areas 1, 2, 4, 10 and the City of Scottsdale production wells, vadose zone conditions were determined not to present a threat to groundwater as the data collected showed minimal levels of VOCs. In the OU II Record of Decision (ROD), EPA selected No Further Action (NFA) for these Areas.

Initially, for Areas 3, 5A, 5B, 5C, 6, 9 and 12, EPA determined that evaluation for remediation at these Areas would be made after additional investigations were conducted, as the amount and type of data were considered not sufficient to estimate the vadose zone conditions. Additional investigations determined that no further actions were required at Areas 3, 5A, 5B, 5C, 9 and 11.

While the data indicated that Area 6 did not represent a threat to groundwater, the participating company, Siemens, voluntarily implemented source control at Area 6 in 1998. The vadose zone remedial action for Area 6 was an SVE system with off gas treatment. Area 6 was decommissioned from August 31, to October 4, 2000. A final closure letter was issued on October 12, 2000, for the completion of source control remedial activities at Area 6.

Following the additional investigations, it was determined that vadose zone remediation was necessary at Area 12. A SVE program was put in place from December 1996 through June 1998. In 2000, EPA determined that the Performance Standards for the Area 12 vadose zone remedial efforts had been attained, and EPA approved discontinuation of SVE operations. The participating company, Motorola, continues to operate a groundwater extraction and treatment system (GWETS) in the vicinity of Area 12.

Areas 7 and 8 conditions in the vadose zone warranted remedial efforts. EPA selected a SVE system with off gas treatment as the remedial action for these areas. The objective of the SVE remedy for Area 8 was to reduce VOC mass in the vadose zone to concentrations that would not pose a significant threat to groundwater. Operation of the SVE system began on September 27, 1995. VLEACH modeling results for the April 1997 sampling event indicated that TCE and other VOCs are not projected to pose a threat to groundwater above maximum contaminant levels (MCLs). On July 21, 1997, EPA issued a Notice of Determination indicating that based on the information provided, the remaining residual mass of TCE in the soil no longer constituted a threat to groundwater beneath Area 8.

The Area 7 remedy includes SVE in the UAU, and a GWETS with groundwater extraction from the UAU and MAU. SVE operations at Area 7 began in July 1994 in accordance with the requirements of the OU II CD. Results of the VLEACH modeling for Area 7 indicated that TCE and other VOCs in the vadose zone represented a threat to underlying groundwater. The PCs voluntarily added the UAU and MAU GWETS to enhance the required remedy, and this remedial action was later incorporated into the final ROD for NIBW. The SVE system currently operates intermittently to monitor for VOC rebound.

6.0 SIBW

The following presents risk characterization, concentration trends and source area site closures for SIBW.

6.1 Risk Characterization

The shallowest depth to groundwater beneath SIBW was 60 feet bgs in the UAU in 2009. The lithology from ground surface to 60 feet bgs is mostly course grained; however the contaminant concentrations in the UAU beneath SIBW are very low, with all the monitor wells showing tetrachloroethene (PCE) and TCE concentrations below MCLs of 5 µg/L. Evaluation of the vapor intrusion pathway based on a TCE concentration of 5 µg/L at 60 feet bgs has an estimated risk of 2E-07, which is below the point of departure of 1E-06. The hazard quotient of 0.03 is also well below the threshold level of 1. Therefore, vapor intrusion from groundwater is not a pathway of concern at SIBW.

6.2 Concentration Trends

Groundwater data from wells in the SIBW indicate that concentrations of TCE and PCE have been decreasing. Concentrations of TCE and PCE have ranged from non-detect to less than the MCL of 5 µg/L for at least the past two years. A detailed discussion on TCE and PCE concentration trends at SIBW is presented in the Data Review Technical Memorandum, an appendix to the IBW FYR report.

