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Retrospective Case Study in Killdeer, North Dakota

STUDY OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES

United States Environmental Protection Agency
Office of Research and Development

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U.S. Environmental Protection Agency
Office of Research and Development
Washington, DC

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Acronyms and Abbreviations

ADQ	audit of data quality
ANOVA	analysis of variance
bbl	barrels
bgs	below ground surface
Cl/Br	chloride to bromide ratio
Cl/I	chloride to iodide ratio
DIC	dissolved inorganic carbon
DO	dissolved oxygen
DOC	dissolved organic carbon
DRO	diesel-range organics
EDD	electronic data deliverable
EDR	Environmental Data Resources, Inc.
EIA	United States Energy Information Administration
ESI+	positive electrospray ionization
EPA	United States Environmental Protection Agency
Franchuk well	Franchuk SWH 44-20 well
ft	feet
ft/day	feet per day
ft^2/day	square feet per day
GC-MS	gas chromatography-mass spectrometry
g/min	gallons per minute
GMWL	Global Meteoric Water Line
GPC	Groundwater Protection Council
GRO	gasoline-range organics
HPLC	high performance liquid chromatography
ICP-OES	inductively coupled plasma-optical emission spectroscopy
ICP-MS	inductively couple plasma-mass spectrometry
IRMS	isotope-ratio mass spectrometry

K	hydraulic conductivity
L	liter
L/min	liters per minute
LMWL	Local Meteoric Water Line
m	meter
m/yr	meters per year
MCF	thousand cubic feet
MCFPD	thousand cubic feet per day
MCL	maximum contaminant level
MDL	minimum detection limit
mg/L	milligrams per liter
mi^2	square miles
mL	milliliters
mL/min	milliliters per minute
MS	mass spectrometry
MS/MS	tandem mass spectrometry
µg/L	micrograms per liter
µm	micrometer
µS/cm	microsiemens per centimeter
mg/L	milligrams per liter
Na/Li	sodium to lithium ratio
NLCD	National Land Cover Database
NDDWQ	North Dakota Department of Health, Division of Water Quality
NDIC	North Dakota Industrial Commission
NDWC	North Dakota Water Commission
NERL	National Exposure Research Lab
NIST	National Institute of Standards and Technology
NLCD	National Land Cover Database
NPL	National Priority List

NRMRL	National Risk Management Laboratory
NTU	nephelometric turbidity units
NURE	National Uranium Resources Evaluation
NWIS	National Water Information System
ORD	Office of Research and Development
ORP	oxidation-reduction potential
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QL	quantitation limit
RCRA	Resource Conservation and Recovery Act
RSKERL	Robert S. Kerr Environmental Research Laboratory
RSKSOP	Robert S Kerr Environmental Research Center Standard Operating Procedure
SMCL	secondary maximum contaminant level
SOP	standard operating procedure
SpC	specific conductivity
STORET	STOrage and RETrieval
$^{87}Sr/^{86}Sr$	strontium-87 to strontium-86 ratio
SVOC	semi-volatile organic compounds
TBA	tert-butyl alcohol
TDS	total dissolved solids
TIC	tentatively identified compound
TIMS	thermal imagery mass spectrometry
TOC	top of casing
TPS	total petroleum system
TSA	technical system audit
USGS	U.S. Geological Survey

UST	underground storage tank
VOC	volatile organic compound

Preface

The U.S. Environmental Protection Agency (EPA) is conducting a study of the potential impacts of hydraulic fracturing for oil and gas on drinking water resources. This study was initiated in Fiscal Year 2010 when Congress urged the EPA to examine the relationship between hydraulic fracturing and drinking water resources in the United States. In response, EPA developed a research plan (*Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*) that was reviewed by the Agency's Science Advisory Board (SAB) and issued in 2011. A progress report on the study (*Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources: Progress Report)*, detailing the EPA's research approaches and next steps, was released in late 2012 and was followed by a consultation with individual experts convened under the auspices of the SAB.

The EPA's study includes the development of several research projects, extensive review of the literature and technical input from state, industry, and non-governmental organizations as well as the public and other stakeholders. A series of technical roundtables and in-depth technical workshops were held to help address specific research questions and to inform the work of the study. The study is designed to address research questions posed for each stage of the hydraulic fracturing water cycle:

- Water Acquisition: What are the possible impacts of large volume water withdrawals from ground and surface waters on drinking water resources?
- Chemical Mixing: What are the possible impacts of surface spills of hydraulic fracturing fluid on or near well pads on drinking water resources?
- Well Injection: What are the possible impacts of the injection and fracturing process on drinking water resources?
- Flowback and Produced Water: What are the possible impacts of surface spills of flowback and produced water on or near well pads on drinking water resources?
- Wastewater Treatment and Waste Disposal: What are the possible impacts of inadequate treatment of hydraulic fracturing wastewaters on drinking water resources?

This report, *Retrospective Case Study in Killdeer, North Dakota*, is the product of one of the research projects conducted as part of the EPA's study. It has undergone independent, external peer review in accordance with Agency policy and all of the peer review comments received were considered in the report's development.

The EPA's study will contribute to the understanding of the potential impacts of hydraulic fracturing activities for oil and gas on drinking water resources and the factors that may influence those impacts. The study will help facilitate and inform dialogue among interested stakeholders, including Congress, other Federal agencies, states, tribal government, the international community, industry, non-governmental organizations, academia, and the general public.

Authors

Douglas G. Beak, US EPA/ORD/NRMRL

Gregory G. Oberley, US EPA/Region 8

Christopher J. Ruybal, Student Services Contractor for US EPA under contract EP-13-C-000135

Steven D. Acree, US EPA/ORD/NRMRL

Randall R. Ross, US EPA/ORD/NRMRL

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Executive Summary

In December 2009, Congress urged the U.S. Environmental Protection Agency (EPA) to conduct a study to better understand the relationship between hydraulic fracturing for oil and gas on drinking water resources. This report provides the results of one of five retrospective case studies conducted as a component of EPA's national study on potential impacts of hydraulic fracturing on drinking water resources (US EPA, 2011a, 2011b). Retrospective case studies focused on investigating reported instances of drinking water contamination in areas where hydraulic fracturing has already occurred. This report describes the retrospective case study in Dunn County, North Dakota, conducted near Killdeer, North Dakota. The Killdeer study area is the location of historical oil and gas production, with current unconventional oil and gas production occurring in the late Devonian/early Mississippian-aged Bakken Shale. A known blowout occurred at this site, the Franchuk 44-20 SHW well (Franchuk well) during the hydraulic fracturing process to complete the well. The blowout occurred during the fifth stage of a 23-stage hydraulic fracture. This resulted in a release of hydraulic fracturing fluids, oil, and flowback water onto the land surface and possibly into the Killdeer aquifer. The release occurred when an inner string of casing burst due to over-pressurization during the hydraulic fracturing process (Jacob, 2011).

Water quality samples were collected from three domestic wells, nine monitoring wells, two supply wells, one municipal well, and one state well during three rounds in July 2011, October 2011, and October 2012. All wells at the Killdeer site, except NDGW09, were screened in the Killdeer aquifer. Regarding the exception, information provided to EPA suggested that this deep monitoring well was screened in the Killdeer aquifer; however, the presence of lignite in the well log suggests that it may also be screened, all or partially, in the underlying Sentinel Butte aquifer.

The geochemistry of water samples was investigated by analyzing major ions, trace metals, methane/ethane gas concentrations, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), glycol ethers, diesel- and gasoline-range organics (DRO and GRO), low-molecular-weight acids, and selected stable isotopes ($\delta^{18}O_{H2O}$, $\delta^{2}H_{H2O}$, and $^{87}Sr/^{86}Sr$). Major ion data collected from this study were compared with historical water quality data retrieved from the literature and national water quality databases, including the U. S. Geological Survey (USGS) National Water Information System (NWIS; USGS, 2013), North Dakota State Water Commission (NDWC) databases (NDWC, 2013), and the report *Ground Water Basic Data for Dunn Co., North Dakota* (Klausing 1976). These data sources provided water quality data for samples collected prior to major development of the Bakken Shale play and provided an initial screening for potential ground water contamination. Statistical comparisons (analysis of variance [ANOVA] and Kruskal-Wallis tests) were made between the data collected from this study and the historical data. In order to help determine whether hydraulic fracturing or processes related to hydraulic fracturing were the cause or one of the causes of alleged impacts on water quality, other potential contaminant sources were identified by conducting detailed environmental record searches.

The initial examination of major anions and cations indicated that two of the study wells, NDGW07 and NDGW08, showed statistically significant differences in parameters such as chloride, calcium, magnesium, sodium, and strontium, compared to other study wells. No other study wells showed differences in chloride, calcium, magnesium, sodium, and strontium, with the exception of NDGW06 in the October 2012 sampling round when compared to the other study wells. In the October 2012

sampling round, the chloride concentration in the NDGW06 sample was elevated, however it was determined that the chloride concentration in the October 2012 NDGW06 sample was an outlier. All other parameters for the October 2012 NDGW06 sample were not outliers based on the Dixon Q-test performed (Dean and Dixon, 1951). Using the data collected during this study, it cannot be determined whether the October 2012 NDGW06 chloride concentration was an anomalous data point or an indication of an additional impacted well.

All study wells with the exceptions of NDGW07, NDGW08, and NDGW09 (NDGW09 was screened partly or completely in the Sentinel Butte Aquifer) were compared with the historical data from the NWIS, NDWC, and Klausing (1976) data sources for the Killdeer aquifer. NDGW09 was not used in this comparison because well logs indicated that it was at least partially screened in the Sentinel Butte aquifer and, therefore, would not be comparable to the Killdeer aquifer. NDGW07 and NDGW08 were not compared with historical data because the initial data screening indicated that these wells had different water quality than the other study wells in the study. The comparison to historical data was performed on historical data within a 3-mile radius of the Franchuk well to ensure that the comparison was reflective of the local Killdeer aquifer chemistry. The comparison of these study wells with the historical data showed that there were no statistical differences and that these study wells were unimpacted, even with inclusion of the October 2012 NDGW06 sample.

Dissolved gases were compared with the results of a report by the state of North Dakota (Anderson et al., 2010) for field screening for shallow gas. Methane was detected in 24% of the total samples, with a maximum concentration of 0.0253 mg/L. These observed concentrations were consistent with background methane concentrations of 0.0149 to 0.3978 mg/L. There were no observed impacts on drinking water quality from methane.

There were limited detections of other organic compounds in the study wells during the study. Thirty-eight VOCs were analyzed for during the study, and at least one was detected in 15% of the samples. The VOCs detected were acetone, toluene, m+p-xylene, o-xylene, 1,2,4-trimethylbenzene, and 1,2,3-trimethylbenzene (2% of the detections); benzene (7% of the detections); and tert-butyl alcohol (TBA) (15% of the detections). Glycols were not detected in the study wells during the study. The detection frequency for low-molecular-weight acids was 8%, and the detections were for formate (10% of detections) and acetate (31% of detections). Finally, 84 SVOCs were analyzed for during the study, and at least one was detected in 17% of the samples. The SVOCs detected during the study were 2-butoxyethanol, dimethyl phthalate (2% of the detections), bis-(2-ethylhexyl) phthalate (17% of the detections), and bis-(2-ethylhexyl) adipate (34% of the detections). In most cases, with the exception of tert-butyl alcohol (TBA), the detected organic compounds reasonably could be related back to sources that were not related to the Franchuk well blowout. These sources included vehicular traffic, generators used to power well pumps, flaring of methane from the pad's production wells, and polyvinyl chloride (PVC) cement that was used to repair NDGW10 the day prior to sampling.

TBA was consistently detected in NDGW07 and NDGW08 but was not detected in any of the other study wells. No historical data were found for TBA in the historical literature, so comparisons with the results from this study could not be made. Based on the analysis of other potential sources of contamination, it was determined that the only potential sources of TBA were from gasoline spills, leaking underground storage tanks (USTs), and hydraulic fracturing fluids. If derived from these sources, the TBA would have to be a degradation product of methyl tert-butyl ether (MTBE) (from gasoline) or tert-butyl

hydroperoxide (from hydraulic fracturing fluid). However, MTBE or other compounds expected to be associated with MTBE were not detected, and the remaining possible origin of TBA would be the tert-butyl hydroperoxide used in the hydraulic fracturing of the Franchuk well. Based on the data in this study, the TBA observed in NDGW07 and NDGW08 was consistent with the blowout of the Franchuk well being the source of the TBA.

An initial hydrological investigation was conducted at the Killdeer case study site. The investigation identified potentially significant temporal fluctuations in the hydraulic gradient beneath the pad. However, there was always a southerly component to the ground water flow. The southerly component of the flow is important, because it eliminates one potential source, road salt, for the observed changes in water quality (elevated chloride concentrations) to NDGW07 and NDGW08. The potential source, road salt, was applied to the highway adjacent to the southern edge of the study site. For this to be a source of contamination, the ground water flow would have to have a northerly component, which was never observed.

The time trends for various parameters in the study wells were also analyzed. The concentrations of various inorganic parameters did not vary over time in the unimpacted wells. However, in NDGW07 and NDGW08, the trends for inorganic parameters and for TBA were consistent with contaminant transport through these wells. Furthermore, the time trend analysis was consistent with the blowout at the Franchuk well being the potential source of contamination, particularly because NDGW07 and NDGW08 were downgradient of the Franchuk well.

The analysis of data from NDGW07 and NDGW08 indicates that the main impact on water quality was from briny water and TBA mixing with Killdeer aquifer water in these wells. In all cases, the fingerprinting techniques used confirmed that the impacts on NDGW07 and NDGW08 were likely from deep formation brines underlying the Killdeer study location. Based on the available deep formation brine data and the use of sodium to lithium (Na/Li) ratios, chloride to iodide (Cl/I) ratios, and isotopic analysis, it was determined that the brine had a Madison Formation-like signature and analysis to determine the potential source of the observed impacts was undertaken. Other sources of impacts on drinking water quality, such as nearby oil and gas activities, land use practices, leaking USTs, and industrial activities, are unlikely. This is because of the lack of detections of organic compounds and the lack of any signature of any source of contamination in the other monitoring wells at this pad. Based on the data in this study, the briny water observed in NDGW07 and NDGW08 was consistent with the blowout of the Franchuk well being the source of the brine.

However, analysis of the data indicated that brine characteristic of the Madison formation rather than the Bakken formation was the source of the impact. Additional literature review indicates that out-of-zone fracturing, or propagation of fractures outside the production zone into adjacent formations, is a common problem in Bakken formation wells. This literature indicates that in a high percentage of Bakken wells that have out-of-zone fracturing also have Madison formation brine signatures. The finding of a Madison formation brine source of impact on NDGW07 and NDGW08 is consistent with what was reported in the literature.

The results for several study samples, as well as the historical data, indicated that sulfate exceeded the secondary maximum contaminant level (SMCL) over time. Analysis of the sulfate data and information on the geology of Dunn County indicate that the sulfate concentration in the Killdeer aquifer is from

naturally occurring sources such as gypsum and selenite in the soils. It is unlikely that any impacts from anthropogenic activities would cause the high sulfate concentrations observed in the Killdeer aquifer.

Based on the data analysis performed for the Killdeer case study, the observed impacts on NDGW07 and NDGW08 are consistent with the blowout that occurred at the Franchuk 44-20 SWH well being the source of the impact.

Key observations or findings from this study are listed below.

- With the exception of TBA (detected in two wells), all VOC compounds (detected in three wells) and SVOC compounds (detected in five wells) could be related to a potential source other than hydraulic fracturing. No glycols were detected in the study wells during the study.
- Methane was detected in 24% of the study samples, with a maximum observed concentration of 0.0253 mg/L. Methane concentrations observed during the study are consistent with background methane concentrations in the Killdeer aquifer (0.0149 to 0.3978 mg/L).
- For sulfate, 38% of the study samples exceeded the secondary maximum contaminant level (SMCL). The sulfate concentrations in the Killdeer aquifer are consistent with naturally occurring sources such as gypsum and selenite in the soils of Dunn County and are consistent with the historical data.
- With the exception of three wells (two impacted wells and a well screened or partially screened in another aquifer), the results from the study wells were not significantly different than the historical data from the Killdeer aquifer and were considered unimpacted wells.
- The study identified two impacted monitoring wells that had water quality different from the other study wells and historical data.
- TBA was consistently detected in the two impacted monitoring wells, but not in the unimpacted wells. TBA concentrations were consistent with the degradation of tert-butyl hydroperoxide, a component used in the hydraulic fracturing fluid at the time of the blowout.
- The only potential source consistent with the conditions observed in the two impacted wells is the blow out that occurred at the Franchuk 44-20 SWH well.

1. Introduction

Recent advances in drilling technologies (horizontal drilling) and well stimulation (hydraulic fracturing) have resulted in large-scale development of vast, unconventional reserves of oil and gas across a wide range of geographic regions and geologic formations in the United States. These reserves are considered unconventional because they are bound up in low-permeability reservoirs such as shale, tight sands, limestone, and coal beds, and recovery of these reserves was previously uneconomical. While some of this new development is occurring in areas with mature oil and gas fields, vast areas with very little or no previous oil and gas development also are now being developed. As a result, there are rising concerns over potential impacts on human health and the environment, especially with regard to potential effects on drinking water sources. Environmental concerns include the potential for contamination of shallow ground water by stray gases (methane), formation waters (brines), and fracturing chemicals associated with unconventional gas development.

Congress urged EPA in December 2009 to study the relationship between hydraulic fracturing and drinking water. The study was to be conducted using a credible approach that relied on the best available science as well as independent sources of information, and through a transparent, peer-reviewed process that would ensure the validity and accuracy of the data. EPA consulted with other federal agencies and appropriate state and interstate regulatory agencies in carrying out the study (US EPA, 2010a). In February 2011, EPA issued the *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* (US EPA, 2011a). The final *Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* was released in November 2011 (US EPA, 2011b).

In 2011, EPA began to research the potential impacts of hydraulic fracturing on drinking water resources, if any, and to identify the driving factors that could affect the severity and frequency of any such impacts. EPA scientists focused primarily on hydraulic fracturing of shale formations, with some study of other oil- and gas-producing formations, including coal beds. EPA designed the scope of the research around five stages of the hydraulic fracturing water cycle (US EPA, 2012). Each stage of the cycle is associated with a primary research question:

- Water acquisition: What are the potential impacts of large-volume water withdrawals from ground water and surface waters on drinking water resources?
- Chemical mixing: What are the potential impacts of hydraulic fracturing fluid surface spills on or near well pads on drinking water resources?
- Well injection: What are the potential impacts of the injection and fracturing process on drinking water resources?
- Flowback and produced water: What are the potential impacts of flowback and produced water (collectively referred to as “hydraulic fracturing wastewater”) surface spills on or near well pads on drinking water resources?
- Wastewater treatment and waste disposal: What are the potential impacts of inadequate treatment of hydraulic fracturing wastewater on drinking water resources?

Prior to release of the study plan, EPA invited the public to nominate specific regions of the United States for inclusion as potential sites for case studies. The plan identified 41 potential retrospective case study sites. The retrospective case studies were to focus on investigating reported instances of drinking water resource contamination in areas where hydraulic fracturing has already occurred and were intended to inform several of the primary research questions related to chemical mixing, well injection, and flowback and produced water. Of the 41 sites nominated during the stakeholder process, EPA selected five sites across the United States at which to conduct retrospective case studies. The sites were deemed illustrative of the types of problems that were reported to EPA during stakeholder meetings held in 2010 and 2011. Additional information on site selection can be found in the Study Plan (US EPA 2012). EPA's plan for the retrospective case studies was to make a determination on the presence and extent of drinking water resource contamination as well as whether hydraulic fracturing or related processes contributed to the contamination. Thus, the retrospective sites were expected to provide EPA with information regarding key factors that may be associated with drinking water contamination (US EPA, 2011b).

In 2011 EPA also began conducting investigations at the five selected retrospective case study locations in Washington County, Pennsylvania (southwestern Pennsylvania); Bradford County, Pennsylvania (northeastern Pennsylvania); Wise County, Texas; Las Animas and Huerfano counties, Colorado (Raton Basin); and Dunn County, North Dakota (Killdeer). The Killdeer Retrospective Case Study was conducted in Dunn County, North Dakota, near the city of Killdeer, where oil is being recovered from the Bakken Shale (Figure 1). This case study differs from the other EPA retrospective case studies in that it focuses on an oil well where a known release occurred during the hydraulic fracturing process. Specifically, a blowout occurred in the Franchuk 44-20 SWH well in September 2010, during the fifth stage of a 23-stage hydraulic fracture (Jacob, 2011). This resulted in a release of hydraulic fracturing fluids, oil, and flowback water onto the land surface and possibly into the Killdeer aquifer. The release occurred when an inner string of casing burst due to over-pressurization during the hydraulic fracturing process. The release prompted state action, which led to the installation of monitoring wells on and around the well pad; monitoring of nearby domestic wells, water supply wells (wells that supply water for oil and gas activities), and municipal wells; removal of contaminated soil; and installation of a liner. Table 1 lists the composition of the hydraulic fracturing fluid used and provided by the state. The North Dakota Industrial Commission's (NDIC) Oil and Gas Division and the North Dakota Department of Health's (NDDWQ) Division of Water Quality subsequently invited EPA to consider Killdeer as a retrospective case study location (US EPA, 2012).

Although the blowout is a potential source of contamination of the Killdeer aquifer, it was not known at the time of the blowout whether the aquifer had been previously impacted by contamination from other sources. Therefore, a comprehensive assessment of the ground water around the well pad was conducted as part of this study to first determine an impact and then to account for all potential sources of contamination. Two potential pathways for contamination of the Killdeer aquifer from the blowout were considered: (1) Direct release from the Franchuk wellbore laterally into the Killdeer aquifer and (2) Indirect contamination from surface infiltration of released fluids down into the Killdeer aquifer.

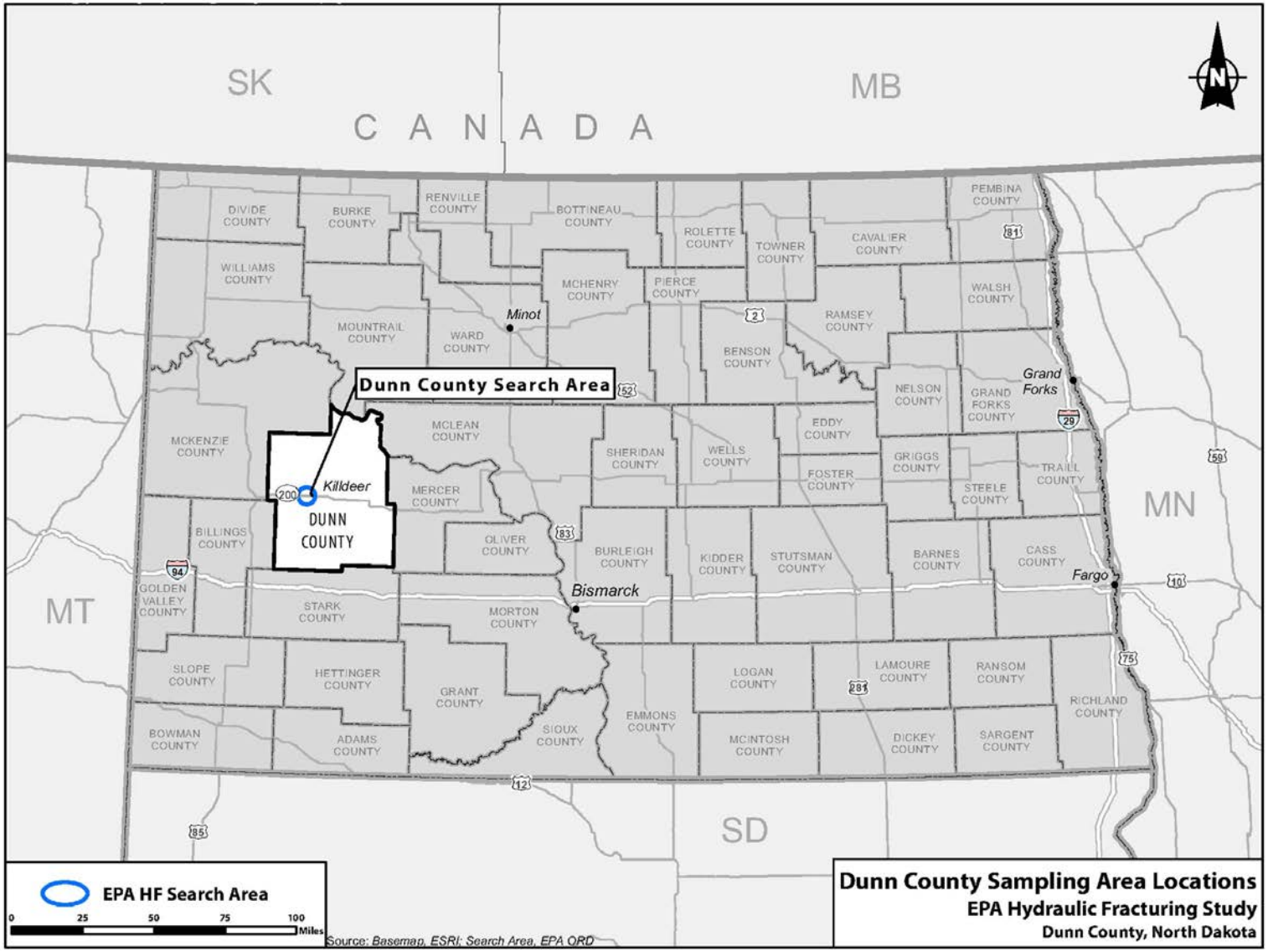

Figure 1. Killdeer retrospective case study location.

This report presents the Killdeer case study data and a discussion of the results. The following sections of this report provide the purpose and scope of this case study; an overview of the case study site background; study methods; historical water quality data; analysis of the study sample data; discussion of site-specific focus areas; and a summary of the case study findings.

Table 1. Hydraulic fracturing chemicals used for hydraulic fracturing of the Franchuk 44-20 SWH well. (Helms, 2010).

Chemical Name	CAS Number	Active Ingredient Concentration - %	Hydraulic Fracturing Fluid Concentration, µg/L
2-Ethylhexanol	104-76-7	5	46.67
Acetic acid	64-19-7	60	109.58
Acrylamide	79-06-1	0.025	0.05
Sodium 2-Acrylamide	38193-60-1	27.6	50.41
Alcohols, C10-16, ethoxylated	68002-97-1	1.8	3.29
Alkyl dimethyl benzyl ammonium chloride (C12-18)	68391-01-5	6.25	3.70
Alkyl dimethyl ethylbenzyl ammonium chloride (68% C12, 32%C14)	85409-23-0	6.25	3.70
Amine phosphonate 1	Proprietary (ammonia salt of CAS Number 34690-00-1)	25	29.63
Benzene, 1-1'-oxybis-,tetrapropylene derivatives, sulfonated (Calfax DBA-70)	119345-03-8	7.5	70.01
Boric oxide	1303-86-2	10	560.07
Canola oil		20	1,120.13
Colemanite	1318-33-8	50	4,772.73
Diethylenetriamine	111-40-0	1.5	14.00
Diethylenetriamine alkylbenzene sulfate	40139-72-8	22	205.36
Dihexamethylenetriaminepentakis (methylene phosphonic acid) [a.k.a. - amine phosphonate]	34690-00-1	24	28.45
Disodium ethylenediaminetetraacetate	38011-25-5	1.5	84.01
Dowicil 75	4080-31-3	0.5	47.73
Emulsion breaker	29316-47-0	3	28.00
Emulsion breaker	153795-76-7	1.5	14.00
Emulsion breaker	68036-95-3	1.5	14.00
Emulsion breaker	30704-64-4	1.5	14.00
Ethanol	64-17-5	0.8	0.47
Ethoxylated nonyl phenol	9016-45-9	5	280.03
Ethoxylated sorbitan monostearate	9005-67-8	0.847	1.55

Table 1. Hydraulic fracturing chemicals used for hydraulic fracturing of the Franchuk 44-20 SWH well. (Helms, 2010).

Chemical Name	CAS Number	Active Ingredient Concentration - %	Hydraulic Fracturing Fluid Concentration, µg/L
Formaldehyde	50-00-0	0.04	0.05
Glutaraldehyde	111-30-8	25	14.82
Heavy aromatic solvent naphtha	64742-94-5	5	46.67
Hydrochloric acid	7647-01-0	2	2.37
Hydroxypropyl guar	39421-75-5	60	21,363.64
Isopropyl alcohol (Isopropanol)	67-63-0	36.5	340.71
Low odor paraffin solvent	64742-47-8	23.3	42.55
Methanol	67-56-1	16	18.96
Mineral oil	64742-46-7(or 8)	70	3,920.46
Naphthalene	91-20-3	1	9.33
Organophyllic clay	68953-58-2	3	168.02
Petroleum distillate blend	64741-84-1	60	21,363.64
Phosphoric acid	7664-38-2	0.5	0.59
Potassium carbonate	584-08-7	40	2,240.26
Potassium hydroxide	1310-58-3	13	728.08
Propylene carbonate	108-32-7	1	56.01
Sodium chloride	7647-14-5	3.98	7.27
Sodium glycolate	2836-32-0	5	280.03
Sodium hydroxide	1310-73-2	1.5	84.01
Sodium tetraborate pentahydrate	12179-04-3	5	280.03
Sorbitan monooleate	1338-43-8	1.05	1.92
Tert-butyl hydroperoxide	75-91-2	100	684.52
Tetramethylammonium chloride	75-57-0	50	466.72
Tetrasodium ethylenediaminetetraacetate	64-02-8	60	3,360.39
Tetrasodium ethylenediaminetetraacetate	64-02-8	0.014	0.03
triethanolamine hydrochloride	637-39-8	4.62	2.74
Trisodium ethylenediaminetetraacetate	19019-43-3	1.5	84.01
Trisodium nitrilotriacetate	5064-31-3	1.5	84.01
Xanthan gum	(various CAS #s listed)	1	95.45

2. Purpose and Scope

As a component of EPA's National Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (US EPA, 2012), five retrospective case studies were conducted to investigate reported instances of drinking water resource contamination in areas of natural gas development and use of hydraulic fracturing technology. These studies were intended to inform primary research questions related to the hydraulic fracturing water cycle (US EPA, 2012).

This report presents the results of the retrospective case study conducted near the city of Killdeer, in Dunn County, North Dakota. This report also describes the changes in general water quality, geochemistry, and isotopic parameters of shallow ground water in the Killdeer aquifer that may have resulted from the blowout that occurred in the Franchuk 44-20 SWH well. This study is focused on the September, 2010 blowout event that occurred during the fifth stage of a 23-stage hydraulic fracture of the Franchuk well. Water quality results are used to evaluate the potential impacts on drinking water resources, if any, from various land use activities not restricted to shale-oil drilling and production because pre-development water quality information at the Franchuk well pad was available. The evaluation of potential impacts includes consideration of the chemicals used in hydraulic fracturing of the Franchuk well, and analyses of dissolved gases, deep brine geochemistry in relation to shallow ground water geochemistry, historical ground water quality for the Killdeer aquifer in Dunn County, and time-dependent geochemical trends. Potential causes of water quality impairment that were evaluated include: industrial/commercial land use; historical land use (e.g., farming); current drilling processes/practices; historical drilling practices; and naturally occurring sources of contamination.

This report presents analytical data for water samples from the Killdeer site representing domestic wells, water supply wells, municipal wells, and monitoring wells sampled at least twice during three rounds spanning 15 months (July 2011, October 2011, and October 2012). The water samples were analyzed for up to 230 constituents, including organic compounds, nutrients, major anions, major cations, trace elements, dissolved gases, and selected isotopes. Ground water quality data and summary statistics are presented for sampled constituents. In addition to chemical data collected specifically for this study, the report includes analysis of historical data from the USGS NWIS database, the North Dakota State Water Commission (NDWC) database, and from Klausing (1976) for the Killdeer aquifer in Dunn County.

Each of the retrospective case study sites differs in geologic and hydrologic characteristics; however, generally similar research approaches were followed at each case study location to assess potential drinking water impacts. The scope of this study includes: sampling and analysis of water wells, literature review of background geology and hydrology; selection of sampling locations and the development of a site-specific quality assurance project plan (QAPP); sampling and analysis of water wells; analysis of historical background data and evaluation of new results against background data; statistical and geochemical evaluation of water quality data; evaluation of impacts observed with specific sources of contamination, and further refinement of relationships between the sources of contamination and the observed impacts on water quality.

3. Study Area Background

3.1. Geology

Dunn County is situated on the Missouri Slope Uplands of the Great Plains Province. The eastern portion of Dunn County shows evidence of glaciation, while the western third does not. The Missouri Slope Uplands are characterized by gently rolling hills interrupted by isolated buttes (topographic highs with flat tops and steep sides). In the northern part of the county, the Missouri Slope is interrupted by the Little Missouri River Badlands. The Killdeer Mountains (composed of two large mesas) are a major geographic feature within the county. The mesas rise approximately 700 feet (ft) above the surrounding topography, with the highest point in the county located on South Killdeer Mountain (3,281 feet) (Murphy, 2001).

Figure 2 presents a stratigraphic column of Dunn County. The geology of Dunn County consists of thick sequences of Paleozoic (250 to 540 million years old), Mesozoic (65 to 250 million years old), and Cenozoic (0 to 65 million years old) rocks, which have accumulated in the Williston basin. The beds dip slightly to the north-northwest into the center of the basin. The estimated top of the Precambrian crystalline rocks is between 11,000 and 13,400 feet below sea level in Dunn County (Heck, 1988; Murphy, 2001; Heck et al., 2013).

Approximately 7,500 feet of Paleozoic rocks underlie Dunn County (Murphy, 2001). The Paleozoic sequence in North Dakota is predominantly carbonate rocks, although clastic rock formations occur at both the beginning and end of this time period.

Mesozoic rocks in North Dakota are primarily marine shales, with non-marine deposits at the base (Inyan Kara Formation) and at the top (Hell Creek Formation) of this interval (see Figure 2). In Dunn County, the Mesozoic rocks are approximately 5,400 feet thick (Carlson and Anderson, 1966; Murphy, 2001). In North Dakota, the Cretaceous rocks are split into three stratigraphic groups: Dakota, Colorado, and Montana (Murphy, 2001).

Cenozoic rocks in Dunn County include the Fort Union Group (Ludlow, Cannonball, Slope, Tongue River, and Sentinel Butte formations) and the Golden Valley, White River, and Arikaree formations (Figure 2). The Fort Union Group is approximately 100 feet thick and is made up of the non-marine Ludlow Formation, which comprises alternating beds of sandstone, siltstone, claystone, mudstone, and lignite (soft coal). The Ludlow Formation is overlain by the Slope Formation in the Little Missouri River Valley and the marine Cannonball Formation in the Missouri River Valley (Murphy, 2001).

The Sentinel Butte formation is present at the surface in at least 75 % of the county and is the oldest strata exposed in the county. The Sentinel Butte Formation consists of alternating beds of sandstone, siltstone, mudstone, claystone, and lignite. Several thick coal beds are present in the Sentinel Butte Formation in Dunn County. At least one of these coals, the Dunn Center bed, has been considered for possible mining (Murphy, 2001).

Soils in Dunn County primarily consist of tertiary alluvial and glacial deposits. The deposits generally consist of clay, silt, sand, and gravel derived from local bedrock (USDA, 2013). These properties give an indication of the movement of water and other parameters from the surface to underlying aquifers and the surface runoff potential, which is important because the Franchuk well blowout created a surface

Era	System	Group	Formation	Dominant Lithology
Cenozoic	Quaternary		Alluvium, Colluvium, and Lacustrine	Sand, Clay, and Gravel
			Coleharbor	Sand, Silt, Clay, Till and Gravel
	Tertiary		Arikaree	Tuffaceous Siltstone and Carbonate
			White River	Conglomerate, Sand, Silt and Clay
			Golden Valley	Silt, Clay, Sand and Lignite
		Fort Union	Sentinel Butte	Silt, Clay, Sand and Lignite
			Tongue River	Silt, Clay, Sand and Lignite
			Slope	Silt, Clay, Sand and Lignite
			Cannonball	Mudstone and Sandstone
			Ludlow	Silt, Clay, Sand and Lignite
Mesozoic	Cretaceous	Montana Group	Hell Creek	Clay, Sandstone and Shale
			Fox Hills	Sandstone and Shale
			Pierre	Shale
		Colorado Group	Niobrara	Shale, Calcareous
			Carlile	Shale
			Greenhorn	Shale, Calcareous
			Belle Fourche	Shale
		Dakota Group	Mowry	Shale
			Newcastle	Sandstone
			Skull Creek	Shale
			Inyan Kara	Sandstone and Shale
	Jurassic		Swift	Mudstone
			Rierdon	Shale and Sandstone
			Piper	Limestone, Shale and Anhydrite
	Triassic		Spearfish	Siltstone and Salt
			Minnekahta	Limestone
Paleozoic	Permian		Opeche	Shale and Limestone
		Minnelusa Group	Broom Creek	Sandstone and Dolomite
	Pennsylvanian		Amsden	Dolomite, Sandstone and Shale
			Tyler	Mudstone and Sandstone
	Mississippian		Madison	Limestone and Anhydrite
			Bakken	Shale and Siltstone
	Devonian		Three Forks	Shale, Siltstone and Dolomite
			Birdbear	Dolomite
			Duperow	Interbedded Dolomite and Limestone
			Souris River	Interbedded Dolomite and Limestone
			Dawson Bay	Dolomite and Limestone
			Prairie	Limestone and Anhydrite
			Winnipegosis	Limestone and Dolomite
	Silurian		Interlake	Dolomite
	Ordovician		Stonewall	Dolomite
			Stony Mountain	Argillaceous Limestone
			Red River	Limestone and Dolomite
		Winnipeg Group	Roughlock	Calcareous Shale and Siltstone
			Icebox	Shale
			Black Island	Sandstone
	Cambrian		Deadwood	Limestone, Shale and Sandstone
	Precambrian Rocks			

Figure 2. Stratigraphic column for Dunn County, North Dakota. (Modified from Murphy, 2001).

spill. The possibility that the spilled fluid leached is an important potential pathway of contamination to reach the Killdeer aquifer.

Figure 3 presents a soil survey map of the soil types near the Franchuk well pad. Twelve different soil series are present near the well pad (USDA, 2013), and these 12 soil series, alone or mixed, represent the 18 soil types located near the Franchuk well. Table 2 lists these soils and selected soil properties (USDA, 2013). The Franchuk well pad is situated on the Velva fine sandy loam (see Figure 3). Based on the properties listed in Table 2, it is expected that a fluid spilled at the soil surface would likely infiltrate through the vadose zone and into the Killdeer aquifer.

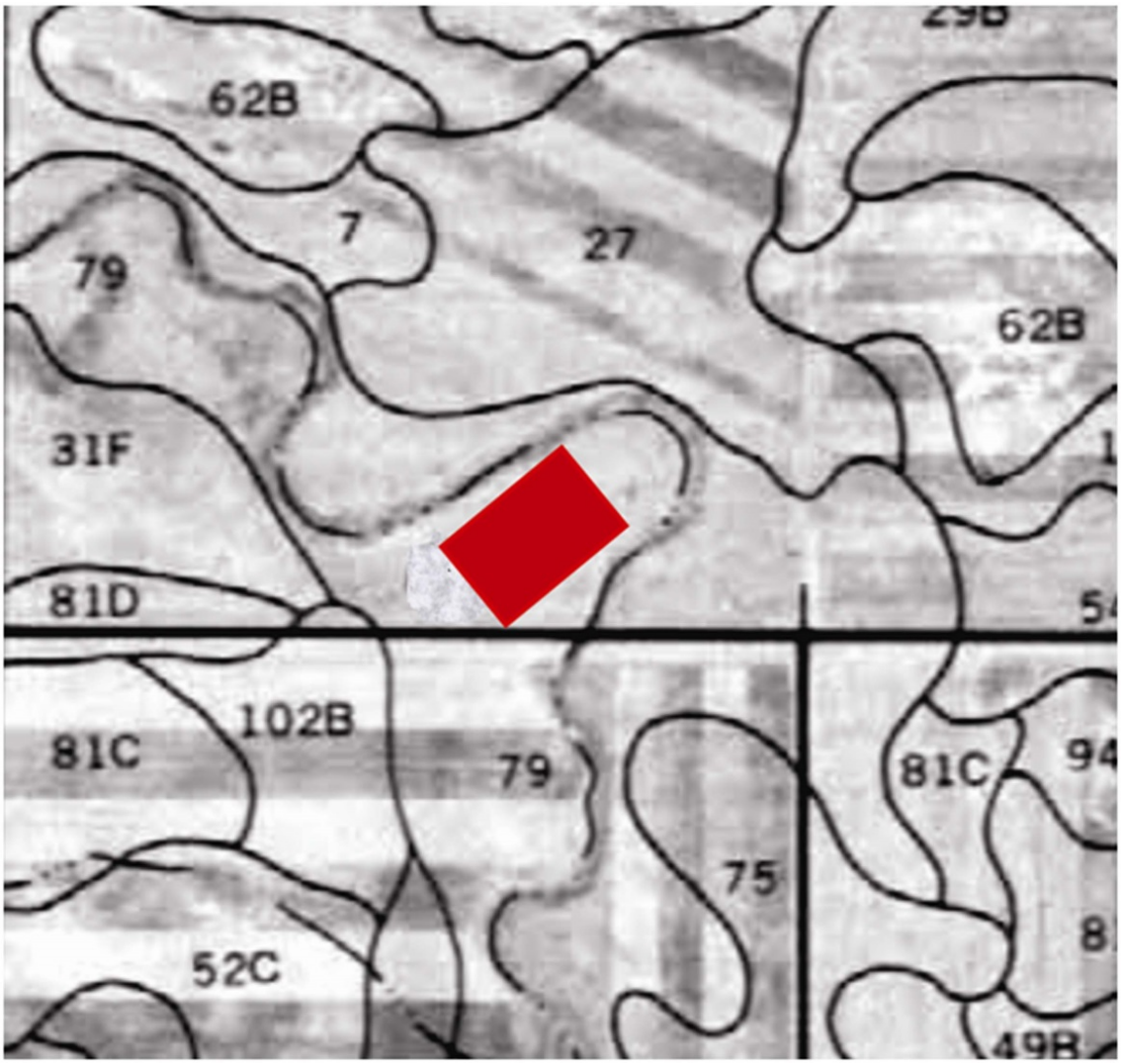

Figure 3. Map of the soil types in the vicinity of the Franchuk 44-20 SWH well pad. The red rectangle is the approximate location of the well pad. See Table 2 for key to the soil names and information. (Modified from USDA, 2013).

Table 2. Soil types and selected properties. (USDA, 2013).

Soil Name	Composition	Map Symbol[1]	Drainage	Permeability[2]	Surface Runoff
Belfield-Farland silt loam	50% Belfield and 40% Farland Series soils	15	Well-drained	Slow to moderate	Slow
Belfield-Grail silty clay loam	45% Belfield and 40% Grail Series soils	18	Well-drained	Slow	Slow
Cohagen-Vebar fine sandy loam 9-25% slope	45% Cohagen and 40% Vebar Series soils	30E	Excessively to moderately well-drained	Moderately rapid	Rapid
Cohagen-Vebar-rock outcrop complex	45% Cohagen, and 30% Vebar Series soils; and 15% rock outcrop	31F	Excessively to well-drained	Moderately rapid	Rapid
Daglum silt loam	Daglum Series soil	106B	Moderately well-drained	Very slow	Slow
Farland silt loam	Frland Series soil	27	Well-drained	Moderate	Slow
Farland-Rhoades silt loam	60% Farland and 25% Rhoades Series soils	29B	Well-drained to moderately well-drained	Moderate	Medium
Morton silt loam 3-6% slope	Morton Series Soil	49B	Well-drained	Moderate	Medium
Morton-Rhoades silt loam	55% Morton and 50% Rhoades Series soils	52C	Well-drained to moderately well-drained	Moderate to very slow	Medium
Parshall fine sandy loam	Parshall Series soil	54B	Well-drained	Moderately rapid	Slow
Rhoades Silt loam	Rhoades Series soil	62B	Moderately well- drained	Very slow	Slow
Shambo loam 3-6% slopes	Shambo	102B	Well-drained	Moderate	Medium
Straw loam channeled	Straw Series soil	3	Well-drained	Moderate	Slow
Straw-Rhoades silt loam	60% Straw and 30% Rhoades Series soils	7	Well-drained to moderately well-drained	Moderate	Slow to very slow
Vebar fine sandy loam	Vebar Series soil	81D	Well-drained	Moderately rapid	Slow
Vebar-Parshall fine sandy loam 1-6% slope	45% Vebar and 40% Parshall Series soils	81B	Well-drained	Moderately rapid	Slow

Table 2. Soil types and selected properties. (USDA, 2013).

Soil Name	Composition	Map Symbol[1]	Drainage	Permeability[2]	Surface Runoff
Vebar-Parshall fine sandy loam 6-9% slope	60% Vebar and 20% Parshall Series soils	81C	Well-drained	Moderately rapid	Medium
Velva fine sandy loam	Velva Series soil	79	Well-drained	Moderately rapid	Slow
Wayden silty clay	Wayden Series soil	94E	Well-drained	Slow	Slow

Data Source: USDA (2013)

[1] Corresponds to Figure 3 in this report

[2] Permeability: very slow = <0.06 inches/hr, slow = 0.06 to 0.20 inches/hr, moderately slow = 0.2 to 0.6 inches/hr, moderate = 0.6 to 2.0 inches/hr, moderately rapid = 2.0 to 6.0 inches/hr, rapid = 6.0 to 20 inches/hr, and very rapid = >20 inches/hr.

3.2. Hydrology

Background information on the hydrology of Dunn County is summarized from Klausing (1976). Numerous rivers, streams, and creeks flow through the county. Spring Creek and the Little Missouri, Knife, and Green rivers are the primary rivers in the county (Klausing, 1976). The Missouri and Little Missouri rivers drain the northern portion of the county; Spring Creek drains the central portion; and the Little Knife, Knife, and Green rivers drain the southern portion of the county (Murphy, 2001). Most rural areas and the cities of Halliday and Killdeer get their water from private and public wells from the Killdeer Aquifer (Klausing, 1976).

Aquifers in Dunn County are found in rocks that were deposited before glaciation and within areas of glacial deposits. Glacial deposits in Dunn County consist of till and glaciofluvial sand and gravel. The primary aquifers lie within sand and gravel deposits that are confined to glacial melt-water channels and include the Killdeer, Horse Nose Butte, Knife River, and Goodman Creek aquifers. In addition to aquifers located in glacial deposits, other aquifers in consolidated deposits include the Fox Hills, Hell Creek, Cannonball, Ludlow, Tongue River, and Sentinel Butte Formations (Klausing, 1976). The Killdeer aquifer is of particularly importance in this study because it directly underlies the Franchuk 44-20 SWH well pad and because nearby water wells are completed within the Killdeer aquifer. The Killdeer aquifer underlying the well pad is unconfined to semi-confined.

The Killdeer aquifer occupies an area of about 74 square miles (mi^2) in Dunn County (see Figures 4 and 5). The aquifer is composed predominantly of fine to medium sand and is generally overlain by clay and silt soils (Klausing, 1976). Several test holes indicate that fine to coarse gravel occurs near the base. The maximum thickness of the aquifer is 233 feet, and the mean thickness is 80 feet. During the study, the depth to water ranged from 19.8 to 33.6 feet below ground surface (bgs).

The aquifer is recharged by infiltration of precipitation. Water levels in the aquifer range from about 0.3 feet (0.09 meters) below ground surface to about 37 feet (11 meters) below ground surface. Seasonal fluctuations in the water table range from about 1 foot (0.3 meters) to a maximum of about 7 feet (2 meters). The minimum seasonal fluctuations occur in a confined portion of the aquifer, whereas the maximum fluctuations occur in an unconfined portion (Klausing, 1976).

In general, the water is hard and consists of either a sodium-bicarbonate type or a sodium-sulfate type. Water obtained from the northern portion of the aquifer is of better quality than water obtained from the southern portion. Total dissolved solids (TDS) in the northern portion rarely exceed 1,100 milligrams per liter (mg/L), but TDS commonly exceed 2,000 mg/L in the southern portion of the aquifer (Klausing, 1976).

According to information provided by Terracon (the contractor to Denbury Onshore, LLC) to the North Dakota Department of Water Quality (NDDWQ), the ground water flow direction is to the southwest and has a relatively uniform gradient of 0.0009 to 0.0008 ft/ft. Given the shallow gradients (determined at the site), ground water flow direction and gradient could vary seasonally depending on precipitation and water usage. The North Dakota State Water Commission stated that the ground water flow within the Killdeer aquifer is < 1 ft /year (Helms, 2010).

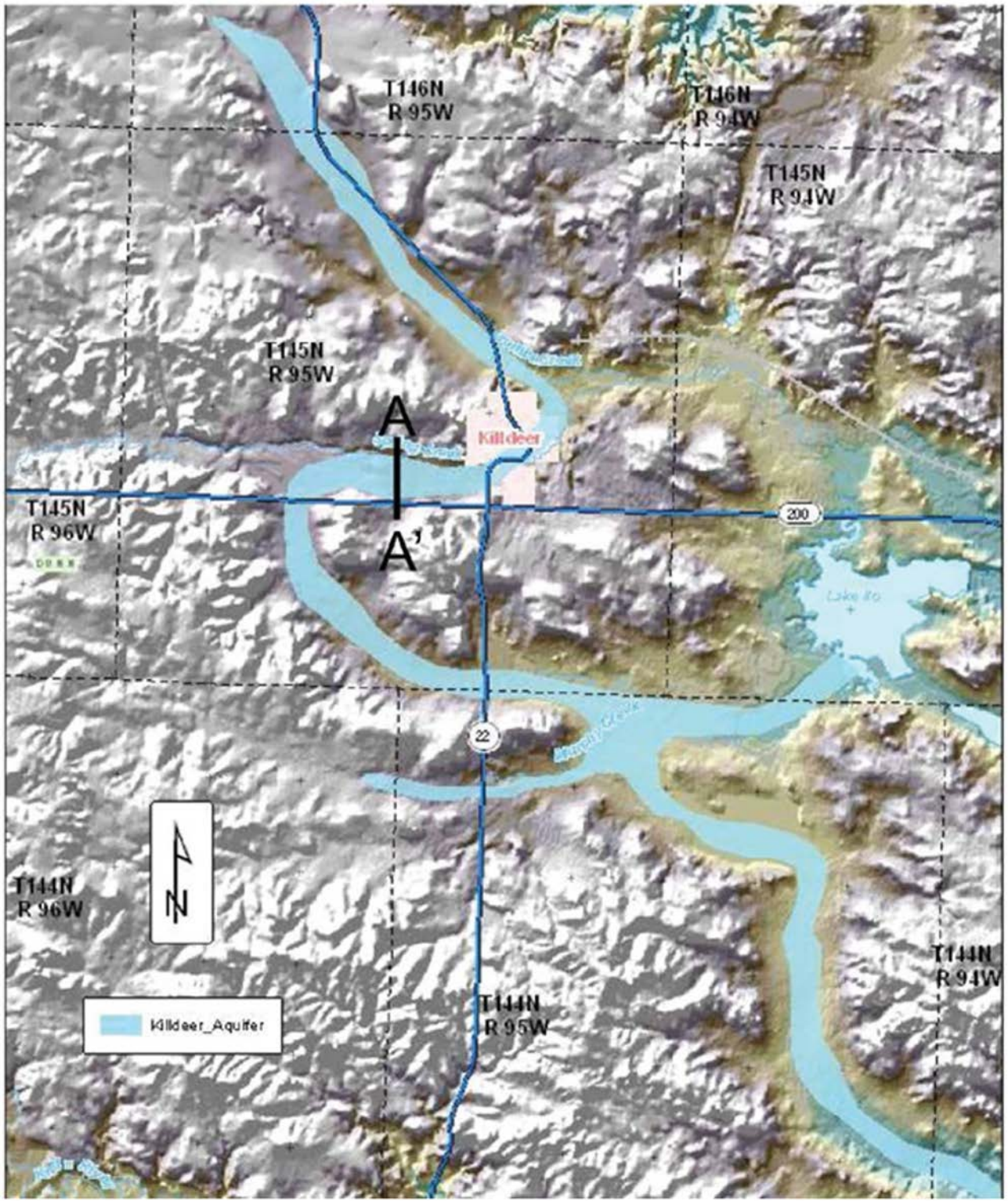

Figure 4. A map showing the Killdeer aquifer, Dunn County, North Dakota. Cross section From A to A' is shown in Figure 5. (Source: Shaver, 2009).

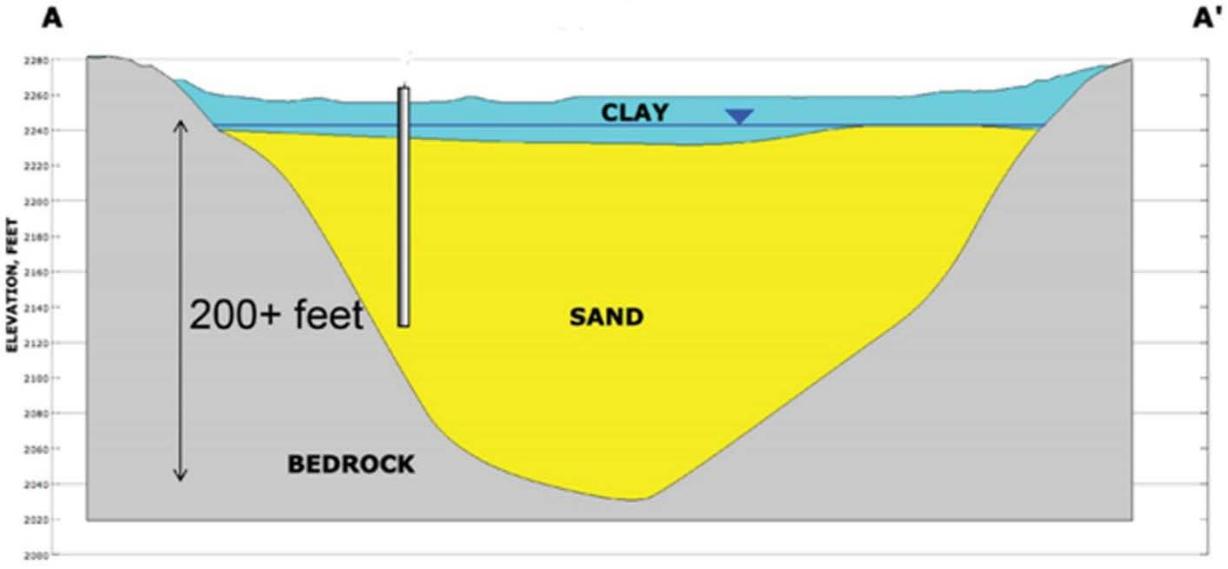

Figure 5. Generalized cross section of the Killdeer aquifer along the line A to A' in Figure 4. (Source: Shaver, 2009).

The Sentinel Butte aquifers consist of poorly consolidated sandstone and fractured lignite. The sandstone aquifers within the Sentinel Butte formation are generally sandstone with clay and silt. Thicknesses range up to 119 feet. Transmissivities from three tests from lignite zones in the Sentinel Butte Formation ranged from 920 to 49 square feet per day (ft^2/day). The lignite aquifers are randomly spaced throughout the formation and range in thickness from 1 to 20 ft. Wells generally yield 1 to 200 gallons per minute (g/min), but not all lignite beds will yield water. Water from both aquifer zones is generally a hard to very hard, sodium-bicarbonate type (Klausing, 1976).

3.3. Oil and Gas Production

The existence of hydrocarbons in North Dakota and the Williston Basin was known before 1900, and the area has a long history of hydrocarbon development (Heck et al., 2013). Natural gas was first reported in the 1890s from artesian wells in Cretaceous formations near Edgely, North Dakota (Heck et al., 2013). The Cedar Creek gas field was the oldest commercial hydrocarbon production field in North Dakota and first produced in 1929 (Heck et al., 2013). North Dakota, in 2013, ranked second in terms of oil production in the United States (USEIA, 2014).

In Dunn County, oil and gas production began in 1959 and is produced primarily from 18 oil fields (Murphy, 2001). Until 1999, production was from the Mission Canyon Formation (Lower Mississippian age) in the Little Knife field, which produced more than 49 million barrels (bbls) of oil (Murphy, 2001). Between 1990 and 2006, oil production rates ranged from 60,000 to 160,000 bbls per month from approximately 100 wells (Battelle, 2013). From 1990 to 2005, natural gas production in Dunn County ranged from 4,000,000 to 5,000,000 thousand cubic feet (MCF) per month. When horizontal drilling began in 2005, this volume increased exponentially, reaching more than 13,000,000 MCF per month by 2011 (Battelle, 2013). Approximately 1,095 conventional oil and gas wells are completed in Dunn County; some uncertainty is associated with this number because of incomplete historical records (Battelle, 2013). Today, the Madison and Bakken Formations account for most of the oil and gas production in Dunn County (Figure 6; Battelle, 2013).

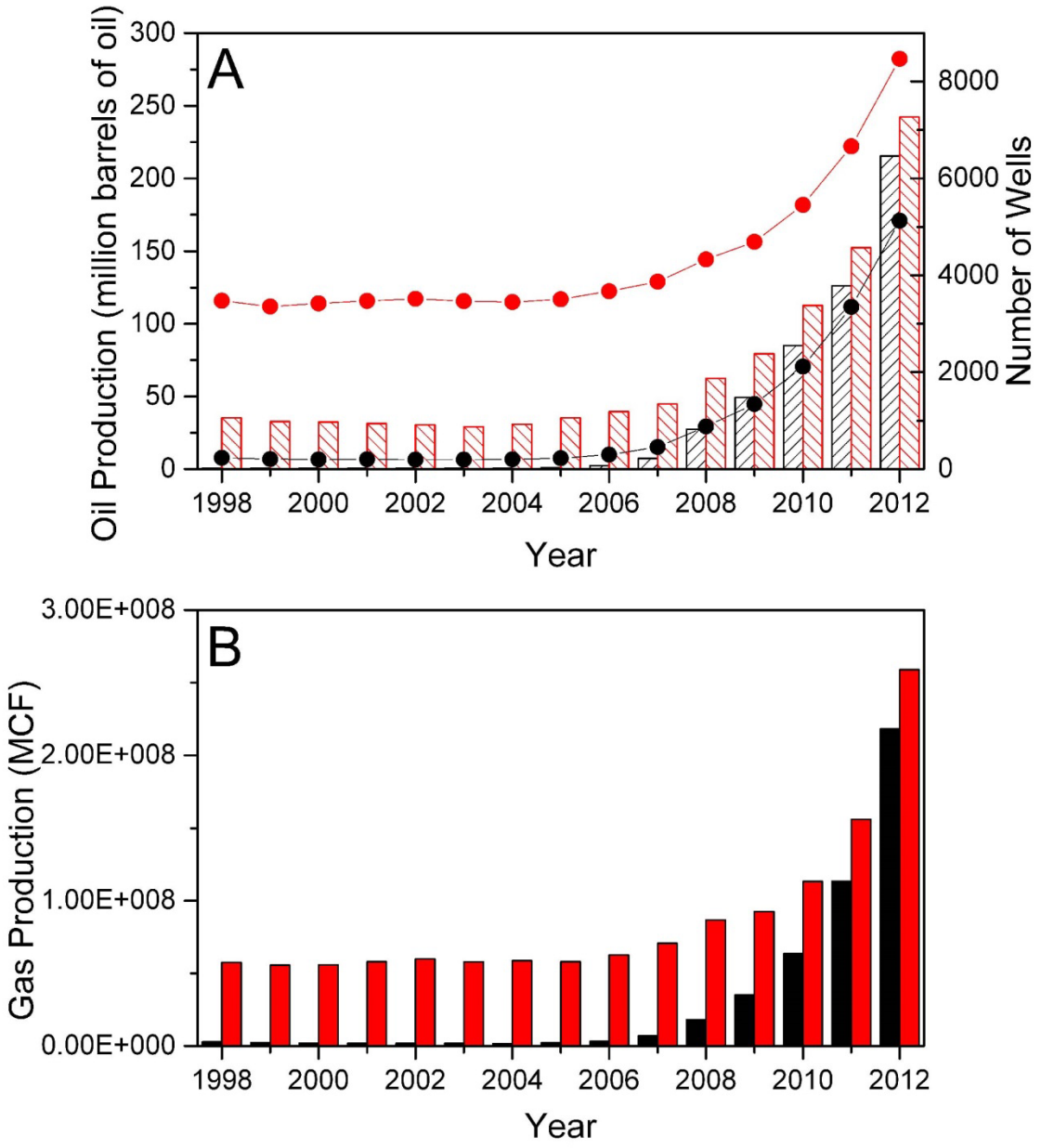

Figure 6. Oil and gas production in North Dakota from 1998 through 2012. (A) Oil Production and (B) Gas Production. Red bars = total production from all producing formations, black bars = Bakken formation, red lines and circles = total wells, black lines and circles = Bakken wells. (Source NDIC, 2013a).

3.4. Land Use

Dunn County is a sparsely populated (population of 3,967), rural county in North Dakota (U.S. Census Bureau, 2012) and covers approximately 2,082 square miles (mi^2) (U.S. Census Bureau, 2012). Unlike other counties in North Dakota, Dunn County has both prairie and badland areas, as well as the Killdeer Mountains in the northwest portion of the county (Dunn County, 2012). Until recently, the county's economy depended on ranching, farming, and recreational activities (City of Killdeer, 2013). Recently, gas and oil production has increased dramatically in scale and importance (Dunn County, 2012).

Although Dunn County experienced a short-lived oil boom in 1976, oil production increased rapidly in the county beginning in 2006 because of the new hydraulic fracturing-based exploitation of oil reserves in the Bakken Shale (NDIC, 2013).

Land uses in Dunn County are depicted on Figure 7. The land use map was created using data from the National Land Cover Database (NLCD) for Dunn County for 1992 and 2006. Table 3 presents a summary of these data (USGS, 2012a). The NLCD is based on 30-meter resolution data from the Landsat satellite, and the dataset for 2006 was the most recent one available.

Table 3. Land use in Dunn County in 1992 and 2006. (USGS, 2012a).

Land Use	1992		2006	
	Square Miles	**% of Total**	**Square Miles**	**% of Total**
Grassland/herbaceous	1,089	52.3	1,223	58.7
Row/cultivated crops	390	18.7	432	20.7
Shrub/scrub	238	11.4	44.2	2.1
Fallow	219	10.5	0.0	0.0
Open water	57.6	2.8	53.4	2.6
Pasture/hay	57.4	2.8	86.2	4.1
Barren	18.2	0.9	23.6	1.1
Emergent herbaceous wetlands	5.3	0.3	16.9	0.8
Developed	4.2	0.2	36.1	1.7
Woody wetlands	1.8	0.1	13.3	0.6
Deciduous forest	0.7	0.0	137	6.6
Transitional	0.5	0.0	0.0	0.0
Urban/recreational grass	0.1	0.0	0.0	0.0
Evergreen forest	0.0	0.0	9.3	0.4
Mixed forest	0.0	0.0	7.2	0.3
Total	**2,082**	**100.0**	**2,082**	**99.7**

Although the data for land use in the two years are not comparable due to changes in input data and mapping methodologies (Multi-Resolution Land Characteristics Consortium, 2013), the NLCD data indicate that, in both years, grassland/herbaceous land and row/cultivated crop land (i.e., land suitable for grazing or used for growing crops) were the largest land use categories in the county. Additional analyses of land use and land use changes, with particular focus on the area adjacent to the sampling locations of this study, are presented in Appendix C.

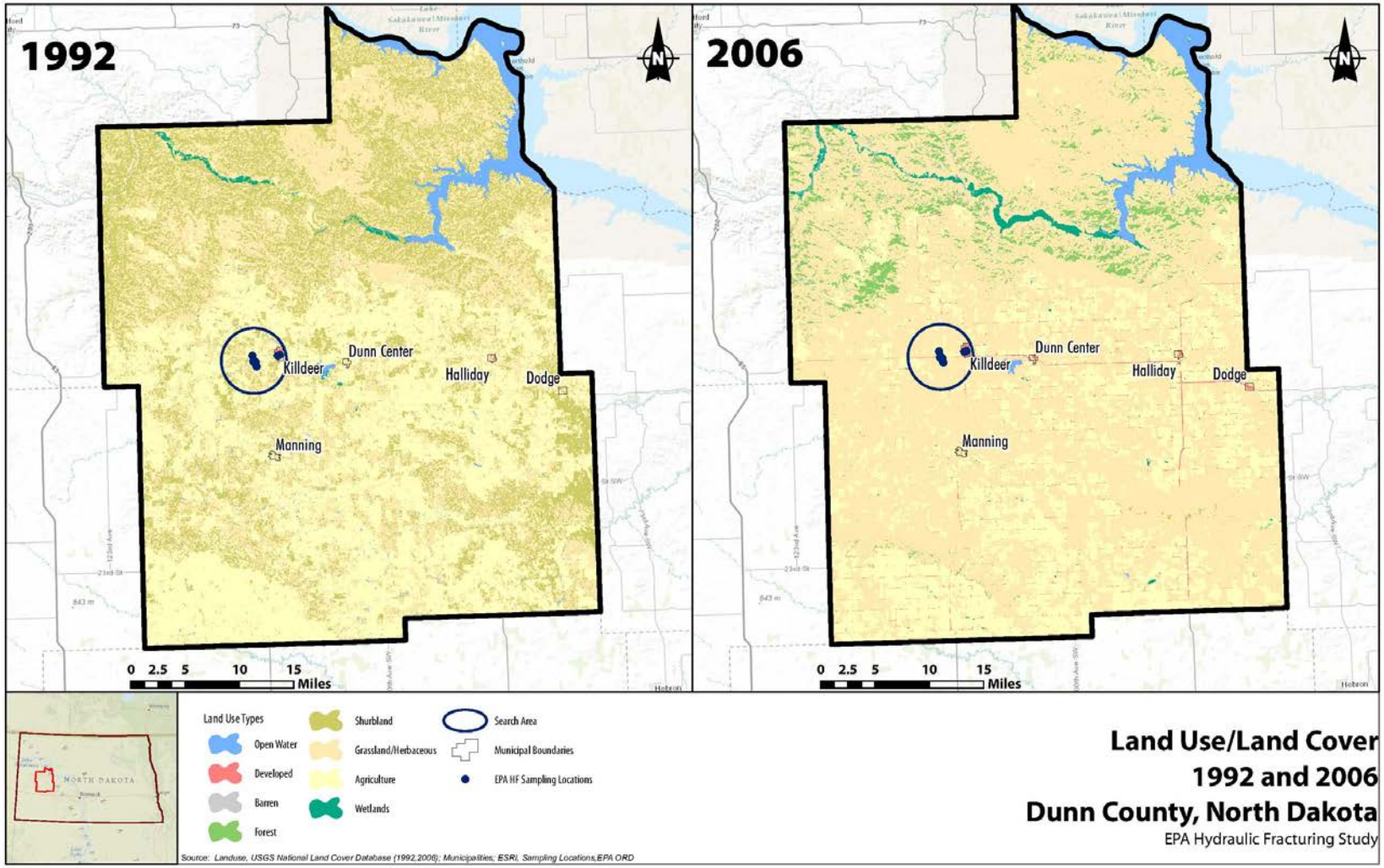

Figure 7. Land use in Dunn County, North Dakota, in 1992 and 2006. Search area represents a 3-mile radius from the Franchuk 44-20 SHW well.

3.5. Other Contaminant Sources

Once an impact on water quality was determined, a consistent approach was adopted for evaluating potential contaminant sources in order to help determine whether hydraulic fracturing was the cause or one of the causes of alleged impacts on water quality.

To determine whether any potential sources of contamination unrelated to hydraulic fracturing activities may have impacted ground water and surface water in the study area, a detailed background assessment, including a search of relevant databases/information sources listed below, was conducted. The detailed findings of this background assessment and search are provided in Appendix C.

The following databases and information sources were considered in the evaluation of alternative contaminant sources:

- Environmental Records Search: Environmental records searches were performed by obtaining environmental record reports from Environmental Data Resources, Inc. (EDR). EDR provides a service for searching publically available databases and provides data from their own proprietary databases.
- Well Inventory: Existing oil and gas well inventories were prepared on the same search areas used for the EDR reports using the North Dakota Department of Mineral Resources Division of Oil and Gas database.
- State Record Summary: The North Dakota Department of Mineral Resources Division of Oil and Gas database was used to find up-to-date well records for the study areas.

The evaluation of other contaminant sources in the study area considered all potential contaminant sources that could contribute to any detected levels of surface and/or ground water contamination. To conduct an effective evaluation, all hypothesized causes of an environmental impairment needed to be "sufficiently credible" (US EPA, 2000a) to be included in the analysis. Candidate alternative contaminant sources were categorized as follows: industrial/commercial land use; historical land use (e.g., farming and mining); historical drilling practices; and naturally occurring sources.

Based on the review of the environmental records search, nine potential sources of contamination were identified. Eight of the nine sources were USTs where leaks have occurred or potentially occurred. The other was an automotive service station where there may have been unreported releases of automotive fluids. All these locations were within 0.5 miles of NDGW16. In addition, oil and gas well inventories were obtained. This revealed that 35 oil and gas wells were within a 3-mile radius of the Franchuk well and seven well were within a 1-mile radius of the well. A state record search did not identify any notices of violations for any of these wells.

A report produced by Battelle (2013) stated that the most significant causes of water quality impacts in Dunn County were agriculture; oil and gas activities; wastewater discharges; industrial, manufacturing and commercial activities; and other nonpoint sources. In Dunn County, agriculture comprises a significant portion of the economy and land use, with approximately 1,800 square miles dedicated to this activity (Battelle, 2013). Agricultural impacts on ground water include nutrients, pathogens, herbicides, insecticides, fungicides, and fertilizers (Battelle, 2013). Battelle (2013) also suggests that oil and gas activities are potential sources of impacts on ground water. The oil and gas activities cited

include conventional and unconventional oil and gas development and saltwater disposal wells (Battelle, 2013). In the Battelle report (2013), wastewater discharges included centralized waste water treatment facilities, septic systems, cesspools, and permitted direct discharges to surface water. According to Batelle, these types of discharges could potentially cause impacts to ground water quality by discharging pathogens, household and industrial chemicals, suspended solids, increased biochemical oxygen demand, and nutrients (Battelle, 2013). Battelle (2013) also discussed industrial, manufacturing, and commercial activities and reported that these were primarily construction, transportation, and repair and maintenance activities (leaking USTs fall into this category). Metals, acids, caustics, cyanides, polychlorinated biphenyls, poly aromatic hydrocarbons, chlorinated solvents, petroleum hydrocarbons, BTEX (benzene, toluene, ethylbenzene, and xylenes) compounds, and oxygenates were the contaminants of concern that could potentially impact ground water in Dunn County (Battelle, 2013). A final category discussed in Battelle (2013) was nonpoint sources, which included storm water runoff (urban, residential, and roads) and sewer overflows. They listed the following contaminants from nonpoint sources that could potentially impact ground water quality: suspended solids, metals, nutrients, organic compounds, pathogens, and volatile organic compounds (VOCs) (Battelle, 2013). It is important to note that for ground water impairments, they did not distinguish data based on which aquifer the water quality impairment was in or impairments near the Franchuk well pad. Although Battelle reported ground water contamination, there is uncertainty about its applicability to this study, which focuses on the Killdeer aquifer and the localized extent of the Killdeer aquifer being investigated.

4. Study Methods

This section describes the methods used in this study for the collection of water samples, sample analysis, quality assurance/quality control (QA/QC), data handling and analysis. The sampling history, parameters measured, and analytical methods used are summarized in Table 4. A more detailed description of the sampling methods, analytical methods, and QA/QC is presented in the Quality Assurance Project Plan (QAPP), *Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND* (Beak, 2013).

Table 4. Test methods used to analyze ground water samples.

Analyte	Laboratory	Method	Sampling Rounds
Dissolved Gases	Shaw- Ada[1]	RSKSOP-175v5 & 194v4	1, 2, 3
Metals (ICP-OES, dissolved and total)	Shaw- Ada[1]	EPA Method 200.7 (analysis) SW-846 Method 3015A (digestion)	1, 2
Metals (ICP-OES, dissolved and total)	EPA Region 7 contract lab (SWRI)	EPA Method 200.7 (analysis & digestion) EPA Method 7470A (Hg)	3
Metals (ICP-MS, dissolved and total)	EPA Region 7 contract lab (SWRI)	EPA Method 6020A (analysis) EPA Method 200.7 (digestion)	3
Anions (Chloride, Bromide, Sulfate, and Fluoride)	EPA- Ada[2]	SW-846 Method 6500	1, 2, 3
Bromide	EPA- Ada[2]	RSKSOP-214v5	2
Bromide	EPA- Ada[2]	SW-846 Method 6500	3
Iodide	EPA- Ada[2]	RSKSOP-223v2	3
Nitrate + Nitrite, and Ammonia	EPA- Ada[2]	EPA Method 350.1 and 353.1	1, 2, 3
DICs (Dissolved Inorganic Carbons)	EPA- Ada[2]	SW-846 Method 9060A	1, 2, 3
DOCs(Dissolved Organic Carbons)	EPA- Ada[2]	SW-486 Method 9060A	1, 2, 3
VOCs (Volatile Organic Compounds)	Shaw- Ada[1]	SW-846 Method 5021A and 8260C	1, 2, 3
Low Molecular Weight Acids	Shaw- Ada[1]	RSKSOP-112v6	1, 2, 3
SVOC (Semi-Volatile Organic Compounds)	EPA- Region 8[3]	SW-846 Method 8270D	1, 2, 3
DRO (Diesel Range Organics)	EPA- Region 8[3]	SW-846 Method 8015D	1, 2, 3
GRO (Gasoline Range Organics)	EPA- Region 8[3]	SW-846 Method 8015D	1, 2, 3
Glycols	EPA- Region 3[4]	Method in development[7]	1, 2
Glycols	EPA- Las Vegas[5]	Method in development[7]	3
$^{87}Sr/^{86}Sr$ Isotope analysis	USGS[6]	Thermal ionization mass spectrometry	2, 3
Acrylamide	EPA- Las Vegas[5]	Method in development[8]	2, 3

Table 4. Test methods used to analyze ground water samples.

Analyte	Laboratory	Method	Sampling Rounds
Alkylphenols, Ethoxylated Alcohols, Ethoxylated Alkylphenols	EPA- Las Vegas[5]	Method in development[9]	2, 3
O, H stable isotopes of water	Shaw- Ada[1]	RSKSOP296v1, RSKSOP-334v0	2, 3

[1] Shaw Environmental, Ada, Oklahoma.
[2] General Parameters Laboratory, EPA, Ground Water and Ecosystems Restoration Division, Ada, Oklahoma.
[3] EPA Region 8 Laboratory, Golden Colorado.
[4] EPA Region 3 Laboratory, Fort Meade, Maryland.
[5] EPA NERL Laboratory, Las Vegas, Nevada.
[6] USGS Denver, Colorado.
[7] Method based on ASTM D773-11.
[8] Method based on EPA Method 8032A and 8316.
[9] Method based on ASTM D7485-09 and USGS method O1433-01

4.1. Sampling Locations

Water quality samples were collected from three domestic wells, nine monitoring wells, one state well (used to monitor water levels in the Killdeer aquifer), one municipal well, and two water supply wells. Three sampling rounds occurred in July 2011, October 2011, and October 2012 (Table 4). Samples were analyzed for up to 230 constituents, including field parameters, major ions, nutrients, trace metals, VOCs and semi-volatile organic compounds (SVOCs), diesel-range organics (DRO), gasoline-range organics (GRO), glycol ethers (diethylene, triethylene, and tetraethylene glycol and 2-butoxyethanol), low-molecular-weight acids (lactate, formate, acetate, propionate, isobutyrate, and butyrate), alkylphenols, ethoxylated alcohols, ethoxylated alkylphenols, dissolved gases (methane, ethane, propane, and butane), and selected stable isotopes ($\delta^{18}O_{H2O}$, $\delta^{2}H_{H2O}$, and $^{87}Sr/^{86}Sr$; see Appendix B).

As noted above, the Killdeer aquifer underlies the Franchuk well pad. The Franchuk wells are located approximately 2.5 miles outside the wellhead protection zone of the City of Killdeer's municipal water supply wells. In addition, several domestic wells, farm wells, and supply wells for drilling and hydraulic fracturing are located approximately 0.5 miles downgradient of the Franchuk 44-20 well.

The geographic distribution of the Killdeer aquifer is shown on Figure 4. A geologic cross section of the aquifer near the Franchuk well is shown on Figure 5 (Shaver, 2009).

Nine monitoring wells were installed immediately after the spill in locations where contamination was suspected based on hydrogeologic conditions at the site and data collected by the North Dakota Industrial Commission (NDIC) and Terracon. Four ground water monitoring wells (NDGW01 through NDGW04) were installed by Terracon (contracted by the well operator, Denbury Resources, Inc.) in September 2010 to monitor for potential ground water contamination in the Killdeer aquifer. An additional five monitoring wells (NDGW05 through NDGW09) were installed at the site in April 2011, by Terracon. Wells NDGW05 and NDGW06 were placed upgradient and within 20 feet of the Franchuk wells. Wells NDGW07 through NDGW09 were placed similarly to wells NDGW05 and NDGW06, but downgradient of the Franchuk wells, and NDGW09 was nested with NDGW08. NDGW08 was screened in a shallower zone of the Killdeer aquifer, and NDGW09 was screened near the bottom of the Killdeer aquifer. The draft boring logs of the monitoring well locations, prepared by Terracon, identified fine to medium silty sand as the dominant aquifer material, with varying silt content. Some logs reported sandy clay or gravelly sand horizons. While drilling NDGW09, bedrock was encountered at 205 feet below

ground surface (bgs), coal was encountered from 205 to 207 feet bgs, and shale was encountered from 207 to 213 feet bgs, which suggests that this well may have actually penetrated into the Sentinel Butte aquifer. Wells NDGW01, NDGW02, NDGW03, NDGW05, and NDGW07 were completed to depths less than 50 feet bgs. NDGW04 was completed to a depth of 72 feet bgs, NDGW06 was completed to a depth of 70 feet bgs, NDGW08 was completed to a depth of 120 feet bgs, and NDGW09 was completed to a depth of 213 feet bgs. The length of the screened intervals for the monitoring wells ranged from 10 to 40 feet. Except for NDGW09, the depth to ground water in all monitoring wells is within a few feet of one another at approximately 30 feet bgs. The elevation of ground water in NDGW09 is consistently 10 feet higher than in the other monitoring wells. NDGW09 is screened in clay and bedrock, and a 1-foot-thick horizon of fine to medium sand is present in the clay.

These nine monitoring wells, along with three domestic wells, two water supply wells (used for drilling activities in the area), one state well, and one city of Killdeer municipal supply well, were part of the periodic sampling program. The sampling locations are identified in Table 5 and are shown on Figure 8. The domestic wells near the Franchuk 44-20 SWH well location were sampled via homeowner taps. According to the state, the domestic wells are screened in the Killdeer aquifer (NDWC, 2013).

Table 5. Sampling Locations.

Sample ID	State ID	Latitude	Longitude	Well Type
NDGW01	MW-1	47.359167 N	102.804722 W	Monitoring
NDGW02	MW-2	47.358056 N	102.805000 W	Monitoring
NDGW03	MW-3	47.358333 N	102.804167 W	Monitoring
NDGW04	MW-4	47.358056 N	102.805833 W	Monitoring
NDGW05	MW-5	47.358611 N	102.805556 W	Monitoring
NDGW06	MW-6	47.358611 N	102.805278 W	Monitoring
NDGW07	MW-7	47.358333 N	102.805278 W	Monitoring
NDGW08	MW-8S	47.358333 N	102.805556 W	Monitoring
NDGW09	MW-8D	47.358333 N	102.805556 W	Monitoring
NDGW10	Confidential	47.365833 N	102.807778 W	Domestic
NDGW11	Confidential	47.352222 N	102.800556 W	Domestic
NDGW12	Confidential	47.351111 N	102.799444 W	Domestic
NDGW13	Truchan Depot	47.353611 N	102.800833 W	Supply
NDGW14	Well 14509529AAAD	47.356944 N	102.801389 W	State
NDGW15	CW-4	47.364444 N	102.757778 W	Municipal
NDGW16	CW-5	47.365833 N	102.753889 W	Supply

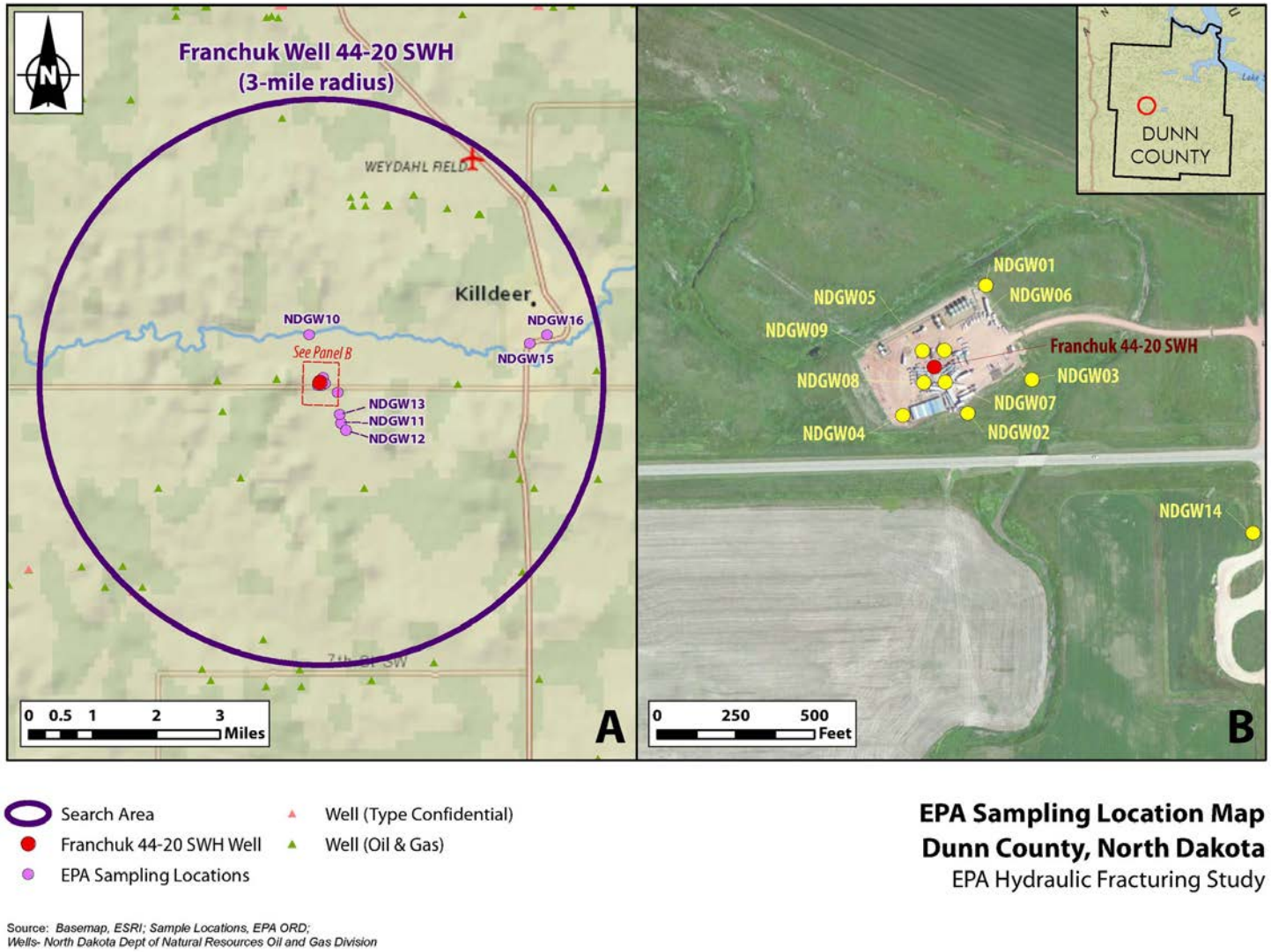

Figure 8. Killdeer Retrospective Case Study Locations**.** (A) Shows the 3-mile radius and gives the locations of the non-pad wells sampled as part of this study. (B) Shows a zoomed in view of the well pad and gives the locations of the pad wells sampled as part of this study.

4.2. Water Collection

Sample bottles for each location were uniquely labeled prior to each sampling round, and all labels were color-coded by analytical parameter. See Table A1 (Appendix A) for pre-cleaned bottle types and number of sample bottles needed for each laboratory analysis.

Both field-filtered and unfiltered water samples were collected. Unfiltered samples were collected first, and unfiltered samples that could contain volatile components were collected before samples with less volatile components. The unfiltered samples were analyzed for the following parameters: dissolved gases, VOCs, SVOCs, DROs GROs, glycols, low-molecular-weight acids, ethoxylate alcohols, alkylphenol ethoxylates, alkylphenols, and total metals. Filtered samples were collected by placing a 0.45 micrometer (µm) disposable capsule filter at the end of the polyethylene tubing and passing the water stream through the filter into the sample container. Approximately 100 milliliters (mL) of ground water was passed through the filter, to waste, before filling sample bottles. Filtered sample parameters included dissolved metals, anions, nutrients (ammonia, nitrate + nitrite), dissolved inorganic carbon (DIC), dissolved organic carbon (DOC), $\delta^{18}O/\delta^{2}H$ of water, and strontium isotope. A more detailed description of the sampling methods is provided in the QAPP (Beak, 2013). Not all parameters mentioned above were analyzed for each sampling round. Table 4 identifies the types of samples collected during each sampling round. Sampling methods, sample preservation, and handling are discussed in detail in the QAPP (Beak, 2013) and is described in Appendix A and Table A1.

Because of the different types of well construction, differences in the pumps in the wells, and intended well uses of the sampled wells in this study, a well volume approach linked with the stabilization of geochemical parameters was used for purging all the different types of wells (Yeskis and Zavala, 2002). The purging methods for the different well types are discussed below.

4.2.1. Purging and Sampling at Domestic and Municipal Wells

Domestic well samples were collected as close to the wellhead as possible, prior to any water treatment or pressure tanks. The well tap was turned on and a clean piece of polyethylene tubing was connected to the sampling port, and the other end of the tubing was connected to a flow cell equipped with a YSI 5600 multi-parameter probe. The well was allowed to purge for 20 minutes before monitoring of geochemical parameters was initiated. The well was then allowed to purge until stable geochemical parameters (specific conductivity (SpC), pH, dissolved oxygen (DO), and oxidation-reduction potential (ORP)) were achieved. Once stable geochemical parameters were obtained, the samples were collected. All samples were preserved immediately upon collection (see Appendix A, Table A1) and stored on ice prior to leaving the sampling location.

4.2.2. Purging and Sampling at Supply Wells

Water supply wells are designed for high flows to fill water trucks; the flow rates cannot be adjusted and there is no tap from which samples can be collected. Terracon, the contractor for the operator, designed an insert with a tap that is placed between the well and the truck tank to collect samples. After the sampling insert was connected to the well and the tanker, the dedicated pump was powered on. The water was allowed to flow for one to two minutes to purge any water in the lines before sample collection was initiated. A sub-sample was collected to measure geochemical parameters before the water samples were collected. All samples were preserved immediately upon collection (see Appendix A, Table A1) and stored on ice before leaving the sampling location.

4.2.3. Purging and Sampling at Monitoring Wells

Monitoring wells were sampled using the following method: Water level measurements were taken before pumping the wells. Water level measurements were taken using the Robert S. Kerr Environmental Research Center Standard Operating Procedure (RSKSOP)-326. A dedicated piece of tubing was connected to the sampling port of the well and the dedicated pump was powered on. Water was allowed to pass through a flow cell equipped with an YSI 5600 multi-parameter probe (or equivalent) to track the stabilization of the geochemical parameters. Once values for the geochemical parameters stabilized, the flow cell was disconnected and samples were collected. All samples were preserved immediately upon collection (see Appendix A, Table A1) and stored on ice before leaving the sampling location. The water levels were measured again following sample collection to see whether significant drawdown had occurred.

4.2.4. Purging and Sampling at the North Dakota State Water Commission (NDWC) Wells

A portable bladder pump (QED Sample Pro or equivalent) was used to sample the NDWC well. Water level measurements were taken before purging the well. The portable bladder pump was then lowered into the well, and the pump intake location was placed within the screened interval of the well. Tubing from the sampling port was connected to the flow cell and the pump was powered on. Because of the low flow rates (less than 50 milliliters per minute [mL/min]), the well was purged for a minimum of six hours before geochemical parameters were measured. Once the values for the geochemical parameters stabilized, the flow cell was disconnected and samples were collected. All samples were preserved immediately upon collection (see Appendix A, Table A1) and stored on ice before leaving the sampling location. The water levels were measured again following sample collection to see whether significant drawdown had occurred.

4.2.5. Sample Handling

At the conclusion of each day, samples were organized by analytical parameter, placed together in sealed Ziploc plastic bags, and transferred to coolers filled with ice. Glass bottles were packed with bubble wrap to prevent breakage. A temperature blank and chain-of-custody form were placed in each cooler. Coolers were sealed and affixed with a custody seal and sent to the appropriate lab, via express delivery, within 24 hours of collection.

4.3. Water Analysis

4.3.1. Field Parameters

Temperature (US EPA Method 170.1), specific conductivity (SpC) (US EPA Method 120.1), pH (US EPA Method 150.2), ORP, and DO (US EPA Method 360.1) were continuously monitored and logged during well purging using an YSI 556 multi-parameter probe. YSI electrodes were calibrated every morning before use. Performance checks were conducted after an initial calibration, again at midday, and at the end of each day. The National Institute of Standards and Technology (NIST)-traceable 1413 microSiemens per centimeter (µS/cm) specific conductance standard was used for calibration. NIST-traceable buffer solutions (4.00, 7.00, and 10.01) were used for pH calibration. An ORP standard (Zobell Solution) was used to calibrate the ORP sensor. DO sensors were calibrated with air. Electrode performance was checked using the YSI 5580 Confidence Solution. Prior to deployment to the field, all calibration and performance standards were checked to ensure that they had not expired or would

expire during the sampling round. Duplicate field measurements are not applicable to measurements in a flow-through cell (RSKSOP-211v3).

Once the geochemical parameters had stabilized, a 1-liter sub-sample was collected for field determinations of alkalinity, turbidity, ferrous iron, and dissolved sulfide. Alkalinity measurements were determined by titrating ground water with 1.6N sulfuric acid (H_2SO_4) to the bromcresol green-methyl red endpoint using a HACH titrator (US EPA Method 310.1). Turbidity measurements (US EPA Method 180.1) were determined with a Hach 2100Q portable meter. Ferrous iron measurements were collected using the 1,10-phenanthroline colorimetric method (HACH DR/890 colorimeter, Standard Method 3500-FeB for Wastewater). Dissolved sulfide measurements were collected using the methylene blue colorimetric method (HACH DR/890 spectrophotometer, Standard Method 4500-S^{2-}D for Wastewater).

Hach spectrophotometers (ferrous iron and sulfide) and turbidimeters (turbidity) were inspected before going to the field, and their function was verified using performance calibration check solutions. The ferrous iron accuracy was checked by making duplicate measurements of a 1 mg Fe/L standard solution (HACH Iron Standard solution, using Ferrover pillows); the results were between 0.90 and 1.10 mg Fe/L. Accuracy and precision of sulfide measurements were checked using a standard solution of sodium sulfide prepared in the laboratory that had been titrated with sodium thiosulfate to determine its concentration. Accuracy should be within ±10 percent of the expected concentration and the coefficient of variation should be less than 20 percent. Turbidity was checked against turbidity standards supplied by Hach (StablCal® Calibration Set for the HACH 2011Q), which consist of four standards (20 nephelometric turbidity units [NTU], 100 NTU, and 800 NTU) with a 10 NTU performance check standard. The performance check must be ±10 percent of the known concentration. Titrators used for alkalinity measurements were checked using a 250 milligrams per liter (mg/L) standard made from sodium bicarbonate ($NaHCO_3$). The performance check must be ±10 percent of the known concentration. Blanks (deionized water) and performance calibration check solutions (where applicable) were measured at the beginning of the day, at midday, and at the end of the day for each parameter.

4.3.2. Analytical Methods for Ground Water

Water samples were collected and analyzed using the methods identified in Table A1, Appendix A. Samples were collected and delivered to seven laboratories for analysis: EPA Office of Research and Development/National Risk Management Laboratory/Groundwater and Ecosystems Restoration Division (ORD/NRMRL/GWERD), Ada, Oklahoma; Shaw Environmental (name changed to CB&I due to change in ownership during study), Ada, Oklahoma; EPA Region 8, Golden, Colorado; EPA Region 3, Fort Meade, Maryland; U.S. Geological Survey (USGS), Denver, Colorado; Southwest Research Institute (SwRI), San Antonio, Texas; EPA ORD/National Exposure Research Lab (NERL), Las Vegas, Nevada; and a Contract Laboratory Program (CLP) laboratory (A4 Scientific, Inc., Woodlands, Texas) (see Appendix A, Table A1).

Anions, nutrients, DIC, and DOC were analyzed in-house (GWERD General Parameters Laboratory, Ada, Oklahoma). Quantitative analyses of the major anions bromide, chloride, fluoride, and sulfate were determined by capillary ion electrophoresis (US EPA Method 6500, RSKSOP-276v4) using a Waters Quanta 4000 capillary ion analyzer for all sampling rounds. To provide better resolution of the bromide in a high chloride matrix, bromide samples containing high chloride levels were also analyzed in round 2 using flow injection analysis (Lachat QuickChem 8000 Series flow injection analyzer RSKSOP-214v5) and in round 3 with the capillary ion analyzer (US EPA Method 6500, RSKSOP-288v3 for high chloride levels). Nutrients (nitrate + nitrite, ammonia) were measured by flow injection analysis (US EPA Method 350.1

and 353.1, RSKSOP-214v5) for all rounds of sampling. Iodide was measured using flow injection analysis (RSKSOP-223v2) only for sampling round 3. The carbon concentrations of DIC and DOC in aqueous samples were determined via combustion and infrared detection (US EPA Method 9060A, RSKSOP-330v0) using a Shimadzu TOC-VCPH analyzer for all sampling rounds.

