

# 22314

**FIRST QUARTER MONITORING REPORT 2010**

**GREENFIELD MUNICIPAL UTILITIES  
P.O. BOX 95  
GREENFIELD, IOWA**

**Terracon Project No. 08077032  
February 17, 2010**

*Prepared for:*

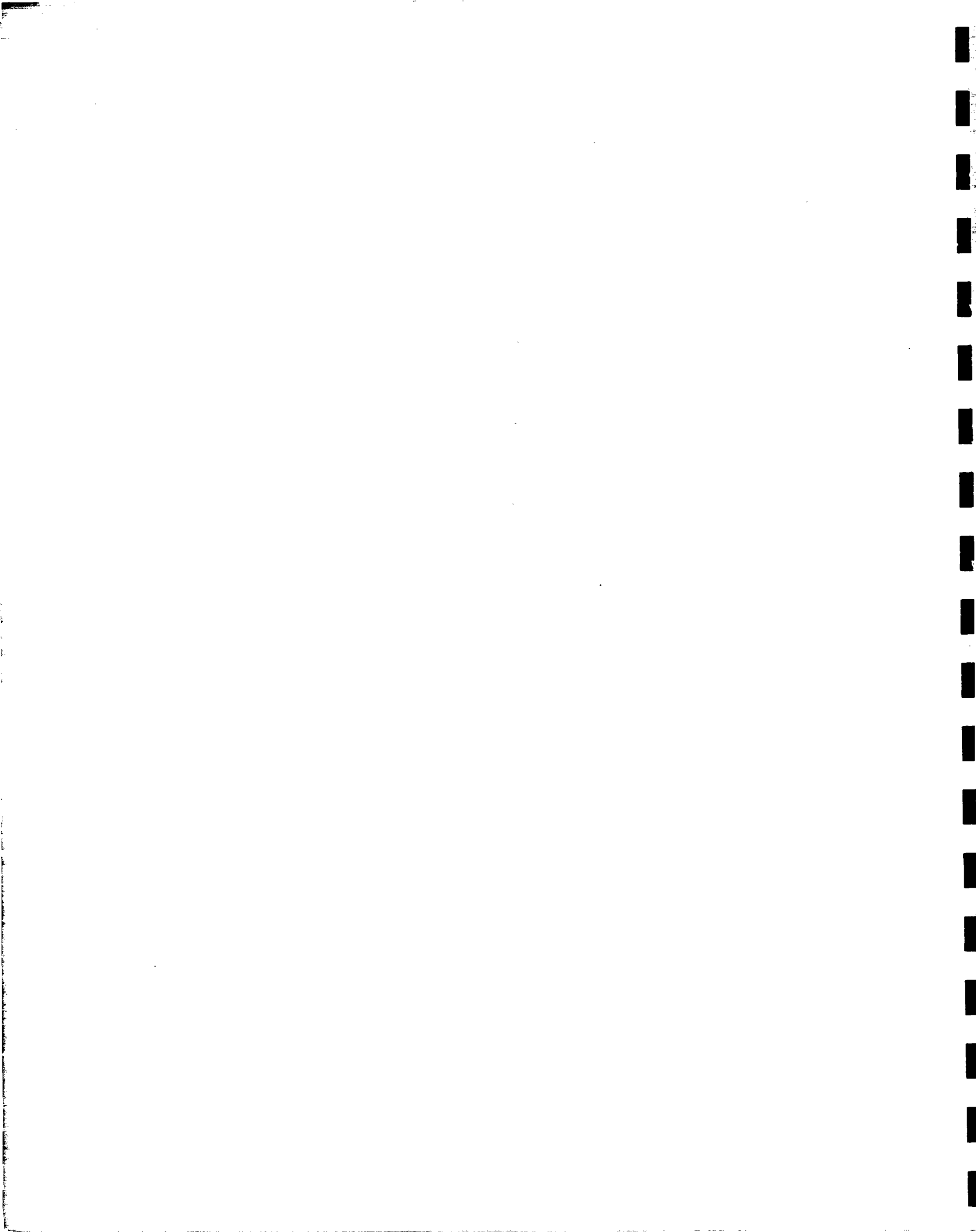
**GREENFIELD MUNICIPAL UTILITIES  
GREENFIELD, IOWA**

*Prepared by:*

**TERRACON CONSULTANTS, INC.  
DES MOINES, IOWA**

RECEIVED FEB 17 2010

**Terracon**



February 17, 2010

Ms. Tami Rice  
Iowa Department of Natural Resources  
Contaminated Sites Section  
Wallace State Office Building  
Des Moines, Iowa 50319

RE: First Quarter 2010 Site monitoring Report  
Greenfield Municipal Utilities  
Greenfield, Iowa  
Terracon Project No. 08077032

Dear Ms. Rice:

Terracon has completed the first quarter monitoring for 2010 at the above-referenced site. The purpose of monitoring is to collect additional groundwater information to evaluate the natural attenuation process with respect to chemicals of concern measured at the site. The report contains methods, observations, results, and conclusions made relative to the site. Since the initial investigation of the site, a total of seven monitoring events have now been completed.

In summary, Terracon measured depths to water in nine existing monitoring wells and collected groundwater samples from the nine wells. The results from the semi-annual sampling activities were as follows:

Semi-annual monitoring was completed to obtain additional site-specific information for evaluating site groundwater TEH concentration trends and possible groundwater TEH lateral movements. The results from the environmental sampling activities were as follows:

- The maximum TEH measured in groundwater reported for the first quarter 2010 were from the samples collected from well PMW-5. At PMW-5, chemicals of concern (COC's) decreased: TEH-diesel decreased from 78,100 µg/L to 53,500 µg/L, and TEH-waste oil decreased from 14,900 µg/L to 13,400 µg/L. At PMW-4A, COC's decreased slightly: TEH-diesel decreased from 6,450 µg/L to 2,700 µg/L, and TEH-waste oil decreased from 2,560 µg/L to 1,080 µg/L. These results indicate a reduction in TEH concentrations in the apparent source area of the site, near PMW-5, when compared to initial characterization results. The source area is where a former above ground fuel storage tank was once located.
- Groundwater concentrations of TEH in up-gradient monitoring wells PMW-7 and PMW-8 indicate a generally steady trend, with concentrations remaining below the applicable standards. Groundwater concentrations of TEH in up-gradient monitoring well, PMW-7, is the highest concentration recorded at its location. A former building, Terracon Consultants, Inc. 600 Southwest 7th Street, Suite M Des Moines, Iowa 50309

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just to the east of PMW-7, was removed between the first quarter and third quarter of 2009 sampling events. The recent demolition may have contributed to the increasing concentrations exhibited at PMW-7 due to vibrations of construction equipment agitating sorbed product from soils and the increased surface area available for water filtration from surface water.