6.3 Source Control Remedial Actions

A ROD for the Soil OU for SIBW was issued by EPA in September 27, 1993. The 1993 Soils ROD established criteria for determining whether soils at a particular location might contribute to future groundwater contamination or pose a threat to public health, and selected SVE as the remedy when those criteria are met. Focused Remedial Investigations (RFIs) identified approximately 30 facilities as potential sources of groundwater contamination. Once EPA decided which of the 30 facilities met the criteria, a Plug-in Determination Document was issued. Originally a Plug-in Determination was issued to DCE Circuits and a combined seven facilities; however, only DCE Circuits was determined to require soil cleanup. An SVE system operated intermittently at this subsite of SIBW from July 1997 through January 2000 and from July 2005 through June 2007. Soil vapor monitoring continues to occur at DCE Circuits. Periodic samples are collected from the vapor wells. Indoor air samples are collected from the four buildings at DCE Circuits. VOCs in vapor from one well, DCE-2, still exceed the Residential Regional Screening Levels (RSLs) for PCE and TCE. There have been periodic vapor concentrations in one building that have exceeded the Residential RSL for TCE as well. However, the buildings are used for industrial purposes only and none of the levels have exceeded the Industrial RSLs for TCE or PCE. EPA has installed air vents and air conditioning units in each building to mitigate indoor air issues. Figure 2 illustrates the locations where focused remedial investigations were conducted.

7.0 SUMMARY and CONCLUSIONS

ITSI's evaluation of the risk assessments conducted for the NIBW and SIBW identified changes in (a) exposure assessment, (b) toxicity criteria, and (c) estimation of cancer risk and hazard index. Changes in toxicity criteria for chemicals detected at NIBW and SIBW were identified and presented above in Tables 1 and 2, respectively. The review also identified inconsistencies in toxicity criteria presented in the risk assessments. These changes could collectively lead to different baseline risk and hazard index estimates and different chemical contributions to the total risk.

The previous risk assessments had not evaluated exposures to vapor emissions from groundwater because of significant uncertainties associated with the evaluation of inhalation exposures to VOCs. However, several scientific studies have been published since 2001 and EPA has issued guidelines on how to evaluate exposures to vapor emissions from VOCs. Concentration trends of VOCs in groundwater, depth to groundwater, and Site-specific soil properties have been used to demonstrate that vapor intrusion is not a pathway of concern at both NIBW and SIBW Sites.

Source control remedial actions have occurred at both NIBW and SIBW. Twelve original areas were identified as source areas at NIBW; these areas increased to fifteen with the addition of the COS production wells and the three subareas of Area 5. EPA selected NFA for Areas 1, 2, 4, 10 and the COS production wells. Additional investigations determined that NFAs were required at Areas 3, 5A, 5B, 5C, 9 and 11. While EPA deemed that Area 6 did not represent a treat to groundwater, Siemens voluntarily implemented source control at Area 6 in 1998. It was determined that vadose zone remediation was necessary at Area 12. EPA approved the discontinuation of SVE operations in 2000; Motorola currently operates a GWETS to extract VOC mass from the MAU groundwater in the vicinity of Area 12. Areas 7 and 8 were found to have conditions in the vadose zone that presented a threat to groundwater. EPA issued a Notice of Determination indicating that the remaining residual mass of TCE in the soil no longer constituted a threat to groundwater beneath Area 8 in 1997. SVE operations at Area 7 began in July 1994; the SVE system is currently operated intermittently in order to monitor for VOC rebound.

At SIBW, RFIs confirmed approximately 7 out of 30 facilities originally identified as potential sources of groundwater contamination. Originally, two Plug-in Determinations were issued, however, only DCE Circuits was determined to require soil cleanup. SVE was implemented at DCE Circuits and in April 2001, EPA approved the closure report that documented the completion of soil cleanup. Although the SVE system was removed in 2007, soil vapor and indoor air monitoring is ongoing at DCE Circuits.

8.0 REFERENCES

EPA, 1986. *Guidelines for Carcinogen Risk Assessment. Federal Register 51(185):33992-34003.*

EPA, 1989. *Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual, Part A, Interim Final.*

EPA, 1991. *Record of Decision, North Indian Bend Wash Superfund Site, Scottsdale, AZ.* September, 1991.

EPA, 1997. *Final IBW-South Groundwater Feasibility Study*. August

EPA, 1999. *Guidelines for Carcinogen Risk Assessment. Review Draft, NCEA-F-0644, July. Risk Assessment forum. Office of Research and Development, Washington, DC.*

EPA, 2001. *Record of Decision Amendment for the North Indian Bend Wash Superfund Site, Final Operable Unit, Scottsdale AZ.* September, 2001.

EPA, 2002. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), EPA 530-D-02-004.

EPA, 2009. *Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual, Part F, Supplemental Guidance for Inhalation Risk Assessment*, January.