Dissolved gases (methane, ethane, propane, and butane), low-molecular-weight acids (lactate, formate, acetate, propionate, isobutyrate, and butyrate), and the stable isotopes of water (δ^2H, $\delta^{18}O$) were analyzed by Shaw Environmental/CB&I (Ada, Oklahoma). Dissolved gases were measured using gas chromatography (Agilent Micro 3000 gas chromatograph (RSKSOP-194v4 and -175v5) for all sampling rounds. The concentrations of low-molecular-weight acids were determined using high-performance liquid chromatography (HPLC) (Dionex ICS-3000, RSKSOP-112v6) for all sampling rounds. Hydrogen (δ^2H) and oxygen ($\delta^{18}O$) isotope ratios for aqueous samples collected were determined by isotope-ratio mass spectrometry (IRMS) (RSKSOP296v1) for sampling round 2 and by cavity ring-down spectrometry (Picarro L2120i CRDS, RSKSOP-334v0) for sampling round 3.

The analyses of DROs, GROs, and SVOCs in water samples were completed by EPA Region 8 laboratory (Golden, Colorado) for all sampling rounds. DROs and GROs were determined by gas chromatography (GC), using a gas chromatograph equipped with a flame ionization detector (US EPA Method 8015B; Agilent 6890N GC). The concentrations of SVOCs were determined by GC/mass spectrometry (GC-MS), (US EPA Method 8270D; HP 6890 GC and HP 5975 MS).

VOCs were measured by Shaw Environmental/ CB&I (Ada, Oklahoma) for all sampling rounds. The samples were analyzed using automated headspace GC/MS (US EPA Methods 5021A and 8260C; Agilent 6890/5973 Quadrupole GC/MS).

Both dissolved (filtered) and total (unfiltered) metal samples were analyzed by Shaw Environmental for rounds 1 and 2. Metals were analyzed using inductively coupled plasma-optical emission spectroscopy (ICP-OES) for all dissolved and total metals (US EPA Methods 200.7; RSKSOP-213v4; Optima 3300 DV ICP-OES). Unfiltered samples were prepared before analyses by microwave digestion (US EPA Method 3015A). Total and dissolved metal analyses for samples collected during sampling round 3 were conducted by SwRI (San Antonio, Texas) in accordance with US EPA Method 6020A (inductively coupled mass spectrometry [ICP-MS]) and US EPA Method 200.7 (ICP-OES). Unfiltered samples were digested prior to analyses (US EPA Method 200.7). Mercury concentrations were determined by cold-vapor atomic absorption (US EPA Method 7470A; PerkinElmer FIMS 400A).

Glycols (2-butoxyethanol, di-, tri-, and tetraethylene glycol) were measured by EPA Region 3 laboratory in samples collected during sampling rounds 1 and 2. The samples were analyzed by high-performance liquid chromatography (HPLC) coupled with positive electrospray ionization (ESI+) tandem mass spectrometry (MS/MS; Waters HPLC/MS/MS with a Waters Atlantis dC18 3µm, 2.1 x 150 mm column). Glycol samples for round 3 were analyzed by EPA's NERL using the same method as EPA Region 3. Over the course of this case study, the glycol method was in development. A verification study of the method used for glycol analysis was completed using volunteer federal, state, municipal, and commercial analytical laboratories. The study indicated that the HPLC/MS/MS method was robust, provided good accuracy and precision, and exhibited no matrix effects for several water types that were tested (Schumacher and Zintek, 2014).

Strontium isotopes ($^{87}Sr/^{86}Sr$) and rubidium (Rb) and strontium (Sr) concentrations were measured by the U.S. Geological Survey (USGS) (Denver, Colorado; no EPA method) for samples collected during sampling rounds 2 and 3. High precision (2σ = +0.00002) strontium isotope ratio results were obtained using thermal ionization mass spectrometry (TIMS) (Finnigan MAT 262 and Thermo Elemental Triton).

Acrylamide, alkylphenols, ethoxylated alkylphenols, and ethoxylated alcohols were measured by the EPA's NERL (Las Vegas, Nevada; no EPA methods) using methods currently under development (US EPA, 2012). These were measured for a limited set of wells in round 2 and for all wells in round 3.

Detection and reporting limits for all analytes, per sample type, are provided in Tables B1 through B8 in Appendix B.

4.4. QA/QC

Detailed information concerning QA/QC is presented in Appendix A of this report. QC samples included blanks, field duplicates, matrix spikes, and matrix spike duplicates. All QC sample types were collected, preserved, and analyzed using methods identical to those used for the water samples collected in the field (Table 4). Sample preservation and holding time criteria are listed in Table A1. Field QC samples for ground water and surface water sampling, which included several types of blanks and duplicate samples, are summarized in Table A2. These included several types of blanks and duplicate samples. Adequate sample volumes were collected to allow for laboratory matrix spike samples to be prepared, where applicable. Data were checked using the software package AqQA (version 1.1.1) for the charge balance and measured SpC versus calculated SpC checks. First, the SpC values measured in the field were compared with a calculated value that is based on anion- and cation-specific resistivity constants and the measured concentrations of anions and cations in specific ground water samples. The agreement between the measured and calculated values should be within 15%. The second method was to calculate the charge balance for each solution. This was done by summing and comparing the net positive and negative charge from the measured concentrations of anions and cations. The agreement should be within 10%. Poor agreement suggests that one or more major solutes were not accounted for in the analytical measurements or, otherwise, could point to an analytical error. Discrepancies in this manner were either qualified or the identity of other sample components and/or reason(s) for poor agreement was investigated (Beak, 2013). A more detailed description of the QA/QC procedures implementation is presented in the QAPP (Beak, 2013).

Appendix A describes general QA and the results of QC sample analyses, including discussions of chain of custody, holding times, blank results, field duplicate results, laboratory QA/QC results, data usability, QAPP additions and deviations, field QA/QC, application of data qualifiers, tentatively identified compounds (TICs), Audits of Data Quality (ADQ), the field Technical System Audit (TSA), and laboratory TSAs. All reported data met project requirements unless otherwise indicated by application of data qualifiers. In rare cases, data were rejected as unusable and not reported. Detailed information concerning QA/QC is presented in Appendix A of this report.

4.5. Data Handling and Analysis

For each sampling location in this study, geochemical parameters and the water quality data for major-ions and other selected inorganic ions collected over the multiple sampling rounds were averaged. This approach ensures that more frequently sampled locations are given equivalent weight in the data

analysis (Battelle, 2013); however, a shortcoming of this method is that potential temporal variability in concentration data at a single location is not captured. Intra-site variability of the data collected in this study was examined by evaluating time-dependent concentration trends at specific locations. Summary statistics were calculated for selected parameters after averaging across sampling rounds for each location (e.g., mean, median, standard deviation, minimum and maximum values). Parameters with non-detect values were set at half the minimum detection limit; summary statistics determined for parameters that showed mixed results, both greater than the quantitation limit (>QL) and less than the quantitation limit (<QL) , were generally determined only when greater than 50% of the concentration data was <QL (US EPA, 2000b). In rare cases, data were not used (e.g., for iron and manganese) and these are noted in the tabulated data.

Concentration data for organic compounds were not averaged across the multiple sampling rounds because relatively few detections > QL were found and these detections were not consistent through time at specific sampling locations. Stable isotope and strontium isotope data, used to identify fluid sources and biogeochemical processes, were not averaged so that the full range of data variability could be evaluated. Furthermore, historical sources of isotope data for the study were not available, so weighting was not a data analysis issue.

Historical ground water data for Killdeer were collected from the NWIS (USGS, 2013), the NDWC (2013), and Klausing (1976) databases. Secondary data from these sources were considered based upon various evaluation criteria, such as: (1) did the organization that collected the data have a quality system in place? (2) Were the secondary data collected under an approved QAPP or other similar planning document? (3) Were the analytical methods used comparable to those used for the primary data? (4) Did the analytical laboratories have demonstrated competency (such as through accreditation) for the analysis they performed? (5) Were the data accuracy and precision control limits similar to the primary data? (6) Are the secondary data source MDLs and QLs comparable to those associated with the primary data or at least adequate to allow for comparisons? and (7) Were sampling methods comparable to those used for the primary water quality data collected for this study? In general, the necessary accompanying metadata are unavailable for the secondary water quality data sources to fully assess these evaluation criteria; thus, the secondary data are used with the understanding that they are of an indeterminable quality relative to the requirements specified for this study (see QAPP; Beak, 2013).

The software package AqQA (version 1.1.1) was used to evaluate internal consistency of water compositions by calculating cation/anion balances and by comparing measured and calculated electrical conductivity values (see Appendix A, Table A26). Major-ion charge balance was calculated by comparing the summed milliequivalents of major cations (calcium, magnesium, sodium, and potassium) with major anions (chloride, sulfate, and bicarbonate) in filtered samples using the equation:

$$\text{Charge Balance } (\%) = \left|\frac{(\sum \text{cations} - \sum \text{anions})}{(\sum \text{cations} + \sum \text{anions})}\right| \text{x}100 \qquad (1)$$

The calculated charge balance error over the five sampling rounds ranged from 0.1% to 8.7% for surface and ground water; 88% of the ground water samples collected for this study had a charge balance error less than 5% (see Appendix A). The gypsum saturation index was determined using the Geochemist's Workbench package (version 8; Bethke, 2008). Speciation and mineral equilibria calculations were made by using temperature and concentrations of base species: major cations (Na^+, K^+, Ca^{2+}, Mg^{2+}),

anions (Cl^-, SO_4^{2-}, HCO_3^-), and pH. Activity corrections were made using the Debye-Hückel equation. The LLNL (EQ3/6) thermodynamic database was selected for use in the calculations (Delany and Lundeen, 1990). For these calculations, charge imbalance was handled by compensating with chloride for samples with an anion deficit or by compensating with sodium for samples with a cation deficit.

Once the databases were sorted and filtered, the data from each database were compared to identify duplicate samples between databases. This comparison was based on the metadata provided in each database. Based on these metadata, sampling locations within databases where duplicated were removed.

For the historical datasets, samples with a charge balance error $\leq$ 15% were used for water-type analysis and for constructing geochemical plots such as Piper or Schoeller diagrams. In most cases, charge balance errors exceeding the 15% criterion were due to missing concentrations of major cations or anions in the historical datasets. Again, the historical data from locations with multiple sampling rounds were averaged and summary statistics were determined. Charge balance criteria were not used to screen data for use in summary statistic calculations or for plotting box-and-whisker diagrams.

Summary statistics for historical data were determined on a reduced-area basis (3-mile radius) in order to more directly evaluate data from samples collected in nearby locations. Various issues relating to data quality and applicability of historical data have been previously discussed (Battelle, 2013; US EPA, 2012; Beak, 2013), such as comparability of analytical methods, comparability of analytes, unknown sample collection methods, and unavailable laboratory QC data and data-quality-related qualifiers. While recognizing these limitations, historical data are used as the best points of reference available to compare with the water quality data collected in this study.

Statistical evaluations were carried out using the ProUCL (US EPA, 2010b) and Statistica (version 12) software packages. Hypothesis testing for the water quality data was performed using parametric (ANOVA) and nonparametric (Kruskal-Wallis) methods. An assumption underlying parametric statistical procedures is that datasets are normally distributed or can be transformed to a normally distributed form; data transformations in some cases included logarithmic functions. For the analysis of the major-ion trends, average values were used in the statistical tests and were combined with single observations. As noted previously, this approach was used to avoid the undue weighting of locations sampled multiple times, either in the new data collected for this study or in the historical water quality data. Post-hoc tests were performed to determine significant differences among water quality datasets for particular analytes, including the Scheffé and Kruskal-Wallis multiple comparison tests. A p-value of less than 0.05 was interpreted as a significant difference between compared datasets. Because a large number of comparisons were made between the data from this study and the historical water quality data that encompass numerous sampling investigations, multiple locations, and extended periods of time, the problem of multiple comparisons is suggested, that is, the increased likelihood of rejecting the null hypothesis and flagging significant differences among datasets. Given the exploratory nature of this study, p-value adjustments were not incorporated (e.g., Bonferroni or Šidák correction factors) and the traditional significance threshold of 0.05 was applied for the data comparisons.

5. Historic Water Quality

5.1. National Water Information Systems (NWIS) Database

The NWIS is a large, publically available database of water quality data for the United States (USGS, 2011). Ground water data are available from the NWIS database.

Initially, the data were sorted based on whether the water was surface water or ground water. The ground water data were then sorted according to the aquifer or formation from which the water had been collected. Using the state well codes, the data, all prior to 1978, were refined further to water samples that came from the Killdeer aquifer. Calculations of charge balances revealed that the charge balances ranged from 0.04% to 4.2%. There were 25 total data points and all were useable.

5.2. North Dakota State Water Commission (NDWC) Database

The State of North Dakota maintains a publicly available database containing ground water quality data. This database is maintained by the North Dakota State Water Commission (NDWC, 2013). Killdeer aquifer data were downloaded, including the calculated charge balances for all locations. Only data prior to 1998 were used. Calculations of charge balances revealed that the charge balances ranged from 0.1% to 3.3%. All six data points were useable.

5.3. Klausing Data

Klausing (1976) published ground water data for the Killdeer aquifer in a report obtained from the North Dakota Geological Survey. Charge balances were calculated for the data in the report and data with charge balances greater than 15% were not considered for data comparisons. All five data points in this report for the Killdeer aquifer were useable (charge balances ranged from 0.3% to 1.6%).

5.4. National Uranium Resources Evaluation (NURE) Database

The National Uranium Resources Evaluation (NURE) database was not used in this study because there were no data related to the Killdeer aquifer.

5.5. Produced Water Database

The produced water database shows the concentrations of major anions and cations, pH, and total dissolved solids (TDS) for produced water in the United States (USGS, 2002). This is a publically available database maintained by the USGS. The USGS compiled the database from the original Department of Energy Fossil Energy Research Center and removed redundancies, verified consistency of the data, and added metadata (USGS, 2002). This database contained analyses of 1,210 produced waters in the Williston Basin for North Dakota.

5.6. Limitations to the Determination of Background Using Historical Data

Using historical data to determine background water quality has several limitations (Battelle, 2013; Reimann et al., 2008; Matschullar et al., 2000; Bowen et al., 2015). Battelle (2013) discussed the importance of taking into consideration the quality assurance (QA) and sample collection methods in regards to the use of secondary data and the intended purpose of the database being considered. For example, EPA STOrage and RETrieval (STORET) database was excluded because it contains samples that were used for regulatory purposes and thus represents impaired waters rather than background data. It

is not known how or if the NWIS and NDWC databases screened sampling locations for potential contamination. Therefore, it is possible that these databases also contain data that are not background. Other potential limitations of the databases include the following: they may not have the appropriate spatial distribution of sampling points or temporal distribution of sampling events needed; they may lack data on trace organic compounds; and they may lack geochemical or isotopic indicators (Bowen et al., 2015). Bowen et al. (2015) also indicated that many of the watersheds where current hydrocarbon exploration is occurring had severely degraded water prior to 1972 and, since 1972, have experienced improvements in water quality. This causes the comparisons to historical data to be more difficult and not straightforward.

6. State-Commissioned Monitoring Data at the Killdeer Retrospective Case Study Location

The state of North Dakota directed the operator of the Franchuk well to initiate site remediation efforts and ground water monitoring immediately after the blowout occurred. The operator and the contractor proposed a Remedial Investigation Work Plan that was finalized in March 2011 (Terracon, 2011a). This document provided information on background and scope of work, the analytical parameters to be measured and a proposed sampling schedule for the remediation efforts and ground water sampling (Terracon, 2011a). In addition, standard operating procedures (SOPs) and a Quality Assurance Project Plan (QAPP) were provided to the state for the Remedial Investigation Work Plan sampling in a separate document (Terracon, 2011b). The QAPP was finalized in March 2011 and contained information for the project organization and responsibilities; QA objectives for measurement of data; sampling procedures; custody procedures; instrument calibration procedures and frequency; analytical procedures; quality control checks; data reduction, validation and reporting procedures; performance and system audits; preventive maintenance; specific routine procedures to assess data precision, accuracy, and completeness; and corrective actions. EPA used similar data collection activities at this retrospective case study.

The state-commissioned data collected were provided to EPA in spring 2013. Because of the greater sampling frequency, these data could be compared with the results of EPA study data and used to potentially fill in data gaps in study data (e.g., time trend analyses). A summary of the state-commissioned data is presented in Appendix D.

7. Water Quality Results from this Study

The following sections describe results and interpretations of the water-quality testing conducted in this case study, including: geochemical parameters, major cations, major anions, manganese, and iron; geochemical parameters (pH and SpC); dissolved gases; organic parameters; and isotopes. Analytical data obtained during the three sampling rounds are provided in the tables in Appendix B.

7.1. Initial Study Data Screening

Figure 9 shows the ranges of the major anions and major cations. NDGW07 and NDGW08 are outliers when compared with other site wells and historical data for the majority of parameters (chloride, calcium, magnesium, and sodium). This is a strong indication that NDGW07 and NDGW08 demonstrated potential impacts on ground water quality. It should be noted that other study wells for parameters shown in Figure 10 are also outside the historical data ranges; however, there is no pattern that suggests impacts on ground water quality. In addition, drilling records for NDGW09 indicate that NDGW09 is partially or entirely screened in the underlying Sentinel Butte aquifer, so differences in water quality compared with historical data or other study wells screened in the Killdeer aquifer would be expected.

A Piper diagram of the study data is provided in Figure 10. This Piper diagram also indicates that the water quality in NDGW07 and NDGW08 differs from the other study wells, with the exception of the October 2012 NDGW06 sample. The anion trilinear plot indicates that NDGW07 and NDGW08 are enriched with chloride compared with other study wells. This chloride enrichment is also indicated for the October 2012 NDGW06 sample. The mixing diamond on the Piper diagram also indicates that NDGW07 and NDGW08 (black dashed area on plot) are enriched with respect to sulfate + chloride and slightly enriched with respect to calcium + magnesium. Unlike the trilinear plot, the mixing diamond does not indicate that the October 2012 NDGW06 sample differs from the other study wells.

The differences in water quality in NDGW07 and NDGW08 are shown for the following parameters: chloride, calcium, magnesium, sodium, and strontium. These wells are potentially impacted (see the Specific Focus Topics- NDGW07 and NDGW08 section of this report for further discussion). The parameters for other study wells, with a few exceptions, appear to be similar. This similarity indicates that these wells most likely are not impacted and thus are discussed in relationship to historical background in the next section.

7.2. Comparisons with Historical Data

As noted previously, the October 2012 NDGW06 sample appeared to be different from the other study wells. To determine if the October 2012 NDGW06 sample was an outlier, a Q-test (Dean and Dixon, 1951; Rorabacher, 1991) was used to determine if this sample was indeed an outlier. The Q-test analysis shows that only chloride for the October 2012 sample for NDGW06 was an outlier (Table 7). The state-commissioned data also showed an elevated concentration of chloride in the October 2012 NDGW06 sample. Other samples collected prior to the October 2012 state-commissioned data for NDGW06 were consistently lower and not outliers. Based on the study data collected by EPA and the state, it cannot be determined whether the October 2012 sample for NDGW06 represents an anomalous sampling point or indicates that NDGW06 is showing that contamination is occurring. However, the October 2012 sample for NDGW06 should not be consider reflective of unimpacted conditions in succeeding discussions, rather it should be considered undetermined. It is also important to note that this data point for the October 2012 sample will be used for future analysis in this report.

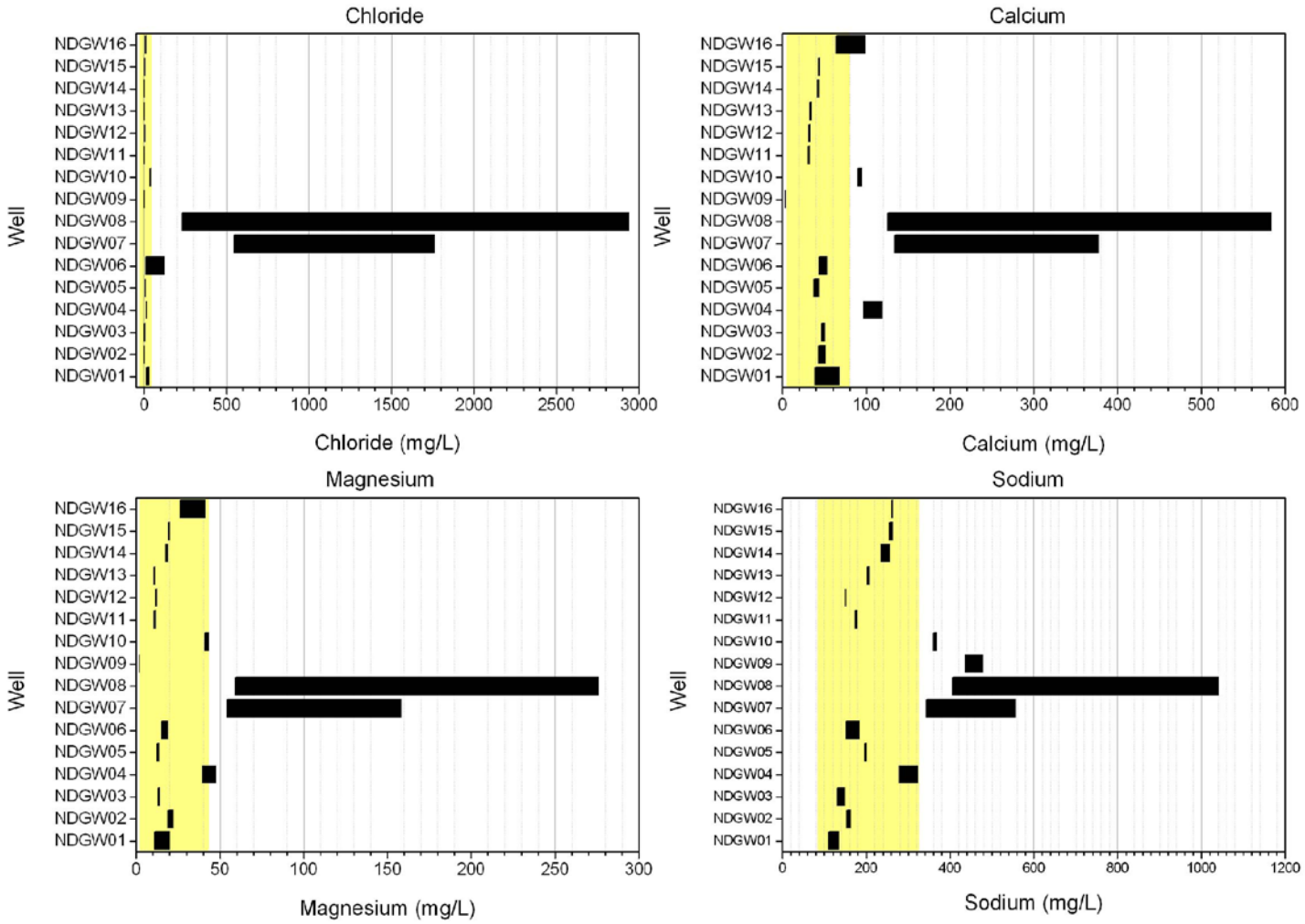

Figure 9. Plots showing data ranges for the Killdeer retrospective case study wells. Yellow shaded areas indicate historical data ranges based on data obtained from Klausing (1979), NWIS and NWDC. Black bars are the observed concentration ranges for each well, collected by US EPA, during the study. (Data Sources: USGS (2013) and NDWC (2013)).

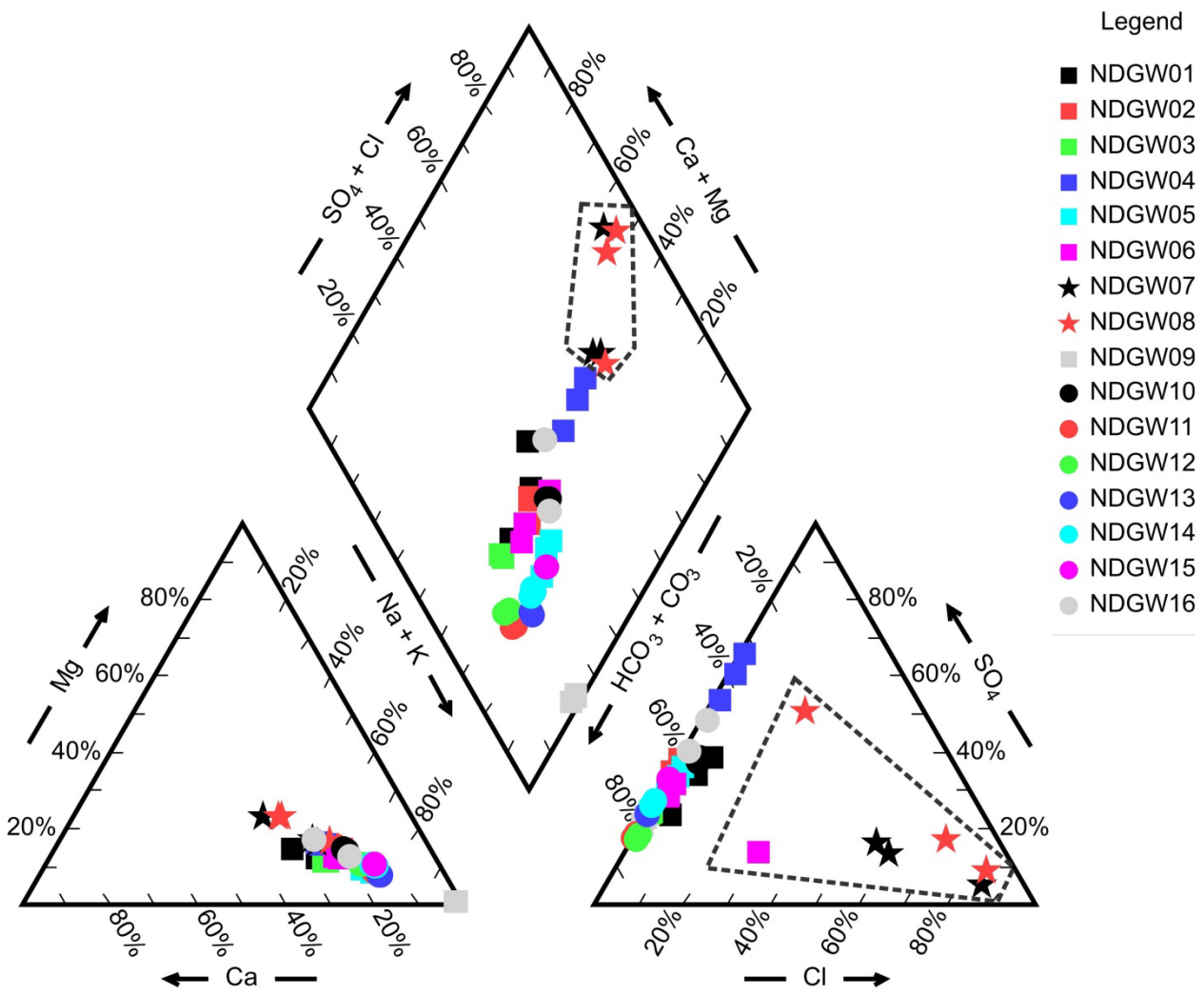

Figure 10. Piper diagram showing all the study data collected at the Killdeer retrospective case study. Dashed areas indicate samples that appear to be outliers from other study wells.

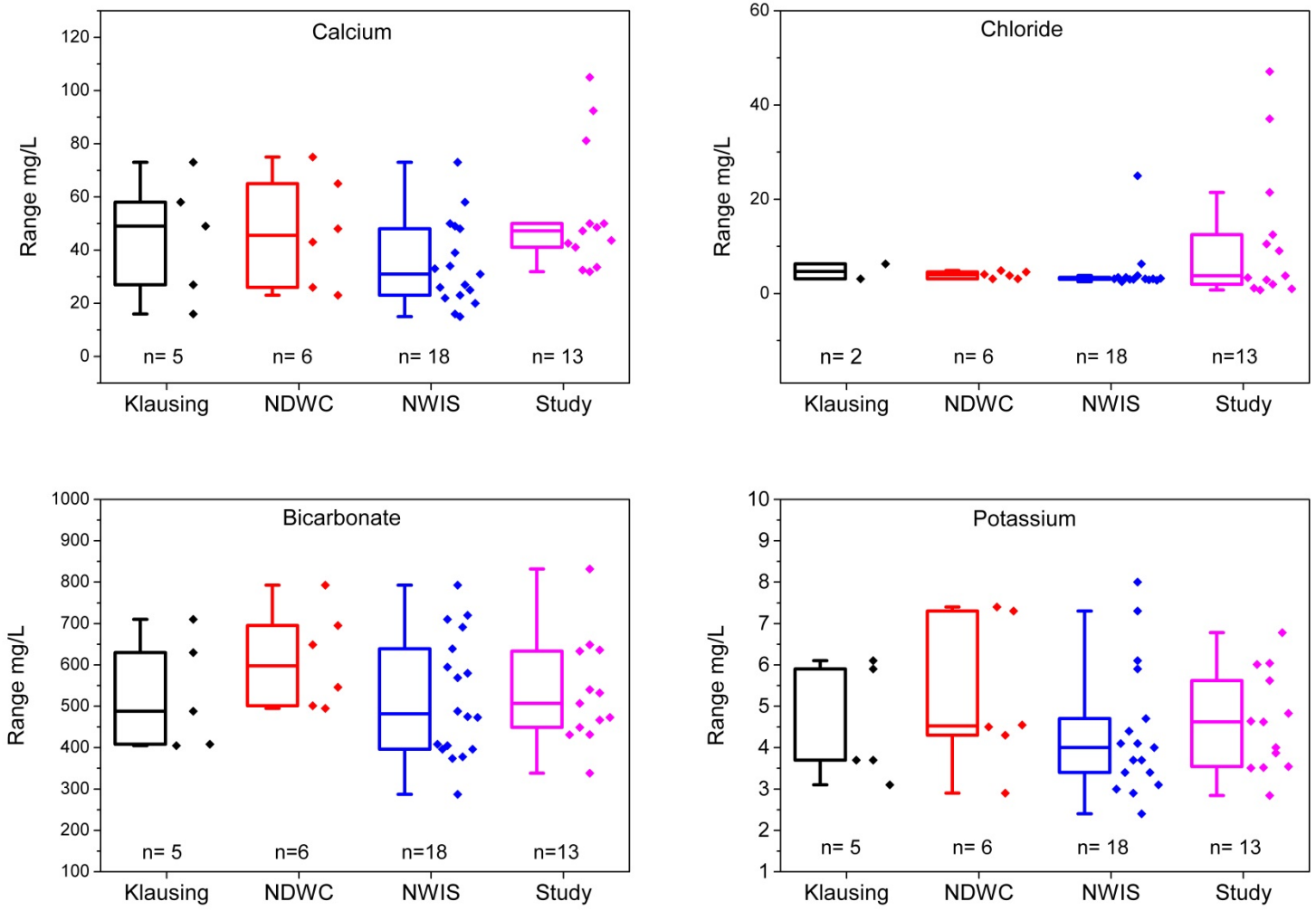

Figure 11. Statistical plots comparing study data (excluding NDGW07 and NDGW08) with historical data within a 3-mile radius of the Franchuk 44-20 SWH well. (Data Sources: Klausing (1979), NDWC (2013), and USGS (2013)).

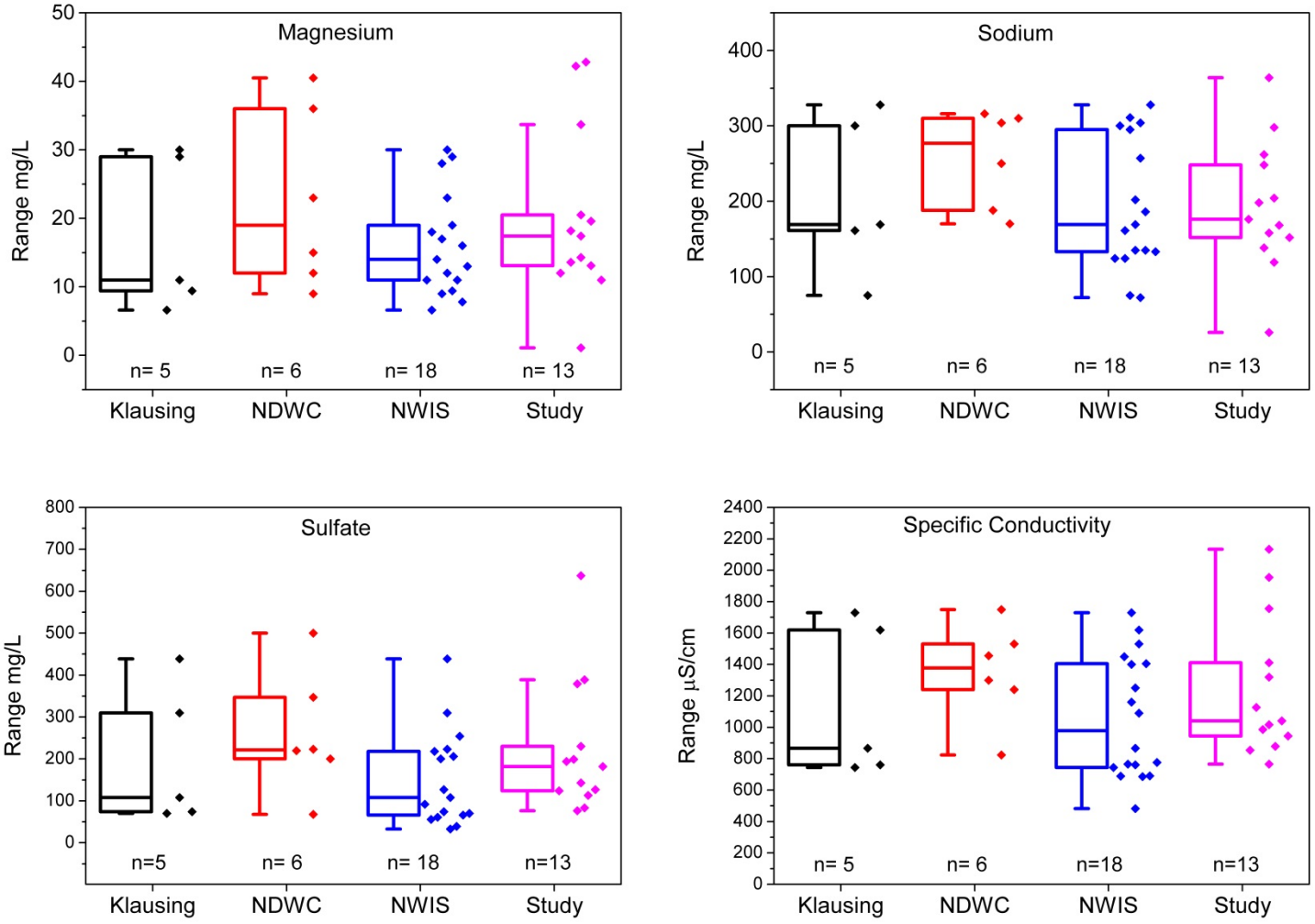

Figure 11 continued. Statistical plots comparing study data (excluding NDGW07 and NDGW08) with historical data within a 3-mile radius of the Franchuk 44-20 SWH well. (Data Sources: Klausing (1979), NDWC (2013), and USGS (2013)).

Table 6. Data comparisons and statistical summaries for study data (excluding NDGW07 and NDGW08) and historical data within a 3-mile radius of the Franchuk 44-20 SWH well.

Data Source	Parameter	Units	Mean	Median	Standard Deviation	Min	Max	Locations[1]	N[2]	Z[3]
Klausing	SPC	µS/cm	1144	867	488	744	1730	5	5	0
NDWC	SPC	µS/cm	1350	1378	315	824	1750	6	6	0
NWIS	SPC	µS/cm	1061	979	388	482	1730	18	18	0
Study	SPC	µS/cm	1245	1041	444	765	2133	13	13	0
Klausing	Bicarbonate	mg/L	528	488	137	405	710	5	5	0
NDWC	Bicarbonate	mg/L	613	598	119	495	793	6	6	0
NWIS	Bicarbonate	mg/L	521	482	146	287	793	18	18	0
Study	Bicarbonate	mg/L	532	507	128	338	832	13	13	0
Klausing	Chloride	mg/L	4.7	4.7	2.3	3.1	6.3	5	2	0
NDWC	Chloride	mg/L	3.9	4.0	0.8	3.1	4.9	6	6	0
NWIS	Chloride	mg/L	4.9	3.1	5.9	2.5	25	18	14	0
Study	Chloride	mg/L	11.7	3.78	14.9	0.76	47.1	13	13	0
Klausing	Sulfate	mg/L	200	108	166	70	439	5	5	0
NDWC	Sulfate	mg/L	260	222	147	68	500	6	6	0
NWIS	Sulfate	mg/L	155	118	110	33	439	18	18	0
Study	Sulfate	mg/L	221	182	159	76.5	637	13	13	0
Klausing	Calcium	mg/L	45	49	23	16	73	5	5	0
NDWC	Calcium	mg/L	47	46	21	23	75	6	6	0
NWIS	Calcium	mg/L	34	30	16	15	73	18	18	0
Study	Calcium	mg/L	53.8	47.2	23.6	31.9	105	13	13	0

Table 6. Data comparisons and statistical summaries for study data (excluding NDGW07 and NDGW08) and historical data within a 3-mile radius of the Franchuk 44-20 SWH well.

Data Source	Parameter	Units	Mean	Median	Standard Deviation	Min	Max	Locations[1]	N[2]	Z[3]
Klausing	Potassium	mg/L	4.5	3.7	1.4	3.1	6.1	5	5	0
NDWC	Potassium	mg/L	5.2	4.5	1.8	2.9	7.4	6	6	0
NWIS	Potassium	mg/L	4.5	4.1	1.6	2.4	8	18	18	0
Study	Potassium	mg/L	4.60	4.62	1.20	2.84	6.78	13	13	0
Klausing	Magnesium	mg/L	17	11	11	6.6	30	5	5	0
NDWC	Magnesium	mg/L	23	19	13	9	41	6	6	0
NWIS	Magnesium	mg/L	16	15	7.4	6.6	30	18	18	0
Study	Magnesium	mg/L	20.0	17.4	12.4	1.11	42.8	13	13	0
Klausing	Sodium	mg/L	207	169	105	75	328	5	5	0
NDWC	Sodium	mg/L	256	277	65	170	316	6	6	0
NWIS	Sodium	mg/L	198	178	85	72	328	18	18	0
Study	Sodium	mg/L	193	176	85.8	26	364	13	13	0

[1] Number of unique sampling points contained in the data base.
[2] Number of sampling points that contains data for the parameter.
[3] Percentage of left censored data.

Table 7. Results of Q-test to determine if a parameter is an outlier for NDGW06.

Parameter	Gap	Range	Q[1]	Critical Value[2]	Outlier[3]
SPC	108	435	0.25	0.97	No
Bicarbonate	48	88	0.54	0.97	No
Chloride	112.2	112.6	0.996	0.97	Yes
Sulfate	63.5	94.5	0.67	0.97	No
Calcium	1.3	9.8	0.13	0.97	No
Potassium	0.21	0.58	0.36	0.97	No
Magnesium	0.9	3.6	0.25	0.97	No
Sodium	15	32	0.47	0.97	No
Strontium	13	78	0.17	0.97	No
Boron	2	15	0.13	0.97	No
Barium	4	12	0.33	0.97	No
DOC	0.75	1.03	0.73	0.97	No

[1] Q statistic is calculated by Q=Gap/Range.
[2] Critical values were determined as in Rorabacher (1991) at the 95% confidence level.
[3] If Q> critical value, then it is an outlier.

7.3. Other Parameters

7.3.1. Dissolved Gases

The dissolved gases analyzed as part of this case study were methane, ethane, propane, and butane. The NWDC and the NWIS databases and the data presented in Klausing (1976) did not include these as part of their suite of analyses. However, a report on field screening for shallow gas was available to use as a comparison (Anderson et al., 2010).

Over the course of the study there were no detectable concentrations of propane or butane. Out of the 31 total samples collected during the study, 10 had detectable concentrations of methane, and all of these were detected in the October 2011 sampling round. The methane concentrations ranged from 0.0004 to 0.0253 mg/L, with a median concentration of 0.0049 mg/L. Anderson et al. (2010) screened 27 observation wells in Dunn County and only five of the wells had detectable methane, which ranged from 0.0149 to 0.3978 mg/L. All methane detections in Anderson et al. (2010) were in the central part of Dunn County in the Killdeer aquifer and the Sentinel Butte-Tongue River aquifer. The information presented in Anderson et al. (2010) indicates that the detected methane concentrations in the study are likely representative of the background conditions of the Killdeer aquifer.

7.3.2. Volatile Organic Compounds (VOCs)

The NWIS and the NDWC databases and Klausing (1976) did not contain data on VOCs, so comparisons with study data were not possible. Acetone, TBA, benzene, toluene, m+p xylene, o-xylene, 1,2,4-trimethylbenzene, and 1,2,3-trimethylbenzene were the VOCs that had detectable concentrations in the samples collected.

One well with detectable VOCs (NDGW10) is upgradient of the blowout site. In the July 2011 sampling round, acetone (80.3 micrograms per liter [µg/L]), benzene (3.77 µg/L), and toluene (0.45 µg/L) were detected. These compounds were not detected in subsequent sampling rounds. The probable source of these compounds was the PVC cement used during well pump replacement the day prior to sampling and is not related to the blowout at the Franchuk well. However, the data collected during the study does not rule out other sources of contamination.

Well NDGW04, downgradient of the Franchuk wells, also had detectable levels of VOCs in the October 2011 sampling round: benzene (0.20 µg/L), m+p-xylene (0.59 µg/L), o-xylene (0.50 µg/L), 1,2,4-trimethylbenzene (0.39 µg/L), and 1,2,3-trimethylbenzene (0.26 µg/L). Benzene, m+p-xylene, 1,2,4-trimethylbenzene, and 1,2,3-trimethylbenzene were qualified with a "J" qualifier, which means that the concentration was ≥ MDL and <QL. O-xylene was at the QL. However there were no detections during other rounds of sampling. It is possible that the detected VOCs were due to either contamination of the sample during sampling or laboratory contamination (US EPA, 1992; Douglas, 2012; Miller, 2015). Although these compounds occur naturally in crude oil, they are also found in gasoline. During sampling, there was considerable vehicular activity at the pad during the installation of pump jacks at the two production wells. Additionally, NDGW04 is adjacent to and downwind of the well pads gas flare, which was actively in use during the sampling.

VOCs were also detected in Well NDGW07, which is downgradient of the Franchuk wells . TBA was detected in the July 2011 (156 µg/L), the October 2011 (795 µg/L), and the October 2012 (229 µg/L) sampling rounds. In addition, TBA was detected in every sampling round for another well, well NDGW08. The concentrations of TBA in NDGW08 were 975 µg/L, 972 µg/L, and 287 µg/L in the July 2011, October 2011, and October 2012 sampling rounds, respectively. This is a known daughter product of a compound, tert-butyl hydroperoxide (Hiatt et al., 1964; Martynova et al., 2001; Chen, 2005; Stepovik and Potkina, 2013), which was used during hydraulic fracturing at the Franchuk well (Table 1). The TBA is discussed in more detail in the "Specific Focus Topics- NDGW07 and NDGW08" section of this report. Another compound detected during the October 2012 sampling round was benzene (0.62 µg/L) in Well NDGW07. No benzene was detected in the previous rounds, and benzene was not detected in any of the nearby upgradient monitoring wells. The source of the benzene detection cannot be determined from the data collected during this study.

7.3.3. Glycols

The glycols analyzed as part of this study were 2-butoxyethanol, diethylene glycol, triethylene glycol, and tetraethylene glycol. These compounds were chosen, in part, because they are reported to be used in hydraulic fracturing (U.S. House of Representatives, 2011; Alpha Environmental Consultants, 2009; GWPC, 2009); however, glycols were not reported as used during the hydraulic fracturing of the Franchuk well. There were no detections of glycols in any of the ground water samples collected (Table B-5, Appendix B).

7.3.4. Semi-Volatile Organic Compounds (SVOCs)

A listing of the SVOCs analyzed is provided in Table B-6 in Appendix B. Several SVOCs have been recognized as potentially occurring in hydraulic fracturing fluid and produced water (U.S. House of Representatives, 2011; Alpha Environmental Consultants, 2009; GWPC, 2009). In addition, SVOCs are linked to other anthropogenic sources of contamination as well as commonly used items such as

plastics, surface coatings, detergents, and soaps (Griffiths et al., 1985; Harris et al., 1998; Wess et al., 1998; Stiles et al., 2008; Serôdio and Nogueira, 2006; Teil et al., 2013).

During this study, 80 of the 84 SVOCs compounds analyzed for were not detected. The SVOCs that were detected included: 2-butoxyethanol, bis-(2-ethylhexyl) adipate, bis-(2-ethylhexyl) phthalate, and di-n-butyl phthalate. However, bis-(2-ethylhexyl) adipate, bis-(2-ethylhexyl) phthalate, and di-n-butyl phthalate are ubiquitous in the environment and are therefore not useful in determining whether impacts occurred or in identifying a source of contamination (Griffiths et al., 1985; Stiles et al., 2008; Serôdio and Nogueira, 2006; Teil et al., 2013). These compounds are considered common laboratory contaminants (WDNR, 2002; Miller, 2015). The 2-butoxyethanol was detected only in the July 2011 sampling round; however, the data were qualified because of blank contamination in field blanks (see Appendix A) and were not reliable. Because there were no other detections of 2-butoxyethanol in subsequent sampling rounds, and because it was not listed as a component of the hydraulic fracturing fluid used (Table 1), the 2-butoxyethanol detected in the July 2011 was likely due to contamination in the sampling equipment or sampling containers because it is used commonly in soaps and detergents (Harris et al., 1998; Wess et al., 1998).

7.3.5. Diesel Range Organic Compounds/ Gasoline Range Organic Compounds (DRO/GRO)

DROs and GROs were used to screen for petroleum contamination in this study. The summary of all the data collected for DROs and GROs is presented in Table B5, Appendix B.

One sample in the July 2011 sampling round (NDGW10) had detectable GRO (77.9 µg/L); this was the same sample with detectable VOCs. The GRO detected in this sample was possibly from the well pump replacement the day before the sampling. NDGW03 and NDGW04 had detectable GRO (20.9 and 23.6 µg/L, respectively) during the October 2011 sampling round. NDGW04 had detectable VOCs during this sampling round. As noted in the VOC discussion, this GRO is likely due to contamination during sampling. GRO was not detected in the October 2012 sampling round.

DRO was detected in all sampling rounds during this study. During the July 2011 and October 2011 sampling rounds, all samples, with the exception of NDGW02, had detectable DRO. However, most samples for the July 2011 sampling round were qualified because of field blanks (see Appendix A). In the October 2012 sampling round, the following wells were found to have detectable DRO: NDGW01, NDGW04, NDGW06, NDGW07, NDGW08, NDGW09, and NDGW14. For the most part, all the wells had similar concentrations (Killdeer aquifer wells ranged from 25.1 to 92.2 µg/L), regardless of whether they were upgradient, downgradient, or on the well pad. This indicates that DRO detections were likely from a naturally occurring source and would be the background range for the Killdeer aquifer.

7.4. Summary of Water Quality Results

Two study wells, NDGW07 and NDGW08, consistently differed from the historical background data and unimpacted well data for chloride, calcium, magnesium, sodium and strontium. The major anion and cation chemistry of NDGW07 and NDGW08 were different than the unimpacted wells. On a local scale other parameters such as manganese were different from the local historical wells and unimpacted wells. The only detections of TBA were in NDGW07 and NDGW08. It appears likely that NDGW07 and NDGW08 have been impacted. The hydrology at the pad site would suggest that the Franchuk well blowout is a likely source of the impacts. Further analysis of the potential impacts on NDGW07 and NDGW08 are described in the next section.

8. Specific Focus Topics – NDGW07 and NDGW08

8.1. Hydrology Results from this Study

Synchronous depths to water in site monitoring wells were measured before sampling. Potentiometric surface maps were prepared using the relative reference elevations and depth-to-water measurements obtained on July 18, 2011 and October 17, 2011 (Table 8). Figure 12 illustrates the southerly ground water flow direction on July 18, 2011 and a similar ground water flow direction during October 2011 (ground water flow direction is perpendicular to the hydraulic gradient). This is similar to information in a report that was provided to EPA by the state of North Dakota (Terracon, 2013).

Table 8. Potentiometric surface elevations relative to survey datum (ft).

Well	July 18, 2011 (ft)	October 17, 2011 (ft)
NDGW01	69.49	69.86
NDGW02	68.70	69.62
NDGW03	68.91	69.68
NDGW04	68.65	69.61
NDGW05	68.97	69.73
NDGW06	69.01	69.72
NDGW07	68.84	69.68

8.2. Brine as a Potential Source of Contamination

The elevated SpC and chloride concentrations found in NDGW07 and NDGW08 would suggest that brine intrusion may be responsible. The brine signature suggested in NDGW07 and NDGW08 is further demonstrated by brine differentiation plots (Figure 13 and Figure 14; Hounslow 1995). Brine differentiation plots can be used to screen samples for the potential brine impacts, but it should be noted that not all of the elements used are conservative species (calcium, sodium and sulfate) and may be subject to other chemical processes such as cation exchange and precipitations reactions. On Figures 13 and 14, the red area is where Hounslow (1995) would predict brines to plot out, and the blue area would be where brines would be expected to plot based on the UGSS produced water data base (2002) for the Williston Basin. As can be seen in Figure 13, the produced water data for the formations in Dunn County have some differences and not all the brines would plot in the region predicted by Hounslow (1995). Figure 14 demonstrates that the unimpacted study wells do not plot in the regions expected for potentially brine-impacted water, whereas most of the samples taken for NDGW07 and NDGW08 do plot in the regions expected for brine-impacted water. (Samples for NDGW07 and NDGW08 that do not plot in this region are discussed below in the “Time Trends” section.)

Plots of TDS versus the ratio of chloride to the sum of anions (Cl/Σanions) have been suggested as a means of distinguishing water that is derived from precipitation, water-rock interactions, and water derived from brine sources (Hounslow, 1995). Such a plot for the Killdeer study is shown in Figure 15. From this plot it can be seen that the unimpacted wells all plot in the cyan-colored field, which suggests

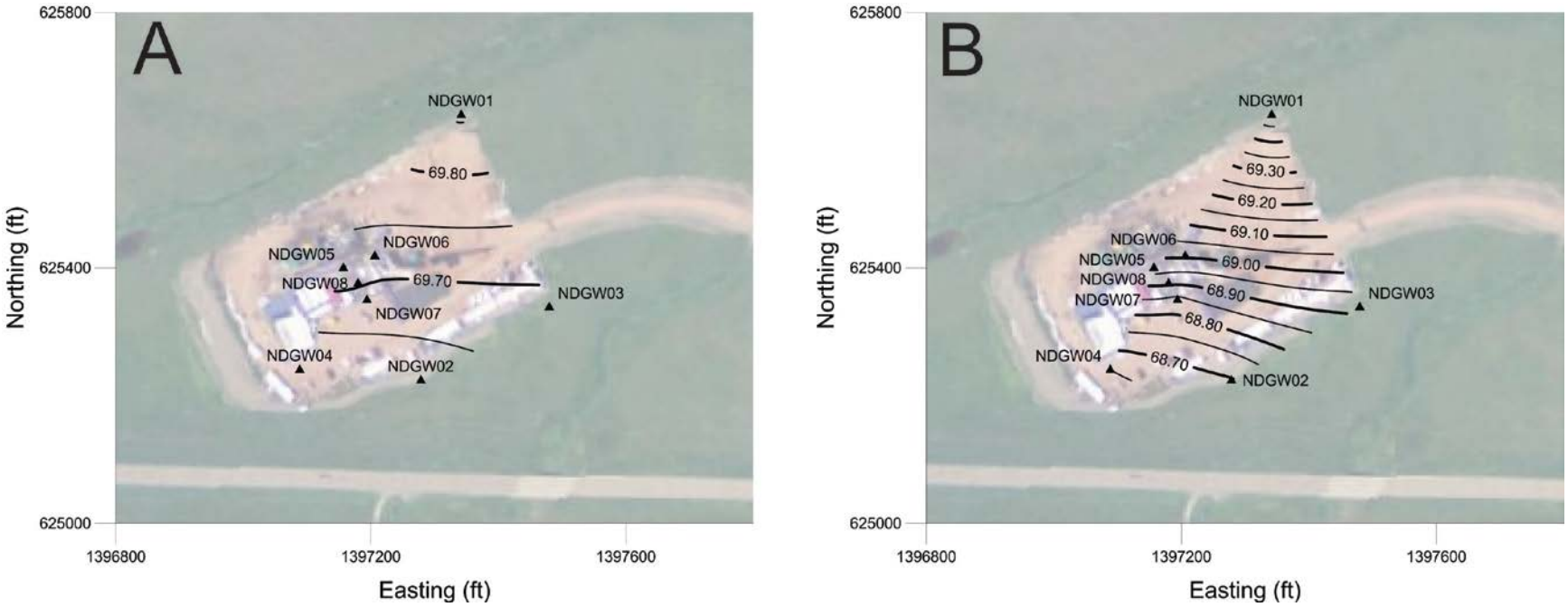

Figure 12. Relative potentiometric surface maps based on relative Top-of-Casing (TOC) survey of site wells. (A) July 18, 2011 and (B) October 17, 2011. Sampling locations are indicated on the figure using black triangles. Contour intervals are 0.05 ft.

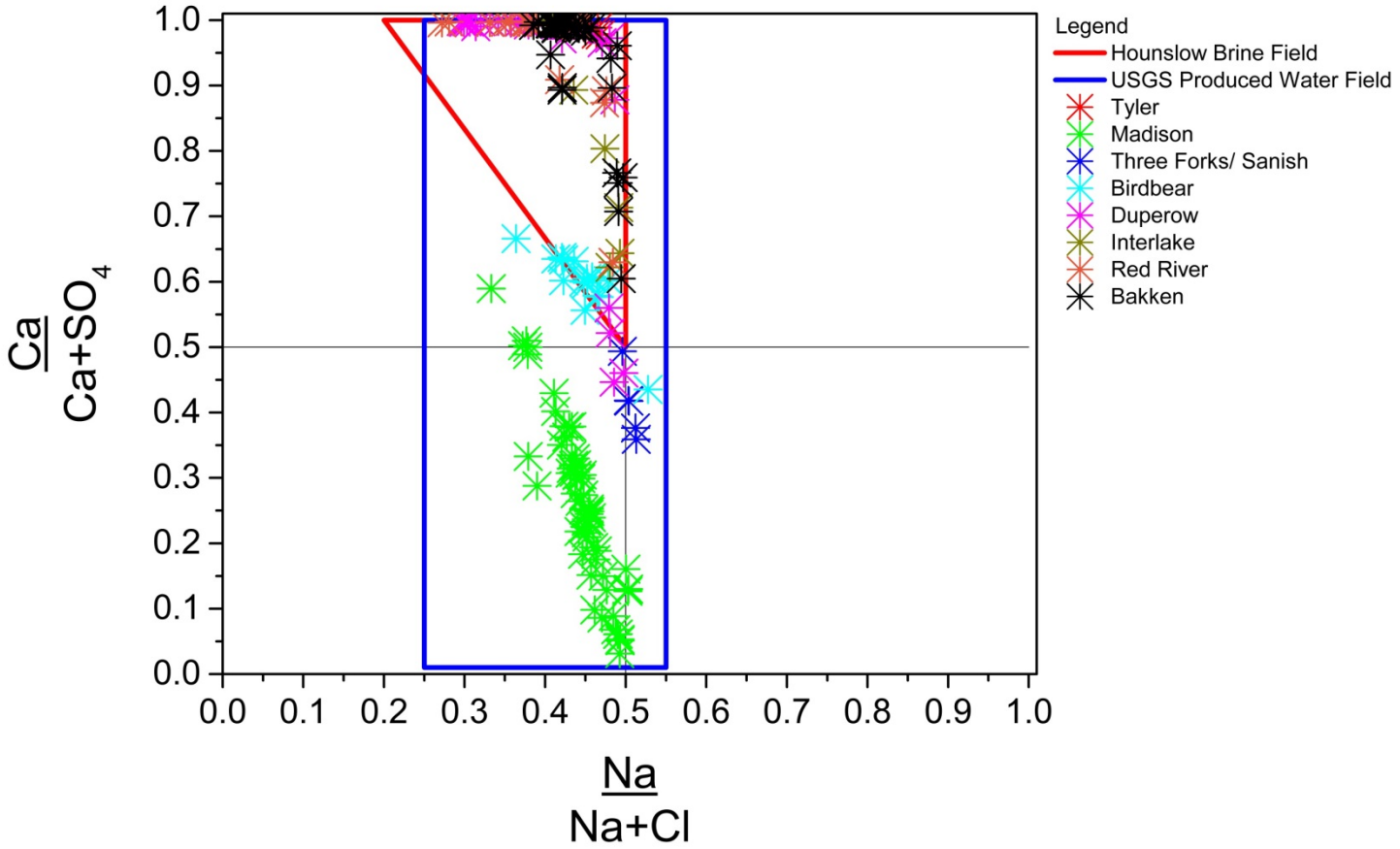

Figure 13. Brine differentiation plot showing how the different hydrocarbon-producing brines formation in Dunn County, North Dakota plot compared with the region predicted by Hounslow (1995). Area highlighted in red represents the brine field suggested by Hounslow (1995) and the blue area represents the brines of the Williston Basin from the USGS (2002) database. (Sources: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

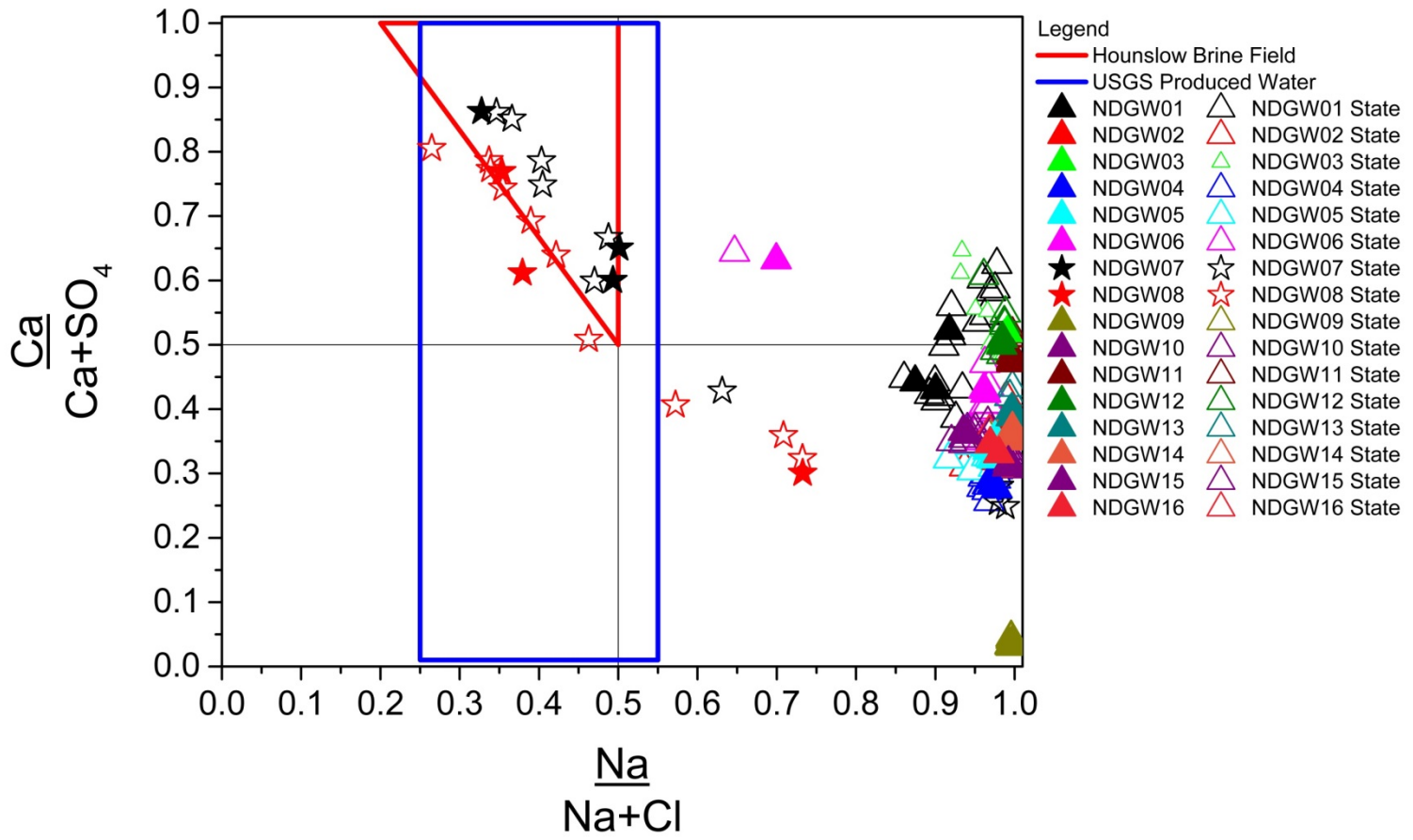

Figure 14. Brine differentiation plot showing the study data collected by EPA as part of this study and the state-commissioned data. Area highlighted in red represents the brine field suggested by Hounslow (1995) and the blue area represents the brines of the Williston Basin from the USGS (2002) database. Wells NDGW07 and NDGW08 initially plotted within the brine fields and other wells plotted outside the brine fields, indicating that NDGW07 and NDGW08 were chemically different (possible brine contamination) than the other wells.

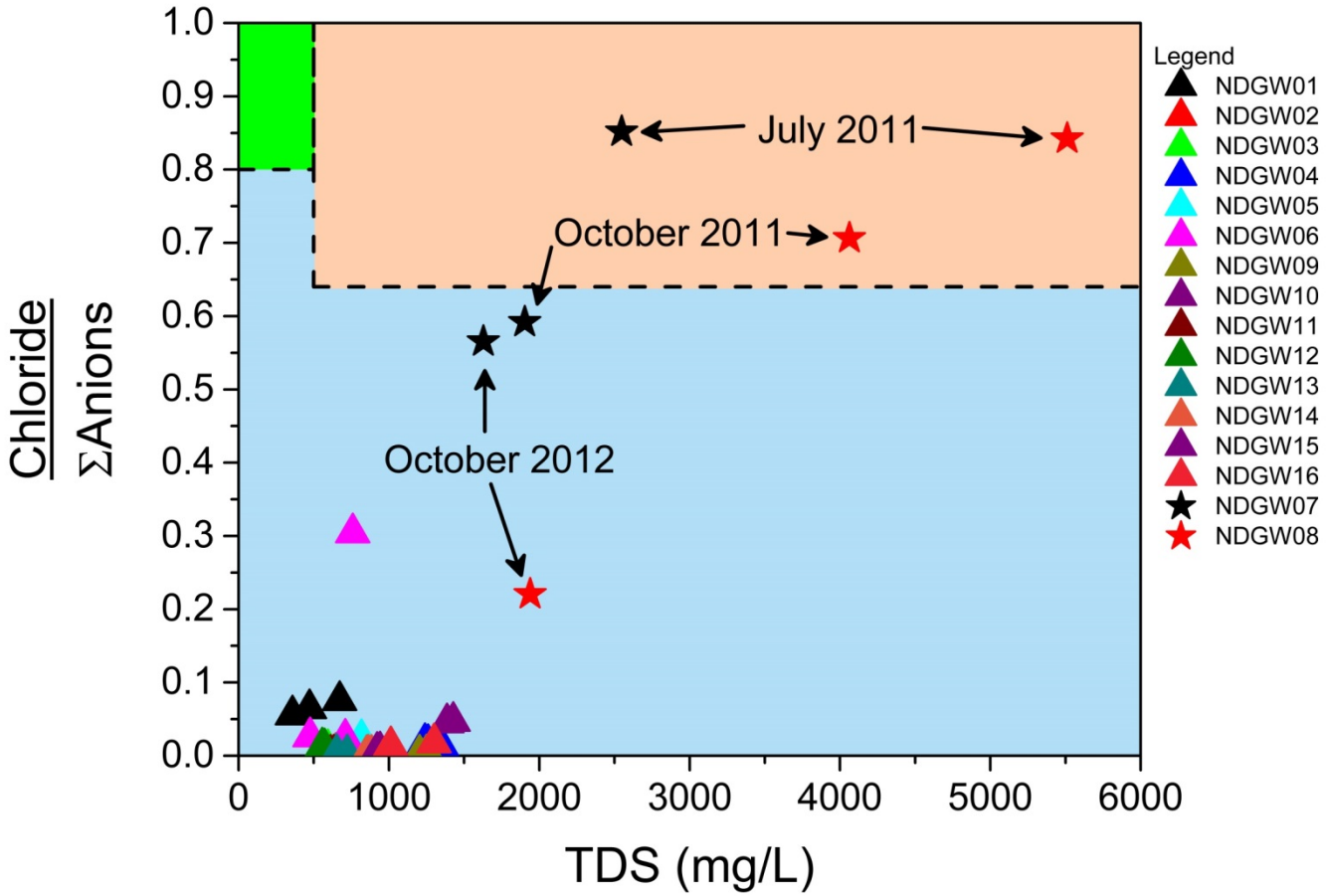

Figure 15. Plot of total dissolved solids (TDS) versus chloride/Σanions for the Killdeer retrospective case study. Green area = water derived from precipitation, cyan area = water derived from water rock interactions, orange area = water derived from Williston Basin brines. Initially samples from NDGW01 and NDGW08 demonstrated brine-like character; later NDGW07 and NDGW08 was more like water derived from water rock interactions. (Source: Hounslow, 1995; USGS, 2002).

that the water from these wells is derived from water-rock interactions, as would be expected. NDGW07 and NDGW08 appear to have water that is of brine origin at times and at other times appears to be similar to water derived from water-rock interactions. (Samples for NDGW07 and NDGW08 that plot outside the brine field are discussed below in the "Time Trends" section.)

Figure 16 shows plots of log chloride plotted against calcium, magnesium, and strontium and a plot of log sodium/chloride versus log calcium/chloride. These plots indicate that for NDGW07 and NDGW08, the data lie between the formation waters and the unimpacted wells. This is similar to what Stoessell (1997) found when he plotted chloride against sodium, iodide, calcium, potassium, magnesium, and strontium in Louisiana. In all cases the monitoring well concentrations in this study were between the background concentrations and the Wilcox or Sparta brine data (Stoessell, 1997). Stoessell (1997) used this as one line of evidence that the monitoring wells had been impacted by brine.

Plots of SpC versus a parameter can also be used to identify water that is potentially impacted by brines. Figure 17 shows SpC plotted against chloride, bicarbonate, magnesium, and sodium. Again, the data in Figure 17 for NDGW07 and NDGW08 are intermediate to the unimpacted wells and formation brines that could potentially impact NDGW07 and NDGW08. This is consistent with the water in NDGW07 and NDGW08 potentially being a mixture of formation water and water from the Killdeer aquifer. Panno et al. (2006) used plots of SpC against chloride to help distinguish between pristine ground water and ground water that has been affected by road salt.

Iodide also can be used to indicate waters that are potentially impacted by brines (Howard and Beck, 1993; Stoessell, 1997; Panno et al., 2006; Harkness et al., 2015). Iodide was measured only during the final sampling round in this case study and was not detected in any of the unimpacted wells. However, iodide was detected in both NDGW07 and NDGW08, above the quantification limit. Figure 18 shows a plot of log chloride concentration versus log iodide concentrations. Because the unimpacted wells had no detectable iodide, the point on this plot representing the unimpacted wells is one-half the MDL for iodide and the one-half the median chloride concentration. NDGW07 and NDGW08 plot between the unimpacted wells and that of the formation brines (Figure 18). This also points to formation brine as the source of impacts on NDGW07 and NDGW08. Road salt could also be a potential source of the impacts observed and is discussed below in the "Source Delineation" section.

Lithium has also been suggested as a potential indicator of brine impacts on ground water (Fontes and Matray, 1993a; Fontes and Matray, 1993b; Bottomley et al., 2003; Hancini and Oelkers, 2011). Lithium was only analyzed in the final round of sampling. As is shown on Figure 19, the impacted wells fall between the unimpacted wells and the formation brine data. This would also indicate the potential source for the impacts seen in NDGW07 and NDGW08 are from a brine source.

8.3. Time Trends

Changes in concentrations of a parameter with time can indicate transport of contaminant in an aquifer (Pérez Guerrero et al., 2010; Olayiwola et al., 2013; Pérez Guerrero et al., 2013). Figure 20 shows the changes in chloride concentrations over time. (Time zero is the date of the Franchuk well blowout.) Also shown in Figure 20 are data provided by the state to EPA (dashed lines). The state collected data before EPA sampling and more frequently. In general, the concentrations of chloride in the state data agree with EPA chloride data when split sampling was performed. Chloride concentrations in the unimpacted wells were fairly consistent, and there was very little difference in concentrations of chloride in the

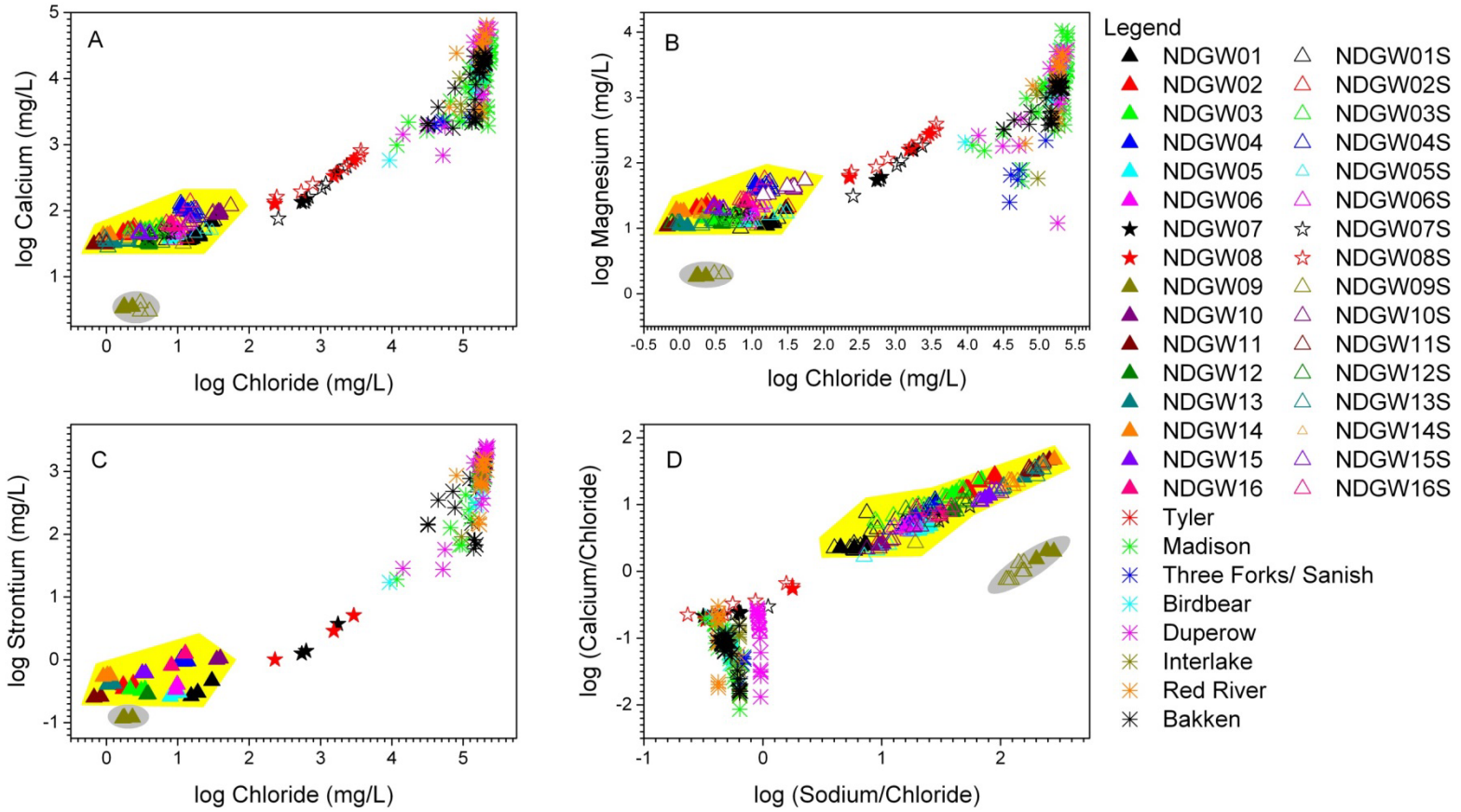

Figure 16. Plots of log chloride or sodium/chloride versus log cation. (A) log calcium, (B) log magnesium, (C) log strontium, and (D) log sodium/chloride vs log calcium/chloride. Sample locations ending in an "S" represent state commissioned samples, samples not ending in an "S" represent data collected by US EPA. Gray shaded areas represent possible mixture of Sentinel Butte aquifer water and Killdeer aquifer water. Yellow shaded area represents the unimpacted study well locations. In all cases data from NDGW07 and NDGW08 lie outside the unimpacted wells and between the unimpacted wells and the formation brines. (Sources: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

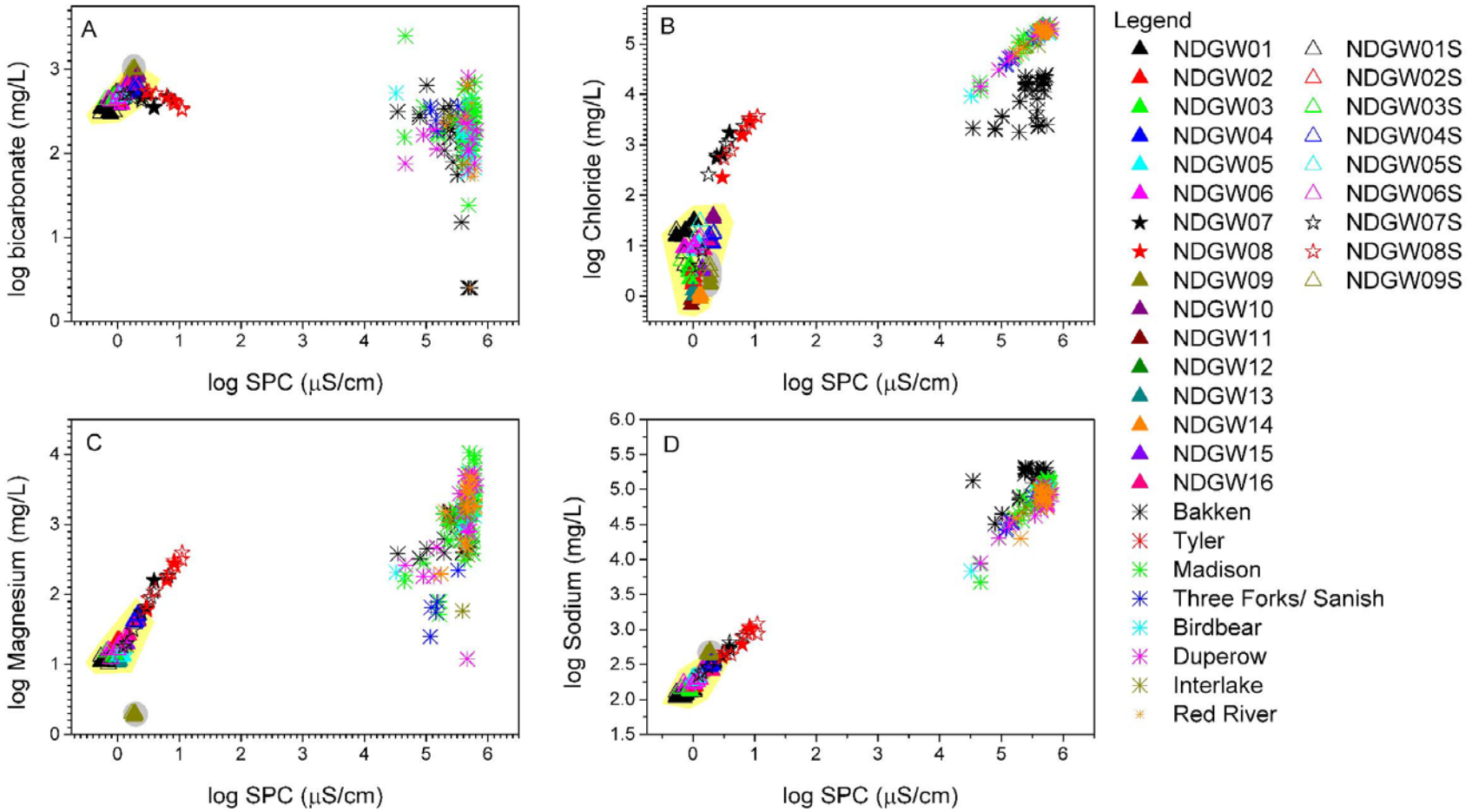

Figure 17. Plots of log specific conductivity (SpC) versus log parameter. (A) log bicarbonate, (B) log chloride, (C) log magnesium, and (D) log sodium. Sample locations ending in an "S" represent state commissioned samples, samples not ending in an "S" represent data collected by US EPA. Gray shaded area represents possible mixture of Sentinel Butte aquifer water with Killdeer aquifer water. Yellow shaded area represents unimpacted study wells. In all cases data from NDGW07 and NDGW08 lie outside the unimpacted wells and between the unimpacted wells and the formation brines. (Source: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

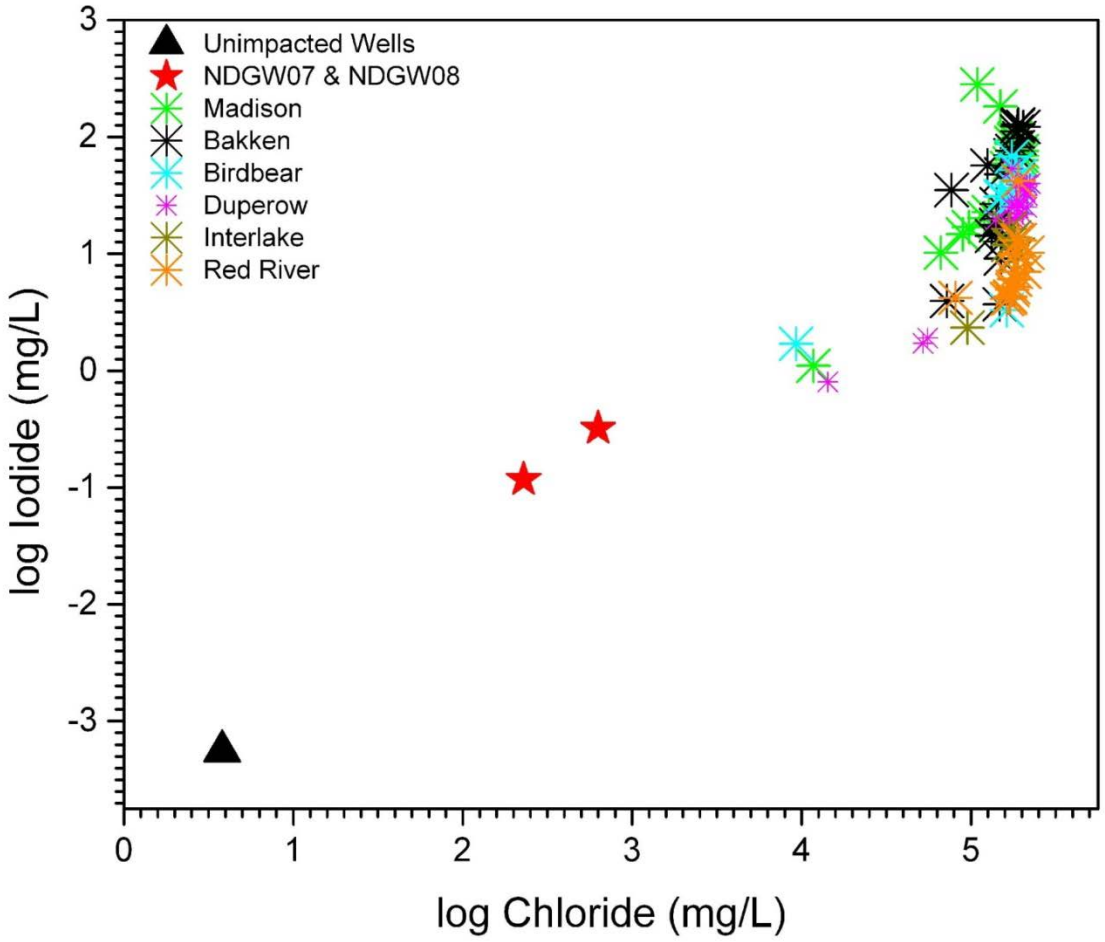

Figure 18. Log chloride concentrations versus log iodide concentrations showing study data and formation brine waters in which hydrocarbon production occurred in Dunn County. As is shown, NDGW08 and NDGW09 lie between the unimpacted wells and formation brine waters, suggesting mixing between the formation brine water and the Killdeer aquifer water. (Source: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

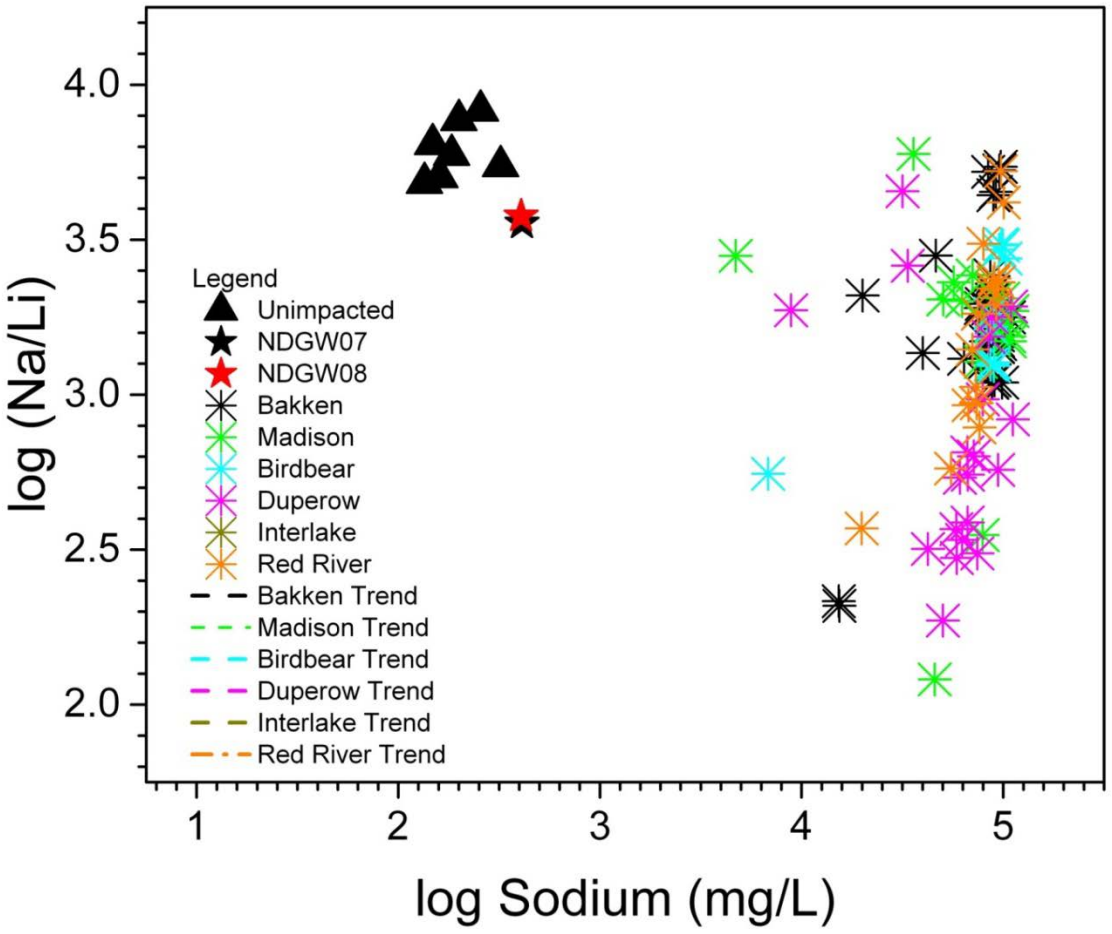

Figure 19. Log sodium concentrations versus log Na/Li showing study data and formation water brines in which hydrocarbon production occurred in Dunn County. Wells NDGW07 and NDGW08 appear to be the result of mixing between the unimpacted Killdeer aquifer water and the formation brines underlying the Killdeer Case Study Location. (Source: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

unimpacted wells, as indicated by the yellow shaded areas. For NDGW07 and NDGW08, chloride concentrations increased significantly from background, peaked, and then steadily decreased with time, approaching background concentrations by the end of the study. The chloride peak in well NDGW08, which is closest to the Franchuk well (approximately 4.5 m), arrived earlier than the chloride peak in NDGW07 (approximately 12.8 m from the Franchuk well [see Figure 20]). The chloride peak at NDGW08 is much narrower than at NDGW07, and at NDGW08, peak chloride concentration is higher than at NDGW07. This is likely due to dispersion of chloride during transport. As the chloride moves from its source, it gradually spreads out three-dimensionally, which would cause a reduction in the concentration of chloride at a given monitoring point further down gradient. In addition, dispersion would cause the chloride plume to become spatially bigger, thus increasing the time it would take to move past a point farther away from the source. Similar relationships were exhibited by other inorganic parameters. These examples would be consistent with a plume moving through the Killdeer aquifer (Pérez Guerrero et al., 2010; Olayiwola et al., 2013; Pérez Guerrero et al., 2013).

In the case of tert-butyl alcohol (TBA), there were not enough data to plot, and the detection limits for TBA were much higher in the state-commissioned data than in EPA data; and the state had one date with detectable TBA in their samples. Therefore, only data collected by EPA were used (Figure 21). There is clearly a time trend in the TBA data from NDGW07 and NDGW08 samples when compared with the unimpacted well data. Samples from the unimpacted wells consistently indicated no detectable TBA; however, there were always detectable concentrations of TBA in NDGW07 and NDGW08. The concentration of TBA in NDGW08, the monitoring well closest to the Frankchuk well, decreased with time, with the peak concentration of TBA likely occurring between the first and second round of sampling and the tail of the plume between the second and third rounds of sampling. NDGW07 is farther downgradient of the Franchuk well. The peak concentration for NDGW07 likely occurred around the second sampling round and then decreased before the third round of sampling. It is very likely, based on these data that the TBA time trend represents a plume moving through the aquifer (Pérez Guerrero et al., 2010; Olayiwola et al., 2013; Pérez Guerrero et al., 2013).

Because no additional samples have been taken since the October 2012 sampling round, it is not known if NDGW07 or NDGW08 returned to unimpacted concentrations or how long it will take to reach unimpacted conditions in these wells. However, using the conservative element chloride and the state-provided data for NDGW08 (Figure 22), an estimate can be made. As shown in Figure 22, the chloride concentration in the tail of the peak for NDGW08 had seven points that could be used to estimate how long it would take for the water in NDGW08 to reach the secondary maximum contaminant level (SMCL) for chloride, mean and median unimpacted concentration of chloride using data from the unimpacted wells. First it is important to point out that the tail of the NDGW08 chloride peak is similar to a first order kinetic (exponential) decay relationship. Therefore, a pseudo-first order kinetic decay model was applied to the data collected for chloride. Figure 22A is a plot of time versus the natural log of the chloride concentration and, as can be seen, this is a roughly linear relationship with an r^2= 0.985, which means that a pseudo-first order kinetic decay model would be appropriate. Applying this model to the actual data is shown in Figure 22B, and as can be seen the model fits the actual data fairly well. The model was used to estimate the time it would take to reach the chloride SMCL (738 days), the mean unimpacted chloride concentration (1,246 days), and the median unimpacted chloride concentration (1,433 days). Because of the lack of data points after the peak in NDGW07 the same analysis cannot be performed.

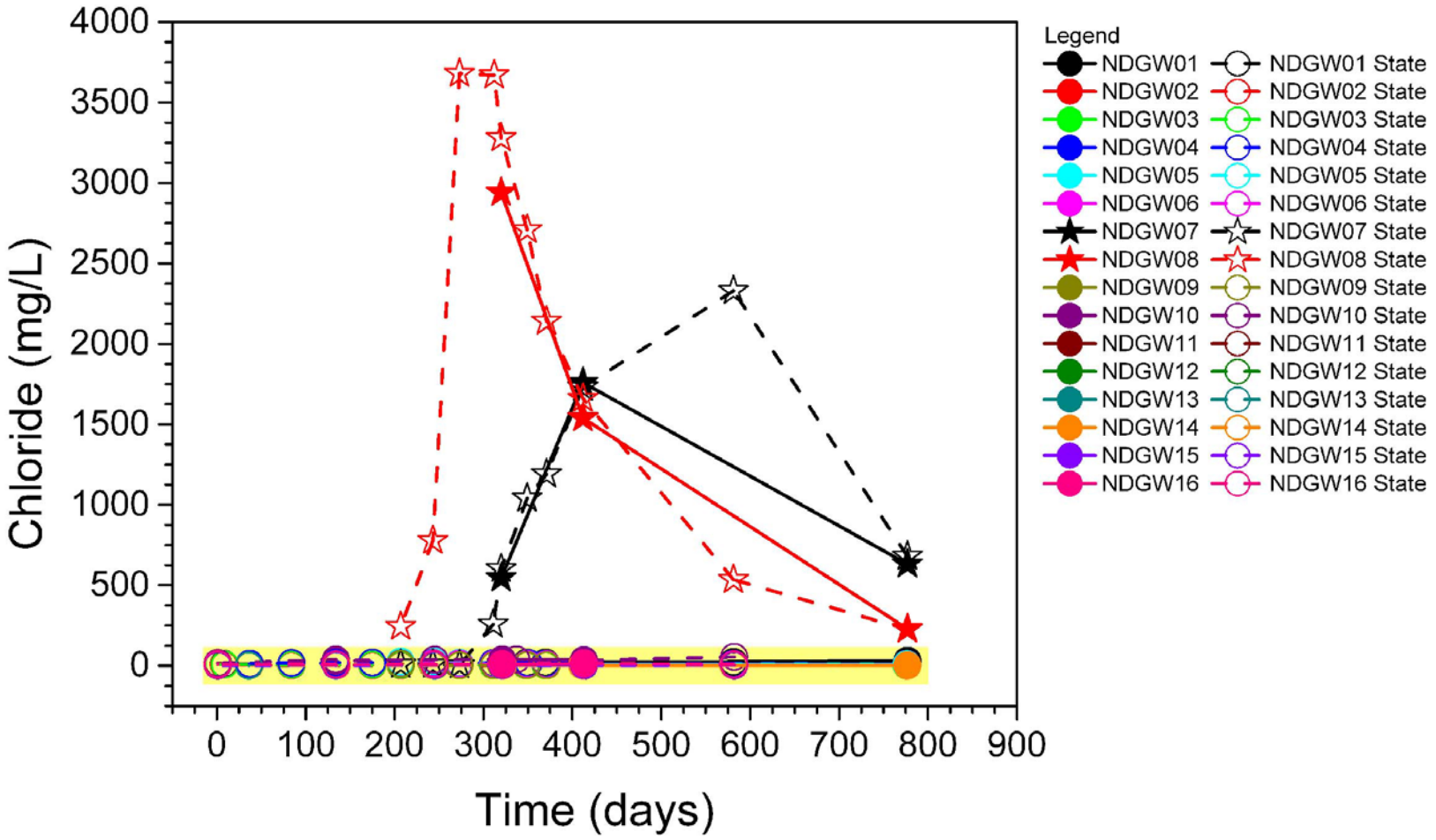

Figure 20. Time trend data for chloride study data and data provided by the state. Solid lines = study data, dashed lines = state-provided data and yellow shaded area represents unimpacted wells. The data suggest a plume moving through NDGW07 and NDGW08.

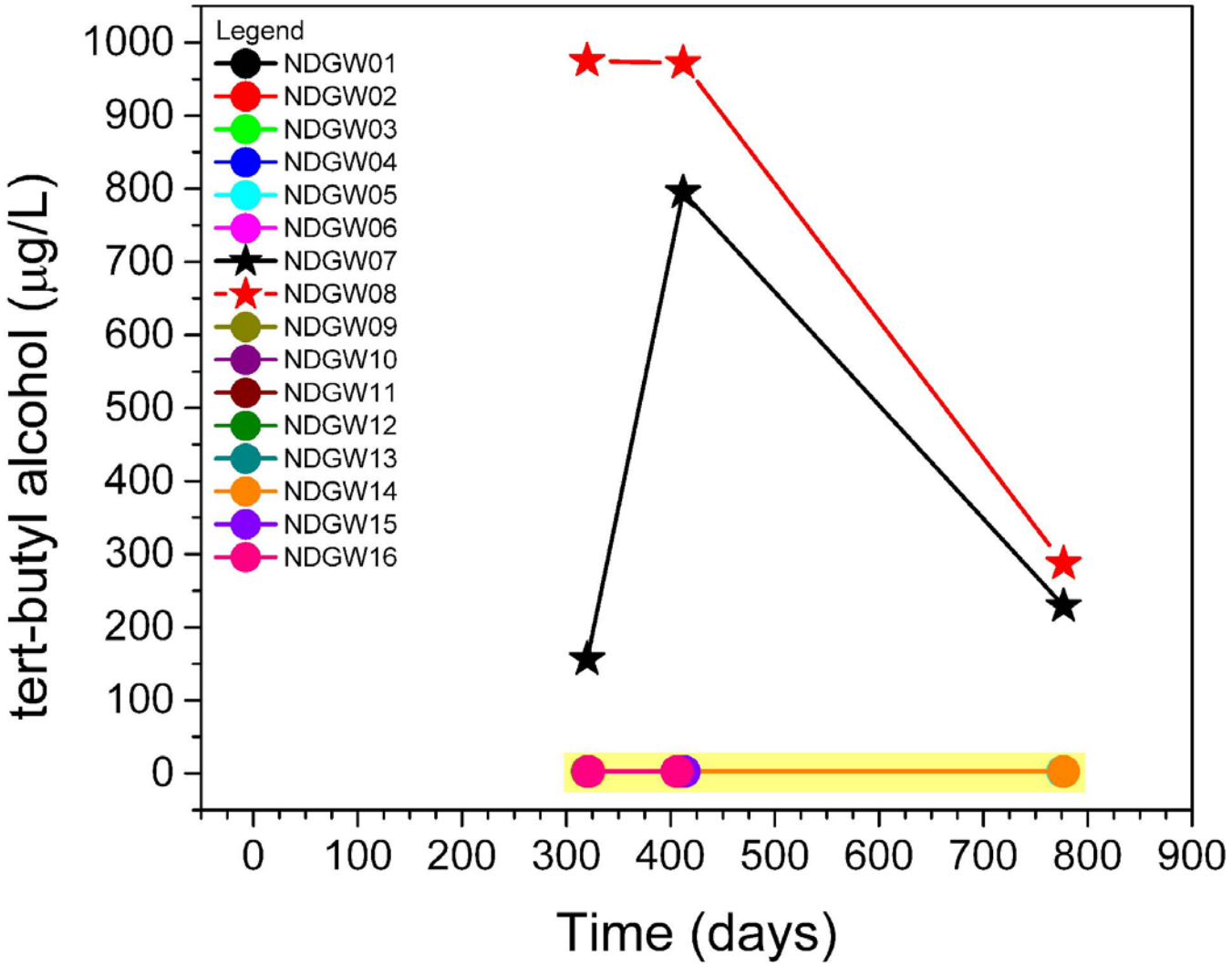

Figure 21. Time trend data for tert-butyl alcohol (TBA). Yellow shaded area represents unimpacted wells. The limited tert-butyl alcohol data suggest a potential plume moving through NDGW07 and NDGW08.