- At monitoring well PMW-1A, located near the discovery boring (geotechnical boring B-3, July of 2006), groundwater concentrations of TEH-diesel and TEH-waste oil have both slightly decreased.
- Based on the static water level elevations for the shallow wells, groundwater flow and expected migration of the elevated TEH plume in the shallow water table system appears to be southerly and westerly, consistent with the initial investigation findings.
- A review of potential exposure pathways did not identify an apparent immediate threat of exposure from the chemicals of concern measured at the site, and it appears that natural degradation and dispersion of the plume is occurring at this time.

Terracon is recommending the site be reclassified to no action require. The chemical of concern concentrations are below Leaking Underground Storage Tank (LUST) Tier 1 target levels for the Groundwater Ingestion to Protected Groundwater Source. The trend for PMW-5 (groundwater source) for TEH-diesel and TEH-waste oil indicate a steady decline in concentration.

If you have any questions regarding the information enclosed within this document, please contact us at (515) 244-3184.

Sincerely,  
**TERRACON CONSULTANTS, INC.**



Eric J. Mueggenberg, P.G.  
Environmental Project Manager



Dennis Sensenbrenner, P.G.  
Environmental Department Manager

Enclosure

Copies to: Addressee (1)  
Mark Landa, Sullivan & Ward, P.C. (1), 6601 Westown Parkway, Suite 200, West Des Moines, Iowa 50266  
Duane Armstead (1), Greenfield Municipal Utilities, PO Box 95, Greenfield, IA 50849

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**FIRST QUARTER MONITORING REPORT 2010  
GREENFIELD MUNICIPAL UTILITIES  
P.O. Box 95  
GREENFIELD, IOWA**

**TERRACON PROJECT NO. 08077032  
February 17, 2010**

## **1.0 PROJECT INTRODUCTION**

Terracon has completed first quarter 2010 groundwater monitoring at the Greenfield Municipal Utilities facilities, referred to hereinafter as the subject site. This is the seventh semi-annual monitoring event completed since the initial investigation of the site. The Environmental Site Assessment (ESA) report for the site is dated March 30, 2007. Apparent petroleum impact to site soil and groundwater was initially observed in a geotechnical boring advanced at the site.

The site is a partially developed parcel located east and south of the Greenfield Municipal Utilities Electrical Power plant, generally in the southern half of the northeast corner of the intersection of South 1<sup>st</sup> and Southeast Kent Streets as presented on Figure 1 – Site Location Map. The site is presently utilized by the Greenfield Municipal Utilities as an electrical transformer substation.

## **2.0 BACKGROUND**

During the ESA, nine monitoring wells were installed to provide information about elevated chemicals of concern (COC's) in soil and groundwater at the site. Site features and monitoring well locations are depicted on Figure 2 – Site Diagram.

### **2.1 Site Location and Description**

The site is located in the downtown commercial area, approximately 1½ blocks south of the Adair County Courthouse. Adjacent property uses include Gross Manufacturing (farm machinery) and Schildberg Car Repair to the east; the former library building (unoccupied), the police station, and the electric power plant to the west. An alley extends east-west across the site. A large diesel generator and cooling towers are present north of the alley. Electrical transformers are present south of the alley. An underground conduit vault and numerous other underground and above ground electric conduits, as well as gas, water (mostly abandoned) and storm water lines are also present below the site and in the alley. In the southern area of the site, adjacent to the former library building, fill and rubble associated with a former water treatment building (demolished) extends to depths averaging 10 feet. While the site investigation was in progress, a new concrete pad on drilled shaft foundations was installed at the site.

## 2.2 Regional Topography and Geology

Greenfield is located on uplands within the Southern Iowa Drift landform region. Drainages extend away in numerous directions. Local surface topography of the site and vicinity is generally relatively level. The approximate elevation of the site is 1,370 feet above sea level (ASL).

The site soils consist of fill and disturbed soils, underlain by brown silty clay loess, which is generally gray below the water table. The loess on uplands in this region is generally underlain by glacial till. Geotechnical borings at the site extended to a depth of 30.5 feet encountered silty clay, fine grained soils. Bedrock in the region is Pennsylvanian age cyclic deposits of shale, limestone and sandstone as indicated by the Iowa Geological Survey Bureau Geologic Map of Iowa. According to the Bedrock Topography map of southwest Iowa (Sendlein and Gilmore, 1980), bedrock is at a depth of approximately 200 feet. Site soil borings encountered up to 10 feet of fill at the former water treatment building location in the southern area of the site, with lesser thickness in other locations.

## 3.0 Semi-annual Groundwater Monitoring

### 3.1 Groundwater Sampling

For the first quarter 2010 site monitoring, groundwater samples were collected from site monitoring wells on February 4, 2010. Prior to the collection of groundwater samples, depth to water was measured in each well and converted to relative groundwater elevations. Groundwater elevations for selected dates are listed in Table 1 below. A groundwater contour map for February 4, 2010 is included as Figure 3.

**Table 1: Groundwater Elevations  
 Greenfield Municipal Utilities, Greenfield, Iowa**

Date Measured	Boring/Monitoring Well Number					
	PMW-1*	PMW-1A	PMW-2	PMW-3	PMW-4*	PMW-4A
Top of Casing	95.28'	96.63'	95.14'	93.20'	95.86'	96.48'
During Drilling	~88'		Dry	Dry	~84'	
3/9/2007	*		89.30'	86.87'	89.91'	
3/12/2007	*		90.98'	88.38'	90.48'	
8/21/2007	Replaced*	91.22'	89.76'	87.51'	Replaced*	90.49'
3/13/2008		90.67	----	87.2		89.58
9/3/2008		90.54	88.80	----		89.18
3/9/2009		90.99	89.52	87.27		90.30
8/3/2009		89.34	88.86	87.04		89.61
2/4/2009		90.79	89.16	87.26		89.39

**Table 1: Groundwater Elevations – Continued**

<b>Boring/Monitoring Well Number</b>					
<b>Date Measured</b>	<b>PMW-5</b>	<b>PMW-6</b>	<b>PMW-7</b>	<b>PMW-8</b>	<b>PMW-9</b>
<b>Top of Casing</b>	97.07'	97.01'	98.07'	97.27'	94.22
<b>During Drilling</b>	~91'	~84'	Dry	Dry	~87
<b>3/9/2007</b>	91.86'	89.20'			
<b>3/12/2007</b>	92.13'	89.71'	92.98'	93.21'	
<b>8/21/2007</b>	91.81'	89.89'	93.97'	93.19'	
<b>3/13/2008</b>	90.2	88.85	92.11	93.24	
<b>9/3/2008</b>	89.43	88.21	92.57	92.28	89.41
<b>3/9/2009</b>	91.98	90.52	93.32	93.59	87.77
<b>8/3/2009</b>	89.13	88.72	92.84	92.64	87.52
<b>2/4/2010</b>	89.75	88.43	93.38	92.52	90.05

\* = Original well damaged or destroyed, replacement well installed (A)

\*\* = Below top of casing.