Johnson, P.C. and R. Ettinger 1991. “Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapours into Buildings” Environmental Science and Technology, 25(8):1445-1452.

Montgomery and Associates, 1993. Vadose Zone Investigation and Groundwater Threat Calculations Report, Area 5C, North Indian Bend Wash Superfund Site, Maricopa County, Arizona,

Montgomery and Associates, 1994. Vadose Zone Investigation and Groundwater Threat Calculations Report, Area 11, North Indian Bend Wash Superfund Site, Maricopa County, Arizona,

NIBW Participating Companies (PCs), 2001. Feasibility Study Addendum, Indian Bend Wash Superfund Site, November.

NIBW PCs, 2010. 2009 Site Monitoring Report, North Indian Bend Wash Superfund Site, Volume1, February 28.

Table 1: North Indian Bend Wash (NIBW)

VOCs of Concern	Carcinogen Toxicity Criteria				Noncarcinogen Toxicity Criteria			
	Oral Slope Factor (SF_o) (mg/kg/day)$^{-1}$		Inhalation Slope Factor (mg/kg/day)$^{-1}$	Inhalation Unit Risk (IUR) ($\mu g/m^3$)$^{-1}$	Oral Reference Dose (RfD) (mg/kg-day)	Oral Reference Dose (RfD) (mg/kg-day)	Inhalation Reference Dose (RfD_i) (mg/kg-day)	Reference Concentration (RfC) (mg/m^3)
	1991 ROD (Table 4)	Current	1991 ROD (Table 4)	Current	1991 ROD (Table 4)	Current	1991 ROD (Table 4)	Current
Trichloroethene	1.1E-02	5.9E-03	5.95E-03	2E-06	6.0E-03	NA	6.0E-03	NA
Tetrachloroethene	5.1E-02	5.4E-01	2.03E-03	5.9E-06	1.0E-02	4.0E-03	1.0E-02	2.7E-01
1,1-DCE	6.0E-01	NA	Not indicated	NA	9.0E-03	5.0E-02	Not Indicated	2.0E-01
1,1,1-TCA	NA	NA	NA	NA	9.0E-02	2E+00	Not Indicated	5E+00
Chloroform	6.1E-02	3.1E-02	Not indicated	2.3E-05	1.0E-02	1.0E-02	Not Indicated	9.8E-02