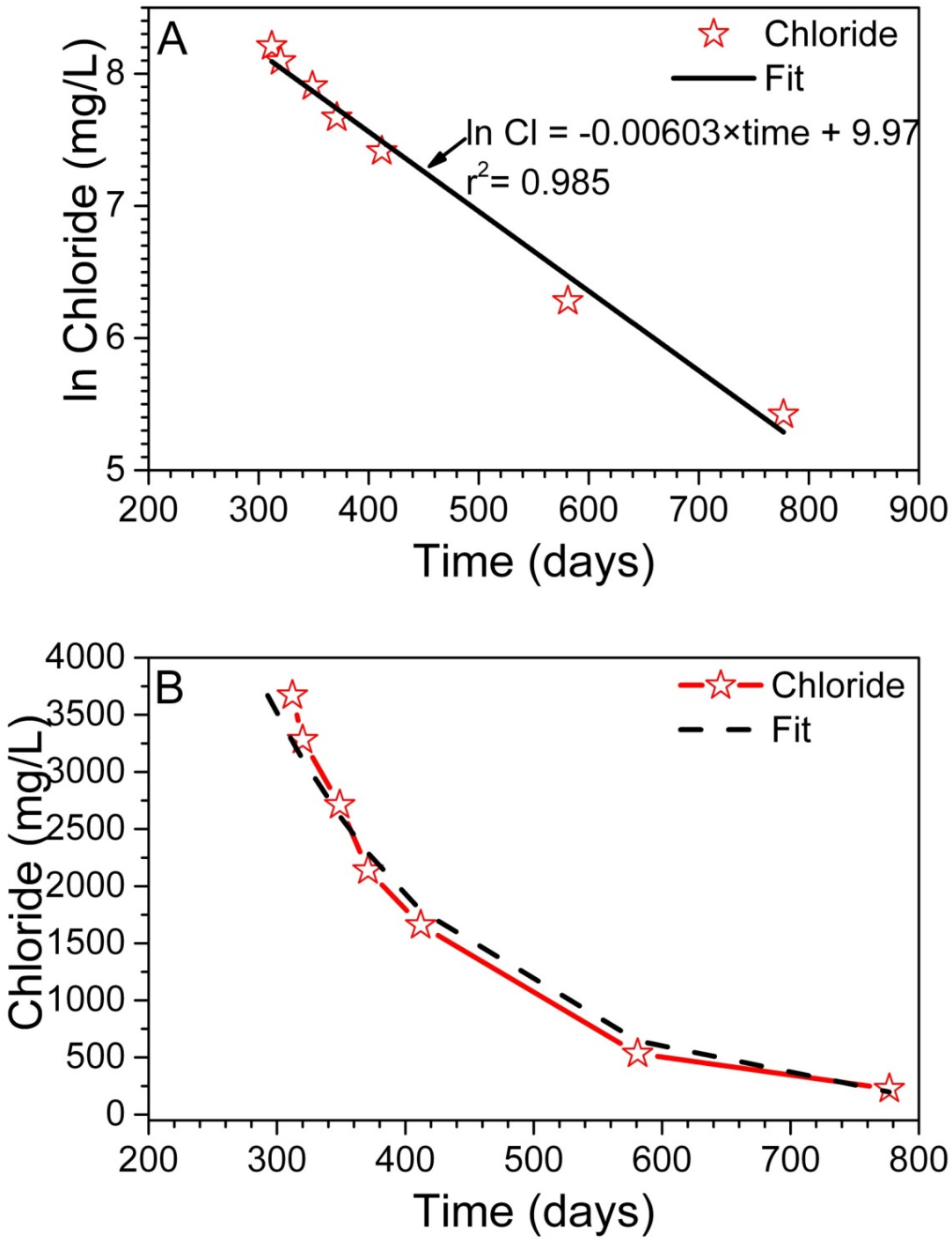

Figure 22. Plots used to predict the concentrations of chloride in NDGW08 after the October 2012 sampling round. (A) time versus the natural log of the chloride concentration used to develop the pseudo first order decay relationship. (B) Time versus chloride plot showing the relationship of the model to that actual chloride concentrations in NDGW08. Both plots used the state-provided data for NDGW08 because of the more frequent sampling intervals.

8.4. Source of the Brine

8.4.1. Out-of-Zone Fracturing

Research into out-of-zone hydraulic fracturing of the Bakken formation indicated that a large number of wells contain water that is external to the Bakken Zone (Arkadakshiy and Rostron, 2012; Peterman et al., 2012; Arkadakshiy and Rostron, 2013). Out-of-zone hydraulic fracturing is defined as the propagation of fractures outside the production zone into adjacent formations (Arkadakshiy and Rostron, 2013). The co-produced water comes from the adjacent, saturated carbonate aquifers (Arkadakshiy and Rostron, 2012; Peterman et al., 2012; Arkadakshiy and Rostron, 2013). Arkadakshiy and Rostron (2013) found up to 70% of the Bakken wells contained external water. The Bakken wells that contained external water were found to all contain water from the Mississippian Lodgepole formation (part of the Madison Group). Water from the underlying Birdbear/Nisku zone was detected in a small number of these wells—6 out of 358 wells (Arkadakshiy and Rostron, 2013). The average volume of external water was 34%, and the external water volume ranged from 10% to 100% (Arkadakshiy and Rostron, 2013).

Based on this information it appears that any analysis of sources of brine impacts should also include analysis of other formations (see Figure 23). Based on the above discussion on out-of-zone fracturing and the information presented in Figure 23, the likely formations for out-of-zone fracturing would be the Madison group, the Three Forks formation, and the Jefferson Group (Birdbear and Duperow Formations). Data were obtained for these formations as well as the Interlake, Red River, and Tyler Formations, also in Dunn County, for the source delineation analysis, which will be discussed in the next section.

8.4.2. Source Delineation

Techniques such as the use of correlation plots and ratios can be used to indicate or fingerprint brines (Leonard and Ward, 1962; Howard and Beck, 1993; Stoessell, 1997; Davis et al., 1998; Vengosh and Pankratov, 1998; Hudak and Wachal, 2001; Hudak, 2003; Panno et al., 2006; Freeman, 2007; Katz et al., 2011; Hudak, 2012; Harkness et al., 2015).

Log chloride versus log calcium, log magnesium, and log strontium plots as well as log sodium/chloride versus log calcium/chloride plots are shown on Figure 24. Also shown on Figure 24 are trend lines representing the 1:1 dilution between the median unimpacted well concentrations and the median concentrations of the various brine formation waters. With the exception of the Three Forks/ Sanish trend line in the log chloride versus log magnesium (Figure 24B), these trends are very similar in all other cases, with slight differences in slopes. The data from the impacted wells, NDGW07 and NDGW08, however, do not fall on the trend lines for calcium and strontium and have lower cation concentrations than would be predicted by a simple 1:1 dilution of formation water with the unimpacted wells (Figures 24A and 24C). This is not unexpected because the cations calcium and strontium are not conservative species. This means that other geochemical processes (precipitation, cation exchange, complexation, etc.) can alter the concentrations of the cations during transport in the aquifer and/or to the aquifer. For magnesium (Figure 24B) many data points for the impacted well NDGW08 and NDGW07 fall on or very close to the 1:1 trend lines for deep formation brines, with the exception of the Three Forks/ Sanish formation. NDGW07 and NDGW08 data are similar to the formation waters when plotting log sodium/chloride versus log calcium/chloride (Figure 24D). The plots in Figure 24 are useful in suggesting

Period	Group	Formation	Hydrocarbons
Permian		Spearfish	Gas, Oil
		Minnekahta	
		Opeche	
Pennsylvanian	Minnelusa	Broom Creek	
		Amseden	Oil
		Tyler	Gas, Oil, Source Rock
Mississippian	Big Snowy	Heath	Gas, Oil
		Otter	Oil
		Kibbey	Oil
	Madison	Charles	Oil, Source Rock
		Mission Canyon	Gas, Oil, Source Rock
		Lodgepole	Gas, Oil, Source Rock
		Midale[1]	Oil
		Ratcliffe[1]	Gas, Oil
Devonian		Bakken	Gas, Oil, Source Rock
		Three Forks/ Sanish Sand[2]	Gas, Oil
	Jefferson	Birdbear[3]	Gas, Oil
		Duperow	Gas, Oil, Source Rock
	Manitoba	Souris River	Oil
		Dawson Bay	Oil
	Elk Point	Prairie	
		Winnipegosis	Gas, Oil
		Ashern	
Silurian		Interlake	Oil
Ordovician	Big Horn	Stonewall	Gas, Oil
		Stony Mountain	Gas, Oil, Source Rock
		Red River	Gas, Oil, Source Rock
	Winnipeg	Winnipeg	Gas, Oil, Source Rock
		Deadwood	Gas, Oil, Source Rock

Figure 23. Detailed stratigraphy of the Paleozoic strata in the Williston Basin in North Dakota. (Source: Stilwell et al., 2009).

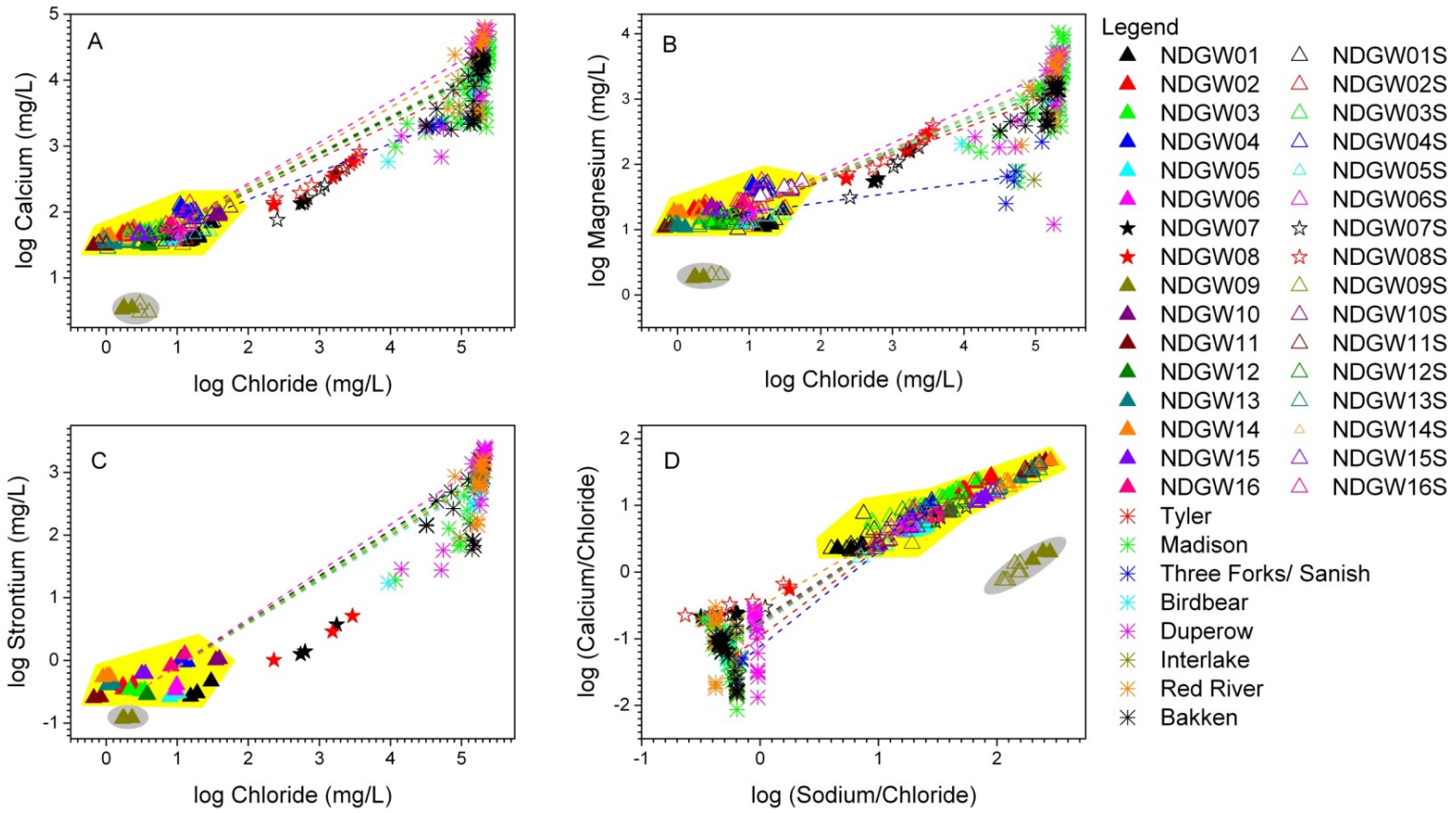

Figure 24. Plots of log chloride or sodium/chloride versus log cation and showing 1:1 trends between unimpacted wells and brine formation water. (A) log calcium, (B) log magnesium, (C) log strontium, and (D) log sodium/chloride vs log calcium/chloride. Gray shaded areas represents a possible mixture of Sentinel Butte aquifer water and Killdeer aquifer water. Yellow shaded area represents the unimpacted study well locations. NDGW07 and NDGW08 are slightly depleted with respect to calcium and strontium based on the mixing trends; magnesium data falls on the mixing trends for several of the brine formations; and the calcium/chloride ratios are slightly enriched with respect to the sodium/chloride ratios for NDGW07 and NDGW08. (Sources: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

that formation brines are a potential source of the impacts on NDGW07 and NDGW08 but are not useful in determining which formation brines would be the source of the observed impacts.

The chloride to bromide ratio (Cl/Br) can also be useful in differentiating sources of water. Panno et al. (2006) concluded that ratios of halides plotted against their own concentrations can distinguish between sources of chloride- contaminated water. In addition, Freeman (2007) was able to use Cl/Br to differentiate shallow ground water with elevated chloride concentrations between ground water that result from mixing salt-dissolution and ground water that has mixed with formation brines.

Figure 25 is a plot of log chloride versus log Cl/Br. The Cl/Br in unimpacted wells are much lower than those of the impacted wells (NDGW07 and NDGW08) and formation brines. The Cl/Br for NDGW07 and NDGW08 are in the same range as those of the brine formations. Both NDGW07 and NDGW08 Cl/Br plot between the mixing trends of the formation brines and unimpacted wells. The percentage of formation brines (up to 5%) needed to change the unimpacted Killdeer water along the mixing curves is indicated in Figure 26. As shown, NDGW07 and NDGW08 only need between 0.1 to 1 % of any of the formation brines to be mixed with the unimpacted Killdeer aquifer water to explain the changes observed in NDGW07 and NDGW08. The Cl/Br found in NDGW07 and NDGW08 are consistent with impacts as the result of mixing of formation brine water with Killdeer aquifer water.

Research has shown that lithium becomes more concentrated in brines, oil field brines, and saline lakes (Fontes and Matray, 1993a; Fontes and Matray, 1993b; Bottomley et al., 2003; Hancini and Oelkers, 2011). Fontes and Matray (1993a) inferred that lithium was a conservative species during sea water concentration, and lithium does not appear to be affected by reactions with solid salts and interbedded sediments. For these reasons lithium would represent a good tracer for the successive mixings in formation brines (Fontes and Matray, 1993a). Similarly, in saline lakes, lithium tends to be conserved during evaporation (Hacini and Oelkers, 2011). In brines associated with oil fields near Paris, France, Fontes and Matray (1993b) found that lithium concentrations in the brine were much higher than one would predict for sea water evaporation and this was likely caused by digenetic contributions (alterations in rock minerals during and after rock formation) for an extremely evolved brine. Bottomley et al. (2003) found that lithium is primarily of marine origin because lithium is a relatively minor component in crustal rocks in non-marine origin rocks. These authors were able to use lithium to show deep brine waters mixing with near surface waters derived from the interactions with host rocks (Bottomley et al., 2003). Therefore, lithium may be a useful indicator of water impacted by brines.

The log sodium/lithium ratios (Na/Li) were plotted against the log sodium concentrations for the study data and the formation brine waters (Figure 27). It is important to note that lithium data were collected only during the final round of sampling (October 2012), and it is not known how or if the Na/Li may have changed prior to this sampling round. NDGW07 and NDGW08 lie between that of the unimpacted wells and the other formation brines and fall on the mixing lines for the Bakken, Madison, and Birdbear formations. This would be consistent with the Franchuk well having had out-of-zone fracturing as was described in Arkadakshiy and Rostron (2012, 2013). Both the Birdbear and especially the Madison formation were implicated as sources of water in Bakken wells by these researchers (Arkadakshiy and Rostron, 2012, 2013; Peterman et al., 2012). As was done with the Cl/Br, the percentage of formation brines (up to 5%) needed to change the unimpacted Killdeer water along the mixing curves was plotted and is shown in Figure 28. Again, NDGW07 and NDGW08 only need between 0.1 to 1 % of any of the

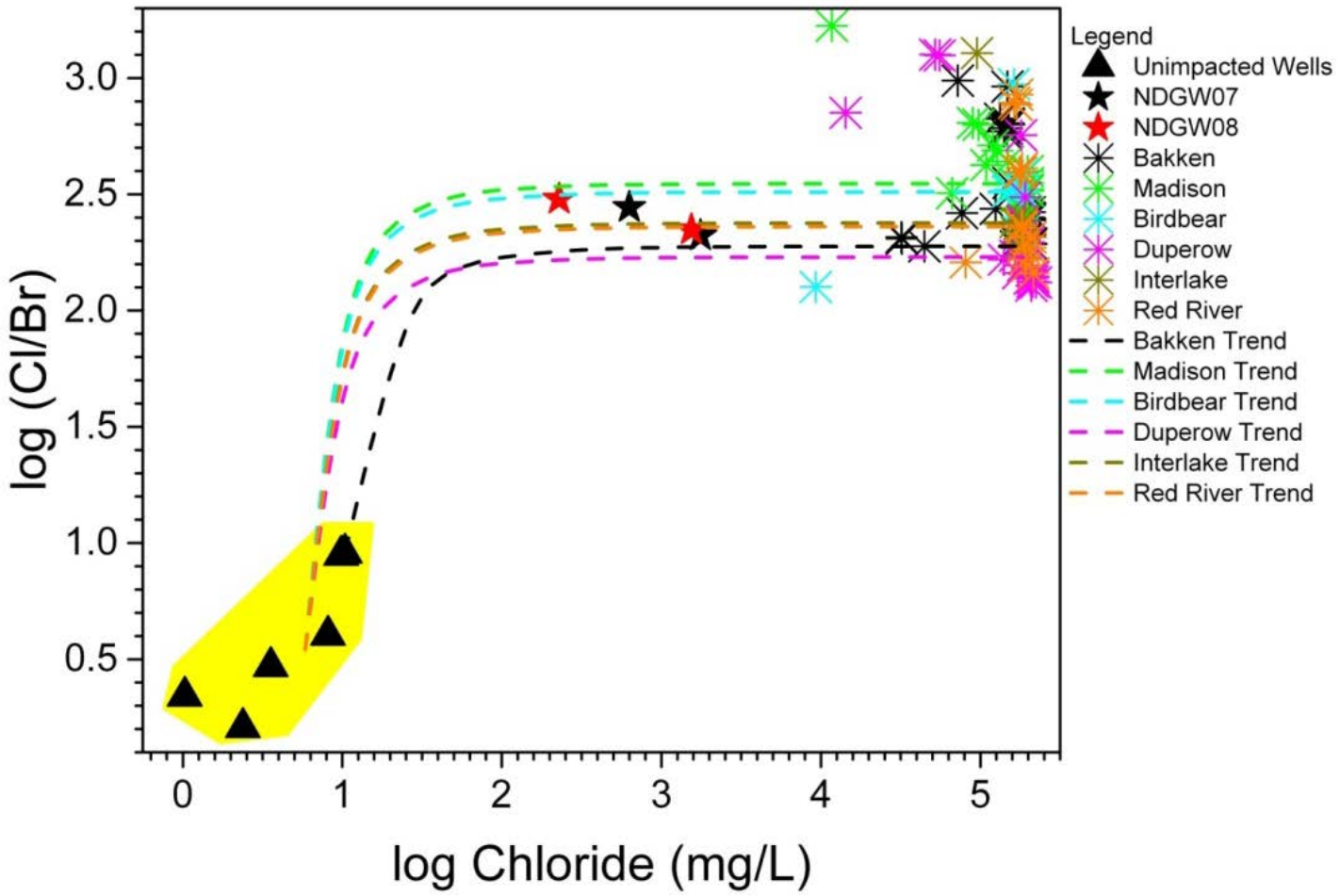

Figure 25. Plot of log chloride versus log Cl/Br for the unimpacted study wells NDGW07 and NDGW08 brine formation waters of oil and gas produced formations in Dunn County, North Dakota. Trend lines are plotted using the median chloride and Cl/Br ratios of the unimpacted wells and the brine formation. Yellow shaded area = unimpacted wells. NDGW07 and NDGW08 fall on the mixing lines between the unimpacted wells and the formation brine waters. This suggests that the water in NDGW07 and NDGW08 is the result of mixing of unimpacted Killdeer aquifer water and formation brine water. (Sources: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

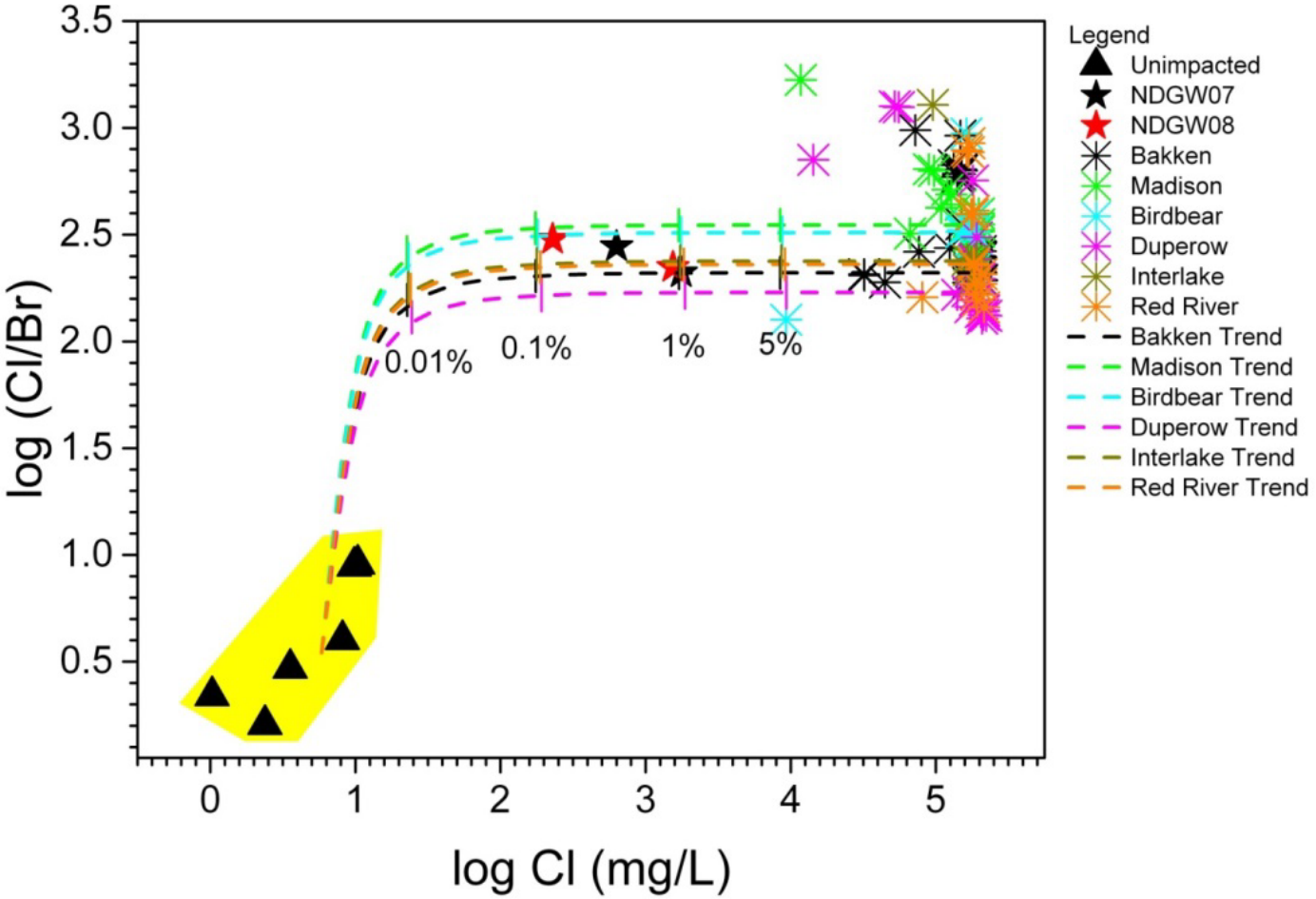

Figure 26. Plot of log chloride versus log Cl/Br showing mixing percentages. Horizontal ticks and number below correspond to the percent brine contribution, assuming mixing between the unimpacted wells and the formation brine waters. The mixing lines were developed using the median unimpacted and median brine formation values. The data suggest that 0.1 % to 1 % of a formation brine would be needed to mix with unimpacted Killdeer aquifer water in order to obtain the results for NDGW07 and NDGW08.

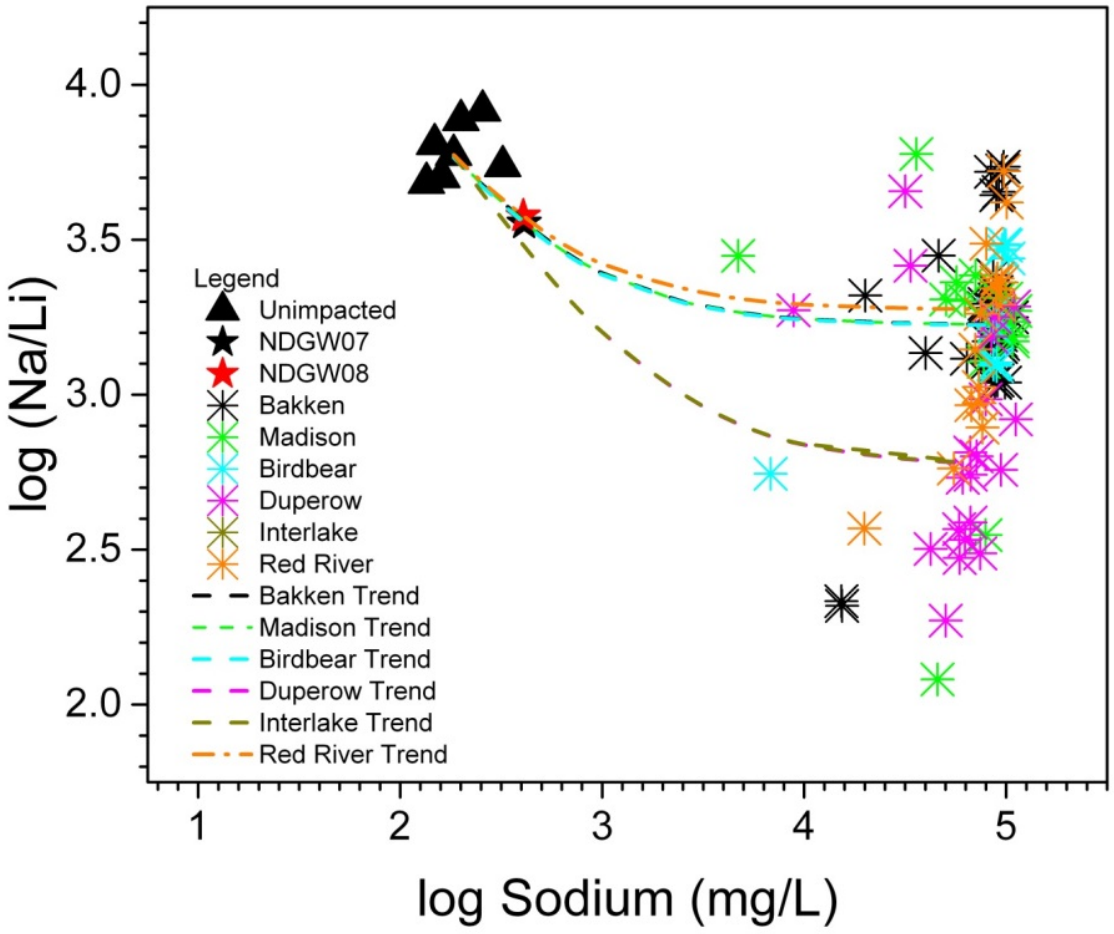

Figure 27. Plot of log sodium versus log Na/Li for study data and brine formation waters. The trend lines are plotted using the median sodium concentrations and median Na/Li ratios between the unimpacted wells and the formation brine waters. NDGW07 and NDGW08 fall on the mixing lines between the unimpacted wells and the formation brine waters. This suggests that the water in NDGW07 and NDGW08 is the result of mixing of unimpacted Killdeer aquifer water and formation brine water. (Sources: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

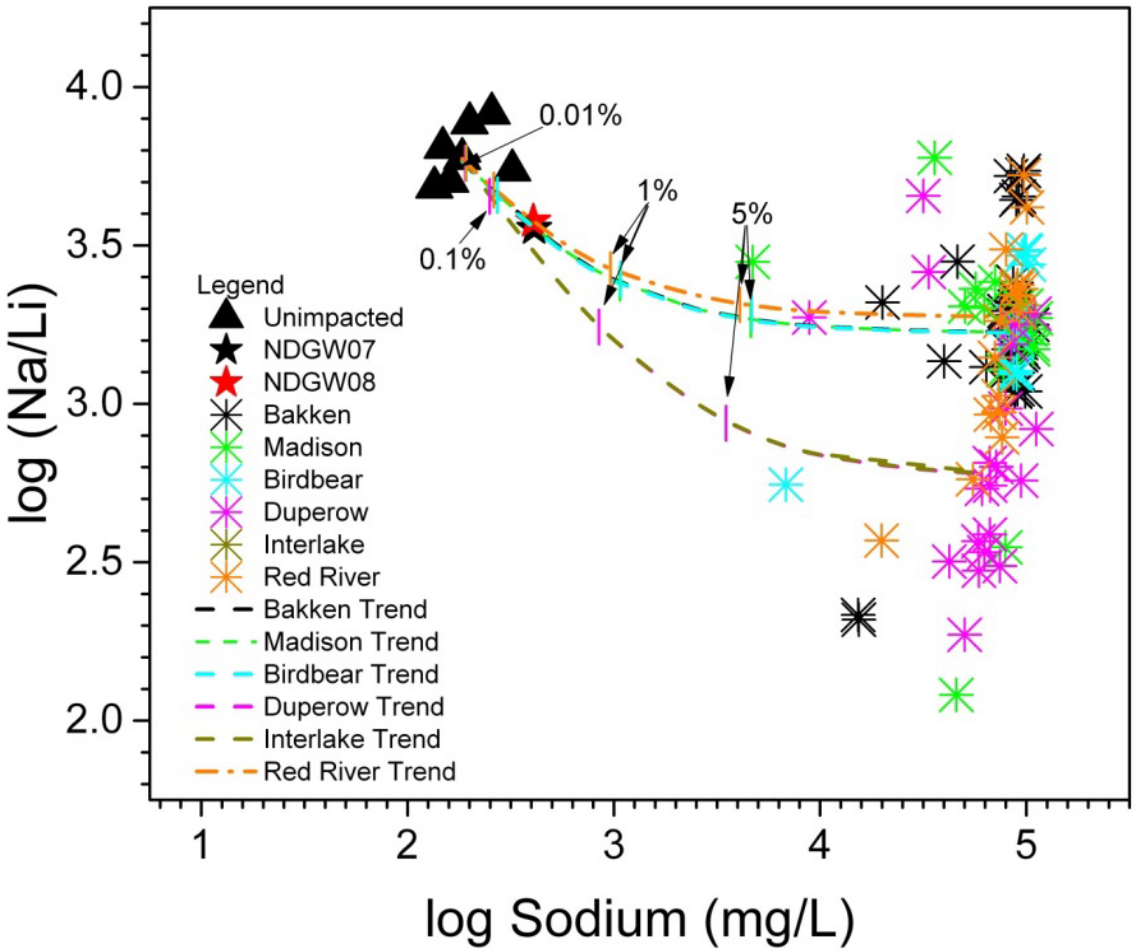

Figure 28. Plot of log sodium versus log Na/Li showing mixing percentages. Vertical ticks and number above and below correspond to the percent brine contribution, assuming mixing between the unimpacted wells and the formation brine waters. The mixing lines were developed using the median unimpacted and median brine formation values. The data suggest that 0.1 % to 1 % of a formation brine would be needed to mix with unimpacted Killdeer aquifer water in order to obtain the results for NDGW07 and NDGW08.

formation brines to be mixed with the unimpacted Killdeer aquifer water to explain the changes observed in NDGW07 and NDGW08.

Several researchers have suggested the use of iodide as a potential indicator to distinguish between sources of ground water (Lloyd et al., 1982; Howard and Beck, 1993; Stoessell, 1997; Panno et al., 2006). Lloyd et al. (1982) found that the presence of iodide in ground water indicates sea water intrusion into aquifers along English estuaries and can be used to distinguish ground waters in limestones and shaley gypsiferous rocks as well as to indicate residence time. Iodide has also been found to be useful in differentiating waters impacted by road salts and saline bed rock waters even when these waters are not distinguishable using major ions (Howard and Beck, 1993). Finally, Stoessell (1997) was able to show that iodide was useful in identifying ground water that had been potentially impacted by oil field brines.

A plot of log chloride versus log Cl/I ratios is shown in Figure 29; again, iodide was collected only during the final round of sampling (October 2012). It is not known how or if the Cl/I changed before this sampling round. Figure 29 shows that the Cl/I in NDGW07 and NDGW08 is lower than the unimpacted wells and falls outside the mixing trends between the unimpacted wells and the formation brines. Also, it can be seen that, based on the spread of the Madison formation brine data, NDGW07 and NDGW08 could still potentially fall within the mixing envelope (defined by the area between the upper and lower limit lines for the unimpacted Killdeer aquifer and the brine formation) of the Madison formation brine waters. Therefore, mixing envelopes were prepared for the Bakken formation brines and the Madison formation brines (Figure 30). NDGW07 and NDGW08 do fall within the mixing envelopes of the Madison formation brines (Figure 30B), whereas NDGW07 and NDGW08 do not fall within the mixing envelopes of the Bakken brines (Figures 30A). This finding suggests that the Madison formation brine is the source of the brine impact on NDGW07 and NDGW08.

Figure 31 shows a plot of the reciprocal strontium concentration versus $^{87}Sr/^{86}Sr$ ratio for the study data, the Bakken formation, and the Madison formation (Ratcliffe member). NDGW07 and NDGW08 also plot between the unimpacted and brine formations. The unimpacted wells and NDGW07 and NDGW08 have an $^{87}Sr/^{86}Sr$ isotopic composition similar to the Madison formation but are different than the $^{87}Sr/^{86}Sr$ isotopic composition of the Bakken formation. Also indicated on Figure 31 are arrows showing changes in NDGW07 and NDGW08 between the October 2011 and October 2012 sampling rounds. The changes are primarily associated with the strontium concentrations.

Time trends for the study data and mixing curves between the unimpacted wells and the brine formations (Bakken and Madison) were used to better understand the source of the brine impacts seen in NDGW07 and NDGW08 (Figures 32 and 33). Both the Bakken and Madison formation waters could explain the apparent $^{87}Sr/^{86}Sr$ isotopic signature of NDGW07 and NDGW08 (Figure 31). Figure 32 further investigates the changes in strontium isotopic composition and concentration between the October 2011 and October 2012 sampling rounds. Figure 32 shows that there was a very slight decrease in the strontium isotopic composition between the two sampling rounds. Furthermore, the isotopic composition trends of the unimpacted wells and those of NDGW07 and NDGW08 are similar. This suggests that the changes in strontium isotopic composition are likely part of the natural variations in the Killdeer aquifer at the Franchuk well site. NDGW07 and NDGW08 strontium concentrations trends (Figure 32) are different than those of the unimpacted wells (except NDGW06). The strontium concentrations in the unimpacted wells (except NDGW06) did not appear to vary between the October 2011 and October 2012 sampling rounds. NDGW07 and NDGW08 both show decreasing strontium

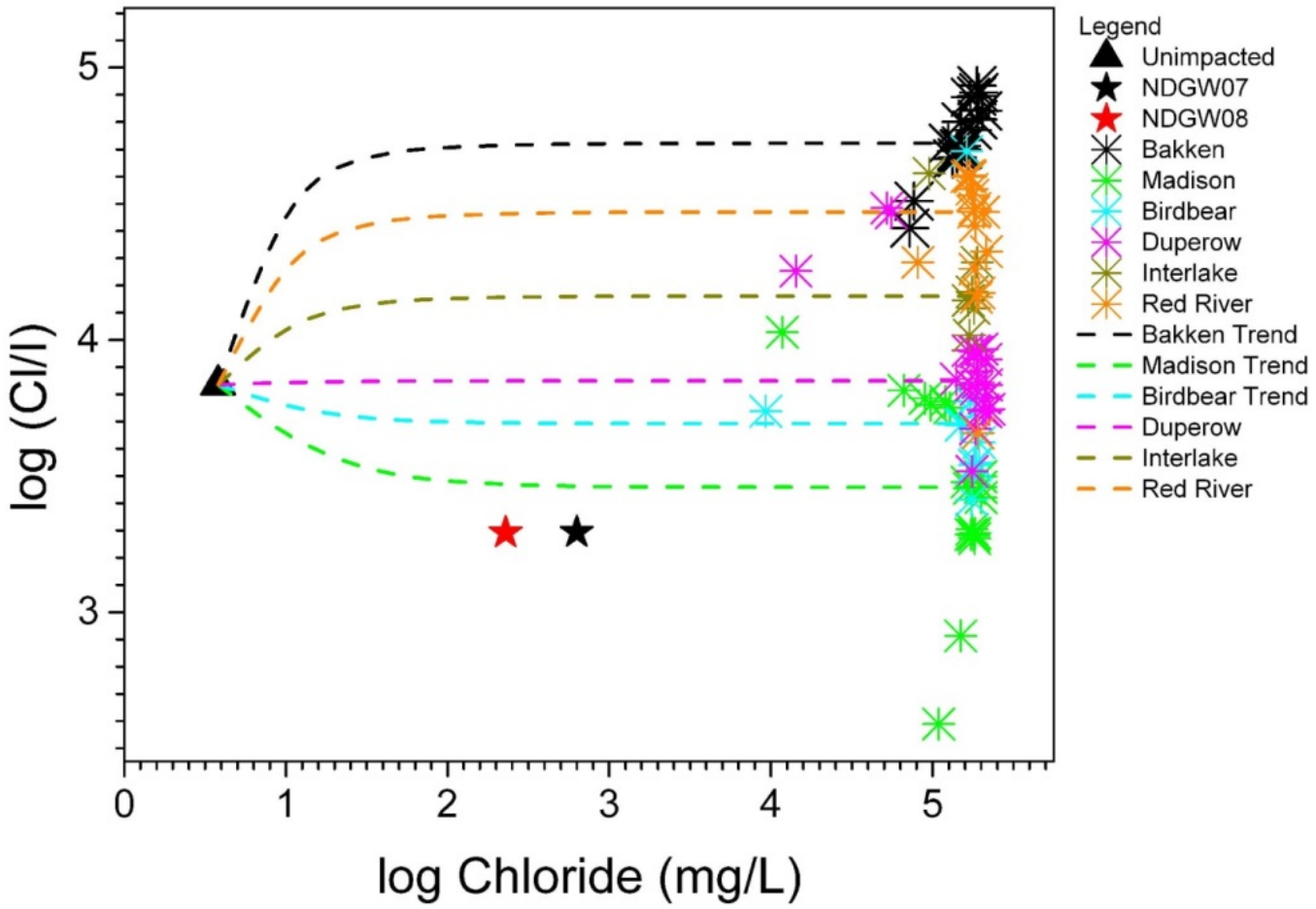

Figure 29. Plot of log chloride versus log Cl/I for study data and brine formation waters. The trend lines are plotted using the median chloride concentrations and median Cl/I ratios between the unimpacted wells and the formation brine waters. Using the median chloride concentrations and the median Cl/I ratios, NDGW07 and NDGW08 appear to fall outside the mixing trends between the unimpacted Killdeer aquifer water and formation brine waters. (Sources: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

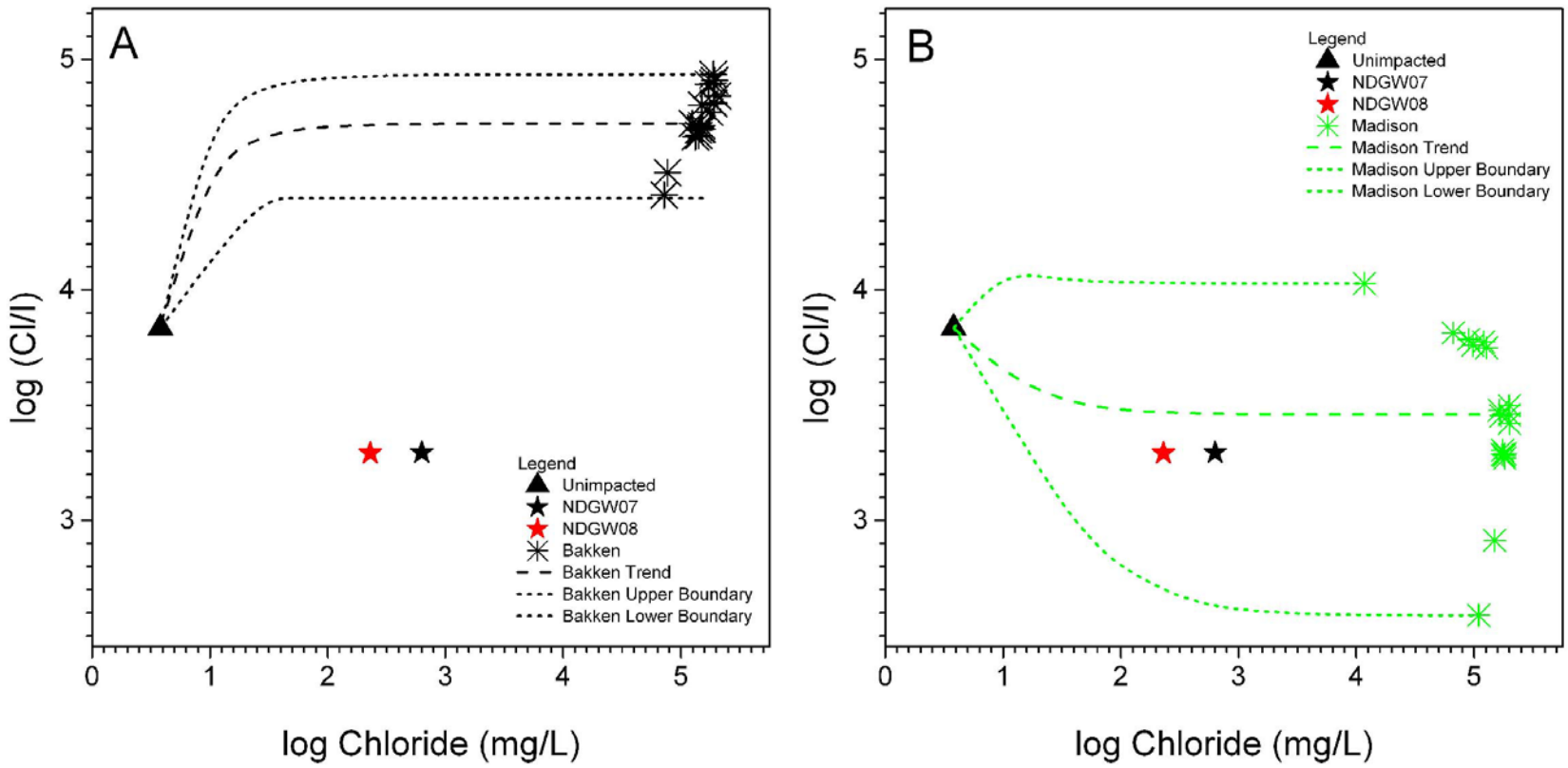

Figure 30. Plot of log chloride versus log Cl/I for study data and (A) Bakken formation water and (B) Madison formation waters. The trend lines are plotted using the median chloride concentrations and median Cl/I ratios between the unimpacted wells and the formation brine waters. The mixing envelopes for the Bakken formation water indicates that NDGW07 and NDGW08 are not likely the result of mixing of Bakken formation water and the unimpacted Killdeer aquifer water. The water found in NDGW07 and NDGW08 could have resulted from the mixing of unimpacted Killdeer aquifer water and Madison formation water because the water found in NDGW07 and NDGW08 fall within the mixing envelope. (Sources: USGS, 2002; Shouaker-Stash, 2008; Preston et al., 2012; USGS, 2013).

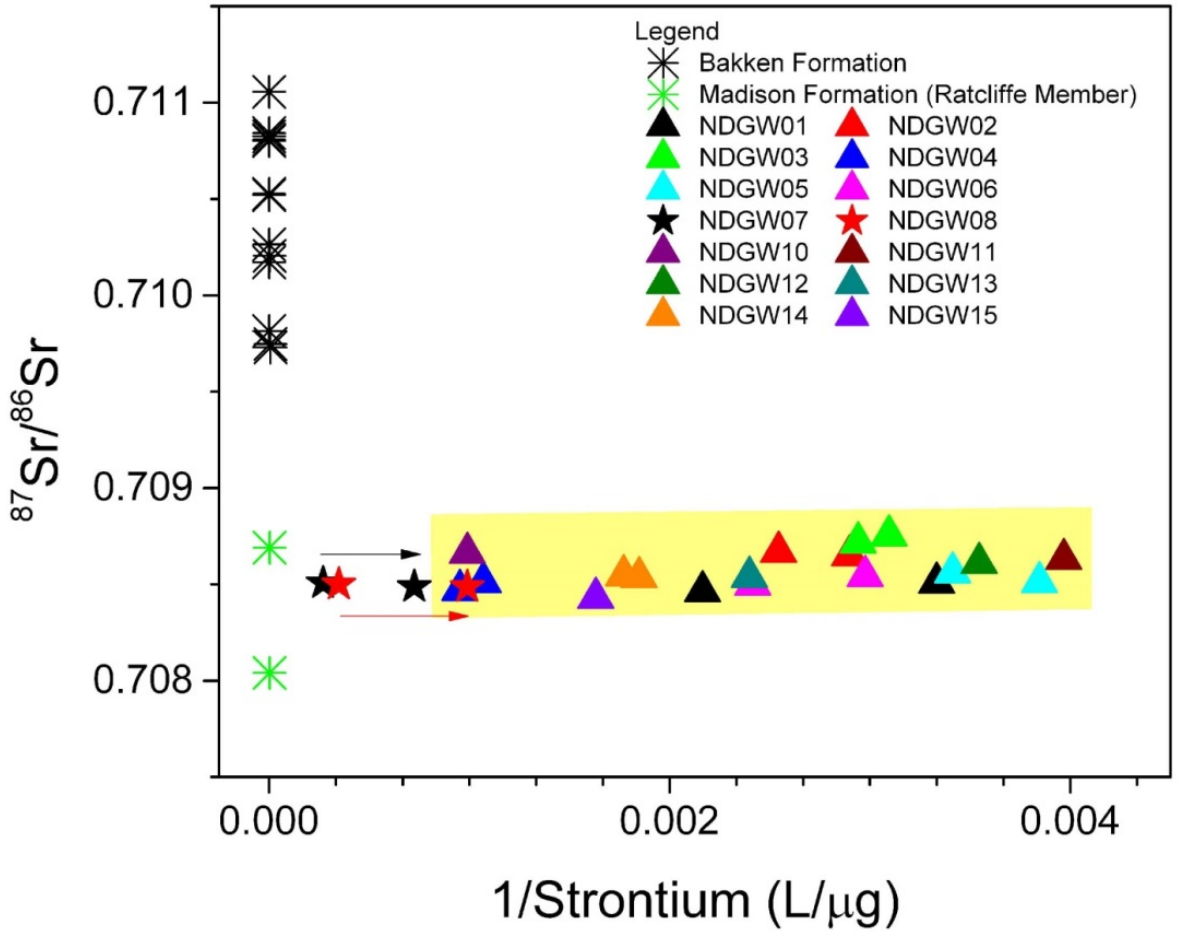

Figure 31. Strontium isotope plot at the Killdeer retrospective case study. Yellow shaded area represents the unimpacted wells. Black and red arrows indicate the changes in strontium concentrations between the October 2011 sampling round and the October 2012 sampling round for NDGW07 and NDGW08. Although the strontium isotopic composition did not change between these two events, the strontium concentration did change. The strontium concentrations over this time period became more like the unimpacted Killdeer aquifer water. The strontium isotopic composition was similar to that of the Madison formation waters. (Source: USGS, 2013).

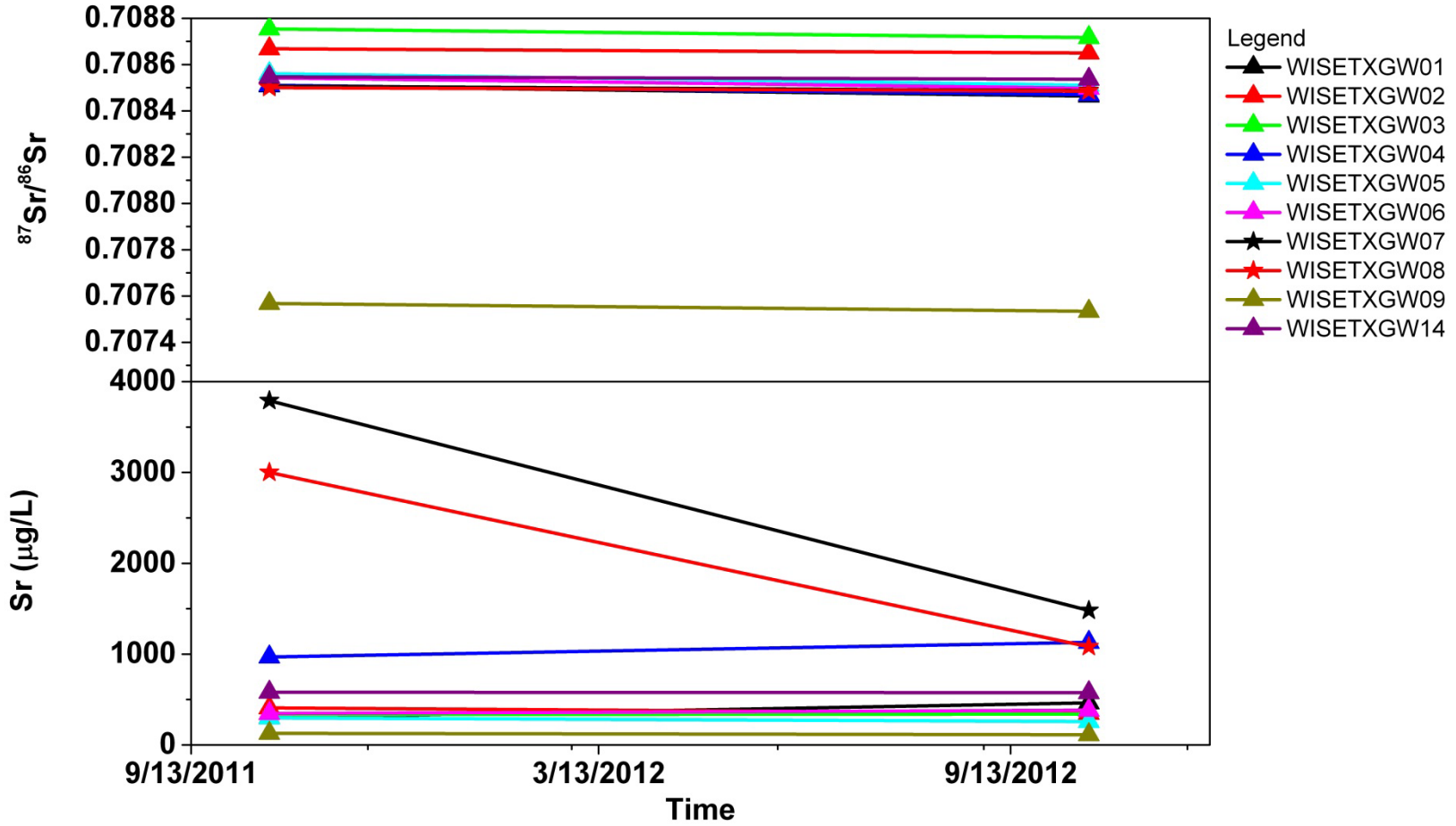

Figure 32. Strontium isotopic ratio and concentration time trends. The strontium isotopic composition did not change over the time period of the study; however, the strontium concentration did change over the time period of the study in NDGW07 and NDGW08. The unimpacted wells strontium concentrations and isotopic signature remained relatively constant over the time period of the study.

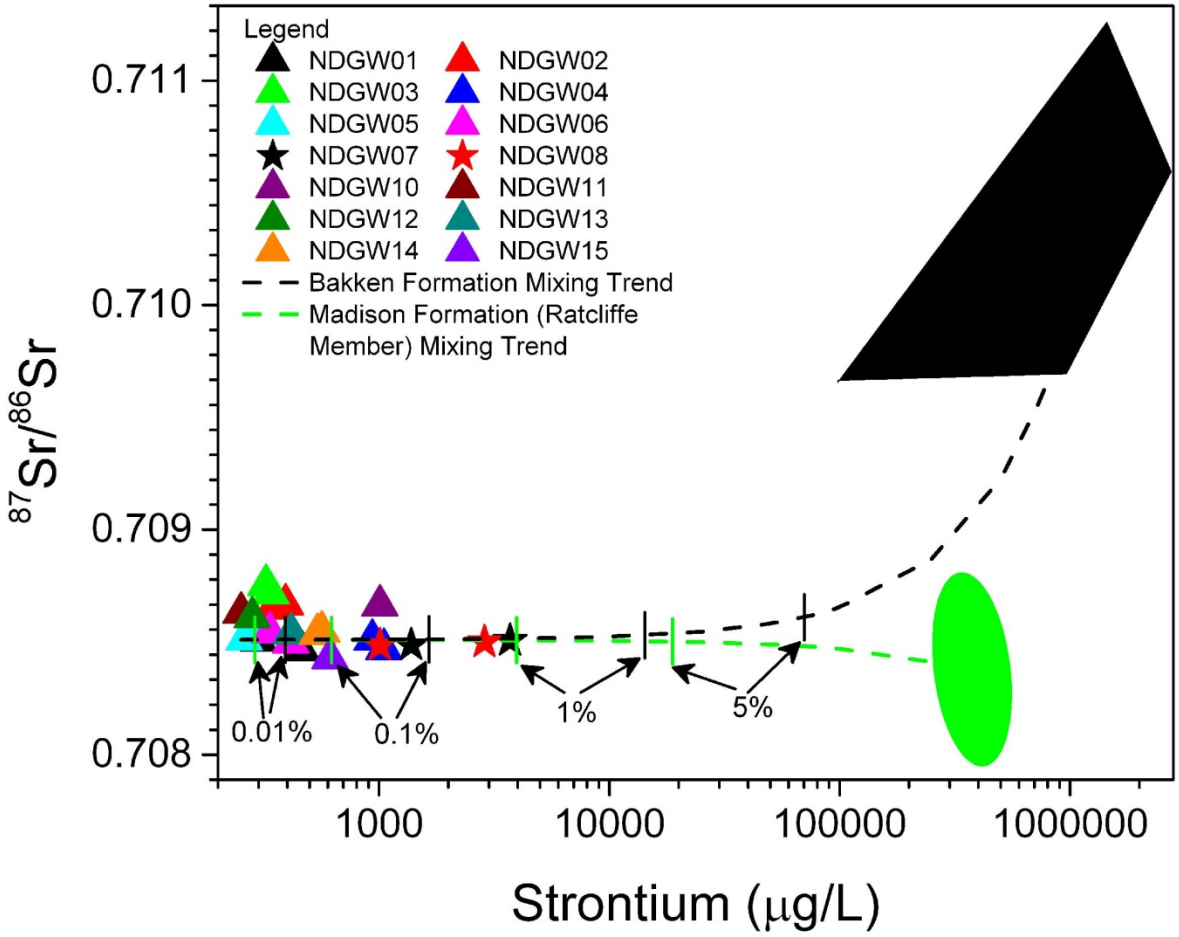

Figure 33. Strontium isotope mixing curves. Horizontal ticks and number below correspond to the percent brine contribution, assuming mixing between the unimpacted wells and the formation brine waters. The mixing lines were developed using the median unimpacted and median brine formation values. The data suggest that 0.1 % to 1 % of a formation brine would be needed to mix with unimpacted Killdeer aquifer water in order to obtain the results for NDGW07 and NDGW08. Black shaded area represents the Bakken formation and the green shaded area represents the Madison formation (Ratcliffe member).

concentration between the October 2011 and October 2012 sampling rounds. NDGW06 shows a slight increasing strontium concentration during this time interval. However, using the data collected as part of this study, it is not known whether the Sr concentration in NDGW06 would constitute an upward trend or if this is the result of an anomalous data point.

The percentage of formation brines (up to 5%) needed to change the unimpacted Killdeer water along the mixing curves was plotted and is shown in Figure 33. Again, NDGW07 and NDGW08 only need between 0.1 to 1 % of any of the formation brines to be mixed with the unimpacted Killdeer aquifer water to explain the changes observed in NDGW07 and NDGW08. Based on mixing models alone, one cannot distinguish between the strontium isotopic fingerprint of the Bakken formation brine or the Madison formation brine.

Combining the $^{87}Sr/^{86}Sr$ isotopic ratios and concentration time trends with a mixing analysis (Figure 34) can potentially be used to delineate a source of the brine observed in NDGW07 and NDGW08. If the Bakken formation was the source of the brine, one would expect the $^{87}Sr/^{86}Sr$ ratio in NDGW07 and NDGW08 to decrease with time, which was not observed. Rather the $^{87}Sr/^{86}Sr$ ratio remained relatively constant with time. This relatively constant $^{87}Sr/^{86}Sr$ ratio over the course of the study in NDGW07 and NDGW08 suggests that the Madison formation would be the brine source. The reason for this is that based on the mixing model for the Madison formation, only the strontium concentration would be required to change and not the $^{87}Sr/^{86}Sr$ isotopic ratio, which was observed in the study. As was stated earlier, Arkadakshiy and Rostron (2013) found that many Bakken wells often had out-of-zone fractures, so this could potentially have happened at the Franchuk well and would explain why the impacts on NDGW07 and NDGW08 did not have an isotopic signature like the Bakken formation wells.

Stable isotopes of water ($\delta^{18}O$ and $\delta^{2}H$) were collected as part of this study and compared with data for formation waters produced in Dunn County, North Dakota (Figure 35). In Figure 35A one can see that the study data mostly lie below the Global Meteoric Water Line (GMWL) (Craig, 1961), and the Local Meteoric Water Line (LMWL) (Kendall and Coplen, 2001) fits the study data better. With the exception of the Madison formation, all other formation waters show considerable differences between the study samples and the formation water isotopic signature, and NDGW07 and NDGW08 do not fit the mixing trends. The water isotopic signature of the Madison formation overlaps the study isotopic water signature but is slightly shifted to lower values of $\delta^{18}O$ and $\delta^{2}H$ (Figure 35). If one looks at the study portion of this plot in detail (Figure 35B) it appears that the majority of the unimpacted wells fall on the LMWL. This is not unexpected because the main source of water in the Killdeer aquifer is believed to be recharge from precipitation (Klausing, 1979; Murphy, 2001). A closer look also reveals that the isotopic composition of the water from NDGW07 and NDGW08 initially are above the LMWL and then move below the LMWL, as indicated by the arrows in Figure 35B. The majority of the unimpacted wells are somewhat shifted from NDGW07 and NDGW08 to higher values of $\delta^{18}O$ and $\delta^{2}H$. In addition, it appears that NDGW07 and NDGW08 plot within the isotopic signature of the Madison formation (Figure 35B). Warner et al. (2012) points out that $\delta^{18}O$ and $\delta^{2}H$ are not sensitive tracers for mixing of two sources of water. Therefore, stable isotopes of water are not sensitive enough to determine if the Madison formation is the source of the changes in water quality seen in NDGW07 and NDGW08. What Figure 35B does point out is that the other formation waters are not the source of the observed impacts in NDGW07 and NDGW08, based on water isotopic signatures.

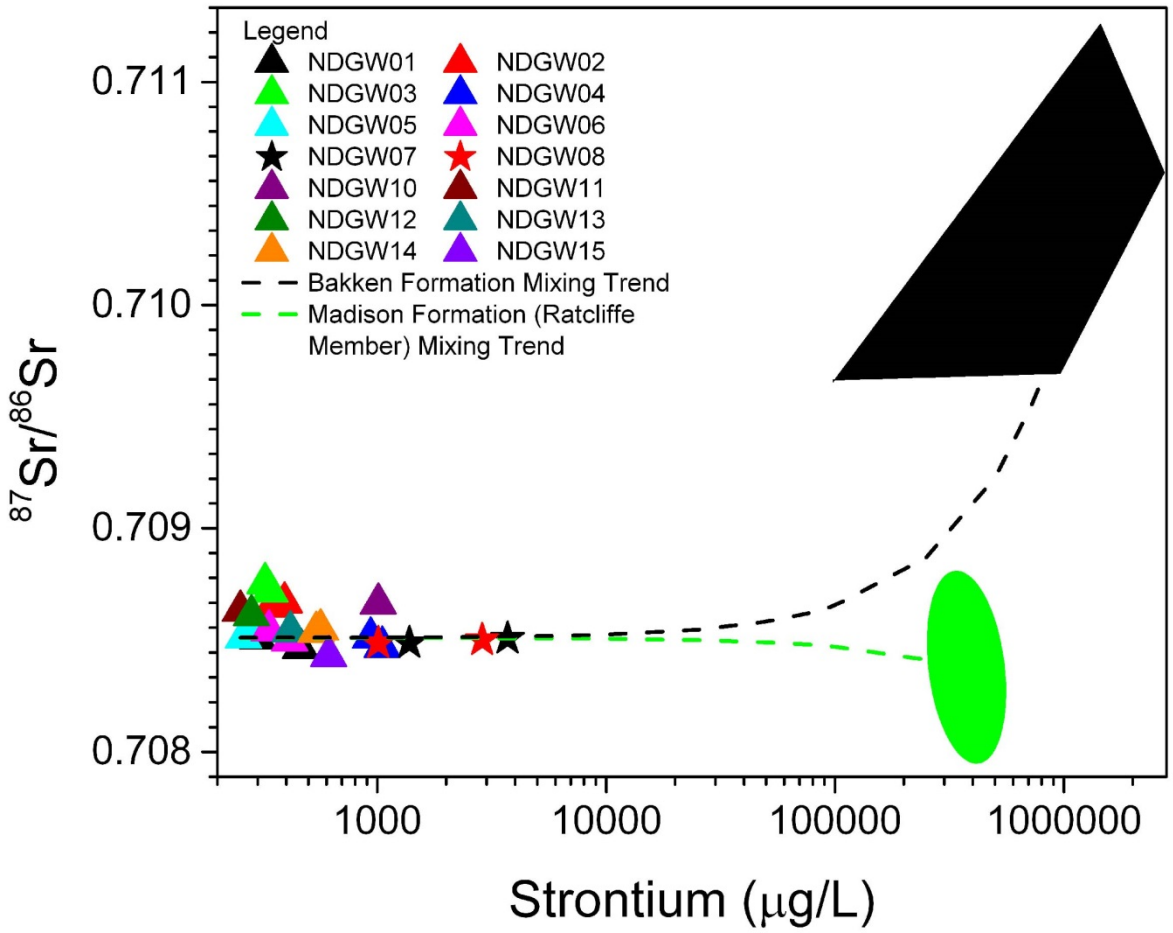

Figure 34. Strontium isotope mixing curves for the Bakken formation and the Madison formation (Ratcliffe member) without mixing values. Black shaded area represents the Bakken formation and the green shaded area represents the Madison formation (Ratcliffe member). Mixing trends plotted using unimpacted Killdeer aquifer water and waters from the Madison and Bakken formations indicate the water in the study wells NDGW07 and NDGW08 could have resulted from mixing of waters from the end members. (Source: USGS, 2013).

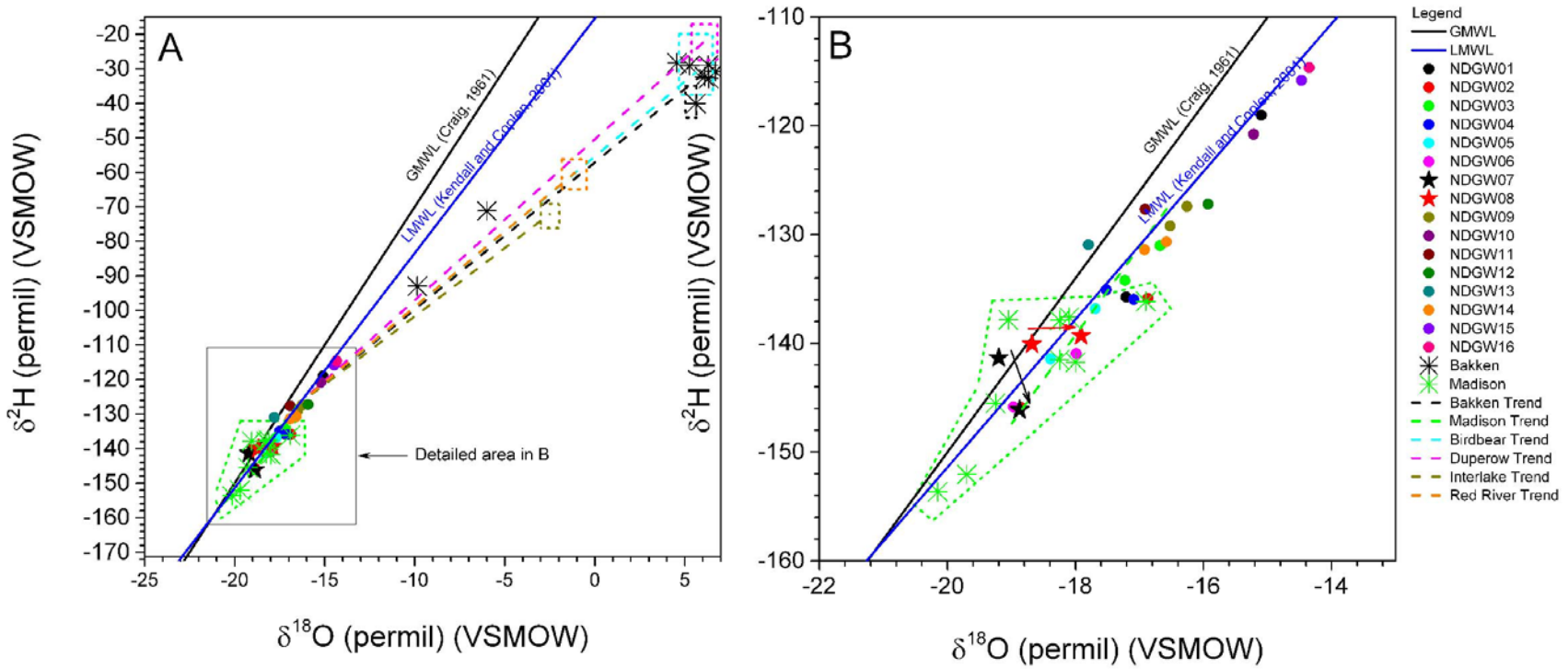

Figure 35. Water isotope plots of $\delta^{18}O$ versus $\delta^{2}H$. (A) Study data and formation water data, (B) Expanded view from A. Colored areas represent the formation waters ranges and colors correspond to color in the legend for the formation trends. This figure shows that the water derived in NDGW07 and NDGW08 is not likely the result of mixing of formation brines other than potentially the Madison formation brine water with unimpacted Killdeer aquifer water. (Source: Rostron and Holmden, 2000; USGS, 2013).

An impact due to road salt applied to the highway just to the south of the Franchuk well pad would be very unlikely because the ground water flow direction would have to be to the north, in contrast to the south, based on information from this study. Based on the data from the other unimpacted monitoring wells, impacts caused by surrounding oil and gas activities or land use practices or industrial activities are also unlikely because one would expect there to be residual chemical signature of an impact in those unimpacted monitoring wells. These unimpacted monitoring wells were not statistically different than the historical background water quality of the Killdeer aquifer. Based on this study, the blowout at the Franchuk well is a probable cause of the impact seen in NDGW07 and NDGW08.

The preceding analysis of potential sources indicates that the source of the brine impact on NDGW07 and NDGW08 is consistent with mixing of Madison formation brines with Killdeer aquifer water. Although the Franchuk well was drilled into the Bakken formation, others have pointed out that out-of-zone fracturing is a common problem with Bakken wells (Arkadakshiy and Rostron, 2012; 2013). Furthermore, Aradakshiy and Rostron (2013) have pointed out that when out-of-zone fracturing occurs, many Bakken wells have a Madison-like produced water. This could explain the influence of Madison formation water in NDGW07 and NDGW08.

8.5. Tert-Butyl Alcohol (TBA)

Tert-butyl alcohol was consistently and selectively present in NDGW07 and NDGW08 throughout the course of the study (Appendix B, Table B4). The potential sources for the observed TBA are fluids released during the Franchuk well blowout event and potential releases of contamination (see Appendix C) related to gasoline spills and leaking USTs.

Methyl tert-butyl ether (MTBE) can be present in gasoline and can degrade to TBA (Wilson et al., 2005). However, gasoline as the source of TBA is unlikely because methyl tert-butyl ether was not detected nor was any other components of gasoline or the daughter products of gasoline detected in upgradient wells or other monitoring wells.

Although TBA was not listed as a component of the hydraulic fracturing fluid used at the Franchuk well, it is known to be a daughter product of tert-butyl hydroperoxide, which was used (see Table 1) (Hiatt et al., 1964; Martynova et al., 2001; Chen, 2005; Stepovik and Potkina, 2013). Hiatt et al. (1964) found that unreacted tert-butyl hydroperoxide [$(CH_3)_3COOH$] would form TBA [$(CH_3)_3COH$] and oxygen (O_2) by the following mechanism:

$$(\mathrm{CH_3})_3\mathrm{COOH} \rightarrow (\mathrm{CH_3})_3\mathrm{CO}\cdot + \cdot\mathrm{OH}$$

$$(\mathrm{CH_3})_3\mathrm{CO}\cdot + (\mathrm{CH_3})_3\mathrm{COOH} \rightarrow (\mathrm{CH_3})_3\mathrm{COH} + (\mathrm{CH_3})_3\mathrm{COO}\cdot$$

$$2(\mathrm{CH_3})_3\mathrm{COO}\cdot \rightarrow \mathrm{O_2} + 2(\mathrm{CH_3})_3\mathrm{CO}\cdot.$$

Others also have proposed mechanisms for the degradation of tert-butyl hydroperoxide in the presence of metal cations (M^{n+}) and organic compounds (R-H) (Martynova et al., 2001; Chen, 2005; Stepovik and Potkina, 2013):

$$(\mathrm{CH_3})_3\mathrm{COOH} + \mathrm{M^{n+}} \rightarrow (\mathrm{CH_3})_3\mathrm{CO}\cdot + \mathrm{OH^-} + \mathrm{M^{n+1}}$$

$$(\mathrm{CH_3})_3\mathrm{CO}\cdot + \mathrm{R-H} \rightarrow (\mathrm{CH_3})_3\mathrm{COH} + \mathrm{R}\cdot.$$

Either of these mechanisms is a plausible explanation of the TBA detected in NDGW07 and NDGW08. Because TBA was not detected in any other monitoring wells or the upgradient wells it is unlikely that the source of TBA was any other oil and gas activities in the area.

8.6. Sulfate

Sulfate concentrations in the Killdeer aquifer commonly exceeded the secondary maximum contaminant level (SMCL) for sulfate. This was true for data collected as part of the study and historical databases and also was reported by Battelle (2013). Gypsum is a common source of sulfate as well as a sink for sulfate in the environment (Hounslow, 1995). Figure 36 is a plot showing the relationship of sulfate concentrations to the gypsum saturation index. Figure 36 was constructed using gypsum saturation indices calculated using Geochemist Workbench. Forty-one of the 42 study samples collected (98%) had charge balances ≤ 5%. One sample, NDGW05-102011, had a charge balance of 5.2% and was still included in Figure 36 because this would potentially cause only a minor error in the calculation of the gypsum saturation index.

As is shown in Figure 36, even when the sulfate concentrations are greater than the SMCL, the gypsum saturation index would indicate that the water in the Killdeer aquifer is under-saturated with respect to gypsum. This means that the water can continue to have higher sulfate concentrations until the saturation index reaches 0. According to the soil survey of Dunn County, many of the soils have salt crystals/ layers, gypsum crystals/layers, and carbonate crystals/layers in the sub soil (USDA, 2013). All these are potential sources for sulfate in the Killdeer aquifer. The primary recharge to the Killdeer aquifer is through recharge from precipitation, and as the precipitation leaches through the soil to the aquifer it is likely to come into contact with gypsum and would dissolve some of the gypsum or selenite, releasing sulfate into the water. Therefore, the high sulfate in the Killdeer aquifer is naturally occurring and most likely not related to any anthropogenic sources.

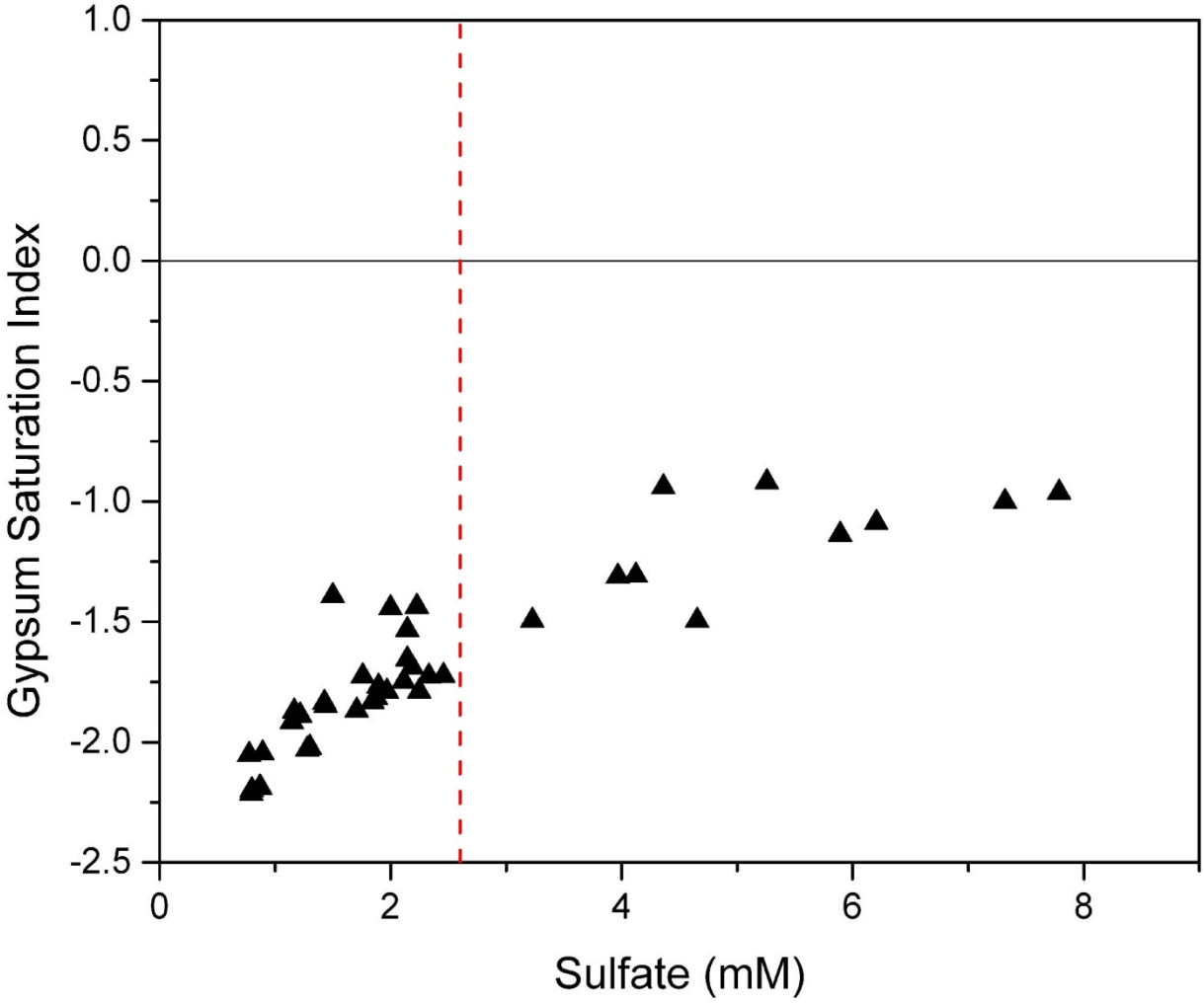

Figure 36. Plot showing the relationship of sulfate concentrations collected in this study to the saturation index of gypsum. Saturation index equal to zero indicates that the sulfate concentrations in the water is in equilibrium with solid gypsum, saturation index> 1 indicates the sulfate concentrations of water are oversaturated with respect to gypsum, and saturation index <1 indicates sulfate concentrations in the water are under-saturated with respect to gypsum. The black triangles = study data and the red dashed line in the sulfate secondary MCL. As is shown, all study samples were under-saturated with respect to gypsum regardless if they were <secondary MCL or >secondary MCL for sulfate.

9. Summary of Case Study Results

The Killdeer Retrospective Case Study was conducted near the city of Killdeer, in Dunn County, North Dakota. The area was and is currently part of the Bakken Shale development. This retrospective case study contrasts with the other EPA retrospective case studies in that the study was done in an area where a known release occurred during the hydraulic fracturing process. The known release was the result of a blowout that occurred in the Franchuk 44-20 SWH well in September 2010, during the fifth stage of a 23-stage hydraulic fracture (Jacob, 2011). The blowout resulted in the release of hydraulic fracturing fluids, oil, and flowback water onto the land surface and possibly into the Killdeer aquifer. The blowout resulted when an inner string of casing ruptured due to over-pressurization during the hydraulic fracturing process. The blowout prompted state action, which led to the installation of monitoring wells on and around the well pad and monitoring of nearby domestic wells, water supply wells, and municipal wells for the city of Killdeer. A comprehensive evaluation of the ground water around the well pad was conducted as part of this study to determine the level of impact and to account for all potential sources of contamination. Two potential pathways for contamination of the Killdeer aquifer from the blowout were considered: (1) direct release from the Franchuk wellbore laterally into the Killdeer aquifer and (2) indirect contamination from surface infiltration of released fluids down into the Killdeer aquifer.

The initial screening analysis of the study data identified two wells, NDGW07 and NDGW08, as having different water quality than the other study wells. NDGW07 and NDGW08 showed differences in the majority of parameters such as chloride, calcium, magnesium, sodium, and strontium. The study wells, excluding NDGW07, NDGW08, and NDGW09, were then compared with historical data obtained for the Killdeer aquifer. NDGW09 was not compared with historical data from the Killdeer aquifer because it was screened partly or entirely within the Sentinel Butte aquifer.

All study wells, except the wells noted above, were compared with historical data from wells within 3 miles of the Franchuk 44-20SHW well (Franchuk well). Analysis of the historical data analysis indicated that all study wells except NDGW07, NDGW08, and NDGW09 were not significantly different than the historical data from the Killdeer aquifer. The October 2012 data for NDGW06 had chloride concentrations higher than what was expected. A Q-test was performed on NDGW06, and it was determined that the October 2012 NDGW06 was indeed an outlier with respect to chloride but was not an outlier for other parameters. Even though chloride concentrations in NDGW06 for the October 2012 sampling round were higher than would be expected, the inclusion of this point into the statistical analysis did not change the fact that there were no statistical differences between the study wells (except wells already noted) and the historical data. Based on this comparison with historical data, the study wells, excluding NDGW07, NDGW08 and NDGW09, were considered unimpacted wells. A summary of potential ground water impacts is provided in Table 9.

There were no detectable concentrations of propane or butane in any of the study samples collected. Ethane was detected in only one sample during the study; the detected concentration, 0.0044 mg/L, is approximately two times the QL (0.0028 mg/L) for ethane. Methane was detected in 24% of the study samples, with a maximum observed concentration of 0.0253 mg/L. The methane concentrations detected in the study were compared with background methane concentrations discussed in a report on field screening for shallow gases in North Dakota (Anderson et al., 2010). This comparison indicated

that the methane concentrations observed during the study were consistent with background methane concentrations in the Killdeer aquifer (0.0149 to 0.3978 mg/L).

Table 9. Potential ground water impacts in the Killdeer retrospective case study.

Parameter	Well Type	Impacted Wells/ Total Wells	Sample Type	Description	Potential Sources
Chloride	Monitoring	2/9 [NDGW07, NDGW08, and NDGW06(October 2012 sampling round only)]	Ground water	Detections ranged from 0.67 to 2940 mg/L; Secondary MCL exceedances; Elevated concentrations compared to historical data and surrounding wells	Brines
	Domestic	0/3			
	Municipal	0/1			
	Depot	0/2			
	State Well	0/1			
Calcium	Monitoring	2/9 (NDGW07 and NDGW08)	Ground water	Detections ranged from 3.36 to 583 mg/L; Elevated concentrations compared to historical data and surrounding wells	Brines
	Domestic	0/3			
	Municipal	0/1			
	Depot	0/2			
	State Well	0/1			
Magnesium	Monitoring	2/9 (NDGW07 and NDGW08)	Ground water	Detections ranged from 1.81 to 276 mg/L; Elevated concentrations compared to historical data and surrounding wells	Brines
	Domestic	0/3			
	Municipal	0/1			
	Depot	0/2			
	State Well	0/1			
Sodium	Monitoring	2/9 (NDGW07 and NDGW08)	Ground water	Detections ranged from 111 to 1040 mg/L; Elevated concentrations compared to historical data and surrounding wells	Brines
	Domestic	0/3			
	Municipal	0/1			
	Depot	0/2			
	State Well	0/1			
Strontium	Monitoring	2/9 (NDGW07 and NDGW08)	Ground water	Detections ranged from 117 to 5100 µg/L; Elevated concentrations compared to historical data and surrounding wells	Brines
	Domestic	0/3			
	Municipal	0/1			
	Depot	0/2			
	State Well	0/1			

Table 9. Potential ground water impacts in the Killdeer retrospective case study.

Parameter	Well Type	Impacted Wells/ Total Wells	Sample Type	Description	Potential Sources
Tert-butyl alcohol	Monitoring	2/9 (NDGW07 and NDGW08)	Ground water	Detections ranged from 156 to 975 µg/L; Elevated concentrations compared to historical data and surrounding wells	Hydraulic Fracturing
	Domestic	0/3			
	Municipal	0/1			
	Depot	0/2			
	State Well	0/1			
Sulfate	Monitoring	2/9 (NDGW04and NDGW08)	Ground water	Detections ranged from 74.5 to 2940 mg/L; Secondary MCL exceedances; Elevated concentrations compared to historical data and surrounding wells	Brines; natural sources
	Domestic	1/3 (NDGW10)			
	Municipal	0/1			
	Depot	1/2 (NDGW16			
	State Well	0/1			
Benzene	Monitoring	1/9 [NDGW07 (October 2012)]	Ground water	Detections at 0.62 µg/L	Gasoline; degradation products; vehicular traffic; current and/or historical drilling practices
	Domestic	0/3			
	Municipal	0/1			
	Depot	0/2			
	State Well	0/1			

Thirty-eight VOC compounds were analyzed for during the study, and at least one was detected in 15% of the samples. The VOCs detected were acetone, toluene, m+p-xylene, o-xylene, 1,2,4-trimethylbenzene, and 1,2,3-trimethylbenzene (2% of the samples); benzene (7% of the samples); and tert-butyl alcohol (TBA) (15% of the samples). With the exception of TBA, all VOC compounds detected in the study wells could be related to a potential source other than hydraulic fracturing. TBA, however, was consistently detected in NDGW07 and NDGW08, but not in the unimpacted wells. The concentrations of TBA observed in NDGW07 and NDGW08 was consistent with a plume moving through these wells. In addition, TBA is a known daughter product of the degradation of MTBE and tert-butyl hydroperoxide. Degradation of MTBE is not a likely source, because MTBE was not detected in these wells nor were other compounds one would expect to be associated with MTBE, such as gasoline constituents. However, the TBA was consistent with the degradation of tert-butyl hydroperoxide, a component used in the hydraulic fracturing fluid at the time of the blowout. So it is unlikely that sources other than the blow out were responsible for the observed TBA in NDGW07 and NDGW08. Although benzene was detected in NDGW07 during the October 2012 sampling round, no potential source of this benzene could be determined, because benzene was not detected in other wells or during other sampling rounds.

Similar to the VOC data, there were limited detections of other organic compounds in the study data, and it was not possible to link these compounds to any source of contamination. No glycols were

detected in the study wells during the study. The detection frequency for low-molecular-weight acids was 31%, and the detections were for formate (10% of samples) and acetate (31% of the samples). Finally, 84 SVOCs were analyzed for and the detection frequency was 34%. The SVOCs detected during the study were 2-butoxyethanol, dimethyl phthalate (2% of the samples), bis-(2-ethylhexyl) phthalate (17% of the samples), and bis-(2-ethylhexyl) adipate (34% of the samples).

The limited hydrological investigations at the Franchuk well pad were able to show a general ground water flow direction. The temporal fluctuations in the hydraulic gradients on the pad appear to be significant. Although there appeared to be significant fluctuations in the hydraulic gradients, the ground water always had a southerly component to the ground water flow. Based on this analysis brine contamination from road salt could be eliminated as a potential cause of the observed changes to water quality in NDGW07 and NDGW08. For road salt to impact NDGW07 and NDGW08 the flow direction would have to have a northerly component, which was not observed.

Time-trend analysis revealed that the data collected over time was indicative of transport of contaminants through NDGW07 and NDGW08. In addition, the peak concentrations in the parameters examined were first observed in NDGW08 and then observed in NDGW07 at a later date. Chloride concentration data for the decay portion of the time series plots were found to follow pseudo-first order kinetics, and a kinetic model could be developed to estimate how long it would take for chloride to attain unimpacted chloride concentrations found in the Killdeer aquifer. Based on this analysis it would take approximately 1,246 days to attain the mean unimpacted chloride concentration and 1,433 days to attain the median unimpacted chloride concentration at the Killdeer site.

Other nearby oil and gas activities, land use practices, or industrial sources as causes of the observed impacts on NDGW07 and NDGW08 are not likely. The monitoring well network installed around the Franchuk well pad (except NDGW07 and NDGW08) would have detected a plume, or there would be residual changes to ground water quality in these monitoring wells if the source of the contamination were off-site. No plumes or residual changes to ground water quality in monitoring wells other than NDGW07 and NDGW08 were observed. Therefore, the only source that would be consistent with the impacts observed in NDGW07 and NDGW08 would be the blow out that occurred on this pad.

Further analysis of unimpacted water with NDGW07 and NDGW08 indicated that the impacts on NDGW07 and NDGW08 were consistent with impacts caused by the mixing of briny water with water from the Killdeer aquifer. All methodologies used to delineate the source indicated that the mixing of unimpacted Killdeer aquifer water with deep formation brines would be consistent with the impacts observed in NDGW07 and NDGW08. The use of sodium to lithium ratios (Na/Li), chloride to iodide ratios Cl/I and isotopic analysis indicated the most likely cause of the impacts observed in NDGW07 and NDGW08 was a brine with a signature of the Madison formation. Although a Madison formation brine signature was not expected as the result of the impact from a Bakken formation well such as the Franchuk well, the literature does support this possibility because out-of-zone fracturing has been demonstrated for some Bakken wells.

Many of the study samples as well as the historical data indicated that sulfate exceeded its secondary maximum contaminant level (SMCL). Analysis of the data and the geology of Dunn County indicate that sulfate concentrations in the Killdeer aquifer are consistent with naturally occurring sources such as gypsum and selenite in the soils of Dunn County. It is unlikely that any anthropogenic impacts would cause the high sulfate concentrations observed in the Killdeer aquifer.

Two of the 16 wells sampled in this investigation, NDGW07 and NDGW08, exhibited evidence of impacts from the blowout of the Franchuk well. The impacts on NDGW07 and NDGW08 are consistent with impacts from deep formation brine. The detections of TBA in NDGW07 and NDGW08 are another important factor in determining the causes of impacts on these wells. The potential sources of contamination at the Franchuk well site were related to nearby oil and gas exploration, leaking USTs, land use practices, road salt, and the blowout of the Franchuk well. Other potential sources of contamination could be ruled out based on hydrology and the lack of residual signatures of impacts in nearby monitoring wells. The Franchuk well blowout would explain the impacts on NDGW07 and NDGW08, because the fingerprint of the water is what would be expected as the result of mixing of deep brine waters, specifically the Madison Formation water, with the Killdeer aquifer waters if out-of-zone fracturing occurred. However, the exact mechanism/pathway could not be determined.

Key observations or findings from this study are listed below.

- Thirty-eight VOCs were analyzed for during the study, and one or more of these VOCs were identified in 15% of the study samples. With the exception of TBA, all VOCs detected in the study wells could be related to a potential source other than hydraulic fracturing.
- No glycols were detected in the study wells during the study.
- Eighty-four SVOCs were analyzed for during the study, and one or more of these SVOCs were identified in 34% of the study samples. The SVOC compounds detected in the study wells could be related to a potential source other than hydraulic fracturing.
- Methane was detected in 24% of the study samples, with a maximum observed concentration of 0.0253 mg/L. Methane concentrations observed during the study were consistent with background methane concentrations in the Killdeer aquifer (0.0149 to 0.3978 mg/L).
- Thirty-eight percent of the study samples and the historical samples indicated that sulfate exceeded its secondary maximum contaminant level (SMCL). The sulfate concentrations in the Killdeer aquifer are consistent with naturally occurring sources such as gypsum and selenite in the soils of Dunn County.
- The data from all study wells except NDGW07, NDGW08, and NDGW09 (NDGW09 was screened or partly screened in the Sentinel Butte aquifer) were not significantly different from the historical data from the Killdeer aquifer, and these wells were considered unimpacted.
- The study identified two wells, NDGW07 and NDGW08, that had water quality different from the other study wells and historical data.
    - NDGW07 and NDGW08 showed differences in the majority of parameters, including chloride, calcium, magnesium, sodium, and strontium.
    - Time-trend analysis revealed that the data collected were indicative of transport of contaminants through NDGW07 and NDGW08.
    - TBA was consistently detected in NDGW07 and NDGW08, but not in the unimpacted wells. TBA concentrations were consistent with the degradation of tert-butyl

hydroperoxide, a component used in the hydraulic fracturing fluid at the time of the blowout.

- The limited hydrogeological investigations at the Franchuk well pad were able to show a general ground water flow direction. Although there appeared to be fluctuations in the hydraulic gradients, ground water always had a southerly flow component, which would be consistent with a plume moving from the Franchuk well towards the impacted wells.
- All methodologies used to delineate the source indicated that the mixing of unimpacted Killdeer aquifer water with deep formation brines would be consistent with the impacts observed in NDGW07 and NDGW08. The deep formation brine had the signature of the Madison formation. A Madison Formation brine signature is consistent with literature that indicates out-of-zone fracturing has been observed in some Bakken wells.

- The only potential source consistent with the impacts observed in NDGW07 and NDGW08 would be the blow out that occurred on this pad.

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Appendix A
QA/QC Summary
Retrospective Case Study in Killdeer, North Dakota

U.S. Environmental Protection Agency
Office of Research and Development
Washington, DC

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A.1. Introduction

This section describes general quality assurance (QA) and results of quality control (QC) samples, including discussion of chain of custody, holding times, blank results, field duplicate results, laboratory QA/QC results, data usability, performance evaluation (PE) samples, Quality Assurance Project Plan (QAPP) additions and deviations, field quality assurance/quality control (QA/QC), application of data qualifiers, tentatively identified compounds (TICs), Audits of Data Quality (ADQ), laboratory and field Technical System Audits (TSA).

All reported data met project requirements unless otherwise indicated by application of data qualifiers. In some cases, data were rejected as unusable and not reported.