Prior to groundwater sampling, each monitoring well was purged of at least three well volumes of water, or dry, using a dedicated pre-cleaned, sealed disposable bailer. The dedicated disposable bailers were also used to collect the groundwater samples to reduce the potential for cross-contamination. The groundwater samples were transferred to laboratory-prepared containers, which were placed in an ice-packed cooler for transport to the laboratory. Samples were relinquished under standard Chain of Custody procedures to TestAmerica in Cedar Falls, Iowa. The executed chain-of-custody forms and laboratory data sheets are provided in Appendix B.

### **3.2 Decontamination Procedures**

Field equipment used to measure depth to groundwater was decontaminated using a non-phosphate detergent in potable water. Equipment was rinsed with tap water, followed by a distilled water rinse.

## **4.0 LABORATORY ANALYSIS**

### **4.1 Groundwater Results – Subsequent Sampling Events**

Semi-annual groundwater samples were obtained from each of the monitoring wells at the site and submitted to a State of Iowa Certified laboratory. The samples were analyzed for total extractable hydrocarbons (TEH) by Iowa Method OA-2. Laboratory results are summarized in Table 2, below.

Table 2: Investigation Groundwater Analytical Results (VOCs and TEH)

Analytes Detected (µg/L)	Date Sampled	Benzene (µg/L)	Cis-1,2-Dichloroethene (µg/L)	TEH – Diesel (µg/L)	TEH– Gasoline (µg/L)	TEH-Motor Oil (µg/L)
<b>Iowa State Wide Standard *</b>		0.005 / 0.10	0.07 / 0.35	1,200/ 75,000 <sup>^</sup>	Not Listed	400 / 40,000 <sup>^</sup>
<b>GW-3W</b>	7/18/2006	0.0122	NT	2,380,000 <sup>+</sup>	957,000	886,000 <sup>+</sup>
<b>PMW-1</b>	12/8/2006	0.00207	<0.0010	8,000	1,590	2,080
<b>PMW-1A<sup>+</sup></b>	8/21/2007			16,900	12,100	739
	3/13/2008			13,700	1,650	2,500
	9/4/2008			4,060	714	963
	3/9/2009			7,060	1,030	1,180
	8/3/2009			11,500	1,710	1,580
	2/4/2010			5,460	691	1,010
<b>PMW-2</b>	12/11/2006	0.00055	0.0153	1,420	656	<353
	8/21/2007			735	657	<300
	3/13/2008			552	<300	<300
	9/4/2008			481	<300	<300
	3/9/2009			566	<300	<300
	8/3/2009			359	<300	<300
	2/4/2010			705	<300	<300
<b>PMW-3</b>	12/11/2006	<0.00050	<0.0010	734	<349	<349
	8/21/2007			503	<300	<300
	3/13/2008			314	<300	<300
	9/4/2008			308	<300	<300
	3/9/2009			<300	<300	<300
	8/3/2009			410	<300	<300
	2/4/2010			445	<300	<300
<b>PMW-4</b>	12/8/2006	<0.00050	<0.0010	21,600	3,180	13,000
<b>PMW-4A<sup>+</sup></b>	8/21/2007			69,000	43,300	20,600
	3/13/2008			169,000	19,500	43,600
	9/4/2008			19,100	4,970	9,950
	3/9/2009			5,450	640	2,390
	8/3/2009			6,450	718	2,560
	2/4/2010			2,700	<300	1,080
<b>PMW-5</b>	12/7/2006	<0.0050	<0.010	521,000	53,200	138,000
	8/21/2007			325,000	83,600	88,800
	3/13/2008			171,000	8,820	13,900
	9/4/2008			118,000	8,720	35,800
	3/9/2009			12,800	562	3,460
	8/3/2009			78,100	3,770	14,900
	2/4/2010			53,500	3,060	13,400

\* = Iowa Land Recycling Program State Wide Standards for Protected / Non-protected Groundwater, µg/L (3/2/07, on-line)

<sup>^</sup> = Iowa LUST Tier 1 Level for Protected / Non-protected Groundwater, µg/L

<sup>+</sup> = Original well damaged or destroyed, replacement well installed prior to third quarter 2007 site monitoring

**Table 2: Investigation Groundwater Analytical Results (VOCs and TEH)**  
 (continued):

<u>Analytes Detected (µg/L)</u>	<u>Date Sampled</u>	<u>Benzene (µg/L)</u>	<u>Cis-1,2-Dichloroethene (µg/L)</u>	<u>TEH – Diesel (µg/L)</u>	<u>TEH– Gasoline (µg/L)</u>	<u>TEH-Motor Oil (µg/L)</u>
<u>Iowa State Wide Standard *</u>		0.005 / 0.10	0.07 / 0.35	1,200/ 75,000^	Not Listed	400 / 40,000^
<u>PMW-6</u>	3/9/2007	<0.0025	<0.0050	2,320	2,000	454
	8/21/2007			528	987	424
	3/13/2008			593	742	<300
	9/4/2008			<300	<300	<300
	3/9/2009			<300	<300	<300
	8/3/2009			<300	<300	<300
	2/4/2010			<300	<300	<300
<u>PMW-7</u>	3/9/2007	<0.0025	<0.0050	3,670	<300	4,540
	8/21/2007			7,490	1,810	3,550
	3/13/2008			8,940	2,050	8,400
	9/4/2008			7,880	743	4,830
	3/9/2009			3,230	<300	1,790
	8/3/2009			15,600	1,180	9,360
	2/4/2010			16,200	879	10,500
<u>PMW-8</u>	3/12/2007	0.00089	0.184	1,110	<300	1,020
	8/21/2007			1,340	2,070	1,150
	3/13/2008			1,920	<300	2,870
	9/4/2008			3,650	<300	5,740
	3/9/2009			1,990	<300	3,000
	8/3/2009			2,880	<300	4,620
	2/4/2010			2,420	<300	3,840
<u>PMW-9</u>	9/4/2008			4,010	645	1,210
	3/9/2009			3,720	355	752
	8/3/2009			7,100	671	1,070
	2/4/2010			3,840	352	903