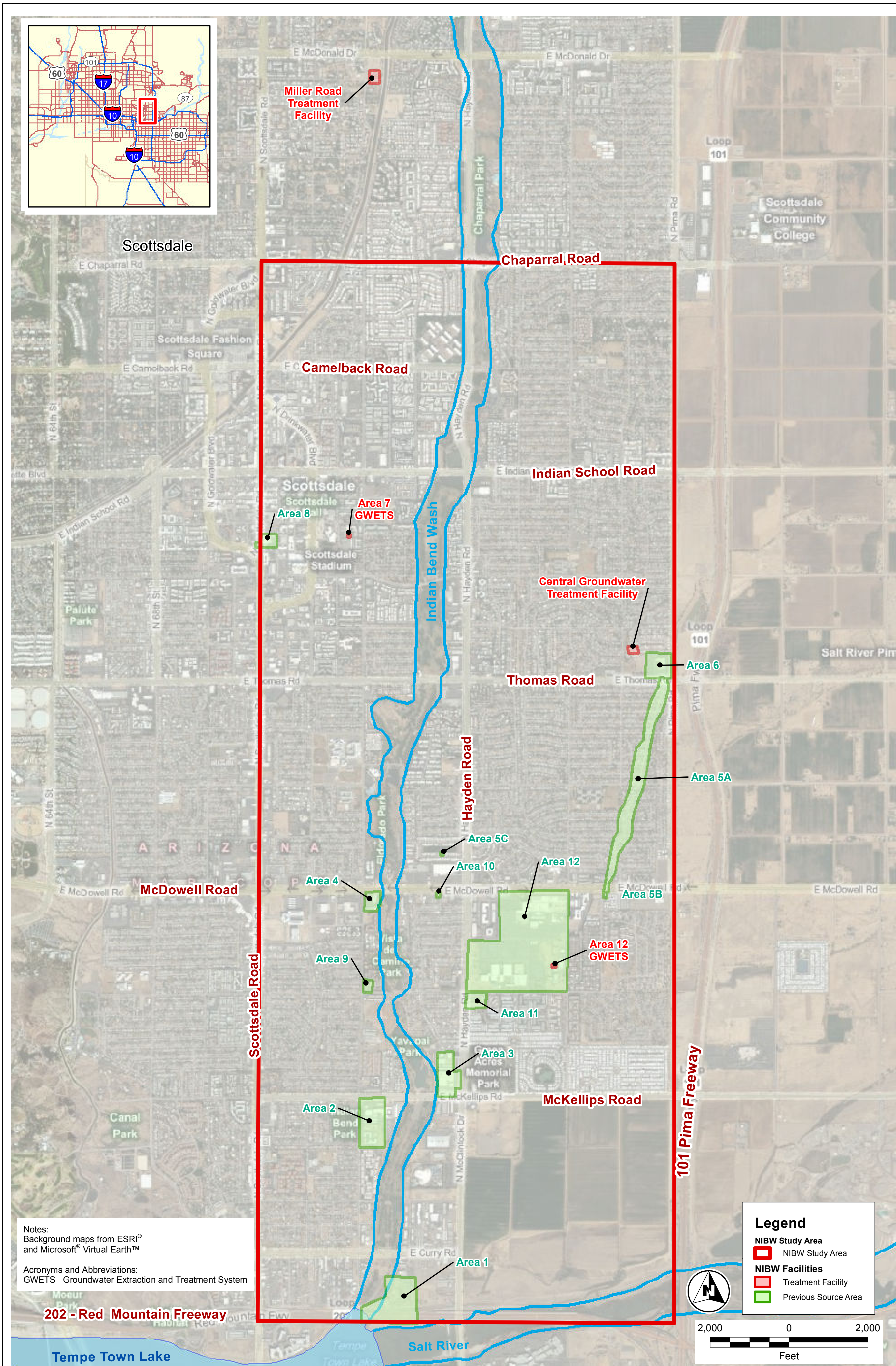
Notes:
NA = not applicable. Chemical is not a carcinogen, or toxicity criteria as a noncarcinogen has not been established.
Not indicated = not presented in previous risk assessment.
DCE = dichloroethene
ROD = Record of Decision
TCA = trichloroethane

Table 2: South Indian Bend Wash (SIBW)

VOCs of Concern	Carcinogen Toxicity Criteria				Noncarcinogen Toxicity Criteria			
	Oral Slope Factor (SF_o) (mg/kg/day)$^{-1}$		Inhalation Slope Factor (mg/kg/day)$^{-1}$	Inhalation Unit Risk (IUR) (ug/m^3)$^{-1}$	Oral Reference Dose (RfD) (mg/kg-day)	Oral Reference Dose (RfD) (mg/kg-day)	Inhalation Reference Dose (RfD_i) (mg/kg-day)	Reference Concentration (RfC) (mg/m^3)
	1991 ROD (Table A-7)	Current	1991 ROD (Table A-7)	Current	1991 ROD (Table A-7)	Current	1991 ROD (Table A-7)	Current
Trichloroethene	1.1E-02	5.9E-03	5.95E-03	2E-06	6.0E-03	NA	6.0E-03	NA
Tetrachloroethene	5.1E-02	5.4E-01	2.03E-03	5.9E-06	1.0E-02	4.0E-03	1.0E-02	2.7E-01
1,1-DCE	6.0E-01	NA	1.75E-01	NA	9.0E-03	5.0E-02	9.0E-03	2.0E-01
1,1,1-TCA	NA	NA	NA	NA	9.0E-02	2E+00	Not Indicated	5E+00
Chloroform	6.1E-03	3.1E-02	8.1E-02	2.3E-05	1.0E-02	1.0E-02	1.0E-02	9.8E-02
1,1- DCA	NA	5.7E-03	NA	1.6E-06	1.0E-01	2.0E-01	1.43E-01	NA
1,2-DCA	9.1E-02	9.1E-02	9.1E-02	2.6E-05	Not indicated	2.0E-02	2.86E-03	2.4
1,2-Dibromoethane	8.5E+01	2.0E+00	7.7E+01	6E-04	Not indicated	9.0E-03	5.71E-05	9.0E-03
1,2-Dichloropropane	6.8E-02	3.6E-02	6.8E-02	1.0E-05	Not indicated	9.0E-02	1.14E-03	4.0E-03
1,2-DCE	NA	NA	NA	NA	9.0E-03	9.0E-03	9.0E-03	NA
2-Butanone	NA	NA	NA	NA	6.0E-01	6.0E-01	2.86E-01	5.0E+00
Acetone	NA	NA	NA	NA	1.0E-01	9.0E-01	1.0E-01	3.1E+01
Bromodichloro-methane	6.2E-02	6.2E-02	6.2E-02	3.7E-05	2.0E-02	2.0E-02	2.0E-02	NA
Benzene	2.9E-02	5.5E-02	2.9E-02	7.8E-06	Not indicated	4E-03	1.71E-03	3.0E-02
cis-1,2-DCE	NA	NA	NA	NA	1.0E-02	1.0E-02	1.0E-02	NA