A.1.1. July 2011 Sampling Event

The sampling and analytical activities for the July 2011 sampling event were conducted under a QAPP titled "Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND," revision 0, approved on June 20, 2011. Deviations from this QAPP are described in Section A9. Nine monitoring wells, one municipal supply well, two supply wells, three domestic wells, and one state well were sampled during this event. A total of 282 samples were collected and delivered to four laboratories for analysis: Shaw Environmental, Ada, OK; EPA Office of Research and Development/National Risk Management Research Laboratory (ORD/NRMRL), Ada OK; EPA Region 8, Golden, CO; and EPA Region 3, Fort Meade, MD. More than 215 analytes were measured per sampling location. Of the 282 samples collected, 90 samples (32%) were QC samples, including blanks, field duplicates, matrix spikes, and matrix spike duplicates.

A.1.2. October 2011 Sampling Event

The October 2011 sampling and analytical activities were conducted under an approved QAPP, "Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND," revision 1, approved August 29, 2011. Deviations from this QAPP are described in Section A9. Nine monitoring wells, one municipal supply well, two supply wells, three domestic wells, and one state well were sampled during this event. A total of 336 samples were collected and delivered to six laboratories for analysis: Shaw Environmental, Ada, OK; EPA ORD/NRMRL, Ada OK; EPA Region 8, Golden, CO; EPA Region 3, Fort Meade, MD; EPA ORD/National Exposure Research Lab (NERL), Las Vegas, NV; and U.S. Geological Survey (USGS) Laboratory, Denver, CO. More than 228 analytes were measured per sampling location. Of the 336 samples collected, 85 samples (25%) were QC samples, including blanks, field duplicates, matrix spikes, and matrix spike duplicates.

A.1.3. October 2012 Sampling Event

The October 2012 sampling and analytical activities were conducted under an approved QAPP, "Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND," revision 1, approved August 29, 2011. An addendum to the QAPP was prepared to document QC acceptance criteria for analysis of samples for metals using a different laboratory from the one used on the previous sampling events, "Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County: Analysis of Samples by the EPA Region VII Contract Laboratory for the October 2012 Sampling

Event, Revision 1 Addendum," approved on February 25, 2013. Deviations from this QAPP are described in Section A9. Nine monitoring wells and one state well were sampled during this event. A total of 255 samples were collected and delivered to six laboratories for analysis: Shaw Environmental, Ada, OK; EPA ORD/NRMRL, Ada OK; EPA Region 8, Golden, CO; EPA ORD/NERL, Las Vegas, NV; Southwest Research Institute Laboratory, San Antonio, TX; and USGS Laboratory, Denver, CO. More than 230 analytes were measured per sampling location. Of the 255 samples, 76 samples (30%) were QC samples, including blanks, field duplicates, matrix spikes, and matrix spike duplicates.

A final version of the QAPP titled "Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND," revision 2, was approved on December 13, 2013.

A.2. Chain of Custody

Sample types, bottle types, sample preservation methods, analyte holding times, and laboratories receiving samples are listed in Table A1. Samples collected in the field were packed on ice into ice chests for shipment by overnight delivery along with completed chain-of-custody (COC) documents and temperature blank containers. Samples were received by the laboratories in good condition, and all temperature blanks were less than 6°C. There were no chain of custody issues that had an impact on data quality.

A.3. Holding Times

Holding times are the length of time a sample can be stored after collection and prior to analysis without significantly affecting the analytical results. Holding times vary with the analyte, sample matrix, and analytical methodology. Sample holding times for the various analyses conducted in this investigation are listed in Table A1 and range from seven days to six months. Generally, the estimated analyte concentration for samples with holding time exceedances are biased low.

A.3.1. July 2011 Sampling

All samples met holding times.

A.3.2. October 2011 Sampling

Sample NDGW07 was re-analyzed for bromide twelve days past its holding time. Sample result is qualified with an "H" and could have a potential negative bias.

A.3.3. October 2012 Sampling

All samples met holding times.

A.4. Blank Samples Collected During Sampling

An extensive series of blank samples were collected during all sampling events, including field blanks, equipment blanks, and trip blanks (see Table A2). These QC samples were intended to test for possible bias from potential sources of contamination during field sample collection, equipment cleaning, sample bottle transportation to and from the field, and laboratory procedures. The same source water was used for the preparation of all blank samples (Barnstead NANOpure Diamond UV water). Field blanks were collected to evaluate potential contamination from sample bottles and environmental sources.

Equipment blanks were collected to determine whether cleaning procedures or sample equipment (filters, fittings, tubing) potentially contributed to analyte detections. Trip blanks consisted of serum bottles or volatile organic compound (VOC) vials filled with NANOpure water and sealed in the laboratory. Trip blanks were used to evaluate whether VOCs and dissolved gas serum bottles were contaminated during sample storage, sampling, or shipment to and from the field. All other analyses had associated field and equipment blanks (when needed), except for isotope ratio analyses, for which no blank sampling schemes are appropriate. Sample bottle types, preservation, and holding times were applied to blank samples in the same way as they were applied to field samples (see Table A1).

The following criteria were used to qualify samples with potential blank contamination. Sample contamination is considered possible if analyte concentrations in blanks are above the method quantitation limit (QL) and if the analyte is present in an associated field sample at a level <10 times the concentration in the blank. In cases where both a sample and its associated laboratory, equipment, or field blank are between the method detection limit (MDL) and the QL, the sample results are reported as <QL with a U qualifier. Blank samples (field, equipment, or trip) are associated with field samples by dates of collection; for example, most sample shipments include both field samples and blank samples that are used for blank contamination assessments. See QAPP section "Additions and Deviations" for additional information. Results of blanks analyses are reported in Tables A3 through A12. In general, field blank samples were free from detections of a vast majority of analytes. The following sections describe instances where blank detections were noted with potential impacts on data quality and usability. Refer to Table A25 for more detail on impacts to data usability from blanks. As previously stated, a majority of these blanks were free from detections or were less than the QL and, in these cases the sample data are not affected and are not discussed in the following sections.

A.4.1. July 2011 Sampling

For low-molecular-weight acids there was significant acetate contamination in the blanks on all dates, and the data were rejected. It was later determined that the TSP preservative was the source of the acetate contamination.

All field blank samples collected for 2-butoxyethanol (SVOC analysis) had blank contamination above the QL of 0.50 µg/L (see Table A10). It was detected in laboratory method blanks. This contamination affected samples NDGW04-072011, NDGW05-072011, NDGW06-072011, NDGW08-072011, NDGW12-072011, and NDGW13-072011, and all three field blanks, which were qualified with a "B" as potentially impacted. Other samples analyzed for 2-butoxyethanol were below the QL and were not qualified. No other analytes in the SVOC analyte suite were detected (see Table A10), and there was no impact.

All the field blanks showed detectable concentrations of GRO above the QL (see Table A11). However, with the exception of NDGW10-072011, all GRO samples were below the QL, so no impact on data is suggested for these samples. In the case of NDGW10-072011, the sample was qualified with "B" because it was above the QL and <10 times the QL. The field blanks collected on July 18 and 19, 2011, had concentrations of DRO above the QL (see Table A11). With the exception of NDGW02-072011 and NDGW14-072011, all samples were qualified with "B" on those dates. Sample NDGW02-072011 was below QL and was not qualified. The field blank associated with sample NDGW14-072011 was below

QL, therefore the sample was not impacted. The EPA Region 8 Laboratory analyzed the blanks samples for GRO and DRO and found that the source water used to collect the field blank samples was contaminated with cyclohexane.

A.4.2. October 2011 Sampling

All of the blanks collected for acetate analysis had concentrations of acetate higher than the QL (see Table A7). With the exceptions of samples NDGW02-102011 and NDGW07-102011, all data for acetate was qualified with "B"; samples NDGW02-102011 and NDGW07-102011 did not have detectable concentrations of acetate and did not require quantification. The source of the acetate was later determined to be the trisodium phosphate (TSP) preservative.

The field and trip blanks collected on October 18, 2011, were rejected and qualified with "R" for dissolved gases as the result of carryover from standards analyzed prior to these blanks (see Table A8). The results for samples collected on this date that were above the QL were qualified because it is not known if the data quality had been impacted. This affected methane samples from NDGW07-102011, NDGW08-102011, NDGW09-102011, and NDGW14-102011, and the ethane sample from NDGW08-102011. No samples for propane or butane were affected since the samples for these analytes were below the QL.

There were no detectable concentrations of SVOCs in any of the field blank samples (see Table A10). Therefore, there was no impact on data quality measured by blanks. However, a laboratory method blank had bis-(2-ethylhexylphthalate). Affected samples (NDGW03-102011, NDGW04-102011, NDGW05-102011, NDGW06-102011, NDGW07-102011, NDGW08-102011, NDGW09-102011, and NDGW14-102011) are qualified with a "B".

The ethoxylates, alkylphenols, and acrylamide blanks showed no detectable concentrations except for nonylphenol ethoxylate and the ethoxylate alcohols C13 (see Table A12). It should be noted that only four samples were collected for this analysis. The concentration of nonylphenol ethoxylate in the blank sample was at the QL. Therefore, all samples (NDGW04-102011, NDGW07-102011, NDGW08-102011, and NDGW09-102011) were qualified with a "B." In the case of the ethoxylated alcohols C13 blank, the concentration was greater than the QL. Samples NDGW04-102011, NDGW07-102011, and NDGW08-102011 were qualified with a "B." It is likely that the contamination was from the glass bottles used for the collection of samples.

A.4.3. October 2012 Sampling

Both equipment blanks had concentrations of dissolved Ni above the QL, and the following samples had concentrations less than 10 times the concentration in the blanks: NDGW01-102012, NDGW02-102012, NDGW03-102012, NDGW04-102012, NDGW05-102012, NDGW06-102012, NDGW09-102012, NDGW09-102012 DUP, and NDGW14-102012. Therefore, these samples were qualified with a "B" qualifier.

Formate was detected in the blanks (see Table A7). All field blanks had concentrations of formate similar to the concentrations in the samples. This likely indicates sample container contamination and the formate data were rejected and qualified with "R."

The ethoxylates, and alkylphenols blanks indicated most of the samples were contaminated (see Table A12), and all data for ethoxylates and alkylphenols were rejected and were qualified with "R."

A.5. Duplicate Samples

Field duplicate samples were collected to measure the reproducibility and precision of field sampling and analytical procedures. The RPD was calculated to compare concentration differences between the primary (sample 1) and duplicate sample (sample 2) using the following equation:

$$\text{RPD}\,(\%) = \left(\frac{2 \times (\text{sample 1} - \text{sample 2})}{(\text{sample 1} + \text{sample 2})} \right) \times 100$$

RPDs were calculated when the constituents in both the primary sample and duplicate sample were ≥5 times the method QLs. Constituents were qualified with a "*" if RPDs were >30%.

A.5.1. All Sampling Events

There were no qualifications required based on RPDs for field duplicates not meeting the 30% criterion.

A.6. Laboratory QA/QC Results and Data Usability Summary

The QA/QC requirements for laboratory analyses conducted as part of this case study are provided in the QAPPs. Table A25 summarizes laboratory QA/QC results regarding sample analysis, i.e., laboratory duplicate analysis, laboratory blank analysis, matrix spike results, calibration, continuing calibration checks, and field QC. Impacts on data quality of any issues noted in the QA narratives are also presented in Table A25. Data qualifiers are listed in Table A26. Many of the specific QA/QC observations noted in the ADQs are summarized in Table A25.

A majority of the reported data met project requirements. Data that did not meet QA/QC requirements specified in the QAPP are indicated by the application of data qualifiers in the final data summaries. Data determined to be unusable were rejected and qualified with an "R." Depending on the data qualifier, data usability is affected to varying degrees. For example, data qualified with a "B" would not be appropriate to use when the sample concentration is below the blank concentration. But as the sample data increase in concentration and approach 10x the blank concentration, they may be more appropriate to use. Data with a "J" flag is usable with the understanding that it is an approximate concentration, but the analyte is positively identified. A "J+" or "J-" qualifier indicates a potential positive or negative bias, respectively. An "H" qualifier, for exceeding sample holding time, is considered a negative bias. An "*" indicates that the data are less precise than project requirements. Each case is evaluated to determine the extent that data are usable or not (see Table A25).

A.7. Double Laboratory Comparisons

There were no double-laboratory comparisons for the July 2011, October 2011, or October 2012 events.

A.8. Performance Evaluation Samples

A series of performance evaluation (PE) samples were analyzed by the laboratories conducting critical analyses to support the HF Retrospective Case Studies. The PE samples were analyzed as part of the

normal QA/QC standard operating procedures, and in the case of certified labs, as part of the certification process to maintain certification for that laboratory. The results of the PE tests are presented in tabular form in the Wise County, Texas, Retrospective Case Study QA/QA Appendix and are not repeated here. These tables show the results of 1,354 tests; 98.6% of the reported values fell within the acceptance range. For the ORD/NRMRL Laboratory, a total of 95 tests were performed, with 96.9% of the reported values falling within the acceptable range. Similarly, for the Shaw Environmental Laboratory, a total of 835 tests were performed, with 98.7% of the reported values falling within the acceptable range. The EPA Region 8 Laboratory had a total of 424 tests performed, with 98.8% of the reported values falling within the acceptable range. These PE sample results demonstrate the high quality of the analytical data reported here. Analytes not falling within the acceptable range were examined, and corrective action was undertaken to ensure data quality in future analysis.

A.9. QAPP Additions and Deviations

The July 2011 sampling was conducted using the Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND, rev. 0 QAPP. The October 2011 sampling was conducted using the Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND, rev. 1 QAPP. The October 2012 sampling was conducted using the Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND, rev. 1 QAPP and the Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County: Analysis of Samples by the EPA Region VII Contract Laboratory for the October 2012 Sampling Event, Revision 1, Addendum QAPP.

A.9.1. July 2011 Sampling Event.

A deviation from the QAPP for this event was the sampling of the supply wells. At the time the QAPP was written, the EPA did not know how these wells were set up for sampling, so a general description was used. The depot wells required the use of a split-flow system, with the sample collected from the side stream that was adjusted to reasonable flow rates for sampling. The well was purged into a tanker truck before sampling. The manifold used was decontaminated between sampling locations. A split sample was collected for field parameters at the same time laboratory samples were collected, since the volume of water that could be collected from the aquifer was limited. Filtered samples were first collected into clean bottles. Once all the samples were collected, the samples were filtered into new clean bottles to be shipped to the laboratories doing the analysis. This change in sampling methodology was incorporated into revision 1 of the QAPP.

An additional deviation from the QAPP was that the ICP-MS metals data were not reported. These data were not reported because of concerns with data quality. The reasons stated were potential interferences and that interference check standards were not run. Instead, ICP-OES data were reported for the ICP-MS metals As, Cd, Cr, Cu, Ni, Pb, Sb, Se, Tl, and U.

A final deviation from the QAPP was that the midday calibration check for the field data was not done on July 19, 2011. However, the initial and end-of-day calibration checks were acceptable, so it is unlikely that there was an impact on the data.

A.9.2. October 2011 Sampling Event

The alkylphenols, ethoxylated alcohols, ethoxylated alkylphenols, and acrylamide analyses were added after the Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND, rev. 1 QAPP revision was approved. The ORD/NERL Laboratory did not have the method ready to accept samples until a few days prior to the sampling. [Note: This was addressed in the next revision of the QAPP for these analytes.]

A deviation from the QAPP was that all of the ICP-MS metals data were not reported. These data were not reported because of concerns with data quality. Instead, ICP-OES data were reported for the ICP-MS metals As, Cd, Cr, Cu, Ni, Pb, Sb, Se, Tl, and U.

Finally, there was no midday or end-of-day calibration check for the field data on October 19, 2011. The sampling was completed at midday, but because of an accidental spill of the YSI 5580 Confidence Solution, no calibration check could be performed for field parameters. The measurements for pH, ORP, and specific conductance were not qualified but are considered usable as estimates.

A.9.3. October 2012 Sampling Event

The QAPP used for this sampling event was Hydraulic Fracturing Retrospective Case Study, Bakken Shale, Killdeer and Dunn County, ND, rev. 1 QAPP which addressed the sampling and all analyses except for metals. A deviation from this QAPP was that the metals were analyzed by a different laboratory than the one used in previous sampling events. The laboratory is a contract laboratory for EPA Region 7. The contract Statement of Work detailing the QA/QC requirements was approved prior to the sampling event. These requirements were subsequently documented in the Addendum to revision 1 of the QAPP.

The field parameter measurements using the YSI meter were problematic because of a faulty sensor (see Section A10.2). The affected parameters were pH, specific conductivity (SpC), temperature, dissolved oxygen (DO), and oxygen-reduction potential (ORP). The PI chose to use data for these parameters that had been collected by Terracon and the state. Because the PI did not know the calibration and calibration checks frequency used by Terracon and the state, this deviation from the QAPP required that measurements for these parameters be qualified using the "J" qualifier, indicating that these were estimated, but the impact was likely minimal.

A.10. Field QA/QC

Field measurements consisted of YSI Model 556 flow-cell readings for temperature, SpC, pH, ORP, and DO. YSI electrodes were calibrated in the morning, and performance checks were generally conducted after initial calibration, at midday, and at the end of each day (see Table A27) using the YSI 5580 Confidence Solution to conduct the performance checks for SpC, ORP, and pH. NIST-traceable buffer solutions (4.00, 7.00, and 10.01) were used for pH calibration. The YSI ORP standard was used to calibrate redox potential measurements. The YSI conductivity standard was used to calibrate specific conductance measurements. DO sensors were calibrated with air. Prior to field deployment the electrode assembly and meter were checked to ensure they were in good working order. In most cases, performance checks were within acceptance limits checks (Table A27).

Field parameters for this case study consisted of turbidity, alkalinity, total dissolved sulfide species (ΣH_2S), and ferrous iron. Because field measurements of ferrous iron and dissolved sulfide sometimes required dilution and all sample preparations and measurements were made in an uncontrolled environment (i.e., the field), concentration data for these parameters were qualified in all cases as estimated. Turbidity was measured using a HACH 2100Q Portable Turbimeter and was calibrated using HACH 2100Q StablCal Calibration Set. The HACH 2100Q StablCal Calibration Set consists of the 20 nephelometric unit (NTU), 100 NTU, and 800 NTU standards, with a 10 NTU calibration verification standard. For alkalinity measurements, a HACH Model AL-DT Digital Titrator was used. The total dissolved sulfide species and ferrous iron measurements were collected using a HACH DR890 Portable Colorimeter. The equipment for measuring alkalinity, total dissolved sulfide species, and ferrous iron measurement accuracy was verified in the lab prior to field deployment using known standards. In the field, a blank sample was measured to ensure no cross contamination occurred. In the field, a blank sample also was measured for turbidity, and a 10 NTU standard was also used to verify the calibration. These checks were performed after initial calibration, at midday, and at the end of the day.

A.11. Data Qualifiers

Data qualifiers are listed in Table A26. Many factors can affect the quality of data reported for environmental samples, including factors related to sample collection in the field, transport of samples to laboratories, and the work conducted by the various analytical laboratories. The list of qualifiers in Table A26 is based on the Data Qualifier Definitions presented in the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review (US EPA/540/R-01, 2008), and the EPA CLP National Functional Guidelines for Superfund Inorganic Methods Data Review (US EPA/540/R/10/011, 2010), with the addition of data qualifiers H and B, which are necessary for communicating issues that occur during analysis in laboratories not bound by the CLP statement of work. The R qualifier is used in cases where it is determined that data need to be rejected. Data rejection can occur for many reasons, which must be explained in QA/QC narratives. Conditions regarding the application of qualifiers include:

- If the analyte was not detected, then it was reported as <QL and qualified with U.
- If the analyte was between the MDL and QL, then it was qualified with J.
- If the analyte concentration was <QL, then the B qualifier was not applied.
- If both an analyte and an associated blank concentration were between the MDL and QL, then the sample results were reported as <QL and qualified with U.
- For samples associated with high matrix spike recoveries, the J+ qualifier was not applied if the analyte was <QL.
- For samples associated with low matrix spike recoveries, the J- qualifier was applied to the analyte with low recovery regardless of analyte concentration (< or > QL).

A.12. Tentatively Identified Compounds (TICs)

The EPA Region 8 Laboratory reported TICs from SVOC analyses. Several SVOC TICs were identified in samples and blanks (see Table A28). To be identified as a TIC, a peak had to have an area at least 10% as large as the area of the nearest internal standard and a match quality greater than 80. The TIC match

quality is based on the number and ratio of the major fragmentation ions. A perfect match has a value of 99. Although the TIC report is essentially a qualitative report, an estimated concentration is calculated based on a response factor of 1.00 and the area of the nearest internal standard. The search for TICs includes the whole chromatogram from approximately 3.0 to 41.0 minutes for SVOCs. TICs are compounds that can be detected, but without the analysis of standards, cannot be confirmed or reliably quantified. Oftentimes, TICs are representative of a class of compounds rather than indicating a specific compound. Only the top TIC is reported for each peak.

A.13. Audits of Data Quality (ADQ)

An ADQ was performed per the EPA/NRMRL Standard Operating Procedure (SOP), *Performing Audits of Data Quality (ADQs)*, to verify that requirements of the QAPP were properly implemented for the analysis of critical analytes for samples submitted to laboratories identified in the QAPP associated with this project. The ADQs were performed by Neptune and Company, Inc., and reviewed by NRMRL QA staff. However, NRMRL QA staff also performed an ADQ on metals for the October 2011 sampling event. NRMRL QA staff provided the ADQ results to the project's PIs for response and assisted in the implementation of corrective actions. The ADQ process is an important element of Category I (highest of four levels in EPA ORD) Quality Assurance Projects, which this study has operated under for all aspects of groundwater collection and analysis.

Complete data packages were provided to the auditors for the July 2011, October 2011, and October 2012 sampling events. A complete data package consists of the following: sample information, method information, data summary, laboratory reports, raw data (including QC results), and data qualifiers. The QAPP was used to identify data quality indicator requirements and goals, and a checklist was prepared based on the types of data collected. The data packages were reviewed against the checklist by tracing a representative set of the data in detail from raw data and instrument readouts through data transcription or transference through data manipulation (either manually or electronically by commercial or customized software) through data reduction to summary data, data calculations, and final reported data. All calibration and QA/QC data were reviewed for all available data packages. Data summary spreadsheets prepared by the PI were also reviewed to determine whether data had been accurately transcribed from lab summary reports and appropriately qualified, based on lab and field QC results.

The critical analytes, as identified in the QAPP, were GROs; DROs; SVOCs; VOCs, including isopropyl alcohol, tert-butyl alcohol, and naphthalene; dissolved gases (methane, ethane, propane, and butane); trace elements (As, Se, Sr, Ba, and B); major cations (Ca, Mg, Na, K); and major anions (Cl, nitrate + nitrite, SO_4). Also included in the ADQ were the following analytes: all metals analyzed and glycols. The non-conformances identified in an ADQ can consist of the following categories: a finding (a deficiency that has or may have a significant effect on the quality of the reported results; a corrective action response is required), or an observation (a deficiency that does not have a significant effect on the quality of the reported results; a corrective action response is required). The ADQ for the July 2011 sampling event had nine observations, and the October 2011 sampling event had three findings and four observations. The ADQ for the October 2012 sampling event had no findings and twenty-one

observations. In most cases, ADQ findings and observations are included in Table A25 along with the corrective actions taken and data qualifications.

A.14. Laboratory Technical Systems Audits (TSA)

Laboratory Technical Systems Audits (TSAs) were conducted early in the project to allow for identification and correction of any issues that may affect data quality. Laboratory TSAs focused on the critical target analytes. Laboratory TSAs were conducted on-site at ORD/NRMRL Laboratory and Shaw Environmental [both laboratories are located at the Robert S. Kerr Research Center, Ada, OK] and at the EPA Region 8 Laboratory (Golden, CO) which analyzed for sVOCs, DRO and GRO. Detailed checklists, based on the procedures and requirements specified in the QAPP, related SOPs, and EPA Methods, were prepared and used during the TSAs. These audits were conducted with contract support from Neptune and Co., with oversight by NRMRL QA Staff. The QA Manager tracked implementation and completion of any necessary corrective actions. The TSAs took place in July 2011. The TSAs found good QA practices in place at each laboratory. There were no findings and six observations across the three laboratories audited. All observations were resolved through corrective actions. The observations had no impact on the sample data quality.

A.15. Field TSAs

For Category 1 QA projects, TSAs are conducted on both field and laboratory activities. Detailed checklists based on the procedures and requirements specified in the QAPP, SOPs, and EPA Methods were prepared and used during the TSAs. The field TSA took place during the first sampling event in July 2011 (audit date: July 19, 2011). The results of the audit and the corrective actions are included in Table A29.

The sample collection, documentation, field measurements (and calibration), and sample handling, including sample custody and COC operations, were generally performed according to the QAPP. Municipal wells and depot wells required using a split-flow system, with the sample collected from the side stream that was adjusted for flow. The well was purged prior to sampling, with the main flow into a storage truck. However, the total flow was not a parameter that could be adjusted by the samplers. The sample stream was adjusted to a reasonable flow by using the valve on the manifold. This manifold was cleaned by Terracon between sample locations. In general, Terracon was first to collect their samples, followed by the collection of EPA samples. The level of drawdown could not be monitored for the wells that were sampled during this TSA. Field parameter measurements (pH, ORP, SpC, DO, temperature, etc.) could not be measured until after the samples for laboratory analysis were collected due to the nature of the wells. The field parameters were measured using a calibrated YSI 556 MSP and Hach kits, depending upon the parameter, as described in the QAPP. Filtered samples also required first collecting an unfiltered sample, as described in the QAPP. New filters and new pieces of tubing were used at each sampling location. Field QC samples were also collected. In the field it was not possible to review every COC against the QAPP due to the nature of sampling and sample packaging, but these custody documents are available at the respective laboratories and copies were provided with the laboratory data packages.

Documentation that was reviewed during the TSA for sampling conducted on the monitoring wells the day prior indicates the QAPP procedures were also followed. Field parameters were measured while purging, and the purge rate and time were documented. Water levels were also recorded before and after purging. The monitoring wells were sampled after purging while monitoring for field parameters (e.g., pH, ORP, SpC, DO, and temperature).

One observation was noted concerning documentation of the YSI Confidence Solution, which was corrected at the time of the audit; no findings were identified. A summary of the audit and corrective actions are given in Table A29.

Appendix A Tables

Table A1 Sample containers, preservation, and holding times for ground water samples from Killdeer, ND

Sample Type	Analysis Method (Lab Method)	Sample Bottles/ # of bottles[1]	Preservation/ Storage	Holding Time(s)	Sampling Rounds[2]
Dissolved gases	Shaw Environmental: No US EPA Method (RSKSOP-194v4 &-175v5)	60 mL serum bottles/2	No headspace TSP[3], pH >10; refrigerate ≤6°C[4]	14 days	1, 2, 3
Dissolved Metals (Filtered)	Shaw Environmental: US EPA Methods 200.7 & 6020A (RSKSOP-213v4 & -257v2 or -332v0)	125 mL plastic bottle/1	HNO_3, pH <2	6 months (Hg 28 days)	1, 2
Dissolved Metals (Filtered)	EPA Region 7 RASP Contract Southwest Research Institute: US EPA Methods 200.7 & 6020A	1 L plastic bottle/1	HNO_3, pH <2	6 months	3
Dissolved Hg (Filtered)	EPA Region 7 RASP Contract Southwest Research Institute: US EPA Method 7470A	1 L plastic bottle/1	HNO_3, pH <2	28 days	3
Total Metals (Unfiltered)	Shaw Environmental: Analysis- US EPA Methods 200.7 & 6020A (RSKSOP-213v4 & -257v2 or -332v0); and Digestion- US EPA Method 3015A (RSKSOP-179v3)	125 mL plastic bottle/1	HNO_3, pH <2	6 months	1, 2
Total Metals (Unfiltered)	EPA Region 7 RASP Contract Southwest Research Institute: US EPA Methods 200.7 & 6020A; and Digestion US EPA Method 200.7	1 L plastic bottle/1	HNO_3, pH <2	6 months	3
Total Hg (Unfiltered)	EPA Region 7 RASP Contract Southwest Research Institute: US EPA Method 7470A; and Digestion US EPA Method 200.7	1 L plastic bottle/1	HNO_3, pH <2	28 days	3
Sulfate (SO_4), Chloride (Cl), Fluoride (F), Bromide (Br)	ORD/NRMRL (Ada): US EPA Method 6500 (RSKSOP-276v3)	60 mL plastic bottle/1	Refrigerate ≤6°C	28 days	1, 2
Br	ORD/NRMRL (Ada): No US EPA Method (RSKSOP-214v5)	60 mL plastic bottle/1	Refrigerate ≤6°C	28 days	2
Br	ORD/NRMRL (Ada): US EPA Method 6500 (RSKSOP-288v3)	60 mL plastic bottle/1	Refrigerate ≤6°C	28 days	3

Table A1 Sample containers, preservation, and holding times for ground water samples from Killdeer, ND

Sample Type	Analysis Method (Lab Method)	Sample Bottles/ # of bottles[1]	Preservation/ Storage	Holding Time(s)	Sampling Rounds[2]
Iodide (I)	ORD/NRMRL (Ada): No US EPA Method (RSKSOP-223v2)	60 mL plastic bottle/1	Refrigerate ≤6°C	28 days	3
Nitrate+Nitrite (NO_3+NO_2)	ORD/NRMRL (Ada): US EPA Method 353.1 (RSKSOP-214v5)	60 mL plastic bottle/1	H_2SO_4, pH <2; refrigerate ≤6°C	28 days	1, 2, 3
Ammonia (NH_3)	ORD/NRMRL (Ada): US EPA Method 350.1 (RSKSOP-214v5)	60 mL plastic bottle/1	H_2SO_4, pH <2; refrigerate ≤6°C	28 days	1, 2, 3
Dissolved Inorganic Carbon (DIC)	ORD/NRMRL (Ada): US EPA Method 9060A (RSKSOP-330v0)	40 mL clear glass VOA vial/2	Refrigerate ≤6°C	14 days	1, 2, 3
Dissolved Organic Carbon (DOC)	ORD/NRMRL (Ada): US EPA Method 9060A (RSKSOP-330v0)	40 mL clear glass VOA vial/2	H_3PO_4, pH<2; Refrigerate ≤6°C	28 days	1, 2, 3
Volatile Organic Compounds (VOC)	Shaw Environmental: US EPA Method 5021A + 8260C (RSKSOP-299v1)	40 mL amber glass VOA vial/2	No headspace TSP[3], pH >10; refrigerate ≤6°C	14 days	1, 2, 3
Low Molecular Weight Acids	Shaw Environmental: No US EPA Method (RSKSOP-112v6)	40 mL amber glass VOA vial/2	TSP[3], pH >10; refrigerate ≤6°C	30 days	1, 2, 3
Semi-volatile organic compounds (sVOC)	EPA Region 8: US EPA Method 8270D (ORGM-515 r1.1)	1 L amber glass bottle/2	Refrigerate ≤6°C	7 days extraction, 30 days after extraction	1, 2, 3
Diesel Range Organics (DRO)	EPA Region 8: US EPA Method 8015D (ORGM-508 r1.0)	1L amber glass bottle/2	HCL, pH <2; refrigerate ≤6°C	7 days extraction, 40 days after extraction	1, 2, 3
Gasoline Range Organics (GRO)	EPA Region 8: US EPA Method 8015D (ORGM-506 r1.0)	40 mL amber VOA vial/2	No headspace HCL, pH <2; refrigerate ≤6°C	14 days	1, 2, 3
Glycols	EPA Region 3: No US EPA Method (R3 Method[5])	40 mL amber VOA vial/2	Refrigerate ≤6°C	14 days	1, 2
Glycols	ORD/NERL (Las Vegas): No US EPA Method (R3 Method[5])	40 mL amber VOA vial/2	Refrigerate ≤6°C	14 days	3
$^{87}Sr/^{86}Sr$ Isotope Analysis	USGS: No US EPA Method (Thermal ionization mass spectrometry)	500 mL plastic bottle/2	Refrigerate ≤6°C	6 months	2, 3

Table A1 Sample containers, preservation, and holding times for ground water samples from Killdeer, ND

Sample Type	Analysis Method (Lab Method)	Sample Bottles/ # of bottles[1]	Preservation/ Storage	Holding Time(s)	Sampling Rounds[2]
Acrylamide	ORD/NERL (Las Vegas): No US EPA Method (ORD/NERL Method[6])	1 L amber glass bottle/2	Refrigerate ≤6°C	30 days	2[7], 3
Alkylphenols, ethoxylated alcohols, ethoxylated alkylphenols	ORD/NERL (Las Vegas): No US EPA Method (ORD/NERL Method[6])	1 L amber glass bottle/2	Refrigerate ≤6°C	30 days	2[7], 3
O, H stable isotopes of water	Shaw Environmental: No US EPA Method (RSKSOP-334v0)	20 ml glass VOA vial/1	Refrigerate ≤6°C	Stable	2, 3

[1] Spare bottles made available for laboratory QC samples and for replacement of compromised samples (broken bottle, QC failures, etc.).
[2] Sampling rounds occurred in July 2011, October 2011, and October 2012.
[3] Trisodium phosphate.
[4] Above freezing point of water.
[5] US EPA Methods 8000C and 8321 were followed for method development and QA/QC; method based on ASTM D773-11.
[6] Methods modified from ASTD D7458-09 and USGS method O1433-01 for ethoxylated alcohols and alkylphenols; US EPA Method 8032A and 8316 were used for acrylamide.
[7] Limited sampling of select wells: NDGW04-102011, NDGW07-102011, NDGW08-102011, and NDGW09-102011.

Table A2 Field QC samples for groundwater analysis

QC Sample	Purpose	Method	Frequency	Acceptance Criteria[1]/ Corrective Actions
Trip Blanks (VOCs and Dissolved Gases only	Assess Contamination during transportation.	Fill bottles with reagent water and preserve, take to field and return without opening.	One in an ice chest with VOA and dissolved gas samples.	<QL Samples are flagged when the analyte concentration was >QL, but <10X the concentration found in the blank.
Equipment Blanks	Assess contamination from field equipment, sampling procedures, decontamination procedures, sample container, preservative, and shipping.	Apply only to samples collected via equipment[2], such as filtered samples: Reagent water is filtered and collected into bottles and preserved same as filtered samples.	One per day of sampling.	
Field Blanks[3]	Assess contamination introduced from sample container with applicable preservation.	In the field, reagent water is collected into sample containers with preservatives.	One per day of sampling.	
Temperature Blanks	Measure temperature of samples in the cooler.	Water sample that is transported in cooler to lab.	One per cooler.	The temperature was recorded by the receiving lab upon receipt.[4]
Field Duplicates	Represent precision of field sampling, analysis, and site heterogeneity.	One or more samples collected immediately after original sample.	One in every 10 samples, or if <10 samples collected for a water type (ground or surface), collect a duplicate for one sample.	RPD<30% for results > 5X the QL. Affected data were flagged as needed.

[1]Reporting Limit (RL), or Quantitation Limit (QL). [2]Reagent water was filtered, collected into bottles, and preserved at the same time as filtered water samples. [3]Blank samples were not required for isotope measurements, including $^{18}O/^{16}O$, H^2/H, and $^{13}C/^{12}C$. [4]The PI was notified if the samples arrived with no ice and/or if the temperature recorded from the temperature blank was >6°C.

Table A3 DOC, DIC, Ammonia, and Anion Blanks

Sample ID	Date Collected	DOC	DIC	NO_3 + NO_2	NH_3	Br	Cl	SO_4^{2}	F	I QC
Units		mg/L	mg/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	µg/L
July 2011										
Equipment Blank	7/18/2011	0.47	NR	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	NA
Equipment Blank (1)	7/19/2011	0.27	<1.00	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	NA
Field Blank	7/18/2011	<0.50	<1.00	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	NA
Field Blank	7/19/2011	NA	<1.00	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	NA
Field Blank	7/20/2011	0.43	<1.00	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	NA
MDL		0.19	0.02	0.01	0.01	0.14	0.07	0.14	0.04	
QL		0.50	1.00	0.10	0.10	1.00	1.00	1.00	0.20	
Detections in samples		18/18	18/18	7/18	8/18	8/18	18/18	18/18	16/18	
Concentration min		1.62	70.2	0.05	0.01	0.47	0.84	76.3	0.22	
Concentration max		6.48	201	9.94	0.29	2.03	2940	566	3.10	
October 2011										
Field Blank	10/18/2011	0.29	0.26	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	NA
Field Blank	10/19/2011	0.24	0.38	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	NA
Equipment Blank	10/18/2011	<1.00	0.21	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	NA
Equipment Blank	10/19/2011	<1.00	0.25	0.02	<0.10	<1.00	<1.00	<1.00	<0.20	NA
MDL		0.07	0.02	0.01	0.01	0.06	0.11	0.05	0.03	
QL		1.00	1.00	0.10	0.10	1.00	1.00	1.00	0.20	
Detections in samples		18/18	18/18	14/18	4/18	3/18	18/18	18/18	16/18	
Concentration min		1.85	61.3	0.02	0.15	6.92	0.67	76.7	0.16	
Concentration max		35.9	182	13.9	0.26	8.39	1760	596	2.98	
October 2012										
Field Blank1-102012	10/17/2012	0.10	<1.00	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	<10.0
Field Blank2-102012	10/18/2012	0.07	<1.00	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	<10.0
Equipment Blank1-	10/17/2012	0.17	<1.00	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	<10.0

Table A3 DOC, DIC, Ammonia, and Anion Blanks

Sample ID	Date Collected	DOC	DIC	NO_3 + NO_2	NH_3	Br	Cl	SO_4^{2}	F	I QC
Units		mg/L	mg/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	µg/L
102012										
Equipment Blank2-102012	10/18/2012	0.25	<1.00	<0.10	<0.10	<1.00	<1.00	<1.00	<0.20	<10.0
MDL		0.01	0.04	0.01	0.01	0.17	0.13	0.16	0.05	2.22
QL		0.50	1.00	0.10	0.10	1.00	1.00	1.00	0.20	10.0
Detections in samples		11/11	11/11	5/11	2/11	3/11	11/11	11/11	10/11	2/11
Concentration min		1.41	74.1	0.25	0.21	0.26	0.90	74.5	0.13	117
Concentration max		6.60	189	1.41	0.21	2.27	631	748	2.83	321

NA. Not analyzed for.

Table A4 Dissolved Metal Blanks

Sample ID	Date Collected	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Equipment Blank	7/18/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
Equipment Blank (1)	7/19/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
Field Blank	7/18/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
Field Blank	7/19/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
Field Blank	7/20/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
MDL		4	148	6	100	1	3	0.09	1	1	2	6	20	
QL		14	494	20	333	4	10	0.29	4	4	7	20	67	
Detections in samples		1/18	0/18	0/18	18/18	18/18	0/18	18/18	0/18	4/18	0/18	4/18	11/18	
Concentration min		8	<494	<20	146	18	<10	4	<4	1	<7	7	24	
Concentration max		8	<494	<20	447	173	<10	583	<4	4	<7	16	23700	
October 2011														
Field Blank	10/18/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
Field Blank	10/19/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
Equipment Blank	10/18/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
Equipment Blank	10/19/2011	<14	<494	<20	<333	<4	<10	<0.29	<4	<4	<7	<20	<67	NA
MDL		4	148	6	100	1	3	0.09	1	1	2	6	20	
QL		14	494	20	333	4	10	0.29	4	4	7	20	67	
Detections in samples		0/18	0/18	0/18	18/18	18/18	0/18	18/18	0/18	2/18	0/18	3/18	10/18	
Concentration min		<14	<494	<20	129	18	<10	4	<4	1	<7	8	50	
Concentration max		<14	<494	<20	456	259	<10	377	<4	5	<7	9	15600	
October 2012														
Field Blank1-102012	10/17/2012	4	<20	<0.2	<40	0.6	<5	<0.1	<0.20	<5	<2.0	<0.5	<100	<0.2
Field Blank2-102012	10/18/2012	<10	<20	<0.2	<40	<5	<5	<0.1	<0.20	<5	<2.0	<0.5	<100	<0.2

Table A4 Dissolved Metal Blanks

Sample ID	Date Collected	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Equipment Blank1-102012	10/17/2012	7	<20	<0.2	<40	0.4	<5	<0.1	<0.20	<5	<2.0	<0.5	<100	<0.2
Equipment Blank2-102012	10/18/2012	3	3	<0.2	<40	<5	<5	<0.1	<0.20	<5	<2.0	<0.5	<100	<0.2
MDL		3	3	0.2	5	0.4	0.2	0.02	0.20	2	0.3	0.1	40	0.01
QL		10	20	0.2	40	5	5	0.1	0.20	5	2.0	0.5	100	0.2
Detects		0/11	3/11	5/11	11/11	11/11	0/11	11/11	0/11	2/11	6/11	11/11	10/11	0/11
Min		<10	7	.02	146	17	<5	3.36	<0.20	4	0.5	0.30	40	<0.2
Max		<10	11	3.2	483	102	<5	149	<0.20	10	3.0	1.1	6560	<0.2

NA. Not analyzed for.

Table A4 Dissolved Metal Blanks

Sample ID	Date Collected	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Se	Si
Units		mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L
July 2011														
Equipment Blank	7/18/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	<0.06	<17	<0.46	R	<30	0.17
Equipment Blank (1)	7/19/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	<0.06	<17	<0.46	R	<30	0.17
Field Blank	7/18/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	<0.06	<17	<0.46	R	<30	<0.43
Field Blank	7/19/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	<0.06	<17	<0.46	R	<30	0.16
Field Blank	7/20/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	<0.06	<17	<0.46	R	<30	<0.43
MDL		0.11		0.03	4	5	0.51	25	0.02	5	0.14		9	0.13
QL		0.35		0.10	14	17	1.71	84	0.06	17	0.46		30	0.43
Detections in samples		18/18		18/18	17/18	7/18	18/18	1/18	5/18	0/18	18/18		0/18	18/18
Concentration min		2		2	11	18	111	197	0.03	<17	25		<30	3.75
Concentration max		15		276	1450	31	1040	197	0.32	<17	184		<30	14
October 2011														
Field Blank	10/18/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	0.02	<17	<0.46	R	<30	<0.43
Field Blank	10/19/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	<0.06	<17	<0.46	R	<30	<0.43
Equipment Blank	10/18/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	<0.06	<17	<0.46	R	<30	<0.43
Equipment Blank	10/19/2011	<0.35	NA	<0.10	<14	<17	<1.71	<84	0.02	<17	<0.46	R	<30	<0.43
MDL		0.11		0.03	4	5	0.51	25	0.02	5	0.14		9	0.13
QL		0.35		0.10	14	17	1.71	84	0.06	17	0.46		30	0.43
Detections in samples		18/18		18/18	17/18	17/18	18/18	2/18	2/18	0/18	18/18		17/18	18/18
Concentration min		2.49		1.90	11	5	151	46	0.11	<17	25.4		11	3.72
Concentration max		11		158	932	18	610	196	0.12	<17	189		40	14
October 2012														
Field Blank1-102012	10/17/2012	<0.5	<10	0.01	<5	<0.5	<0.25	<0.20	0.02	<0.20	NA	<0.20	<2	0.02
Field Blank2-102012	10/18/2012	<0.5	<10	<0.05	<5	<0.5	<0.25	<0.20	0.02	<0.20	NA	<0.20	<2	0.01

Table A4 Dissolved Metal Blanks

Sample ID	Date Collected	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Se	Si
Units		mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L
Equipment Blank1-102012	10/17/2012	0.1	<10	0.02	<5	<0.5	0.022	0.43	0.02	<0.20	NA	<0.20	<2	0.02
Equipment Blank2-102012	10/18/2012	0.1	<10	0.01	<5	<0.5	0.016	0.26	0.02	<0.20	NA	<0.20	<2	0.02
MDL		0.1	1	0.01	0.3	0.05	0.01	0.10	0.01	0.05		0.10	0.6	0.01
QL		0.5	10	0.05	5	0.5	0.25	0.20	0.05	0.20		0.20	2	0.1
Detects		11/11	11/11	11/11	10/11	11/11	11/11	11/11	5/11	2/11		1/11	5/11	11/11
Min		2.5	23	1.81	10	2.1	135	0.18	0.05	0.05		0.11	0.6	4.0
Max		7.3	115	60.8	420	16.9	480	171	0.32	0.14		0.11	2.3	11

NA. Not analyzed for.

R. Data rejected potential spectral interferences.

Table A4 Dissolved Metal Blanks

Sample ID	Date Collected	Sr	Th	Ti	Tl	U	V	Zn
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011								
Equipment Blank	7/18/2011	<4	NA	<7	<17	<50	<10	<50
Equipment Blank (1)	7/19/2011	<4	NA	<7	<17	<50	<10	<50
Field Blank	7/18/2011	<4	NA	<7	<17	<50	<10	<50
Field Blank	7/19/2011	<4	NA	<7	<17	<50	<10	<50
Field Blank	7/20/2011	<4	NA	<7	<17	<50	<10	<50
MDL		1		2	5	15	3	15
QL		4		7	17	50	10	50
Detections in samples		18/18		1/18	2/18	16/18	2/18	7/18
Concentration min		121		2	6	17	3	17
Concentration max		5100		2	152	104	4	64
October 2011								
Field Blank	10/18/2011	<4	NA	<7	<17	<50	<10	<50
Field Blank	10/19/2011	<4	NA	<7	<17	<50	<10	<50
Equipment Blank	10/18/2011	<4	NA	<7	<17	<50	<10	<50
Equipment Blank	10/19/2011	<4	NA	<7	<17	<50	<10	<50
MDL		1		2	5	15	3	15
QL		4		7	17	50	10	50
Detections in samples		18/18		0/18	0/18	10/18	0/18	3/18
Concentration min		120		<7	<17	17	<10	71
Concentration max		3710		<7	<17	27	<10	116
October 2012								
Field Blank1-102012	10/17/2012	<2.0	<0.20	<5	<0.20	<0.20	<0.20	<5
Field Blank2-102012	10/18/2012	<2.0	<0.20	<5	<0.20	<0.20	<0.20	<5

Table A4 Dissolved Metal Blanks

Sample ID	Date Collected	Sr	Th	Ti	Tl	U	V	Zn
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Equipment Blank1-102012	10/17/2012	<2.0	<0.20	<5	<0.20	<0.20	<0.20	3
Equipment Blank2-102012	10/18/2012	0.20	<0.20	<5	<0.20	<0.20	<0.20	3
MDL		0.2	0.05	1	0.05	0.15	0.02	1
QL		2.0	0.20	5	0.20	0.20	0.2	5
Detects		11/11	0/11	0/11	0/11	9/11	11/11	5/11
Min		117	<0.20	<5	<0.20	1.4	0.04	1
Max		1380	<0.20	<5	<0.20	5.0	0.28	2

NA. Not analyzed for.

Table A5 Total Metal Blanks

Sample ID	Date Collected	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/2011	<16	<548	<22	<370	<4	<11	0.37	<4	<4	<8	<22	<74	NA
Field Blank	7/19/2011	<16	<548	<22	<370	<4	<11	0.15	<4	<4	<8	10	<74	NA
Field Blank	7/20/2011	<16	<548	<22	<370	<4	<11	<0.32	<4	<4	<8	<22	<74	NA
MDL		4	164	7	111	1	3	0.10	1	1	2	7	22	
QL		16	548	22	370	4	11	0.32	4	4	8	22	74	
Detections in samples		1/18	4/18	0/18	17/18	17/18	0/18	17/18	0/18	1/18	1/18	7/18	18/18	
Concentration min		18	189	<22	141	20	<11	4	<4	2	11	8	37	
Concentration max		18	9010	<22	469	173	<11	580	<4	2	11	16	23400	
October 2011														
Field Blank	10/18/2011	9	<548	<22	<370	<4	<11	0.11	<4	<4	<8	<22	<74	NA
Field Blank	10/19/2011	<16	<548	<22	<370	<4	<11	<0.32	<4	<4	<8	<22	<74	NA
Equipment Blank	10/18/2011	7	<548	<22	<370	<4	<11	0.10	<4	<4	<8	<22	<74	NA
Equipment Blank	10/19/2011	<16	<548	<22	<370	<4	<11	<0.32	<4	<4	<8	<22	<74	NA
MDL		4	164	7	111	1	3	0.10	1	1	2	7	22	
QL		16	548	22	370	4	11	0.32	4	4	8	22	74	
Detections in samples		1/18	2/18	0/18	17/18	17/18	0/18	17/18	0/18	1/18	0/18	6/18	14/18	
Concentration min		19	217	<22	171	19	<11	3.59	<4	4	<8	7	41	
Concentration max		19	316	<22	474	263	<11	384	<4	4	<8	21	16200	
October 2012														
Field Blank1-102012	10/17/2012	<10	<20	<0.2	<20	0.3	<3	0.01	<0.20	<5	<2.0	<0.5	<50	0.07
Field Blank2-102012	10/18/2012	<10	<20	<0.2	<20	<3	<3	0.01	<0.20	1	<2.0	<0.5	<50	<0.2
MDL		2	3	0.2	3	0.2	0.1	0.01	0.20	1	0.3	0.1	20	0.01
QL		10	20	0.2	20	3	3	0.05	0.20	3	2.0	0.5	50	0.2
Detects		0/11	3/11	11/11	11/11	11/11	0/11	11/11	0/11	6/11	1/11	10/11	7/11	2/11
Min		<10	25	0.3	144	17	<3	3.27	<0.20	1	2.6	0.54	38	0.01
Max		<10	243	3.7	475	97	<3	163	<0.20	8	2.6	1.6	6850	0.12

NA. Not analyzed for.

Table A5 Total Metal Blanks

Sample ID	Date Collected	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Se	Si
Units		mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L
July 2011														
Field Blank	7/18/2011	<0.39	NA	<0.11	<16	<19	<1.90	<93	<0.07	<19	<0.51	R	12	<0.48
Field Blank	7/19/2011	<0.39	NA	<0.11	<16	<19	<1.90	<93	<0.07	<19	<0.51	R	13	<0.48
Field Blank	7/20/2011	<0.39	NA	<0.11	<16	<19	<1.90	<93	<0.07	<19	<0.51	R	<33	<0.48
MDL		0.12		0.03	4	6	0.57	28	0.02	6	0.15		10	0.14
QL		0.39		0.11	16	19	1.90	93	0.07	19	0.51		33	0.48
Detections in samples		17/18		17/18	16/18	4/18	17/18	1/18	8/18	0/18	17/18		0/18	17/18
Concentration min		3		2	13	20	110	199	.04	<19	25		<33	4.29
Concentration max		15		276	1450	23	1060	199	0.32	<19	173		<33	34
October 2011														
Field Blank	10/18/2011	<0.39	NA	<0.11	<16	<19	<1.90	<93	<0.07	<19	<0.51	NA	<33	<0.48
Field Blank	10/19/2011	<0.39	NA	<0.11	<16	<19	<1.90	<93	<0.07	<19	<0.51	NA	<33	<0.48
Equipment Blank	10/18/2011	<0.39	NA	<0.11	<16	<19	<1.90	<93	<0.07	<19	<0.51	R	<33	<0.48
Equipment Blank	10/19/2011	<0.39	NA	<0.11	<16	<19	<1.90	<93	<0.07	<19	<0.51	R	<33	<0.48
MDL		0.12		0.03	4	6	0.57	28	0.02	6	0.15		10	0.14
QL		0.39		0.11	16	19	1.90	93	0.07	19	0.51		33	0.48
Detections in samples		17/18		17/18	16/18	14/18	17/18	2/18	8/18	0/18	17/18		3/18	17/18
Concentration min		2.75		1.95	12	7	153	46	0.02	<19	24.5		12	4.05
Concentration max		12		163	1130	21	627	206	0.31	<19	187		19	14
October 2012														
Field Blank1-102012	10/17/2012	<0.5	<5	<0.03	0.2	<0.5	<0.13	<0.20	<0.03	<0.20	NA	<0.20	<2	0.01
Field Blank2-102012	10/18/2012	<0.5	<5	<0.03	0.2	<0.5	<0.13	<0.20	<0.03	<0.20	NA	<0.20	<2	0.01
MDL		0.1	1	0.01	0.2	0.05	0.01	0.10	0.01	0.05		0.10	0.6	0.01
QL		0.3	5	0.03	3	0.5	0.13	0.20	0.03	0.20		0.20	2	0.05

Table A5 Total Metal Blanks

Sample ID	Date Collected	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Se	Si
Units		mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L
Detects		11/11	11/11	11/11	11/11	11/11	11/11	11/11	11/11	2/11		2/11	3/11	11/11
Min		2.6	22	1.76	0.2	2.2	138	0.36	0.01	0.21		0.12	0.8	3.8
Max		7.6	108	58.5	418	17.5	497	172	0.31	0.27		0.18	1.7	11

NA. Not analyzed for.

R. Data rejected due to spectral interferences.

Table A5 Total Metal Blanks

Sample ID	Date Collected	Sr	Th	Ti	Tl	U	V	Zn
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011								
Field Blank	7/18/2011	<4	NA	<8	<19	<56	<11	<56
Field Blank	7/19/2011	<4	NA	<8	<19	<56	4	<56
Field Blank	7/20/2011	<4	NA	<8	<19	<56	<11	<56
MDL		1		2	6	17	3	17
QL		4		8	19	56	11	56
Detections in samples		17/18		3/18	4/18	8/18	6/18	6/18
Concentration min		124		9	9	19	4	20
Concentration max		5050		317	172	105	17	93
October 2011								
Field Blank	10/18/2011	<4	NA	<8	<19	<56	<11	<56
Field Blank	10/19/2011	<4	NA	<8	<19	<56	<11	<56
Equipment Blank	10/18/2011	<4	NA	<8	<19	<56	<11	<56
Equipment Blank	10/19/2011	<4	NA	<8	<19	<56	<11	<56
MDL		1		2	6	17	3	17
QL		4		8	19	56	11	56
Detections in samples		17/18		4/18	0/18	3/18	0/18	3/18
Concentration min		119		6	<19	18	<11	33
Concentration max		3640		7	<19	25	<11	36
October 2012								
Field Blank1-102012	10/17/2012	<2	0.07	<3	0.10	<0.20	<0.20	<3
Field Blank2-102012	10/18/2012	<2	<0.20	<3	<0.20	<0.20	<0.20	<3
MDL		0.2	0.05	1	0.05	0.15	0.02	1
QL		2.0	0.20	3	0.20	0.20	0.2	3
Detects		11/11	1/11	4/11	0/11	9/11	11/11	4/11
Min		122	0.12	1	<0.20	1.4	0.27	1
Max		1310	0.12	7	<0.20	5.4	1.30	2

NA. Not analyzed for.

Table A6 VOC Blanks

Sample ID	Date Collected	ethanol (64-17-5)	isopropanol (67-63-0)	acrylonitrile (107-13-1)	styrene (100-42-5)	acetone (67-64-1)	tert-butyl Alcohol (75-65-0)	methyl tert-butyl ether (1634-04-4)	diisopropyl ether (108-20-3)	ethyl tert-butyl ether (637-92-3)	tert-amyl methyl ether (994-05-8)	vinyl chloride (75-01-4)	1,1-dichloroethene (75-35-4)	carbon disulfide (75-15-0)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Field Blank	7/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Field Blank	7/20/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Trip Blank	7/18/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Trip Blank	7/20/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
MDL		12.4	6.4			0.63	2.8	0.41	0.12	0.17	0.15	0.18		0.07
QL		100	25			1.0	5.0	1.0	1.0	1.0	1.0	0.5		0.5
Detections in samples		0/18	0/18			1/18	2/18	0/18	0/18	0/18	0/18	0/18		0/18
Concentration min		<100	<25.0			80.3	156	<1.0	<1.0	<1.0	<1.0	<0.5		<0.5
Concentration max		<100	<25.0			80.3	975	<1.0	<1.0	<1.0	<1.0	<0.5		<0.5
October 2011														
Field Blank	10/18/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Field Blank	10/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Trip Blank	10/18/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Trip Blank	10/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
October 2011														
MDL		12.4	6.4			0.63	2.8	0.41	0.12	0.17	0.15	0.18		0.07
QL		100	25.0			1.0	5.0	1.0	1.0	1.0	1.0	0.5		0.5
Detections in samples		0/18	0/18			0/18	2/18	0/18	0/18	0/18	0/18	0/18		0/18

Table A6 VOC Blanks

Sample ID	Date Collected	ethanol (64-17-5)	isopropanol (67-63-0)	acrylonitrile (107-13-1)	styrene (100-42-5)	acetone (67-64-1)	tert-butyl Alcohol (75-65-0)	methyl tert-butyl ether (1634-04-4)	diisopropyl ether (108-20-3)	ethyl tert-butyl ether (637-92-3)	tert-amyl methyl ether (994-05-8)	vinyl chloride (75-01-4)	1,1-dichloroethene (75-35-4)	carbon disulfide (75-15-0)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Concentration min		<100	<25.0			<1.0	795	<1.0	<1.0	<1.0	<1.0	<0.5		<0.5
Concentration max		<100	<25.0			<1.0	972	<1.0	<1.0	<1.0	<1.0	<0.5		<0.5
October 2012														
Field Blank1-102012	10/17/2012	<200	<25.0	<25.0	<0.5	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Field Blank2-102012	10/18/2012	<200	<25.0	<25.0	<0.5	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
Trip Blank 1-102012	10/17/2012	<200	<25.0	<25.0	<0.5	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R	<0.5
MDL		135	9.42	6.8	0.16	4.35	2.66	0.09	0.15	0.28	0.10	0.12		0.05
QL		200	25.0	25.0	0.5	1.0	5.0	1.0	1.0	1.0	1.0	0.5		0.5
Detects		0/11	0/11	0/11	0/11	0/11	2/11	0/11	0/11	0/11	0/11	0/11		0/11
Min		<200	<25	<25	<0.5	<1.0	229	<1.0	<1.0	<1.0	<1.0	<0.5		<0.5
Max		<200	<25	<25	<0.5	<1.0	287	<1.0	<1.0	<1.0	<1.0	<0.5		<0.5

R. Data rejected. 1,1,2-trichloroethane is subject to alkaline hydrolysis to 1,1-dichloroethene. This reaction could be supported by the sample preservative (trisodium phosphate).

NA. Not analyzed for.

Table A6 VOC Blanks

Sample ID	Date Collected	methylene chloride (75-09-2)	trans-1,2-dichloroethene (156-60-5)	1,1-dichloroethane (75-34-3)	cis-1,2-dichloroethene (156-59-2)	chloroform (67-66-3)	1,1,1-trichloroethane (71-55-6)	carbon tetrachloride (56-23-5)	benzene (71-43-2)	1,2-dichloroethane (107-06-2)	trichloroethene (79-01-6)	toluene (108-88-3)	1,1,2-trichloroethane (79-00-5)	tetrachloroethene (127-18-4)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Field Blank	7/19/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Field Blank	7/20/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Trip Blank	7/18/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Trip Blank	7/20/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
MDL		0.14	0.11	0.08	0.14	0.07	0.09	0.1	0.07	0.16	0.15	0.1		0.1
QL		1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	1/18	0/18	0/18	0/18		0/18
Concentration min		<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.77	<0.5	<0.5	<0.5		<0.5
Concentration max		<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.77	<0.5	<0.5	<0.5		<0.5
October 2011														
Field Blank	10/18/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Field Blank	10/19/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Trip Blank	10/18/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Trip Blank	10/19/2011	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
MDL		0.14	0.11	0.08	0.14	0.07	0.09	0.1	0.07	0.16	0.15	0.1		0.1
QL		1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	1/18	0/18	0/18	0/18		0/18

Table A6 VOC Blanks

Sample ID	Date Collected	methylene chloride (75-09-2)	trans-1,2-dichloroethene (156-60-5)	1,1-dichloroethane (75-34-3)	cis-1,2-dichoroethene (156-59-2)	chloroform (67-66-3)	1,1,1-trichloroethane (71-55-6)	carbon tetrachloride (56-23-5)	benzene (71-43-2)	1,2-dichloroethane (107-06-2)	trichloroethene (79-01-6)	toluene (108-88-3)	1,1,2-trichloroethane (79-00-5)	tetrachloroethene (127-18-4)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Concentration min		<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.20	<0.5	<0.5	<0.5		<0.5
Concentration max		<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.20	<0.5	<0.5	<0.5		<0.5
October 2012														
Field Blank1-102012	10/17/2012	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Field Blank2-102012	10/18/2012	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
Trip Blank 1-102012	10/17/2012	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	R	<0.5
MDL		0.17	0.17	0.09	0.15	0.09	0.17	0.12	0.11	0.21	0.10	0.09		0.10
QL		1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11	1/11	0/11	0/11	0/11		0/11
Min		<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.62	<0.5	<0.5	<0.5		<0.5
Max		<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.62	<0.5	<0.5	<0.5		<0.5

R. Data rejected. 1,1,2-trichloroethane is subject to alkaline hydrolysis to 1,1-dichloroethene. This reaction could be supported by the sample preservative (trisodium phosphate).

Table A6 VOC Blanks

Sample ID	Date Collected	chlorobenzene (108-90-7)	ethylbenzene (100-41-4)	m+p xylene (108-38-3, 106-42-3)	o-xylene (95-47-6)	isopropylbenzene (98-82-8)	1,3,5-trimethylbenzene (108-67-8)	1,2,4-trimethylbenzene (95-63-6)	1,3-dichlorobenzene (541-73-1)	1,4-dichlorobenzene (106-46-7)	1,2,3-trimethylbenzene (526-73-8)	1,2-dichlorobenzene (95-50-1)	naphthalene (91-20-3)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
Field Blank	7/18/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Field Blank	7/19/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Field Blank	7/20/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trip Blank	7/18/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trip Blank	7/20/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MDL		0.09	0.07	0.17	0.06	0.06	0.06	0.06	0.1	0.06	0.12	0.13	0.12
QL		0.5	1.0	2.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Concentration max		<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
October 2011													
Field Blank	10/18/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Field Blank	10/19/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trip Blank	10/18/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trip Blank	10/19/2011	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MDL		0.09	0.07	0.17	0.06	0.06	0.06	0.06	0.1	0.08	0.12	0.13	0.12

Table A6 VOC Blanks

Sample ID	Date Collected	chlorobenzene (108-90-7)	ethylbenzene (100-41-4)	m+p xylene (108-38-3, 106-42-3)	o-xylene (95-47-6)	isopropylbenzene (98-82-8)	1,3,5-trimethylbenzene (108-67-8)	1,2,4-trimethylbenzene (95-63-6)	1,3-dichlorobenzene (541-73-1)	1,4-dichlorobenzene (106-46-7)	1,2,3-trimethylbenzene (526-73-8)	1,2-dichlorobenzene (95-50-1)	naphthalene (91-20-3)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
QL		0.5	1.0	2.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Detections in samples		0/18	0/18	1/18	1/18	0/18	0/18	1/18	0/18	0/18	1/18	0/18	0/18
Concentration min		<0.5	<1.0	0.59	0.5	<0.5	<0.5	0.39	<0.5	<0.5	0.26	<0.5	<0.5
Concentration max		<0.5	<1.0	0.59	0.5	<0.5	<0.5	0.39	<0.5	<0.5	0.26	<0.5	<0.5
October 2012													
Field Blank1-102012	10/17/2012	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Field Blank2-102012	10/18/2012	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trip Blank 1-102012	10/17/2012	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MDL		0.10	0.06	0.14	0.03	0.07	0.04	0.07	0.10	0.07	0.06	0.09	0.12
QL		0.5	1.0	2.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11
Min		<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Max		<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

R. Data rejected. 1,1,2-trichloroethane is subject to alkaline hydrolysis to 1,1-dichloroethene. This reaction could be supported by the sample preservative (trisodium phosphate).

Table A7 Low Molecular Weight Acid Blanks

Sample ID	Date Collected	Lactate (50-21-5)	Formate (64-18-6)	Acetate (64-19-7)	Propionate (79-09-4)	Butyrate (107-92-6)
Units		mg/L	mg/L	mg/L	mg/L	mg/L
July 2011						
Field Blank	7/18/2011	<0.10	0.04	R	<0.10	<0.10
Field Blank	7/19/2011	<0.10	0.06	R	<0.10	<0.10
Field Blank	7/20/2011	<0.10	0.05	R	<0.10	<0.10
MDL		0.01	0.01		0.02	0.01
QL		0.10	0.10		0.10	0.10
Detections in samples		0/18	3/18		0/18	0/18
Concentration min		<0.10	0.11		<0.10	<0.10
Concentration max		<0.10	0.36		<0.10	<0.10
October 2011						
Field Blank	10/18/2011	<0.10	0.06	0.19	<0.10	<0.10
Field Blank	10/19/2011	<0.10	0.09	1.38	<0.10	<0.10
MDL		0.01	0.01	0.01	0.02	0.01
QL		0.10	0.10	0.10	0.10	0.10
Detections in samples		0/18	2/18	15/18	0/18	0/18
Concentration min		<0.10	0.20	0.12	<0.10	<0.10
Concentration max		<0.10	0.45	0.46	<0.10	<0.10
October 2012						
Field Blank1-102012	10/17/2012	<0.10	R	<0.10	<0.10	<0.10
Field Blank2-102012	10/18/2012	<0.10	R	<0.10	<0.10	<0.10
MDL		0.02		0.01	0.02	0.02
QL		0.10		0.10	0.10	0.10
Detects		0/11		0/11	0/11	0/11
Min		<0.10		<0.10	<0.10	<0.10
Max		<0.10		<0.10	<0.10	<0.10

R. Data rejected. Formate contamination of TSP preservative.

Table A8 Dissolved Gas Blanks

Sample ID	Date Collected	Methane (74-82-8)	Ethane (74-84-0)	Propane (74-98-6)	Butane (106-97-8)
Units		mg/L	mg/L	mg/L	mg/L
July 2011					
Field Blank	7/18/11	<0.0015	<0.0029	<0.0041	<0.0054
Field Blank	7/19/11	<0.0015	<0.0029	<0.0041	<0.0054
Field Blank	7/20/11	<0.0015	<0.0029	<0.0041	<0.0054
Trip Blank	7/18/11	<0.0015	<0.0029	<0.0041	<0.0054
Trip Blank	7/20/11	<0.0015	<0.0029	<0.0041	<0.0054
MDL		0.0002	0.0008	0.0008	0.0010
QL		0.0015	0.0029	0.0041	0.0054
Detections in samples		0/18	0/18	0/18	0/18
Concentration min		<0.0015	<0.0029	<0.0041	<0.0054
Concentration max		<0.0015	<0.0029	<0.0041	<0.0054
October 2011					
Field Blank	10/18/2011	R	R	R	R
Field Blank	10/19/2011	<0.0002	<0.0028	<0.0039	0.0013
Trip Blank	10/18/2011	R	R	R	R
Trip Blank	10/19/2011	<0.0002	<0.0028	<0.0039	<0.0049
MDL		0.0002	0.0007	0.0008	0.0010
QL		0.0014	0.0028	0.0039	0.0049
Detections in samples		11/18	1/18	0/18	0/18
Concentration min		0.0004	0.0044	<0.0039	<0.0049
Concentration max		0.0253	0.0044	<0.0039	<0.0049
October 2012					
Field Blank1-102012	10/17/2012	<0.0015	<0.0030	<0.0042	<0.0052
Field Blank2-102012	10/18/2012	<0.0015	<0.0030	<0.0042	<0.0052
Trip Blank1-102012	10/17/2012	<0.0015	<0.0030	<0.0042	<0.0052
MDL		0.0003	0.0005	0.0007	0.0008
QL		0.0015	0.0030	0.0042	0.0052
Detects		0/11	0/11	0/11	0/11
Min		<0.0015	<0.0030	<0.0042	<0.0052
Max		<0.0015	<0.0030	<0.0042	<0.0052

R. Data Rejected. Dissolved gas field and trip blank on 10/1811 was unusable due to carryover in the gas chromatograph from a standard analyzed prior to this field and trip blank.

Table A9 Glycol Blanks

Sample ID	Date Collected	2-butoxyethanol (111-76-2)	Diethylene glycol (111-46-6)	Triethylene glycol (112-27-6)	Tetraethylene glycol (112-60-7)
Units		µg/L	µg/L	µg/L	µg/L
July 2011					
Field Blank	7/18/11	<5	<25	<25	<10
Field Blank	7/19/11	<5	<25	<25	<10
Field Blank	7/20/11	<5	<25	<25	<10
QL		5	25	25	10
Detections in samples		0/18	0/18	0/18	0/18
Concentration min		<5	<25	<25	<10
Concentration max		<5	<25	<25	<10
October 2011					
Field Blank	10/18/2011	<5	<50	<25	R
Field Blank	10/19/2011	<5	<50	<25	R
QL		5	50	25	
Detections in samples		0/15	0/15	0/15	
Concentration min		<5	<50	<25	
Concentration max		<5	<50	<25	
October 2012					
Field Blank1-102012	10/17/2012	<25	<10	<10	<10
Field Blank2-102012	10/18/2012	<25	<10	<10	<10
QL		25	10	10	10
Detects		0/11	0/11	0/11	0/11
Min		<25	<10	<10	<10
Max		<25	<10	<10	<10

R. Data rejected due to low recoveries on spikes and CCVs.

Table A10 sVOC Blanks

Sample ID	Date Collected	R-(+)-limonene (5989-27-5)	1,2,4-trichlorobenzene (120-82-1)	1,2-dichlorobenzene (95-50-1)	1,2-dinitrobenzene (528-29-0)	1,3-dichlorobenzene (541-73-1)	1,3-dimethyladamantane (702-79-4)	1,3 -dinitrobenzene (99-65-0)	1,4-dichlorobenzene (106-46-7)	1,4-dinitrobenzene (100-25-4)	1-methylnaphthalene (90-12-0)	2,3,4,6-tetrachlorophenol (58-90-2)	2,3,5,6-tetrachlorophenol (935-95-5)	2,4,5-trichlorophenol (95-95-4)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	7/20/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
QL		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Concentration max		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
October 2011														
Field Blank	10/18/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
QL		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Concentration max		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Table A10 sVOC Blanks

Sample ID	Date Collected	R-(+)-limonene (5989-27-5)	1,2,4-trichlorobenzene (120-82-1)	1,2-dichlorobenzene (95-50-1)	1,2-dinitrobenzene (528-29-0)	1,3-dichlorobenzene (541-73-1)	1,3-dimethyladamantane (702-79-4)	1,3 -dinitrobenzene (99-65-0)	1,4-dichlorobenzene (106-46-7)	1,4-dinitrobenzene (100-25-4)	1-methylnaphthalene (90-12-0)	2,3,4,6-tetrachlorophenol (58-90-2)	2,3,5,6-tetrachlorophenol (935-95-5)	2,4,5-trichlorophenol (95-95-4)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012														
Field Blank1-102012	10/17/2012	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.00	<2.00	<2.00
Field Blank2-102012	10/18/2012	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.00	<2.00	<2.00
QL		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11
Min		<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.00	<2.00	<2.00
Max		<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.00	<2.00	<2.00

Table A10 SVOC Blanks

Sample ID	Date Collected	2,4,6-trichlorophenol (88-06-2)	2,4-dichlorophenol (120-83-2)	2,4-dimethylphenol (105-67-9)	2,4-dinitrophenol (51-28-5)	2,4dinitrotoluene (121-14-2)	2,6-dinitrotoluene (606-20-2)	2-butoxyethanol (111-76-2)	2-chloronaphthalene (91-58-7)	2-chlorophenol (95-57-8)	2-methylnaphthalene (91-57-6)	2-methylphenol (95-48-7)	2-nitroaniline (88-74-4)	2-nitrophenol (88-75-5)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/11	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	0.54	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	7/19/11	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	0.56	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	7/20/11	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	0.87	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
QL		0.50	0.50	0.50	5.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	6/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Concentration max		<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	1.53	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
October 2011														
Field Blank	10/18/2011	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	10/19/2011	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
QL		0.50	0.50	0.50	5.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Concentration max		<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
October 2012														
Field Blank1-102012	10/17/2012	<2.00	<2.00	<2.00	<2.00	<3.00	<1.00	<1.00	<1.00	<1.00	<2.00	<1.00	<2.00	<1.00
Field Blank2-102012	10/18/2012	<2.00	<2.00	<2.00	<2.00	<3.00	<1.00	<1.00	<1.00	<1.00	<2.00	<1.00	<2.00	<1.00

Table A10 SVOC Blanks

Sample ID	Date Collected	2,4,6-trichlorophenol (88-06-2)	2,4-dichlorophenol (120-83-2)	2,4-dimethylphenol (105-67-9)	2,4-dinitrophenol (51-28-5)	2,4dinitrotoluene (121-14-2)	2,6-dinitrotoluene (606-20-2)	2-butoxyethanol (111-76-2)	2-chloronaphthalene (91-58-7)	2-chlorophenol (95-57-8)	2-methylnaphthalene (91-57-6)	2-methylphenol (95-48-7)	2-nitroaniline (88-74-4)	2-nitrophenol (88-75-5)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
QL		2.00	2.00	2.00	2.00	3.00	1.00	1.00	1.00	1.00	2.00	1.00	2.00	1.00
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11
Min		<2.00	<2.00	<2.00	<2.00	<3.00	<1.00	<1.00	<1.00	<1.00	<2.00	<1.00	<2.00	<1.00
Max		<2.00	<2.00	<2.00	<2.00	<3.00	<1.00	<1.00	<1.00	<1.00	<2.00	<1.00	<2.00	<1.00

Table A10 SVOC Blanks

Sample ID	Date Collected	3&4-methylphenol (108-39-4 &106-44-5)	3,3'-dichlorobenzidine (91-94-1)	3-nitroaniline (99-09-2)	4,6-dinitro-2-methylphenol (534-52-1)	4-bromophenyl phenyl ether (101-55-3)	4-chloro-3-methylphenol (59-50-7)	4-chloroaniline (106-47-8)	4-chlorophenyl phenyl ether (7005-72-3)	4-nitroaniline (100-01-6)	4-nitrophenol (100-02-7)	Acenaphthene (83-32-9)	Acenaphthylene (208-96-8)	Adamantane (281-23-2)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/11	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50
Field Blank	7/19/11	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50
Field Blank	7/20/11	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50
QL		0.50	1.00	0.50	0.50	0.50	0.50	1.00	0.50	0.50	2.50	0.50	0.50	0.50
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50
Concentration max		<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50
October2011														
Field Blank	10/18/2011	<0.50	NR	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50
Field Blank	10/19/2011	<0.50	NR	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50
QL		0.50		0.50	0.50	0.50	0.50	1.00	0.50	0.50	2.50	0.50	0.50	0.50
Detections in samples		0/18		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50		<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50
Concentration max		<0.50		<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50	<0.50	<0.50	<0.50

Table A10 SVOC Blanks

Sample ID	Date Collected	3&4-methylphenol (108-39-4 &106-44-5)	3,3'-dichlorobenzidine (91-94-1)	3-nitroaniline (99-09-2)	4,6-dinitro-2-methylphenol (534-52-1)	4-bromophenyl phenyl ether (101-55-3)	4-chloro-3-methylphenol (59-50-7)	4-chloroaniline (106-47-8)	4-chlorophenyl phenyl ether (7005-72-3)	4-nitroaniline (100-01-6)	4-nitrophenol (100-02-7)	Acenaphthene (83-32-9)	Acenaphthylene (208-96-8)	Adamantane (281-23-2)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012														
Field Blank1-102012	10/17/2012	<5.00	<1.00	<3.00	<2.00	<1.00	<2.00	<3.00	<1.00	<3.00	<3.00	<1.00	<1.00	<1.00
Field Blank2-102012	10/18/2012	<5.00	<1.00	<3.00	<2.00	<1.00	<2.00	<3.00	<1.00	<3.00	<3.00	<1.00	<1.00	<1.00
QL		5.00	1.00	3.00	2.00	1.00	2.00	3.00	1.00	3.00	3.00	1.00	1.00	1.00
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11
Min		<5.00	<1.00	<3.00	<2.00	<1.00	<2.00	<3.00	<1.00	<3.00	<3.00	<1.00	<1.00	<1.00
Max		<5.00	<1.00	<3.00	<2.00	<1.00	<2.00	<3.00	<1.00	<3.00	<3.00	<1.00	<1.00	<1.00

Table A10 SVOC Blanks

Sample ID	Date Collected	Aniline (62-53-3)	Anthracene (120-12-7)	Azobenzene (103-33-3)	Benzo(a)anthracene (56-55-3)	Benzo(a)pyrene (50-32-3)	Benzo(b)fluoranthene (205-99-2)	Benzo(g,h,i)perylene (191-24-2)	Benzo(k)fluoranthene (207-08-9)	Benzoic Acid (65-85-0)	Benzyl alcohol (100-51-6)	Bis-(2-chloroethoxy)methane (111-91-1)	Bis-(2-chloroethyl)ether (111-44-4)	Bis-(2-chloroisopropyl)ether (108-60-1)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/11	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50
Field Blank	7/19/11	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50
Field Blank	7/20/11	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50
QL		1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	5.00	0.50	0.50	0.50	0.50
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50
Concentration max		<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50
October 2011														
Field Blank	10/18/2011	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50
Field Blank	10/19/2011	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50
QL		1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	5.00	0.50	0.50	0.50	0.50
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50
Concentration max		<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50

Table A10 SVOC Blanks

Sample ID	Date Collected	Aniline (62-53-3)	Anthracene (120-12-7)	Azobenzene (103-33-3)	Benzo(a)anthracene (56-55-3)	Benzo(a)pyrene (50-32-3)	Benzo(b)fluoranthene (205-99-2)	Benzo(g,h,i)perylene (191-24-2)	Benzo(k)fluoranthene (207-08-9)	Benzoic Acid (65-85-0)	Benzyl alcohol (100-51-6)	Bis-(2-chloroethoxy)methane (111-91-1)	Bis-(2-chloroethyl)ether (111-44-4)	Bis-(2-chloroisopropyl)ether (108-60-1)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012														
Field Blank1-102012	10/17/2012	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<3.00	<1.00	<1.00	<1.00	<1.00
Field Blank2-102012	10/18/2012	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<3.00	<1.00	<1.00	<1.00	<1.00
QL		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	1.00	1.00	1.00
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11
Min		<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<3.00	<1.00	<1.00	<1.00	<1.00
Max		<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<3.00	<1.00	<1.00	<1.00	<1.00

Table A10 SVOC Blanks

Sample ID	Date Collected	Bis-(2-ethylhexyl) adipate (103-23-1)	Bis-(2-ethylhexyl) phthalate (117-81-7)	Butyl benzyl phthalate (85-68-7)	Carbazole (86-74-8)	Chrysene (218-01-9)	Dibenz(a,h)anthracene (53-70-3)	Dibenzofuran (132-64-9)	Diethyl phthalate (84-66-2)	Dimethyl phthalate (131-11-3)	Di-n-butyl phthalate (84-74-2)	Di-n-octyl phthalate (117-84-0)	Diphenylamine (122-39-4)	Fluoranthene (206-44-0)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/11	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	7/19/11	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	7/20/11	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
QL		1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Detections in samples		0/18	5/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<1.00	1.44	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Concentration max		<1.00	10.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
October 2011														
Field Blank	10/18/2011	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Field Blank	10/19/2011	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
QL		1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Detections in samples		15/18	4/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		1.08	1.34	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Concentration max		3.78	2.31	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Table A10 SVOC Blanks

Sample ID	Date Collected	Bis-(2-ethylhexyl) adipate (103-23-1)	Bis-(2-ethylhexyl) phthalate (117-81-7)	Butyl benzyl phthalate (85-68-7)	Carbazole (86-74-8)	Chrysene (218-01-9)	Dibenz(a,h)anthracene (53-70-3)	Dibenzofuran (132-64-9)	Diethyl phthalate (84-66-2)	Dimethyl phthalate (131-11-3)	Di-n-butyl phthalate (84-74-2)	Di-n-octyl phthalate (117-84-0)	Diphenylamine (122-39-4)	Fluoranthene (206-44-0)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October2012														
Field Blank1-102012	10/17/2012	<1.00	<2.00	<1.00	<3.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Field Blank2-102012	10/18/2012	<1.00	<2.00	<1.00	<3.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
QL		1.00	2.00	1.00	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11
Min		<1.00	<2.00	<1.00	<3.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Max		<1.00	<2.00	<1.00	<3.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00

Table A10 SVOC Blanks

Sample ID	Date Collected	Fluoranthene (206-44-0)	Fluorene (86-73-7)	Hexachlorobenzene (118-74-1)	Hexachlorobutadiene (87-68-3)	Hexachlorocyclopentadiene (77-47-4)	Hexachloroethane (67-72-1)	Indeno(1,2,3-cd)pyrene (193-39-5)	Isophorone (78-59-1)	Naphthalene (91-20-3)	Nitrobenzene (98-95-3)	N-nitrosodimethylamine (62-75-9)	N-nitrosodi-n-propylamine (621-64-7)	Pentachlorophenol (87-86-5)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011														
Field Blank	7/18/11	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00
Field Blank	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00
Field Blank	7/20/11	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00
QL		0.50	0.50	0.50	1.00	0.50	1.00	0.50	0.50	0.50	0.50	0.50	0.50	1.00
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00
Concentration max		<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00
October 2011														
Field Blank	10/18/2011	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00
Field Blank	10/19/2011	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00
QL		0.50	0.50	0.50	1.00	0.50	1.00	0.50	0.50	0.50	0.50	0.50	0.50	1.00
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00
Concentration max		<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00

Table A10 SVOC Blanks

Sample ID	Date Collected	Fluoranthene (206-44-0)	Fluorene (86-73-7)	Hexachlorobenzene (118-74-1)	Hexachlorobutadiene (87-68-3)	Hexachlorocyclopentadiene (77-47-4)	Hexachloroethane (67-72-1)	Indeno(1,2,3-cd)pyrene (193-39-5)	Isophorone (78-59-1)	Naphthalene (91-20-3)	Nitrobenzene (98-95-3)	N-nitrosodimethylamine (62-75-9)	N-nitrosodi-n-propylamine (621-64-7)	Pentachlorophenol (87-86-5)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012														
Field Blank1-102012	10/17/2012	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.00
Field Blank2-102012	10/18/2012	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.00
QL		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11	0/11
Min		<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.00
Max		<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.00

Table A10 SVOC Blanks

Sample ID	Date Collected	Phenanthrene (85-01-8)	Phenol (108-95-2)	Pyrene (129-00-0)	Pyridine (110-86-1)	Squalene (111-02-4)	Terpiniol (98-55-5)	tri-(2-butoxyethyl) phosphate (78-51-3)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011								
Field Blank	7/18/11	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
Field Blank	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
Field Blank	7/20/11	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
QL		0.50	0.50	0.50	0.50	1.00	0.50	1.00
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
Concentration max		<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
October 2011								
Field Blank	10/18/2011	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
Field Blank	10/19/2011	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
QL		0.50	0.50	0.50	0.50	1.00	0.50	1.00
Detections in samples		0/18	0/18	0/18	0/18	0/18	0/18	0/18
Concentration min		<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
Concentration max		<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00

Table A10 SVOC Blanks

Sample ID	Date Collected	Phenanthrene (85-01-8)	Phenol (108-95-2)	Pyrene (129-00-0)	Pyridine (110-86-1)	Squalene (111-02-4)	Terpiniol (98-55-5)	tri-(2-butoxyethyl) phosphate (78-51-3)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012								
Field Blank1-102012	10/17/2012	<1.00	<2.00	<1.00	<1.00	<2.00	<1.00	<1.00
Field Blank2-102012	10/18/2012	<1.00	<2.00	<1.00	<1.00	<2.00	<1.00	<1.00
QL		1.00	2.00	1.00	1.00	2.00	1.00	1.00
Detects		0/11	0/11	0/11	0/11	0/11	0/11	0/11
Min		<1.00	<2.00	<1.00	<1.00	<2.00	<1.00	<1.00
Max		<1.00	<2.00	<1.00	<1.00	<2.00	<1.00	<1.00

Table A11 DRO/ GRO Blanks

Sample ID	Date Collected	GRO/TPH	DRO
Units		µg/L	µg/L
July 2011			
Field Blank	7/18/11	32.5	48.7
Field Blank	7/19/11	27.9	26.7
Field Blank	7/20/11	26.7	<20.0
QL		20.0	20.0
Detections in samples		1/18	17/18
Concentration min		77.9	26.3
Concentration max		77.9	120
October 2011			
Field Blank	10/18/2011	<20	<20
Field Blank	10/19/2011	<20	<20
QL		20.0	20.0
Detections in samples		2/18	17/18
Concentration min		20.9	25.1
Concentration max		23.6	96.9
October 2012			
Field Blank1-102012	10/17/2012	<20.0	<20.0
Field Blank2-102012	10/18/2012	<20.0	<20.0
QL		20.0	20.0
Detects		0/11	7/11
Min		<20.0	27.3
Max		<20.0	124

Table A12 Ethoxylated Alcohols, Alkylphenols and Acrylamide Blanks

Sample ID	Date Collected	Octylphenol ethoxylate	Nonylphenol ethoxylate	Ethoxylated alcohol C12	Ethoxylated alcohol C13	Ethoxylated alcohol C14	nonylphenol	Octylphenol	Acrylamide
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2011									
Field Blank	10/18/2011	NA	NA	NA	NA	NA	NA	NA	NA
Field Blank	10/19/2011	NA	NA	NA	NA	NA	NA	NA	NA
Trip Blank	10/18/2011	<0.8	0.8	<0.3	0.4	<0.3	<1	<0.05	<0.01
QL		0.8	0.8	0.3	0.3	0.3	1	0.05	0.01
Detections in samples		0/4	4/4	0/4	3/4	1/4	0/4	0/4	0/4
Concentration min		<0.8	1.2	<0.3	0.4	0.5	<1	<0.05	<0.01
Concentration max		<0.8	1.9	<0.3	0.8	0.5	<1	<0.05	<0.01
October 2012									
Field Blank1-102012	10/17/2012	R	R	R	R	R	R	R	<0.01
Field Blank2-102012	10/18/2012	R	R	R	R	R	R	R	<0.01
QL									0.01
Detects									1
Min									0.02
Max									0.02

NA. Not analyzed for.

R. Data rejected lab and analytical QA issues.

Table A13 DOC, DIC, Ammonia, and Anion Duplicates

Sample ID	Date Collected	DOC	DIC	NO_3 + NO_2	NH_3	Br	Cl	SO_4^{2}	F	I
Units		mg/L	mg/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	µg/L
July 2011										
5× QL		2.50	5.0	0.50	0.50	5.00	5.00	5.00	1.00	
NDGW11-072011	7/19/2011	2.98	110	<0.10	0.07	<1.00	0.84	83.9	0.45	NA
NDGW11-072011 DUP	7/19/2011	3.23	109	<0.10	0.08	<1.00	0.93	83.8	0.47	NA
RPD (%)		8.1	0.9	NC	NC	NC	NC	0.1	NC	NC
NDGW15-072011	7/19/2011	3.84	137	<0.10	0.23	1.21	3.56	236	0.54	NA
NDGW15-072011 DUP	7/19/2011	3.75	136	NS	NS	1.03	3.16	230	0.60	NA
RPD (%)		2.4	0.7	NC	NC	NC	NC	2.6	NC	NC
October 2011										
5× QL		5.00	5.00	0.50	0.50	5.00	5.00	5.00	1.00	
NDGW12-102011	10/19/2011	2.28	95.2	0.20	<0.10	<1.00	3.85	76.7	0.37	NA
NDGW12-102011 DUP	10/19/2011	2.37	95.7	0.20	<0.10	0.06	3.86	77.5	0.35	NA
RPD (%)		NC	0.52	NC	NC	NC	NC	1.04	NC	NC
NDGW16-102011	10/19/2011	4.33	143	<0.10	0.26	<1.00	12.8	447	0.33	NA
NDGW16-102011 DUP	10/19/2011	4.43	141	<0.10	0.21	<1.00	11.5	446	0.32	NA
RPD (%)		2.3	1.4	NC	NC	NC	10.7	0.2	NC	NC
October 2012										
5xQL		2.50	5.00	0.50	0.50	5.00	5.00	5.00	1.00	50.0
NDGW09-102012	10/18/2012	6.44	188	<0.10	0.21	<1.00	1.70	224	2.83	<10.0
NDGW09-102012 DUP	10/18//2012	6.60	189	<0.10	0.21	<1.00	1.62	223	2.75	<10.0
RPD		2.5	0.5	NC	NC	NC	NC	0.4	2.9	NC

NA. Not analyzed for.

NS. Not sampled well went dry.

NC. Not calculated.

Table A14 Dissolved Metal Duplicates

Sample ID	Date Collected	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		70	2470	100	1665	20	50	1	20	20	35	100	335
NDGW11-072011	7/19/2011	<14	<494	<20	177	51	<10	32.8	<4	1	<7	7	816
NDGW11-072011 DUP	7/19/2011	<14	<494	<20	178	52	<10	33.1	<4	<4	<7	<20	971
RPD (%)		NC	NC	NC	NC	1.9	NC	0.9	NC	NC	NC	NC	17.3
NDGW15-072011	7/19/2011	<14	<494	<20	338	25	<10	44.2	<4	<4	<7	<20	1890
NDGW15-072011 DUP	7/19/2011	<14	<494	<20	346	26	<10	45.8	<4	<4	<7	<20	1930
RPD (%)		NC	NC	NC	NC	3.9	NC	3.6	NC	NC	NC	NC	2.1
October 2011													
5× QL		70	2470	100	1665	20	50	1.45	20	20	35	100	335
NDGW12-102011	10/19/2011	<14	<494	<20	179	43	<10	31.9	<4	<4	<7	9	<67
NDGW12-102011 DUP	10/19/2011	<14	<494	<20	177	43	<10	32.2	<4	<4	<7	9	<67
RPD (%)		NC	NC	NC	NC	0.0	NC	0.9	NC	NC	NC	NC	NC
NDGW16-102011	10/19/2011	<14	<494	<20	340	39	<10	98.5	<4	<4	<7	<20	5500
NDGW16-102011 DUP	10/19/2011	<14	<494	<20	341	39	<10	100	<4	<4	<7	<20	5520
RPD (%)		NC	NC	NC	NC	0.0	NC	1.5	NC	NC	NC	NC	0.4
October 2012													
5xQL		50	100	1.0	200	25	25	0.5	1.0	25	10.0	2.5	500
NDGW09-102012	10/18/2012	<10	7	<0.2	476	17	<5	3.36	<0.20	<5	0.7	0.3	41
NDGW09-102012 DUP	10/18//2012	<10	11	<0.2	483	19	<5	3.38	<0.20	<5	0.6	0.7	<100
RPD		NC	NC	NC	1.5	NC	NC	0.6	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A14 Dissolved Metal Duplicates

Sample ID	Date Collected	Hg	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb
Units		µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L
July 2011													
5× QL			2		1	70	85	9	420	0	85	2	0
NDGW11-072011	7/19/2011	NA	3.56	NA	11.4	77	31	178	<84	0.05	<17	27.2	R
NDGW11-072011 DUP	7/19/2011	NA	3.55	NA	11.4	78	19	180	<84	0.07	<17	27.7	R
RPD (%)		NC	0.3	NC	0.0	1.3	NC	1.1	NC	NC	NC	1.8	NC
NDGW15-072011	7/19/2011	NA	5.65	NA	19.8	338	22	263	<84	<0.06	<17	72.2	R
NDGW15-072011 DUP	7/19/2011	NA	5.84	NA	20.3	344	22	273	<84	<0.06	<17	73.5	R
RPD (%)		NC	3.3	NC	2.5	1.8	NC	3.7	NC	NC	NC	1.8	NC
October 2011													
5× QL		NA	1.75		0.5	70	85	8.55	420	0.3	85	2.3	
NDGW12-102011	10/19/2011	NA	2.79	NA	11.8	95	5	151	<84	<0.06	<17	25.4	R
NDGW12-102011 DUP	10/19/2011	NA	2.81	NA	11.9	94	6	152	<84	<0.06	<17	25.2	R
RPD (%)		NC	0.7	NC	0.8	1.1	NC	0.7	NC	NC	NC	0.8	NC
NDGW16-102011	10/19/2011	NA	7.18	NA	41.1	927	15	261	<84	<0.06	<17	147	R
NDGW16-102011 DUP	10/19/2011	NA	7.18	NA	41.2	932	15	264	<84	<0.06	<17	146	R
RPD (%)		NC	0.0	NC	0.2	0.5	NC	1.1	NC	NC	NC	0.7	NC
October 2012													
5xQL		1.0	2.5	50	0.25	25	2.5	1.25	1.00	0.25	1.00		1.00
NDGW09-102012	10/18/2012	<0.2	2.6	33	1.81	10	3.8	477	0.18	0.31	<0.20	NA	<0.20
NDGW09-102012 DUP	10/18//2012	<0.2	2.5	34	1.83	11	4.6	480	0.22	0.32	<0.20	NA	<0.20
RPD		NC	3.9	NC	1.1	NC	19.0	NC	NC	3.2	NC	NC	NC

NA. Not analyzed for.

NC. Not Calculated.

R. Data Rejected.

Table A14 Dissolved Metal Duplicates

Sample ID	Date Collected	Se	Si	Sr	Th	Ti	Tl	U	V	Zn
Units		µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011										
5× QL		150	2	20		35	85	250	50	250
NDGW11-072011	7/19/2011	<30	10.4	259	NA	2	<17	17	<10	34
NDGW11-072011 DUP	7/19/2011	<30	10.6	261	NA	<7	<17	<50	<10	37
RPD (%)		NC	1.9	0.8	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/2011	<30	13.0	610	NA	<7	<17	22	<10	<50
NDGW15-072011 DUP	7/19/2011	<30	13.1	633	NA	<7	<17	24	<10	<50
RPD (%)		NC	0.8	3.7	NC	NC	NC	NC	NC	NC
October 2011										
5× QL		150	2.15	20		35	85	250	50	250
NDGW12-102011	10/19/2011	15	7.54	282	NA	<7	<17	17	<10	71
NDGW12-102011 DUP	10/19/2011	14	7.52	283	NA	<7	<17	<50	<10	70
RPD (%)		NC	0.3	0.4	NC	NC	NC	NC	NC	NC
NDGW16-102011	10/19/2011	11	13.6	1260	NA	<7	<17	17	<10	<50
NDGW16-102011 DUP	10/19/2011	19	13.6	1280	NA	<7	<17	19	<10	<50
RPD (%)		NC	0.0	1.6	NC	NC	NC	NC	NC	NC
October 2012										
5xQL		10	0.5	10.0	1.0	25	1.00	1.00	1.0	25
NDGW09-102012	10/18/2012	<2	4.0	117	<0.20	<5	<0.20	<0.20	0.06	<5
NDGW09-102012 DUP	10/18//2012	<2	4.0	121	<0.20	<5	<0.20	<0.20	0.07	1
RPD		NC	0.0	3.4	NC	NC	NC	NC	NC	NC

NA. Not analyzed for.