\* = Iowa Land Recycling Program State Wide Standards for Protected / Non-protected Groundwater, µg/L (3/2/07, on-line)

^ = Iowa LUST Tier 1 Level for Protected / Non-protected Groundwater, µg/L

\* = Original well damaged or destroyed, replacement well installed prior to third quarter 2007 site monitoring

## 5.0 DATA EVALUATION

### 5.1 Previous Groundwater Analytical Results

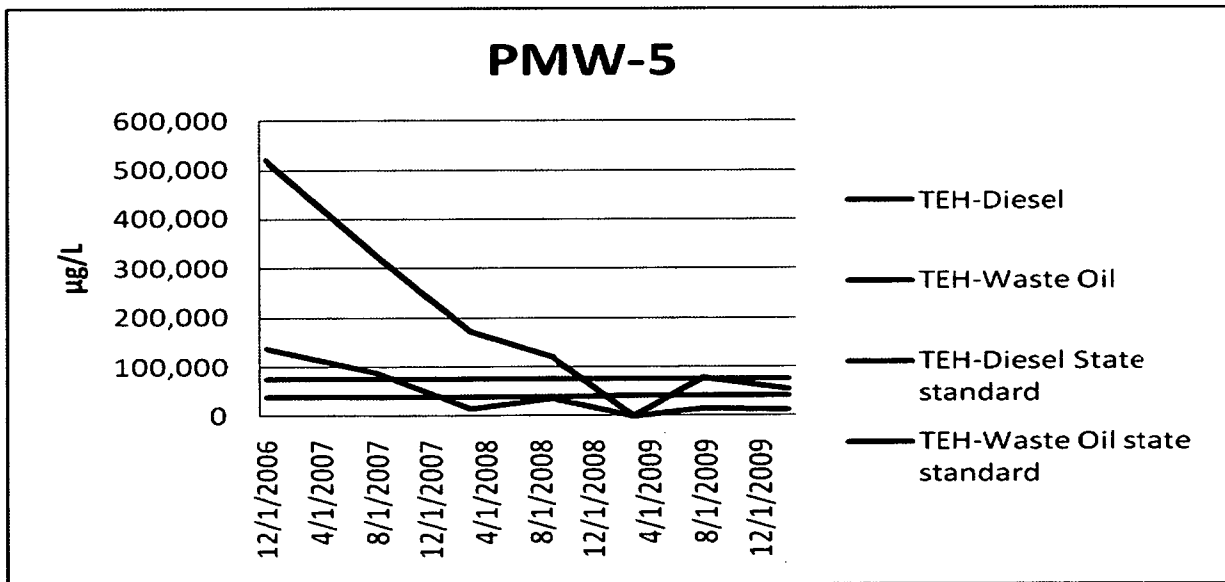
Initial site characterization results completed during December 2006 through March 2007, groundwater samples were analyzed for volatile organic compounds (VOCs) and total extractable hydrocarbons (TEH). A total of 12 VOCs were reported exceeding detection limits for the eight groundwater samples. At least one VOC exceeding its detection limit was reported for five of the eight well locations. Concentrations of VOCs exceeding detection limits were not reported for the samples from PWM-3, PMW-5, or PMW-7. As

with the soil analytical results for the initial investigation, the VOC results did not exceed an applicable statewide standard (SWS) for soil or non-protected groundwater, IDNR Land Recycling Program web site March 2, 2007. Two VOCs did exceed the statewide standard for a protected groundwater source: Benzene at B-3 (0.0122 mg/l, SWS= 0.005 mg/l), and Cis-1,2-Dichloroethene at PMW-8 (0.184 mg/l, SWS=0.07 mg/l). However, protected groundwater statewide standard (0.44 m/day) does not appear to be applicable to the site based on the relatively low hydraulic conductivity of the site soils (maximum = 0.265 m/day), which measured less than the protected groundwater criteria. Based on this information, and consultation with Tami Rice of the Iowa Department of Natural Resources (IDNR), analysis of VOCs was not included in the semi-annual groundwater monitoring plan for the site. Therefore, groundwater monitoring samples were analyzed for TEH only. Table 2 presents the initial site groundwater analytical results for VOCs exceeding a protected groundwater SWS, and the initial site groundwater TEH results.

**5.2 First Quarter 2010 Groundwater Analytical Results**

Groundwater concentrations of TEH-diesel exceeded the IDNR Tier 1 levels for non-protected groundwater of 75,000 µg/L at PMW-5 with 78,100 µg/L. Groundwater concentrations of TEH-waste oil no longer exceed the IDNR Tier 1 levels for non-protected groundwater of 40,000 µg/L. Results of key wells are discussed as follows:

- PMW-5 decreased from 78,100 µg/L TEH-diesel to 53,500 µg/L and from 14,900 µg/L TEH-waste oil to 13,400 µg/L.



- PMW-4A TEH-diesel decreased from 6,450 µg/L to 2,700 µg/L and TEH-waste oil decreased from 2,560 µg/L to 1,080 µg/L.

Although the concentrations increased between the two 2009 semi-annual monitoring events, overall the concentrations of TEH-diesel in PMW-5 continued to decrease compared to the initial sample results of 521,000 µg/L TEH-diesel and 138,000 µg/L TEH-waste oil. A review of potential exposure pathways did not identify an apparent immediate threat of exposure from the chemicals of concern measured at the site, and natural degradation of the plume appears to be ongoing. These results support a reduction in TEH concentrations in the apparent source area of the site near PMW-5, where an above ground fuel storage tank had been located, and a decrease in concentrations at location PMW-4A, which is located down gradient of the source area compared to the initial investigation results. This supports steady and declining conditions.

Groundwater concentrations of TEH in up-gradient monitoring wells PMW-7 and PMW-8 also support steady trend conditions, with concentrations remaining below the applicable SWS. However, recent dissolved concentrations of TEH in monitoring well PMW-7, recorded its highest concentration at its location. A former building, east of PMW-7, was removed between the first and third quarter of 2009. The demolition process may have contributed to the increasing concentrations exhibited at PMW-7 due to vibrations of construction equipment agitating sorbed product from soils and the increased surface area available for water filtration from surface water. Future monitoring results are anticipated to measure steady or lower concentrations further supporting steady and declining conditions.

At monitoring well PMW-1A, located near where petroleum contamination was discovered, groundwater concentrations of TEH-diesel and TEH-waste oil have remained steady with only slight increases.