VOCs of Concern	Carcinogen Toxicity Criteria				Noncarcinogen Toxicity Criteria			
	Oral Slope Factor (SF_o) (mg/kg/day)$^{-1}$		Inhalation Slope Factor (mg/kg/day)$^{-1}$	Inhalation Unit Risk (IUR) (ug/m^3)$^{-1}$	Oral Reference Dose (RfD) (mg/kg-day)	Oral Reference Dose (RfD) (mg/kg-day)	Inhalation Reference Dose (RfD_i) (mg/kg-day)	Reference Concentration (RfC) (mg/m^3)
	1991 ROD (Table A-7)	Current	1991 ROD (Table A-7)	Current	1991 ROD (Table A-7)	Current	1991 ROD (Table A-7)	Current
Carbon Disulfide	NA	NA	NA	NA	1.0E-01	1.0E-01	2.86E-02	7.0E-01
Chloroform	6.1E-03	3.1E-02	8.1E-02	2.3E-05	1.0E-02	1.0E-02	1.0E-02	0.8E-02
Chloromethane	1.3E-02	NA	6.3E-03	NA	3.6E-03	NA	3.6E-03	9.0E-02
Ethylbenzene	NA	1.1E-02	NA	2.5E-06	1.0E-01	1.0E-01	2.86E-01	1.0E+00
Methylene Chloride	7.5E-03	7.5E-03	1.65E-03	4.7E-07	6.0E-02	6.0E-02	8.57E-01	1.0E+00
m,p-Xylenes	NA	NA	NA	NA	2.0E+00	2.0E-01	2.0E+00	7.0E-01
m-Xylene	NA	NA	NA	NA	2.0E+00	2.0E-01	2.0E+00	7.0E-01
o-Xylene	NA	NA	NA	NA	2.0E+00	2.0E-01	2.0E+00	7.0E-01
p-Xylene	NA	NA	NA	NA	2.0E+00	2.0E-01	2.0E+00	7.0E-01
1,1,2,2-TCA	2.0E-01	2.0E-01	2.03E-01	5.8E-05	Not indicated	4.0E-03	Not indicated	NA
Styrene	2.47E+00	NA	2.47E+00	NA	2.0E-01	2.0E-01	2.86E-01	1.0E+00
Trans-1,2-DCE	NA	NA	NA	NA	2.0E-02	2.0E-02	2.0E-02	6.0E-02
Toluene	NA	NA	NA	NA	2.0E-01	8.0E-02	1.14E-01	5.0E+00
Total Xylenes	NA	NA	NA	NA	2.0E+00	2.0E-01	2.0E+00	1.0E-01

Notes:
DCE – Dichloroethene
DCA –Dichloroethane
TCA - Trichloroethane
NA – not applicable. Chemical is not a carcinogen or toxicity criteria as a noncarcinogen has not been established.
Not Indicated – not presented in previous risk assessment.