NC. Not Calculated.

Table A15 Total Metal Duplicates

Sample ID	Date Collected	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5×QL		80	2740	110	1850	20	55	2	20	20	40	110	370
NDGW11-072011	7/19/2011	<16	<548	<22	167	52	<11	32.4	<4	<4	<8	<22	1170
NDGW11-072011 DUP	7/19/2011	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/2011	<16	<548	<22	331	26	<11	44.3	<4	<4	<8	<22	2550
NDGW15-072011 DUP	7/19/2011	<16	<548	<22	331	26	<11	44.4	<4	<4	<8	<22	2580
RPD (%)		NC	NC	NC	NC	0.0	NC	0.2	NC	NC	NC	NC	1.2
October 2011													
5× QL		80	2740	110	1850	20	55	1.6	20	20	40	110	370
NDGW12-102011	10/19/2011	<16	<548	<22	180	47	<11	33.2	<4	<4	<8	21	71
NDGW12-102011 DUP	10/19/2011	<16	<548	<22	180	48	<11	33.7	<4	<4	<8	20	69
RPD (%)		NC	NC	NC	NC	2.1	NC	1.5	NC	NC	NC	NC	NC
NDGW16-102011	10/19/2011	<16	<548	<22	353	50	<11	121	<4	<4	<8	<22	7650
NDGW16-102011 DUP	10/19/2011	<16	<548	<22	354	42	<11	102	<4	<4	<8	<22	6350
RPD (%)		NC	NC	NC	NC	17.4	NC	17.0	NC	NC	NC	NC	18.6
October 2012													
5xQL		50	100	1	100	15	15	0.25	1.00	15	10.0	2.5	250
NDGW09-102012	10/18/2012	<10	<20	0.3	475	18	<3	3.27	<0.20	1	<2.0	<0.5	45.2
NDGW09-102012 DUP	10/18//2012	<10	<20	0.3	473	17	<3	3.31	<0.20	1	<2.0	0.54	38.1
RPD		NC	NC	NC	0.4	5.7	NC	1.2	NC	NC	NC	NC	NC

NS. Not sampled for.

NC. Not Calculated.

Table A15 Total Metal Duplicates

Sample ID	Date Collected	Hg	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb
Units		µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L
July 2011													
5×QL			2		1	80	95	10	465	0	95	3	0
NDGW11-072011	7/19/2011	NA	3.61	NA	11.3	76	<19	178	<93	0.11	<19	25.2	R
NDGW11-072011 DUP	7/19/2011	NA	NS	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/2011	NA	5.70	NA	19.9	340	20	265	<93	0.04	<19	70.6	R
NDGW15-072011 DUP	7/19/2011	NA	5.71	NA	19.8	340	20	265	<93	0.04	<19	70.1	R
RPD (%)		NC	0.2	NC	0.5	0.0	NC	0.0	NC	0.0	NC	0.7	NC
October 2011													
5× QL			1.95		0.55	80	95	9.5	465	0.35	95	2.55	0
NDGW12-102011	10/19/2011	NA	2.99	NA	12.3	231	8	154	<93	<0.07	<19	24.5	R
NDGW12-102011 DUP	10/19/2011	NA	2.93	NA	12.1	304	<19	156	<93	<0.07	<19	24.3	R
RPD (%)		NC	2.0	NC	1.6	27.3	NC	1.3	NC	NC	NC	0.8	NC
NDGW16-102011	10/19/2011	NA	7.84	NA	49.5	1130	14	268	<93	0.03	<19	159	R
NDGW16-102011 DUP	10/19/2011	NA	7.39	NA	41.7	956	15	269	<93	0.03	<19	141	R
RPD (%)		NC	5.9	NC	17.1	16.7	NC	0.4	NC	NC	NC	12.0	NC
October 2012													
5xQL		1.0	1.5	25	0.15	15	2.5	0.65	1.00	0.15	1		1
NDGW09-102012	10/18/2012	<0.2	2.6	24	1.76	11	6.5	497	0.42	0.30	<0.20	NA	<0.20
NDGW09-102012 DUP	10/18//2012	<0.2	2.6	24	1.78	11	6.5	496	0.36	0.31	<0.20	NA	<0.20
RPD		NC	0.0	NC	1.1	NC	0.0	0.2	NC	3.3	NC	NC	NC

NS. Not sampled for.

NA. Not analyzed for.

NC. Not Calculated.

R. Data rejected.

Table A15 Total Metal Duplicates

Sample ID	Date Collected	Se	Si	Sr	Th	Ti	Tl	U	V	Zn
Units		µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011										
5×QL		165	2	20		40	95	280	55	280
NDGW11-072011	7/19/2011	<33	9.97	255	NA	<8	<19	<56	<11	93
NDGW11-072011 DUP	7/19/2011	NS	NS	NS	NA	NS	NS	NS	NS	NS
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/2011	<33	12.9	610	NA	<8	<19	19	<11	<56
NDGW15-072011 DUP	7/19/2011	<33	12.8	611	NA	<8	<19	18	<11	<56
RPD (%)		NC	0.8	0.2	NC	NC	NC	NC	NC	NC
October 2011										
5× QL		165	2.4	20		40	95	280	55	280
NDGW12-102011	10/19/2011	<33	7.24	280	NA	<8	<19	<56	<11	36
NDGW12-102011 DUP	10/19/2011	<33	7.26	280	NA	<8	<19	<56	<11	37
RPD (%)		NC	0.3	0.0	NC	NC	NC	NC	NC	NC
NDGW16-102011	10/19/2011	<33	13.8	1450	NA	<8	<19	<56	<11	<56
NDGW16-102011 DUP	10/19/2011	<33	13.7	1240	NA	<8	<19	<56	<11	<56
RPD (%)		NC	0.7	15.6	NC	NC	NC	NC	NC	NC
October 2012										
5xQL		10	0.25	10.0	1.00	15	1.00	1.00	1.0	15
NDGW09-102012	10/18/2012	<2	3.8	122	<0.20	2	<0.20	<0.20	0.39	<3
NDGW09-102012 DUP	10/18//2012	<2	3.8	123	<0.20	3	<0.20	<0.20	0.39	<3
RPD		NC	0.0	0.8	NC	NC	NC	NC	NC	NC

NS. Not sampled for.

NA. Not analyzed for.

NC. Not Calculated.

Table A16 Volatile Organic Compound Duplicates

Sample ID	Date Collected	ethanol (64-17-5)	isopropanol (67-63-0)	acrylonitrile (107-13-1)	styrene (100-42-5)	acetone (67-64-1)	tert-butyl Alcohol (75-65-0)	methyl tert-butyl ether (1634-04-4)	diisopropyl ether (108-20-3)	ethyl tert-butyl ether (637-92-3)	tert-amyl methyl ether (994-05-8)	vinyl chloride (75-01-4)	1,1-dichloroethene (75-35-4)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July2011													
5× QL		500	125	0	0	5	25	5	5	5	5	2.5	
NDGW11-072011	7/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
NDGW11-072011 DUP	7/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
NDGW15-072011 DUP	7/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		500	125	0	0	5	25	5	5	5	5	2.5	
NDGW12-102011	10/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
NDGW12-102011 DUP	10/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
5× QL		500	125	0	0	5	25	5	5	5	5	2.5	
NDGW16-102011	10/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
NDGW16-102011 DUP	10/19/2011	<100	<25.0	NA	NA	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table A16 Volatile Organic Compound Duplicates

Sample ID	Date Collected	ethanol (64-17-5)	isopropanol (67-63-0)	acrylonitrile (107-13-1)	styrene (100-42-5)	acetone (67-64-1)	tert-butyl Alcohol (75-65-0)	methyl tert-butyl ether (1634-04-4)	diisopropyl ether (108-20-3)	ethyl tert-butyl ether (637-92-3)	tert-amyl methyl ether (994-05-8)	vinyl chloride (75-01-4)	1,1-dichloroethene (75-35-4)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012													
5xQL		1000	125	125	2.5	5	25	5	5	5	5	2.5	
NDGW09-102012	10/18/2012	<200	<25.0	<25.0	<0.5	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
NDGW09-102012 DUP	10/18//2012	<200	<25.0	<25.0	<0.5	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	R
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NA. Not analyzed for.

NC. Not Calculated.

R. Data rejected.

Table A16 Volatile Organic Compound Duplicates

Sample ID	Date Collected	carbon disulfide (75-15-0)	methylene chloride (75-09-2)	trans-1,2-dichloroethene (156-60-5)	1,1-dichloroethane (75-34-3)	cis-1,2-dichloroethene (156-59-2)	chloroform (67-66-3)	1,1,1-trichloroethane (71-55-6)	carbon tetrachloride (56-23-5)	benzene (71-43-2)	1,2-dichloroethane (107-06-2)	trichloroethene (79-01-6)	toluene (108-88-3)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		2.5	5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NDGW11-072011	7/19/2011	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW11-072011 DUP	7/19/2011	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/2011	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW15-072011 DUP	7/19/2011	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.5	5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NDGW12-102011	10/19/2011	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW12-102011 DUP	10/19/2011	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.5	5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NDGW16-102011	10/19/2011	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW16-102011 DUP	10/19/2011	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table A16 Volatile Organic Compound Duplicates

Sample ID	Date Collected	carbon disulfide (75-15-0)	methylene chloride (75-09-2)	trans-1,2-dichloroethene (156-60-5)	1,1-dichloroethane (75-34-3)	cis-1,2-dichoroethene (156-59-2)	chloroform (67-66-3)	1,1,1-trichloroethane (71-55-6)	carbon tetrachloride (56-23-5)	benzene (71-43-2)	1,2-dichloroethane (107-06-2)	trichloroethene (79-01-6)	toluene (108-88-3)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012													
5xQL		2.5	5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NDGW09-102012	10/18/2012	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW09-102012 DUP	10/18//2012	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A16 Volatile Organic Compound Duplicates

Sample ID	Date Collected	1,1,2-trichloroethane (79-00-5)	tetrachloroethene (127-18-4)	chlorobenzene (108-90-7)	ethylbenzene (100-41-4)	m+p xylene (108-38-3, 106-42-3)	o-xylene (95-47-6)	isopropylbenzene (98-82-8)	1,3,5-trimethylbenzene (108-67-8)	1,2,4-trimethylbenzene (95-63-6)	1,3-dichlorobenzene (541-73-1)	1,4-dichlorobenzene (106-46-7)	1,2,3-trimethylbenzene (526-73-8)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		0	2.5	2.5	5	10	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NDGW11-072011	7/19/2011	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW11-072011 DUP	7/19/2011	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/2011	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW15-072011 DUP	7/19/2011	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		0	2.5	2.5	5	10	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NDGW12-102011	10/19/2011	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW12-102011 DUP	10/19/2011	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		0	2.5	2.5	5	10	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NDGW16-102011	10/19/2011	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW16-102011 DUP	10/19/2011	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table A16 Volatile Organic Compound Duplicates

Sample ID	Date Collected	1,1,2-trichloroethane (79-00-5)	tetrachloroethene (127-18-4)	chlorobenzene (108-90-7)	ethylbenzene (100-41-4)	m+p xylene (108-38-3, 106-42-3)	o-xylene (95-47-6)	isopropylbenzene (98-82-8)	1,3,5-trimethylbenzene (108-67-8)	1,2,4-trimethylbenzene (95-63-6)	1,3-dichlorobenzene (541-73-1)	1,4-dichlorobenzene (106-46-7)	1,2,3-trimethylbenzene (526-73-8)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012													
5xQL		2.5	2.5	2.5	5	10	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NDGW09-102012	10/18/2012	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NDGW09-102012 DUP	10/18//2012	R	<0.5	<0.5	<1.0	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

R. Data rejected.

Table A16 Volatile Organic Compound Duplicates

Sample ID	Date Collected	1,2-dichlorobenzene (95-50-1)	naphthalene (91-20-3)
Units		µg/L	µg/L
July 2011			
5× QL		2.5	2.5
NDGW11-072011	7/19/2011	<0.5	<0.5
NDGW11-072011 DUP	7/19/2011	<0.5	<0.5
RPD (%)		NC	NC
NDGW15-072011	7/19/2011	<0.5	<0.5
NDGW15-072011 DUP	7/19/2011	<0.5	<0.5
RPD (%)		NC	NC
October 2011			
5× QL		2.5	2.5
NDGW12-102011	10/19/2011	<0.5	<0.5
NDGW12-102011 DUP	10/19/2011	<0.5	<0.5
RPD (%)		NC	NC
October 2011			
5× QL		2.5	2.5
NDGW16-102011	10/19/2011	<0.5	<0.5
NDGW16-102011 DUP	10/19/2011	<0.5	<0.5
RPD (%)		NC	NC

Table A16 Volatile Organic Compound Duplicates

Sample ID	Date Collected	1,2-dichlorobenzene (95-50-1)	naphthalene (91-20-3)
Units		µg/L	µg/L
October 2012			
5xQL		2.5	2.5
NDGW09-102012	10/18/2012	<0.5	<0.5
NDGW09-102012 DUP	10/18//2012	<0.5	<0.5
RPD		NC	NC

NC. Not Calculated.

Table A17 Low Molecular Weight Acid Duplicates

Sample ID	Date Collected	Lactate (50-21-5)	Formate (64-18-6)	Acetate (64-19-7)	Propionate (79-09-4)	Butyrate (107-92-6)
Units		mg/L	mg/L	mg/L	mg/L	mg/L
July 2011						
5× QL		0.50	0.50		0.50	0.50
NDGW11-072011	7/19/2011	<0.10	<0.10	R	<0.10	<0.10
NDGW11-072011 DUP	7/19/2011	<0.10	0.11	R	<0.10	<0.10
RPD (%)		NC	NC	NC	NC	NC
NDGW15-072011	7/19/2011	<0.10	<0.10	R	<0.10	<0.10
NDGW15-072011 DUP	7/19/2011	<0.10	<0.10	R	<0.10	<0.10
RPD (%)		NC	NC	NC	NC	NC
October 2011						
5× QL		0.50	0.50	0.50	0.50	0.50
NDGW12-102011	10/19/2011	<0.10	<0.10	0.14	<0.10	<0.10
NDGW12-102011 DUP	10/19/2011	<0.10	<0.10	0.17	<0.10	<0.10
RPD (%)		NC	NC	NC	NC	NC
NDGW16-102011	10/19/2011	<0.10	<0.10	0.20	<0.10	<0.10
NDGW16-102011 DUP	10/19/2011	<0.10	<0.10	0.30	<0.10	<0.10
RPD (%)		NC	NC	NC	NC	NC
October 2012						
5xQL		0.50		0.50	0.50	0.50
NDGW09-102012	10/18/2012	<0.10	R	<0.10	<0.10	<0.10
NDGW09-102012 DUP	10/18//2012	<0.10	R	<0.10	<0.10	<0.10
RPD		NC	NC	NC	NC	NC

NC. Not Calculated.

R. Data rejected.

Table A18 Dissolved Gas Duplicates

Sample ID	Date Collected	Methane (74-82-8)	Ethane (74-84-0)	Propane (74-98-6)	Butane (106-97-8)
Units		mg/L	mg/L	mg/L	mg/L
July 2011					
5× QL		0.0075	0.0145	0.0205	0.0270
NDGW11-072011	7/19/11	<0.0015	<0.0029	<0.0041	<0.0054
NDGW11-072011 DUP	7/19/11	<0.0015	<0.0029	<0.0041	<0.0054
RPD (%)		NC	NC	NC	NC
NDGW15-072011	7/19/11	<0.0015	<0.0029	<0.0041	<0.0054
NDGW15-072011 DUP	7/19/11	<0.0015	<0.0029	<0.0041	<0.0054
RPD (%)		NC	NC	NC	NC
October 2011					
5× QL		0.0070	0.0140	0.0195	0.0245
NDGW12-102011	10/19/2011	0.0004	<0.0028	<0.0039	<0.0049
NDGW12-102011 DUP	10/19/2011	<0.0014	<0.0028	<0.0039	<0.0049
RPD (%)		NC	NC	NC	NC
NDGW16-102011	10/19/2011	0.0041	<0.0028	<0.0039	<0.0049
NDGW16-102011 DUP	10/19/2011	0.0050	<0.0028	<0.0039	<0.0049
RPD (%)		NC	NC	NC	NC
October 2012					
5xQL		0.0075	0.0150	0.0210	0.0260
NDGW09-102012	10/18/2012	<0.0015	<0.0030	<0.0042	<0.0052
NDGW09-102012 DUP	10/18//2012	<0.0015	<0.0030	<0.0042	<0.0052
RPD		NC	NC	NC	NC

NC. Not Calculated.

Table A19 Glycol Duplicates

Sample ID	Date Collected	2-butoxyethanol (111-76-2)	Diethylene glycol (111-46-6)	Triethylene glycol (112-27-6)	Tetraethylene glycol (112-60-7)
Units		µg/L	µg/L	µg/L	µg/L
July 2011					
5× QL		25	125	125	50
NDGW11-072011	7/19/11	<5	<25	<25	<10
NDGW11-072011 DUP	7/19/11	<5	<25	<25	<10
RPD (%)		NC	NC	NC	NC
NDGW15-072011	7/19/11	<5	<25	<25	<10
NDGW15-072011 DUP	7/19/11	<5	<25	<25	<10
RPD (%)		NC	NC	NC	NC
October 2011					
5× QL		25	250	125	
NDGW12-102011	10/19/2011	<5	<50	<25	R
NDGW12-102011 DUP	10/19/2011	<5	<50	<25	R
RPD (%)		NC	NC	NC	NC
NDGW16-102011	10/19/2011	<5	<50	<25	R
NDGW16-102011 DUP	10/19/2011	<5	<50	<25	R
RPD (%)		NC	NC	NC	NC
October 2012					
5xQL		125	50	50	50
NDGW09-102012	10/18/2012	<25	<10	<10	<10
NDGW09-102012 DUP	10/18//2012	<25	<10	<10	<10
RPD		NC	NC	NC	NC

NC. Not Calculated.

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	R-(+)-limonene (5989-27-5)	1,2,4-trichlorobenzene (120-82-1)	1,2-dichlorobenzene (95-50-1)	1,2-dinitrobenzene (528-29-0)	1,3-dichlorobenzene (541-73-1)	1,3-dimethyladamantane (702-79-4)	1,3 -dinitrobenzene (99-65-0)	1,4-dichlorobenzene (106-46-7)	1,4-dinitrobenzene (100-25-4)	1-methylnaphthalene (90-12-0)	2,3,4,6-tetrachlorophenol (58-90-2)	2,3,5,6-tetrachlorophenol (935-95-5)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
NDGW11-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW11-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW15-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
NDGW12-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW12-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
NDGW16-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW16-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	R-(+)-limonene (5989-27-5)	1,2,4-trichlorobenzene (120-82-1)	1,2-dichlorobenzene (95-50-1)	1,2-dinitrobenzene (528-29-0)	1,3-dichlorobenzene (541-73-1)	1,3-dimethyladamantane (702-79-4)	1,3 -dinitrobenzene (99-65-0)	1,4-dichlorobenzene (106-46-7)	1,4-dinitrobenzene (100-25-4)	1-methylnaphthalene (90-12-0)	2,3,4,6-tetrachlorophenol (58-90-2)	2,3,5,6-tetrachlorophenol (935-95-5)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2012													
5xQL		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	10.00	10.00
NDGW09-102012	10/18/2012	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<10.0	<10.0
NDGW09-102012 DUP	10/18//2012	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<10.0	<10.0
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	2,4,5-trichlorophenol (95-95-4)	2,4,6-trichlorophenol (88-06-2)	2,4-dichlorophenol (120-83-2)	2,4-dimethylphenol (105-67-9)	2,4-dinitrophenol (51-28-5)	2,4dinitrotoluene (121-14-2)	2,6-dinitrotoluene (606-20-2)	2-butoxyethanol (111-76-2)	2-chloronaphthalene (91-58-7)	2-chlorophenol (95-57-8)	2-methylnaphthalene (91-57-6)	2-methylphenol (95-48-7)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		2.50	2.50	2.50	2.50	25.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
NDGW11-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW11-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW15-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	25.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
NDGW12-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW12-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	25.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
NDGW16-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW16-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	2,4,5-trichlorophenol (95-95-4)	2,4,6-trichlorophenol (88-06-2)	2,4-dichlorophenol (120-83-2)	2,4-dimethylphenol (105-67-9)	2,4-dinitrophenol (51-28-5)	2,4dinitrotoluene (121-14-2)	2,6-dinitrotoluene (606-20-2)	2-butoxyethanol (111-76-2)	2-chloronaphthalene (91-58-7)	2-chlorophenol (95-57-8)	2-methylnaphthalene (91-57-6)	2-methylphenol (95-48-7)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012													
5xQL		10.00	10.00	10.00	10.00	15.00	5.00	5.00	5.00	5.00	10.00	5.00	10.00
NDGW09-102012	10/18/2012	<10.0	<10.0	<10.0	<10.0	<15.0	<5.00	<5.00	<5.00	<5.00	<10.0	<5.00	<10.0
NDGW09-102012 DUP	10/18//2012	<10.0	<10.0	<10.0	<10.0	<15.0	<5.00	<5.00	<5.00	<5.00	<10.0	<5.00	<10.0
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	2-nitroaniline (88-74-4)	2-nitrophenol (88-75-5)	3&4-methylphenol (108-39-4 & 106-44-5)	3,3'-dichlorobenzidine (91-94-1)	3-nitroaniline (99-09-2)	4,6-dinitro-2-methylphenol (534-52-1)	4-bromophenyl phenyl ether (101-55-3)	4-chloro-3-methylphenol (59-50-7)	4-chloroaniline (106-47-8)	4-chlorophenyl phenyl ether (7005-72-3)	4-nitroaniline (100-01-6)	4-nitrophenol (100-02-7)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		2.50	2.50	2.50	5.00	2.50	2.50	2.50	2.50	5.00	2.50	2.50	12.50
NDGW11-072011	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50
NDGW11-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50
NDGW15-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	0.00	2.50	2.50	2.50	2.50	5.00	2.50	2.50	12.50
NDGW12-102011	10/19/2011	<0.50	<0.50	<0.50	NR	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50
NDGW12-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	NR	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	0.00	2.50	2.50	2.50	2.50	5.00	2.50	2.50	12.50

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	2-nitroaniline (88-74-4)	2-nitrophenol (88-75-5)	3&4-methylphenol (108-39-4 & 106-44-5)	3,3'-dichlorobenzidine (91-94-1)	3-nitroaniline (99-09-2)	4,6-dinitro-2-methylphenol (534-52-1)	4-bromophenyl phenyl ether (101-55-3)	4-chloro-3-methylphenol (59-50-7)	4-chloroaniline (106-47-8)	4-chlorophenyl phenyl ether (7005-72-3)	4-nitroaniline (100-01-6)	4-nitrophenol (100-02-7)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NDGW16-102011	10/19/2011	<0.50	<0.50	<0.50	NA	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50
NDGW16-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	NA	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<2.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2012													
5xQL		5.00	10.00	25.00	5.00	15.00	10.00	5.00	10.00	15.00	5.00	15.00	15.00
NDGW09-102012	10/18/2012	<5.00	<10.0	<25.0	<5.00	<15.0	<10.0	<5.00	<10.0	<15.0	<5.00	<15.0	<15.0
NDGW09-102012 DUP	10/18//2012	<5.00	<10.0	<25.0	<5.00	<15.0	<10.0	<5.00	<10.0	<15.0	<5.00	<15.0	<15.0
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	Acenaphthene (83-32-9)	Acenaphthylene (208-96-8)	Adamantane (281-23-2)	Aniline (62-53-3)	Anthracene (120-12-7)	Azobenzene (103-33-3)	Benzo(a)anthracene (56-55-3)	Benzo(a)pyrene (50-32-3)	Benzo(b)fluoranthene (205-99-2)	Benzo(g,h,i)perylene (191-24-2)	Benzo(k)fluoranthene (207-08-9)	Benzoic Acid (65-85-0)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		2.50	2.50	2.50	5.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	25.00
NDGW11-072011	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00
NDGW11-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00
NDGW15-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	5.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	25.00
NDGW12-102011	10/19/2011	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00
NDGW12-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	5.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	25.00
NDGW16-102011	10/19/2011	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00
NDGW16-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.00
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	Acenaphthene (83-32-9)	Acenaphthylene (208-96-8)	Adamantane (281-23-2)	Aniline (62-53-3)	Anthracene (120-12-7)	Azobenzene (103-33-3)	Benzo(a)anthracene (56-55-3)	Benzo(a)pyrene (50-32-3)	Benzo(b)fluoranthene (205-99-2)	Benzo(g,h,i)perylene (191-24-2)	Benzo(k)fluoranthene (207-08-9)	Benzoic Acid (65-85-0)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
October 2012													
5xQL		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	15.00
NDGW09-102012	10/18/2012	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<15.0
NDGW09-102012 DUP	10/18//2012	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<15.0
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	Benzyl alcohol (100-51-6)	Bis-(2-chloroethoxy)methane (111-91-1)	Bis-(2-chloroethyl)ether (111-44-4)	Bis-(2-chloroisopropyl)ether (108-60-1)	Bis-(2-ethylhexyl) adipate (103-23-1)	Bis-(2-ethylhexyl) phthalate (117-81-7)	Butyl benzyl phthalate (85-68-7)	Carbazole (86-74-8)	Chrysene (218-01-9)	Dibenz(a,h)anthracene (53-70-3)	Dibenzofuran (132-64-9)	Diethyl phthalate (84-66-2)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		2.50	2.50	2.50	2.50	5.00	5.00	2.50	2.50	2.50	2.50	2.50	2.50
NDGW11-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW11-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	2.08	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW15-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	5.00	5.00	2.50	2.50	2.50	2.50	2.50	2.50
NDGW12-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	1.12	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW12-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<1.00	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	5.00	5.00	2.50	2.50	2.50	2.50	2.50	2.50

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	Benzyl alcohol (100-51-6)	Bis-(2-chloroethoxy)methane (111-91-1)	Bis-(2-chloroethyl)ether (111-44-4)	Bis-(2-chloroisopropyl)ether (108-60-1)	Bis-(2-ethylhexyl) adipate (103-23-1)	Bis-(2-ethylhexyl) phthalate (117-81-7)	Butyl benzyl phthalate (85-68-7)	Carbazole (86-74-8)	Chrysene (218-01-9)	Dibenz(a,h)anthracene (53-70-3)	Dibenzofuran (132-64-9)	Diethyl phthalate (84-66-2)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NDGW16-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<1.00	2.31	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NDGW16-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	1.71	1.49	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2012													
5xQL		5.00	5.00	5.00	5.00	5.00	10.00	5.00	15.00	5.00	5.00	5.00	5.00
NDGW09-102012	10/18/2012	<5.00	<5.00	<5.00	<5.00	<5.00	<10.0	<5.00	<15.0	<5.00	<5.00	<5.00	<5.00
NDGW09-102012 DUP	10/18//2012	<5.00	<5.00	<5.00	<5.00	<5.00	<10.0	<5.00	<15.0	<5.00	<5.00	<5.00	<5.00
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	Dimethyl phthalate (131-11-3)	Di-n-butyl phthalate (84-74-2)	Di-n-octyl phthalate (117-84-0)	Diphenylamine (122-39-4)	Fluoranthene (206-44-0)	Fluorene (86-73-7)	Hexachlorobenzene (118-74-1)	Hexachlorobutadiene (87-68-3)	Hexachlorocyclopentadiene (77-47-4)	Hexachloroethane (67-72-1)	Indeno(1,2,3-cd)pyrene (193-39-5)	Isophorone (78-59-1)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		2.50	2.50	2.50	2.50	2.50	2.50	2.50	5.00	2.50	5.00	2.50	2.50
NDGW11-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50
NDGW11-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50
NDGW15-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	2.50	2.50	2.50	5.00	2.50	5.00	2.50	2.50
NDGW12-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50
NDGW12-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	2.50	2.50	2.50	5.00	2.50	5.00	2.50	2.50
NDGW16-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	Dimethyl phthalate (131-11-3)	Di-n-butyl phthalate (84-74-2)	Di-n-octyl phthalate (117-84-0)	Diphenylamine (122-39-4)	Fluoranthene (206-44-0)	Fluorene (86-73-7)	Hexachlorobenzene (118-74-1)	Hexachlorobutadiene (87-68-3)	Hexachlorocyclopentadiene (77-47-4)	Hexachloroethane (67-72-1)	Indeno(1,2,3-cd)pyrene (193-39-5)	Isophorone (78-59-1)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NDGW16-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00	<0.50	<0.50
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2012													
5xQL		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
NDGW09-102012	10/18/2012	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
NDGW09-102012 DUP	10/18//2012	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	Naphthalene (91-20-3)	Nitrobenzene (98-95-3)	N-nitrosodimethylamine (62-75-9)	N-nitrosodi-n-propylamine (621-64-7)	Pentachlorophenol (87-86-5)	Phenanthrene (85-01-8)	Phenol (108-95-2)	Pyrene (129-00-0)	Pyridine (110-86-1)	Squalene (111-02-4)	Terpiniol (98-55-5)	tri-(2-butoxyethyl) phosphate (78-51-3)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011													
5× QL		2.50	2.50	2.50	2.50	5.00	2.50	2.50	2.50	2.50	5.00	2.50	5.00
NDGW11-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
NDGW11-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NDGW15-072011	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
NDGW15-072011 DUP	7/19/11	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	5.00	2.50	2.50	2.50	2.50	5.00	2.50	5.00
NDGW12-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
NDGW12-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2011													
5× QL		2.50	2.50	2.50	2.50	5.00	2.50	2.50	2.50	2.50	5.00	2.50	5.00

Table A20 Semi-Volatile Organic Compounds

Sample ID	Date Collected	Naphthalene (91-20-3)	Nitrobenzene (98-95-3)	N-nitrosodimethylamine (62-75-9)	N-nitrosodi-n-propylamine (621-64-7)	Pentachlorophenol (87-86-5)	Phenanthrene (85-01-8)	Phenol (108-95-2)	Pyrene (129-00-0)	Pyridine (110-86-1)	Squalene (111-02-4)	Terpiniol (98-55-5)	tri-(2-butoxyethyl) phosphate (78-51-3)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NDGW16-102011	10/19/2011	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
NDGW16-102011 DUP	10/19/2011	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50	<1.00
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
October 2012													
5xQL		5.00	5.00	5.00	5.00	10.00	5.00	10.00	5.00	5.00	10.00	5.00	5.00
NDGW09-102012	10/18/2012	<5.00	<5.00	<5.00	<5.00	<10.0	<5.00	<10.0	<5.00	<5.00	<10.0	<5.00	<5.00
NDGW09-102012 DUP	10/18//2012	<5.00	<5.00	<5.00	<5.00	<10.0	<5.00	<10.0	<5.00	<5.00	<10.0	<5.00	<5.00
RPD		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

NC. Not Calculated.

Table A21 Diesel Range Organic Compounds and Gasoline Range Organic Compounds Duplicates

Sample ID	Date Collected	GRO/TPH	DRO
Units		µg/L	µg/L
July 2011			
5× QL		100	100
NDGW11-072011	7/19/11	<20.0	55.4
NDGW11-072011 DUP	7/19/11	<20.0	52.4
RPD (%)		NC	NC
NDGW15-072011	7/19/11	<20.0	40.1
NDGW15-072011 DUP	7/19/11	<20.0	49.3
RPD (%)		NC	NC
October 2011			
5× QL		100	100
NDGW12-102011	10/19/2011	<20	25.7
NDGW12-102011 DUP	10/19/2011	<20	26.3
RPD (%)		NC	NC
NDGW16-102011	10/19/2011	<20	40.1
NDGW16-102011 DUP	10/19/2011	<20	47.1
RPD (%)		NC	NC
October 2012			
5xQL		100	100.0
NDGW09-102012	10/18/2012	<20.0	124
NDGW09-102012 DUP	10/18//2012	<20.0	118
RPD		NC	5.0

NC. Not Calculated.

Table A22 O and H Stable Isotopes of Water Duplicates

Sample ID	Date Collected	$\delta^{2}H$	$\delta^{18}O$
Units		‰	‰
July 2011			
NDGW10-072011	7/19/11	NA	NA
NDGW10-072011 DUP	7/19/11	NA	NA
RPD (%)		NC	NC
NDGW13-072011	7/19/11	NA	NA
NDGW13-072011 DUP	7/19/11	NA	NA
RPD (%)		NC	NC
October 2011			
NDGW12-102011	10/19/2011	-127.20	-15.93
NDGW12-102011 DUP	10/19/2011	-126.89	-15.98
RPD (%)		0.2	0.3
NDGW16-102011	10/19/2011	-114.64	-14.35
NDGW16-102011 DUP	10/19/2011	-114.69	-14.39
RPD (%)		0.0	0.3
October 2012			
NDGW09-102012	10/18/2012	-129.21	-16.52
NDGW09-102012 DUP	10/18//2012	-129.09	-16.38
RPD		0.1	0.9

NA. Not analyzed for.

NC. Not Calculated.

Table A23 Strontium Isotope Duplicates

Sample ID	Date Collected	Sr	$^{87}Sr/^{86}Sr$	1/Sr	Rb/Sr
Units		µg/L	Atom Ratio	L/µg	Weight Ratio
July 2011					
NDGW10-072011	7/19/11	NA	NA	NA	NA
NDGW10-072011 DUP	7/19/11	NA	NA	NA	NA
RPD (%)		NC	NC	NC	NC
NDGW13-072011	7/19/11	NA	NA	NA	NA
NDGW13-072011 DUP	7/19/11	NA	NA	NA	NA
RPD (%)		NC	NC	NC	NC
October 2011					
NDGW12-102011	10/19/2011	287	0.708610	0.00348	0.0009
NDGW12-102011 DUP	10/19/2011	293	0.708618	0.00341	0.0009
RPD (%)		2.1	0.0	2.0	2.1
October 2012					
NDGW09-102012	10/18/2012	112	0.707534	0.0089286	0.023214
NDGW09-102012 DUP	10/18//2012	117	0.707561	0.008547	0.022222
RPD		4.4	0.0	4.4	4.4

Table A24 Ethoxylated Alcohols, Alkylphenols and Acrylamide Duplicates

Sample ID	Date Collected	Octylphenol ethoxylate	Nonylphenol ethoxylate	Ethoxylated alcohol C12	Ethoxylated alcohol C13	Ethoxylated alcohol C14	nonylphenol	Octylphenol	Acrylamide
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
July 2011									
5× QL									
NDGW10-072011	7/19/11	NA	NA	NA	NA	NA	NA	NA	NA
NDGW10-072011 DUP	7/19/11	NA	NA	NA	NA	NA	NA	NA	NA
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC
NDGW13-072011	7/19/11	NA	NA	NA	NA	NA	NA	NA	NA
NDGW13-072011 DUP	7/19/11	NA	NA	NA	NA	NA	NA	NA	NA
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC
October 2011									
5× QL		4	4	1.5	1.5	1.5	5	0.25	0.05
NDGW12-102011	10/19/2011	NA	NA	NA	NA	NA	NA	NA	NA
NDGW12-102011 DUP	10/19/2011	NA	NA	NA	NA	NA	NA	NA	NA
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC
NDGW16-102011	10/19/2011	NA	NA	NA	NA	NA	NA	NA	NA
NDGW16-102011 DUP	10/19/2011	NA	NA	NA	NA	NA	NA	NA	NA
RPD (%)		NC	NC	NC	NC	NC	NC	NC	NC
October 2012									
5xQL									0.05
NDGW09-102012	10/18/2012	R	R	R	R	R	R	R	<0.01
NDGW09-102012 DUP	10/18//2012	R	R	R	R	R	R	R	<0.01
RPD		NC	NC	NC	NC	NC	NC	NC	NC

NA. Not analyzed for.

NC. Not Calculated.

R. Data Rejected.

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
July 2011		
Field Parameters/EPA on-site	Results for ferrous iron and sulfide are considered screening values as they were measured on site with field kits. Mid-day performance checks were not done.	All detected results for ferrous iron and sulfide were qualified "J" as estimated. Data usability is unaffected. Beginning and end-of day performance checks were done and were within control limits. Data usability is unaffected.
Dissolved gases/ Shaw Environmental	All QA/QC criteria were met.	Meets project requirements.
DOC/ ORD/NRMRL- Ada	All QA/QC criteria were met.	Meets project requirements.
DIC/ ORD/NRMRL- Ada	All QA/QC criteria were met.	Meets project requirements.
Anions/ Ammonia ORD/NRMRL- Ada	All QA/QC criteria were met.	Meets project requirements.
Dissolved Metals/ Shaw Environmental	ICP-MS: All ICP-MS results were rejected and replaces with ICP-OES results. The reasons stated were potential interferences and that interference check standards were not run. ICP-OES: Antimony: The ICP-OES data for Sb was rejected because of potential spectral interferences. Continuing calibration checks were analyzed at appropriate intervals, however, some metals (B, Ba, K, Na, Ag, Si, S, P, and U) were not always included in the check standards at the required intervals. Uranium: High U results (>30 µg/L) may be due to spectral interference and/or high quantitation limits using ICP-OES.	ICP-MS: The ICP-MS data was replaced with ICP-OES data. Detection and quantitation limits are higher than desirable. The ICP-OES data cannot be compared with the subsequent ICP-MS data for trace metals from the third sampling event. ICP-OES Antimony: The data was rejected and flagged with an R. All samples with detected quantities for these metals were qualified "J" as estimated. Data for B, Ba, K, Na, Ag, Si, S, P, and U are usable as positive identifications with estimated concentrations. Uranium: Affected samples are NDGW04, NDGW07, NDGW08, and NDGW10. No primary MCL exceedances (>30 µg/L) were observed in the October 2011 sampling event. Third sampling event used ICP-MS.
Total Metals/ Shaw Environmental	ICP-MS: All ICP-MS results were rejected and replaced with ICP-OES results. The reasons stated were potential interferences and that	ICP-MS: The ICP-MS data was replaced with ICP-OES data. Detection and quantitation limits are higher than desirable. The ICP-OES data cannot be

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
	interference check standards were not run.	compared with the subsequent ICP-MS data for trace metals from the third sampling event.
	Digestion: It was determined that all parameters were not adhered to in US EPA Method 3015A.	Digestion: The "J" qualifier was applied to detections above the QL for digested samples. Data are usable as positive identifications with estimated concentrations.
	ICP-OES: Continuing calibration checks were analyzed at appropriate intervals, however, some metals (B, Ba, K, Na, Ag, Si, S, P, and U) were not always included in the check standards at the required intervals.	ICP-OES All samples with detected quantities for these metals were qualified "J" as estimated. Data for B, Ba, K, Na, Ag, Si, S, P, and U are usable as positive identifications with estimated concentrations.
	Antimony: The ICP-OES data for Sb was rejected because of potential spectral interferences.	Antimony: The data was rejected and flagged with an R.
	Uranium: High U results (>30 µg/L) may be due to spectral interference and/or high quantitation limits using ICP-OES.	Uranium: Affected samples are NDGW04, NDGW07, and NDGW08. No primary MCL exceedances (>30 µg/L) were observed in the October 2011 sampling event. Future sampling events will use ICP-MS.
	Digestion Blank: The digestion blank for Ca was reported 0.33 mg/L. The field blanks on 7/18/2011 had detectable concentrations of Ca at 0.37 mg/L. The samples were >10× the concentration reported in the digestion blank.	Digestion Blank: There was no impact on data quality for Ca since all samples were >10× that reported in the digestion Blank. The field blank collected on 7/18/11 was qualified with a B. Data is usable with caution since it is greater in concentration than the digestion blank.
Charge Balance	The calculated charge balance ranged from 0.1 to 3.9% based on major anions (bicarbonate, chloride, and sulfate) and major cations (dissolved calcium, magnesium, potassium, and sodium).	Meets project requirements.
Measured SPC Versus Calculated SPC	The measured SPC versus calculated SPC ranged from 1.1 to 12.0%.	Meets project requirements.
VOC/ Shaw Environmental	The matrix spike results for 1,1-dichloroethene and 1,1,2-trichloroethane were significantly outside of the control limits. These compounds are known to be affected	All data for 1,1-dichloroethene and 1,1,2-trochloroethene were qualified with an "R" and rejected as unusable.

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
	by base hydrolysis. The preservative, trisodium phosphate (TSP), is a base and elevated temperatures (heated headspace sample introduction) will accelerate the hydrolysis of 1,1,2-trichloroethane to 1,1-dichloroethene. Acetone, toluene, vinyl chloride, carbon disulfide, tetrachloroethene, and chlorobenzene had low matrix spike recoveries on 7/28/11.	This affected the following samples: NDGW10-072011, NDGW11-072011, NDGW11-072011 DUP, NDGW12-072011, NDGW13-072011, NDGW15-072011, NDGW16-072011, and the field blank collected on 7/19/2011. The samples were qualified with a "J-". indicating that the samples may be biased low.
Low Molecular Weight Acids/ Shaw Environmental	All field blanks for acetate were greater than the QL. It was later determined that the TSP preservative was the source of the acetate contamination.	For acetate, the data were qualified with "R" and rejected as unusable.
Glycols/ Region 3 Laboratory	The method for glycols was under development.	The QAPP stated that these data are to be considered screening values until the method was validated. Even though the data are considered to be for screening level evaluation, they are usable as on-going QC checks provide confidence that the method can detect glycols.
sVOC/ Region 8 Laboratory	2-butoxyethanol was detected in method blanks at 0.67 and 0.77 µg/L affecting the following samples NDGW04-072011, NDGW05-072011, NDGW06-072011, NDGW08-072011, field blank on7/18/2011, NDGW12-072011, NDGW13-072011, the field blank on 7/19/2011, and the field blank on7/20/2011 for 2-butoxyethanol. The blank spike had a high recovery for bis(2-ethylhexyl)phthalate affecting the following samples NDGW06-072011 and NDGW16-072011 for bis(2-ethylhexyl)phthalate.	The affected samples >QL for 2-butoxyethanol were qualified with a "B." Data is usable with caution for samples greater than the method blanks (NDGW05, NDGW06, NDGW12, and NDGW13). The remaining affected samples (NDGW04, NDGW08, and field blanks) are less than method blanks and unusable, but indicative that samples are low in concentration. The two identified samples were >QL for bis(2-ethylhexyl)phthalate and that data was qualified with a "J+" to indicate the potential high bias; data is usable taking this into account.
DRO/GRO/ Region 8 Laboratory	DRO: The MSD recovery was low for sample NDGW11-072011 Field blank samples collected on	DRO: Sample NDGW11 was qualified with a "J-" to indicate that the sample was possibly biased low, data usability takes this into account. Samples collected on 7/18/2011 and

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
	7/18/2011 and 7/19/2011 both had reported concentrations >QL at 48.7 and 26.7 µg/L, respectively. GRO: All three field blanks have detections above QL at 32.5, 27.8, and 26.7 µg/L.	7/19/2011 that were >QL, but <10× QL were qualified with a B to indicate possible contamination. Samples with concentrations less than their associated blank: NDGW01, NDGW03, NDGW04, NDGW05, and NDGW06 ;data are unusable but indicative that samples are low in concentration. NDGW07,NDGW08, NDGW09, NDGW10, NDGW11, NDGW11dup, NDGW12, NDGW13, NDGW15, NDGW15dup, and NDGW16 are greater than blank value and are usable with caution. NDGW02 and NDGW14 have no impacts from blanks and are usable. GRO: One sample, NDGW10 is affected and qualified with a "B". It is more than 2x the associated blank value and is usable with caution.
O, H Stable Isotopes of Water/ Shaw Environmental	Not analyzed in this sampling event.	Not analyzed in this sampling event.
Sr Isotopes/ USGS Laboratory- Denver	Not analyzed in this sampling event.	Not analyzed in this sampling event.
Ethoxylated Alcohols, Alkylphenols, and Acrylamide/ ORD/NERL-Las Vegas	Not analyzed in this sampling event.	Not analyzed in this sampling event.
October 2011		
Field Parameters/EPA on-site	Results for ferrous iron and sulfide are considered screening values as they were measured on site with field kits. Mid-day performance checks were not done. End-of-day check was not done on 10/19/2011.	All detected results for ferrous iron and sulfide were qualified "J" as estimated. Data usability is unaffected. Beginning and end-of day performance checks were done on 10/18/2011 and were within control limits. Data usability is unaffected. The end-of-day check on 10/19/2011 was not done to the accidental spill of the YSI Confidence Solution. The measurements for pH, ORP, and specific conductance were not qualified but are considered usable as estimates.
Dissolved gases/ Shaw Environmental	All target analytes were detected in a dissolved gases trip blank collected on 10/18/11 and in a field blank collected 10/18/11.	It was determined that these blanks were affected by standard carryover from the syringe used to inject samples and standards. The blanks were qualified with an "R" and rejected as unusable.Samples collected on 10/18/2011 with reported

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
		concentrations >QL (NDGW07, NDGW08, NDGW09 and NDGW14 for methane and NDGW08 for ethane) were qualified with a "B" to indicate that there is a potential impact on data quality and data is suspect but usable as estimated.
DOC/ ORD/NRMRL- Ada	All QA/QC criteria were met.	Meets project requirements
DIC/ ORD/NRMRL- Ada	The matrix spikes had low recovery, ranging from 60-80%. The matrix spikes were prepared and analyzed twice with similar results. A laboratory control spike was prepared and analyzed. The laboratory control spike produced 97.3% recovery. These results indicate possible matrix interference.	The likely reason for the matrix spike failure is that the addition of the matrix spike caused the sample to become saturated with respect to a carbonate mineral phase, such as calcite. This caused the carbonate to precipitate and therefore caused the low spike recovery observed. All results were qualified with a "J-" to indicate a potential negative bias taken into account for data usability.
Anions/ Ammonia ORD/NRMRL- Ada	Bromide (FIA): Sample NDGW07 was re-analyzed past its holding time by about 12 days. Chloride: All QA/QC criteria were met. Sulfate: All QA/QC criteria were met. Fluoride: All QA/QC criteria were met. Nitrate + Nitrite: All QA/QC criteria were met. Ammonia: All QA/QC criteria were met.	Bromide (FIA): The sample NDGW07-102011 was qualified with an "H" and is considered to have a potential negative bias that is taken into account for data usability. Chloride: Meets project requirements. Sulfate: Meets project requirements. Fluoride: Meets project requirements. Nitrate + Nitrite: Meets project requirements. Ammonia: Meets project requirements.
Dissolved Metals/ Shaw Environmental	ICP-MS: All ICP-MS results were rejected and replaces with ICP-OES results. The reasons stated were potential interferences and that interference check standards were not run. ICP-OES: Antimony: The data was affected by a potential spectral interference using the ICP-OES. Continuing calibration checks were analyzed at appropriate intervals,	ICP-MS: The ICP-MS data was replaced with ICP-OES data. Detection and quantitation limits are higher than desirable. The ICP-OES data cannot be compared with the subsequent ICP-MS data for trace metals from the third sampling event. ICP-OES: Antimony: The data was rejected and flagged with an "R". All samples with detected quantities for these metals were qualified "J" as

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
	however, some metals (B, Ba, K, Na, Ag, Si, S, P, and U) were not always included in the check standards at the required intervals.	estimated. Data for B, Ba, K, Na, Ag, Si, S, P, and U are usable as positive identifications with estimated concentrations.
Total Metals/ Shaw Environmental	ICP-MS: All ICP-MS results were rejected and replaced with ICP-OES results. The reasons stated were potential interferences and that interference check standards were not run. Digestion: It was determined that all parameters were not adhered to in US EPA Method 3015A ICP-OES: Antimony: The ICP-OES data for Sb was rejected because of potential spectral interferences. Continuing calibration checks were being analyzed at appropriate intervals, however, some metals (B, Ba, K, Na, Ag, Si, S, P, and U) were not always included in the check standards at the required intervals.	ICP-MS: The ICP-MS data was replaced with ICP-OES data. Detection and quantitation limits are higher than desirable. The ICP-OES data cannot be compared with the subsequent ICP-MS data for trace metals from the third sampling event. Digestion: The "J" qualifier was applied to detections above the QL for digested samples. Data are usable as positive identifications with estimated concentrations. ICP-OES: Antimony: The data was rejected and flagged with an "R". All samples with detected quantities for these metals were qualified "J" as estimated. Data for B, Ba, K, Na, Ag, Si, S, P, and U are usable as positive identifications with estimated concentrations.
Charge Balance	The calculated charge balance ranged from 0.2to 5.2% based on major anions (bicarbonate, chloride, and sulfate) and major cations (dissolved calcium, magnesium, potassium, and sodium).	Meets project requirements. NDGW05-102011 had a charge balance of 5.2% which is slightly greater than the 5% restriction for inclusion in geochemical modeling. However, this will only have a minor effect and can be used with caution.
Measured SPC Versus Calculated SPC	The measured SPC versus calculate SPC ranged from 0.3 to 14.6%.	Meet project requirements.
VOC/ Shaw Environmental	The matrix spike results for 1,1-dichloroethene and 1,1,2-trichloroethane were significantly outside of the control limits. These compounds are known to be affected by base hydrolysis. The preservative, trisodium phosphate (TSP), is a base and elevated temperatures (heated headspace sample introduction) will accelerate the hydrolysis of 1,1,2-trichloroethane to 1,1-dichloroethene.	All data for 1,1-dichloroethene and 1,1,2-trichloroethene were qualified with an "R" and rejected as unusable.

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
	Carbon disulfide had low recoveries for both the matrix spike (MS) & matrix spike duplicate (MSD). A laboratory control spike (LCS) was analyzed with all compound recoveries in acceptance limits.	All sample results were <QL all samples were qualified using a "J-" with a potential negative bias which is taken into account for data usability.
Low Molecular Weight Acids/ Shaw Environmental	Both Field Blank samples contained acetate above the QL. It was later determined that the TSP preservative was the source of the acetate contamination.	The samples with reported acetate concentrations >QL were qualified with a "B". All samples collected on 10/19/11 are less than the field blank and are unusable (NDGW10, NDGW11, NDGW12, NDGW12dup, NDGW13, NDGW15, NDGW16, and NDGW16dup). Samples collected on 10/18/11 that are less than the field blank are NDGW04, NDGW06, NDGW08, and NDGW09 and their data is unusable. NDGW01, NDGW03, and NDGW14 are greater than the blank and are usable with caution.
Glycols/ Region 3 Laboratory	The method for glycols was under development. The recovery for the LCS/blank spike BJ12502-BS1 for tetraethylene glycol was 71%, below the 80-120% limits. Also, the continuing calibration verification (CCV) Ultra glycol 50 ppb 1100495 standard was below the 80-120% recovery range for tetraethylene glycol at 56%.	The QAPP stated that these data are to be considered screening values until the method was validated. Even though the data are considered to be for screening level evaluation, they are usable as on-going QC checks provide confidence that the method can detect glycols. For tetraethylene glycol the data was rejected and qualified with "R".
sVOC/ Region 8 Laboratory	Low spike recovery (57.8%) in blank spike for (R)-(+)-limonene affecting all samples. A method blank sample had bis-(2-ethylhexyl)adipate >QL at 1.41 µg/L affecting the following samples: NDGW03-102011, NDGW04-102011, NDGW05-102011, NDGW06-102011, NDGW07-102011, NDGW08-102011, NDGW09-102011, and NDGW14-102011.	All samples are qualified with a "J-" for potential negative bias taken into account for data usability. Affected samples with reported values ≥QL were qualified using a B qualifier for bis-(2-ethylhexyl)adipate. Sample data is suspect and should be used with caution.

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
	Low matrix spike recovery for limonene (50%), 1,3-dimethylandamantane (59.4%), adamantane (58%), diphenylamine (54%), squalene (50.2%), and 4-chloroaniline (10.6%).	All reported values for 1,3-dimethylandamantane, adamantante, diphenylamine, and squalene and 4-chloroaniline are qualified with a "J-" for potential negative bias taken into account for data usability.
DRO/GRO/ Region 8 Laboratory	All QA/QC criteria were met.	Meets project requirements.
O, H Stable Isotopes of Water/ Shaw Environmental	All QA/QC criteria were met.	Meets project requirements. No problems noted.
Sr Isotopes/ USGS Laboratory- Denver	All QA/QC criteria were met.	Meets project requirements.
Ethoxylated Alcohols, Alkylphenols, and Acrylamide/ ORD/NERL-Las Vegas	The nonylphenol ethoxylate and ethoxylated alcohol ($C_{13}EO_{4-10}$) had concentration >QL in the trip blank. This affected samples NDGW04-102011, NDGW07-102011, NDGW08-102011, and NDGW09-102011.	Affected samples were qualified with a "B" qualifier. Samples <QL were not qualified. Nonylphenol ethoxylate results are up to 2x the blank value but are usable with caution. Ethoxylated alcohol ($C_{13}EO_{4-10}$) results for NDGW08 are equal to blank and are usable with caution. Results for NDGW04 and NDGW07 are 2x blank but are usable with caution.
October 2012		
Field Parameters/EPA on-site	Results for ferrous iron and sulfide are considered screening values as they were measured on site with field kits. Results from the contractor, Terracon, for pH, ORP, DO, specific conductance, TDS, and temperature were used instead of those collected by the EPA due to electrode malfunctioning.	All detected results for ferrous iron and sulfide were qualified "J" as estimated. Data usability is unaffected. All results are qualified with "J" as estimated since it cannot be confirmed that they met project requirements. Data is usable as estimated.
Dissolved gases/ Shaw Environmental	All QA/QC criteria were met.	Meets project requirements
DOC/ ORD/NRMRL- Ada	All QA/QC criteria were met.	Meets project requirements
DIC/ ORD/NRMRL- Ada	All QA/QC criteria were met.	Meets project requirements.
Anions/ Ammonia ORD/NRMRL- Ada	All QA/QC criteria were met.	Meets project requirements.
Dissolved Metals/ Southwest Research Institute	ICP-MS: Nickel: Both equipment blanks had results detected above the lab RL. All results within 10x the corresponding blank result (based on date collected) should be qualified with a "B". The dissolved Ni results for samples NDGW01-102012, NDGW02-102012,	Nickel: A "B" qualifier was added to the dissolved Ni results for samples NDGW01-102012, NDGW02-102012, NDGW03-102012, NDGW04-102012, NDGW05-102012, NDGW06-102012, NDGW09-102012, NDGW09-102012dup, and NDGW14-1012. NDGW02-102012, NDGW03-102012, and NDGW05-102012

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
	NDGW03-102012, NDGW04-102012, NDGW05-102012, NDGW06-102012, NDGW09-102012, NDGW09-102012dup, and NDGW14-1012 should be qualified with a "B". ICP-OES: All QA/QC criteria were met. Hg by CVAA: All QA/QC criteria were met.	are ~5x blank and are usable with caution. NDGW04-102012 is ~10x blank and is usable. NDGW01-102012 and NDGW06-102012 are ~10x blank and are usable. NDGW14-102012 is ~7x blank and is usable with caution. NDGW09-102012dup is less than the blank and unusable. ICP-OES: Meets project requirements. Hg by CVAA: Meets project requirements.
Total Metals/ Southwest Research Institute	ICP-MS: All QA/QC criteria were met. ICP-OES: All QA/QC criteria were met. Hg by CVAA: All QA/QC criteria were met.	ICP-MS: Meets project requirements. ICP-OES: Meets project requirements. Hg by CVAA: Meets project requirements.
Charge Balance	The calculated charge balance ranged from 0.3 to 3.8% based on major anions (bicarbonate, chloride, and sulfate) and major cations (dissolved calcium, magnesium, potassium, and sodium).	Meets project requirements.
Measured SPC Versus Calculated SPC	The measured SPC versus calculate SPC ranged from 0.9 to 10.0%.	Meet project requirements.
VOC/ Shaw Environmental	The matrix spike results for 1,1-dichloroethene and 1,1,2-trichloroethane were significantly outside of the control limits. These compounds are known to be affected by base hydrolysis. The preservative, trisodium phosphate (TSP), is a base and elevated temperatures (heated headspace sample introduction) will accelerate the hydrolysis of 1,1,2-trichloroethane to 1,1-dichloroethene. Acrylonitrile, ethanol and acetone had a low matrix spike recovery.	All data for 1,1-dichloroethene and 1,1,2-trichloroethene were qualified with an "R" and rejected as unusable. The "J-" qualifier was added to all samples for acrylonitrile, ethanol, and acetone for potential negative bias taken into account for data usability.
Low Molecular Weight Acids/ Shaw Environmental	Butyrate had low matrix spike and matrix spike duplicate recoveries. Formate concentration in field blanks were similar or greater than sample data.	All samples and field blanks were qualified with a "J-" qualifier for potential negative bias taken into account for data usability. Data for formate was rejected and qualified with an "R" as unusable.

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
Glycols/ ORD/NERL- Las Vegas	The method for glycols was under development.	The QAPP stated that these data are to be considered screening values until the method was validated. Even though the data are considered to be for screening level evaluation, they are usable as on-going QC checks provide confidence that the method can detect glycols.
sVOC/ Region 8 Laboratory	Due to sample matrix (e.g., color, turbidity), sample NDGW09-102012 and its MS/MSD samples were diluted by a factor of 5. This resulted in most MS/MSD sample concentrations near or below the reporting limit, which cannot be evaluated accurately for recovery. Only 4-nitroaniline, carbazole and pentachlorophenol were above the RL. An appropriate MS/MSD for the SVOCs is not available due to the need for the dilution performed for NDGW09-102012.	Because all sample results are non-detect and are qualified with U, no additional qualifiers were applied. The lack of an MS/MSD should be taken into account for data usability, i.e., lack of matrix spike recovery results prevents evaluation of specific analyte recoveries, although blank spike recoveries were acceptable.
DRO/GRO/ Region 8 Laboratory	DRO: The MS/MSD recoveries for DRO were below control limits at 43% and 29%, respectively. GRO: All QA/QC criteria were met.	DRO: A "J-" qualifier was added to all samples for potential negative bias taken into account for data usability. GRO: Meets project requirements.
O, H Stable Isotopes of Water/ Shaw Environmental	All QA/QC criteria were met.	Meets project requirements.
Sr Isotopes/ USGS Laboratory- Denver	All QA/QC criteria were met.	Meets project requirements.
Ethoxylated Alcohols, Alkylphenols, and Acrylamide/ ORD/NERL- Las Vegas	No certified standards exist for ethoxylated alcohols or ethoxylated alkylphenols. Quantitation was performed by obtaining the approximate composition of a C12-C15 ethoxylate industrial surfactant from Shell Chemical Company and using the response factors to calculate the approximate compositions of other ethoxylate mixtures, as described in SOP ECB-14.0. Alkylphenols- Glass cartridges that were certified to have low levels of nonylphenol were purchased and used for extraction (it is unclear how low of concentrations of nonylphenol are present, as that information is proprietary). Regardless of their	All data would be qualified as estimates, but because of other QA and analytical issues this data was rejected. The alkylphenol data was rejected and qualified with an "R" because of laboratory contamination in blanks and contamination in field blanks.

Table A25 Data Usability Summary[1]

Analysis/Lab	Summary of QA/QC Results	Impact on Data/Usability
	certification, the laboratory blank measured a concentration of 21.5 ng/L nonylphenol, presumably coming from the cartridges. However, this concentration is much lower than conventional polypropylene SPE cartridges.	
	Ethoxylated alcohols/ ethoxylated alkylphenols- Ethoxylates were also measured in the method blank. However, the method blank was performed on a day when the distilled water system in the building was down, and water was transported in glass bottles from a separate building. When the water came back up, a separate method blank was extracted and analyzed, and no ethoxylates were detected. Therefore, due to the presence of ethoxylates in the field blanks and other QC-related issues described below, it is difficult to determine whether most of the groundwater samples contained any appreciable concentrations of ethoxylates. In addition there was no quantification of the data and therefore no concentration could be assigned to the samples or field blanks.	The alkylphenol data was rejected and qualified with an "R" because of laboratory contamination in blanks, contamination in field blanks and no quantified or semi-quantified data was reported.

[1] QA/QC criteria and project requirements were met with exceptions as listed.

Table A26 Data Qualifiers and Data Descriptors

Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the reported quantitation limit (QL).
J	The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the QL).
J+	The result is an estimated quantity, but the result may be biased high.
J-	For both detected and non-detected results, there may be a low bias due to low spike recoveries or sample preservation issues.
B	The analyte is found in a blank sample above the QL and the concentration found in the sample is less than 10 times the concentration found in the blank.
H	The sample was prepared or analyzed beyond the specified holding time. Sample results may be biased low.
*	Relative percent difference of a field or lab duplicate is outside acceptance criteria.
R	The data are unusable. The sample results are rejected due to serious deficiencies in the ability to analyze the sample and/or meet quality control criteria. Sample results are not reported. The analyte may or may not be present in the sample.

Data Descriptors

Descriptor	Definition
NA	Not Applicable (See QAPP)
NR	Not Reported by Laboratory or Field Sampling Team
ND	Not Detected
NS	Not Sampled

Table A27 Field QC data for YSI electrode measurements

Parameter	Electrode Reading	Acceptance Range	Performance Evaluation
July 18, 2011 initial/mid-day			
Specific Conductance	7840	7636-7971	Acceptable
ORP	225.6	222-252	Acceptable
pH	6.94	6.8-7.2	Acceptable
July 18, 2011 end-of-day			
Specific Conductance	7821	7690-8080	Acceptable
ORP	221.8	204-234	Acceptable
pH	6.95	6.8-7.2	Acceptable
July 19, 2011 initial			
Specific Conductance	7831	7630-8010	Acceptable
ORP	228	212-242	Acceptable
pH	6.98	6.8-7.2	Acceptable
July 19, 2011 mid-day			
Specific Conductance	NR	NR	Not evaluated
ORP	NR	NR	Not evaluated
pH	NR	NR	Not evaluated
July 19, 2011 end-of-day			
Specific Conductance	7850	7690-8080	Acceptable
ORP	219.8	204-234	Acceptable
pH	6.97	6.8-7.2	Acceptable
July 20, 2011 initial			
Specific Conductance	7921	7630-8010	Acceptable
ORP	225	212-242	Acceptable
pH	7.12	6.8-7.2	Acceptable
July 20, 2011 mid-day/ end-of-day			
Specific Conductance	7821	7690-8080	Acceptable
ORP	221.6	204-234	Acceptable
pH	7.01	6.8-7.2	Acceptable
October 18, 2011 initial			
Specific Conductance	7866	7630-7970	Acceptable
ORP	232.2	222-252	Acceptable
pH	6.95	6.8-7.2	Acceptable
October 18, 2011 mid-day			
Specific Conductance	7629	7630-7970	Acceptable

Table A27 Field QC data for YSI electrode measurements

Parameter	Electrode Reading	Acceptance Range	Performance Evaluation
ORP	230.2	222-252	Acceptable
pH	7.12	6.8-7.2	Acceptable
October 18, 2011 end-of-day			
Specific Conductance	7904	7600-7970	Acceptable
ORP	213.3	229-261	Acceptable
pH	7.01	6.8-7.2	Acceptable
October 19, 2011 initial			
Specific Conductance	7926	7630-7970	Acceptable
ORP	226.1	222-252	Acceptable
pH	6.95	6.8-7.2	Acceptable
October 19, 2011 mid-day/ end-of-day			
Specific Conductance	NR	NR	Not evaluated
ORP	NR	NR	Not evaluated
pH	NR	NR	Not evaluated

Table A28 Tentatively identified compounds (TICs) for sVOCs

Sample	Compound (CAS Number)	Estimated Concentration (µg/L)
July 2011 Sampling Event		
NDGW01-072011	Butylated hydroxytoluene (128-37-0)	0.43
NDGW03-072011	Triallyl isocyanurate (1025-15-6)	0.35
NDGW04-072011	Toluene (108-88-3)	0.26
	Butylated hydroxytoluene (128-37-0)	1.45
NDGW05-072011	Dichloronitromethane (7119-89-3)	0.33
	1-methyl-2-pyrrolidone (872-50-4)	0.26
	Caprolactam (105-60-2)	0.50
	2-methyl-propanoic acid (79-31-2)	0.30
NDGW07-072011	2-ethyl-1-hexanol (104-76-7)	3.69
	2-ethyl-hexanoic acid (149-57-5)	9.58
	Butylated hydroxytoluene (128-37-0)	0.95
NDGW08-072011	1,1'-oxybis-2-propanol (108-61-2)	0.27
	2-ethyl-1-hexanol (104-76-7)	2.13
	1-methyl-2-pyrrolidone (872-50-4)	0.46
	Butoxyacetic acid (2516-93-0)	0.61
	Caprolactam (105-60-2)	0.54
	Butylated hydroxytoluene (128-37-0)	2.80
NDGW09-072011	Butylated hydroxytoluene (128-37-0)	2.50
NDGW10-072011	Cyclohexanone (108-94-1)	31.3
	Diethyltoluamide (134-62-3)	0.30
	Bis-(2-ethylhexyl)-hexanedioic acid (103-23-1)	0.29
NDGW10-072011 DUP	4-methyl-3-penten-2-one (141-79-7)	36.1
NDGW11-072011	1,1-demethylethyl-hexadecanoic acid (31158-91-5)	0.76
	4-4'-di-tert-butylbiphenyl (1625-91-8)	0.46
	Bis-(2-ethylhexyl)-hexanedioic acid (103-23-1)	0.47
NDGW12-072011	4-methyl-3-penten-2-one (141-79-7)	3.51
NDGW14-072011	Caprolactam (105-60-2)	0.44
	Dodecanoic acid (143-07-7)	0.29
	Triallyl isocyanurate (1025-15-6)	0.49
	Oxybenzone (131-57-7)	0.47
	Cyclic octaatomic sulfur (10544-50-0)	6.02
NDGW15-072011	2-methylpropylester hexadecanoic acid (110-34-9)	0.27
	Butyl ester hexadecanoic acid (111-06-8)	1.72
	Butyl ester octadecanoic acid (123-95-5)	1.43
	Eicosane	0.26
NDGW15-072011 DUP	Butyl ester hexadecanoic acid (111-06-8)	0.30

Table A28 Tentatively identified compounds (TICs) for sVOCs

Sample	Compound (CAS Number)	Estimated Concentration (µg/L)
	Bis-(2-ethylhexyl)-hexanedioic acid (103-23-1)	0.50
NDGW16-072011	Bis-(2-ethylhexyl)-hexanedioic acid (103-23-1)	0.35
Field Blank 7/18/2011	2-nonanone (821-55-6)	0.39
	2-undecanone (112-12-9)	1.34
	3,5-bis(1,1-dimethylethyl)-4-hydroxy-benzenepropanoic acid (6386-38-5)	0.38
Field Blank 7/19/2011	2-undecanone (112-12-9)	1.48
	1-ethoxy-butane (628-81-9)	64.7
Field Blank 7/20/2011	2-nonanone (821-55-6)	0.35
	2-undecanone (112-12-9)	0.95
	3,5-bis(1,1-dimethylethyl)-4-hydroxy-benzenepropanoic acid (6386-38-5)	0.35
October 2011		
NDGW01-102011	Butylated hydroxytoluene (128-37-0)	0.75
NDGW03-102011	Butylated hydroxytoluene (128-37-0)	0.28
NDGW04-102011	Propylene glycol (57-55-6)	0.95
	Butylated hydroxytoluene (128-37-0)	3.84
	Isobutyl octyl ester phthalic acid (1000309-04-5)	0.33
	Butyl ester hexadecanoic acid (11-06-8)	0.37
NDGW05-102011	Propylene glycol (57-55-6)	0.61
	1-methyl-2-pyrolidone (872-50-4)	0.27
	Isobutyl octyl ester phthalic acid (1000309-04-5)	0.33
NDGW06-102011	Butyl ester hexadecanoic acid (111-06-8)	0.44
NDGW07-102011	Di(propylene glycol) (110-98-5)	0.62
	2-ethyl-1-hexanol (104-76-7)	2.54
	2-ethyl-hexanoic acid (149-57-5)	6.75
	Butylated hydroxytoluene (128-37-0)	0.77
NDGW08-102011	Di(propylene glycol) (110-98-5)	1.77
	2-ethyl-1-hexanol (104-76-7)	2.45
	2-(2-hydroxypropxy)-1-propanol (106-62-7)	0.72
	2-ethyl-hexanoic acid	0.58
	Butylated hydroxytoluene (128-37-0)	0.62
	Mono(2-ethylhexyl)phthalate (4376-20-9)	0.27
NDGW09-102011	Butylated hydroxytoluene (128-37-0)	1.01
NDGW10-102011	Butyl ester hexadecanoic acid (111-06-8)	0.57
NDGW11-102011	Butyl ester hexadecanoic acid (111-06-8)	0.28
	Mono(2-ethylhexyl)phthalate (4376-20-9)	0.29
NDGW12-102011 DUP	Mono(2-ethylhexyl)phthalate (4376-20-9)	0.30

Table A28 Tentatively identified compounds (TICs) for sVOCs

Sample	Compound (CAS Number)	Estimated Concentration (µg/L)
NDGW13-102011	Octadecanoic acid (57-11-4)	0.39
	Heptadecane (629-78-7)	0.30
	Heneicosane (629-94-7)	0.34
	Eicosane (112-95-8)	0.42
	Heptacosane (593-49-7)	0.26
NDGW14-102011	Propylene glycol (57-55-6)	0.55
	Butyl ester hexadecanoic acid (111-06-8)	0.82
NDGW16-102011	Butyl ester hexadecanoic acid (111-06-8)	0.45
Field Blank 10/18/2011	2-undecanone (112-12-9)	1.17
Field Blank 10/19/2011	2-undecanone (112-12-9)	1.48
	Butyl ester hexadecanoic acid (111-06-8)	0.44
October 2012		
Field Blank 1-102012	2-undecanone (112-12-9)	0.640
Field Blank 2-102012	3,5-di-tert-butyl-4-hydroxybenzaldehyde (1620-98-0)	0.540
	2-undecanone (112-12-9)	0.710
NDGW02-102012	1,1,2,2-tetrachloroethane (79-34-5)	3.57
	1,2,3-trichloro-1-propene (13116-58-0)	3.40
NDGW04-102012	Butylated hydroxytoluene (128-37-0)	0.740
	1,2,3-trichloro-1-propene (13116-58-0)	1.16
NDGW07-102012	2-ethyl-hexanoic acid	0.660
	1,1'-oxybis-2-propanol	2.25
	2-ethyl-1-hexanol	1.64
NDGW08-102012	Butylated hydroxytoluene (128-37-0)	1.58
NDGW14-102012	Butylated hydroxytoluene (128-37-0)	0.940

Table A29 QA/QC Narrative Associated with the Killdeer Field TSA

Finding/Observation	QC Narrative	Response
Document the YSI 5580 Confidence Solution	During the audit, it was recommended to the field team to be sure to document in the notebooks the information on the YSI 5580 Confidence Solution. This is a recommended step to ensure traceability. This is recommended for any other reagent information that is associated with calibration.	The YSI confidence solution information (Lot number and expiration date) was documented in the field notebook at the time of the audit.

Appendix B
Sample Results
Retrospective Case Study in Killdeer, North Dakota

U.S. Environmental Protection Agency
Office of Research and Development
Washington, DC

May 2015
EPA/600/R-14/103

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Appendix B. Sample Results - Legend (Killdeer, North Dakota)

Data Qualifiers

<	The analyte concentration is less than the quantitation limit (QL).
U	The analyte was analyzed for, but was not detected above the reported QL.
J	The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the QL).
J+	The result is an estimated quantity, but the result may be biased high.
J-	For both detected and non-detected results, the result is estimated but may be biased low.
B	The analyte is found in a blank sample above the QL and the concentration found in the sample is less than 10 times the concentration found in the blank.
H	The sample was prepared or analyzed beyond the specified holding time. Sample results may be biased low.
*	Relative percent difference of a field or lab duplicate is outside acceptance criteria.
R	The data are unusable. The sample results are rejected due to serious deficiencies in the ability to analyze the sample and/or meet quality control criteria. Sample results are not reported. The analyte may or may not be present in the sample.

Notes

Table B-1	Total Dissolved Solids (TDS) is estimated based on Specific Conductance (SPC): TDS(mg/L) = SPC(mS/cm) * 650.
	Field-determined concentrations of ferrous iron and hydrogen sulfide are screening values.
Table B-2	Round 1 - † Not sampled because well went dry.
Table B-3	Round 1 - † Not sampled because well went dry.
	Round 1 - † † High uranium results may be due to spectral interference and/or high quantitation limits using ICP-OES. No primary MCL exceedances for U (>30 µg/L) were observed in the October 2011 sampling event. Future sampling events will analyze U using ICP-MS.
	R. Data rejected. Potential spectral (mass or emission) interference for Sb Rounds 1 and 2.
Table B-4	R. Data rejected. 1,1,2-trichloroethane is subject to alkaline hydrolysis to 1,1-dichloroethene. This reaction could be supported by the sample preservative (trisodium phosphate).
Table B-5	R. Data rejected. Acetate contamination in samples and blanks is due to the sample preservative (trisodium phosphate) for Round 1.
	The method used for glycol analysis is under development. Round 2 - Tetraethylene Gycol data rejected due to low recoveries on spikes and CCVs.
	Round 2 - R. Data rejected. Dissolved gas field and trip blank on 10/18/11 was unusable due to carryover in the gas chromatograph from a standard analyzed prior to this field and trip blank.
	Round 3 - R. Data rejected. Formate contamination in Field Blanks.
Table B-8	Round 3 - R. Data Rejected. Lab analytical issues.

Appendix B. Sample Results - Legend (Killdeer, North Dakota)

Acronyms

CAS	Chemical Abstracts Service
DIC	Dissolved Inorganic Carbon
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
NA	Not Applicable (See QAPP)
ND	Not Detected
NR	Not Reported by Laboratory or Field Sampling Team
NS	Not Sampled
ORP	Oxidation reduction potential
SPC	Specific Conductance
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons

Units

^{o}C	Degrees Celsius
µg/L	Micrograms per liter
mg/L	Milligrams per liter
mS/cm	Millisiemens per centimeter at 25^{o}C

Key

GW	Ground water sample
03	Sampling location
d	Field Duplicate

Appendix B. Sample Results. Legend (Killdeer, North Dakota)

Metals and Isotopes

Ag	Silver	K	Potassium	Se	Selenium
Al	Aluminum	Li	Lithium	Si	Silicon
As	Arsenic	Mg	Magnesium	Sr	Strontium
B	Boron	Mn	Manganese	Th	Thorium
Ba	Barium	Mo	Molybdenum	Ti	Titanium
Be	Beryllium	Na	Sodium	Tl	Thallium
Ca	Calcium	Ni	Nickel	U	Uranium
Cd	Cadmium	P	Phosphorus	V	Vanadium
Co	Cobalt	Pb	Lead	Zn	Zinc
Cr	Chromium	Rb	Rubidium		
Cu	Copper	S	Sulfur		
Fe	Iron	Sb	Antimony		

$\delta^{2}H$	$[(^{2}H/H)$ Sample/$(^{2}H/H)$ Standard] * 1000
$\delta^{18}O$	$[(^{18}O/^{16}O)$ Sample/$(^{18}O/^{16}O)$ Standard] * 1000

Table B-1 Sample Results - Field Parameters (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3
Temperature	^{o}C	8.5	9.4	8.1 J	10.4	8.8	8.6 J	10.4	8.5	8.2 J
SPC	mS/cm	0.536	0.726	1.034 J	1.036	1.020	0.995 J	0.887	0.856	0.891 J
TDS	mg/L	359	472	672 J	694	663	647 J	594	556	579 J
DO	mg/L	9.19	0.12	3.99 J	0.09	0.33	0.48 J	1.58	0.87	4.35 J
pH		7.67	8.28	8.17 J	7.56	8.62	8.2 J	8.58	8.37	7.53 J
ORP	mV	139	-227	45 J	88	-60	71 J	80	84	42 J
Turbidity	NTU	0.7	0.4	0.5 J	0.8	1.5	11.5 J	1.1	2.1	0.1 J
Alkalinity	mg $CaCO_3$/L	270	283	292 J	328	331	344 J	351	256	381 J
Ferrous Iron	mg Fe^{2+}/L	<0.03 U	NR	0.04 J	0.36 J	0.10 J	0.07 J	<0.03 U	NR	<0.03 U
Hydrogen Sulfide	mg S/L	<0.01 U	NR	0.03 J	0.04 J	0.01 J	<0.01 U	<0.01 U	NR	0.01 J

Table B-1 Sample Results - Field Parameters (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
Temperature	°C	10	8.6	8.7 J	11.7	9.1	9.1 J	11.8	7.2	9.4 J
SPC	mS/cm	1.850	1.939	2.077 J	1.220	1.091	1.068 J	1.059	0.732	1.167 J
TDS	mg/L	1240	1261	1350 J	817	709	694 J	710	476	759 J
DO	mg/L	0.35	0.08	0.3 J	0.17	1.86	1.58 J	0.07	0.36	0.54 J
pH		8.32	7.34	7.34 J	8.03	9.33	8.17 J	7.45	7.87	8.16 J
ORP	mV	-63	-43	-93 J	-26	-8	47 J	91	-236	46 J
Turbidity	NTU	3.8	7.9	3.4 J	0.7	0.5	1.0 J	0.9	0.5	0.8 J
Alkalinity	mg $CaCO_3$/L	454	439	413 J	360	331	390 J	355	331	437 J
Ferrous Iron	mg Fe^{2+}/L	1.01 J	0.36 J	0.17 J	<0.03 U	<0.03 U	<0.03 U	<0.03 U	<0.03 U	<0.03 U
Hydrogen Sulfide	mg S/L	0.40 J	0.04 J	0.01 J	0.08 J	0.02 J	0.02 J	0.07 J	0.02 J	0.01 J

Table B-1 Sample Results - Field Parameters (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3
Temperature	°C	10.5	8.7	9.6 J	11.5	9.7	11.1 J	11.9	10.1	11.2 J
SPC	mS/cm	2.430	3.921	2.927 J	8.225	6.250	2.984 J	1.880	1.922	1.851 J
TDS	mg/L	1628	2549	1903 J	5511	4063	1940 J	1260	1249	1203 J
DO	mg/L	0.32	2.57	0.28 J	0.22	0.57	0.22 J	1.07	0.14	0.33 J
pH		8.78	7.52	7.43 J	7.38	7.33	7.39 J	8.90	8.40	8.63 J
ORP	mV	-21	-80	-74 J	-111	-157	-171 J	-104	71	-173 J
Turbidity	NTU	2.5	0.7	1.8 J	8.8	7.1	44.3 J	1.5	1.0	1.2 J
Alkalinity	mg $CaCO_3$/L	335	319	440 J	331	385	446 J	771	787	842 J
Ferrous Iron	mg Fe^{2+}/L	1.19 J	0.85 J	0.61 J	1.71 J	0.8 J	1.14 J	0.42 J	0.13 J	0.13 J
Hydrogen Sulfide	mg S/L	0.45 J	0.03 J	0.03 J	0.04 J	0.02 J	0.03 J	0.09 J	0.08 J	0.08 J

Table B-1 Sample Results - Field Parameters (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2
Temperature	^{o}C	22.5	11.2	20.9	10.8	21.2	10.1	20.8	9.3
SPC	mS/cm	2.132	2.133	0.946	0.942	0.852	0.856	1.077	1.005
TDS	mg/L	1428	1386	634	612	571	556	722	653
DO	mg/L	1.95	1.42	1.13	1.38	1.26	1.67	1.57	1.38
pH		7.21	7.24	7.52	7.51	7.57	7.52	7.47	7.60
ORP	mV	121	56	-117	-114	100	46	-103	-154
Turbidity	NTU	115	NR	2.8	NR	0.5	NR	2.0	NR
Alkalinity	mg $CaCO_3$/L	684	NR	390	NR	354	NR	422	NR
Ferrous Iron	mg Fe^{2+}/L	<0.03 U	NR	0.70 J	NR	0.37 J	NR	0.31 J	NR
Hydrogen Sulfide	mg S/L	0.30 J	NR	<0.01 U	NR	<0.01 U	NR	0.04 J	NR

Table B-1 Sample Results - Field Parameters (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
Temperature	^{o}C	14.7	9.5	5.2 J	17.4	9.7	23.0	8.6
SPC	mS/cm	1.286	1.360	1.31 J	1.405	1.417	1.511	2.001
TDS	mg/L	862	884	852 J	941	921	1012	1301
DO	mg/L	1.74	0.22	0.23 J	2.34	2.45	2.44	2.28
pH		7.77	7.68	7.83 J	7.45	7.41	7.38	7.26
ORP	mV	-110	-153	-171 J	-111	-105	-109	-110
Turbidity	NTU	16.7	7.3	27 J	2.8	NR	6.1	NR
Alkalinity	mg $CaCO_3$/L	526	524	537 J	486	NR	454	NR
Ferrous Iron	mg Fe^{2+}/L	0.73 J	0.32 J	0.41 J	1.37 J	NR	0.29 J	NR
Hydrogen Sulfide	mg S/L	0.18 J	0.08 J	0.04 J	0.46 J	NR	0.02 J	NR

Table B-2 Sample Results - Anions and Ammonia (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3
Anion-Cation Balance	%	0.6	1.1	1.1	1.0	3.7	0.7	3.5	2.4	1.6
DOC	mg/L	2.07	2.35	2.63	1.62	35.9	1.41	2.30	1.85	1.48
DIC	mg/L	70.2	61.3 J-	74.1	92.2	85.6 J-	86	92.7	86.1 J-	96
Nitrate + Nitrite	mg N/L	0.43	0.24	0.25	0.58	0.56	0.93	0.67	0.31	0.30
Ammonia	mg N/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	0.01 J	<0.10 U	<0.10 U
Bromide	mg/L	<1.00 U	<1.00 U	<1.00 U	1.48	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Chloride	mg/L	15.4	19.1	29.9	2.38	1.72	1.73	3.49	3.06	2.15
Sulfate	mg/L	85.6	137	206	206	210	182	117	110	112
Fluoride	mg/L	0.40	0.37	0.21	0.23	0.24	0.13 J	0.37	0.40	0.21
Iodide	µg/L	NR	NR	<10.0 U	NR	NR	<10.0 U	NR	NR	<10.0 U

Table B-2 Sample Results - Anions and Ammonia (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
Anion-Cation Balance	%	2.5	1.7	0.8	3.3	5.2	0.3	0.5	1.3	3.8
DOC	mg/L	3.14	3.13	3.10	2.41	2.23	1.94	2.56	2.28	1.53
DIC	mg/L	119	110 J-	111	99.9	90.7 J-	98.1	100	87.9 J-	77.5
Nitrate + Nitrite	mg N/L	<0.10 U	0.04 J	<0.10 U	1.13	1.40	1.41	1.21	1.26	1.18
Ammonia	mg N/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Bromide	mg/L	<4.00 U	<1.00 U	<1.00 U	1.15	<1.00 U	<1.00 U	1.11	<1.00 U	0.26 J
Chloride	mg/L	13.9	12.3	11.3	10.4	8.87	7.84	9.83	9.40	122
Sulfate	mg/L	566	596	748	203	216	164	169	138	74.5
Fluoride	mg/L	<0.80 U	0.16 J	0.31	0.24	0.26	0.14 J	0.30	0.23	0.14 J
Iodide	µg/L	NR	NR	<10.0 U	NR	NR	<10.0 U	NR	NR	<10.0 U

Table B-2 Sample Results - Anions and Ammonia (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3
Anion-Cation Balance	%	2.7	2.0	0.7	0.6	4.4	0.5	3.9	1.4	1.0
DOC	mg/L	2.71	2.24	3.53	4.95	7.67	5.73	6.12	6.42	6.44
DIC	mg/L	91.4	72.0 J-	107	88.8	99.1 J-	107	201	182 J-	188
Nitrate + Nitrite	mg N/L	<0.10 U	0.05 J	<0.10 U	<0.10	0.02 J	<0.10 U	<0.10 U	0.02 J	<0.10 U
Ammonia	mg N/L	<0.10 U	<0.10 U	<0.10 U	0.03 J	<0.10 U	<0.10 U	0.29	<0.10 U	0.21
Bromide	mg/L	<3.00 U	8.39 H	2.27	<11.0 U	6.92	0.76 J	1.09	<1.00 U	<1.00 U
Chloride	mg/L	545	1760	631	2940	1540	229	2.31	1.78	1.70
Sulfate	mg/L	214	144	192	419	505	703	220	220	224
Fluoride	mg/L	0.22	<0.80 U	<0.20 U	<2.20 U	<1.60 U	0.17 J	3.10	2.98	2.83
Iodide	µg/L	NR	NR	321	NR	NR	117	NR	NR	<10.0 U

Table B-2 Sample Results - Anions and Ammonia (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2
Anion-Cation Balance	%	1.8	3.6	0.1	1.6	2.3	0.2	1.9	0.7
DOC	mg/L	6.48	5.81	2.98	3.39	2.49	2.28	3.67	3.55
DIC	mg/L	192	175 J-	110	102 J-	102	95.2 J-	113	109 J-
Nitrate + Nitrite	mg N/L	9.94	13.9	<0.10 U	0.02 U	<0.10 U	0.20	<0.10 U	<0.10 U
Ammonia	mg N/L	<0.10 U	<0.10 U	0.07 J	<0.10 U	<0.10 U	<0.10 U	0.19	0.15
Bromide	mg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	0.47	<1.00 U
Chloride	mg/L	39.2	35.0	0.84 J	0.67 J	3.70	3.85	1.03	1.28
Sulfate	mg/L	396	381	83.9	83.2	76.3	76.7	125	123
Fluoride	mg/L	0.30	0.20	0.45	0.45	0.32	0.37	0.50	0.42
Iodide	µg/L	NR	NR	NR	NR	NR	NR	NR	NR

Table B-2 Sample Results - Anions and Ammonia (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
Anion-Cation Balance	%	0.1	0.9	0.6	0.7	0.5	0.3	1.4
DOC	mg/L	3.48	3.50	3.23	3.84	3.73	3.98	4.33
DIC	mg/L	135	130 J-	133	137	131 J-	132	143 J-
Nitrate + Nitrite	mg N/L	0.05 U	0.02 J	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Ammonia	mg N/L	<0.10 U	<0.10 U	<0.10 U	0.23	0.17	0.25	0.26
Bromide	mg/L	<1.00 U	<1.00 U	<1.00 U	1.21	<1.00 U	2.03	<1.00 U
Chloride	mg/L	1.13	1.03	0.90 J	3.56	3.17	8.15	12.8
Sulfate	mg/L	177	180	189	236	224	310	447
Fluoride	mg/L	0.24	0.29	0.16	0.54	0.46	0.45	0.33
Iodide	µg/L	NR	NR	<10.0 U	NR	NR	NR	NR

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3
Dissolved Ag	µg/L	<14 U	<14 U	<10 U	<14 U	<14 U	<10 U	<14 U	<14 U	<10 U
Total Ag	µg/L	<16 U	<16 U	<10 U	<16 U	NR	<10 U	<16 U	<16 U	<10 U
Dissolved Al	µg/L	<494 U	<494 U	<20 U	<494 U	<494 U	<20 U	<494 U	<494 U	<20 U
Total Al	µg/L	<548 U	<548 U	<20 U	<548 U	NR	243	<548 U	316 J	<20 U
Dissolved As	µg/L	<20 U	<20 U	<0.2 U	<20 U	<20 U	<0.2 U	<20 U	<20 U	0.02
Total As	µg/L	<22 U	<22 U	0.3	<22 U	NR	0.5	<22 U	<22 U	0.3
Dissolved B	µg/L	151 J	129 J	146	175 J	159 J	187	146 J	140 J	159
Total B	µg/L	146 J	136 J	144	172 J	NR	159	141 J	148 J	145
Dissolved Ba	µg/L	47 J	51 J	77	59 J	42 J	50	72 J	67 J	72
Total Ba	µg/L	47 J	53 J	74	59 J	NR	60	74 J	80 J	70
Dissolved Be	µg/L	<10 U	<10 U	<5 U	<10 U	<10 U	<5 U	<10 U	<10 U	<5 U
Total Be	µg/L	<11 U	<11 U	<3 U	<11 U	NR	<3 U	<11 U	<11 U	<3 U
Dissolved Ca	mg/L	39.0	43.1	68.1	51.2	47.6	42.9	49.4	46.1	50.3
Total Ca	mg/L	38.4 J	45.3 J	64.7	51.3 J	NR	42.5	50.2 J	48.4 J	48.2
Dissolved Cd	µg/L	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U
Total Cd	µg/L	<4 U	<4 U	<0.20 U	<4 U	NR	<0.20 U	<4 U	<4 U	<0.20 U
Dissolved Co	µg/L	<4 U	<4 U	<5 U	<4 U	<4 U	<5 U	<4 U	<4 U	<5 U
Total Co	µg/L	<4 U	<4 U	<5 U	<4 U	NR	2 J	<4 U	<4 U	<5 U
Dissolved Cr	µg/L	<7 U	<7 U	3.0	<7 U	<7 U	<2.0 U	<7 U	<7 U	0.5 J
Total Cr	µg/L	<8 U	<8 U	2.6	<8 U	NR	<2.0 U	<8 U	<8 U	<2.0 U
Dissolved Cu	µg/L	<20 U	<20 U	1.0	<20 U	<20 U	0.7	<20 U	<20 U	0.7
Total Cu	µg/L	8 J	<22 U	1.2	16 J	NR	1.5	8 J	<22 U	0.60
Dissolved Fe	µg/L	<67 U	<67 U	79 J	<67 U	<67 U	69 J	<67 U	<67 U	58 J
Total Fe	µg/L	<74 U	<74 U	<50 U	<74 U	NR	642	37 J	376 J	<50 U
Dissolved Hg	µg/L	NR	NR	<0.2 U	NR	NR	<0.2 U	NR	NR	<0.2 U
Total Hg	µg/L	NR	NR	<0.2 U	NR	NR	<0.2 U	NR	NR	<0.2 U
Dissolved K	mg/L	3.48 J	3.52 J	4.6	4.09 J	3.92 J	4.0	4.75 J	4.52 J	4.6
Total K	mg/L	3.46 J	3.68 J	4.4	4.10 J	NR	3.9	4.89 J	4.77 J	4.2
Dissolved Li	µg/L	NA	NR	28	NA	NR	32	NA	NR	23
Total Li	µg/L	NA	NR	27	NA	NR	31	NA	NR	22
Dissolved Mg	mg/L	11.0	12.2	19.8	21.8	20.6	19.1	13.7	12.8	14.3

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
Dissolved Ag	µg/L	<14 U	<14 U	<10 U	<14 U	<14 U	<10 U	<14 U	<14 U	<10 U
Total Ag	µg/L	<16 U	<16 U	<10 U	<16 U	<16 U	<10 U	<16 U	<16 U	<10 U
Dissolved Al	µg/L	<494 U	<494 U	<20 U	<494 U	<494 U	<20 U	<494 U	<494 U	<20 U
Total Al	µg/L	<548 U	217 J	58	<548 U	<548 U	25	<548 U	<548 U	<20 U
Dissolved As	µg/L	<20 U	<20 U	0.8	<20 U	<20 U	<0.2 U	<20 U	<20 U	<0.2 U
Total As	µg/L	<22 U	<22 U	1.0	<22 U	<22 U	0.3	<22 U	<22 U	0.3
Dissolved B	µg/L	258 J	252 J	260	207 J	192 J	202	200 J	187 J	185
Total B	µg/L	246 J	264 J	251	195 J	202 J	192	197 J	197 J	179
Dissolved Ba	µg/L	78 J	71 J	65	23 J	21 J	21	36 J	28 J	40
Total Ba	µg/L	78 J	73 J	64	23 J	23 J	21	37 J	30 J	38
Dissolved Be	µg/L	<10 U	<10 U	<5 U	<10 U	<10 U	<5 U	<10 U	<10 U	<5 U
Total Be	µg/L	<11 U	<11 U	<3 U	<11 U	<11 U	<3 U	<11 U	<11 U	<3 U
Dissolved Ca	mg/L	96.8	98.5	119	42.8	42.9	37.7	52.0	43.5	53.3
Total Ca	mg/L	95.8 J	102 J	115	43.3 J	43.6 J	36.6	51.8 J	44.2 J	49.7
Dissolved Cd	µg/L	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U
Total Cd	µg/L	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U
Dissolved Co	µg/L	<4 U	1 J	<5 U	<4 U	<4 U	<5 U	<4 U	<4 U	<5 U
Total Co	µg/L	<4 U	<4 U	1 J	<4 U	<4 U	<5 U	<4 U	<4 U	<5 U
Dissolved Cr	µg/L	<7 U	<7 U	0.5 J	<7 U	<7 U	<2.0 U	<7 U	<7 U	<2.0 U
Total Cr	µg/L	<8 U	<8 U	<2.0 U	<8 U	<8 U	<2.0 U	<8 U	<8 U	<2.0 U
Dissolved Cu	µg/L	<20 U	<20 U	1.0	<20 U	<20 U	1.0	<20 U	<20 U	0.9
Total Cu	µg/L	8 J	<22 U	1.6	11 J	10 J	1.5	<22 U	7 J	1.2
Dissolved Fe	µg/L	216	308	335	<67 U	<67 U	40 J	<67 U	<67 U	64 J
Total Fe	µg/L	327 J	476 J	269	<74 U	<74 U	<50 U	<74 U	<74 U	<50 U
Dissolved Hg	µg/L	NR	NR	<0.2 U	NR	NR	<0.2 U	NR	NR	<0.2 U
Total Hg	µg/L	NR	NR	<0.2 U	NR	NR	<0.2 U	NR	NR	0.01 J
Dissolved K	mg/L	6.09 J	5.82 J	6.2	3.61 J	3.44 J	3.5	3.59 J	3.22 J	3.8
Total K	mg/L	6.17 J	6.02 J	6.1	3.61 J	3.61 J	3.3	3.59 J	3.34 J	3.6
Dissolved Li	µg/L	NA	NR	59 J	NA	NR	26	NA	NR	31
Total Li	µg/L	NA	NR	53	NA	NR	25	NA	NR	30
Dissolved Mg	mg/L	41.2	39.6	47.5	13.6	13.5	12.3	18.0	15.3	18.9