## 6.0 RISK EVALUATION

The most conservative groundwater pathway for chemicals of concern (TEH-diesel and TEH-waste oil) is Tier 1 levels for non-protected groundwater are 75,000 µg/L and 40,000 µg/L respectively. These action levels apply to various exposure pathways under IAC Ch. 135, Risk Based Corrective Action (RBCA) Leaking Underground Storage Tank (LUST) for Tier 1 Assessment evaluation procedures. As discussed in the initial site investigation report, the Groundwater Ingestion-potential pathway continues to be complete at the site, as there is no local ordinance or institutional control(s) on potentially affected properties prohibiting installation of drinking water wells in the site vicinity. No new risk pathways were identified as a result of the recent site monitoring event.

## 7.0 CONCLUSIONS

Semi-annual monitoring was completed to obtain additional site-specific information on site groundwater TEH concentration trends and possible groundwater TEH lateral movements. The results from the environmental sampling activities were as follows:

- The maximum TEH measured in groundwater reported for the first quarter 2010 were from the samples collected from well PMW-5. At PMW-5, chemicals of concern (COC's) decreased: TEH-diesel decreased from 78,100 µg/L to 53,500 µg/L, and TEH-waste oil decreased from 14,900 µg/L to 13,400 µg/L. At PMW-4A, COC's decreased slightly: TEH-diesel decreased from 6,450 µg/L to 2,700 µg/L, and TEH-waste oil decreased from 2,560 µg/L to 1,080 µg/L. These results indicate a reduction in TEH concentrations in the apparent source area of the site, near PMW-5, when compared to initial characterization results. The source area is where a former above ground fuel storage tank was once located.
- Groundwater concentrations of TEH in up-gradient monitoring wells PMW-7 and PMW-8 indicate a generally steady trend, with concentrations remaining below the applicable standards. Groundwater concentrations of TEH in up-gradient monitoring well, PMW-7, is the highest concentration recorded at its location. A former building, just to the east of PMW-7, was removed between the first quarter and third quarter of 2009 sampling events. The recent demolition may have contributed to the increasing concentrations exhibited at PMW-7 due to vibrations of construction equipment agitating sorbed product from soils and the increased surface area available for water filtration from surface water.
- At monitoring well PMW-1A, located near the discovery boring (geotechnical boring B-3, July of 2006), groundwater concentrations of TEH-diesel and TEH-waste oil have both slightly decreased.
- Based on the static water level elevations for the shallow wells, groundwater flow and expected migration of the elevated TEH plume in the shallow water table system appears to be southerly and westerly, consistent with the initial investigation findings.
- A review of potential exposure pathways did not identify an apparent immediate threat of exposure from the chemicals of concern measured at the site, and it

appears that natural degradation and dispersion of the plume is occurring at this time.

Terracon is recommending No Further Action based upon the previous monitoring data supporting steady and declining conditions.

## **8.0 GENERAL COMMENTS**

The analyses and opinions expressed in this report are based upon data obtained from soil borings and monitoring wells installed at the indicated locations and from other information discussed in this report. This report does not reflect any variations in subsurface stratigraphy, hydrogeology, or contaminant concentrations, which may occur between borings or across the site. Actual subsurface conditions may vary and may not become evident without further exploration.

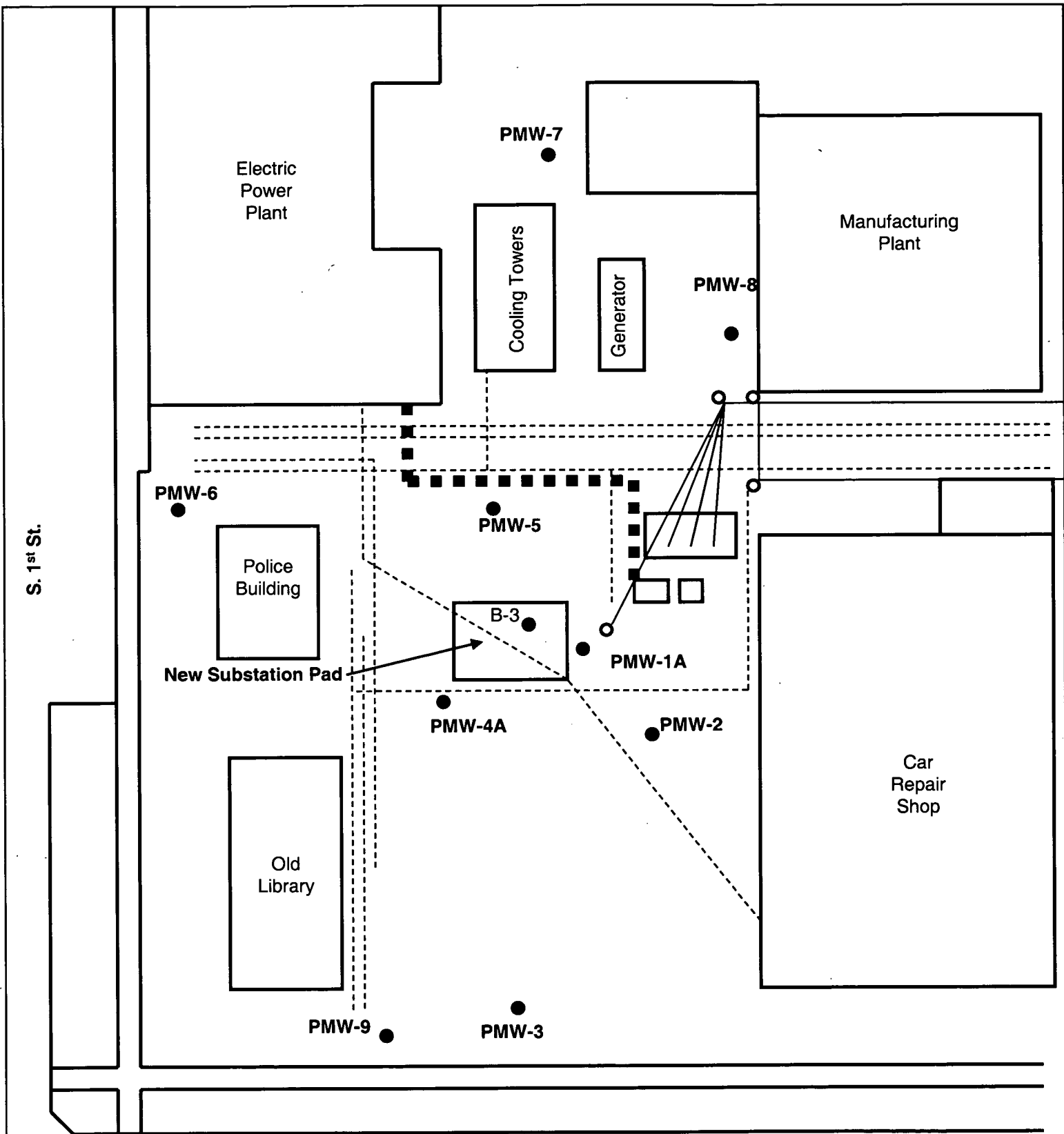
The limitations of the assessment should be recognized. The site assessment should provide additional information to assist in the evaluation of potential environmental impairment risk associated with the subject site. The scope of services for this report was determined by the findings of previous reports and discussions with the client and counsel. The client must acknowledge the limitations of the scope of services and the limitations of the data collected.