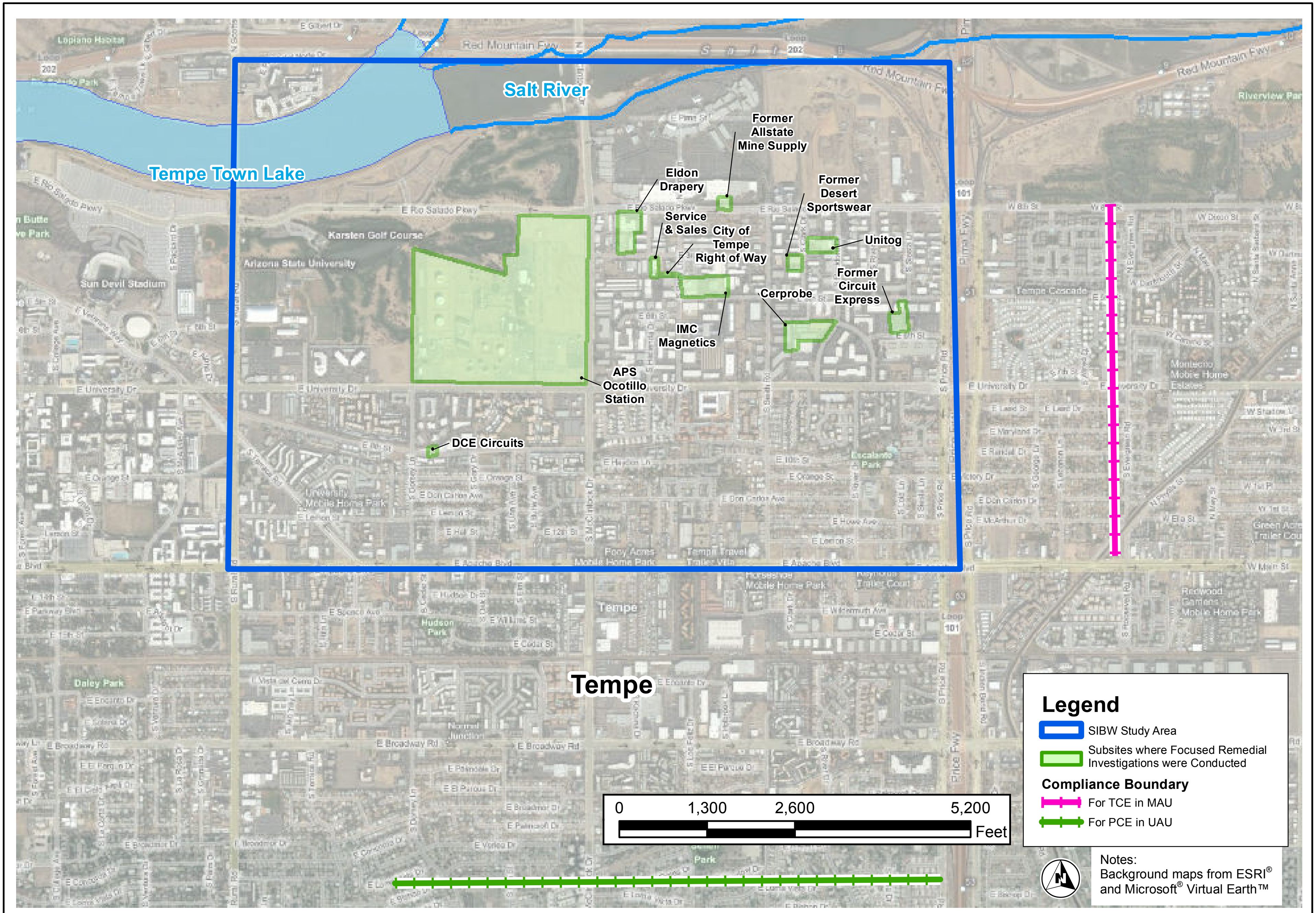


Innovative Technical Solutions, Inc. (ITSI) — A Gilbane Company

Risk Assessment and Toxicology Analysis Techical Memorandum
Indian Bend Wash Superfund Site
Scottsdale and Tempe, Arizona

Figure 1
North Indian Bend Wash
Study Area

G:\ArcGIS\EPA\SIBW\PROJECTS\HHRA_Eval\NIBW_Study.mxd 2/4/2011 [14:47 PM]



ITSI Innovative Technical Solutions, Inc.
A Gilbane Company

Risk Assessment and Toxicology Analysis Technical Memorandum
Indian Bend Wash Superfund Site
Scottsdale and Tempe, Arizona

Figure 2
South Indian Bend Wash
Study Area

G:\ArcGIS\EPA\SIBW\PROJECTS\HHRA_Eval\SIBW_Study.mxd 2/4/2011 [14:46 PM]

Appendix H

NIBW Groundwater Extraction & Treatment Systems Incidents and Corrective Measures