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3
Dissolved Ag	µg/L	<14 U	<14 U	<10 U	8 J	<14 U	<10 U	<14 U	<14 U	<10 U
Total Ag	µg/L	<16 U	19 J	<10 U	18 U	<16 U	<10 U	<16 U	<16 U	<10 U
Dissolved Al	µg/L	<494 U	<494 U	<20 U	<494 U	<494 U	<20 U	<494 U	<494 U	7 J
Total Al	µg/L	<548 U	<548 U	<20 U	189 J	<548 U	<20 U	222 J	<548 U	<20 U
Dissolved As	µg/L	<20 U	<20 U	1.0	<20 U	<20 U	3.1	<20 U	<20 U	<0.2 U
Total As	µg/L	<22 U	<22 U	1.1	<22 U	<22 U	3.7	<22 U	<22 U	0.3
Dissolved B	µg/L	237 J	238 J	348	188 J	222 J	228	447 J	456 J	476
Total B	µg/L	236 J	254 J	342	198 J	242 J	224	469 J	474 J	475
Dissolved Ba	µg/L	103 J	259 J	102	173 J	86 J	33	18 J	18 J	17
Total Ba	µg/L	104 J	263 J	97	173 J	89 J	33	20 J	19 J	18
Dissolved Be	µg/L	<10 U	<10 U	<5 U	<10 U	<10 U	<5 U	<10 U	<10 U	<5 U
Total Be	µg/L	<11 U	<11 U	<3 U	<11 U	<11 U	<3 U	<11 U	<11 U	<3 U
Dissolved Ca	mg/L	134	377	149	583	332	126	3.53	3.59	3.36
Total Ca	mg/L	134 J	384 J	163	580 J	342 J	119	4.23 J	3.69 J	3.27
Dissolved Cd	µg/L	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U
Total Cd	µg/L	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U	<4 U	<4 U	<0.20 U
Dissolved Co	µg/L	1 J	<4 U	10	4 J	5	4 J	1 J	<4 U	<5 U
Total Co	µg/L	<4 U	<4 U	8 J	2 J	4 J	2 J	<4 U	<4 U	1 J
Dissolved Cr	µg/L	<7 U	<7 U	0.5 J	<7 U	<7 U	<2.0 U	<7 U	<7 U	0.7 J
Total Cr	µg/L	<8 U	<8 U	<2.0 U	<8 U	<8 U	<2.0 U	<8 U	<8 U	<2.0 U
Dissolved Cu	µg/L	<20 U	<20 U	0.7	9 J	<20 U	1.0	<20 U	<20 U	0.3 J
Total Cu	µg/L	11 J	<22 U	0.98	13 J	<22 U	1.3	<22 U	16 J	<0.5 U
Dissolved Fe	µg/L	1430	4280	2090	23700	15600	6560	24 J	50 J	41 J
Total Fe	µg/L	1430 J	4300 J	1920	23400 J	16200 J	6850	87 J	59 J	45.2 J
Dissolved Hg	µg/L	NR	NR	<0.2 U	NR	NR	<0.2 U	NR	NR	<0.2 U
Total Hg	µg/L	NR	NR	<0.2 U	NR	NR	<0.2 U	NR	NR	<0.2 U
Dissolved K	mg/L	6.71 J	11.4 J	7.3	15.1 J	10.9 J	6.7	2.44 J	2.49 J	2.6 J
Total K	mg/L	6.72 J	11.8 J	7.6	15.0 J	11.5 J	6.9	2.52 J	2.75 J	2.6
Dissolved Li	µg/L	NA	NR	115	NA	NR	108	NA	NR	33 J
Total Li	µg/L	NA	NR	108	NA	NR	103	NA	NR	24
Dissolved Mg	mg/L	54.4	158	60.8	276	158	59.3	1.86	1.90	1.81

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2
Dissolved Ag	µg/L	<14 U	<14 U	<14 U	<14 U	<14 U	<14 U	<14 U	<14 U
Total Ag	µg/L	<16 U	<16 U	<16 U	<16 U	<16 U	<16 U	<16 U	<16 U
Dissolved Al	µg/L	<494 U	<494 U	<494 U	<494 U	<494 U	<494 U	<494 U	<494 U
Total Al	µg/L	9010 J	<548 U	<548 U	<548 U	<548 U	<548 U	<548 U	<548 U
Dissolved As	µg/L	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U
Total As	µg/L	<22 U	<22 U	<22 U	<22 U	<22 U	<22 U	<22 U	<22 U
Dissolved B	µg/L	392 J	360 J	177 J	168 J	187 J	179 J	221 J	216 J
Total B	µg/L	380 J	371 J	167 J	171 J	177 J	180 J	214 J	218 J
Dissolved Ba	µg/L	59 J	48 J	51 J	49 J	45 J	43 J	25 J	21 J
Total Ba	µg/L	151 J	51 J	52 J	52 J	44 J	47 J	25 J	23 J
Dissolved Be	µg/L	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Total Be	µg/L	<11 U	<11 U	<11 U	<11 U	<11 U	<11 U	<11 U	<11 U
Dissolved Ca	mg/L	95.0	89.7	32.8	31.0	33.1	31.9	34.6	32.5
Total Ca	mg/L	96.1 J	92.1 J	32.4 J	31.6 J	32.8 J	33.2 J	34.4 J	34.1 J
Dissolved Cd	µg/L	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U
Total Cd	µg/L	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U
Dissolved Co	µg/L	<4 U	<4 U	1 J	<4 U	<4 U	<4 U	<4 U	<4 U
Total Co	µg/L	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U	<4 U
Dissolved Cr	µg/L	<7 U	<7 U	<7 U	<7 U	<7 U	<7 U	<7 U	<7 U
Total Cr	µg/L	11	<8 U	<8 U	<8 U	<8 U	<8 U	<8 U	<8 U
Dissolved Cu	µg/L	8 J	8 J	7 J	<20 U	16 J	9 J	<20 U	<20 U
Total Cu	µg/L	<22 U	10 J	<22 U	<22 U	<22 U	21 J	<22 U	<22 U
Dissolved Fe	µg/L	<67 U	<67 U	816	1060	<67 U	<67 U	1120	1000
Total Fe	µg/L	6530 J	41 J	1170 J	1250 J	<74 U	71 J	1210 J	1160 J
Dissolved Hg	µg/L	NR	NR	NR	NR	NR	NR	NR	NR
Total Hg	µg/L	NR	NR	NR	NR	NR	NR	NR	NR
Dissolved K	mg/L	6.16 J	5.86 J	3.56 J	3.45 J	2.89 J	2.79 J	4.84 J	4.82 J
Total K	mg/L	7.89 J	6.17 J	3.61 J	3.62 J	2.93 J	2.99 J	4.74 J	5.00 J
Dissolved Li	µg/L	NA	NR	NA	NR	NA	NR	NA	NR
Total Li	µg/L	NA	NR	NA	NR	NA	NR	NA	NR
Dissolved Mg	mg/L	43.4	41.0	11.4	10.7	12.1	11.8	11.2	10.8

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
Dissolved Ag	µg/L	<14 U	<14 U	<10 U	<14 U	<14 U	<14 U	<14 U
Total Ag	µg/L	<16 U	<16 U	<10 U	<16 U	<16 U	<16 U	<16 U
Dissolved Al	µg/L	<494 U	<494 U	10 J	<494 U	<494 U	<494 U	<494 U
Total Al	µg/L	425 J	<548 U	<20 U	<548 U	<548 U	<548 U	<548 U
Dissolved As	µg/L	<20 U	<20 U	3.2	<20 U	<20 U	<20 U	<20 U
Total As	µg/L	<22 U	<22 U	3.4	<22 U	<22 U	<22 U	<22 U
Dissolved B	µg/L	224 J	222 J	227	338 J	331 J	350 J	340 J
Total B	µg/L	212 J	233 J	215	331 J	340 J	334 J	353 J
Dissolved Ba	µg/L	22 J	27 J	27	25 J	24 J	31 J	39 J
Total Ba	µg/L	32 J	31 J	27	26 J	26 J	32 J	50 J
Dissolved Be	µg/L	<10 U	<10 U	<5 U	<10 U	<10 U	<10 U	<10 U
Total Be	µg/L	<11 U	<11 U	<3 U	<11 U	<11 U	<11 U	<11 U
Dissolved Ca	mg/L	43.3	42.1	42.5	44.2	43.2	63.9	98.5
Total Ca	mg/L	42.8 J	43.5 J	41.2	44.3 J	44.6 J	63.5 J	121 J
Dissolved Cd	µg/L	<4 U	<4 U	<0.20 U	<4 U	<4 U	<4 U	<4 U
Total Cd	µg/L	<4 U	<4 U	<0.20 U	<4 U	<4 U	<4 U	<4 U
Dissolved Co	µg/L	<4 U	<4 U	<5 U	<4 U	<4 U	<4 U	<4 U
Total Co	µg/L	<4 U	<4 U	<5 U	<4 U	<4 U	<4 U	<4 U
Dissolved Cr	µg/L	<7 U	<7 U	<2.0 U	<7 U	<7 U	<7 U	<7 U
Total Cr	µg/L	<8 U	<8 U	<2.0 U	<8 U	<8 U	<8 U	<8 U
Dissolved Cu	µg/L	<20 U	<20 U	1.1	<20 U	<20 U	<20 U	<20 U
Total Cu	µg/L	<22 U	<22 U	0.58	<22 U	<22 U	<22 U	<22 U
Dissolved Fe	µg/L	1430	3320	3120	1890	2290	3410	5500
Total Fe	µg/L	4210 J	3840 J	3180	2550 J	2640 J	3970 J	7650 J
Dissolved Hg	µg/L	NR	NR	<0.2 U	NR	NR	NR	NR
Total Hg	µg/L	NR	NR	0.12 J	NR	NR	NR	NR
Dissolved K	mg/L	4.68 J	4.55 J	4.7 J	5.65 J	5.58 J	6.38 J	7.18 J
Total K	mg/L	4.70 J	4.81 J	4.8	5.70 J	5.79 J	6.34 J	7.84 J
Dissolved Li	µg/L	NA	NR	31 J	NA	NR	NA	NR
Total Li	µg/L	NA	NR	28	NA	NR	NA	NR
Dissolved Mg	mg/L	18.0	17.7	18.8	19.8	19.4	26.3	41.1

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3
Total Mg	mg/L	10.8 J	12.6 J	18.9	21.7 J	NR	18.9	14.0 J	13.3 J	13.8
Dissolved Mn	µg/L	<14 U	<14 U	<5 U	201	190	166	212	183	200
Total Mn	µg/L	<16 U	<16 U	0.2 J	204 J	NR	228	230 J	225 J	192
Dissolved Mo	µg/L	<17 U	<17 U	2.1	<17 U	8 J	2.6	<17 U	9 J	6.4
Total Mo	µg/L	<19 U	<19 U	2.2	<19 U	NR	2.7	<19 U	11 J	6.6
Dissolved Na	mg/L	111 J	112 J	135	159 J	154 J	161	137 J	130 J	148
Total Na	mg/L	110 J	114 J	138	159 J	NR	166	135 J	132 J	149
Dissolved Ni	µg/L	<84 U	<84 U	2.4 B	<84 U	<84 U	2.1 B	<84 U	<84 U	2.3 B
Total Ni	µg/L	<93 U	<93 U	3.1	<93 U	NR	3.0	<93 U	<93 U	2.6
Dissolved P	mg/L	<0.06 U	<0.06 U	<0.05 U	<0.06 U	<0.06 U	<0.05 U	<0.06 U	<0.06 U	<0.05 U
Total P	mg/L	<0.07 U	<0.07 J	0.01 J	<0.07 U	NR	0.02 J	<0.07 U	<0.07 J	0.01 J
Dissolved Pb	µg/L	<17 U	<17 U	<0.20 U	<17 U	<17 U	0.05 J	<17 U	<17 U	<0.20 U
Total Pb	µg/L	<19 U	<19 U	<0.20 U	<19 U	NR	0.27	<19 U	<19 U	<0.20 U
Dissolved S	mg/L	27.8 J	46.1 J	NR	69.1 J	64.9 J	NR	39.6 J	35.5 J	NR
Total S	mg/L	26.9 J	45.7 J	NR	65.3 J	NR	NR	37.2 J	34.7 J	NR
Dissolved Sb	µg/L	R	R	0.11 J	R	R	<0.20 U	R	R	<0.20 U
Total Sb	µg/L	R	R	0.12 J	R	R	0.18 J	R	R	<0.20 U
Dissolved Se	µg/L	<30 U	<30 U	<2 U	<30 U	19 J	0.6 J	<30 U	11 J	1.6 J
Total Se	µg/L	<33 U	<33 U	<2 U	<33 U	NR	<2 U	<33 U	<33 U	0.8 J
Dissolved Si	mg/L	6.50 J	6.23 J	6.5	9.64 J	9.47 J	8.6	7.70 J	7.64 J	7.3
Total Si	mg/L	6.07 J	6.03 J	6.2	9.31 J	NR	9.1	7.45 J	8.08 J	6.9
Dissolved Sr	µg/L	264	300	462	413	393	345	336	323	340
Total Sr	µg/L	259 J	295 J	428	413 J	NR	333	341 J	317 J	321
Dissolved Th	µg/L	NA	NR	<0.20 U	NA	NR	<0.20 U	NA	NR	<0.20 U
Total Th	µg/L	NA	NR	<0.20 U	NA	NR	<0.20 U	NA	NR	<0.20 U
Dissolved Ti	µg/L	<7 U	<7 U	<5 U	<7 U	<7 U	<5 U	<7 U	<7 U	<5 U
Total Ti	µg/L	<8 U	<8 U	<3 U	<8 U	NR	6.7	<8 U	14 J	<3 U
Dissolved Tl	µg/L	<17 U	<17 U	<0.20 U	<17 U	<17 U	<0.20 U	<17 U	<17 U	<0.20 U
Total Tl	µg/L	<19 U	<19 U	<0.20 U	<19 U	NR	<0.20 U	<19 U	<19 U	<0.20 U
Dissolved U	µg/L	17 J	<50 U	2.0	23 J	<50 U	2.4	20 J	17 J	5.0
Total U	µg/L	<56 U	<56 U	2.0	<56 U	NR	2.5	19 J	<56 U	5.0

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
Total Mg	mg/L	40.7 J	40.2 J	47	13.4 J	13.7 J	11.9	18.0 J	15.4 J	17.6
Dissolved Mn	µg/L	479	400	275	91	60	29	140	86	62
Total Mn	µg/L	464 J	401 J	280	95 J	60 J	29	139 J	83 J	58
Dissolved Mo	µg/L	<17 U	6 J	2.4	<17 U	9 J	3.4	<17 U	11 J	4.5
Total Mo	µg/L	<19 U	7 J	4.5	<19 U	10 J	3.6	<19 U	10 J	4.8
Dissolved Na	mg/L	292 J	279 J	322	196 J	197 J	200	169 J	152 J	184
Total Na	mg/L	290 J	288 J	335	201 J	198 J	205	167 J	153 J	186
Dissolved Ni	µg/L	<84 U	<84 U	4.3 B	<84 U	<84 U	2.0 B	<84 U	<84 U	2.5 B
Total Ni	µg/L	<93 U	<93 U	7.0	<93 U	<93 U	2.1	<93 U	<93 U	3.1
Dissolved P	mg/L	<0.06 U	<0.06 U	<0.05 U	<0.06 U	<0.06 U	<0.05 U	<0.06 U	<0.06 U	<0.05 U
Total P	mg/L	<0.07 U	<0.07 U	0.02 J	<0.07 U	0.147 J	0.01 J	<0.07 U	<0.07 U	0.01 J
Dissolved Pb	µg/L	<17 U	<17 U	<0.20 U	<17 U	<17 U	<0.20 U	<17 U	<17 U	<0.20 U
Total Pb	µg/L	<19 U	<19 U	<0.20 U	<19 U	<19 U	<0.20 U	<19 U	<19 U	<0.20 U
Dissolved S	mg/L	184 J	189 J	NR	66.9 J	67.5 J	NR	56.3 J	44.4 J	NR
Total S	mg/L	173 J	187 J	NR	62.4 J	69.0 J	NR	54.3 J	43.8 J	NR
Dissolved Sb	µg/L	R	R	<0.20 U	R	R	<0.20 U	R	R	<0.20 U
Total Sb	µg/L	R	R	<0.20 U	R	R	<0.20 U	R	R	<0.20 U
Dissolved Se	µg/L	<30 U	14 J	<2 U	<30 U	23 J	2.3	<30 U	23 J	1.2 J
Total Se	µg/L	<33 U	<33 U	<2 U	<33 U	<33 U	1.7 J	<33 U	<33 U	1.4 J
Dissolved Si	mg/L	8.51 J	8.48 J	7.8	6.82 J	6.53 J	6.4	7.49 J	7.20 J	6.8
Total Si	mg/L	8.93 J	8.96 J	7.8	6.61 J	6.68 J	6.3	7.14 J	6.91 J	6.5
Dissolved Sr	µg/L	950	935	1050	299	293	260	401	336	414
Total Sr	µg/L	933 J	922 J	1030	302 J	291 J	274	397 J	331 J	381
Dissolved Th	µg/L	NA	NR	<0.20 U	NA	NR	<0.20 U	NA	NR	<0.20 U
Total Th	µg/L	NA	NR	<0.20 U	NA	NR	<0.20 U	NA	NR	<0.20 U
Dissolved Ti	µg/L	<7 U	<7 U	<5 U	<7 U	<7 U	<5 U	<7 U	<7 U	<5 U
Total Ti	µg/L	<8 U	6 J	1 J	<8 U	<8 U	<3 U	<8 U	<8 U	<3 U
Dissolved Tl	µg/L	<17 U	<17 U	<0.20 U	<17 U	<17 U	<0.20 U	<17 U	<17 U	<0.20 U
Total Tl	µg/L	10 J	<19 U	<0.20 U	<19 U	<19 U	<0.20 U	<19 U	<19 U	<0.20 U
Dissolved U	µg/L	37‡ J	17 J	4.9	19 J	17 J	1.7	19 J	17 J	1.4
Total U	µg/L	31‡ J	25 J	5.4	<56 U	<56 U	1.8	<56 U	<56 U	1.4

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3
Total Mg	mg/L	54.6 J	158 J	58.5	276 J	163 J	57.7	1.92 J	1.95 J	1.76
Dissolved Mn	µg/L	658	815	336	1450	856	420	11 J	11 J	10
Total Mn	µg/L	683 J	834 J	332	1450 J	911 J	418	13 J	12 J	11
Dissolved Mo	µg/L	<17 U	6 J	3.1	<17 U	6 J	7.3	<17 U	11 J	3.8
Total Mo	µg/L	<19 U	8 J	3.3	<19 U	8 J	7.6	<19 U	11 J	6.5
Dissolved Na	mg/L	344 J	556 J	411	1040 J	610 J	407	463 J	436 J	477
Total Na	mg/L	339 J	556 J	430	1060 J	627 J	437	468 J	450 J	497
Dissolved Ni	µg/L	<84 U	46 J	171	197	196	38.2	<84 U	<84 U	0.18 J
Total Ni	µg/L	<93 U	46 J	172	199 J	206 J	41	<93 U	<93 U	0.42
Dissolved P	mg/L	<0.06 U	<0.06 U	0.12	0.03 J	<0.06 U	0.06	0.32 J	<0.06 U	0.31
Total P	mg/L	<0.07 U	<0.07 U	0.04	0.05 J	<0.07 U	0.03	0.32 J	0.306 J	0.30
Dissolved Pb	µg/L	<17 U	<17 U	0.14 J	<17 U	<17 U	<0.20 U	<17 U	<17 U	<0.20 U
Total Pb	µg/L	<19 U	<19 U	0.21	<19 U	<19 U	<0.20 U	<19 U	<19 U	<0.20 U
Dissolved S	mg/L	75.0 J	55.3 J	NR	167 J	173 J	NR	68.7 J	67.9 J	NR
Total S	mg/L	70.8 J	53.8 J	NR	159 J	174 J	NR	68.8 J	68.9 J	NR
Dissolved Sb	µg/L	R	R	<0.20 U	R	R	<0.20 U	R	R	<0.20 U
Total Sb	µg/L	R	R	<0.20 U	R	R	<0.20 U	R	R	<0.20 U
Dissolved Se	µg/L	<30 U	19 J	<2 U	<30 U	19 J	0.7 J	<30 U	34 J	<2 U
Total Se	µg/L	<33 U	19 J	<2 U	<33 U	16 J	<2 U	<33 U	12 J	<2 U
Dissolved Si	mg/L	8.04 J	7.86 J	7.2	8.48 J	8.49 J	7.8	3.75 J	3.72 J	4.0
Total Si	mg/L	8.03 J	7.86 J	7.1	8.45 J	8.64 J	7.7	4.29 J	4.05 J	3.8
Dissolved Sr	µg/L	1260	3710	1380	5100	2870	1010	121	120	117
Total Sr	µg/L	1260 J	3640 J	1310	5050 J	2810 J	972	124 J	119 J	122
Dissolved Th	µg/L	NA	NR	<0.20 U	NA	NR	<0.20 U	NA	NR	<0.20 U
Total Th	µg/L	NA	NR	<0.20 U	NA	NR	<0.20 U	NA	NR	<0.20 U
Dissolved Ti	µg/L	<7 U	<7 U	<5 U	<7 U	<7 U	<5 U	<7 U	6 J	<5 U
Total Ti	µg/L	<8 U	<8 U	<3 U	<8 U	<8 U	<3 U	9 J	7 J	2 J
Dissolved Tl	µg/L	6 J	<17 U	<0.20 U	152	<17 U	<0.20 U	<17 U	<17 U	<0.20 U
Total Tl	µg/L	21 J	<19 U	<0.20 U	172 J	<19 U	<0.20 U	<19 U	<19 U	<0.20 U
Dissolved U	µg/L	39‡ J	24 J	4.7	104‡ J	18 J	3.9	<50 U	<50 U	<0.20 U
Total U	µg/L	40‡ J	<56 U	4.7	105‡ J	20 J	4.0	<56 U	<56 U	<0.20 U

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2
Total Mg	mg/L	44.9 J	42.3 J	11.3 J	11.0 J	12.1 J	12.3 J	11.1 J	11.2 J
Dissolved Mn	µg/L	353	244	77	75	63	95	278	294
Total Mn	µg/L	891 J	251 J	76 J	77 J	64 J	231 J	280 J	306 J
Dissolved Mo	µg/L	<17 U	10 J	31	10 J	<17 U	5 J	18	17
Total Mo	µg/L	<19 U	<19 U	<19 U	9 J	<19 U	8 J	21 J	18 J
Dissolved Na	mg/L	368 J	360 J	178 J	173 J	152 J	151 J	207 J	201 J
Total Na	mg/L	368 J	361 J	178 J	173 J	153 J	154 J	204 J	207 J
Dissolved Ni	µg/L	<84 U	<84 U	<84 U	<84 U	<84 U	<84 U	<84 U	<84 U
Total Ni	µg/L	<93 U	<93 U	<93 U	<93 U	<93 U	<93 U	<93 U	<93 U
Dissolved P	mg/L	<0.06 U	<0.06 U	0.05 J	0.12 J	<0.06 U	<0.06 U	0.10 J	0.11 J
Total P	mg/L	0.08 J	<0.07 U	0.11 J	0.10 J	<0.07 U	<0.07 U	<0.07 U	0.11 J
Dissolved Pb	µg/L	<17 U	<17 U	<17 U	<17 U	<17 U	<17 U	<17 U	<17 U
Total Pb	µg/L	<19 U	<19 U	<19 U	<19 U	<19 U	<19 U	<19 U	<19 U
Dissolved S	mg/L	123 J	123 J	27.2 J	26.6 J	24.8 J	25.4 J	41.0 J	39.9 J
Total S	mg/L	121 J	123 J	25.2 J	25.7 J	23.0 J	24.5 J	39.0 J	38.6 J
Dissolved Sb	µg/L	R	R	R	R	R	R	R	R
Total Sb	µg/L	R	R	R	R	R	R	R	R
Dissolved Se	µg/L	<30 U	40	<30 U	18 J	<30 U	15 J	<30 U	18 J
Total Se	µg/L	<33 U	<33 U	<33 U	<33 U	<33 U	<33 U	<33 U	<33 U
Dissolved Si	mg/L	11.5 J	10.8 J	10.4 J	10.3 J	7.60 J	7.54 J	11.0 J	10.7 J
Total Si	mg/L	33.8 J	10.9 J	9.97 J	9.98 J	7.10 J	7.24 J	10.6 J	10.5 J
Dissolved Sr	µg/L	1050	1010	259	252	280	282	402	417
Total Sr	µg/L	1050 J	983 J	255 J	249 J	280 J	280 J	398 J	419 J
Dissolved Th	µg/L	NA	NR	NA	NR	NA	NR	NA	NR
Total Th	µg/L	NA	NR	NA	NR	NA	NR	NA	NR
Dissolved Ti	µg/L	<7 U	<7 U	2 J	<7 U	<7 U	<7 U	<7 U	<7 U
Total Ti	µg/L	317 J	<8 U	<8 U	<8 U	<8 U	<8 U	<8 U	<8 U
Dissolved Tl	µg/L	<17 U	<17 U	<17 U	<17 U	<17 U	<17 U	<17 U	<17 U
Total Tl	µg/L	9 J	<19 U	<19 U	<19 U	<19 U	<19 U	<19 U	<19 U
Dissolved U	µg/L	43‡ J	27 J	17 J	<50 U	17 J	17 J	18 J	<50 U
Total U	µg/L	29 J	18 J	<56 U	<56 U	<56 U	<56 U	<56 U	<56 U

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
Total Mg	mg/L	17.9 J	18.3 J	18.4	19.9 J	20.0 J	26.2 J	49.5 J
Dissolved Mn	µg/L	281	290	298	338	328	595	927
Total Mn	µg/L	291 J	304 J	297	340 J	340 J	591 J	1130 J
Dissolved Mo	µg/L	22	16 J	16.9	22	18	19	15 J
Total Mo	µg/L	23 J	21 J	17.5	20 J	18 J	<19 U	14 J
Dissolved Na	mg/L	251 J	236 J	256	263 J	256 J	263 J	261 J
Total Na	mg/L	244 J	243 J	270	265 J	258 J	262 J	268 J
Dissolved Ni	µg/L	<84 U	<84 U	1.8 B	<84 U	<84 U	<84 U	<84 U
Total Ni	µg/L	<93 U	<93 U	1.4	<93 U	<93 U	<93 U	<93 U
Dissolved P	mg/L	<0.06 U	<0.06 U	0.05 J	<0.06 U	<0.06 U	<0.06 U	<0.06 U
Total P	mg/L	0.04 J	0.02 J	0.03	0.04 J	0.03 J	0.05 J	0.03 J
Dissolved Pb	µg/L	<17 U	<17 U	<0.20 U	<17 U	<17 U	<17 U	<17 U
Total Pb	µg/L	<19 U	<19 U	<0.20 U	<19 U	<19 U	<19 U	<19 U
Dissolved S	mg/L	56.6 J	56.5 J	NR	72.2 J	73.3 J	101 J	147 J
Total S	mg/L	54.5 J	56.9 J	NR	70.6 J	71.5 J	96.5 J	159 J
Dissolved Sb	µg/L	R	R	<0.20 U	R	R	R	R
Total Sb	µg/L	R	R	<0.20 U	R	R	R	R
Dissolved Se	µg/L	<30 U	19 J	<2 U	<30 U	20 J	<30 U	11 J
Total Se	µg/L	<33 U	<33 U	<2 U	<33 U	<33 U	<33 U	<33 U
Dissolved Si	mg/L	11.4 J	12.1 J	11.4	13.0 J	12.9 J	13.5 J	13.6 J
Total Si	mg/L	12.4 J	12.2 J	11	12.9 J	12.9 J	13.1 J	13.8 J
Dissolved Sr	µg/L	561	565	541	610	613	811	1260
Total Sr	µg/L	551 J	547 J	529	610 J	597 J	804 J	1450 J
Dissolved Th	µg/L	NA	NR	<0.20 U	NA	NR	NA	NR
Total Th	µg/L	NA	NR	<0.20 U	NA	NR	NA	NR
Dissolved Ti	µg/L	<7 U	<7 U	<5 U	<7 U	<7 U	<7 U	<7 U
Total Ti	µg/L	11 J	6 J	<3 U	<8 U	<8 U	<8 U	<8 U
Dissolved Tl	µg/L	<17 U	<17 U	<0.20 U	<17 U	<17 U	<17 U	<17 U
Total Tl	µg/L	<19 U	<19 U	<0.20 U	<19 U	<19 U	<19 U	<19 U
Dissolved U	µg/L	17 J	<50 U	1.6	22 J	<50 U	25 J	17 J
Total U	µg/L	<56 U	<56 U	1.6	19 J	<56 U	24 J	<56 U

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3
Dissolved V	µg/L	<10 U	<10 U	0.13 J	<10 U	<10 U	0.12 J	<10 U	<10 U	0.14 J
Total V	µg/L	<11 U	<11 U	0.27	<11 U	NR	1.3	<11 U	<11 U	0.36
Dissolved Zn	µg/L	<50 U	<50 U	<5 U	<50 U	<50 U	<5 U	<50 U	<50 U	<5 U
Total Zn	µg/L	<56 U	<56 U	<3 U	<56 U	NR	2 J	<56 U	<56 U	<3 U

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
Dissolved V	µg/L	<10 U	<10 U	0.11 J	<10 U	<10 U	0.21	<10 U	<10 U	0.28
Total V	µg/L	5 J	<11 U	0.56	4 J	<11 U	0.53	4 J	<11 U	0.58
Dissolved Zn	µg/L	17 J	<50 U	2 J	<50 U	<50 U	1 J	<50 U	<50 U	1 J
Total Zn	µg/L	<56 U	<56 U	<3 U	<56 U	<56 U	1 J	<56 U	<56 U	2 J

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3
Dissolved V	µg/L	3 J	<10 U	0.15 J	4 J	<10 U	0.07 J	<10 U	<10 U	0.06 J
Total V	µg/L	5 J	<11 U	0.41	7 J	<11 U	0.32	<11 U	<11 U	0.39
Dissolved Zn	µg/L	21 J	<50 U	2 J	64	<50 U	<5 U	<50 U	<50 U	<5 U
Total Zn	µg/L	20 J	<56 U	2 J	56 J	<56 U	<3 U	<56 U	<56 U	<3 U

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2
Dissolved V	µg/L	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Total V	µg/L	17 J	<11 U	<11 U	<11 U	<11 U	<11 U	<11 U	<11 U
Dissolved Zn	µg/L	28 J	<50 U	34 J	116	32 J	71	<50 U	<50 U
Total Zn	µg/L	50 J	<56 U	93 J	33 J	27 J	36 J	<56 U	<56 U

Table B-3 Sample Results - Dissolved and Total Metals (Killdeer, North Dakota)

Parameter	Sample Sample Date Unit	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
Dissolved V	µg/L	<10 U	<10 U	0.04 J	<10 U	<10 U	<10 U	<10 U
Total V	µg/L	<11 U	<11 U	0.29	<11 U	<11 U	<11 U	<11 U
Dissolved Zn	µg/L	<50 U	<50 U	<5 U	<50 U	<50 U	<50 U	<50 U
Total Zn	µg/L	40 J	<56 U	<3 U	<56 U	<56 U	<56 U	<56 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3
ethanol (64-17-5)	µg/L	<100 U	<100 U	<200 U,J-	<100 U	NR	<200 U,J-
isopropanol (67-63-0)	µg/L	<25.0 U	<25.0 U	<25.0 U	<25.0 U	NR	<25.0 U
acrylonitrile (107-13-1)	µg/L	NA	NR	<25.0 U,J-	NA	NR	<25.0 U,J-
styrene (100-42-5)	µg/L	NA	NR	<0.5 U	NA	NR	<0.5 U
acetone (67-64-1)	µg/L	<1.0 U	<1.0 U	<1.0 U,J-	<1.0 U	NR	<1.0 U,J-
tert-butyl alcohol (75-65-0)	µg/L	<5.0 U	<5.0 U	<5.0 U	<5.0 U	NR	<5.0 U
methyl tert-butyl ether (1634-04-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	NR	<1.0 U
diisopropyl ether (108-20-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	NR	<1.0 U
ethyl tert-butyl ether (637-92-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	NR	<1.0 U
tert-amyl methyl ether (994-05-8)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	NR	<1.0 U
vinyl chloride (75-01-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,1-dichloroethene (75-35-4)	µg/L	R	R	R	R	NR	R
carbon disulfide (75-15-0)	µg/L	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U	NR	<0.5 U
methylene chloride (75-09-2)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	NR	<1.0 U
trans-1,2-dichloroethene (156-60-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,1-dichloroethane (75-34-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
cis-1,2-dichoroethene (156-59-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
chloroform (67-66-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,1,1-trichloroethane (71-55-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
carbon tetrachloride (56-23-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
benzene (71-43-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,2-dichloroethane (107-06-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
trichloroethene (79-01-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
toluene (108-88-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,1,2-trichloroethane (79-00-5)	µg/L	R	R	R	R	NR	R
tetrachloroethene (127-18-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
chlorobenzene (108-90-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
ethylbenzene (100-41-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	NR	<1.0 U
m+p xylene (108-38-3, 106-42-3)	µg/L	<2.0 U	<2.0 U	<2.0 U	<2.0 U	NR	<2.0 U
o-xylene (95-47-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
isopropylbenzene (98-82-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,3,5-trimethylbenzene (108-67-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3
ethanol (64-17-5)	µg/L	<100 U	<100 U	<200 U,J-	<100 U	<100 U	<200 U,J-
isopropanol (67-63-0)	µg/L	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U
acrylonitrile (107-13-1)	µg/L	NA	NR	<25.0 U,J-	NA	NR	<25.0 U,J-
styrene (100-42-5)	µg/L	NA	NR	<0.5 U	NA	NR	<0.5 U
acetone (67-64-1)	µg/L	<1.0 U	<1.0 U	<1.0 U,J-	<1.0 U	<1.0 U	<1.0 U,J-
tert-butyl alcohol (75-65-0)	µg/L	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U
methyl tert-butyl ether (1634-04-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
diisopropyl ether (108-20-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
ethyl tert-butyl ether (637-92-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
tert-amyl methyl ether (994-05-8)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
vinyl chloride (75-01-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethene (75-35-4)	µg/L	R	R	R	R	R	R
carbon disulfide (75-15-0)	µg/L	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U	<0.5 U,J-	<0.5 U
methylene chloride (75-09-2)	µg/L	<1.0 U	<1.0	<1.0 U	<1.0 U	<1.0 U	<1.0 U
trans-1,2-dichloroethene (156-60-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethane (75-34-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-dichoroethene (156-59-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chloroform (67-66-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,1-trichloroethane (71-55-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
carbon tetrachloride (56-23-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
benzene (71-43-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.2 J	<0.5 U
1,2-dichloroethane (107-06-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
trichloroethene (79-01-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
toluene (108-88-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2-trichloroethane (79-00-5)	µg/L	R	R	R	R	R	R
tetrachloroethene (127-18-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chlorobenzene (108-90-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
ethylbenzene (100-41-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
m+p xylene (108-38-3, 106-42-3)	µg/L	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.59 J	<2.0 U
o-xylene (95-47-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.50	<0.5 U
isopropylbenzene (98-82-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-trimethylbenzene (108-67-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
ethanol (64-17-5)	µg/L	<100 U	<100 U	<200 U,J-	<100 U	<100 U	<200 U,J-
isopropanol (67-63-0)	µg/L	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U
acrylonitrile (107-13-1)	µg/L	NA	NR	<25.0 U,J-	NA	NR	<25.0 U,J-
styrene (100-42-5)	µg/L	NA	NR	<0.5 U	NA	NR	<0.5 U
acetone (67-64-1)	µg/L	<1.0 U	<1.0 U	<1.0 U,J-	<1.0 U	<1.0 U	<1.0 U,J-
tert-butyl alcohol (75-65-0)	µg/L	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U
methyl tert-butyl ether (1634-04-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
diisopropyl ether (108-20-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
ethyl tert-butyl ether (637-92-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
tert-amyl methyl ether (994-05-8)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
vinyl chloride (75-01-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethene (75-35-4)	µg/L	R	R	R	R	R	R
carbon disulfide (75-15-0)	µg/L	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U	<0.5 U,J-	<0.5 U
methylene chloride (75-09-2)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
trans-1,2-dichloroethene (156-60-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethane (75-34-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-dichoroethene (156-59-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chloroform (67-66-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,1-trichloroethane (71-55-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
carbon tetrachloride (56-23-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
benzene (71-43-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-dichloroethane (107-06-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
trichloroethene (79-01-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
toluene (108-88-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2-trichloroethane (79-00-5)	µg/L	R	R	R	R	R	R
tetrachloroethene (127-18-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chlorobenzene (108-90-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
ethylbenzene (100-41-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
m+p xylene (108-38-3, 106-42-3)	µg/L	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U
o-xylene (95-47-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
isopropylbenzene (98-82-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-trimethylbenzene (108-67-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3
ethanol (64-17-5)	µg/L	<100 U	<100 U	<200 U,J-	<100 U	<100 U	<200 U,J-
isopropanol (67-63-0)	µg/L	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U
acrylonitrile (107-13-1)	µg/L	NA	NR	<25.0 U,J-	NA	NR	<25.0 U,J-
styrene (100-42-5)	µg/L	NA	NR	<0.5 U	NA	NR	<0.5 U
acetone (67-64-1)	µg/L	<1.0 U	<1.0 U	<1.0 U,J-	<1.0 U	<1.0 U	<1.0 U,J-
tert-butyl alcohol (75-65-0)	µg/L	156	795	229	975	972	287
methyl tert-butyl ether (1634-04-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
diisopropyl ether (108-20-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
ethyl tert-butyl ether (637-92-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
tert-amyl methyl ether (994-05-8)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
vinyl chloride (75-01-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethene (75-35-4)	µg/L	R	R	R	R	R	R
carbon disulfide (75-15-0)	µg/L	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U	<0.5 U,J-	<0.5 U
methylene chloride (75-09-2)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
trans-1,2-dichloroethene (156-60-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethane (75-34-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-dichoroethene (156-59-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chloroform (67-66-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,1-trichloroethane (71-55-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
carbon tetrachloride (56-23-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
benzene (71-43-2)	µg/L	<0.5 U	<0.5 U	0.62	<0.5 U	<0.5 U	<0.5 U
1,2-dichloroethane (107-06-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
trichloroethene (79-01-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
toluene (108-88-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2-trichloroethane (79-00-5)	µg/L	R	R	R	R	R	R
tetrachloroethene (127-18-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chlorobenzene (108-90-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
ethylbenzene (100-41-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
m+p xylene (108-38-3, 106-42-3)	µg/L	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U
o-xylene (95-47-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
isopropylbenzene (98-82-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-trimethylbenzene (108-67-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2
ethanol (64-17-5)	µg/L	<100 U	<100 U	<200 U,J-	<100 U	<100 U	<100 U	<100 U
isopropanol (67-63-0)	µg/L	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U
acrylonitrile (107-13-1)	µg/L	NA	NR	<25.0 U,J-	NA	NR	NA	NR
styrene (100-42-5)	µg/L	NA	NR	<0.5 U	NA	NR	NA	NR
acetone (67-64-1)	µg/L	<1.0 U	<1.0 U	<1.0 U,J-	80.3 J-	<1.0 U	<1.0 U,J-	<1.0 U
tert-butyl alcohol (75-65-0)	µg/L	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U
methyl tert-butyl ether (1634-04-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
diisopropyl ether (108-20-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
ethyl tert-butyl ether (637-92-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
tert-amyl methyl ether (994-05-8)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
vinyl chloride (75-01-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U
1,1-dichloroethene (75-35-4)	µg/L	R	R	R	R	R	R	R
carbon disulfide (75-15-0)	µg/L	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U,J-	<0.5 U,J-	<0.5 U,J-
methylene chloride (75-09-2)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
trans-1,2-dichloroethene (156-60-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethane (75-34-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-dichoroethene (156-59-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chloroform (67-66-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,1-trichloroethane (71-55-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
carbon tetrachloride (56-23-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
benzene (71-43-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	3.77	<0.5 U	<0.5 U	<0.5 U
1,2-dichloroethane (107-06-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
trichloroethene (79-01-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
toluene (108-88-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	0.45 J-	<0.5 U	<0.5 U,J-	<0.5 U
1,1,2-trichloroethane (79-00-5)	µg/L	R	R	R	R	R	R	R
tetrachloroethene (127-18-4)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U
chlorobenzene (108-90-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U
ethylbenzene (100-41-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
m+p xylene (108-38-3, 106-42-3)	µg/L	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U
o-xylene (95-47-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
isopropylbenzene (98-82-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-trimethylbenzene (108-67-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3
ethanol (64-17-5)	µg/L	<100 U	<100 U	<100 U	<100 U	<100 U	<100 U	<200 U,J-
isopropanol (67-63-0)	µg/L	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U	<25.0 U
acrylonitrile (107-13-1)	µg/L	NA	NR	NA	NR	NA	NR	<25.0 U,J-
styrene (100-42-5)	µg/L	NA	NR	NA	NR	NA	NR	<0.5 U
acetone (67-64-1)	µg/L	<1.0 U,J-	<1.0 U	<1.0 U,J-	<1.0 U	<1.0 U	<1.0 U	<1.0 U,J-
tert-butyl alcohol (75-65-0)	µg/L	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U	<5.0 U
methyl tert-butyl ether (1634-04-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
diisopropyl ether (108-20-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
ethyl tert-butyl ether (637-92-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
tert-amyl methyl ether (994-05-8)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
vinyl chloride (75-01-4)	µg/L	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethene (75-35-4)	µg/L	R	R	R	R	R	R	R
carbon disulfide (75-15-0)	µg/L	<0.5 U,J-	<0.5 U,J-	<0.5 U,J-	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U
methylene chloride (75-09-2)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
trans-1,2-dichloroethene (156-60-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethane (75-34-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-dichoroethene (156-59-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chloroform (67-66-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,1-trichloroethane (71-55-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
carbon tetrachloride (56-23-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
benzene (71-43-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-dichloroethane (107-06-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
trichloroethene (79-01-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
toluene (108-88-3)	µg/L	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2-trichloroethane (79-00-5)	µg/L	R	R	R	R	R	R	R
tetrachloroethene (127-18-4)	µg/L	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chlorobenzene (108-90-7)	µg/L	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U	<0.5 U	<0.5 U	<0.5 U
ethylbenzene (100-41-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
m+p xylene (108-38-3, 106-42-3)	µg/L	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U
o-xylene (95-47-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
isopropylbenzene (98-82-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-trimethylbenzene (108-67-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
ethanol (64-17-5)	µg/L	<100 U	<100 U	<100 U	<100 U
isopropanol (67-63-0)	µg/L	<25.0 U	<25.0 U	<25.0 U	<25.0 U
acrylonitrile (107-13-1)	µg/L	NA	NR	NA	NR
styrene (100-42-5)	µg/L	NA	NR	NA	NR
acetone (67-64-1)	µg/L	<1.0 U,J-	<1.0 U	<1.0 U,J-	<1.0 U
tert-butyl alcohol (75-65-0)	µg/L	<5.0 U	<5.0 U	<5.0 U	<5.0 U
methyl tert-butyl ether (1634-04-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U
diisopropyl ether (108-20-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U
ethyl tert-butyl ether (637-92-3)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U
tert-amyl methyl ether (994-05-8)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U
vinyl chloride (75-01-4)	µg/L	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U
1,1-dichloroethene (75-35-4)	µg/L	R	R	R	R
carbon disulfide (75-15-0)	µg/L	<0.5 U,J-	<0.5 U,J-	<0.5 U,J-	<0.5 U,J-
methylene chloride (75-09-2)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U
trans-1,2-dichloroethene (156-60-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-dichloroethane (75-34-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-dichoroethene (156-59-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
chloroform (67-66-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,1-trichloroethane (71-55-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
carbon tetrachloride (56-23-5)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
benzene (71-43-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-dichloroethane (107-06-2)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
trichloroethene (79-01-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
toluene (108-88-3)	µg/L	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U
1,1,2-trichloroethane (79-00-5)	µg/L	R	R	R	R
tetrachloroethene (127-18-4)	µg/L	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U
chlorobenzene (108-90-7)	µg/L	<0.5 U,J-	<0.5 U	<0.5 U,J-	<0.5 U
ethylbenzene (100-41-4)	µg/L	<1.0 U	<1.0 U	<1.0 U	<1.0 U
m+p xylene (108-38-3, 106-42-3)	µg/L	<2.0 U	<2.0 U	<2.0 U	<2.0 U
o-xylene (95-47-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
isopropylbenzene (98-82-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-trimethylbenzene (108-67-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3
1,2,4-trimethylbenzene (95-63-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,2,3-trimethylbenzene (526-73-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U
naphthalene (91-20-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NR	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3
1,2,4-trimethylbenzene (95-63-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.39 J	<0.5 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-trimethylbenzene (526-73-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.26 J	<0.5 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
naphthalene (91-20-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
1,2,4-trimethylbenzene (95-63-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-trimethylbenzene (526-73-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
naphthalene (91-20-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3
1,2,4-trimethylbenzene (95-63-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-trimethylbenzene (526-73-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
naphthalene (91-20-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2
1,2,4-trimethylbenzene (95-63-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-trimethylbenzene (526-73-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
naphthalene (91-20-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3
1,2,4-trimethylbenzene (95-63-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-trimethylbenzene (526-73-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
naphthalene (91-20-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-4 Sample Results - Volatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
1,2,4-trimethylbenzene (95-63-6)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-trimethylbenzene (526-73-8)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U
naphthalene (91-20-3)	µg/L	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table B-5 Sample Results - Dissolved Gases, Diesel and Gasoline Range Organics, Glycols, and Low Molecular Weight Acids (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3
Dissolved Gases							
Methane (74-82-8)	mg/L	<0.0015 U	<0.0014 U	<0.0015 U	<0.0015 U	NR	<0.0015 U
Ethane (74-84-0)	mg/L	<0.0029 U	<0.0028 U	<0.0030 U	<0.0029 U	NR	<0.0030 U
Propane (74-98-6)	mg/L	<0.0041 U	<0.0039 U	<0.0042 U	<0.0041 U	NR	<0.0042 U
Butane (106-97-8)	mg/L	<0.0054 U	<0.0049 U	<0.0052 U	<0.0054 U	NR	<0.0052 U
Diesel and Gas Range Organics							
GRO/TPH	µg/L	<20.0 U	<20 U	<20.0 U	<20.0 U	NR	<20.0 U
DRO	µg/L	29.3 B	38.7	40.3 J-	<20.0 U	NR	<20.0 U,J-
Glycols							
2-butoxyethanol (111-76-2)	µg/L	<5 U	<5 U	<25 U	<5 U	<5 U	<25 U
Diethylene glycol (111-46-6)	µg/L	<25 U	<50 U	<10 U	<25 U	<50 U	<10 U
Triethylene glycol (112-27-6)	µg/L	<25 U	<25 U	<10 U	<25 U	<25 U	<10 U
Tetraethylene glycol (112-60-7)	µg/L	<10 U	R	<10 U	<10 U	R	<10 U
Low Molecular Weight Acids							
Lactate (50-21-5)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Formate (64-18-6)	mg/L	<0.10 U	<0.10 U	R	<0.10 U	<0.10 U	R
Acetate (64-19-7)	mg/L	R	0.46 B	<0.10 U	R	<0.10 U	<0.10 U
Propionate (79-09-4)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Butyrate (107-92-6)	mg/L	<0.10 U	<0.10 U	<0.10 U,J-	<0.10 U	<0.10 U	<0.10 U,J-

Table B-5 Sample Results - Dissolved Gases, Diesel and Gasoline Range Organics, Glycols, and Low Molecular Weight Acids (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3
Dissolved Gases							
Methane (74-82-8)	mg/L	<0.0015 U	<0.0014 U	<0.0015 U	<0.0015 U	<0.0014 U	<0.0015 U
Ethane (74-84-0)	mg/L	<0.0029 U	<0.0028 U	<0.0030 U	<0.0029 U	<0.0028 U	<0.0030 U
Propane (74-98-6)	mg/L	<0.0041 U	<0.0039 U	<0.0042 U	<0.0041 U	<0.0039 U	<0.0042 U
Butane (106-97-8)	mg/L	<0.0054 U	<0.0049 U	<0.0052 U	<0.0054 U	<0.0049 U	<0.0052 U
Diesel and Gas Range Organics							
GRO/TPH	µg/L	<20.0 U	20.9	<20.0 U	<20.0 U	23.6	<20.0 U
DRO	µg/L	28.5 B	42.9	<20.0 U,J-	45.6 B	53.8	27.3 J-
Glycols							
2-butoxyethanol (111-76-2)	µg/L	<5 U	<5 U	<25 U	<5 U	<5 U	<25 U
Diethylene glycol (111-46-6)	µg/L	<25 U	<50 U	<10 U	<25 U	<50 U	<10 U
Triethylene glycol (112-27-6)	µg/L	<25 U	<25 U	<10 U	<25 U	<25 U	<10 U
Tetraethylene glycol (112-60-7)	µg/L	<10 U	R	<10 U	<10 U	R	<10 U
Low Molecular Weight Acids							
Lactate (50-21-5)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Formate (64-18-6)	mg/L	<0.10 U	<0.10 U	R	<0.10 U	<0.10 U	R
Acetate (64-19-7)	mg/L	R	0.20 B	<0.10 U	R	0.15 B	<0.10 U
Propionate (79-09-4)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Butyrate (107-92-6)	mg/L	<0.10 U	<0.10 U	<0.10 U,J-	<0.10 U	<0.10 U	<0.10 U,J-

Table B-5 Sample Results - Dissolved Gases, Diesel and Gasoline Range Organics, Glycols, and Low Molecular Weight Acids (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
Dissolved Gases							
Methane (74-82-8)	mg/L	<0.0015 U	<0.0014 U	<0.0015 U	<0.0015 U	<0.0014 U	<0.0015 U
Ethane (74-84-0)	mg/L	<0.0029 U	<0.0028 U	<0.0030 U	<0.0029 U	<0.0028 U	<0.0030 U
Propane (74-98-6)	mg/L	<0.0041 U	<0.0039 U	<0.0042 U	<0.0041 U	<0.0039 U	<0.0042 U
Butane (106-97-8)	mg/L	<0.0054 U	<0.0049 U	<0.0052 U	<0.0054 U	<0.0049 U	<0.0052 U
Diesel and Gas Range Organics							
GRO/TPH	µg/L	<20.0 U	<20 U	<20.0 U	<20.0 U	<20 U	<20.0 U
DRO	µg/L	39.8 B	30.3	<20.0 U,J-	26.3 B	25.1	31.0 J-
Glycols							
2-butoxyethanol (111-76-2)	µg/L	<5 U	<5 U	<25 U	<5 U	<5 U	<25 U
Diethylene glycol (111-46-6)	µg/L	<25 U	<50 U	<10 U	<25 U	<50 U	<10 U
Triethylene glycol (112-27-6)	µg/L	<25 U	<25 U	<10 U	<25 U	<25 U	<10 U
Tetraethylene glycol (112-60-7)	µg/L	<10 U	R	<10 U	<10 U	R	<10 U
Low Molecular Weight Acids							
Lactate (50-21-5)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Formate (64-18-6)	mg/L	<0.10 U	<0.10 U	R	<0.10 U	<0.10 U	R
Acetate (64-19-7)	mg/L	R	<0.10 B	<0.10 U	R	0.15 B	<0.10 U
Propionate (79-09-4)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Butyrate (107-92-6)	mg/L	<0.10 U	<0.10 U	<0.10 U,J-	<0.10 U	<0.10 U	<0.10 U,J-

Table B-5 Sample Results - Dissolved Gases, Diesel and Gasoline Range Organics, Glycols, and Low Molecular Weight Acids (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3
Dissolved Gases							
Methane (74-82-8)	mg/L	<0.0015 U	0.0085 B	<0.0015 U	<0.0015 U	0.0253 B	<0.0015 U
Ethane (74-84-0)	mg/L	<0.0029 U	<0.0028 U	<0.0030 U	<0.0029 U	0.0044 B	<0.0030 U
Propane (74-98-6)	mg/L	<0.0041 U	<0.0039 U	<0.0042 U	<0.0041 U	<0.0039 U	<0.0042 U
Butane (106-97-8)	mg/L	<0.0054 U	<0.0049 U	<0.0052 U	<0.0054 U	<0.0049 U	<0.0052 U
Diesel and Gas Range Organics							
GRO/TPH	µg/L	<20.0 U	<20 U	<20.0 U	<20.0 U	<20 U	<20.0 U
DRO	µg/L	81.5 B	53.1	35.8 J-	92.2 B	75.9	70.9 J-
Glycols							
2-butoxyethanol (111-76-2)	µg/L	<5 U	<5 U	<25 U	<5 U	<5 U	<25 U
Diethylene glycol (111-46-6)	µg/L	<25 U	<50 U	<10 U	<25 U	<50 U	<10 U
Triethylene glycol (112-27-6)	µg/L	<25 U	<25 U	<10 U	<25 U	<25 U	<10 U
Tetraethylene glycol (112-60-7)	µg/L	<10 U	R	<10 U	<10 U	R	<10 U
Low Molecular Weight Acids							
Lactate (50-21-5)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Formate (64-18-6)	mg/L	<0.10 U	0.45	R	0.36	0.20	R
Acetate (64-19-7)	mg/L	R	<0.10 U	<0.10 U	R	0.17 B	<0.10 U
Propionate (79-09-4)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Butyrate (107-92-6)	mg/L	<0.10 U	<0.10 U	<0.10 U,J-	<0.10 U	<0.10 U	<0.10 U,J-

Table B-5 Sample Results - Dissolved Gases, Diesel and Gasoline Range Organics, Glycols, and Low Molecular Weight Acids (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2
Dissolved Gases								
Methane (74-82-8)	mg/L	<0.0015 U	0.0101 B	<0.0015 U	<0.0015 U	0.0008 J	<0.0015 U	0.0013 J
Ethane (74-84-0)	mg/L	<0.0029 U	<0.0028 U	<0.0030 U	<0.0029 U	<0.0028 U	<0.0029 U	<0.0028 U
Propane (74-98-6)	mg/L	<0.0041 U	<0.0039 U	<0.0042 U	<0.0041 U	<0.0039 U	<0.0041 U	<0.0039 U
Butane (106-97-8)	mg/L	<0.0054 U	<0.0049 U	<0.0052 U	<0.0054 U	<0.0049 U	<0.0054 U	<0.0049 U
Diesel and Gas Range Organics								
GRO/TPH	µg/L	<20.0 U	<20 U	<20.0 U	77.9 B	<20 U	<20.0 U	<20 U
DRO	µg/L	120 B	96.9	124 J-	67.3 B	57.6	55.4 B,J-	46.0
Glycols								
2-butoxyethanol (111-76-2)	µg/L	<5 U	<5 U	<25 U	<5 U	<5 U	<5 U	<5 U
Diethylene glycol (111-46-6)	µg/L	<25 U	<50 U	<10 U	<25 U	<50 U	<25 U	<50 U
Triethylene glycol (112-27-6)	µg/L	<25 U	<25 U	<10 U	<25 U	<25 U	<25 U	<25 U
Tetraethylene glycol (112-60-7)	µg/L	<10 U	R	<10 U	<10 U	R	<10 U	R
Low Molecular Weight Acids								
Lactate (50-21-5)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Formate (64-18-6)	mg/L	<0.10 U	<0.10 U	R	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Acetate (64-19-7)	mg/L	R	0.18 B	<0.10 U	R	0.12 B	R	0.17 B
Propionate (79-09-4)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Butyrate (107-92-6)	mg/L	<0.10 U	<0.10 U	<0.10 U,J-	<0.10 U	<0.10 U	<0.10 U	<0.10 U

Table B-5 Sample Results - Dissolved Gases, Diesel and Gasoline Range Organics, Glycols, and Low Molecular Weight Acids (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3
Dissolved Gases								
Methane (74-82-8)	mg/L	<0.0015 U	0.0004 J	<0.0015 U	0.0024	<0.0015 U	0.0132 B	<0.0015 U
Ethane (74-84-0)	mg/L	<0.0029 U	<0.0028 U	<0.0029 U	<0.0028 U	<0.0029 U	<0.0028 U	<0.0030 U
Propane (74-98-6)	mg/L	<0.0041 U	<0.0039 U	<0.0041 U	<0.0039 U	<0.0041 U	<0.0039 U	<0.0042 U
Butane (106-97-8)	mg/L	<0.0054 U	<0.0049 U	<0.0054 U	<0.0049 U	<0.0054 U	<0.0049 U	<0.0052 U
Diesel and Gas Range Organics								
GRO/TPH	µg/L	<20.0 U	<20 U	<20.0 U	<20 U	<20.0 U	<20 U	<20.0 U
DRO	µg/L	43.3 B	25.7	49.4 B	43.4	65.4	53.5	49.3 J-
Glycols								
2-butoxyethanol (111-76-2)	µg/L	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<25 U
Diethylene glycol (111-46-6)	µg/L	<25 U	<50 U	<25 U	<50 U	<25 U	<50 U	<10 U
Triethylene glycol (112-27-6)	µg/L	<25 U	<25 U	<25 U	<25 U	<25 U	<25 U	<10 U
Tetraethylene glycol (112-60-7)	µg/L	<10 U	R	<10 U	R	<10 U	R	<10 U
Low Molecular Weight Acids								
Lactate (50-21-5)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Formate (64-18-6)	mg/L	<0.10 U	<0.10 U	0.11	<0.10 U	<0.10 U	<0.10 U	R
Acetate (64-19-7)	mg/L	R	0.14 B	R	0.13 B	R	0.39 B	<0.10 U
Propionate (79-09-4)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Butyrate (107-92-6)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U,J-

Table B-5 Sample Results - Dissolved Gases, Diesel and Gasoline Range Organics, Glycols, and Low Molecular Weight Acids (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
Dissolved Gases					
Methane (74-82-8)	mg/L	<0.0015 U	0.0056	<0.0015 U	0.0041
Ethane (74-84-0)	mg/L	<0.0029 U	<0.0028 U	<0.0029 U	<0.0028 U
Propane (74-98-6)	mg/L	<0.0041 U	<0.0039 U	<0.0041 U	<0.0039 U
Butane (106-97-8)	mg/L	<0.0054 U	<0.0049 U	<0.0054 U	<0.0049 U
Diesel and Gas Range Organics					
GRO/TPH	µg/L	<20.0 U	<20 U	<20.0 U	<20 U
DRO	µg/L	40.1 B	40.4	43.3 B	40.1
Glycols					
2-butoxyethanol (111-76-2)	µg/L	<5 U	<5 U	<5 U	<5 U
Diethylene glycol (111-46-6)	µg/L	<25 U	<50 U	<25 U	<50 U
Triethylene glycol (112-27-6)	µg/L	<25 U	<25 U	<25 U	<25 U
Tetraethylene glycol (112-60-7)	µg/L	<10 U	R	<10 U	R
Low Molecular Weight Acids					
Lactate (50-21-5)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Formate (64-18-6)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Acetate (64-19-7)	mg/L	R	0.18 B	R	0.20 B
Propionate (79-09-4)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Butyrate (107-92-6)	mg/L	<0.10 U	<0.10 U	<0.10 U	<0.10 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3
R-(+)-limonene (5989-27-5)	µg/L	<0.50 U	<0.50 U,J-	<1.00 U	<0.50 U	NR	<1.00 U
1,2,4-trichlorobenzene (120-82-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
1,2-dinitrobenzene (528-29-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
1,3-dimethyladamantane (702-79-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
1,3 -dinitrobenzene (99-65-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
1,4-dinitrobenzene (100-25-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
1-methylnaphthalene (90-12-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
2,3,4,6-tetrachlorophenol (58-90-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
2,3,5,6-tetrachlorophenol (935-95-5)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
2,4,5-trichlorophenol (95-95-4)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
2,4,6-trichlorophenol (88-06-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
2,4-dichlorophenol (120-83-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
2,4-dimethylphenol (105-67-9)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
2,4-dinitrophenol (51-28-5)	µg/L	<5.00 U	<5.00 U	<3.00 U	<5.00 U	NR	<3.00 U
2,4-dinitrotoluene (121-14-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
2,6-dinitrotoluene (606-20-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
2-butoxyethanol (111-76-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
2-chloronaphthalene (91-58-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
2-chlorophenol (95-57-8)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
2-methylnaphthalene (91-57-6)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
2-methylphenol (95-48-7)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
2-nitroaniline (88-74-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
2-nitrophenol (88-75-5)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
3&4-methylphenol (108-39-4 & 106-44-5)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	NR	<5.00 U
3,3'-dichlorobenzidine (91-94-1)	µg/L	<1.00 U	NR	<1.00 U	<1.00 U	NR	<1.00 U
3-nitroaniline (99-09-2)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	NR	<3.00 U
4,6-dinitro-2-methylphenol (534-52-1)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
4-bromophenyl phenyl ether (101-55-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
4-chloro-3-methylphenol (59-50-7)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3
R-(+)-limonene (5989-27-5)	µg/L	<0.50 U	<0.50 U,J-	<1.00 U	<0.50 U	<0.50 U,J-	<1.00 U
1,2,4-trichlorobenzene (120-82-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,2-dinitrobenzene (528-29-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3-dimethyladamantane (702-79-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3 -dinitrobenzene (99-65-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,4-dinitrobenzene (100-25-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1-methylnaphthalene (90-12-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2,3,4,6-tetrachlorophenol (58-90-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,3,5,6-tetrachlorophenol (935-95-5)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4,5-trichlorophenol (95-95-4)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4,6-trichlorophenol (88-06-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dichlorophenol (120-83-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dimethylphenol (105-67-9)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dinitrophenol (51-28-5)	µg/L	<5.00 U	<5.00 U	<3.00 U	<5.00 U	<5.00 U	<3.00 U
2,4-dinitrotoluene (121-14-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2,6-dinitrotoluene (606-20-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-butoxyethanol (111-76-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	0.50 B	<0.50 U	<1.00 U
2-chloronaphthalene (91-58-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-chlorophenol (95-57-8)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2-methylnaphthalene (91-57-6)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-methylphenol (95-48-7)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2-nitroaniline (88-74-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-nitrophenol (88-75-5)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
3&4-methylphenol (108-39-4 & 106-44-5)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<5.00 U
3,3'-dichlorobenzidine (91-94-1)	µg/L	<1.00 U	NR	<1.00 U	<1.00 U	NR	<1.00 U
3-nitroaniline (99-09-2)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
4,6-dinitro-2-methylphenol (534-52-1)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
4-bromophenyl phenyl ether (101-55-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
4-chloro-3-methylphenol (59-50-7)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
R-(+)-limonene (5989-27-5)	µg/L	<0.50 U	<0.50 U,J-	<1.00 U	<0.50 U	<0.50 U,J-	<1.00 U
1,2,4-trichlorobenzene (120-82-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,2-dinitrobenzene (528-29-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3-dimethyladamantane (702-79-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3 -dinitrobenzene (99-65-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,4-dinitrobenzene (100-25-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1-methylnaphthalene (90-12-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2,3,4,6-tetrachlorophenol (58-90-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,3,5,6-tetrachlorophenol (935-95-5)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4,5-trichlorophenol (95-95-4)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4,6-trichlorophenol (88-06-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dichlorophenol (120-83-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dimethylphenol (105-67-9)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dinitrophenol (51-28-5)	µg/L	<5.00 U	<5.00 U	<3.00 U	<5.00 U	<5.00 U	<3.00 U
2,4-dinitrotoluene (121-14-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2,6-dinitrotoluene (606-20-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-butoxyethanol (111-76-2)	µg/L	1.46 B	<0.50 U	<1.00 U	0.81 B	<0.50 U	<1.00 U
2-chloronaphthalene (91-58-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-chlorophenol (95-57-8)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2-methylnaphthalene (91-57-6)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-methylphenol (95-48-7)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2-nitroaniline (88-74-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-nitrophenol (88-75-5)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
3&4-methylphenol (108-39-4 & 106-44-5)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<5.00 U
3,3'-dichlorobenzidine (91-94-1)	µg/L	<1.00 U	NR	<1.00 U	<1.00 U	NR	<1.00 U
3-nitroaniline (99-09-2)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
4,6-dinitro-2-methylphenol (534-52-1)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
4-bromophenyl phenyl ether (101-55-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
4-chloro-3-methylphenol (59-50-7)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3
R-(+)-limonene (5989-27-5)	µg/L	<0.50 U	<0.50 U,J-	<1.00 U	<0.50 U	<0.50 U,J-	<1.00 U
1,2,4-trichlorobenzene (120-82-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,2-dinitrobenzene (528-29-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3-dimethyladamantane (702-79-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,3 -dinitrobenzene (99-65-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1,4-dinitrobenzene (100-25-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
1-methylnaphthalene (90-12-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2,3,4,6-tetrachlorophenol (58-90-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,3,5,6-tetrachlorophenol (935-95-5)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4,5-trichlorophenol (95-95-4)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4,6-trichlorophenol (88-06-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dichlorophenol (120-83-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dimethylphenol (105-67-9)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2,4-dinitrophenol (51-28-5)	µg/L	<5.00 U	<5.00 U	<3.00 U	<5.00 U	<5.00 U	<3.00 U
2,4-dinitrotoluene (121-14-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2,6-dinitrotoluene (606-20-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-butoxyethanol (111-76-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	0.51 B	<0.50 U	<1.00 U
2-chloronaphthalene (91-58-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-chlorophenol (95-57-8)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2-methylnaphthalene (91-57-6)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-methylphenol (95-48-7)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
2-nitroaniline (88-74-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
2-nitrophenol (88-75-5)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
3&4-methylphenol (108-39-4 & 106-44-5)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<5.00 U
3,3'-dichlorobenzidine (91-94-1)	µg/L	<1.00 U	NR	<1.00 U	<1.00 U	NR	<1.00 U
3-nitroaniline (99-09-2)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
4,6-dinitro-2-methylphenol (534-52-1)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
4-bromophenyl phenyl ether (101-55-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
4-chloro-3-methylphenol (59-50-7)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2
R-(+)-limonene (5989-27-5)	µg/L	<0.50 U	<0.50 U,J-	<5.00 U	<0.50 U	<0.50 U,J-	<0.50 U	<0.50 U,J-
1,2,4-trichlorobenzene (120-82-1)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,2-dinitrobenzene (528-29-0)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,3-dimethyladamantane (702-79-4)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,3 -dinitrobenzene (99-65-0)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,4-dinitrobenzene (100-25-4)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1-methylnaphthalene (90-12-0)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,3,4,6-tetrachlorophenol (58-90-2)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,3,5,6-tetrachlorophenol (935-95-5)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4,5-trichlorophenol (95-95-4)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4,6-trichlorophenol (88-06-2)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4-dichlorophenol (120-83-2)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4-dimethylphenol (105-67-9)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4-dinitrophenol (51-28-5)	µg/L	<5.00 U	<5.00 U	<15.0 U	<5.00 U	<5.00 U	<5.00 U	<5.00 U
2,4-dinitrotoluene (121-14-2)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,6-dinitrotoluene (606-20-2)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-butoxyethanol (111-76-2)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-chloronaphthalene (91-58-7)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-chlorophenol (95-57-8)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-methylnaphthalene (91-57-6)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-methylphenol (95-48-7)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-nitroaniline (88-74-4)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-nitrophenol (88-75-5)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
3&4-methylphenol (108-39-4 & 106-44-5)	µg/L	<0.50 U	<0.50 U	<25.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
3,3'-dichlorobenzidine (91-94-1)	µg/L	<1.00 U	NR	<5.00 U	<1.00 U	NR	<1.00 U	NR
3-nitroaniline (99-09-2)	µg/L	<0.50 U	<0.50 U	<15.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4,6-dinitro-2-methylphenol (534-52-1)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4-bromophenyl phenyl ether (101-55-3)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4-chloro-3-methylphenol (59-50-7)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3
R-(+)-limonene (5989-27-5)	µg/L	<0.50 U	<0.50 U,J-	<0.50 U	<0.50 U,J-	<0.50 U	<0.50 U,J-	<1.00 U
1,2,4-trichlorobenzene (120-82-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
1,2-dinitrobenzene (528-29-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
1,3-dimethyladamantane (702-79-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
1,3 -dinitrobenzene (99-65-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
1,4-dinitrobenzene (100-25-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
1-methylnaphthalene (90-12-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
2,3,4,6-tetrachlorophenol (58-90-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
2,3,5,6-tetrachlorophenol (935-95-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
2,4,5-trichlorophenol (95-95-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
2,4,6-trichlorophenol (88-06-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
2,4-dichlorophenol (120-83-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
2,4-dimethylphenol (105-67-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
2,4-dinitrophenol (51-28-5)	µg/L	<5.00 U	<5.00 U	<5.00 U	<5.00 U	<5.00 U	<5.00 U	<3.00 U
2,4-dinitrotoluene (121-14-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
2,6-dinitrotoluene (606-20-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
2-butoxyethanol (111-76-2)	µg/L	0.91 B	<0.50 U	1.53 B	<0.50 U	<0.50 U	<0.50 U	<1.00 U
2-chloronaphthalene (91-58-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
2-chlorophenol (95-57-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
2-methylnaphthalene (91-57-6)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
2-methylphenol (95-48-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
2-nitroaniline (88-74-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
2-nitrophenol (88-75-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
3&4-methylphenol (108-39-4 & 106-44-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<5.00 U
3,3'-dichlorobenzidine (91-94-1)	µg/L	<1.00 U	NR	<1.00 U	NR	<1.00 U	NR	<1.00 U
3-nitroaniline (99-09-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<3.00 U
4,6-dinitro-2-methylphenol (534-52-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
4-bromophenyl phenyl ether (101-55-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
4-chloro-3-methylphenol (59-50-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
R-(+)-limonene (5989-27-5)	µg/L	<0.50 U	<0.50 U,J-	<0.50 U	<0.50 U,J-
1,2,4-trichlorobenzene (120-82-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,2-dichlorobenzene (95-50-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,2-dinitrobenzene (528-29-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,3-dichlorobenzene (541-73-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,3-dimethyladamantane (702-79-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,3 -dinitrobenzene (99-65-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,4-dichlorobenzene (106-46-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1,4-dinitrobenzene (100-25-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
1-methylnaphthalene (90-12-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,3,4,6-tetrachlorophenol (58-90-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,3,5,6-tetrachlorophenol (935-95-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4,5-trichlorophenol (95-95-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4,6-trichlorophenol (88-06-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4-dichlorophenol (120-83-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4-dimethylphenol (105-67-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,4-dinitrophenol (51-28-5)	µg/L	<5.00 U	<5.00 U	<5.00 U	<5.00 U
2,4-dinitrotoluene (121-14-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2,6-dinitrotoluene (606-20-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-butoxyethanol (111-76-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-chloronaphthalene (91-58-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-chlorophenol (95-57-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-methylnaphthalene (91-57-6)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-methylphenol (95-48-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-nitroaniline (88-74-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
2-nitrophenol (88-75-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
3&4-methylphenol (108-39-4 & 106-44-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
3,3'-dichlorobenzidine (91-94-1)	µg/L	<1.00 U	NR	<1.00 U	NR
3-nitroaniline (99-09-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4,6-dinitro-2-methylphenol (534-52-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4-bromophenyl phenyl ether (101-55-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4-chloro-3-methylphenol (59-50-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3
4-chloroaniline (106-47-8)	µg/L	<1.00 U	<1.00 U	<3.00 U	<1.00 U	NR	<3.00 U
4-chlorophenyl phenyl ether (7005-72-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
4-nitroaniline (100-01-6)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	NR	<3.00 U
4-nitrophenol (100-02-7)	µg/L	<2.50 U	<2.50 U	<3.00 U	<2.50 U	NR	<3.00 U
Acenaphthene (83-32-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Acenaphthylene (208-96-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Adamantane (281-23-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Aniline (62-53-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	NR	<1.00 U
Anthracene (120-12-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Azobenzene (103-33-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Benzo(a)anthracene (56-55-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Benzo(a)pyrene (50-32-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Benzo(b)fluoranthene (205-99-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Benzo(g,h,i)perylene (191-24-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Benzo(k)fluoranthene (207-08-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Benzoic Acid (65-85-0)	µg/L	<5.00 U	<5.00 U	<3.00 U	<5.00 U	NR	<3.00 U
Benzyl alcohol (100-51-6)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Bis-(2-chloroethoxy)methane (111-91-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Bis-(2-chloroethyl)ether (111-44-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Bis-(2-chloroisopropyl)ether (108-60-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Bis-(2-ethylhexyl) adipate (103-23-1)	µg/L	<1.00 U	1.11	<1.00 U	<1.00 U	NR	<1.00 U
Bis-(2-ethylhexyl) phthalate (117-81-7)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	NR	<2.00 U
Butyl benzyl phthalate (85-68-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Carbazole (86-74-8)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	NR	<3.00 U
Chrysene (218-01-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Dibenz(a,h)anthracene (53-70-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Dibenzofuran (132-64-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Diethyl phthalate (84-66-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Dimethyl phthalate (131-11-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Di-n-butyl phthalate (84-74-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Di-n-octyl phthalate (117-84-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Diphenylamine (122-39-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3
4-chloroaniline (106-47-8)	µg/L	<1.00 U	<1.00 U	<3.00 U	<1.00 U	<1.00 U	<3.00 U
4-chlorophenyl phenyl ether (7005-72-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
4-nitroaniline (100-01-6)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
4-nitrophenol (100-02-7)	µg/L	<2.50 U	<2.50 U	<3.00 U	<2.50 U	<2.50 U	<3.00 U
Acenaphthene (83-32-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Acenaphthylene (208-96-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Adamantane (281-23-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Aniline (62-53-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Anthracene (120-12-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Azobenzene (103-33-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(a)anthracene (56-55-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(a)pyrene (50-32-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(b)fluoranthene (205-99-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(g,h,i)perylene (191-24-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(k)fluoranthene (207-08-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzoic Acid (65-85-0)	µg/L	<5.00 U	<5.00 U	<3.00 U	<5.00 U	<5.00 U	<3.00 U
Benzyl alcohol (100-51-6)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroethoxy)methane (111-91-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroethyl)ether (111-44-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroisopropyl)ether (108-60-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-ethylhexyl) adipate (103-23-1)	µg/L	<1.00 U	3.56 J,B	<1.00 U	<1.00 U	3.48 J,B	<1.00 U
Bis-(2-ethylhexyl) phthalate (117-81-7)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	<1.00 U	<2.00 U
Butyl benzyl phthalate (85-68-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Carbazole (86-74-8)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
Chrysene (218-01-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dibenz(a,h)anthracene (53-70-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dibenzofuran (132-64-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Diethyl phthalate (84-66-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dimethyl phthalate (131-11-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Di-n-butyl phthalate (84-74-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Di-n-octyl phthalate (117-84-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Diphenylamine (122-39-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
4-chloroaniline (106-47-8)	µg/L	<1.00 U	<1.00 U	<3.00 U	<1.00 U	<1.00 U	<3.00 U
4-chlorophenyl phenyl ether (7005-72-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
4-nitroaniline (100-01-6)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
4-nitrophenol (100-02-7)	µg/L	<2.50 U	<2.50 U	<3.00 U	<2.50 U	<2.50 U	<3.00 U
Acenaphthene (83-32-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Acenaphthylene (208-96-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Adamantane (281-23-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Aniline (62-53-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Anthracene (120-12-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Azobenzene (103-33-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(a)anthracene (56-55-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(a)pyrene (50-32-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(b)fluoranthene (205-99-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(g,h,i)perylene (191-24-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(k)fluoranthene (207-08-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzoic Acid (65-85-0)	µg/L	<5.00 U	<5.00 U	<3.00 U	<5.00 U	<5.00 U	<3.00 U
Benzyl alcohol (100-51-6)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroethoxy)methane (111-91-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroethyl)ether (111-44-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroisopropyl)ether (108-60-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-ethylhexyl) adipate (103-23-1)	µg/L	<1.00 U	3.51 J,B	<1.00 U	<1.00 U	2.69 J,B	<1.00 U
Bis-(2-ethylhexyl) phthalate (117-81-7)	µg/L	3.93 U	<1.00 U	<2.00 U	10.7 J+	1.51	<2.00 U
Butyl benzyl phthalate (85-68-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Carbazole (86-74-8)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
Chrysene (218-01-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dibenz(a,h)anthracene (53-70-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dibenzofuran (132-64-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Diethyl phthalate (84-66-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dimethyl phthalate (131-11-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Di-n-butyl phthalate (84-74-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	0.54	<1.00 U
Di-n-octyl phthalate (117-84-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Diphenylamine (122-39-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3
4-chloroaniline (106-47-8)	µg/L	<1.00 U	<1.00 U	<3.00 U	<1.00 U	<1.00 U	<3.00 U
4-chlorophenyl phenyl ether (7005-72-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
4-nitroaniline (100-01-6)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
4-nitrophenol (100-02-7)	µg/L	<2.50 U	<2.50 U	<3.00 U	<2.50 U	<2.50 U	<3.00 U
Acenaphthene (83-32-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Acenaphthylene (208-96-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Adamantane (281-23-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Aniline (62-53-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Anthracene (120-12-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Azobenzene (103-33-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(a)anthracene (56-55-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(a)pyrene (50-32-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(b)fluoranthene (205-99-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(g,h,i)perylene (191-24-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzo(k)fluoranthene (207-08-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Benzoic Acid (65-85-0)	µg/L	<5.00 U	<5.00 U	<3.00 U	<5.00 U	<5.00 U	<3.00 U
Benzyl alcohol (100-51-6)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroethoxy)methane (111-91-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroethyl)ether (111-44-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroisopropyl)ether (108-60-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-ethylhexyl) adipate (103-23-1)	µg/L	<1.00 U	3.58 J,B	<1.00 U	<1.00 U	2.32 J,B	<1.00 U
Bis-(2-ethylhexyl) phthalate (117-81-7)	µg/L	<1.00 U	1.34	<2.00 U	<1.00 U	<1.00 U	<2.00 U
Butyl benzyl phthalate (85-68-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Carbazole (86-74-8)	µg/L	<0.50 U	<0.50 U	<3.00 U	<0.50 U	<0.50 U	<3.00 U
Chrysene (218-01-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dibenz(a,h)anthracene (53-70-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dibenzofuran (132-64-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Diethyl phthalate (84-66-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Dimethyl phthalate (131-11-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Di-n-butyl phthalate (84-74-2)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Di-n-octyl phthalate (117-84-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Diphenylamine (122-39-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2
4-chloroaniline (106-47-8)	µg/L	<1.00 U	<1.00 U	<15.0 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
4-chlorophenyl phenyl ether (7005-72-3)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4-nitroaniline (100-01-6)	µg/L	<0.50 U	<0.50 U	<15.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4-nitrophenol (100-02-7)	µg/L	<2.50 U	<2.50 U	<15.0 U	<2.50 U	<2.50 U	<2.50 U	<2.50 U
Acenaphthene (83-32-9)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Acenaphthylene (208-96-8)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Adamantane (281-23-2)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Aniline (62-53-3)	µg/L	<1.00 U	<1.00 U	<5.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Anthracene (120-12-7)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Azobenzene (103-33-3)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(a)anthracene (56-55-3)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(a)pyrene (50-32-8)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(b)fluoranthene (205-99-2)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(g,h,i)perylene (191-24-2)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(k)fluoranthene (207-08-9)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzoic Acid (65-85-0)	µg/L	<5.00 U	<5.00 U	<15.0 U	<5.00 U	<5.00 U	<5.00 U	<5.00 U
Benzyl alcohol (100-51-6)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Bis-(2-chloroethoxy)methane (111-91-1)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Bis-(2-chloroethyl)ether (111-44-4)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Bis-(2-chloroisopropyl)ether (108-60-1)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Bis-(2-ethylhexyl) adipate (103-23-1)	µg/L	<1.00 U	3.34 J,B	<5.00 U	<1.00 U	1.68	<1.00 U	1.08
Bis-(2-ethylhexyl) phthalate (117-81-7)	µg/L	<1.00 U	<1.00 U	<10.0 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Butyl benzyl phthalate (85-68-7)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Carbazole (86-74-8)	µg/L	<0.50 U	<0.50 U	<15.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Chrysene (218-01-9)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Dibenz(a,h)anthracene (53-70-3)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Dibenzofuran (132-64-9)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Diethyl phthalate (84-66-2)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Dimethyl phthalate (131-11-3)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Di-n-butyl phthalate (84-74-2)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Di-n-octyl phthalate (117-84-0)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Diphenylamine (122-39-4)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3
4-chloroaniline (106-47-8)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<3.00 U
4-chlorophenyl phenyl ether (7005-72-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
4-nitroaniline (100-01-6)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<3.00 U
4-nitrophenol (100-02-7)	µg/L	<2.50 U	<2.50 U	<2.50 U	<2.50 U	<2.50 U	<2.50 U	<3.00 U
Acenaphthene (83-32-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Acenaphthylene (208-96-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Adamantane (281-23-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Aniline (62-53-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Anthracene (120-12-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Azobenzene (103-33-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Benzo(a)anthracene (56-55-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Benzo(a)pyrene (50-32-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Benzo(b)fluoranthene (205-99-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Benzo(g,h,i)perylene (191-24-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Benzo(k)fluoranthene (207-08-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Benzoic Acid (65-85-0)	µg/L	<5.00 U	<5.00 U	<5.00 U	<5.00 U	<5.00 U	<5.00 U	<3.00 U
Benzyl alcohol (100-51-6)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroethoxy)methane (111-91-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroethyl)ether (111-44-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-chloroisopropyl)ether (108-60-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Bis-(2-ethylhexyl) adipate (103-23-1)	µg/L	<1.00 U	1.12	<1.00 U	1.09	<1.00 U	3.78 J,B	<1.00 U
Bis-(2-ethylhexyl) phthalate (117-81-7)	µg/L	1.52	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<2.00 U
Butyl benzyl phthalate (85-68-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Carbazole (86-74-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<3.00 U
Chrysene (218-01-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Dibenz(a,h)anthracene (53-70-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Dibenzofuran (132-64-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Diethyl phthalate (84-66-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Dimethyl phthalate (131-11-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Di-n-butyl phthalate (84-74-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Di-n-octyl phthalate (117-84-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Diphenylamine (122-39-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
4-chloroaniline (106-47-8)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U
4-chlorophenyl phenyl ether (7005-72-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4-nitroaniline (100-01-6)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
4-nitrophenol (100-02-7)	µg/L	<2.50 U	<2.50 U	<2.50 U	<2.50 U
Acenaphthene (83-32-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Acenaphthylene (208-96-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Adamantane (281-23-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Aniline (62-53-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Anthracene (120-12-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Azobenzene (103-33-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(a)anthracene (56-55-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(a)pyrene (50-32-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(b)fluoranthene (205-99-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(g,h,i)perylene (191-24-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzo(k)fluoranthene (207-08-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Benzoic Acid (65-85-0)	µg/L	<5.00 U	<5.00 U	<5.00 U	<5.00 U
Benzyl alcohol (100-51-6)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Bis-(2-chloroethoxy)methane (111-91-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Bis-(2-chloroethyl)ether (111-44-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Bis-(2-chloroisopropyl)ether (108-60-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Bis-(2-ethylhexyl) adipate (103-23-1)	µg/L	<1.00 U	1.45	<1.00 U	<1.00 U
Bis-(2-ethylhexyl) phthalate (117-81-7)	µg/L	<1.00 U	<1.00 U	1.44 J+	2.31
Butyl benzyl phthalate (85-68-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Carbazole (86-74-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Chrysene (218-01-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Dibenz(a,h)anthracene (53-70-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Dibenzofuran (132-64-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Diethyl phthalate (84-66-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Dimethyl phthalate (131-11-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Di-n-butyl phthalate (84-74-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Di-n-octyl phthalate (117-84-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Diphenylamine (122-39-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3
Fluoranthene (206-44-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Fluorene (86-73-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Hexachlorobenzene (118-74-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Hexachlorobutadiene (87-68-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	NR	<1.00 U
Hexachlorocyclopentadiene (77-47-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Hexachloroethane (67-72-1)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	NR	<1.00 U
Indeno(1,2,3-cd)pyrene (193-39-5)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Isophorone (78-59-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Naphthalene (91-20-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Nitrobenzene (98-95-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
N-nitrosodimethylamine (62-75-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
N-nitrosodi-n-propylamine (621-64-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Pentachlorophenol (87-86-5)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	NR	<2.00 U
Phenanthrene (85-01-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Phenol (108-95-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	NR	<2.00 U
Pyrene (129-00-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Pyridine (110-86-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
Squalene (111-02-4)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	NR	<2.00 U
Terpiniol (98-55-5)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	NR	<1.00 U
tri-(2-butoxyethyl) phosphate (78-51-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	NR	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3
Fluoranthene (206-44-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Fluorene (86-73-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachlorobenzene (118-74-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachlorobutadiene (87-68-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Hexachlorocyclopentadiene (77-47-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachloroethane (67-72-1)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Indeno(1,2,3-cd)pyrene (193-39-5)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Isophorone (78-59-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Naphthalene (91-20-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Nitrobenzene (98-95-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
N-nitrosodimethylamine (62-75-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
N-nitrosodi-n-propylamine (621-64-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Pentachlorophenol (87-86-5)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	<1.00 U	<2.00 U
Phenanthrene (85-01-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Phenol (108-95-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
Pyrene (129-00-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Pyridine (110-86-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Squalene (111-02-4)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	<1.00 U	<2.00 U
Terpiniol (98-55-5)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
tri-(2-butoxyethyl) phosphate (78-51-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW05 7/18/11 Round 1	GW05 10/18/11 Round 2	GW05 10/17/12 Round 3	GW06 7/18/11 Round 1	GW06 10/18/11 Round 2	GW06 10/18/12 Round 3
Fluoranthene (206-44-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Fluorene (86-73-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachlorobenzene (118-74-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachlorobutadiene (87-68-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Hexachlorocyclopentadiene (77-47-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachloroethane (67-72-1)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Indeno(1,2,3-cd)pyrene (193-39-5)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Isophorone (78-59-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Naphthalene (91-20-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Nitrobenzene (98-95-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
N-nitrosodimethylamine (62-75-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
N-nitrosodi-n-propylamine (621-64-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Pentachlorophenol (87-86-5)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	<1.00 U	<2.00 U
Phenanthrene (85-01-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Phenol (108-95-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
Pyrene (129-00-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Pyridine (110-86-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Squalene (111-02-4)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	<1.00 U	<2.00 U
Terpiniol (98-55-5)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
tri-(2-butoxyethyl) phosphate (78-51-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3
Fluoranthene (206-44-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Fluorene (86-73-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachlorobenzene (118-74-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachlorobutadiene (87-68-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Hexachlorocyclopentadiene (77-47-4)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Hexachloroethane (67-72-1)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Indeno(1,2,3-cd)pyrene (193-39-5)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Isophorone (78-59-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Naphthalene (91-20-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Nitrobenzene (98-95-3)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
N-nitrosodimethylamine (62-75-9)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
N-nitrosodi-n-propylamine (621-64-7)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Pentachlorophenol (87-86-5)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	<1.00 U	<2.00 U
Phenanthrene (85-01-8)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Phenol (108-95-2)	µg/L	<0.50 U	<0.50 U	<2.00 U	<0.50 U	<0.50 U	<2.00 U
Pyrene (129-00-0)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Pyridine (110-86-1)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
Squalene (111-02-4)	µg/L	<1.00 U	<1.00 U	<2.00 U	<1.00 U	<1.00 U	<2.00 U
Terpiniol (98-55-5)	µg/L	<0.50 U	<0.50 U	<1.00 U	<0.50 U	<0.50 U	<1.00 U
tri-(2-butoxyethyl) phosphate (78-51-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW09 7/18/11 Round 1	GW09 10/18/11 Round 2	GW09 10/18/12 Round 3	GW10 7/19/11 Round 1	GW10 10/19/11 Round 2	GW11 7/19/11 Round 1	GW11 10/19/11 Round 2
Fluoranthene (206-44-0)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Fluorene (86-73-7)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Hexachlorobenzene (118-74-1)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Hexachlorobutadiene (87-68-3)	µg/L	<1.00 U	<1.00 U	<5.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Hexachlorocyclopentadiene (77-47-4)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Hexachloroethane (67-72-1)	µg/L	<1.00 U	<1.00 U	<5.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Indeno(1,2,3-cd)pyrene (193-39-5)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Isophorone (78-59-1)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Naphthalene (91-20-3)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Nitrobenzene (98-95-3)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
N-nitrosodimethylamine (62-75-9)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
N-nitrosodi-n-propylamine (621-64-7)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Pentachlorophenol (87-86-5)	µg/L	<1.00 U	<1.00 U	<10.0 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Phenanthrene (85-01-8)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Phenol (108-95-2)	µg/L	<0.50 U	<0.50 U	<10.0 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Pyrene (129-00-0)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Pyridine (110-86-1)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Squalene (111-02-4)	µg/L	<1.00 U	<1.00 U	<10.0 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Terpiniol (98-55-5)	µg/L	<0.50 U	<0.50 U	<5.00 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U
tri-(2-butoxyethyl) phosphate (78-51-3)	µg/L	<1.00 U	<1.00 U	<5.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample / Sample Date / Unit	GW12 7/19/11 Round 1	GW12 10/19/11 Round 2	GW13 7/19/11 Round 1	GW13 10/19/11 Round 2	GW14 7/20/11 Round 1	GW14 10/18/11 Round 2	GW14 10/18/12 Round 3
Fluoranthene (206-44-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Fluorene (86-73-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Hexachlorobenzene (118-74-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Hexachlorobutadiene (87-68-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Hexachlorocyclopentadiene (77-47-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Hexachloroethane (67-72-1)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Indeno(1,2,3-cd)pyrene (193-39-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Isophorone (78-59-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Naphthalene (91-20-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Nitrobenzene (98-95-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
N-nitrosodimethylamine (62-75-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
N-nitrosodi-n-propylamine (621-64-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Pentachlorophenol (87-86-5)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<2.00 U
Phenanthrene (85-01-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Phenol (108-95-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<2.00 U
Pyrene (129-00-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Pyridine (110-86-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
Squalene (111-02-4)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<2.00 U
Terpiniol (98-55-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<0.50 U	<1.00 U
tri-(2-butoxyethyl) phosphate (78-51-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U	<1.00 U

Table B-6 Sample Results - Semivolatile Organic Compounds (Killdeer, North Dakota)

Parameter (CAS Number)	Sample Sample Date Unit	GW15 7/19/11 Round 1	GW15 10/19/11 Round 2	GW16 7/19/11 Round 1	GW16 10/19/11 Round 2
Fluoranthene (206-44-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Fluorene (86-73-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Hexachlorobenzene (118-74-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Hexachlorobutadiene (87-68-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Hexachlorocyclopentadiene (77-47-4)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Hexachloroethane (67-72-1)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Indeno(1,2,3-cd)pyrene (193-39-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Isophorone (78-59-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Naphthalene (91-20-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Nitrobenzene (98-95-3)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
N-nitrosodimethylamine (62-75-9)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
N-nitrosodi-n-propylamine (621-64-7)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Pentachlorophenol (87-86-5)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Phenanthrene (85-01-8)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Phenol (108-95-2)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Pyrene (129-00-0)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Pyridine (110-86-1)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
Squalene (111-02-4)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U
Terpiniol (98-55-5)	µg/L	<0.50 U	<0.50 U	<0.50 U	<0.50 U
tri-(2-butoxyethyl) phosphate (78-51-3)	µg/L	<1.00 U	<1.00 U	<1.00 U	<1.00 U

Table B-7 Sample Results - Water Isotopes and Strontium Isotopes (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW01 7/18/11 Round 1	GW01 10/18/11 Round 2	GW01 10/18/12 Round 3	GW02 7/18/11 Round 1	GW02 10/18/11 Round 2	GW02 10/17/12 Round 3
Water Isotopes							
$\delta^{2}H$	‰	NA	-135.75	-119.01	NA	-135.86	-145.88
$\delta^{18}O$	‰	NA	-17.21	-15.10	NA	-16.87	-18.85
Strontium Isotopes							
Sr	µg/L	NA	300	464	NA	409	349
Rb	µg/L	NA	0.70	0.8	NA	0.25	<0.5
$^{87}Sr/^{86}Sr$	Atom Ratio	NA	0.708508	0.708464	NA	0.708668	0.708650
1/Sr	L/µg	NA	0.00333	0.002155172	NA	0.00244	0.00286533
Rb/Sr	Weight Ratio	NA	0.0023	0.001724138	NA	0.0006	

Table B-7 Sample Results - Water Isotopes and Strontium Isotopes (Killdeer, North Dakota)

Parameter	Unit	Sample Sample Date Round	GW03 7/18/11 Round 1	GW03 10/18/11 Round 2	GW03 10/17/12 Round 3	GW04 7/18/11 Round 1	GW04 10/18/11 Round 2	GW04 10/17/12 Round 3
Water Isotopes								
$\delta^{2}H$	‰		NA	-131.01	-134.21	NA	-135.97	-135.08
$\delta^{18}O$	‰		NA	-16.68	-17.23	NA	-17.09	-17.52
Strontium Isotopes								
Sr	µg/L		NA	333	340	NA	968	1130
Rb	µg/L		NA	1.10	0.8	NA	1.10	0.8
$^{87}Sr/^{86}Sr$	Atom Ratio		NA	0.708754	0.708717	NA	0.708511	0.708470
1/Sr	L/µg		NA	0.00300	0.002941176	NA	0.00103	0.000884956
Rb/Sr	Weight Ratio		NA	0.0033	0.002352941	NA	0.0011	0.000707965

Table B-7 Sample Results - Water Isotopes and Strontium Isotopes (Killdeer, North Dakota)

Parameter	Unit	Sample Sample Date	GW05 7/18/11	GW05 10/18/11	GW05 10/17/12	GW06 7/18/11	GW06 10/18/11	GW06 10/18/12
			Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
Water Isotopes								
$\delta^{2}H$	‰		NA	-136.80	-141.44	NA	-140.94	-145.85
$\delta^{18}O$	‰		NA	-17.69	-18.39	NA	-17.99	-18.97
Strontium Isotopes								
Sr	µg/L		NA	298	259	NA	347	381
Rb	µg/L		NA	0.70	0.6	NA	0.70	0.6
$^{87}Sr/^{86}Sr$	Atom Ratio		NA	0.708561	0.708511	NA	0.708543	0.708498
1/Sr	L/µg		NA	0.00336	0.003861004	NA	0.00288	0.002624672
Rb/Sr	Weight Ratio		NA	0.0023	0.002316602	NA	0.0020	0.001574803

Table B-7 Sample Results - Water Isotopes and Strontium Isotopes (Killdeer, North Dakota)

Parameter	Unit	Sample Sample Date Round	GW07 7/18/11 Round 1	GW07 10/18/11 Round 2	GW07 10/18/12 Round 3	GW08 7/18/11 Round 1	GW08 10/18/11 Round 2	GW08 10/18/12 Round 3
Water Isotopes								
$\delta^{2}H$	‰		NA	-141.35	-146.12	NA	-140.08	-139.31
$\delta^{18}O$	‰		NA	-19.20	-18.87	NA	-18.68	-17.91
Strontium Isotopes								
Sr	µg/L		NA	3790	1480	NA	3000	1080
Rb	µg/L		NA	1.00	<1.0	NA	1.00	<1.0
$^{87}Sr/^{86}Sr$	Atom Ratio		NA	0.708507	0.708487	NA	0.708500	0.708486
1/Sr	L/µg		NA	0.00026	0.000675676	NA	0.00033	0.000925926
Rb/Sr	Weight Ratio		NA	0.0003		NA	0.0003	

Table B-7 Sample Results - Water Isotopes and Strontium Isotopes (Killdeer, North Dakota)

Parameter	Unit	Sample Sample Date	GW09 7/18/11	GW09 10/18/11	GW09 10/18/12	GW10 7/19/11	GW10 10/19/11	GW11 7/19/11	GW11 10/19/11
			Round 1	Round 2	Round 3	Round 1	Round 2	Round 1	Round 2
Water Isotopes									
$\delta^{2}H$	‰		NA	-127.42	-129.21	NA	-120.78	NA	-127.67
$\delta^{18}O$	‰		NA	-16.26	-16.52	NA	-15.22	NA	-16.91
Strontium Isotopes									
Sr	µg/L		NA	129	112	NA	1010	NA	263
Rb	µg/L		NA	3.20	2.6	NA	0.80	NA	0.50
$^{87}Sr/^{86}Sr$	Atom Ratio		NA	0.707568	0.707534	NA	0.708663	NA	0.708631
1/Sr	L/µg		NA	0.00775	0.008928571	NA	0.00099	NA	0.00380
Rb/Sr	Weight Ratio		NA	0.0248	0.023214286	NA	0.0008	NA	0.0019

Table B-7 Sample Results - Water Isotopes and Strontium Isotopes (Killdeer, North Dakota)

Parameter	Unit	Sample Sample Date	GW12 7/19/11	GW12 10/19/11	GW13 7/19/11	GW13 10/19/11	GW14 7/19/11	GW14 10/18/11	GW14 10/18/12
			Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 3
Water Isotopes									
$\delta^{2}H$	‰		NA	-127.20	NA	-130.95	NA	-130.67	-131.40
$\delta^{18}O$	‰		NA	-15.93	NA	-17.80	NA	-16.58	-16.92
Strontium Isotopes									
Sr	µg/L		NA	287	NA	414	NA	581	575
Rb	µg/L		NA	0.25	NA	0.60	NA	0.90	0.8
$^{87}Sr/^{86}Sr$	Atom Ratio		NA	0.708610	NA	0.708539	NA	0.708547	0.708537
1/Sr	L/µg		NA	0.00348	NA	0.00242	NA	0.00172	0.00173913
Rb/Sr	Weight Ratio		NA	0.0009	NA	0.0014	NA	0.0015	0.001391304

Table B-7 Sample Results - Water Isotopes and Strontium Isotopes (Killdeer, North Dakota)

Parameter	Unit	Sample Sample Date Round 1	GW15 10/19/11 Round 2	GW16 10/19/11 Round 2
Water Isotopes				
$\delta^{2}H$	‰	NA	-115.83	-114.64
$\delta^{18}O$	‰	NA	-14.47	-14.35
Strontium Isotopes				
Sr	µg/L	NA	626	NR
Rb	µg/L	NA	1.50	NR
$^{87}Sr/^{86}Sr$	Atom Ratio	NA	0.708429	NR
1/Sr	L/µg	NA	0.00160	NR
Rb/Sr	Weight Ratio	NA	0.0024	NR

Table B-8 Sample Results - Surfactants and Ethoxylates (Killdeer, North Dakota)

Parameter	Sample	GW01	GW01	GW01	GW02	GW02	GW02
	Sample Date	7/18/2011	10/18/2011	10/18/2012	7/18/2011	10/18/2011	10/17/2012
	Unit	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
Octylphenol ethoxylate	µg/L	NA	NR	R	NA	NR	R
Nonylphenol ethoxylate	µg/L	NA	NR	R	NA	NR	R
Ethoxylated alcohol C12	µg/L	NA	NR	R	NA	NR	R
Ethoxylated alcohol C13	µg/L	NA	NR	R	NA	NR	R
Ethoxylated alcohol C14	µg/L	NA	NR	R	NA	NR	R
nonylphenol	µg/L	NA	NR	R	NA	NR	R
Octylphenol	µg/L	NA	NR	R	NA	NR	R
Acrylamide	µg/L	NA	NR	<0.01 U	NA	NR	<0.01 U

Table B-8 Sample Results - Surfactants and Ethoxylates (Killdeer, North Dakota)

Parameter	Sample	GW03	GW03	GW03	GW04	GW04	GW04
	Sample Date	7/18/2011	10/18/2011	10/17/2012	7/18/2011	10/18/2011	10/17/2012
	Unit	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
Octylphenol ethoxylate	µg/L	NA	NR	R	NA	<0.8 U	R
Nonylphenol ethoxylate	µg/L	NA	NR	R	NA	1.3 B	R
Ethoxylated alcohol C12	µg/L	NA	NR	R	NA	<0.3 U	R
Ethoxylated alcohol C13	µg/L	NA	NR	R	NA	0.8 B	R
Ethoxylated alcohol C14	µg/L	NA	NR	R	NA	<0.3 U	R
nonylphenol	µg/L	NA	NR	R	NA	<1 U	R
Octylphenol	µg/L	NA	NR	R	NA	<0.05 U	R
Acrylamide	µg/L	NA	NR	<0.01 U	NA	<0.01 U	<0.01 U

Table B-8 Sample Results - Surfactants and Ethoxylates (Killdeer, North Dakota)

Parameter	Sample	GW05	GW05	GW05	GW06	GW06	GW06
	Sample Date	7/18/2011	10/18/2011	10/17/2012	7/18/2011	10/18/2011	10/18/2012
	Unit	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
Octylphenol ethoxylate	µg/L	NA	NR	R	NA	NR	R
Nonylphenol ethoxylate	µg/L	NA	NR	R	NA	NR	R
Ethoxylated alcohol C12	µg/L	NA	NR	R	NA	NR	R
Ethoxylated alcohol C13	µg/L	NA	NR	R	NA	NR	R
Ethoxylated alcohol C14	µg/L	NA	NR	R	NA	NR	R
nonylphenol	µg/L	NA	NR	R	NA	NR	R
Octylphenol	µg/L	NA	NR	R	NA	NR	R
Acrylamide	µg/L	NA	NR	<0.01 U	NA	NR	<0.01 U

Table B-8 Sample Results - Surfactants and Ethoxylates (Killdeer, North Dakota)

Parameter	Sample	GW07	GW07	GW07	GW08	GW08	GW08
	Sample Date	7/18/2011	10/18/2011	10/18/2012	7/18/2011	10/18/2011	10/18/2012
	Unit	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
Octylphenol ethoxylate	µg/L	NA	<0.8 U	R	NA	<0.8 U	R
Nonylphenol ethoxylate	µg/L	NA	1.6 B	R	NA	1.2 B	R
Ethoxylated alcohol C12	µg/L	NA	<0.3 U	R	NA	<0.3 U	R
Ethoxylated alcohol C13	µg/L	NA	0.8 B	R	NA	0.4 B	R
Ethoxylated alcohol C14	µg/L	NA	0.5	R	NA	<0.3 U	R
nonylphenol	µg/L	NA	<1 U	R	NA	<1 U	R
Octylphenol	µg/L	NA	<0.05 U	R	NA	<0.05 U	R
Acrylamide	µg/L	NA	<0.01 U	<0.01 U	NA	<0.01 U	<0.01 U

Table B-8 Sample Results - Surfactants and Ethoxylates (Killdeer, North Dakota)

Parameter	Sample	GW09	GW09	GW09	GW10	GW10	GW11	GW11
	Sample Date	7/18/2011	10/18/2011	10/18/2012	7/19/2011	10/19/2011	7/19/2011	10/19/2011
	Unit	Round 1	Round 2	Round 3	Round 1	Round 2	Round 1	Round 2
Octylphenol ethoxylate	µg/L	NA	<0.8 U	R	NA	NR	NA	NR
Nonylphenol ethoxylate	µg/L	NA	1.9 B	R	NA	NR	NA	NR
Ethoxylated alcohol C12	µg/L	NA	<0.3 U	R	NA	NR	NA	NR
Ethoxylated alcohol C13	µg/L	NA	<0.3 U	R	NA	NR	NA	NR
Ethoxylated alcohol C14	µg/L	NA	<0.3 U	R	NA	NR	NA	NR
nonylphenol	µg/L	NA	<1 U	R	NA	NR	NA	NR
Octylphenol	µg/L	NA	<0.05 U	R	NA	NR	NA	NR
Acrylamide	µg/L	NA	<0.01 U	<0.01 U	NA	NR	NA	NR

Table B-8 Sample Results - Surfactants and Ethoxylates (Killdeer, North Dakota)

Parameter	Sample / Sample Date / Unit	GW12 7/19/2011 Round 1	GW12 10/19/2011 Round 2	GW13 7/19/2011 Round 1	GW13 10/19/2011 Round 2	GW14 7/19/2011 Round 1	GW14 10/18/2011 Round 2	GW14 10/18/2012 Round 3
Octylphenol ethoxylate	µg/L	NA	NR	NA	NR	NA	NR	R
Nonylphenol ethoxylate	µg/L	NA	NR	NA	NR	NA	NR	R
Ethoxylated alcohol C12	µg/L	NA	NR	NA	NR	NA	NR	R
Ethoxylated alcohol C13	µg/L	NA	NR	NA	NR	NA	NR	R
Ethoxylated alcohol C14	µg/L	NA	NR	NA	NR	NA	NR	R
nonylphenol	µg/L	NA	NR	NA	NR	NA	NR	R
Octylphenol	µg/L	NA	NR	NA	NR	NA	NR	R
Acrylamide	µg/L	NA	NR	NA	NR	NA	NR	0.02

Table B-8 Sample Results - Surfactants and Ethoxylates (Killdeer, North Dakota)

Parameter	Sample	GW15	GW15	GW16
	Sample Date	7/19/2011	10/19/2011	10/19/2011
	Unit	Round 1	Round 2	Round 2
Octylphenol ethoxylate	µg/L	NA	NR	NR
Nonylphenol ethoxylate	µg/L	NA	NR	NR
Ethoxylated alcohol C12	µg/L	NA	NR	NR
Ethoxylated alcohol C13	µg/L	NA	NR	NR
Ethoxylated alcohol C14	µg/L	NA	NR	NR
nonylphenol	µg/L	NA	NR	NR
Octylphenol	µg/L	NA	NR	NR
Acrylamide	µg/L	NA	NR	NR

Appendix C
Background Data
Retrospective Case Study in Killdeer, North Dakota

U.S. Environmental Protection Agency
Office of Research and Development
Washington, DC

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C.1. Land Use

This section presents descriptions of land uses in Dunn County as a whole, followed by descriptions of land uses in and around the sampling points of this study. Building on information provided in the "Study Area Background" section of this report, information on the use of agricultural land was obtained from the Cropland Data Layer produced by the National Agricultural Statistics Service (NASS)(U.S. Department of Agriculture 2012). The NASS data on agricultural land uses are based on satellite imagery and an extensive agricultural ground checking of the imagery. Figure C1 shows land uses in Dunn County in 2012. Table C1 shows the percentages of county land devoted to the largest agricultural uses. Grassland herbaceous and spring wheat growing were the largest agricultural land uses, accounting for approximately 59% and 12%, respectively, of land in the county.