This report has been prepared for the exclusive use and reliance of the client, Greenfield Municipal Utilities, and their counsel. Use or reliance by any other individual or entity is prohibited without the written authorization of Greenfield Municipal Utilities, and Terracon. Reliance on the report by the client and all authorized parties will be subject to the terms, conditions and limitations stated in the proposal, report, and Terracon's Terms and Conditions. The limitation of liability defined in the Terms and Conditions is the aggregate limit of Terracon's liability to the client and all relying parties.

**FIGURES**

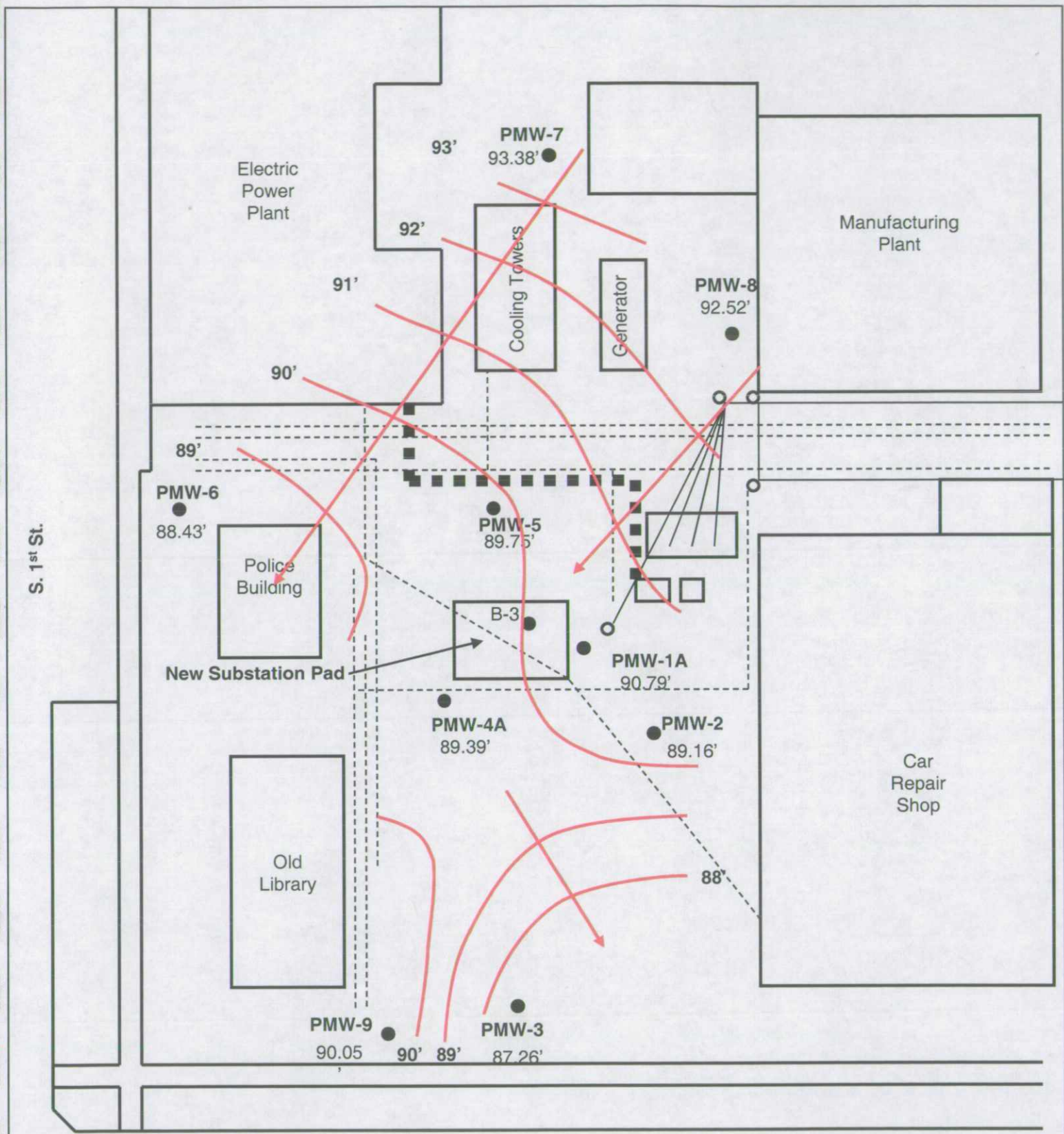






● Soil Boring / Monitoring Well  
 DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES.

FIGURE 2 – Site Map Greenfield Municipal Utilities Greenfield, IA		
PM: EJM	 600 SW 7th Street Des Moines, IA 50309	Proj. # 08077032
Designed by: EJM		FN: Figure2.ppt
Drawn by: EJM		Date: 2/4/2010



S. 1<sup>st</sup> St.

SE Kent St.



**Groundwater Elevations, 2/4/2010**

- Soil Boring / Monitoring Well

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES.

FIGURE 3 – Groundwater Flow Map  
Greenfield Municipal Utilities  
Greenfield, IA

PM: EJM	 600 SW 7 <sup>th</sup> Street Des Moines, IA 50309	Proj. # 08077032
Designed by: EJM		FN: Figure3.ppt
Drawn by: EJM		Date: 2/4/2010



**APPENDIX A**  
**Analytical Reports**

February 12, 2010

Client:

TERRACON - DES MOINES  
600 SW 7th St., Suite M  
Des Moines, IA 50309

Work Order: CTB0324  
Project Name: Greenfield Municipal  
Project Number: 08077032

Attn: Eric Mueggenberg

Date Received: 02/05/10

The Chain(s) of Custody, 2 pages, are included and are an integral part of this report.