Appendix H

NIBW Groundwater Extraction & Treatment System Incidents, and Corrective Measures

Miller Road Treatment Facility

Following the January 2008 incident, the MRTF was taken off line pending investigation of the untreated water releases and subsequent revisions to O&M practices and procedures, and system modifications and upgrades. On 25 April 2008, the MRTF was brought back on line with Treatment Train 2 (TT2) and PCX-1 operation based on an interim operating plan (IOP) approved by EPA in April 2008 (followed by amendments dated June 13 and November 21, 2008). Between April 2009 and April 2010, the MRTF was refurbished. The air stripper column packing was replaced; internal column walls were recoated; a new column cleaning system was installed; a number of valves in the water and air piping/ducting manifolds, and certain instrumentation, were upgraded; and facilities maintenance activities such as roof and parking lot repairs, re-grading of specific unpaved areas for drainage, and upgrades to the air conditioning systems were implemented. The following paragraphs provide brief descriptions of operational events that have occurred at the MRTF within the past five years:

Treatment Tower 2: Partial Treatment of PCX-1 Water on 15 October 2007: Routine performance monitoring of TT2 effluent on 15 October 2007 indicated a TCE concentration of 14 µg/L. Subsequent sampling of the MRTF clear well where the TT2 effluent was discharged indicated a TCE concentration of 9.4 µg/L. This effluent was delivered to the Paradise Valley Arsenic Removal Facility (PVARF) where it was blended with effluent from additional Arizona American Water production well effluent, then delivered as potable supply. An investigation conducted following this event attributed the poor treatment performance at the MRTF to an improperly wired blower that caused insufficient process air to be forced into the air stripper tower. Critical system instrumentation was disconnected, wired incorrectly, or out of calibration. Additionally, the control logic and set-points were not properly set. Following the October failure at the MRTF, EPA required the PCs to revise treatment plant operating procedures during "startup" and maintenance periods and promptly notify EPA of potential sampling problems. After extensive "startup" sampling requirements were put in place, the MRTF was brought back into normal operation in December 2007. Once in operation, revised sampling procedures with 48 hour turn-around times for data results were implemented to increase protectiveness.

Treatment Tower 3: Failure to Treat PCX-1 Water on 15/16 January 2008: On 15 January 2008, the process air blower for TT3 shut down, allowing untreated groundwater from well PCX-1 to be pumped to the PVARF for approximately 16 hours. This caused water with TCE concentrations in the range of 11 µg/L to 23 µg/L to be delivered to the potable water supply. Following the incident, the MRTF was shut down pending an investigation of the incident. The investigation report stated that the TT3 process air blower had shut down but, due to improperly maintained instrumentation and inappropriate airflow set-points, the PLC did not register an alarm condition and failed to shut down PCX-1. The report identified several deficiencies in the operation and maintenance of the MRTF and recommended actions to correct these deficiencies. Following release of the investigation report, these recommendations were incorporated into the MRTF Interim Operations Plan and include the following:

• Well PCX-1 and TT2 were physically separated from wells PV-14 and PV-15 and from TT1 and TT3;
• Operation of PCX-1/TT2 was assigned to a contractor for the NIBW PCs with a 24/7 presence on site;
• Frequency of performance monitoring and reporting was increased;
• Existing critical process instrumentation was replaced and redundant instrumentation was added as appropriate;
• New system control logic was applied to the system; and
• Treated water from well PCX-1 is delivered to the Arizona Canal.

PCX-1: Air Relief Valve Failure on 23 September 2009 (SRP, September 2009): On 23 September 2009, an air relief valve located at the PCX-1 wellhead failed, releasing untreated groundwater to soil and paved areas. It was determined that the failure of the air relief valve at PCX-1 was due to pressure fluctuations associated with extraction well start/stop sequences, combined with corrosion of the valve casting. Approximately 20,000 gallons of untreated groundwater was released. All necessary personnel were contacted immediately following the release. Results of water samples collected in the Arizona Canal and in ponded water at the well site following this release were below the drinking water MCL for TCE of 5 µg/L. Corrective actions taken include replacing the faulty air relief valve (and related piping as necessary) and installing a water-level sensor in the well site piping vault, with an alarm system and controls, to shut down the well pump and notify system operators automatically when there is excess water in the vault.

<u>Central Groundwater Treatment Facility</u>

The following two instances in 2009 resulted in releases of untreated groundwater to soil and paved areas.