Land use change data from the U.S. Geological Survey's (USGS) National Land Cover Database for 1992 and 2006 are not directly comparable (U.S. Geological Survey 2012). However, it was possible to compare data from 1992 to data from 2001 and to then compare data from 2001 to that from 2006 to identify land use changes in the 1992 to 2001 and 2001 to 2006 sub-periods (Multi-Resolution Land Characteristics Consortium 2013). Figure C2 shows land use changes in Dunn County between 1992 and 2001 and between 2001 and 2006, respectively. Table C2 presents data on the changes in land use during the same two sub-periods. It can be seen from the table that only a very small proportion of the land in the county changed use during each sub-period.

The population of Dunn County (an indicator of the intensity of land use) has declined throughout the period (1950-2010), although the rate of decline was much less between 2000 and 2010 (see Figure C3) (U.S. Census Bureau 2013a, 2013b, 2013c). In 2011, the population density in Dunn County was approximately 2 persons per square mile, as compared with approximately 10 persons per square mile for the entire state (U.S. Census 2012a). In 2010, no land in Dunn County was taken up by urban areas (another indicator of the intensity of land use), whereas approximately 0.3 percent of the land in the entire state was taken up by urban areas (U.S. Census Bureau 2012b).

Employment is another broad indicator of land use in the county. Table C3 identifies the largest industries, by employment, in the county. Mining, quarrying, and oil and gas extraction (one of the production industries) accounted for approximately 19% of employment in Dunn County.

C.2. Search Area

C.2.1. Land Use

Figure C4, which was created using data from the National Land Cover Database, presents land use maps for the search area in 1992 and 2006. The search area encompasses a 3-mile search radius around the sampling points in the county and was used to focus the analysis of land use patterns and the environmental records searches. Table C4 presents data on land use in the search area in 1992 and 2006. Although the data for land use in 1992 and 2006 are not directly comparable because of changes in data collection methodology, the data from the National Land Cover Database indicate that grassland/herbaceous and row/cultivated crop land (i.e., land suitable for grazing or used for growing crops) accounted for the majority of land use in the search area in both years.

C.2.2. Crop Land

Figure C5 shows land uses, including agricultural uses (crop lands), in the search area in 2012. Table C5 shows the percentages of land devoted to the largest agricultural uses in the search area—grassland, herbaceous land, and spring wheat and other hay/non-alfalfa cropland.

C.2.3. Land Use Changes

Figure C6 and Table C6 show land use changes in the search area between 1992 and 2001 and between 2001 and 2006. The table shows that, in general, only a tiny proportion of the land in the search area changed use during either sub-period.

C.3. Environmental Records Search

An environmental record search of the area surrounding the Franchuk well was performed by Environmental Data Resources, Inc. (EDR). EDR provides a service for searching publically available databases and also provides data from their own proprietary databases. The database search included reviews of several federal, state, and tribal environmental databases and proprietary EDR environmental databases for the study area. The search identified the documented use, storage, or release of hazardous materials or petroleum products (see Attachment 1). Record dates varied based on the particular database from which the record was obtained. EDR began collecting a majority of the records in 1991 from the standard databases (State Hazardous Sites Cleanup Act Site Lists [SHWS]; Landfills [LF]; Leaking Underground Storage Tanks [LUST]; Underground Storage Tanks [UST]; Resource Conservation and Recovery Act [RCRA]; National Priority List [NPL]; Comprehensive Environmental Response, Compensation and Liability Information System [CERCLIS]; etc.). However, some databases (e.g., spill databases) may have records dating back to the 1980s.

The record search was based on a 3-mile-radius search area centered on the location of the Franchuk well, which experienced a blowout in September 2010. Because of the large size of the study area, the search area was chosen based on professional judgment.

The identified records included historically contaminated properties; businesses that use, generate, transport, or dispose of hazardous materials or petroleum products in their operations; active contaminated sites that are currently under assessment and/or remediation; sites with National Pollutant Discharge Elimination System (NPDES) and State Pollutant Discharge Elimination System (SPDES) permits; and active and abandoned mines and landfills. All of the properties listed on the Environmental Records Search Report were reviewed and screened based on the EDR record search findings to determine whether they were potential candidate causes. The criteria used for the screening included relevant environmental information (including, but not limited to, notices of violations, current and historical use of the site, materials and wastes at the site, releases and/or spills) and distance from the sampling points.

Sites that EDR could not automatically map because of poor or inadequate address information in the searched databases were not included on the EDR Radius Map. However, EDR determined that, based on the limited address information available, it was possible that these sites could be located within the stated search radius (e.g., zip code listed within searched radius) and were, therefore, listed on the

Environmental Records Search Report as "orphan" sites. (Orphan sites are those sites with poor locational information in the databases and so may or may not exist inside the search radius.) All of the orphan sites were screened to the extent possible based on limited information on those sites available through additional searches of the databases listed above and information obtained through internet searches (e.g., EPA website and state websites). Additionally, through a more extensive review of the available records (including EnviroFacts, business listings, etc.), a location was determined for most orphan sites and their approximate distance from the sampling points was measured on a map.

C.3.1. Oil and Gas Well Inventory

Well inventories were prepared for the same search area described above for the EDR reports. All oil and gas wells identified within the search area were selected for review. Specific focus was placed on wells within 1 mile of the sampling points. Information was obtained from desktop surveys performed using searchable state agency databases. The oldest well spud date identified in this study was March 1980.

C.3.2. State Record Summary

The North Dakota Department of Mineral Resources, Division of Oil and Gas, was contacted to find up-to-date well records for wells within 1 mile of EPA study sampling locations. The information requested included inspection and pollution-prevention visits, violations (if noted), and any enforcement that may have resulted. Not all of the state's records were included in the state's electronic database. Access to additional paper records can be obtained only by appointment with the particular state regional office.

C.4. Evaluation of Data for the Killdeer Site

C.4.1. Environmental Records Search Report Summary

A 3-mile-radius search area was established for the EDR database searches to capture the Dunn County sampling points (see Figure C7). EDR identified 38 records of mapped sites within this search area. An additional 102 orphan sites were identified during the searches. An attempt to locate these sites with information available in the reports and through internet searches was made to help determine the potential of these sites to be candidate causes. The evaluation of the sites is summarized in Table C7. (Some of these records are for the same location, and they are listed together on the table).

The 140 records identified in the EDR reports include facilities with underground storage tanks (USTs) and aboveground storage tanks (ASTs), RCRA-regulated facilities, numerous drilling sites, etc. Thirty-seven of the incidents/records/sites have been retained as potential candidate causes (at 31 locations) and are identified in the databases described below:

- **UST/LUST/AST Storage Tanks -** Included sites listed in one of three databases: The Aboveground Storage Tank (AST) database, which contains a list of registered ASTs from the North Dakota Department of Health and Consolidated Laboratories' AST Data; the Underground Storage Tank (UST) database, which contains registered USTs regulated under the Resource Conservation and Recovery Act (RCRA) (note: the data came from the Department of Health's UST Data); and the Leaking Underground Storage Tank (LUST)

Incident Reports, which contain an inventory of reported leaking USTs (note: the data are from the Department of Health's LUST List). A total of eight ASTs, and 11 USTs (for a total of 18 separate locations) were retained (sites with documented cleanup records were not retained). Of these 18 sites, 16 are located within 0.5 miles of the sampling points, one is less than 2 miles away, and one was retained because location information was insufficient. Three of these sites are also listed in the Facility Index System (FINDS) database.

- **US Hist STAT Auto -** This database is a select list of business directories of potential gas station/filling station/service station sites that were available to EDR that may not show up in current government record searches. A total of three US HIST Auto STAT sites were retained as potential gas station/filling station/service station sites and were included as potential contributors to groundwater quality impacts because of their proximity to the nearest sampling point. One of these sites was also listed in the FINDS database.
- **Federal RCRA Generators List (RCRA-CESQG) –** This database is EPA's information system on sites that generate, transport, store, treat, and/or dispose of hazardous waste as defined by RCRA. Conditionally exempt small-quantity generators (CESQGs) generate less than 100 kilograms (kg) of hazardous waste per month. One RCRA-CESQG site was retained because of its proximity to the sampling points (less than 0.1 miles north of NDGW16) and recorded violations. Hazardous waste generated at this location included barium, chromium, lead, methyl ethyl ketone, certain spent non-halogenated solvents (F003 waste), certain spent non-halogenated solvents (F005 waste), and ignitable waste. This site was also listed in the FINDS database.
- **RCRA Non-Gen/No Longer Regulated (NLR) Site –** This database includes information on sites that generate, transport, store, treat, and/or dispose of hazardous waste as defined by RCRA. Non-generators do not presently generate hazardous waste and were not retained as potential candidate causes, with one exception. This site was retained because of records indicating compliance violations. The hazardous waste was not identified on the available records.
- **Facility Index System (FINDS) -** This database contains both facility information (North Dakota Facility Profile [ND-FP]) and other sources of information from the EPA/National Technical Information Service (NTIS). In addition to the five FINDS records for sites that also have records in the databases discussed above (UST, US Hist STAT Auto, and RCRA-CESQG), two FINDS records were retained because the sites were near the sampling points and the information on facility activities and compliance was insufficient.
- **Tier 2 -** This database records and stores information on Tier 2 locations. Tier 2 records may include facilities or sites with recorded chemical storage. Six Tier 2 locations showed gasoline, diesel, oil, motor oil, ethanol, or propane storage and were retained due to their proximity to the sampling points (within 0.5 miles).

C.4.2. Oil and Gas Well Inventory Summary

The EPA Study sampling locations were compared with the inventory of wells identified in database files from the North Dakota Department of Mineral Resources, Division of Oil and Gas (see Table C8).

Thirty-five oil and gas wells are located within 3 miles of the Franchuk well. Of these wells, seven are within 1 mile of the EPA Study sampling locations (see Table C9). The presence of these oil and gas wells increases the probability of one or more of these features being a potential candidate cause for groundwater contamination.

C.4.3. State Record Summary

Notice of Violations. Notices of violations (NOVs) were researched for all oil and gas wells within a 1-mile radius of the EPA study site. Although no NOVs were identified by the North Dakota Department of Mineral Resources (NDDMR), Division of Oil and Gas, NDDMR did provide incident notes regarding the Franchuk 44-20SWH well. In addition, after subsequent inquiries, NDDMR also provided the following additional information and stated that there were no NOVs on record for the Franchuk well because the fine had been paid:

- The Industrial Commission, on March 30, 2011, filed a complaint against Encore Operating, L.P. (Encore) and Denbury Resources, Inc. (Denbury) for violating North Dakota Administrative Code(NDAC) Section 43-02-03-28 by failing to properly control subsurface pressure during the completion operation, NDAC Section 43-02-03-49 by allowing oil to flow over and pool on the surface of the land, NDAC Section 43-02-03-53 by allowing brine to flow over and pool on the surface of the land, and NDAC Section 43-02-03-11 by failing to properly notify the Commission when Denbury acquired Encore and the Franchuk 44-20SWH well in Dunn County, North Dakota.
- In the complaint, the Commission requested Encore and Denbury to pay a $237,500 fine and $5,236 in costs and expenses incurred by the Commission.
- In lieu of a formal hearing on the complaint, Denbury paid the $237,500 fine and $5,236 in costs and expenses incurred by the Commission.

Therefore, this case was dismissed on December 7, 2011.

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Appendix C Tables

Table C-1 Major Agricultural Land Uses in Dunn County in 2012

Use	% of County Land
Grassland herbaceous	59.2
Spring wheat	12.0
Other hay/non-alfalfa	5.2
Winter wheat	2.0
Corn	1.4
Sunflower	1.3
Alfalfa	0.8

Source: U.S. Department of Agriculture, 2012.

Table C-2 Changes in Land Use, 1992 to 2001 and 2001 to 2006, in Dunn County

Change in Land Use	% of County Land Area	
	1992 to 2001	2001 to 2006
No change	98.4	99.1
Change in land use	1.6	0.9
- to agriculture	0.9	0.0
- to grassland/shrub	0.4	0.0
- to wetlands	0.1	0.0
- to open water	0.1	0.0
- to emergent herbaceous wetlands	0.0	0.4
- to herbaceous	0.0	0.2
- to barren land	0.0	0.1
- to cultivated crops	0.0	0.2

Source US Geological Survey, 2012.

Table C-3 Largest Industries, by Employment, in Dunn County in 2011

Industry Title	Number of Paid Employees	% of Total Paid Employees
Mining, quarrying, and oil and gas extraction	238	18.8
Retail trade	164	12.9
Construction	117	9.2
Transportation and warehousing	73	5.8
Accommodation and food services	63	5.0
Real estate and rental and leasing	18	1.4

Source: U.S. Census Bureau, 2011.

Table C-4 Land Use in the Search Area in 1992 and 2006

Land Use	1992		2006	
	Square Miles	% of Total	Square Miles	% of Total
Grassland/herbaceous	14.5	51.2	20.6	72.8
Row/cultivated crops	5.7	20.1	5.5	19.6
Fallow	4.2	14.7	0.0	0.0
Shrub/scrub	2.8	10.0	0.4	1.3
Developed	0.8	2.8	1.4	4.8
Pasture/hay	0.2	0.9	0.3	0.9
Open water	0.1	0.3	0.1	0.2
Deciduous forest	0.0	0.0	0.0	0.2
Woody wetlands	0.0	0.0	0.0	0.1
Barren	0.0	0.0	0.0	0.1
Total	**28.3**	**100.0**	**28.3**	**100.0**

Source: US Geological Survey, 2012.
Note: Totals may not sum exactly due to rounding.

Table C-5 Major Agricultural Land Uses in the Search area in 2012

Use	% of County Land
Grassland herbaceous	68.0
Spring wheat	9.3
Other hay/non-alfalfa	9.0
Corn	2.1
Alfalfa	1.5
Winter wheat	1.4
Fallow/idle cropland	1.2
Durum wheat	0.8
Sunflower	0.6
Oats	0.5
Barley	0.2

Source: US Department of Agriculture, 2012.

Table C-6 Changes in Land Use, 1992 to 2001 and 2001 to 2006, in the Search Area

Change in Land Use	% of County Land Area	
	1992 to 2001	2001 to 2006
No change	98.3	99.2
Change in land use:	1.7	0.8
- to grassland/shrub	1.2	0.0
- to agriculture	0.5	0.0
- to cultivated crops	0.0	0.8

Source: US Geological Survey, 2012.

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
AST	Benz Oil Company, Inc.	10688 Highway 200	approx. 0.5 miles W of NDGW04	Yes	Unknown contents of active AST, no leaks on record. Site included as a potential candidate cause due to proximity to site and potential for contamination.	45 Federal USGS Wells 1 Federal FRDS Public Water Supply Well 45 State Wells	No oil/gas wells were listed in the EDR report.
TIER 2	BOC - Sunrise [Sunrise Oil Company]	10688 Highway 200	approx. 0.5 mi. W of NDGW04	Yes	Chemical inventory submitted per Tier 2, diesel fuel, gasoline, propane, and motor oil storage. No leaks on record. Site included due to proximity to site and potential for contamination.		
AST	BENZ OIL COMPANY, INC. DBA GRAB'N GO, INC	10690 N Dakota 200, Killdeer, ND 58640 Hwy 22 & 200	0.5 miles S of NDGW15	Yes	Unknown contents of active AST, no leaks on record. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
ORPHAN; LUST, UST				No	Inactive UST that contained petroleum. Identified LUST, status: cleaned up completed on 08/21/1993.		
TIER 2	GNG - Bulk Plant	10690 Highway 200	0.5 miles S of NDGW15	Yes	Chemical inventory submitted per Tier 2, diesel fuel, gasoline, and ethanol, no violations. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
UST	Prairie Implement Inc.	Junction 22 & 200 Latitude: 47.3604690, Longitude: -102.75758	Less than 0.5 miles S of NDGW15	Yes	Unknown contents of UST, no leaks on record. Inactive. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
RCRA NonGen / NLR, FINDS	Project Safe Send	NE of Junction of Highways 22 & 200	Less than 0.5 miles S of NDGW15	No	Presently non-generator of hazardous waste, no violations found.		
FINDS	MITCHELL S OIL FIELD SERVICES - WATFORD CITY	1202 North Dakota SR 22	Less than 0.1 miles S of NDGW15	No	This site is listed in the Federal FINDS database. The type of facility listed could not be determined. Based on an online map search it appears that a commercial business is listed at this address.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
FINDS, UST	Schmidt Electric Shop	1st Avenue East and Dakota Street	0.5 miles NE of NDGW16	Yes	This site is listed in the Federal FINDS database. The Environmental Interest/Information System is listed as North Dakota Facility Profile (ND-FP) which contains facility based, environmental information for the State of North Dakota. Inactive UST on-site. Unknown contents of UST, no leaks on record. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
FINDS	Dunn Spraying LLC	10849 Highway 200 Latitude: 47.35772 Longitude: -102.85431	2.26 miles W of NDGW10	No	This site is listed in the Federal FINDS database. The Environmental Interest/Information System is listed as ICIS. The type of facility listed could not be determined. Based on an online map search it appears that a commercial business is listed at this address. No compliance records found. More than 2 miles from sample points.		
FINDS, RMP,TIER 2	CHS, Inc. - Killdeer [Southwest Grain COOP]	303 Railroad Street Latitude: 47.36783 Longitude: -102.75353	0.16 miles N of NDGW16	No	This site is listed in the Federal FINDS, RMP, and ND TIER 2 databases. The RMP listing notes Anhydrous Ammonia Storage. The TIER 2 lists propane, anhydrous ammonia, RT3 (herbicide), and Durango DMA (herbicide). No violations.		
UST	Farmers Union Oil C-Store	335 Central Ave Latitude: 47.36504 Longitude: -102.75207	0.33 miles N of NDGW16	Yes	UST: unknown materials. AST appear to contain diesel fuel, no leaks on record, greater than 2 miles from nearest sampling point. Site included as a potential candidate cause due to proximity to site and potential for contamination.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
FINDS	Farmers Union Oil C-Store	335 Central Ave Latitude: 47.371855 Longitude: -102.754052	< 0.5 miles N of NDGW16	Yes	This site is listed in the Federal FINDS database. The Environmental Interest/Information System is listed as ND-FP which contains facility based, environmental information for the State of North Dakota. No other information available.		
FINDS	Killdeer Elementary School	101 High St NW	< 0.5 miles N of NDGW16	No	This site is listed in the Federal FINDS database. The Environmental Interest/Information System is listed as NCES (National Center for Education Statistics), the primary federal entity for collecting and analyzing data related to education in the United States and other nations and the institute of education sciences. No contamination concerns. No violations cited.		
FINDS	Killdeer High School	101 High St NW	< 0.5 miles N of NDGW16	No	This site is listed in the Federal FINDS database. The Environmental Interest/Information System is listed as NCES and ICIS. No compliance and violation information.		
LUST, UST, EDR US HIST AUTO STAT	AP Auto	19 S Central Avenue	< 0.5 miles N of NDGW16	No	Unknown contents of LUST/UST, Site Cleanup Completed 10/12/1989.		
FINDS, EDR US HIST AUTO STAT	Schmidtys Auto Service	401 Central Ave N	0.5 miles N of NDGW16	Yes	This site is listed in the Federal FINDS database. The Environmental Interest/Information System is ND-FP as a gasoline service station with USTs. Site included as a potential candidate cause due to proximity to site and potential for contamination.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
UST, FINDS	Killdeer Public School Grounds	201 West High Street	< 0.5 miles N of NDGW16	Yes	Unknown contents of UST, no leaks on record. Listed as Inactive. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
AST	Farmers Union Oil Company of Killdeer	335 Central Ave S	< 0.5 miles N of NDGW16	Yes	Unknown contents of AST, listed as active, no record of releases found. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
TIER 2	C-STORE	335 Central Ave S	< 0.5 miles N of NDGW16	Yes	TIER 2 listing for diesel fuel and gasoline. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
AST	Farmers Union Oil Company of Killdeer	370 Central Ave S	< 0.5 miles N of NDGW16	Yes	Unknown contents of AST, listed as active, no record of releases found. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
TIER 2	125 Railroad St Location	125 Railroad Street SE	0.3 miles NE of NDGW16	Yes	TIER 2 listing for diesel fuel, motor oil, and gasoline. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
UST	Benz Oil Company	Railroad Street	approx. 0.5 miles NE of NDGW16	Yes	Unknown contents of UST, listed as inactive, no releases found. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
AST	Sax Motor Company of Killdeer	500 Central SE	0.3 miles NE of NDGW16	Yes	Unknown contents of AST, listed as active, no record of releases found. Site included as a potential candidate cause due to proximity to site and potential for contamination.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
FINDS & ORPHAN; LUST, UST	Dean Bender Chevrolet Inc.	500 SE Central, Killdeer, ND	0.3 miles NE of NDGW16	No	This site is listed in the Federal FINDS database. The Environmental Interest/Information System is ND-FD listed as a motor vehicle dealer (new and used) with inactive USTs of unknown contents. Cleanup completed on 1/1/2000.		
AST, UST, FINDS	Farmers Union Oil Company of Killdeer	125 Railroad Street SE	0.3 miles NE of NDGW16	Yes	Unknown contents of AST and UST, listed as active, no record of releases found. ND-FD lists it as gasoline service station. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
AST	Consolidated Telcom	57 Main St East	0.3 miles NE of NDGW16	Yes	Unknown contents of AST, listed as active, no record of releases found. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
EDR US HIST AUTO STAT	Tony's Auto Repair	422 2nd Ave SE	0.4 miles NE of NDGW16	Yes	Historical auto repair facility. No other information. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
RCRA, FINDS	Killdeer Mountain Manufacturing Inc.	401 Main Street	0.2 miles NW of NDGW16	No	Presently non-generator of hazardous, no violations found, waste codes D001, F001, F003. EnviroFacts shows no violations.		
EDR US HIST AUTO STAT	Badlands Auto	345 Railroad St SE	0.4 miles NE of NDGW16	Yes	Historical auto repair facility. No other information. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
UST	Dunn County Airport Authority	Latitude: 47.3907880 Longitude: -102.76769	1.8 miles NE	Yes	Unknown contents of UST, no leaks on record.		
ORPHAN; AIRS	Killdeer Station	Township 145 Range 95 Section 4	NI	No	Permitted facility for emissions.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; HIST FTTS, ORPHAN; FTTS, & ORPHAN; FINDS	Killdeer WTP	PO BOX 515 KILLDEER, ND 58640	0.4 miles N of NDGW16	No	Listed in FITTS. Envirofacts identifies site in the NCDB (National Compliance Data Base) which supports implementation of the FIFRA and TSCA. The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements. No record of violations found in Envirofacts. Not a suspected source of contamination.		
ORPHAN; FINDS	Killdeer Landfill	KILLDEER, ND 58640 Latitude: 47.402062 Longitude: -102.622182	6.7 miles ENE of NDGW16	No	FINDS identifies the facility as a landfill listed in the Emission Inventory System (EIS). No violations noted. Site more than 6 miles away from sampling locations, based on coordinates in Envirofacts.		
ORPHAN; RCRA-CESQG	Petro-Hunt Llc - Little Knife Gas	258 119th Avenue SW Killdeer, ND 58640	>10 miles W	No	Small quantity generator, waste codes D001, D002, D008, D009 identified, no violations noted.		
ORPHAN; TIER 2	MBI - Hausauer SWD 22-2	SE 1/4, SEC 2,2 T145N, R93W KILLDEER, ND 58640 Latitude: 47.362215 Longitude: -102.510838	>10 miles E	No	Salt water disposal well. Greater than 10 miles from nearest sampling point.		
ORPHAN; TIER 2	Killdeer Compressor Station	NE 1/4 SECTION 28, T146N, R95W KILLDEER, ND 58640 Latitude: 47.443 Longitude: -102.787	approx. 5.5 miles N	No	Compressor station for natural gas pipeline, storage tanks on site, no violations noted, greater than 5 miles from nearest sampling point.		
ORPHAN; TIER 2	Lone Butte Compressor Station	S 1/2 SECTION 13, T147N, R97W KILLDEER, ND 58640 Latitude: 47.547 Longitude: -103.089	18.6 miles NW	No	Compressor station for natural gas pipeline, storage tanks on site, no violations noted, greater than 15 miles from nearest sampling point.		
ORPHAN; FINDS	ND DOT Maintenance Facility - Killdeer	40 HWY 22 KILLDEER, ND 58640 Latitude: 47.364583 Longitude: -102.819444	0.7 NW of NDGW05	Yes	North Dakota State Department of Transportation Maintenance Facility, no violations noted.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; TIER 2	ND DOT Killdeer (North Dakota DOT)	400 HWY 22 KILLDEER, ND 58640 Latitude: 47.3587 Longitude: -102.7570	0.3 miles S of NDGW15	Yes	North Dakota State Department of Transportation, storage of tar oil, no violations noted.		
ORPHAN; TIER 2	PLAINS / BRIDGER KILLDEER STATION	41 Highway 22 North KILLDEER, ND 58640 Latitude: 47.40892 Longitude: -102.79405	3.5 miles N of NDGW15	No	Compressor station for natural gas pipeline, storage tanks on site, no violations noted, greater than 3 miles from nearest sampling point.		
ORPHAN; TIER 2	Plains Marketing Killdeer Truck Station	S4 T145N R95W, 41 HIGHWAY 22 Latitude: 47.40892 Longitude: -102.79406	3.5 miles N of NDGW15	No	The TIER 2 information for this entry identifies aluminum and crude oil storage.		
ORPHAN; UST	Sunrise Oil Company	HWY 22 & 200	approx. 0.5 mi. S of NDGW15	Yes	Location is a truck stop. Active UST. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
ORPHAN; LUST, UST	S Curves Auto And Repair	HIGHWAY 22 SOUTH KILLDEER, ND 58640 Latitude: 47.9093689 Longitude: -97.631721	NI Coordinates are incorrect (Larimore ND > 200 mi)	No	Inactive UST that contained petroleum. Identified leaking UST, status; cleaned up as of 05/11/1994.		
ORPHAN; UST	North Dakota State Dept Of Transportation	398 HWY 22 S KILLDEER, ND 58640 Latitude: 47.3647169 Longitude: -102.75433	less than 0.1 miles S of NDGW16	Yes	Inactive UST. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
ORPHAN; TIER 2	Duininck Portable Plant	HWY 22 KILLDEER, ND 58640 Latitude: 47.433693 Longitude: -102.804668	5.3 miles N	No	Storage of fuel oil, diesel, and asphalt cement at this location, no violations noted, greater than 5 miles from nearest sampling location.		
ORPHAN; TIER 2	Mid State Oilfield Supply	196 HWY 22N KILLDEER, ND 58640 Latitude: 47.386886 Longitude: -102.759261	0.4 miles N of NDGW16	No	Storage of paint at this location, no violations noted.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; RCRA NonGen / NLR	Denbury Franchuk 44-20NWH	KILLDEER, ND 58640 Latitude: 47.358542 Longitude: -102.804835	0 miles	Yes	Listed as presently non-generator of hazardous waste (waste not specified). Non-violation status on 10/03/2012 Compliance Evaluation Inspection.		
ORPHAN; TIER 2	Moc - Ivan Hecker 41-6h #2	6 MILES WEST, 2 MILES SOUTH & 1 MILE EAST OF KILLDEER, ND 58640 Latitude: 47.328014 Longitude: -102.889478	4.5 miles SW	No	Well Location, Storage of diesel, bentonite, barite, produced water, and crude oil at this location, greater than 4 miles from nearest sampling location.		
ORPHAN; TIER 2	Moc - Edward Darwin 14-35h	6 MILES WEST, 2 MILES SOUTH & 1 MILE EAST OF KILLDEER, ND 58640 Latitude: 47.331272 Longitude: -102.881653	4.0 miles SW	No	Well Location, Storage of diesel, bentonite, barite, produced water, and crude oil at this location, approximately 4 miles from nearest sampling location.		
ORPHAN; TIER 2	Moc - Dawn Kupper 31-15h	7 MILES NORTH & 0.5 MILES WEST OF KILLDEER KILLDEER, ND 58640 Latitude: 47.47243 Longitude: -102.76431	8.3 miles N	No	Well Location, Storage of diesel, bentonite, barite, produced water, and crude oil at this location, greater than 8 miles from nearest sampling location.		
ORPHAN; RCRA-CESQG	Tesoro High Plains Pipeline Co - CONNOLLY TANK SITE	148 97TH AVE NW KILLDEER, ND 58640 Latitude: 47.391628 Longitude: -102.609766	> 6 miles E of NDGW15	No	Pipeline transportation of crude oil. Small quantity generator, waste codes D001 and D018 identified, no violations noted.		
ORPHAN; TIER 2	Bulk Plant	370 S CENTRAL AVE KILLDEER, ND 58640 Latitude: 47.3701 Longitude: -102.7523	0.3 miles NE of NDGW16	Yes	Storage of diesel, gasoline, and propane at this location. Site included as a potential candidate cause due to proximity to site and potential for contamination.		
ORPHAN; AST	Dunn County Road Dept.	300 CENTRAL AVE KILLDEER, ND 58640	0.3 miles NE of NDGW16	Yes	Two active ASTs with unknown contents, no other information available. Site included as a potential candidate cause due unknown location and potential for contamination.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; NPDES & ORPHAN; FINDS	Killdeer City Of	Highway 22 and High Street KILLDEER, ND 58640	0.4 miles N of NDGW16	No	Wastewater treatment facility, NPDES permit, no violations noted.		
ORPHAN; UST	Killdeer Fiber Hut U S West	JCT. HWY 85 & 200 KILLDEER, ND 58640	>18 miles W of NDGW10	No	Inactive UST that contained petroleum, no violations noted.		
ORPHAN; UST	Bishop Construction Building	KILLDEER, ND 58640 Latitude: 47.3670370 Longitude: -102.74833	0.2 miles NE of NDGW16	Yes	Inactive UST, no other information available. Site included as a potential candidate cause due to unknown location and potential for contamination.		
ORPHAN; UST	North Rocky Mt. Area Field Office	KILLDEER, ND 58640	NI	Yes	Inactive UST. Site included as a potential candidate cause due to unknown location and potential for contamination.		
ORPHAN; TIER 2	Br - Bakken Area - Patton 31-1h	KILLDEER, ND 58640 Latitude: 47.414986 Longitude: -102.596354	10.6 miles NE	No	Well Location, Storage of crude oil and diesel at this location, greater than 10 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Newry 24-26h	KILLDEER, ND 58640	12.5 miles SW	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, further than 12 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Gorhman 24-31mb	KILLDEER, ND 58640	> 6 miles NE	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location.		
ORPHAN; TIER 2	Br - Bakken Area -Scott 31-36mbh	KILLDEER, ND 58640 Latitude: 47.255015 Longitude: -102.788508	7.2 miles S	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, greater than 7 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Scott 21-36mbh	KILLDEER, ND 58640 Latitude: 47.255100 Longitude: -102.793695	7.2 miles S	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, greater than 7 miles from nearest sampling point.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; TIER 2	Br - Bakken Area - Gorhman 14-31TF	KILLDEER, ND 58640	> 6 miles NE	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, further than 6 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Elizabeth Stroh	KILLDEER, ND 58640 Latitude: 47.21311472 Longitude: -102.8931694	10.9 miles SW	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, further than 10 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Cecilia Stroh 3	KILLDEER, ND 58640 Latitude: 47.21311472 Longitude: -102.8929883	10.9 miles SW	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, greater than 10 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Berlin 34-14h	KILLDEER, ND 58640 Latitude: 47.19836 Longitude: -102.93151	12.7 miles SW	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, greater than 12 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Bath 11-35h	KILLDEER, ND 58640 Latitude: 47.16817778 Longitude: -102.9433578	14.7 miles SW	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, greater than 14 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Rifle Falls 21-	KILLDEER, ND 58640 Latitude: 47.26981 Longitude: -102.66173	9.2 miles SE	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, greater than 9 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Lincoln Hill 41	KILLDEER, ND 58640 Latitude: 47.385703 Longitude: -102.699061	2 miles N	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, greater than 2 miles from nearest sampling location.		
ORPHAN; TIER 2	Br - Bakken Area - Audubon 41-27h	KILLDEER, ND 58640 Latitude: 47.530000 Longitude: -102.760000	12 miles N	No	Tank battery location, Storage of crude oil at this location, greater than 12 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Intervale 41-35	KILLDEER, ND 58640 Latitude: 47.25523 Longitude: -102.81529	7.2 miles S	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location, greater than 7 miles from nearest sampling point.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; TIER 2	Br - Bakken Area - Goldpoint 41-25	KILLDEER, ND 58640 Latitude: 47.35640278 Longitude: -102.7186056	1.6 miles SE of NDGW16	No	Tank battery, drill rig, and possible well location, Storage of crude oil and diesel at this location.		
ORPHAN; TIER 2	Br - Bakken Area - Tilton 34-7h	KILLDEER, ND 58640 Latitude: 47.559442 Longitude: -103.157308	>20 miles NE	No	Tank battery location, Storage of crude oil at this location, further than 20 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Manchester 34-9	KILLDEER, ND 58640 Latitude: 47.559844 Longitude: -103.041319	17.8 miles NW	No	Tank battery location, Storage of crude oil at this location, greater than 17 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Keene 14-35h	KILLDEER, ND 58640 Latitude: 47.502683 Longitude: -103.008744	14.2 miles NW	No	Tank battery location, Storage of crude oil at this location, greater than 14 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Franklin 24-36h	KILLDEER, ND 58640 Latitude: 47.502756 Longitude: -102.986850	>10 miles NE	No	Tank battery location, Storage of crude oil at this location, greater than 12 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Concord 24-10h	KILLDEER, ND 58640 Latitude: 47.560664 Longitude: -103.029983	17.5 miles NW	No	Tank battery location, Storage of crude oil at this location, greater than 17 miles from nearest sampling point.		
ORPHAN; TIER 2	Br - Bakken Area - Jorgenson Feder	KILLDEER, ND 58640 Latitude: 47.661033 Longitude: -103.076517	24.5 miles NW	No	Tank battery location, Storage of crude oil at this location, greater than 24 miles from nearest sampling point.		
ORPHAN; TIER 2	MOC - T Kupper Usa 34-11h	KILLDEER, ND 58640 Latitude: 47.475228 Longitude: -102.746297	7.5 miles N	No	Well Location, Storage of diesel, bentonite, barite, produced water, and crude oil at this location, greater than 7 miles from the nearest sampling location.		
ORPHAN; TIER 2	Hwy 200	6 miles W of Killdeer KILLDEER, ND 58640 Latitude: 47.372600 Longitude: -102.890800	3.9 miles W of NDGW10	No	Tank battery location, Storage of crude oil at this location, greater than 3 miles from nearest sampling point.		
ORPHAN; RCRA NonGen / NLR, FINDS	Koch Pipeline Co - Killdeer Sta	5 MI NE OF KILLDEER KILLDEER, ND 58640	> 5 mi NE of NDGW16	No	Presently non-generator of hazardous waste, no violations found, waste code D018 identified. No violations.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; TIER 2	CIT - Lone Butte Field - Lone Butte	NW NE SEC. 19, T147N, R97W KILLDEER, ND 58640	41 miles N	No	Tank battery location, Storage of crude oil and hydrogen sulfide at this location, greater than 40 miles from nearest sampling location.		
ORPHAN; RCRA NonGen / NLR, FINDS	AT&T Corp - Killdeer	12.7 MI NW KILLDEER, ND 58640	>5 miles NW	No	Presently non-generator of hazardous waste, no violations found, waste codes D000 and D002 identified. No violations.		
ORPHAN; TIER 2	CIT - Lone Butte Field - Carus B 1	SW NW SEC. 20, T147N, R97W KILLDEER, ND 58640 Latitude: 47.8992 Longitude: -103.1248	> 20 miles NW	No	Tank battery location, Storage of crude oil and hydrogen sulfide at this location, greater than 20 miles from nearest sampling location.		
ORPHAN; TIER 2	CIT - Lone Butte Field - Bob Creek	KILLDEER, ND 58640 Latitude: 47.5403 Longitude: -103.0957	18.5 miles NW	No	Tank battery location, Storage of crude oil and hydrogen sulfide at this location, greater than 18 miles from nearest sampling location.		
ORPHAN; TIER 2	Con - Haag 1X-21H	S021-T144N-R099W KILLDEER, ND 58640 Latitude: 47.2707 Longitude: -103.2362	> 23 miles SW	No	Tank battery location, Storage of crude oil at this location, greater than 20 miles from nearest sampling point. Further than 20 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Chretien 1-36H	S031-T142N-R101W KILLDEER, ND 58640	> 20 miles SW	No	Tank battery location, Storage of crude oil at this location, further than 20 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Champlain 1-36H	S36-T143N-R101W KILLDEER, ND 58640	> 20 miles SW	No	Tank battery location, Storage of crude oil at this location, further than 20 miles from nearest sampling point.		
ORPHAN; RCRA-CESQG, FINDS	Killdeer Mountain Manufacturing Inc.	233 Rodeo Dr, Killdeer, ND 58640	> 0.1 miles N of NDGW16	Yes	Small quantity generator, waste codes D001, D005, D007, D008, D035, F003, and F005 identified, several violations for not reporting RCRA hazardous waste. In the 5 years of records there were 2 Inspections with violations or compliance issues . No other information found.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; TIER 2	CIT - Little Knife Field - Kukla A-1	SE SE SEC. 20, T144N, R97W KILLDEER, ND 58640 Latitude: 47.4525 Longitude: -103.6556	> 15 miles SW	No	Tank battery location, Storage of crude oil and hydrogen sulfide at this location, approximately 15 miles from nearest sampling point.		
ORPHAN; TIER 2	CIT - Lone Butte Field - Carus Uni	KILLDEER, ND 58640 Latitude: 47.9105 Longitude: -103.141	41 miles NW	No	Tank battery location, Storage of crude oil and hydrogen sulfide at this location, further than 40 miles from nearest sampling location.		
ORPHAN; TIER 2	CON - Gale 1-32H	KILLDEER, ND 5864 Latitude: 47.516133 Longitude: -102.935219	> 12 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, further than 10 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Federal Jorgenson 14-5H	KILLDEER, ND 58640 Latitude: 47.660943 Longitude: -103.076287	> 20 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 20 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Dvirnak 14-6H	KILLDEER, ND 58640 Latitude: 47.488837 Longitude: -102.84082	> 9 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 9 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Dennis 44-8H	KILLDEER, ND 58640 Latitude: 47.560739 Longitude: -102.9302	> 15 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, further than 15 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Carus 24-28h	SEC. 021-T147N-R096W KILLDEER, ND 58640 Latitude: 47.517847 Longitude: -102.922872	> 12 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, further than 12 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Candee 11-9H	SEC. 009-T146N-R095W KILLDEER, ND 58640	> 10 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, further than 45 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Bridger 44-14H	SEC. 014-T146N-R096W KILLDEER, ND 58640 Latitude: 47.459824 Longitude: -102.868047	> 7 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, further than 7 miles from nearest sampling point.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; TIER 2	CON - Veigel 1-9H	SEC. 009-T146N-R096W KILLDEER, ND 58640 Latitude: 47.486958 Longitude: -102.9213111	> 10 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 10 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - State Weydahl 44-36H 76	SEC. 001-T146N-R096W KILLDEER, ND 58640 Latitude: 47.503047 Longitude: -102.845292	> 10 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 10 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - State Dolezal 44-1h	SEC. 036-T146N-R096W KILLDEER, ND 58640 Latitude: 47.401854 Longitude: -102.848231	> 3 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, further than 3 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Skachenko 1-31H	SEC. 031-T146N-R095W KILLDEER, ND 58640 Latitude: 47.41625 Longitude: -102.8384	> 4 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 4 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Ryden 21-24H	SEC. 024-T146N-R096W KILLDEER, ND 58640 Latitude: 47.457675 Longitude: -102.854867	> 7 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 7 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Rodney 1-29H	SEC. 029-T147N-R096W KILLDEER, ND 58640 Latitude: 47.517369 Longitude: -102.934558	> 10 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 10 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Pletan 1-18H	SEC. 018-T146N-R095W KILLDEER, ND 58640 Latitude: 47.472908 Longitude: -102.838331	> 8 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 8 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Oakdale 11-12H	SEC. 012-T146N-R096W KILLDEER, ND 58640 Latitude: 47.48665 Longitude: -102.859661	> 9 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 9 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Mountain Gap 31-10H	SEC. 010-T146N-R096W KILLDEER, ND 58640 Latitude: 47.487091 Longitude: -102.894101	> 9 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 9 miles from nearest sampling point.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; TIER 2	CON - Morris 1-23H	SEC. 023-T147N-R096W KILLDEER, ND 58640 Latitude: 47.543658 Longitude: -102.871522	> 13 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 13 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Mittelstadt 1-20H	SEC. 020-T146N-R095W KILLDEER, ND 58640 Latitude: 47.445053 Longitude: -102.806206	> 5 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 5 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Kelly 44-2H	SEC. 002-T145N-R096W KILLDEER, ND 58640 Latitude: 47.487061 Longitude: -102.965975	> 11 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 11 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Kelling 1-4H	SEC. 004-T145N-R096W KILLDEER, ND 58640	> 5 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 5 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Jensen 1-5H	SEC. 005-T146N-R095W KILLDEER, ND 58640 Latitude: 47.488444 Longitude: -102.819811	> 8 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 8 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Brandvik 14-24H	SEC. 024-T147N-R096W KILLDEER, ND 58640 Latitude: 47.532253 Longitude: -102.863714	12.3 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 12 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Bonneville 41-23H	SEC. 023-T146N-R096W KILLDEER, ND 58640 Latitude: 47.458095 Longitude: -102.868834	> 7 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 7 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Bice 1-29H	SEC. 029-T146N-R095W KILLDEER, ND 58640 Latitude: 47.443956 Longitude: -102.806211	> 5 miles N	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 5 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Bang 1-33H	SEC. 033-T147N-R096W KILLDEER, ND 58640 Latitude: 47.5159 Longitude: -102.923706	> 10 miles NW	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 12 miles from nearest sampling point.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; TIER 2	CON - Sloan 1-17H	SEC. 017-T145N-R096W KILLDEER, ND 58640 Latitude: 47.37277 Longitude: -102.944588	> 6 miles W	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 6 miles from nearest sampling point.		
ORPHAN; TIER 2	CON - Dolezal 1-18	SEC. 018-T145N-R097W KILLDEER, ND 58640 Latitude: 47.374022 Longitude: -103.08425	> 13 miles W	No	Tank battery location, Storage of "produced hydrocarbons" at this location, greater than 13 miles from nearest sampling point.		
ORPHAN; TIER 2	MBI - Kohn SWD 3 1		> 15 miles S	No	Tank battery location, Storage of produced water at this location, greater than 15 miles from nearest sampling point.		
ORPHAN; RCRA NonGen / NLR, FINDS	Western Area Power Admin - Killdeer Substation	10310 HWY 200, SOUTH SIDE KILLDEER, ND 58640 Latitude: 47.357561 Longitude: -102.739314	1 mile E of NDGW15	No	Presently non-generator of hazardous waste (waste not specified). No violations.		
ORPHAN; TIER 2	CIT - Little Knife Field - Kudrna	SW SW SEC. 29, T144N, R97W KILLDEER, ND 58640 Latitude: 47.3794598 Longitude: -103.0732426	> 12 miles W	No	Tank battery location, Storage of crude oil and hydrogen sulfide at this location, greater than 12 miles from nearest sampling point.		
ORPHAN; TIER 2	CIT - Jim's Creek Field - Skachend	NE SW SEC. 30, T146N, R95W KILLDEER, ND 58640	> 8 miles NW	No	Tank battery location, Storage of crude oil and hydrogen sulfide at this location, greater than 11 miles from nearest sampling point.		
ORPHAN; TIER 2	CIT - Little Knife Field - Loh A	SW SW SEC. 30, T144N, R97W KILLDEER, ND 58640 Latitude: 47.4294 Longitude: -103.051	> 10 miles SW	No	Tank battery location, Storage of crude oil and hydrogen sulfide at this location, greater than 10 miles from nearest sampling point.		
ORPHAN; CERCLIS	Dunn County Erionite	SW SECTION 25, TOWNSHP 146 N, RANGE 96W KILLDEER, ND 58640	> 30 miles N	No	Removal Only Site, Gravel pit mining has caused a release of fibrous erionite to county roads and the surrounding environment; Removal Assessment Completed 11/01/10.		

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		
ORPHAN; FTTS, HIST FTTS, FINDS	Killdeer Ranch Supply & Recycling	400 THIRD AVENUE EAST KILLDEER, ND 58640 Latitude: 47.34999 Longitude: -102.33304	0.4 miles NE of NDGW16	No	PCB inspection, no violations noted.		
ORPHAN; FTTS, HIST FTTS, FINDS	Killdeer Sch Dist	101 High Street Northwest Killdeer, ND 58640	2.5 miles NE	No	Asbestos inspection, no violations noted.		
ORPHAN; RCRA NonGen / NLR, FINDS	Eott Energy - Killdeer Truck Shop	1 MI W JCT 22 & 200 KILLDEER, ND 58640	1 mile E of NDGW14	No	Presently non-generator of hazardous waste, no violations found, waste codes D001 and D018 identified.		

Primary Source: Environmental records search report by Environmental Data Resources, Inc. (EDR) / EDR Inquiry Number: 3589271.2s
EDR Search Radius: 3 miles with EDR Center of Search: Latitude 47.3585000 - 47° 21' 30.60'', Longitude 102.8050000 - 102° 48' 18.00''

Other Sources: https://www.dmr.nd.gov/oilgas/
http://www.ndhealth.gov/WM/UndergroundStoragetankProgram/

Notes:
ORPHAN SITE: A site of potential environmental interest that appear in the records search but due to incomplete location information (i.e., address and coordinates) is unmappable and not included in the records search report

Key:

AST = Above ground storage tank.
DOT = Department of Transportation.
E = East.
ENE = East-northeast.
FRDS = Federal Reporting Data System.
mi = Mile.
N = North.
ND = North Dakota.
NE = Northeast.
NI = No information.
NPDES = National Pollutant Discharge Elimination System.
PCB = Polychnorinated biphenyl.
S = South.
SE = Southeast.
SW = Southwest.
USGS = United States Geological Survey.
UST = Underground storage tank.
W = West.

Databases:

AIRS: Permitted Airs Facility Listing.

AST: Aboveground Storage Tank Listing. The data come from the Department of Health & Consolidated Laboratories' AST Data (Facility & Owner Address of the Tanks Currently Recorded in North Dakota).

FINDS: Facility Index System of the U.S. EPA/NTIS database that contains both facility information and "pointers" to other sources of information that contain more detail. It includes: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA.

FTTS: FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act) Tracking System. FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act).

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing: A complete administrative case listing from the FTTS for all 10 EPA regions. The information was obtained from the National Compliance Database (NCDB) that NCDB supports the implementation of FIFRA and TSCA. Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing: A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the NCDB.

ICIS: Integrated Compliance Information System. ICIS provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs.

LUST: The Leaking Underground Storage Tank Incident Reports contains an inventory of reported leaking underground storage tank incidents. The data come from the Department of Health's LUST List.

Table C-7 Environmental Database Review Summary
Killdeer, Dunn County North Dakota

Database	Name of Facility (Location)	Address of Facility	Distance from Nearest Sample Point	Potential Candidate Cause		Groundwater Wells	Oil/Gas Wells
				Yes/No	Justification		

NPDES: National Pollutant Discharge Elimination System Permit Listing

RCRAInfo: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the RCRA.

RCRA-CESQG: Federal RCRA Conditionally Exempt Small Quantity Generator List.
RCRA NonGen/NLR: RCRAInfo listings of RCRA Non-Generators /No longer regulated. Non-Generators do not presently generate hazardous waste.
RMP: List of facilities with Risk Management Programs. The RMP Rule, which was built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program.

TIER 2: Listing of Tier 2 information.
US Hist Auto Stat: EDR's database of listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Health's UST Data (Facility & Owner Address of the Tanks Currently Recorded in North Dakota).
Waste Code D001 - Ignitable hazardous wastes are those wastes which have a flashpoint of less than 140 degrees Fahrenheit as determined by a Pensky-Martens closed cup flash point tester.
Waste Code D002 - A waste which has a pH of less than 2 or greater than 12.5 is considered to be a corrosive hazardous waste.
Waste Code D005 - Barium
Waste Code D007 - Chromium.
Waste Code D008 - Lead.
Waste Code D009 - Mercury.
Waste Code D018 - Benzene.
Waste Code D035 - Methyl ethyl ketone.

Waste Code F003 - The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of 10 percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.

Waste Code F005 - The following spent nonhalogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above nonhalogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.

Table C-8 Well Inventory Summary, Killdeer Retrospective Case Study Site, Dunn County, North Dakota

File Number	API Number	Operator	Well Name	Field Name	Quarter	Section	Township	Range	Latitude	Longitude	Status
18537	33-025-01015-00-00	Continental Resources, Inc.	Roadrunner 1-22H	Murphy Creek	SWSW	22	145	95	47.3582814	-102.7740982	PNC
17702	33-025-00841-00-00	Continental Resources, Inc.	Jack 14-9H	Murphy Creek	SESW	9	145	95	47.3872974	-102.7952458	A
17669	33-025-00837-00-00	Denbury Onshore, LLC	Rogne 44-27H	Wildcat	SESE	27	145	95	47.3437151	-102.7600234	PNC
16740	33-025-00651-00-00	Denbury Onshore, LLC	Lazorenko 11-31H	Murphy Creek	LOT 1	31	145	95	47.3423247	-102.8419889	PNC
18638	33-025-01033-00-00	XTO Energy Inc.	Franchuk 44-20NWH	Murphy Creek	SESE	20	145	95	47.3585428	-102.8048359	A
18769	33-025-01060-00-00	Continental Resources, Inc.	Roadrunner 1-15H	Murphy Creek	NWNW	15	145	95	47.3852751	-102.7764828	A
23520	33-025-01831-00-00	Continental Resources, Inc.	Jack 3-9H	Murphy Creek	SESE	9	145	95	47.3873564	-102.7840249	A
23519	33-025-01830-00-00	Continental Resources, Inc.	Jack 4-9H	Murphy Creek	SESE	9	145	95	47.3872911	-102.7841799	A
21584	33-025-01483-00-00	Continental Resources, Inc.	Clover 3-10H	Murphy Creek	NENW	15	145	95	47.3842742	-102.7692591	A
21586	33-025-01485-00-00	Continental Resources, Inc.	Clover 2-10H	Murphy Creek	NENW	15	145	95	47.3842755	-102.7688954	A
16678	33-025-00637-00-00	XTO Energy Inc.	Truchan 11X-33H	Murphy Creek	NWNW	33	145	95	47.3423449	-102.7952824	A
17713	33-025-00845-00-00	Marathon Oil Company	State Lazorenko 34-36H	Murphy Creek	SWSE	36	145	96	47.3303624	-102.8500630	A
21583	33-025-01482-00-00	Continental Resources, Inc.	Roadrunner 3-15H	Murphy Creek	NENW	15	145	95	47.3842735	-102.7694409	A
18637	33-025-01032-00-00	XTO Energy Inc.	Franchuk 44-20SWH	Murphy Creek	SESE	20	145	95	47.3585044	-102.8049411	A
19138	33-025-01121-00-00	XTO Energy Inc.	Franchuk 34-19SWH	Murphy Creek	SWSE	19	145	95	47.3588156	-102.8286698	A

Table C-8 Well Inventory Summary, Killdeer Retrospective Case Study Site, Dunn County, North Dakota

File Number	API Number	Operator	Well Name	Field Name	Quarter	Section	Township	Range	Latitude	Longitude	Status
16765	33-025-00663-00-00	XTO Energy Inc.	Rogne 11-35H	Murphy Creek	NWNW	35	145	95	47.3422865	-102.7567995	A
21585	33-025-01484-00-00	Continental Resources, Inc.	Roadrunner 2-15H	Murphy Creek	NENW	15	145	95	47.3842748	-102.7690773	A
16763	33-025-00661-00-00	Encore Operating, L.P.	Lazorenko 44-30H	Wildcat	SESE	30	145	95	47.3439253	-102.8233010	PNC
8374	33-025-00199-00-00	Adobe Resources Corp.	Federal Killdeer 41-4	Wildcat	NENE	4	144	96	47.3269740	-102.8455970	DRY
16766	33-025-00664-00-00	XTO Energy Inc.	Rogne 44-34H	Murphy Creek	SESE	34	145	95	47.3294486	-102.7593999	A
19137	33-025-01120-00-00	XTO Energy Inc.	Franchuk 34-19NWH	Murphy Creek	SWSE	19	145	95	47.3588672	-102.8285647	A
9612	33-025-00338-00-00	Crawford Exploration Co.	Kulish 1	Wildcat	NWSW	2	144	96	47.3190440	-102.8182180	PNC
21424	33-025-01453-00-00	XTO Energy Inc.	Johnson 43-27WNH	Murphy Creek	NESE	27	145	95	47.3475106	-102.7617258	A
7584	33-025-00164-00-00	Amoco Production Co.	Roshau 1	Wildcat	NENW	8	145	95	47.3991300	-102.8139110	DRY
21425	33-025-01454-00-00	XTO Energy Inc.	Johnson 43-27ENH	Murphy Creek	NESE	27	145	95	47.3475107	-102.7615440	A
20746	33-025-01356-00-00	Continental Resources, Inc.	Jack 2-9H	Murphy Creek	SWSW	9	145	95	47.3869499	-102.7984068	A
25299	33-025-02107-00-00	XTO Energy Inc.	Franchuk 24X-20A	Murphy Creek	SESW	20	145	95	47.3590698	-102.8151383	Confidential
25300	33-025-02108-00-00	XTO Energy Inc.	Franchuk 24X-20E	Murphy Creek	SESW	20	145	95	47.3591520	-102.8151383	Confidential
10542	33-025-00384-00-00	Cities Service Oil & Gas Corp.	State Of North Dakota B-1	Wildcat	CNE	30	145	95	47.3540910	-102.8273630	DRY
21484	33-025-01458-00-00	Burlington Resources Oil & Gas Company LP	Bartlett 31-16TFH	Murphy Creek	NWNE	16	145	95	47.3856369	-102.7897082	A

Table C-8 Well Inventory Summary, Killdeer Retrospective Case Study Site, Dunn County, North Dakota

File Number	API Number	Operator	Well Name	Field Name	Quarter	Section	Township	Range	Latitude	Longitude	Status
22987	33-025-01732-00-00	Continental Resources, Inc.	Doe 34-23NH	Murphy Creek	SWSE	23	145	95	47.3603657	-102.7425771	A
21486	33-025-01460-00-00	Burlington Resources Oil & Gas Company LP	Bartlett 21-16TFH	Murphy Creek	NENW	16	145	95	47.3856380	-102.7900992	A
21485	33-025-01459-00-00	Burlington Resources Oil & Gas Company LP	Bartlett 21-16MBH	Murphy Creek	NENW	16	145	95	47.3856375	-102.7899174	A
18074	33-025-00922-00-00	Burlington Resources Oil & Gas Company LP	Bartlet 21-16H	Murphy Creek	NENW	16	145	95	47.3856519	-102.7950243	A
21487	33-025-01461-00-00	Burlington Resources Oil & Gas Company LP	Bartlett 11-16TFH	Murphy Creek	NWNW	16	145	95	47.3856600	-102.7979334	A

Key:

API = American Petroleum Institute.

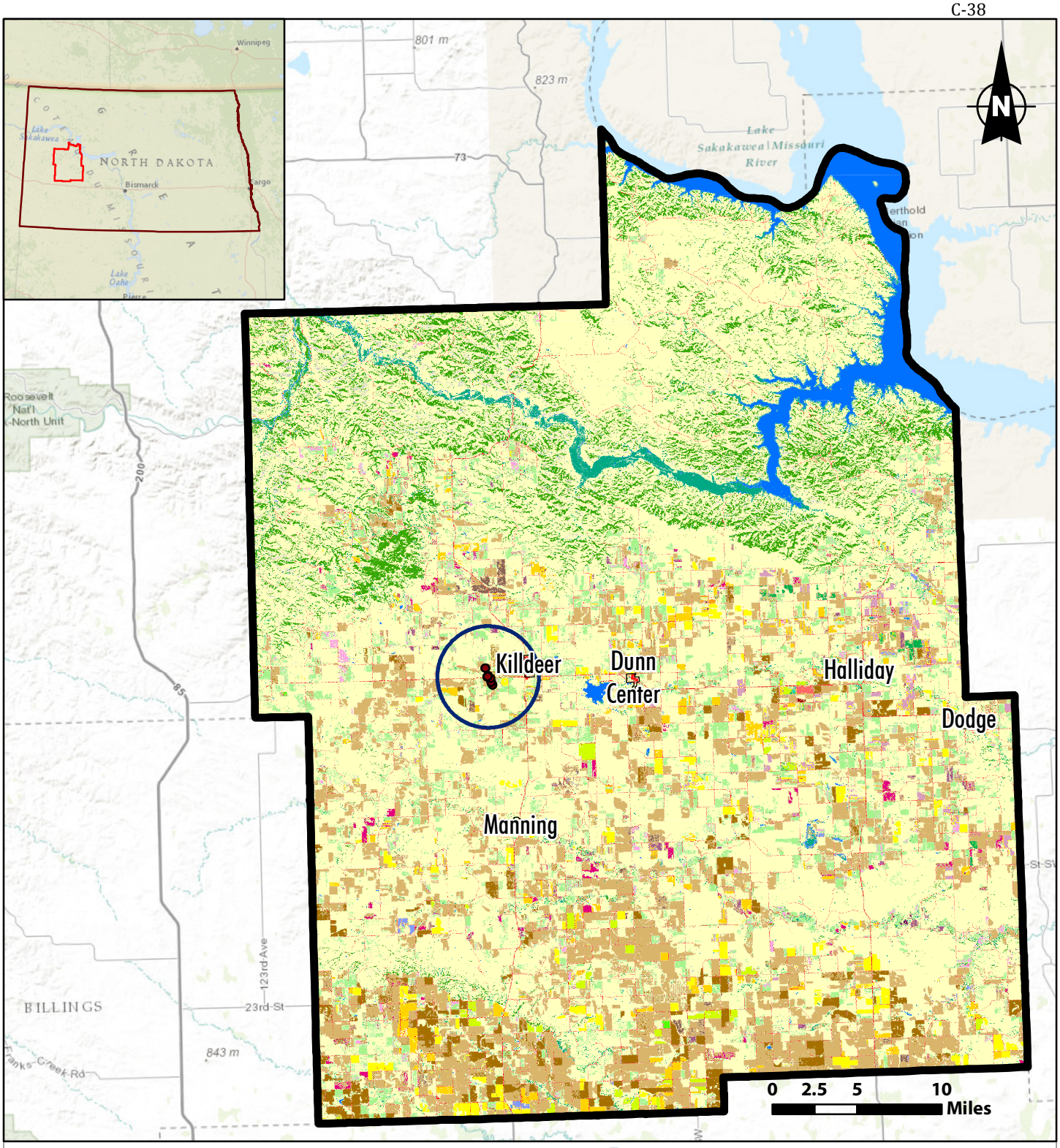
A = Active well.

PNC = Permit now canceled.

Table C-9 Number of Oil and Gas Wells within a 3-mile Search Area and within 1 mile of the EPA Sampling Points

Search Area Name	Search Area Radius (miles)	EPA Samples	Total Number of Oil and Gas Wells	Oil and Gas Wells within 1 Mile of EPA Sampling Points
Dunn County				
Franchuk Well 44-20 SWH	3	NDGW01 NDGW02 NDGW03 NDGW04 NDGW05 NDGW06 NDGW07 NDGW08 NDGW09 NDGW14	35	7

Appendix C Figures



Crop Lands

- Alfalfa
- Barley
- Buckwheat
- Canola
- Clover/Wildflowers
- Corn
- Dry Beans
- Durum Wheat
- Fallow/Idle Cropland
- Flaxseed
- Lentils
- Millet
- Mustard
- Oats
- Other Crops
- Other Hay/Non Alfalfa
- Peas
- Potatoes
- Radishes
- Safflower
- Sorghum
- Soybeans
- Spring Wheat
- Sugarbeets
- Sunflower
- Triticale
- Winter Wheat

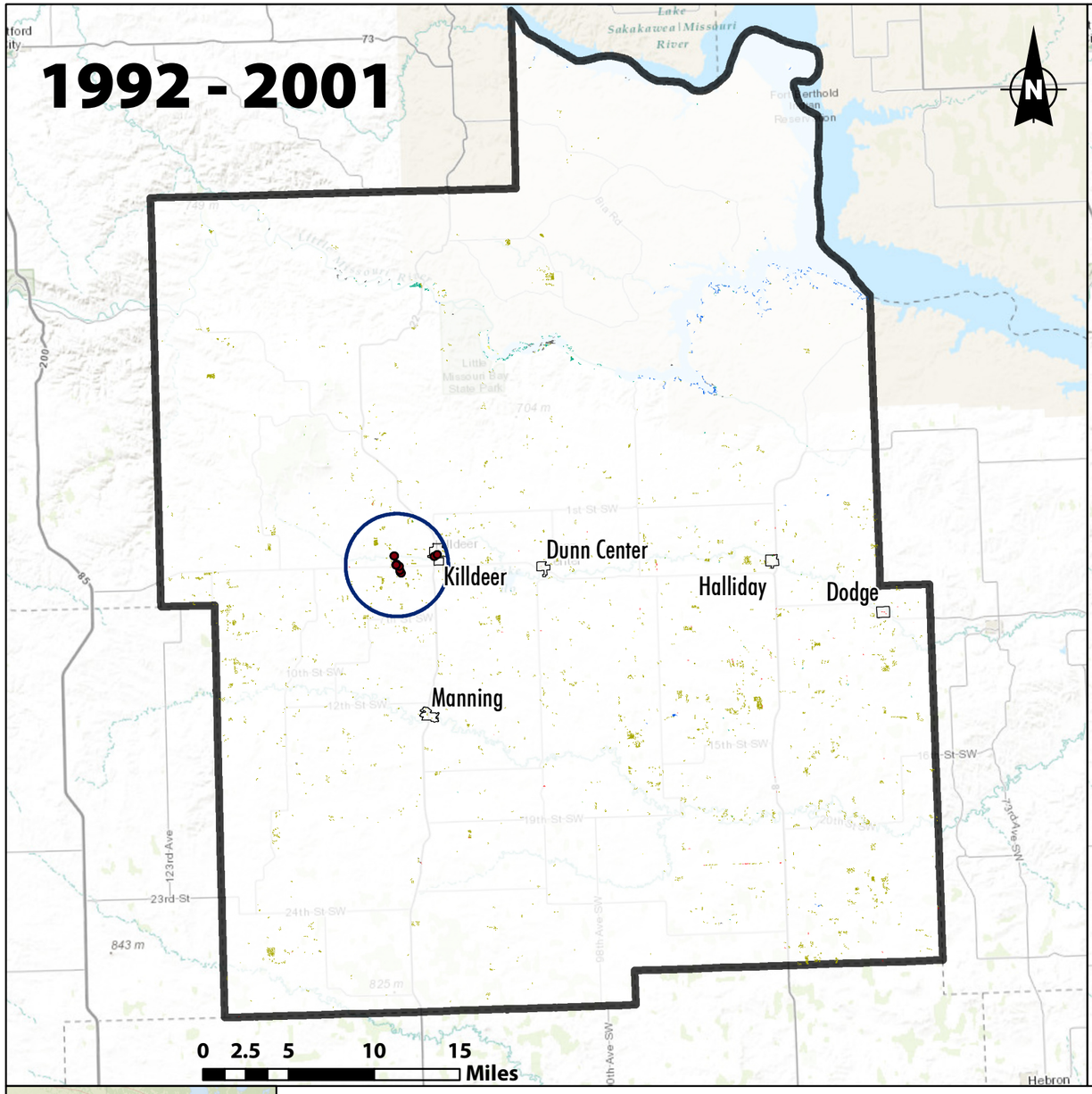
Other Lands

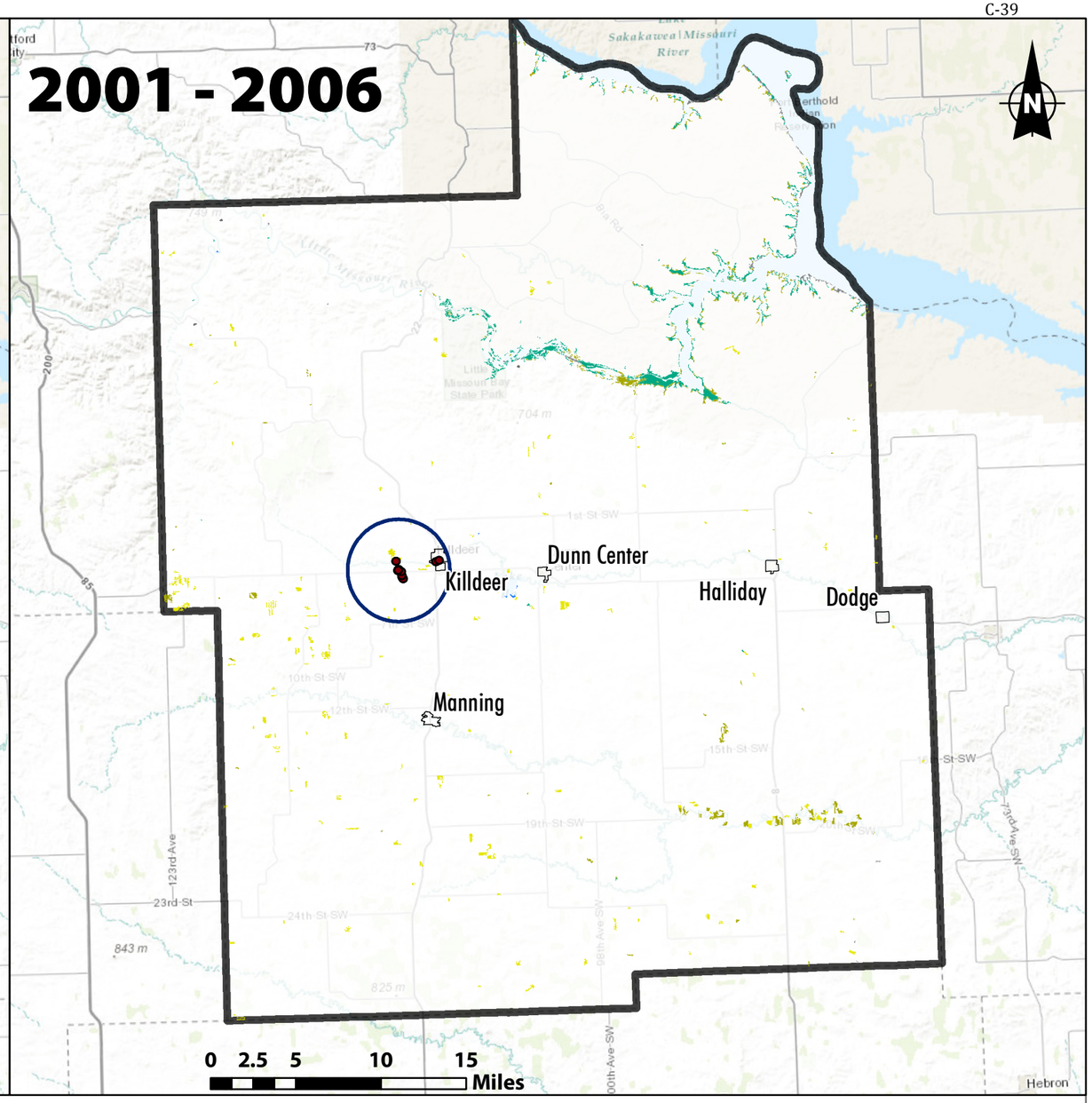
- Open Water
- Developed
- Barren
- Forest
- Shrubland
- Grassland Herbaceous
- Wetlands

- Search Area
- Municipal Boundaries
- EPA HF Sampling Locations

Figure C-1
2012 Crop Lands
Dunn County, North Dakota
EPA Hydraulic Fracturing Study

Source: *Land Use, USDA; Municipalities, ESRI; Sample Locations, EPA ORD*





Land Use Change

- To Open Water
- To Barren
- Evergreen Forest
- To Grassland/Shrub
- To Agriculture
- To Wetlands

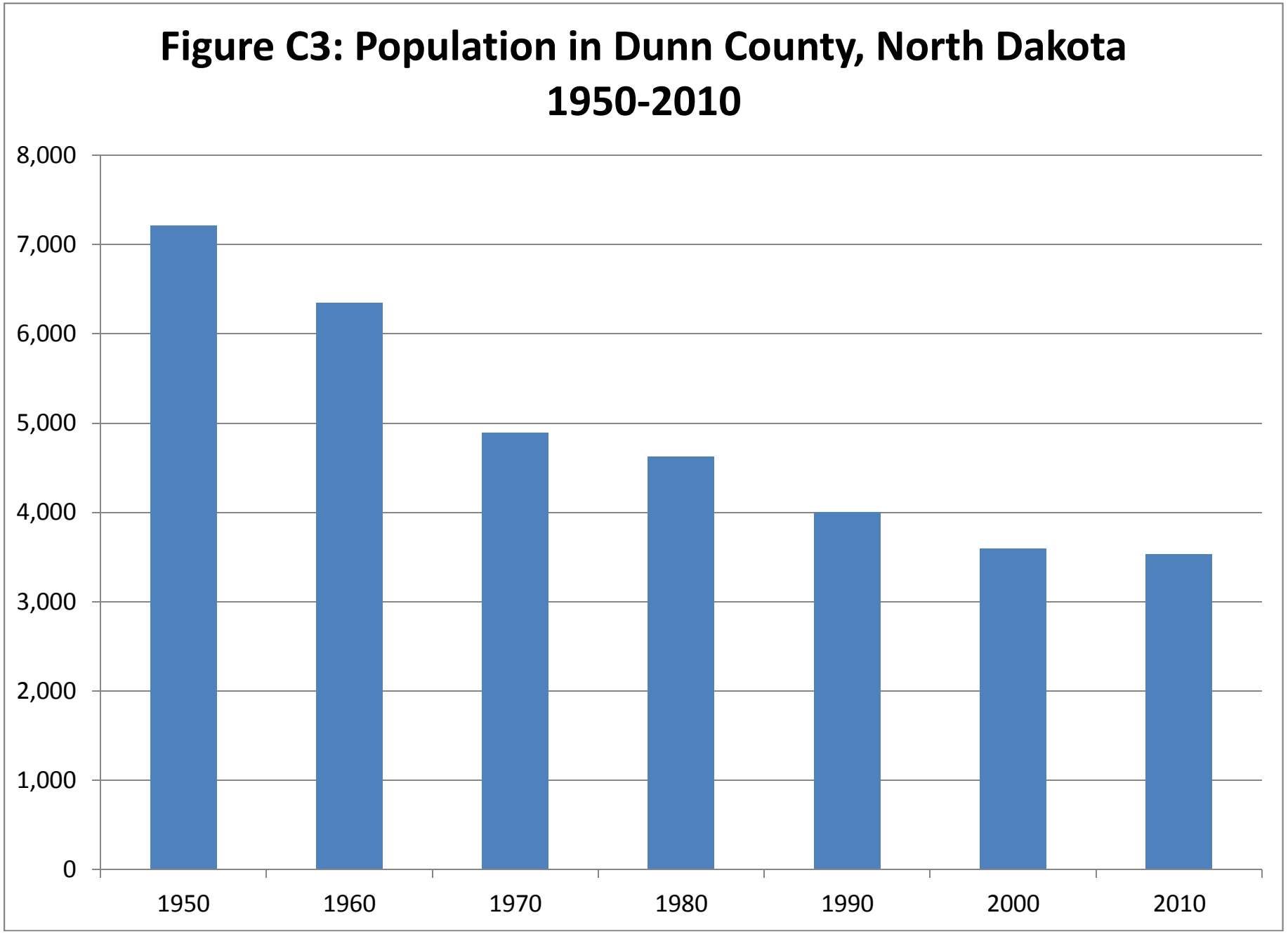
- Search Area
- Municipal Boundaries
- EPA HF Sampling Locations

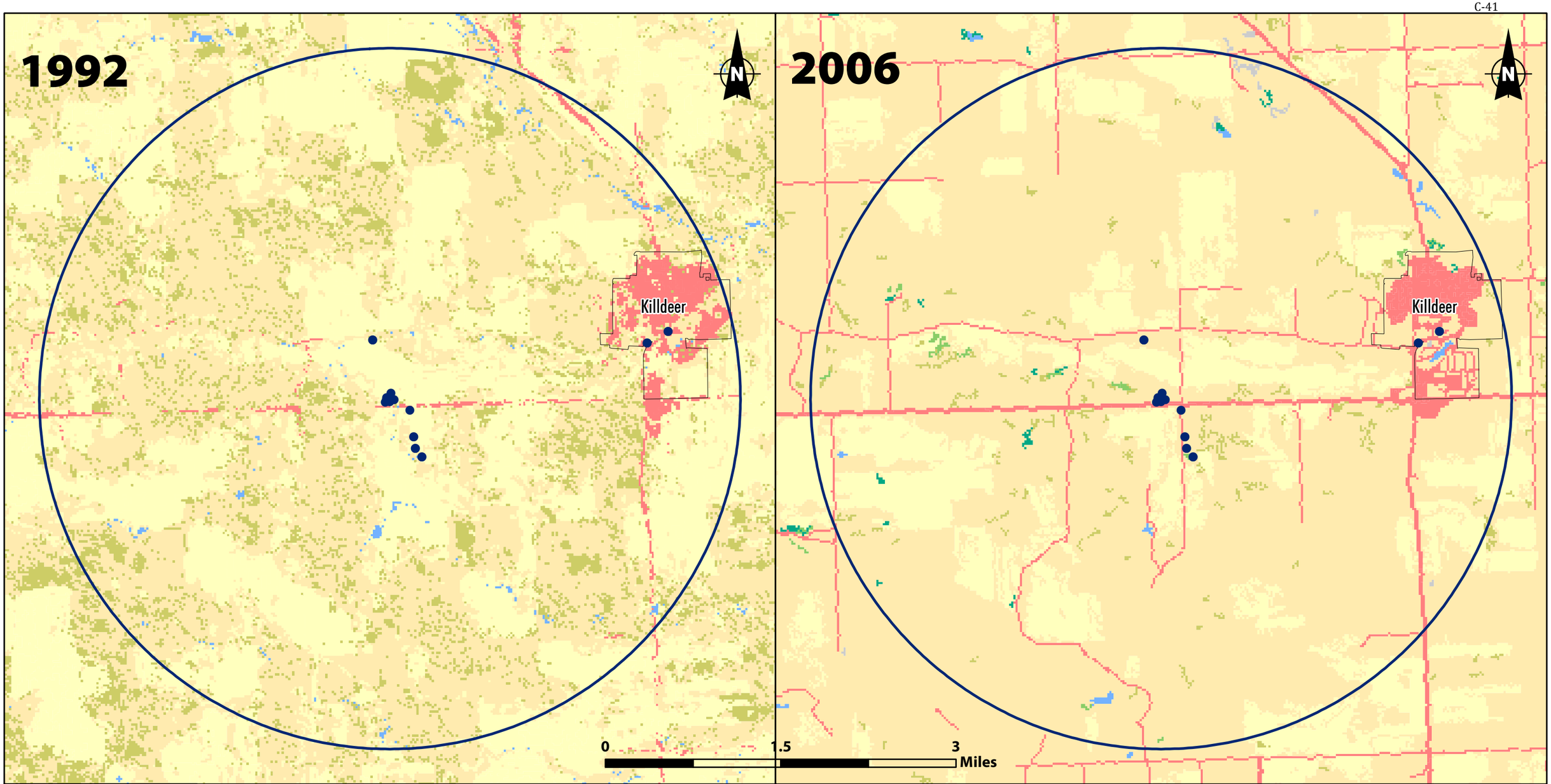
Source: *Landuse, USGS National Land Cover Database; Municipalities, ESRI; Sampling Locations, EPA ORD*

Figure C-2
Land Use Changes
1992-2001 and 2001-2006
Dunn County, North Dakota

EPA Hydraulic Fracturing Study

Figure C3: Population in Dunn County, North Dakota 1950-2010





Land Use

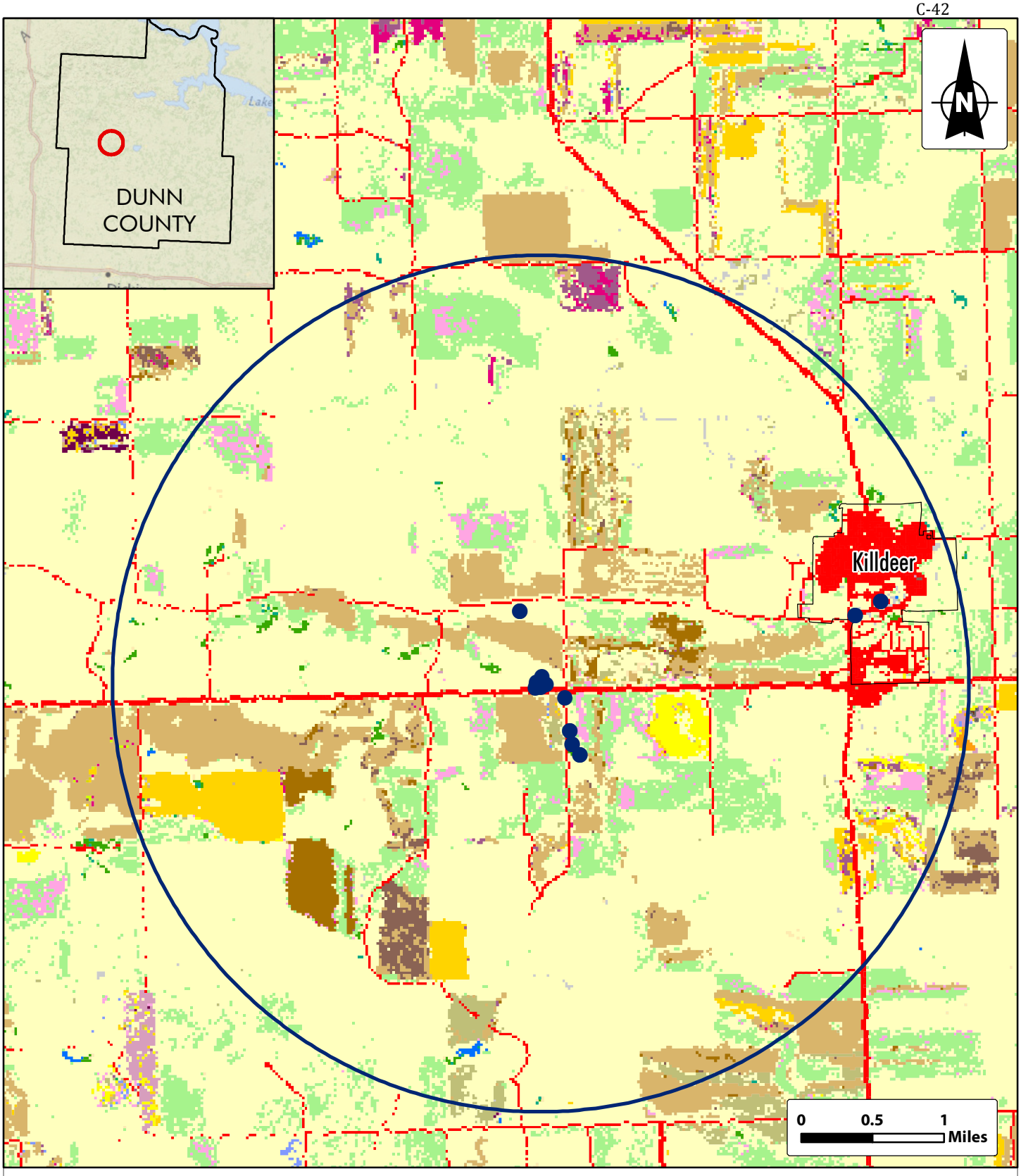
- Open Water
- Developed
- Barren
- Forest
- Shurbland
- Grassland/Herbaceous
- Agriculture
- Wetlands

- EPA HF Sampling Locations
- Search Area
- Municipal Boundaries

Source: *Landuse, USGS National Land Cover Database; Municipalities, ESRI; Sampling Locations, EPA ORD*

Figure C-4
Land Use/Land Cover
1992 and 2006
Dunn County, North Dakota
Franchuk Well Search Area

EPA Hydraulic Fracturing Study



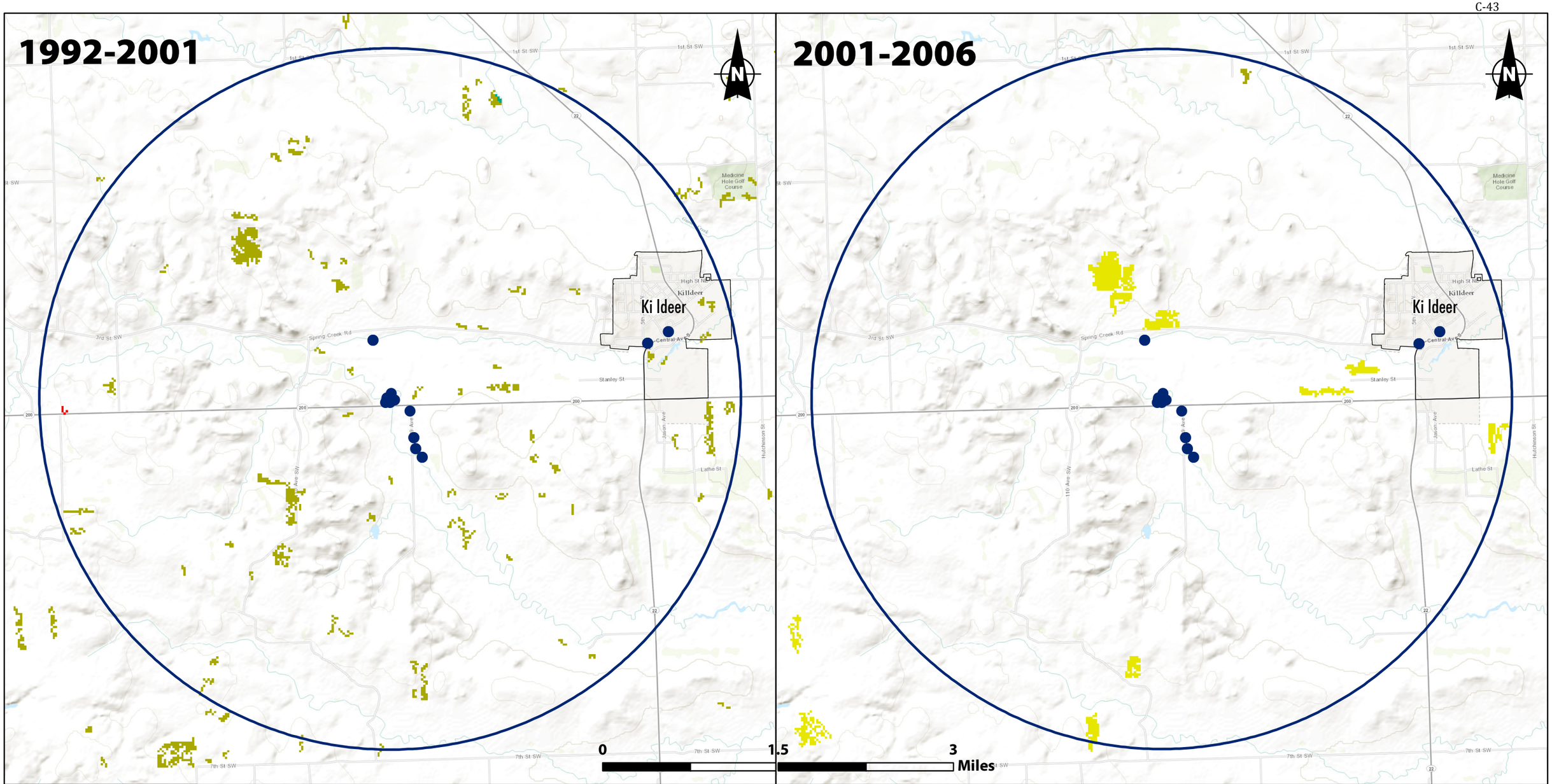
Crop Lands
- Alfalfa
- Barley
- Buckwheat
- Canola
- Clover/Wildflowers
- Corn
- Durum Wheat
- Fallow/Idle Cropland
- Flaxseed
- Millet
- Mustard
- Oats
- Other Hay/Non Alfalfa
- Peas
- Potatoes
- Safflower
- Sorghum
- Soybeans
- Spring Wheat
- Sunflower
- Winter Wheat

Other Lands
- Open Water
- Developed
- Barren
- Forest
- Shrubland
- Grassland Herbaceous
- Wetlands

- Search Area
- Municipal Boundaries
- EPA HF Sampling Locations

Source: *Land Use, USDA; Municipalities, ESRI; Sample Locations: EPA ORD*

Figure C-5
2012 Crop Lands
Dunn County, North Dakota
Franchuk Well Search Area
EPA Hydraulic Fracturing Study

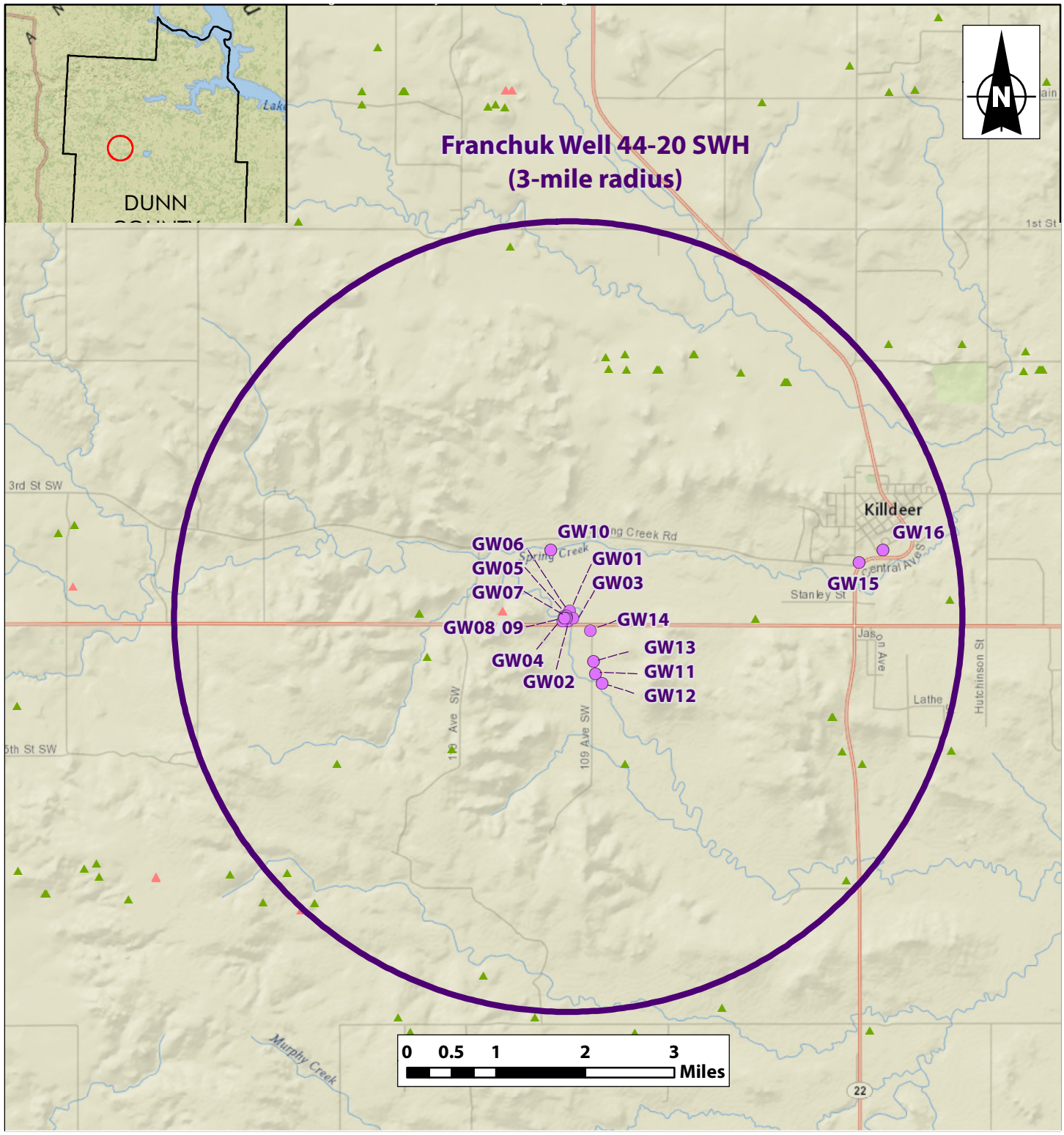


Land Use Change

- To Open Water
- To Barren
- Evergreen Forest
- To Grassland/Shrub
- To Agriculture
- To Wetlands
- EPA HF Sampling Locations
- Search Area
- Municipal Boundaries

Source: Landuse: USGS National Land Cover Database (1992,2006), Municipalities: ESRI, Sampling Locations: US EPA ORD

Figure C-6
Land Use Changes
1992-2001 and 2001-2006
Dunn County, North Dakota
Franchuk Well Search Area
EPA Hydraulic Fracturing Study



Search Area
EPA HF Sampling Locations
Well (Type Confidential)
Well (Oil & Gas)

Figure C-7
EPA HF Sampling Location Map
Dunn County, North Dakota
EPA Hydraulic Fracturing Study

Source: *Basemap, ESRI; Sample Locations, EPA ORD;*
Wells- North Dakota Dept of Natural Resources Oil and Gas Division

Attachment 1 EDR Record Search

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: N/A
Last EDR Contact: 05/09/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: N/A
Last EDR Contact: 05/09/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: N/A
Last EDR Contact: 05/09/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/04/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 04/05/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 10/09/2012
Date Made Active in Reports: 12/20/2012
Number of Days to Update: 72

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/10/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 04/05/2013
Next Scheduled EDR Contact: 03/11/2013
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/21/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 6

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 12/19/2012
Date Data Arrived at EDR: 12/26/2012
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 03/11/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 12/19/2012
Date Data Arrived at EDR: 12/26/2012
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 03/11/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/18/2013
Next Scheduled EDR Contact: 06/03/2013
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/17/2013
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 29

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 04/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

State- and tribal - equivalent NPL

SHWS: Hazardous Sites Cleanup Act Site List

The Hazardous Sites Cleanup Act Site List includes sites listed on PA Priority List, sites delisted from PA Priority List, Interim Response Completed sites, and Sites Being Studied or Response Being Planned.