If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-(800)750-2401

SAMPLE IDENTIFICATION	LAB NUMBER	COLLECTION DATE AND TIME
PMW-1A	CTB0324-01	02/04/10 11:20
PMW-2	CTB0324-02	02/04/10 11:14
PMW-3	CTB0324-03	02/04/10 12:05
PMW-4A	CTB0324-04	02/04/10 11:07
PMW-5	CTB0324-05	02/04/10 10:55
PMW-6	CTB0324-06	02/04/10 10:29
PMW-7	CTB0324-07	02/04/10 10:36
PMW-8	CTB0324-08	02/04/10 10:45
PMW-9	CTB0324-09	02/04/10 11:30

Samples were received into laboratory at a temperature of 5.40 °C.

NELAC states that samples which require thermal preservation shall be considered acceptable if the arrival temperature is within 2 degrees C of the required temperature or the method specified range. For samples with a temperature requirement of 4 degrees C, an arrival temperature from 0 degrees C to 6 degrees C meets specifications. Samples that are delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

Please refer to the Temperature and Sample Receipt form that is included with this report for additional information regarding the condition of samples at the time of receipt by the laboratory.

The reported results were obtained in compliance with the 2003 NELAC standards unless otherwise noted.

Iowa Certification Number: 007

*Reproduction of this analytical report is permitted only in its entirety. This report shall not be reproduced except in full without the written approval of the laboratory.*

*TestAmerica Laboratories, Inc. certifies that the analytical results contained herein apply only to the specific sample analyzed.*

Approved By:



TestAmerica Cedar Falls  
Angela Muehling  
Project Coordinator

TERRACON - DES MOINES  
600 SW 7th St., Suite M  
Des Moines, IA 50309  
Eric Mueggenberg

Work Order: CTB0324  
Project: Greenfield Municipal  
Project Number: 08077032

Received: 02/05/10  
Reported: 02/12/10 13:15

## ANALYTICAL REPORT

Analyte	Sample Result	Data Qualifiers	Units	Quan. Limit	Dilution Factor	Date Analyzed	Analyst	Seq/ Batch	Method
<b>Sample ID: CTB0324-01 (PMW-1A - Ground Water)</b>				<b>Sampled: 02/04/10 11:20</b>			<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	7160		ug/L	300	1	02/10/10 22:21	rdm	[CALC]	OA-2 - 8015B
Diesel	5460		ug/L	300	1.01	02/10/10 22:21	rdm	10B0313	OA-2
Gasoline	691	Q	ug/L	300	1.01	02/10/10 22:21	rdm	10B0313	OA-2
Motor Oil	1010	Q	ug/L	300	1.01	02/10/10 22:21	rdm	10B0313	OA-2
Surr: Octacosane (35-135%)	136 %	ZX							
<b>Sample ID: CTB0324-02 (PMW-2 - Ground Water)</b>				<b>Sampled: 02/04/10 11:14</b>			<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	705		ug/L	300	1	02/10/10 23:02	rdm	[CALC]	OA-2 - 8015B
Diesel	705		ug/L	300	1.01	02/10/10 23:02	rdm	10B0313	OA-2
Gasoline	<300		ug/L	300	1.01	02/10/10 23:02	rdm	10B0313	OA-2
Motor Oil	<300		ug/L	300	1.01	02/10/10 23:02	rdm	10B0313	OA-2
Surr: Octacosane (35-135%)	95 %								
<b>Sample ID: CTB0324-03 (PMW-3 - Ground Water)</b>				<b>Sampled: 02/04/10 12:05</b>			<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	445		ug/L	300	1	02/10/10 23:43	rdm	[CALC]	OA-2 - 8015B
Diesel	445		ug/L	300	1.01	02/10/10 23:43	rdm	10B0313	OA-2
Gasoline	<300		ug/L	300	1.01	02/10/10 23:43	rdm	10B0313	OA-2
Motor Oil	<300		ug/L	300	1.01	02/10/10 23:43	rdm	10B0313	OA-2
Surr: Octacosane (35-135%)	97 %								
<b>Sample ID: CTB0324-04 (PMW-4A - Ground Water)</b>				<b>Sampled: 02/04/10 11:07</b>			<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	3780		ug/L	300	1	02/11/10 00:24	rdm	[CALC]	OA-2 - 8015B
Diesel	2700		ug/L	300	1.01	02/11/10 00:24	rdm	10B0313	OA-2
Gasoline	<300		ug/L	300	1.01	02/11/10 00:24	rdm	10B0313	OA-2
Motor Oil	1080	Q	ug/L	300	1.01	02/11/10 00:24	rdm	10B0313	OA-2
Surr: Octacosane (35-135%)	119 %								
<b>Sample ID: CTB0324-05 (PMW-5 - Ground Water)</b>				<b>Sampled: 02/04/10 10:55</b>			<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	70000		ug/L	1500	5	02/12/10 01:37	am	[CALC]	OA-2 - 8015B
Diesel	53500		ug/L	1500	5.05	02/12/10 01:37	am	10B0313	OA-2
Gasoline	3060	Q	ug/L	300	1.01	02/11/10 01:04	rdm	10B0313	OA-2
Motor Oil	13400	Q	ug/L	300	1.01	02/11/10 01:04	rdm	10B0313	OA-2
Surr: Octacosane (35-135%)	456 %	ZX							
<b>Sample ID: CTB0324-06 (PMW-6 - Ground Water)</b>				<b>Sampled: 02/04/10 10:29</b>			<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	<300		ug/L	300	1	02/11/10 01:44	rdm	[CALC]	OA-2 - 8015B
Diesel	<300		ug/L	300	1	02/11/10 01:44	rdm	10B0313	OA-2
Gasoline	<300		ug/L	300	1	02/11/10 01:44	rdm	10B0313	OA-2
Motor Oil	<300		ug/L	300	1	02/11/10 01:44	rdm	10B0313	OA-2
Surr: Octacosane (35-135%)	90 %								