Air Release Valve Failure near Well 71: Untreated Water Release on 20 August 2009 (COS, August 2009): The CGTF untreated water release was caused by the failure of a PVC coupling at air release valve (ARV) #4, located to the east-southeast of Well COS-71. The raw water line runs through an easement located within the Coronado Golf Course (2829 North Miller Road, Scottsdale, AZ, 85257). It was determined (after a review of data collected at one minute intervals indicated a drop in flow at all three columns) that the release occurred at approximately 9:25 p.m. on 19 August 2009. The Coronado Golf Course notified COS of the release at 7:00 a.m. on 20 August 2009. COS immediately followed the EPA-approved Contingency and Emergency Response Plan (CERP), and all in-line valves were shut down by 9:15 a.m. Approximately 200,000 gallons of untreated groundwater was released and flowed into the main SRP pump ditch that flows through Indian Bend Wash. The release did not impact potable water systems, as the ditch ultimately connects to the SRP Grand Canal, an irrigation source with no drinking water intakes. Results for a water sample collected at the air release valve were 66.8 µg/L for TCE, 3.01 µg/L for PCE, and 1.21 µg/L for chloroform. These results are above the MCL for TCE and below MCLs for PCE and chloroform. However, the water quickly evaporated in the 100+-degree temperatures in Arizona in August. The results for water samples collected from the ditch run-off, influent into the lake, and effluent from the lake indicated non-detectable VOC concentrations. Results for a soil sample collected at the point of release indicated non-detectable VOC concentrations. Corrective actions taken by COS include replacing the broken two-inch PVC coupling that connects the air release valve with a two-inch brass coupling, inspecting all other ARVs on the pipelines, and replacing all other PVC couplings with brass couplings as a precautionary measure.

Drain Pipe at CGTF: Untreated Water Release on 23 November 2009 (COS, December 2009): A release of untreated water at well COS-75 during system start-up was caused by a new remote terminal unit (RTU) that was wired incorrectly by an outside electrical contractor. This caused the three solenoid valves on the pipe that drains the air stripper influent lines (risers) to remain in the open position during system start-up. Up to approximately 1,000 gallons of untreated groundwater that was released and flowed into a nearby park. No alarm or electronic notification systems were installed on these solenoid valves. COS Water Quality Services was contacted immediately following the release and the area was cordoned off. Results from water samples collected by COS near a sidewalk that runs through Pima Park were 1.06 µg/L for PCE and 9.31 µg/L for TCE which are above the MCLs for TCE and below MCLs for PCE. However, the water quickly evaporated in the high temperatures in Arizona. Results for soil samples collected in the same area indicated non-detectable VOC concentrations. Corrective actions taken by COS include rewiring the RTU, replacing the three manual valves on the drain line, and identifying and replacing the solenoid valves with new alarm communication capabilities.

Area 7

The following upset condition occurred in 2010, resulting in a release of untreated groundwater to the environment.

7EX-5MA: Failure of Wellhead Discharge Piping Sample Port, 6 July, 2010: On 6 July 2010, a sample port located on the discharge piping at well 7EX-5MA failed, releasing untreated groundwater to the environment. Failure of the sample port occurred during startup of the groundwater collection system following a system-initiated shutdown on 2 July 2010 due to a low-voltage condition at the UV/Ox system. It was determined that the pipe failure was caused by corrosion in the carbon steel process piping combined with pressure spikes in the pipe associated with startup of the groundwater extraction pump. Following detection of the release, EPA and ADEQ were notified, in accordance with the Area 7 CERP and communications plans. An estimated 480 gallons of water were released during the incident, which lasted approximately sixteen minutes before the pump shut down due a short circuit in the extraction pump motor. Inspection of the vault which houses 7EX-5MA did not reveal any standing water. Two soil samples collected from the surficial soil within the vault and at a point approximately one foot below the ground surface of the vault floor were analyzed for NIBW COCs. The data indicate non-detectable VOC concentrations. Corrective actions taken following the incident include:

- Installation of leak detection switches within Area 7 extraction well vaults;
- Replacement of carbon steel process pipe at area 7 extraction wellheads;
- Visual inspection of the extraction wellheads prior to and following groundwater collection system startup; and
- Replacement of all wellhead piping three inches in diameter and smaller every two years.