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## ANALYTICAL REPORT

Analyte	Sample Result	Data Qualifiers	Units	Quan. Limit	Dilution Factor	Date Analyzed	Analyst	Seq/ Batch	Method
<b>Sample ID: CTB0324-07 (PMW-7 - Ground Water)</b>						<b>Sampled: 02/04/10 10:36</b>	<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	27600		ug/L	400	1	02/11/10 02:25	rdm	[CALC]	OA-2 - 8015B
Diesel	16200		ug/L	400	1.33	02/11/10 02:25	rdm	10B0313	OA-2
Gasoline	879	Q	ug/L	400	1.33	02/11/10 02:25	rdm	10B0313	OA-2
Motor Oil	10500		ug/L	400	1.33	02/11/10 02:25	rdm	10B0313	OA-2
<i>Surr: Octacosane (35-135%)</i>	291 %	ZX							
<b>Sample ID: CTB0324-08 (PMW-8 - Ground Water)</b>						<b>Sampled: 02/04/10 10:45</b>	<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	6260		ug/L	300	1	02/11/10 03:06	rdm	[CALC]	OA-2 - 8015B
Diesel	2420		ug/L	300	1.02	02/11/10 03:06	rdm	10B0313	OA-2
Gasoline	<300		ug/L	300	1.02	02/11/10 03:06	rdm	10B0313	OA-2
Motor Oil	3840		ug/L	300	1.02	02/11/10 03:06	rdm	10B0313	OA-2
<i>Surr: Octacosane (35-135%)</i>	148 %	ZX							
<b>Sample ID: CTB0324-09 (PMW-9 - Ground Water)</b>						<b>Sampled: 02/04/10 11:30</b>	<b>Recvd: 02/05/10 18:30</b>		
UST ANALYSIS PARAMETERS									
Total Extractable Hydrocarbons	5090		ug/L	300	1	02/11/10 03:46	rdm	[CALC]	OA-2 - 8015B
Diesel	3840		ug/L	300	1.01	02/11/10 03:46	rdm	10B0313	OA-2
Gasoline	352	Q	ug/L	300	1.01	02/11/10 03:46	rdm	10B0313	OA-2
Motor Oil	903		ug/L	300	1.01	02/11/10 03:46	rdm	10B0313	OA-2
<i>Surr: Octacosane (35-135%)</i>	109 %								

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### SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracted	Extracted Vol	Date	Analyst	Extraction Method
<b>UST ANALYSIS PARAMETERS</b>							
OA-2	10B0313	CTB0324-01	990.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-02	990.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-03	990.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-04	990.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-05	990.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-05RE1	990.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-06	1,000.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-07	750.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-08	980.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2	10B0313	CTB0324-09	990.00	1.00	02/09/10 07:19	CMM	SW 3510C GC
OA-2 - 8015B	[CALC]	CTB0324-01	1.00	1.00	02/09/10 07:19		[CALC]
OA-2 - 8015B	[CALC]	CTB0324-02	1.00	1.00	02/09/10 07:19		[CALC]
OA-2 - 8015B	[CALC]	CTB0324-03	1.00	1.00	02/09/10 07:19		[CALC]
OA-2 - 8015B	[CALC]	CTB0324-04	1.00	1.00	02/09/10 07:19		[CALC]
OA-2 - 8015B	[CALC]	CTB0324-05	1.00	1.00	02/09/10 07:19		[CALC]
OA-2 - 8015B	[CALC]	CTB0324-06	1.00	1.00	02/09/10 07:19		[CALC]
OA-2 - 8015B	[CALC]	CTB0324-07	1.00	1.00	02/09/10 07:19		[CALC]
OA-2 - 8015B	[CALC]	CTB0324-08	1.00	1.00	02/09/10 07:19		[CALC]
OA-2 - 8015B	[CALC]	CTB0324-09	1.00	1.00	02/09/10 07:19		[CALC]

THE LEADER IN ENVIRONMENTAL TESTING

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LABORATORY BLANK QC DATA

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Result	Dup Result	% REC	Dup %REC	% REC Limits	RPD RPD	Limit	Q
<b>UST ANALYSIS PARAMETERS</b>														
Diesel	10B0313			ug/L	N/A	300	<300							
Gasoline	10B0313			ug/L	N/A	300	<300							
Motor Oil	10B0313			ug/L	N/A	300	<300							
Surrogate: Octacosane	10B0313			ug/L						131	35-135			

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### LCS/LCS DUPLICATE QC DATA

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Result	Dup Result	% REC	Dup %REC	% REC Limits	RPD	RPD Limit	Q
<b>UST ANALYSIS PARAMETERS</b>														
Diesel	10B0313		2000	ug/L	N/A	300	1790	1860	89	93	40-135	4	30	
Surrogate: Octacosane	10B0313			ug/L					75	79	45-135			

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## CERTIFICATION SUMMARY

### TestAmerica Cedar Falls

Method	Matrix	Nelac	Iowa
OA-2 - 8015B	Water - NonPotable		
OA-2	Water - NonPotable	X	X

*Any abnormalities or departures from sample acceptance policy shall be documented on the 'Sample Receipt and Temperature Log Form' and 'Sample Non-conformance Form' (if applicable) included with this report.*

*For information concerning certifications of this facility or another TestAmerica facility, please visit our website at [www.TestAmericaInc.com](http://www.TestAmericaInc.com)*

*Samples collected by TestAmerica Field Services personnel are noted on the Chain of Custody (COC) and are sampled in accordance with TA-CF SOP CF-FSS-01.*

## DATA QUALIFIERS AND DEFINITIONS

**Q** Poor chromatographic match to standard.  
**ZX** Due to sample matrix effects, the surrogate recovery was outside the control limits.

## ADDITIONAL COMMENTS



# TestAmerica

704 ENTERPRISE DRIVE • CEDAR FALLS, IA 50613  
800-750-2401 • 319-277-2425 FAX

THE LEADER IN ENVIRONMENTAL TESTING

## Sample Receipt and Temperature Log Form

Client: TERRACON

Project: Greenfield

City: Des Moines, Ia

Municipal.

Date: 2/5/12 Receiver's Initials: JMH Time (Delivered): 1830

### Temperature Record:

<b>Cooler ID# (If Applicable)</b> <u>TERRACON 5342</u>
<u>5.4</u> °C / <u>On Ice</u>

### Thermometer:

- IR - 61997671 'B'
- IR - 90876942 'C'
- IR - 61854108
- 22126775

### Courier:

<input type="checkbox"/> UPS	<input checked="" type="checkbox"/> TA Courier
<input type="checkbox"/> FedEx	<input type="checkbox"/> TA Field Services
<input type="checkbox"/> FedEx Ground	<input type="checkbox"/> Client
<input type="checkbox"/> US Postal Service	<input type="checkbox"/> Other
<input type="checkbox"/> Spee-Dee	

Temp Blank

Temperature out of compliance

Custody seals present?

Yes

Custody seals intact?

Yes  No

Non-Conformance report started

### Exceptions Noted

<input type="checkbox"/> Sample(s) not received in a cooler.
<input type="checkbox"/> Samples(s) received same day of sampling.
<input type="checkbox"/> Evidence of a chilling process
<input type="checkbox"/> Temperature not taken:

\*Refer to SOP CF-SS-01 for Temperature Criteria

H:\QA Folder\QA Forms & Log Book pgs\Cooler Receipt rev15.doc