Date of Government Version: 01/08/2013
Date Data Arrived at EDR: 01/24/2013
Date Made Active in Reports: 02/19/2013
Number of Days to Update: 26

Source: Department Environmental Protection
Telephone: 717-783-7816
Last EDR Contact: 04/26/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

HSCA: HSCA Remedial Sites Listing

A list of remedial sites on the PA Priority List. This is the PA state equivalent of the federal NPL superfund list.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/25/2013
Date Made Active in Reports: 02/19/2013
Number of Days to Update: 25

Source: Department of Environmental Protection
Telephone: 717-783-7816
Last EDR Contact: 04/24/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Varies

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Operating Facilities

The listing includes Municipal Waste Landfills, Construction/Demolition Waste Landfills and Waste-to-Energy Facilities.

Date of Government Version: 02/26/2013
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/17/2013
Number of Days to Update: 48

Source: Department of Environmental Protection
Telephone: 717-787-7564
Last EDR Contact: 02/26/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

LUST: Storage Tank Release Sites

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 03/04/2013
Date Data Arrived at EDR: 03/20/2013
Date Made Active in Reports: 04/18/2013
Number of Days to Update: 29

Source: Department of Environmental Protection
Telephone: 717-783-7509
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/01/2013
Data Release Frequency: Semi-Annually

UNREG LTANKS: Unregulated Tank Cases

Leaking storage tank cases from unregulated storage tanks.

Date of Government Version: 04/12/2002
Date Data Arrived at EDR: 08/14/2003
Date Made Active in Reports: 08/29/2003
Number of Days to Update: 15

Source: Department of Environmental Protection
Telephone: 717-783-7509
Last EDR Contact: 08/14/2003
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

LAST: Storage Tank Release Sites

Leaking Aboveground Storage Tank Incident Reports.

Date of Government Version: 03/04/2013
Date Data Arrived at EDR: 03/20/2013
Date Made Active in Reports: 04/18/2013
Number of Days to Update: 29

Source: Department of Environmental Protection
Telephone: 717-783-7509
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/01/2013
Data Release Frequency: Semi-Annually

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/27/2012
Date Data Arrived at EDR: 08/28/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 49

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 02/06/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 65

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 11/01/2012
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 162

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/01/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 43

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 59

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 02/06/2013
Date Data Arrived at EDR: 02/08/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 63

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Semi-Annually

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Listing of Pennsylvania Regulated Underground Storage Tanks
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/21/2013
Date Made Active in Reports: 04/17/2013
Number of Days to Update: 27

Source: Department of Environmental Protection
Telephone: 717-772-5599
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/01/2013
Data Release Frequency: Varies

AST: Listing of Pennsylvania Regulated Aboveground Storage Tanks
Registered Aboveground Storage Tanks.

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/21/2013
Date Made Active in Reports: 04/17/2013
Number of Days to Update: 27

Source: Department of Environmental Protection
Telephone: 717-772-5599
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/01/2013
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 02/06/2013
Date Data Arrived at EDR: 02/08/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 63

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 43

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 08/02/2012
Date Data Arrived at EDR: 08/03/2012
Date Made Active in Reports: 11/05/2012
Number of Days to Update: 94

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 11/07/2012
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 156

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 02/06/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 65

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 02/21/2013
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 45

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/27/2012
Date Data Arrived at EDR: 08/28/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 49

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/18/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Site Listing

Under the Land Recycling Act (Act 2) persons who perform a site cleanup using the site-specific standard or the special industrial area standard may use engineering or institutional controls as part of the response action. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 05/15/2008
Date Data Arrived at EDR: 05/16/2008
Date Made Active in Reports: 06/12/2008
Number of Days to Update: 27

Source: Department of Environmental Protection
Telephone: 717-783-9470
Last EDR Contact: 04/24/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AUL: Environmental Covenants Listing
A listing of sites with environmental covenants.

Date of Government Version: 01/22/2013
Date Data Arrived at EDR: 01/24/2013
Date Made Active in Reports: 02/19/2013
Number of Days to Update: 26

Source: Department of Environmental Protection
Telephone: 717-783-7509
Last EDR Contact: 04/23/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Varies

INST CONTROL: Institutional Controls Site Listing
Under the Land Recycling Act (Act 2) persons who perform a site cleanup using the site-specific standard or the special industrial area standard may use engineering or institutional controls as part of the response action. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 05/15/2008
Date Data Arrived at EDR: 05/16/2008
Date Made Active in Reports: 06/12/2008
Number of Days to Update: 27

Source: Department of Environmental Protection
Telephone: 717-783-9470
Last EDR Contact: 04/24/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 10/02/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 14

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 04/05/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Sites
The VCP listings included Completed Sites, Sites in Progress and Act 2 Non-Use Aquifer Determinations Sites. Formerly known as the Act 2, the Land Recycling Program encourages the voluntary cleanup and reuse of contaminated commercial and industrial sites.

Date of Government Version: 01/15/2013
Date Data Arrived at EDR: 01/16/2013
Date Made Active in Reports: 02/19/2013
Number of Days to Update: 34

Source: Department of Environmental Protection
Telephone: 717-783-2388
Last EDR Contact: 04/17/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Semi-Annually

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites
Brownfields are generally defined as abandoned or underused industrial or commercial properties where redevelopment is complicated by actual or perceived environmental contamination. Brownfields vary in size, location, age and past use. They can range from a small, abandoned corner gas station to a large, multi-acre former manufacturing plant that has been closed for years.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 02/19/2013
Date Data Arrived at EDR: 02/21/2013
Date Made Active in Reports: 04/17/2013
Number of Days to Update: 55

Source: Department of Environmental Protection
Telephone: 717-783-1566
Last EDR Contact: 04/24/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 12/10/2012
Date Data Arrived at EDR: 12/11/2012
Date Made Active in Reports: 12/20/2012
Number of Days to Update: 9

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/26/2013
Next Scheduled EDR Contact: 07/08/2013
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: No Update Planned

HIST LF INACTIVE: Inactive Facilities List

A listing of inactive non-hazardous facilities (10000 & 300000 series). This listing is no longer updated or maintained by the Department of Environmental Protection. At the time the listing was available, the DEP?s name was the Department of Environmental Resources.

Date of Government Version: 12/20/1994
Date Data Arrived at EDR: 07/12/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 30

Source: Department of Environmental Protection
Telephone: 717-787-7381
Last EDR Contact: 06/21/2005
Next Scheduled EDR Contact: 12/19/2005
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

HIST LF INVENTORY: Facility Inventory

A listing of solid waste facilities. This listing is no longer updated or maintained by the Department of Environmental Protection. At the time the listing was available, the DEP's name was the Department of Environmental Resources.

Date of Government Version: 06/02/1999
Date Data Arrived at EDR: 07/12/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 30

Source: Department of Environmental Protection
Telephone: 717-787-7381
Last EDR Contact: 09/19/2005
Next Scheduled EDR Contact: 12/19/2005
Data Release Frequency: No Update Planned

HIST LF ALI: Abandoned Landfill Inventory

The report provides facility information recorded in the Pennsylvania Department of Environmental Protection ALI database. Some of this information has been abstracted from old records and may not accurately reflect the current conditions and status at these facilities

Date of Government Version: 01/04/2005
Date Data Arrived at EDR: 01/04/2005
Date Made Active in Reports: 02/04/2005
Number of Days to Update: 31

Source: Department of Environmental Protection
Telephone: 717-787-7564
Last EDR Contact: 11/26/2012
Next Scheduled EDR Contact: 03/11/2013
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 05/03/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 11/14/2012
Date Data Arrived at EDR: 12/11/2012
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 66

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/04/2013
Next Scheduled EDR Contact: 06/17/2013
Data Release Frequency: Quarterly

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Lists of Registered Storage Tanks

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ARCHIVE UST: Archived Underground Storage Tank Sites

The list includes tanks storing highly hazardous substances that were removed from the DEP's Storage Tank Information database because of the Department's policy on sensitive information. The list also may include tanks that are removed or permanently closed.

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/21/2013
Date Made Active in Reports: 04/18/2013
Number of Days to Update: 28

Source: Department of Environmental Protection
Telephone: 717-772-5599
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/01/2013
Data Release Frequency: Varies

ARCHIVE AST: Archived Aboveground Storage Tank Sites

The list includes aboveground tanks with a capacity greater than 21,000 gallons that were removed from the DEP's Storage Tank Information database because of the Department's policy on sensitive information. The list also may include tanks that are removed or permanently closed.

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/21/2013
Date Made Active in Reports: 04/18/2013
Number of Days to Update: 28

Source: Department of Environmental Protection
Telephone: 717-772-5599
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/01/2013
Data Release Frequency: Varies

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/16/2012
Date Data Arrived at EDR: 03/26/2012
Date Made Active in Reports: 06/14/2012
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

ACT 2-DEED: Act 2-Deed Acknowledgment Sites

This listing pertains to sites where the Department has approved a cleanup requiring a deed acknowledgment under Act 2. This list includes sites remediated to a non-residential Statewide health standard (Section 303(g)); all sites demonstrating attainment of a Site-specific standard (Section 304(m)); and sites being remediated as a special industrial area (Section 305(g)). Persons who remediated a site to a standard that requires a deed acknowledgment shall comply with the requirements of the Solid Waste Management Act or the Hazardous Sites Cleanup Act, as referenced in Act 2. These statutes require a property description section in the deed concerning the hazardous substance disposal on the site. The location of disposed hazardous substances and a description of the type of hazardous substances disposed on the site shall be included in the deed acknowledgment. A deed acknowledgment is required at the time of conveyance of the property.

Date of Government Version: 04/23/2010
Date Data Arrived at EDR: 04/28/2010
Date Made Active in Reports: 04/30/2010
Number of Days to Update: 2

Source: Department of Environmental Protection
Telephone: 717-783-9470
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 55

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 04/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SPILLS: State spills
A listing of hazardous material incidents.

Date of Government Version: 01/16/2013
Date Data Arrived at EDR: 01/24/2013
Date Made Active in Reports: 02/19/2013
Number of Days to Update: 26

Source: DEP, Emergency Response
Telephone: 717-787-5715
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Varies

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/07/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Varies

DOD: Department of Defense Sites
This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites
The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 15

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 03/11/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 01/15/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 57

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 04/01/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 12/18/2012
Date Data Arrived at EDR: 03/13/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 30

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 03/13/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/25/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Varies

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 09/08/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 21

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 03/06/2013
Next Scheduled EDR Contact: 06/17/2013
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 09/01/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 131

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/26/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/28/2013
Next Scheduled EDR Contact: 07/08/2013
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 02/25/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 02/25/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77
Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/20/2011
Date Data Arrived at EDR: 11/10/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 61
Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 04/15/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 06/21/2011
Date Data Arrived at EDR: 07/15/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 60

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 03/11/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/08/2013
Date Data Arrived at EDR: 01/09/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 93

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/11/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 10/23/2011
Date Data Arrived at EDR: 12/13/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 79

Source: EPA
Telephone: (215) 814-5000
Last EDR Contact: 03/12/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

RMP: Risk Management Plans

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 05/08/2012
Date Data Arrived at EDR: 05/25/2012
Date Made Active in Reports: 07/10/2012
Number of Days to Update: 46
Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/19/2013
Number of Days to Update: 52
Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 02/26/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Biennially

UIC: Underground Injection Wells

A listing of underground injection well locations.

Date of Government Version: 03/26/2013
Date Data Arrived at EDR: 03/26/2013
Date Made Active in Reports: 04/18/2013
Number of Days to Update: 23
Source: Department of Environmental Protection
Telephone: 717-783-7209
Last EDR Contact: 03/26/2013
Next Scheduled EDR Contact: 07/08/2013
Data Release Frequency: Varies

NPDES: NPDES Permit Listing

A listing of facilities with an NPDES permit.

Date of Government Version: 12/26/2012
Date Data Arrived at EDR: 03/13/2013
Date Made Active in Reports: 04/18/2013
Number of Days to Update: 36
Source: Department of Environmental Protection
Telephone: 717-787-9642
Last EDR Contact: 03/13/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/23/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 57
Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/23/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Annually

DRYCLEANERS: Drycleaner Facility Locations

A listing of drycleaner facility locations.

Date of Government Version: 03/25/2013
Date Data Arrived at EDR: 03/25/2013
Date Made Active in Reports: 04/18/2013
Number of Days to Update: 24
Source: Department of Environmental Protection
Telephone: 717-787-9702
Last EDR Contact: 03/25/2013
Next Scheduled EDR Contact: 07/08/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Permit and Emissions Inventory Data
Permit and emissions inventory data.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 01/04/2013
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 42

Source: Department of Environmental Protection
Telephone: 717-787-9702
Last EDR Contact: 04/01/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 05/06/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 05/03/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information
All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 11/20/2012
Date Data Arrived at EDR: 11/30/2012
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 89

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 02/19/2013
Next Scheduled EDR Contact: 06/03/2013
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST
EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/13/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 02/12/2013
Next Scheduled EDR Contact: 05/27/2013
Data Release Frequency: Quarterly

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 11/15/2012
Date Data Arrived at EDR: 11/16/2012
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 91

Source: EPA
Telephone: 202-564-5962
Last EDR Contact: 04/01/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)
The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 11/15/2012
Date Data Arrived at EDR: 11/16/2012
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 91

Source: EPA
Telephone: 202-564-5962
Last EDR Contact: 04/01/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

MINES: Abandoned Mine Land Inventory
This data set portrays the approximate location of Abandoned Mine Land Problem Areas containing public health, safety, and public welfare problems created by past coal mining.

Date of Government Version: 10/02/2012
Date Data Arrived at EDR: 01/30/2013
Date Made Active in Reports: 02/21/2013
Number of Days to Update: 22

Source: PASDA
Telephone: 814-863-0104
Last EDR Contact: 05/02/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: N/A

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 12/02/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 04/04/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 11/11/2011
Date Data Arrived at EDR: 05/18/2012
Date Made Active in Reports: 05/25/2012
Number of Days to Update: 7
Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/15/2013
Next Scheduled EDR Contact: 05/27/2013
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36
Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 01/29/2013
Date Data Arrived at EDR: 02/14/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 13
Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/08/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 03/15/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

COAL ASH DOE: Steam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 04/18/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Proprietary Historic Dry Cleaners - Cole

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: N/A
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Auto Stat: EDR Proprietary Historic Gas Stations - Cole

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: N/A
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 02/18/2013
Date Data Arrived at EDR: 02/18/2013
Date Made Active in Reports: 03/21/2013
Number of Days to Update: 31

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 02/18/2013
Next Scheduled EDR Contact: 06/03/2013
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/19/2012
Date Made Active in Reports: 08/28/2012
Number of Days to Update: 40

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 02/07/2013
Date Made Active in Reports: 03/15/2013
Number of Days to Update: 36

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/09/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 06/22/2012
Date Made Active in Reports: 07/31/2012
Number of Days to Update: 39

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 02/25/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Annually

VT MANIFEST: Hazardous Waste Manifest Data
Hazardous waste manifest information.

Date of Government Version: 02/15/2013
Date Data Arrived at EDR: 02/21/2013
Date Made Active in Reports: 03/15/2013
Number of Days to Update: 22

Source: Department of Environmental Conservation
Telephone: 802-241-3443
Last EDR Contact: 01/21/2013
Next Scheduled EDR Contact: 05/06/2013
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/19/2012
Date Made Active in Reports: 09/27/2012
Number of Days to Update: 70

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/18/2013
Next Scheduled EDR Contact: 07/01/2013
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Facility List
Source: Department of Public Welfare
Telephone: 717-783-3856

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

Appendix D
Supporting Information
Retrospective Case Study in Killdeer, North Dakota

U.S. Environmental Protection Agency
Office of Research and Development
Washington, DC

May 2015
EPA/600/R-14/103

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Table D-1 Groundwater Depths and General Notes

State Id	Study ID	Date	Ground Surface Elevation (ft)	Top of Well Casing Elevation (ft)	Total Depth (ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
MW-1	NDGW01	9/7/2010	2276.6	2278.7	-	34.73	2243.97	Screen Interval 35-45 ft below ground surface
MW-1	NDGW01	10/8/2010	2276.6	2278.7	42.98	34.66	2244.04	-
MW-1	NDGW01	11/23/2010	2276.6	2278.7	43.67	34.39	2244.31	-
MW-1	NDGW01	1/12/2011	2276.6	2278.7	43.21	34.36	2244.34	-
MW-1	NDGW01	2/23/2011	2276.6	2278.7	43.5	34.59	2244.11	-
MW-1	NDGW01	3/24/2011	2276.6	2278.7	43.47	35.38	2243.32	-
MW-1	NDGW01	4/27/2011	2276.33	2278.53	-	-	-	New survey
MW-1	NDGW01	5/3/2011	2276.33	2278.51	43.47	32.15	2246.36	Well casing cut approx. 0.1 ft for pump install
MW-1	NDGW01	5/31/2011	2276.33	2278.51	43.47	30.57	2247.94	-
MW-1	NDGW01	7/10/2011	2276.33	2278.51	43.47	30.2	2248.31	transducer in place
MW-1	NDGW01	7/18/2011	2276.33	2278.51	43.47	29.95	2248.56	transducer in place
MW-1	NDGW01	8/16/2011	2276.33	2278.51	43.47	29.52	2248.99	transducer in place
MW-1	NDGW01	9/6/2011	2276.33	2278.51	43.47	29.74	2248.77	transducer in place
MW-1	NDGW01	10/18/2011	2276.33	2278.51	43.47	29.6	2248.91	-
MW-1	NDGW01	4/5/2012	2276.33	2278.51	43.47	31.09	2247.42	-
MW-1	NDGW01	10/17/2012	2276.33	2278.51	-	31.19	2247.32	
MW-2	NDGW02	9/7/2010	2278.6	2280.9	-	37.23	2243.67	Screen Interval 35-45 ft below ground surface
MW-2	NDGW02	10/8/2010	2278.6	2280.9	43.29	36.98	2243.92	-
MW-2	NDGW02	11/23/2010	2278.6	2280.9	43.28	36.81	2244.09	-
MW-2	NDGW02	1/12/2011	2278.6	2280.9	42.95	36.83	2244.07	-
MW-2	NDGW02	2/23/2011	2278.6	2280.9	43.08	37.4	2243.5	-
MW-2	NDGW02	3/24/2011	2278.6	2280.9	43.18	38.17	2242.73	-
MW-2	NDGW02	4/27/2011	2278.43	2280.73	-	-	-	New survey
MW-2	NDGW02	5/2/2011	2278.43	2280.73	43.18	35.29	2245.44	Well casing cut approx 0.1 ft for pump install
MW-2	NDGW02	6/1/2011	2278.43	2280.73	43.18	33.38	2247.35	-
MW-2	NDGW02	7/9/2011	2278.43	2280.73	43.18	33.34	2247.39	transducer in place
MW-2	NDGW02	7/18/2011	2278.43	2280.73	43.18	33.01	2247.72	transducer in place
MW-2	NDGW02	8/15/2011	2278.43	2280.73	43.18	32.54	2248.19	transducer in place
MW-2	NDGW02	9/7/2011	2278.43	2280.73	43.18	32.44	2248.29	transducer in place
MW-2	NDGW02	10/18/2011	2278.43	2280.73	43.18	32.1	2248.63	-
MW-2	NDGW02	4/5/2012	2278.43	2280.73	43.18	34.6	2246.13	-
MW-2	NDGW02	10/17/2012	2278.43	2280.73	-	33.58	2247.15	
MW-3	NDGW03	9/7/2010	2275.5	2278	-	34.15	2243.85	Screen Interval 25-40 ft below ground surface
MW-3	NDGW03	10/8/2010	2275.5	2278	40.56	33.93	2244.07	-
MW-3	NDGW03	11/23/2010	2275.5	2278	40.61	33.73	2244.27	-
MW-3	NDGW03	1/12/2011	2275.5	2278	40.37	33.75	2244.25	-
MW-3	NDGW03	2/23/2011	2275.5	2278	40.52	34.33	2243.67	-
MW-3	NDGW03	3/24/2011	2275.5	2278	40.52	35.07	2242.93	-
MW-3	NDGW03	4/27/2011	2275.31	2277.76	-	-	-	New survey
MW-3	NDGW03	5/2/2011	2275.31	2277.77	40.52	32.09	2245.68	Well casing cut approx 0.1 ft for pump install
MW-3	NDGW03	6/1/2011	2275.31	2277.77	40.52	30.03	2247.74	-
MW-3	NDGW03	7/9/2011	2275.31	2277.77	40.52	30.19	2247.58	transducer in place
MW-3	NDGW03	7/18/2011	2275.31	2277.77	40.52	29.81	2247.96	transducer in place
MW-3	NDGW03	8/15/2011	2275.31	2277.77	40.52	29.35	2248.42	transducer in place
MW-3	NDGW03	9/6/2011	2275.31	2277.77	40.52	29.32	2248.45	transducer in place
MW-3	NDGW03	10/18/2011	2275.31	2277.77	40.52	29.04	2248.73	-
MW-3	NDGW03	4/5/2012	2275.31	2277.77	40.52	31.43	2246.34	-
MW-3	NDGW03	10/17/2012	2275.31	2277.77	-	30.55	2247.22	
MW-4	NDGW04	10/8/2010	2277.33	2280.06	70.61	36.35	2243.71	Screen Interval 32-72 ft below ground surface
MW-4	NDGW04	11/23/2010	2277.33	2280.06	71.65	36.09	2243.97	-
MW-4	NDGW04	1/12/2011	2277.33	2280.06	71.16	36.11	2243.95	-
MW-4	NDGW04	2/23/2011	2277.33	2280.06	71.59	36.7	2243.36	-
MW-4	NDGW04	3/24/2011	2277.33	2280.06	72.28	37.33	2242.73	-
MW-4	NDGW04	4/27/2011	2277.13	2280.03	-	-	-	New survey
MW-4	NDGW04	5/2/2011	2277.13	2279.92	72.28	34.51	2245.41	Well casing cut approx. 0.2 ft for pump install
MW-4	NDGW04	6/1/2011	2277.13	2279.92	72.28	32.89	2247.03	-
MW-4	NDGW04	7/9/2011	2277.13	2279.92	72.28	32.51	2247.41	transducer in place
MW-4	NDGW04	7/18/2011	2277.13	2279.92	72.28	32.28	2247.64	transducer in place
MW-4	NDGW04	8/16/2011	2277.13	2279.92	72.28	31.79	2248.13	transducer in place
MW-4	NDGW04	9/6/2011	2277.13	2279.92	72.28	31.65	2248.27	transducer in place
MW-4	NDGW04	10/18/2011	2277.13	2279.92	72.28	31.3	2248.62	-
MW-4	NDGW04	4/5/2012	2277.13	2279.92	72.28	33.82	2246.1	-
MW-4	NDGW04	10/17/2012	2277.13	2279.92	-	32.85	2247.07	
MW-5	NDGW05	3/24/2011	2277.53	2277.3	45.22	35.16	2242.14	Screen Interval 31-46 ft below ground surface
MW-5	NDGW05	4/27/2011	2277.53	2277.3	-	-	-	Initial survey
MW-5	NDGW05	5/3/2011	2277.53	2277.26	45.22	31.58	2245.68	Well casing cut approx. 0.2 ft for pump install
MW-5	NDGW05	6/1/2011	2277.53	2277.26	45.22	29.82	2247.44	-
MW-5	NDGW05	7/10/2011	2277.53	2277.26	45.22	29.47	2247.79	transducer in place
MW-5	NDGW05	7/18/2011	2277.53	2277.26	45.22	29.25	2248.01	transducer in place
MW-5	NDGW05	8/16/2011	2277.53	2277.26	45.22	28.78	2248.48	transducer in place
MW-5	NDGW05	9/7/2011	2277.53	2277.26	45.22			Not sampled due to site activity conditions[1]
MW-5	NDGW05	10/18/2011	2277.53	2277.26	45.22	28.54	2248.72	-

Table D-1 Groundwater Depths and General Notes

State Id	Study ID	Date	Ground Surface Elevation (ft)	Top of Well Casing Elevation (ft)	Total Depth (ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
MW-5	NDGW05	4/5/2012	2277.53	2277.26	45.22	31.29	2245.97	-
MW-5	NDGW05	10/17/2012	2277.53	2277.26	-	30.08	2247.18	
MW-6	NDGW06	3/24/2011	2278.03	2280.56	72.93	37.84	2242.72	Screen Interval 55-70 ft below ground surface
MW-6	NDGW06	4/27/2011	2271.61	2277.46	-	-	-	Initial survey
MW-6	NDGW06	5/3/2011	2277.61	2277.36	45.79	31.67	2245.69	Well casing cut approx. 0.3 ft for pump install
MW-6	NDGW06	6/1/2011	2277.61	2277.36	46.79	30.14	2247.22	-
MW-6	NDGW06	7/10/2011	2277.61	2277.36	46.79	29.59	2247.77	transducer in place
MW-6	NDGW06	7/18/2011	2277.61	2277.36	46.79	29.23	2248.13	transducer in place
MW-6	NDGW06	8/16/2011	2277.61	2277.36	46.79	28.87	2248.49	transducer in place
MW-6	NDGW06	9/7/2011	2277.61	2277.36	46.79	28.92	2248.44	transducer in place
MW-6	NDGW06	10/18/2011	2277.61	2277.36	46.79	28.61	2248.75	-
MW-6	NDGW06	4/5/2012	2277.61	2277.36	46.79	31.43	2245.93	-
MW-6	NDGW06	10/18/2012	2277.61	2277.36	-	30.08	2247.28	
MW-7	NDGW07	3/24/2011	2278.03	2280.56	72.93	37.84	2242.72	Screen Interval 55-70 ft below ground surface
MW-7	NDGW07	4/27/2011	2278.03	2280.56	-	-	-	Initial survey
MW-7	NDGW07	5/2/2011	2278.03	2280.22	72.93	34.6	2245.62	Well casing cut approx. 0.5 ft for pump install
MW-7	NDGW07	6/1/2011	2278.03	2280.22	73.93	32.79	2247.43	-
MW-7	NDGW07	7/9/2011	2278.03	2280.22	73.93	32.64	2247.58	transducer in place
MW-7	NDGW07	7/18/2011	2278.03	2280.22	73.93	32.37	2247.85	transducer in place
MW-7	NDGW07	8/16/2011	2278.03	2280.22	73.93	31.9	2248.32	transducer in place
MW-7	NDGW07	9/7/2011	2278.03	2280.22	73.93	31.85	2248.37	transducer in place
MW-7	NDGW07	10/18/2011	2278.03	2280.22	73.93	31.59	2248.63	-
MW-7	NDGW07	4/5/2012	2278.03	2280.22	73.93	33.96	2246.26	-
MW-7	NDGW07	10/18/2012	2278.03	2280.22	-	33.11	2247.11	
MW-8S	NDGW08	3/24/2011	2277.8	2280.67	122.53	37.85	2242.82	Screen Interval 80-120 ft below ground surface
MW-8S	NDGW08	4/27/2011	2277.8	2280.67	-	-	-	Initial survey
MW-8S	NDGW08	5/2/2011	2277.8	2280.2	122.53	34.62	2245.58	Well casing cut approx. 0.5 ft for pump install
MW-8S	NDGW08	6/1/2011	2277.8	2280.2	122.53	32.8	2247.4	-
MW-8S	NDGW08	7/10/2011	2277.8	2280.2	122.53	32.69	2247.51	Stovepipe covered with oil and dirt from wo rig.
MW-8S	NDGW08	7/18/2011	2277.8	2280.2	122.53	32.38	2247.82	transducer in place
MW-8S	NDGW08	8/16/2011	2277.8	2280.2	122.53	31.92	2248.28	transducer in place
MW-8S	NDGW08	9/7/2011	2277.8	2280.2	122.53	31.89	2248.31	transducer in place
MW-8S	NDGW08	10/18/2011	2277.8	2280.2	122.53	31.58	2248.62	-
MW-8S	NDGW08	4/5/2012	2277.8	2280.2	122.53	33.9	2246.3	-
MW-8S	NDGW08	10/18/2012	2277.8	2280.2	-	33.08	2247.12	After this measurement the casing was cut 0.37'
MW-8D	NDGW09	3/24/2011	2277.8	2280.56	217.4	25.31	2255.25	Screen Interval 178-213 ft below ground surface
MW-8D	NDGW09	4/27/2011	2277.8	2280.56	-	-	-	Initial survey
MW-8D	NDGW09	5/5/2011	2277.8	2280.22	217.4	21.39	2258.83	Well casing cut approx. 0.5 ft for pump install
MW-8D	NDGW09	6/1/2011	2277.8	2280.22	217.4	20.04	2260.18	-
MW-8D	NDGW09	7/10/2011	2277.8	2280.22	217.4	19.85	2260.37	transducer in place
MW-8D	NDGW09	7/18/2011	2277.8	2280.22	217.4	19.76	2260.46	transducer in place
MW-8D	NDGW09	8/16/2011	2277.8	2280.22	217.4	19.6	2260.62	transducer in place
MW-8D	NDGW09	9/7/2011	2277.8	2280.22	217.4	19.82	2260.4	transducer in place
MW-8D	NDGW09	10/18/2011	2277.8	2280.22	217.4	19.98	2260.24	-
MW-8D	NDGW09	4/5/2012	2277.8	2280.22	217.4	20.85	2259.37	-
MW-8D	NDGW09	10/18/2012	2277.8	2280.22		21.73	2258.49	After this measurement the casing was cut 0.35'

*estimated due to casing modifications after sampling but before survey was completed

All well were re-surveyed (April 27, 2011) after MW-5 through MW-8D were installed

Casings for MW-8S and MW-8D were modified following the October 2012 sampling event to allow for more room between the top of the casing and the stovepipe monument lid.

[1]a workover rig prevented access to the well

Casings for MW-8S and MW-8D were modified following the October 2012 sampling event to allow for more room between the top of the casing and the stovepipe monument lid.

Table D-2 Field Parameter Results

State ID	Study ID	Date	Temp. (°C)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	pH	ORP
MW-1	NDGW01	9/7/2010	-	-	-	-	-
MW-1	NDGW01	10/8/2010	-	-	-	-	-
MW-1	NDGW01	11/23/2010	-	-	-	-	-
MW-1	NDGW01	1/12/2011	-	-	-	-	-
MW-1	NDGW01	2/23/2011	-	-	-	-	-
MW-1	NDGW01	3/24/2011	-	-	-	-	-
MW-1	NDGW01	4/27/2011	-	-	-	-	-
MW-1	NDGW01	5/3/2011	8.8	0.737	2.35	8.31	148
MW-1	NDGW01	5/31/2011	7.98	0.713	4.75	8.18	100
MW-1	NDGW01	7/10/2011	7.95	0.687	10.86	9.7	111
MW-1	NDGW01	7/18/2011	8.46	0.536	9.19	7.67	139
MW-1	NDGW01	8/16/2011	7.83	0.751	8.08	7.61	86
MW-1	NDGW01	9/6/2011	8.31	0.771	10.98	7.96	74
MW-1	NDGW01	10/18/2011	7.08	0.534	8.08	12.57	-219
MW-1	NDGW01	4/5/2012	8.07	0.87	6.8	8.19	25
MW-1	NDGW01	10/17/2012	8.1	1.034	3.99	8.17	45
MW-2	NDGW02	9/7/2010	-	-	-	-	-
MW-2	NDGW02	10/8/2010	-	-	-	-	-
MW-2	NDGW02	11/23/2010	-	-	-	-	-
MW-2	NDGW02	1/12/2011	-	-	-	-	-
MW-2	NDGW02	2/23/2011	-	-	-	-	-
MW-2	NDGW02	3/24/2011	-	-	-	-	-
MW-2	NDGW02	4/27/2011	-	-	-	-	-
MW-2	NDGW02	5/2/2011	8.83	1.057	0.79	8.53	54
MW-2	NDGW02	6/1/2011	9.39	1.076	3.05	8.01	114
MW-2	NDGW02	7/9/2011	9.49	10	4.35	8.61	81
MW-2	NDGW02	7/18/2011	10.41	1.036	0.09	7.56	88
MW-2	NDGW02	8/15/2011	10.47	1.035	0.93	8.14	28
MW-2	NDGW02	9/7/2011	10.74	1.026	1.06	8.59	-59
MW-2	NDGW02	10/18/2011	8.78	1.02	0.33	8.62	-60
MW-2	NDGW02	4/5/2012	9.27	0.983	0.41	8.52	2
MW-2	NDGW02	10/17/2012	8.61	0.995	0.48	8.2	71
MW-3	NDGW03	9/7/2010	-	-	-	-	-
MW-3	NDGW03	10/8/2010	-	-	-	-	-
MW-3	NDGW03	11/23/2010	-	-	-	-	-
MW-3	NDGW03	1/12/2011	-	-	-	-	-
MW-3	NDGW03	2/23/2011	-	-	-	-	-
MW-3	NDGW03	3/24/2011	-	-	-	-	-
MW-3	NDGW03	4/27/2011	-	-	-	-	-
MW-3	NDGW03	5/2/2011	9.22	0.645	7.39	7.63	99.9
MW-3	NDGW03	6/1/2011	8.95	0.911	2.91	7.99	62
MW-3	NDGW03	7/9/2011	10.22	0.88	4.14	9.07	111
MW-3	NDGW03	7/18/2011	10.4	0.887	1.58	8.58	80
MW-3	NDGW03	8/15/2011	11.55	0.882	2.06	8.04	63
MW-3	NDGW03	9/6/2011	9.47	0.864	1.73	7.99	39
MW-3	NDGW03	10/18/2011	8.45	0.856	0.87	8.37	84
MW-3	NDGW03	4/5/2012	10.32	0.885	6.02	8.79	15

Table D-2 Field Parameter Results

State ID	Study ID	Date	Temp. (°C)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	pH	ORP
MW-3	NDGW03	10/17/2012	8.21	0.891	4.35	7.53	42
MW-4	NDGW04	10/8/2010	-	-	-	-	-
MW-4	NDGW04	11/23/2010	-	-	-	-	-
MW-4	NDGW04	1/12/2011	-	-	-	-	-
MW-4	NDGW04	2/23/2011	-	-	-	-	-
MW-4	NDGW04	3/24/2011	-	-	-	-	-
MW-4	NDGW04	4/27/2011	-	-	-	-	-
MW-4	NDGW04	5/2/2011	8.58	2.12	0.39	8.14	-50
MW-4	NDGW04	6/1/2011	8.83	2.17	1.83	7.86	-72
MW-4	NDGW04	7/9/2011	9.46	1.83	3.19	8.98	-35
MW-4	NDGW04	7/18/2011	10.04	1.85	0.35	8.32	-63
MW-4	NDGW04	8/16/2011	9.32	1.87	0.46	7.56	-175
MW-4	NDGW04	9/6/2011	9.47	1.86	0.93	7.72	-168
MW-4	NDGW04	10/18/2011	8.58	1.939	0.08	7.34	-42
MW-4	NDGW04	4/5/2012	8.84	1.835	0.31	7.37	-78.8
MW-4	NDGW04	10/17/2012	8.72	2.077	0.3	7.34	-92.9
MW-5	NDGW05	3/24/2011	-	-	-	-	-
MW-5	NDGW05	4/27/2011	-	-	-	-	-
MW-5	NDGW05	5/3/2011	8.92	1.299	0.21	8.09	6
MW-5	NDGW05	6/1/2011	8.86	1.224	2.5	7.98	57
MW-5	NDGW05	7/10/2011	10.03	1.07	1.73	9.3	67
MW-5	NDGW05	7/18/2011	11.65	1.22	0.17	8.03	-26
MW-5	NDGW05	8/16/2011	10.96	1.079	1.07	7.67	56
MW-5	NDGW05	9/7/2011					
MW-5	NDGW05	10/18/2011	9.1	1.091	1.86	9.33	-8
MW-5	NDGW05	4/5/2012	9.9	1.006	0.14	7.58	18
MW-5	NDGW05	10/17/2012	9.09	1.068	1.58	8.17	47
MW-6	NDGW06	3/24/2011	-	-	-	-	-
MW-6	NDGW06	4/27/2011	-	-	-	-	-
MW-6	NDGW06	5/3/2011	10.4	1.311	0.29	8.09	71
MW-6	NDGW06	6/1/2011	9.59	1.268	1.61	7.71	57
MW-6	NDGW06	7/10/2011	10.71	1.051	1.07	9.05	85
MW-6	NDGW06	7/18/2011	11.75	1.059	0.07	7.45	91
MW-6	NDGW06	8/16/2011	10.6	1.019	0.73	8.16	86
MW-6	NDGW06	9/7/2011	11.57	0.994	0.62	8.85	65
MW-6	NDGW06	10/18/2011	9.5	0.705	1.22	10.28	-240
MW-6	NDGW06	4/5/2012	10.29	0.772	0.17	7.49	-8
MW-6	NDGW06	10/18/2012	9.44	1.167	0.54	8.16	46
MW-7	NDGW07	3/24/2011	-	-	-	-	-
MW-7	NDGW07	4/27/2011	-	-	-	-	-
MW-7	NDGW07	5/2/2011	8.59	1.41	0.3	8.48	-84
MW-7	NDGW07	6/1/2011	9.1	1.236	1.14	8.18	-184
MW-7	NDGW07	7/9/2011	9.66	1.78	2.08	8.95	-254
MW-7	NDGW07	7/18/2011	10.49	2.43	0.32	8.78	-208
MW-7	NDGW07	8/16/2011	9.9	3.47	1.95	7.85	-223
MW-7	NDGW07	9/7/2011	10.75	3.87	0.53	8.36	-196
MW-7	NDGW07	10/18/2011	8.72	3.921	2.57	7.52	-80

Table D-2 Field Parameter Results

State ID	Study ID	Date	Temp. (°C)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	pH	ORP
MW-7	NDGW07	4/5/2012	10.49	6.61	0.4	7.26	-99.3
MW-7	NDGW07	10/18/2012	9.6	2.927	0.28	7.43	-73.7
MW-8S	NDGW08	3/24/2011	-	-	-	-	-
MW-8S	NDGW08	4/27/2011	-	-	-	-	-
MW-8S	NDGW08	5/2/2011	9.24	4.16	0.24	8.32	-166
MW-8S	NDGW08	6/1/2011	10.1	11.06	0.68	7.28	-149
MW-8S	NDGW08	7/10/2011	10.88	11.02	2.4	7.25	-129
MW-8S	NDGW08	7/18/2011	11.47	8.225	0.22	7.38	-111.2
MW-8S	NDGW08	8/16/2011	10.2	8.73	0.74	7.57	-139
MW-8S	NDGW08	9/7/2011	11.12	7.39	3.07	7.73	-137
MW-8S	NDGW08	10/18/2011	9.68	6.25	0.57	7.33	-157
MW-8S	NDGW08	4/5/2012	12.21	3.202	0.28	7.4	-142.4
MW-8S	NDGW08	10/18/2012	11.14	2.984	0.22	7.39	-170.9
MW-8D	NDGW09	3/24/2011	-	-	-	-	-
MW-8D	NDGW09	4/27/2011	-	-	-	-	-
MW-8D	NDGW09	5/5/2011	9.05	1.87	0.27	8.8	27
MW-8D	NDGW09	6/1/2011	10	1.89	0.86	9.02	-127
MW-8D	NDGW09	7/10/2011	10.44	1.86	2.35	9.67	-129
MW-8D	NDGW09	7/18/2011	11.85	1.88	1.07	8.9	-104
MW-8D	NDGW09	8/16/2011	10.93	1.87	1.32	8.85	-144
MW-8D	NDGW09	9/7/2011	11.02	1.86	3.99	9.16	-133
MW-8D	NDGW09	10/18/2011	10.14	1.92	0.14	8.4	71
MW-8D	NDGW09	4/5/2012	11.97	1.701	0.29	8.52	-85.9
MW-8D	NDGW09	10/18/2012	11.15	1.851	0.33	8.63	-173.2

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	Lab pH	pH QC	Lab Dissolved Oxygen	Lab Dissolved Oxygen QC	Total Alkalinity as CaCO3	Total Alkalinity as CaCO3 QC	$NO_3 + NO_2$	$NO_3 + NO_2$ QC
Units					mg/L		mg/L		mg N/L	
CW-5	NDGW16	9/2/2010	8.0		10.4	H	527		0.01	
CW-5	NDGW16	9/2/2010	8.07		-		528		0.04	
CW-5	NDGW16	1/13/2011	7.4		7.1		511		0.02	
CW-5	NDGW16	1/13/2011	7.66		-		515		0.03	
CW-5	NDGW16	5/4/2011	7.5		7.3		531		0.01	
CW-5	NDGW16	7/19/2011	7.4		6.7		552		<0.01	
CW-5	NDGW16	10/19/2011			6.9		581		<0.01	
CW-5	NDGW16	4/6/2012	7.5		7.8	H	528		<0.01	
CW-4	NDGW15	9/2/2010	7.6		7.5	H	535		<0.01	
CW-4	NDGW15	9/2/2010	7.56		-		549		0.03	
CW-4	NDGW15	1/13/2011	7.9		9.7		533		0.01	
CW-4	NDGW15	1/13/2011	7.62		-		539		0.07	
CW-4	NDGW15	5/4/2011	7.6		7.0		549		0.01	
CW-4	NDGW15	7/19/2011	7.4		6.6		546		<0.01	
CW-4	NDGW15	10/19/2011			7.4		554		<0.01	
CW-4	NDGW15	4/6/2012	7.5		7.6	H	551		<0.01	
CONFIDENTIAL	NDGW11	9/2/2010	7.6		7.0	H	431		<0.01	
CONFIDENTIAL	NDGW11	9/2/2010	7.72		-		441		<0.03	
CONFIDENTIAL	NDGW11	1/13/2011	7.6		9.5		428		<0.01	
CONFIDENTIAL	NDGW11	1/13/2011	7.65		-		425		<0.03	
CONFIDENTIAL	NDGW11	5/4/2011	7.6		5.7		449		0.01	
CONFIDENTIAL	NDGW11	7/19/2011	7.5		3.9		437		<0.01	
CONFIDENTIAL	NDGW11	10/19/2011			7.1		434		<0.01	
CONFIDENTIAL	NDGW11	4/6/2012	7.6		7.8	H	442		<0.01	
Truchan Depot	NDGW13	10/7/2010	7.6		4.2		470		<0.01	
Truchan Depot	NDGW13	10/7/2010	7.47		-		471		<0.03	
Truchan Depot	NDGW13	1/13/2011	7.5		6.1		459		<0.01	
Truchan Depot	NDGW13	1/13/2011	7.66		-		458		<0.03	
Truchan Depot	NDGW13	5/4/2011	7.7		8.6		474		<0.01	
Truchan Depot	NDGW13	7/19/2011	7.5		7.3		462		<0.01	
Truchan Depot	NDGW13	10/19/2011			6.8		469		<0.01	
Truchan Depot	NDGW13	4/6/2012	7.5		7.8	H	457		<0.01	
CONFIDENTIAL	NDGW12	9/2/2010	7.8		8.1	H	380		0.10	
CONFIDENTIAL	NDGW12	9/2/2010	7.75		-		384		0.10	
CONFIDENTIAL	NDGW12	1/13/2011	7.6		8.6		380		0.12	
CONFIDENTIAL	NDGW12	1/13/2011	7.65		-		385		0.11	
CONFIDENTIAL	NDGW12	5/3/2011	7.8		9.6		335		1.20	
CONFIDENTIAL	NDGW12	7/19/2011	7.6		6.1		423		0.10	
CONFIDENTIAL	NDGW12	10/19/2011			8.5		394		0.16	
CONFIDENTIAL	NDGW12	4/6/2012	7.6		7.8	H	382		0.18	
CONFIDENTIAL	NDGW10	9/2/2010	7.4		1.7	H	696		3.18	

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	NH_3	NH_3 QC	Br	Br QC	Cl	Cl QC	SO_4^2	SO_4^2 QC
Units			mg N/L		mg/L		mg/L		mg/L	
CW-5	NDGW16	9/2/2010	0.20		<0.5		8		273	
CW-5	NDGW16	9/2/2010	0.16		-		7.6		265	
CW-5	NDGW16	1/13/2011	0.25		<0.5		9		327	
CW-5	NDGW16	1/13/2011	0.33		-		6.94		303	
CW-5	NDGW16	5/4/2011	0.19		<0.5		9		316	
CW-5	NDGW16	7/19/2011	0.02		<5	D	10	D	308	D
CW-5	NDGW16	10/19/2011	0.29		<5	D	15	D	559	D
CW-5	NDGW16	4/6/2012	0.24		<0.5		9		290	
CW-4	NDGW15	9/2/2010	0.21		<0.5		3		228	
CW-4	NDGW15	9/2/2010	0.26		-		2.91		219	
CW-4	NDGW15	1/13/2011	0.22		<0.5		4		238	
CW-4	NDGW15	1/13/2011	0.17		-		2.81		220	
CW-4	NDGW15	5/4/2011	0.14		<0.5		4		232	
CW-4	NDGW15	7/19/2011	0.19		<0.5		4		237	
CW-4	NDGW15	10/19/2011	0.19		<0.5		3		231	
CW-4	NDGW15	4/6/2012	0.21		<0.5		4		226	
CONFIDENTIAL	NDGW11	9/2/2010	0.10		<0.5		1		80	
CONFIDENTIAL	NDGW11	9/2/2010	0.12		-		0.79		77.7	
CONFIDENTIAL	NDGW11	1/13/2011	0.09		<0.5		1		83	
CONFIDENTIAL	NDGW11	1/13/2011	0.06		-		0.77		74.2	
CONFIDENTIAL	NDGW11	5/4/2011	0.06		<0.5		1		85	
CONFIDENTIAL	NDGW11	7/19/2011	0.08		<0.5		1		87	
CONFIDENTIAL	NDGW11	10/19/2011	0.08		<0.5		1		81	
CONFIDENTIAL	NDGW11	4/6/2012	0.09		<0.5		1		81	
Truchan Depot	NDGW13	10/7/2010	0.20		<0.5		2		126	
Truchan Depot	NDGW13	10/7/2010	0.15		-		1.05		112	
Truchan Depot	NDGW13	1/13/2011	0.20		<0.5		2		132	
Truchan Depot	NDGW13	1/13/2011	0.17		-		0.94		118	
Truchan Depot	NDGW13	5/4/2011	0.14		<0.5		1		126	
Truchan Depot	NDGW13	7/19/2011	0.18		<0.5		2		133	
Truchan Depot	NDGW13	10/19/2011	0.20		<0.5		1		123	
Truchan Depot	NDGW13	4/6/2012	0.19		<0.5		2		127	
CONFIDENTIAL	NDGW12	9/2/2010	<0.05		<0.5		3		71	
CONFIDENTIAL	NDGW12	9/2/2010	0.06		-		2.86		67.9	
CONFIDENTIAL	NDGW12	1/13/2011	<0.05		<0.5		4		79	
CONFIDENTIAL	NDGW12	1/13/2011	<0.03		-		3.08		70.9	
CONFIDENTIAL	NDGW12	5/3/2011	<0.05		<0.5		6		79	
CONFIDENTIAL	NDGW12	7/19/2011	<0.05		<0.5		4		80	
CONFIDENTIAL	NDGW12	10/19/2011	0.06		<0.5		4		75	
CONFIDENTIAL	NDGW12	4/6/2012	<0.05		<0.5		6		82	
CONFIDENTIAL	NDGW10	9/2/2010	<0.05		<0.5		17		308	

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	Lab pH	pH QC	Lab Dissolved Oxygen	Lab Dissolved Oxygen QC	Total Alkalinity as CaCO3	Total Alkalinity as CaCO3 QC	$NO_3 + NO_2$	$NO_3 + NO_2$ QC
Units					mg/L		mg/L		mg N/L	
CONFIDENTIAL	NDGW10	9/2/2010	7.48		-		708		3.06	
CONFIDENTIAL	NDGW10	1/13/2011	7.3		8.1		684		7.50	
CONFIDENTIAL	NDGW10	1/13/2011	7.51		-		684		7.20	
CONFIDENTIAL	NDGW10	5/4/2011	7.4		7.9		745		11.6	D
CONFIDENTIAL	NDGW10	7/19/2011	7.3		6.0		777		9.38	D
CONFIDENTIAL	NDGW10	8/4/2011	7.3		7.4		755		11.9	D
CONFIDENTIAL	NDGW10	10/19/2011			7.9		727		12.6	D
CONFIDENTIAL	NDGW10	4/6/2012	7.3		8.0	H	716		21.0	D
Well 14509529AAAD	NDGW14	9/2/2010	8.0		7.3	H	528		0.01	
Well 14509529AAAD	NDGW14	1/14/2011	7.9		7.4		535		0.02	
Well 14509529AAAD	NDGW14	5/3/2011	7.9		7.9		551		0.02	
Well 14509529AAAD	NDGW14	7/20/2011	7.8		8.1		546		0.01	
Well 14509529AAAD	NDGW14	10/17/2011			6.8		547		<0.01	
Well 14509529AAAD	NDGW14	4/5/2012	7.8		7.6	H	553		<0.01	
Well 14509529AAAD	NDGW14	10/18/2012	7.8	H	2.2	H	562		<0.01	
MW-1	NDGW01	9/3/2010	8.0		7.3	H	110		0.32	
MW-1	NDGW01	9/7/2010	7.65		-		169		0.34	
MW-1	NDGW01	10/8/2010	7.8		6.8		232		0.23	
MW-1	NDGW01	11/24/2010	7.7		9.2		269		0.45	
MW-1	NDGW01	1/13/2011	7.6		7.5		313		0.66	
MW-1	NDGW01	1/13/2011	7.7		-		307		0.80	
MW-1	NDGW01	2/23/2011	7.5		7.9		315		0.82	
MW-1	NDGW01	3/27/2011	7.6		7.7		325		1.10	
MW-1	NDGW01	5/3/2011	7.7		7.3		338		0.81	
MW-1	NDGW01	5/31/2011	7.4		8.5		329		1.19	
MW-1	NDGW01	7/10/2011	7.6		8.6		275		0.37	
MW-1	NDGW01	7/18/2011	7.5		9.8		278		0.36	
MW-1	NDGW01	8/16/2011	7.6		10.0		246		0.23	
MW-1	NDGW01	9/6/2011	7.4		9.5		241		0.21	
MW-1	NDGW01	10/18/2011			7.9		245		0.21	
MW-1	NDGW01	4/5/2012	7.7		10.8	H	254		0.13	
MW-1	NDGW01	10/18/2012	7.7	H	6.9	H	304		0.22	
MW-2	NDGW02	9/3/2010	8.0		7.6	H	192		0.44	
MW-2	NDGW02	9/7/2010	7.78		-		295		0.39	
MW-2	NDGW02	10/8/2010	7.8		6.6		338		0.24	
MW-2	NDGW02	11/24/2010	7.6		8.4		335		0.29	
MW-2	NDGW02	1/13/2011	7.6		6.5		345		0.34	
MW-2	NDGW02	1/13/2011	7.8		-		352		0.38	
MW-2	NDGW02	2/23/2011	7.5		7.2		341		0.47	
MW-2	NDGW02	3/27/2011	7.6		8.7		331		0.62	
MW-2	NDGW02	5/2/2011	7.8		9.6		361		0.50	

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	NH_3	NH_3 QC	Br	Br QC	Cl	Cl QC	SO_4^2	SO_4^2 QC
Units			mg N/L		mg/L		mg/L		mg/L	
CONFIDENTIAL	NDGW10	9/2/2010	<0.03		-		14.4		286	
CONFIDENTIAL	NDGW10	1/13/2011	<0.05		<0.5		39		394	
CONFIDENTIAL	NDGW10	1/13/2011	<0.03		-		30.3		366	
CONFIDENTIAL	NDGW10	5/4/2011	<0.05		<1.0	D	37		393	D
CONFIDENTIAL	NDGW10	7/19/2011	<0.05		<0.5	D	37	D	395	D
CONFIDENTIAL	NDGW10	8/4/2011	<0.05		<0.5		39		410	
CONFIDENTIAL	NDGW10	10/19/2011	<0.05		<0.5	D	31	D	382	D
CONFIDENTIAL	NDGW10	4/6/2012	<0.05		<1	D	55	D	527	D
Well 14509529AAAD	NDGW14	9/2/2010	<0.05		<0.5		2		168	
Well 14509529AAAD	NDGW14	1/14/2011	<0.05		<0.5		2		166	
Well 14509529AAAD	NDGW14	5/3/2011	<0.05		<0.5		2		165	
Well 14509529AAAD	NDGW14	7/20/2011	<0.05		<0.5		2		183	
Well 14509529AAAD	NDGW14	10/17/2011	<0.02		<0.5		2		180	
Well 14509529AAAD	NDGW14	4/5/2012	0.06		<0.5		2		169	
Well 14509529AAAD	NDGW14	10/18/2012	0.06		0.6		2		184	
MW-1	NDGW01	9/3/2010	0.10		<0.5		14		162	
MW-1	NDGW01	9/7/2010	<0.17		0.1		10.7		159	
MW-1	NDGW01	10/8/2010	<0.05		<0.5		10		136	
MW-1	NDGW01	11/24/2010	<0.05		<1.0	D	8	D	98	D
MW-1	NDGW01	1/13/2011	<0.05		0.9		7		98	
MW-1	NDGW01	1/13/2011	0.04		-		5.58		86.8	
MW-1	NDGW01	2/23/2011	<0.05		<0.5		6		85	
MW-1	NDGW01	3/27/2011	<0.05		<0.5		5		76	
MW-1	NDGW01	5/3/2011	<0.05		<0.5		4		59	
MW-1	NDGW01	5/31/2011	<0.05		<0.5		7		57	
MW-1	NDGW01	7/10/2011	<0.05		<0.5		15		84	
MW-1	NDGW01	7/18/2011	<0.05		<0.5		16		92	
MW-1	NDGW01	8/16/2011	<0.05		<0.5		20		127	
MW-1	NDGW01	9/6/2011	<0.05		<0.5		20		140	
MW-1	NDGW01	10/18/2011	<0.05		<0.5		20		146	
MW-1	NDGW01	4/5/2012	<0.05		<0.5		23		167	
MW-1	NDGW01	10/18/2012	<0.05		0.5		32		210	
MW-2	NDGW02	9/3/2010	0.08		<0.5		13		208	
MW-2	NDGW02	9/7/2010	<0.17		0.01		6.75		220	
MW-2	NDGW02	10/8/2010	<0.05		<0.5		4		206	
MW-2	NDGW02	11/24/2010	<0.05		<1.0	D	3		176	D
MW-2	NDGW02	1/13/2011	<0.05		1.0		3		210	
MW-2	NDGW02	1/13/2011	0.04		-		2.44		188	
MW-2	NDGW02	2/23/2011	<0.05		<0.5		3		203	
MW-2	NDGW02	3/27/2011	<0.05		<0.5		3		190	
MW-2	NDGW02	5/2/2011	<0.05		<0.5		3		214	

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	Lab pH	pH QC	Lab Dissolved Oxygen	Lab Dissolved Oxygen QC	Total Alkalinity as CaCO3	Total Alkalinity as CaCO3 QC	$NO_3 + NO_2$	$NO_3 + NO_2$ QC
Units					mg/L		mg/L		mg N/L	
MW-2	NDGW02	6/1/2011	7.5		9.1		359		0.37	
MW-2	NDGW02	7/9/2011	7.6		5.3		350		0.46	
MW-2	NDGW02	7/18/2011	7.6		6.2		352		0.51	
MW-2	NDGW02	8/15/2011	7.6		6.0		350		0.55	
MW-2	NDGW02	9/6/2011	7.4		4.9		350		0.56	
MW-2	NDGW02	10/18/2011			5.0		351		0.53	
MW-2	NDGW02	4/5/2012	7.6		9.4	H	341		0.65	
MW-2	NDGW02	10/17/2012	7.7	H	4.4	H	353		0.77	
MW-3	NDGW03	9/3/2010	8.0		6.9	H	221		0.41	
MW-3	NDGW03	9/8/2010	7.89		-		241		0.14	
MW-3	NDGW03	10/8/2010	7.9		6.2		248		0.01	
MW-3	NDGW03	11/24/2010	7.7		8.7		297		0.08	
MW-3	NDGW03	1/13/2011	7.6		7.6		320		0.06	
MW-3	NDGW03	2/23/2011	7.7		8.7		333		0.26	
MW-3	NDGW03	3/27/2011	7.7		6.6		336		0.07	
MW-3	NDGW03	5/2/2011	7.9		10.1		358		0.29	
MW-3	NDGW03	6/1/2011	7.6		8.5		377		0.29	
MW-3	NDGW03	7/9/2011	7.7		6.9		363		0.16	
MW-3	NDGW03	7/18/2011	7.8		7.5		360		0.39	
MW-3	NDGW03	8/15/2011	7.7		6.3		358		0.33	
MW-3	NDGW03	9/6/2011	7.5		6.3		356		0.30	
MW-3	NDGW03	10/18/2011			6.9		356		0.26	
MW-3	NDGW03	4/5/2012	7.7		9.4	H	366		0.20	
MW-3	NDGW03	10/17/2012	8.0	H	5.0	H	391		0.10	
MW-4	NDGW04	10/8/2010	7.8		7.0		309		0.16	
MW-4	NDGW04	11/24/2010	7.6		8.7		426		0.01	
MW-4	NDGW04	1/12/2011	7.57		-		456		<0.03	
MW-4	NDGW04	1/13/2011	7.4		7.4		439		0.01	
MW-4	NDGW04	2/23/2011	7.4		6.0		444		0.01	
MW-4	NDGW04	3/27/2011	7.5		7.6		440		0.02	
MW-4	NDGW04	5/2/2011	7.6		8.6		495		<0.01	
MW-4	NDGW04	6/1/2011	7.4		8.3		513		<0.01	
MW-4	NDGW04	7/9/2011	7.4		6.1		499		<0.01	
MW-4	NDGW04	7/18/2011	7.4		5.2		492		<0.01	
MW-4	NDGW04	8/18/2011	7.4		6.7		458		<0.01	
MW-4	NDGW04	9/6/2011	7.3		7.3		451		<0.01	
MW-4	NDGW04	10/18/2011			7.7		462		0.02	
MW-4	NDGW04	4/5/2012	7.4		9.2	H	428		<0.01	
MW-4	NDGW04	10/17/2012	7.5	H	2.9	H	433		<0.01	
MW-5	NDGW05	3/27/2011	7.7		8.6		405		0.66	
MW-5	NDGW05	5/3/2011	7.7		3.3		390		0.33	D

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	NH_3	NH_3 QC	Br	Br QC	Cl	Cl QC	SO_4^2	SO_4^2 QC
Units			mg N/L		mg/L		mg/L		mg/L	
MW-2	NDGW02	6/1/2011	<0.05		<0.5		3		233	
MW-2	NDGW02	7/9/2011	<0.05		<0.5		3		211	
MW-2	NDGW02	7/18/2011	<0.05		<0.5		3		217	
MW-2	NDGW02	8/15/2011	<0.05		<0.5		3		216	
MW-2	NDGW02	9/6/2011	<0.05		<0.5		2		208	
MW-2	NDGW02	10/18/2011	<0.05		<0.5		2		206	
MW-2	NDGW02	4/5/2012	<0.05		<0.5		3		184	
MW-2	NDGW02	10/17/2012	<0.05		<0.5		3		177	
MW-3	NDGW03	9/3/2010	0.05		0.8		8		55	
MW-3	NDGW03	9/8/2010	<0.17		0.13		7.71		66.4	
MW-3	NDGW03	10/8/2010	<0.05		<0.5		7		90	
MW-3	NDGW03	11/24/2010	<0.05		<1.0		6	D	107	D
MW-3	NDGW03	1/13/2011	<0.05		1.8		6		138	
MW-3	NDGW03	2/23/2011	<0.05		1.2		6		144	
MW-3	NDGW03	3/27/2011	<0.05		0.5		6		142	
MW-3	NDGW03	5/2/2011	<0.05		<0.5		5		142	
MW-3	NDGW03	6/1/2011	0.12		<0.5		4		142	
MW-3	NDGW03	7/9/2011	<0.05		<0.5		4		132	
MW-3	NDGW03	7/18/2011	0.06		<0.5		4		128	
MW-3	NDGW03	8/15/2011	<0.05		<0.5		4		123	
MW-3	NDGW03	9/6/2011	<0.05		<0.5		3		119	
MW-3	NDGW03	10/18/2011	<0.05		<0.5		3		111	
MW-3	NDGW03	4/5/2012	<0.05		<0.5		3		110	
MW-3	NDGW03	10/17/2012	<0.05		<0.5		3		113	
MW-4	NDGW04	10/8/2010	0.17		<0.5		12		202	
MW-4	NDGW04	11/24/2010	<0.05		<1.0		17		467	D
MW-4	NDGW04	1/12/2011	<0.03		-		15.4		546	
MW-4	NDGW04	1/13/2011	<0.05		1.3		19		504	
MW-4	NDGW04	2/23/2011	<0.05		<0.5		19		535	
MW-4	NDGW04	3/27/2011	<0.05		<0.5		16		479	
MW-4	NDGW04	5/2/2011	<0.05		<1.0	D	17		669	D
MW-4	NDGW04	6/1/2011	0.07		<5		18		716	
MW-4	NDGW04	7/9/2011	<0.05		<5	D	16	D	580	D
MW-4	NDGW04	7/18/2011	<0.05		<5	D	16	D	573	D
MW-4	NDGW04	8/18/2011	<0.05		<5	D	16	D	593	D
MW-4	NDGW04	9/6/2011	<0.05		<5	D	12	D	578	D
MW-4	NDGW04	10/18/2011	<0.05		<5	D	11	D	587	D
MW-4	NDGW04	4/5/2012	<0.05		<1	D	12	D	689	D
MW-4	NDGW04	10/17/2012	<0.05		<1	D	11	D	724	D
MW-5	NDGW05	3/27/2011	<0.05		<0.5		25		238	
MW-5	NDGW05	5/3/2011	<0.05		<0.5		30		252	

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	Lab pH	pH QC	Lab Dissolved Oxygen	Lab Dissolved Oxygen QC	Total Alkalinity as CaCO3	Total Alkalinity as CaCO3 QC	NO_3 + NO_2	NO_3 + NO_2 QC
Units					mg/L		mg/L		mg N/L	
MW-5	NDGW05	6/1/2011	7.6		8.2		391		0.40	
MW-5	NDGW05	7/10/2011	7.6		7.5		372		1.11	
MW-5	NDGW05	7/18/2011	7.5		7.1		377		1.04	D
MW-5	NDGW05	8/16/2011	7.5		2.7		371		1.34	
MW-5	NDGW05	9/7/2011								
MW-5	NDGW05	10/18/2011			6.6		367		1.37	
MW-5	NDGW05	4/5/2012	7.6		9.8	H	380		1.55	D
MW-5	NDGW05	10/17/2012	7.7	H	8.8	H	395		1.18	D
MW-6	NDGW06	3/27/2011	7.5		8.6		394		1.09	
MW-6	NDGW06	5/3/2011	7.7		8.4		408		0.25	
MW-6	NDGW06	6/1/2011	7.4		6.9		403		0.49	
MW-6	NDGW06	7/10/2011	7.5		5.7		419		0.92	
MW-6	NDGW06	7/18/2011	7.5		6.5		414		1.08	D
MW-6	NDGW06	8/16/2011	7.5		6.2		368		1.10	
MW-6	NDGW06	9/7/2011	7.4		5.6		362		1.20	D
MW-6	NDGW06	10/18/2011			7.0		360		1.15	
MW-6	NDGW06	4/5/2012	7.6		9.7	H	341		1.25	
MW-6	NDGW06	10/18/2012	7.7	H	8.4	H	312		0.98	D
MW-7	NDGW07	3/27/2011	7.7		7.0		400		0.01	
MW-7	NDGW07	5/2/2011	7.8		5.5		417		<0.01	
MW-7	NDGW07	6/1/2011	7.6		6.3		407		<0.01	
MW-7	NDGW07	7/9/2011	7.5		6.2		368		0.02	
MW-7	NDGW07	7/18/2011	7.4		4.8		344		<0.01	
MW-7	NDGW07	8/16/2011	7.3		6.5		341		0.02	
MW-7	NDGW07	9/7/2011	7.2		6.3		293		0.01	
MW-7	NDGW07	10/18/2011			6.2		285		<0.01	
MW-7	NDGW07	4/5/2012	7.2		9.9	H	380		<0.01	
MW-7	NDGW07	10/18/2012	7.5	H	6.2	H	441		<0.01	
MW-8S	NDGW08	3/27/2011	7.4		7.8		397		0.01	
MW-8S	NDGW08	5/2/2011	7.5		6.9		419		0.02	
MW-8S	NDGW08	6/1/2011	6.7		6.8		269		<0.01	
MW-8S	NDGW08	7/10/2011	6.7		5.2		278		0.02	
MW-8S	NDGW08	7/18/2011	6.8		3.9		319		0.02	
MW-8S	NDGW08	8/16/2011	6.9		6.8		324		0.05	
MW-8S	NDGW08	9/7/2011	6.9		6.1		353		<0.01	
MW-8S	NDGW08	10/18/2011			6.6		390		<0.01	
MW-8S	NDGW08	4/5/2012	7.3		10.4		445		<0.01	
MW-8S	NDGW08	10/18/2012	7.4	H	5.6	H	447		<0.01	
MW-8D	NDGW09	3/27/2011	7.8		10.8		423		0.03	
MW-8D	NDGW09	5/5/2011	8.4		6.7		812		<0.01	
MW-8D	NDGW09	6/1/2011	8.3		6.7		823		0.03	

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	NH_3	NH_3 QC	Br	Br QC	Cl	Cl QC	SO_4^2	SO_4^2 QC
Units			mg N/L		mg/L		mg/L		mg/L	
MW-5	NDGW05	6/1/2011	0.06		<0.5		18		247	
MW-5	NDGW05	7/10/2011	<0.05		<0.5		10		203	
MW-5	NDGW05	7/18/2011	<0.05		<0.5		11		213	
MW-5	NDGW05	8/16/2011	<0.05		<0.5		10		204	
MW-5	NDGW05	9/7/2011								
MW-5	NDGW05	10/18/2011	<0.05		<0.5		9		214	
MW-5	NDGW05	4/5/2012	<0.05		<0.5		9		197	
MW-5	NDGW05	10/17/2012	<0.05		<0.5		9		163	
MW-6	NDGW06	3/27/2011	<0.05		<0.5		14		231	
MW-6	NDGW06	5/3/2011	<0.05		<0.5		15		287	
MW-6	NDGW06	6/1/2011	0.06		<0.5		13		266	
MW-6	NDGW06	7/10/2011	<0.05		<0.5		10		188	
MW-6	NDGW06	7/18/2011	<0.05		<0.5		10		184	
MW-6	NDGW06	8/16/2011	<0.05		<0.5		10		164	
MW-6	NDGW06	9/7/2011	<0.05		<0.5		9		153	
MW-6	NDGW06	10/18/2011	<0.05		<0.5		9		143	
MW-6	NDGW06	4/5/2012	<0.05		<0.5		9		97	
MW-6	NDGW06	10/18/2012	<0.05		1.6		150		73	
MW-7	NDGW07	3/27/2011	<0.05		<0.5		7		283	
MW-7	NDGW07	5/2/2011	<0.05		<0.5		8		322	
MW-7	NDGW07	6/1/2011	0.05		<0.5		4		275	
MW-7	NDGW07	7/9/2011	<0.05		2.7		257	D	243	D
MW-7	NDGW07	7/18/2011	<0.05		<5	D	602	D	218	D
MW-7	NDGW07	8/16/2011	<0.05		<10	D	1040	D	178	D
MW-7	NDGW07	9/7/2011	<0.05		<10	D	1190	D	167	D
MW-7	NDGW07	10/18/2011	<0.05		<10	D	1730	D	160	D
MW-7	NDGW07	4/5/2012	<0.05		27	D	2330	D	181	D
MW-7	NDGW07	10/18/2012	<0.05		8	D	679	D	194	D
MW-8S	NDGW08	3/27/2011	<0.05		<0.5	D	243	D	689	D
MW-8S	NDGW08	5/2/2011	<0.05		<10	D	777	D	588	D
MW-8S	NDGW08	6/1/2011	0.11		<20	D	3680	D	475	D
MW-8S	NDGW08	7/10/2011	0.08		29	D	3670	D	446	D
MW-8S	NDGW08	7/18/2011	0.09		<20	D	3280	D	446	D
MW-8S	NDGW08	8/16/2011	0.06		<20	D	2710	D	437	D
MW-8S	NDGW08	9/7/2011	0.06		<20	D	2140	D	462	D
MW-8S	NDGW08	10/18/2011	<0.05		<10	D	1660	D	500	D
MW-8S	NDGW08	4/5/2012	<0.05		<5	D	534	D	678	D
MW-8S	NDGW08	10/18/2012	<0.05		3	D	226	D	682	D
MW-8D	NDGW09	3/27/2011	<0.05		<0.5		12		137	
MW-8D	NDGW09	5/5/2011	0.12		<1.0		3		219	
MW-8D	NDGW09	6/1/2011	0.29		<0.5		3		225	

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	Lab pH	pH QC	Lab Dissolved Oxygen	Lab Dissolved Oxygen QC	Total Alkalinity as CaCO3	Total Alkalinity as CaCO3 QC	NO_3 + NO_2	NO_3 + NO_2 QC
Units					mg/L		mg/L		mg N/L	
MW-8D	NDGW09	7/10/2011	8.4		5.1		844		0.01	
MW-8D	NDGW09	7/18/2011	8.4		6.8		838		<0.01	
MW-8D	NDGW09	8/16/2011	8.4		5.6		801		0.10	
MW-8D	NDGW09	9/7/2011	8.4		4.0		806		0.01	
MW-8D	NDGW09	10/18/2011			7.2		808		0.02	
MW-8D	NDGW09	4/5/2012	8.4		10.1	H	811		0.01	
MW-8D	NDGW09	10/18/2012	8.4	H	4.7	H	819		0.02	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

NDGW05 on 9/7/2011 Not sampled due to site activity

Table D-3 Anion, Nutrient, and Physical Chemistry Results

State ID[1]	Study ID	Date Collected	NH_3	NH_3 QC	Br	Br QC	Cl	Cl QC	SO_4^{2}	SO_4^{2} QC
Units			mg N/L		mg/L		mg/L		mg/L	
MW-8D	NDGW09	7/10/2011	0.23		<0.5		4	D	214	D
MW-8D	NDGW09	7/18/2011	0.21		<5	D	4	D	207	D
MW-8D	NDGW09	8/16/2011	0.20		<5	D	4	D	206	D
MW-8D	NDGW09	9/7/2011	0.35		<5	D	3	D	203	D
MW-8D	NDGW09	10/18/2011	0.22		<5	D	3	D	206	D
MW-8D	NDGW09	4/5/2012	0.23		<0.5		4	D	206	D
MW-8D	NDGW09	10/18/2012	0.24		<0.5		3		221	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

NDGW05 on 9/7/2011 Not sampled due to site activity

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Dissolved Ca	Dissolved Ca QC	Dissolved K	Dissolved K QC	Dissolved Mg	Dissolved Mg QC	Dissolved Na	Dissolved Na QC
Units			mg/L		mg/L		mg/L		mg/L	
CW-5	NDGW16	9/2/2010	58		7		25		248	
CW-5	NDGW16	9/2/2010	60		7		27		280	
CW-5	NDGW16	1/13/2011	61		7		26		273	
CW-5	NDGW16	1/13/2011	64		7		27		267	
CW-5	NDGW16	5/4/2011	62		7		25		262	
CW-5	NDGW16	7/19/2011	65		6		26		257	
CW-5	NDGW16	10/19/2011	134		9		56		294	
CW-5	NDGW16	4/6/2012	62		7		25		262	
CW-4	NDGW15	9/2/2010	48		6		20		254	
CW-4	NDGW15	9/2/2010	46		6		21		271	
CW-4	NDGW15	1/13/2011	44		7		20		275	
CW-4	NDGW15	1/13/2011	45		6		20		259	
CW-4	NDGW15	5/4/2011	44		6		19		268	
CW-4	NDGW15	7/19/2011	46		7		20		273	
CW-4	NDGW15	10/19/2011	45		6		21		303	
CW-4	NDGW15	4/6/2012	45		6		20		262	
CONFIDENTIAL	NDGW11	9/2/2010	35		4		12		174	
CONFIDENTIAL	NDGW11	9/2/2010	34		4		12		181	
CONFIDENTIAL	NDGW11	1/13/2011	31		4		11		184	
CONFIDENTIAL	NDGW11	1/13/2011	33		4		12		176	
CONFIDENTIAL	NDGW11	5/4/2011	32		4		11		180	
CONFIDENTIAL	NDGW11	7/19/2011	33		4		11		173	
CONFIDENTIAL	NDGW11	10/19/2011	32		4		12		197	
CONFIDENTIAL	NDGW11	4/6/2012	32		4		11		178	
Truchan Depot	NDGW13	10/7/2010	38		6		12		213	
Truchan Depot	NDGW13	10/7/2010	28		4		11		213	
Truchan Depot	NDGW13	1/13/2011	36		6		12		213	
Truchan Depot	NDGW13	1/13/2011	38		5		12		212	
Truchan Depot	NDGW13	5/4/2011	35		5		11		196	
Truchan Depot	NDGW13	7/19/2011	35		5		11		208	
Truchan Depot	NDGW13	10/19/2011	34		6		12		229	
Truchan Depot	NDGW13	4/6/2012	34		5		11		206	
CONFIDENTIAL	NDGW12	9/2/2010	34		3		12		146	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Ag	Total Ag QC	Total As	Total As QC	Total Ba	Total Ba QC	Total Cd	Total Cd QC
Units			mg/L		mg/L		mg/L		mg/L	
CW-5	NDGW16	9/2/2010	<0.005		<0.005		<0.1		<0.001	
CW-5	NDGW16	9/2/2010	-		0.004		0.03		<0.001	
CW-5	NDGW16	1/13/2011	<0.005		0.006		<0.1		<0.001	
CW-5	NDGW16	1/13/2011	<0.005		<0.005		0.03		<0.005	
CW-5	NDGW16	5/4/2011	<0.005		0.005		<0.1		<0.001	
CW-5	NDGW16	7/19/2011	<0.005		0.006		<0.1		<0.001	
CW-5	NDGW16	10/19/2011	<0.005		0.006		<0.1		<0.001	
CW-5	NDGW16	4/6/2012	<0.005		0.006		<0.1		<0.001	
CW-4	NDGW15	9/2/2010	<0.005		0.006		<0.1		<0.001	
CW-4	NDGW15	9/2/2010	-		0.005		0.03		<0.001	
CW-4	NDGW15	1/13/2011	<0.005		0.006		<0.1		<0.001	
CW-4	NDGW15	1/13/2011	<0.005		<0.005		0.03		<0.005	
CW-4	NDGW15	5/4/2011	<0.005		<0.005		<0.1		<0.001	
CW-4	NDGW15	7/19/2011	<0.005		<0.005		<0.1		<0.001	
CW-4	NDGW15	10/19/2011	<0.005		<0.005		<0.1		<0.001	
CW-4	NDGW15	4/6/2012	<0.005		0.006		<0.1		<0.001	
CONFIDENTIAL	NDGW11	9/2/2010	<0.005		0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW11	9/2/2010	-		0.004		0.06		<0.001	
CONFIDENTIAL	NDGW11	1/13/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW11	1/13/2011	<0.005		<0.005		0.05		<0.005	
CONFIDENTIAL	NDGW11	5/4/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW11	7/19/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW11	10/19/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW11	4/6/2012	<0.005		<0.005		<0.1		<0.001	
Truchan Depot	NDGW13	10/7/2010	<0.005		0.006		<0.1		<0.001	
Truchan Depot	NDGW13	10/7/2010	<0.005		<0.005		0.03		<0.005	
Truchan Depot	NDGW13	1/13/2011	<0.005		0.006		<1.0		<0.001	
Truchan Depot	NDGW13	1/13/2011	<0.005		0.006		0.03		0.005	
Truchan Depot	NDGW13	5/4/2011	<0.005		0.008		<0.1		<0.001	
Truchan Depot	NDGW13	7/19/2011	<0.005		0.007		<0.1		<0.001	
Truchan Depot	NDGW13	10/19/2011	<0.005		0.007		<0.1		<0.001	
Truchan Depot	NDGW13	4/6/2012	<0.005		0.007		<0.1		<0.001	
CONFIDENTIAL	NDGW12	9/2/2010	<0.005		<0.005		<0.1		<0.001	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Cr	Total Cr QC	Dissolved Fe	Dissolved Fe QC	Total Hg	Total Hg QC	Total Pb	Total Pb QC
Units			mg/L		mg/L		mg/L		mg/L	
CW-5	NDGW16	9/2/2010	<0.01		0.37		<0.001		<0.01	
CW-5	NDGW16	9/2/2010	<0.001		-		-		0.0112	
CW-5	NDGW16	1/13/2011	<0.01		0.04		<0.001		<0.01	
CW-5	NDGW16	1/13/2011	<0.005		-		-		<0.005	
CW-5	NDGW16	5/4/2011	<0.01		1.65		<0.001		<0.01	
CW-5	NDGW16	7/19/2011	<0.01		3.13		<0.001		<0.01	
CW-5	NDGW16	10/19/2011	<0.01		8.08		<0.001		<0.01	
CW-5	NDGW16	4/6/2012	<0.01		3.41		<0.0001		<0.01	
CW-4	NDGW15	9/2/2010	<0.01		0.14		<0.001		<0.01	
CW-4	NDGW15	9/2/2010	<0.001		-		-		<0.001	
CW-4	NDGW15	1/13/2011	<0.1		0.29		<0.001		<0.1	
CW-4	NDGW15	1/13/2011	<0.005		-		-		<0.005	
CW-4	NDGW15	5/4/2011	<0.01		2.23		<0.001		<0.01	
CW-4	NDGW15	7/19/2011	<0.01		2.43		<0.001		<0.01	
CW-4	NDGW15	10/19/2011	<0.01		2.06		<0.001		<0.01	
CW-4	NDGW15	4/6/2012	<0.01		2.52		<0.0001		<0.01	
CONFIDENTIAL	NDGW11	9/2/2010	<0.01		0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW11	9/2/2010	0.00101		-		-		0.00101	
CONFIDENTIAL	NDGW11	1/13/2011	<0.01		0.05		<0.001		<0.01	
CONFIDENTIAL	NDGW11	1/13/2011	<0.005		-		-		<0.005	
CONFIDENTIAL	NDGW11	5/4/2011	<0.01		0.99		<0.001		<0.01	
CONFIDENTIAL	NDGW11	7/19/2011	<0.01		1.08		<0.001		<0.01	
CONFIDENTIAL	NDGW11	10/19/2011	<0.01		1.08		<0.001		<0.01	
CONFIDENTIAL	NDGW11	4/6/2012	<0.01		1.13		<0.0001		<0.01	
Truchan Depot	NDGW13	10/7/2010	<0.01		0.10		<0.001		<0.01	
Truchan Depot	NDGW13	10/7/2010	<0.005		-		-		<0.005	
Truchan Depot	NDGW13	1/13/2011	<0.01		0.06		<0.001		<0.01	
Truchan Depot	NDGW13	1/13/2011	<0.005		-		-		<0.005	
Truchan Depot	NDGW13	5/4/2011	<0.01		0.92		<0.001		<0.01	
Truchan Depot	NDGW13	7/19/2011	<0.01		0.96		<0.001		<0.01	
Truchan Depot	NDGW13	10/19/2011	<0.01		0.86		<0.001		<0.01	
Truchan Depot	NDGW13	4/6/2012	<0.01		1.18		<0.0001		<0.01	
CONFIDENTIAL	NDGW12	9/2/2010	<0.01		<0.03		<0.001		<0.01	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Se	Total Se QC
Units			mg/L	
CW-5	NDGW16	9/2/2010	<0.005	
CW-5	NDGW16	9/2/2010	<0.001	
CW-5	NDGW16	1/13/2011	<0.005	
CW-5	NDGW16	1/13/2011	<0.005	
CW-5	NDGW16	5/4/2011	<0.005	
CW-5	NDGW16	7/19/2011	<0.005	
CW-5	NDGW16	10/19/2011	<0.005	
CW-5	NDGW16	4/6/2012	<0.005	
CW-4	NDGW15	9/2/2010	<0.005	
CW-4	NDGW15	9/2/2010	<0.001	
CW-4	NDGW15	1/13/2011	<0.005	
CW-4	NDGW15	1/13/2011	<0.005	
CW-4	NDGW15	5/4/2011	<0.005	
CW-4	NDGW15	7/19/2011	<0.005	
CW-4	NDGW15	10/19/2011	<0.005	
CW-4	NDGW15	4/6/2012	<0.005	
CONFIDENTIAL	NDGW11	9/2/2010	<0.005	
CONFIDENTIAL	NDGW11	9/2/2010	<0.001	
CONFIDENTIAL	NDGW11	1/13/2011	<0.005	
CONFIDENTIAL	NDGW11	1/13/2011	<0.005	
CONFIDENTIAL	NDGW11	5/4/2011	<0.005	
CONFIDENTIAL	NDGW11	7/19/2011	<0.005	
CONFIDENTIAL	NDGW11	10/19/2011	<0.005	
CONFIDENTIAL	NDGW11	4/6/2012	<0.005	
Truchan Depot	NDGW13	10/7/2010	<0.005	
Truchan Depot	NDGW13	10/7/2010	<0.005	
Truchan Depot	NDGW13	1/13/2011	<0.005	
Truchan Depot	NDGW13	1/13/2011	<0.005	
Truchan Depot	NDGW13	5/4/2011	<0.005	
Truchan Depot	NDGW13	7/19/2011	<0.005	
Truchan Depot	NDGW13	10/19/2011	<0.005	
Truchan Depot	NDGW13	4/6/2012	<0.005	
CONFIDENTIAL	NDGW12	9/2/2010	<0.005	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Dissolved Ca	Dissolved Ca QC	Dissolved K	Dissolved K QC	Dissolved Mg	Dissolved Mg QC	Dissolved Na	Dissolved Na QC
Units			mg/L		mg/L		mg/L		mg/L	
CONFIDENTIAL	NDGW12	9/2/2010	35		3		13		156	
CONFIDENTIAL	NDGW12	1/13/2011	31		4		12		157	
CONFIDENTIAL	NDGW12	1/13/2011	33		3		13		160	
CONFIDENTIAL	NDGW12	5/3/2011	51		4		17		96	
CONFIDENTIAL	NDGW12	7/19/2011	34		3		12		151	
CONFIDENTIAL	NDGW12	10/19/2011	32		3		12		169	
CONFIDENTIAL	NDGW12	4/6/2012	33		3		12		159	
CONFIDENTIAL	NDGW10	9/2/2010	78		6		33		316	
CONFIDENTIAL	NDGW10	9/2/2010	68		5		32		306	
CONFIDENTIAL	NDGW10	1/13/2011	87		7		39		370	
CONFIDENTIAL	NDGW10	1/13/2011	87		6		40		359	
CONFIDENTIAL	NDGW10	5/4/2011	90		6		40		363	
CONFIDENTIAL	NDGW10	7/19/2011	96	D	7		43		378	D
CONFIDENTIAL	NDGW10	8/4/2011	94		6		42		370	
CONFIDENTIAL	NDGW10	10/19/2011	93	D	7		44		385	D
CONFIDENTIAL	NDGW10	4/6/2012	118		7		54		412	D
Well 14509529AAAD	NDGW14	9/2/2010	45		6		18		236	
Well 14509529AAAD	NDGW14	1/14/2011	38		6		18		255	
Well 14509529AAAD	NDGW14	5/3/2011	38		5		17		240	
Well 14509529AAAD	NDGW14	7/20/2011	44		5		18		248	
Well 14509529AAAD	NDGW14	10/17/2011	44		5		19		278	
Well 14509529AAAD	NDGW14	4/5/2012	43		5		17		248	
Well 14509529AAAD	NDGW14	10/18/2012	45		5		20		248	
MW-1	NDGW01	9/3/2010	36		7		11		82	
MW-1	NDGW01	9/7/2010	42		4		13		87	
MW-1	NDGW01	10/8/2010	43		5		12		92	
MW-1	NDGW01	11/24/2010	47		5		14		105	
MW-1	NDGW01	1/13/2011	49		6		14		116	
MW-1	NDGW01	1/13/2011	51		6		15		115	
MW-1	NDGW01	2/23/2011	45		5		14		45	
MW-1	NDGW01	3/27/2011	45		6		13		128	
MW-1	NDGW01	5/3/2011	41		4		12		113	
MW-1	NDGW01	5/31/2011	36		4		10		107	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Ag	Total Ag QC	Total As	Total As QC	Total Ba	Total Ba QC	Total Cd	Total Cd QC
Units			mg/L		mg/L		mg/L		mg/L	
CONFIDENTIAL	NDGW12	9/2/2010	-		<0.001		0.05		<0.001	
CONFIDENTIAL	NDGW12	1/13/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW12	1/13/2011	<0.005		<0.005		0.04		<0.005	
CONFIDENTIAL	NDGW12	5/3/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW12	7/19/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW12	10/19/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW12	4/6/2012	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW10	9/2/2010	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW10	9/2/2010	-		<0.001		0.05		<0.001	
CONFIDENTIAL	NDGW10	1/13/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW10	1/13/2011	<0.005		<0.005		0.05		<0.005	
CONFIDENTIAL	NDGW10	5/4/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW10	7/19/2011	<0.005		<0.005		0.10		0.001	
CONFIDENTIAL	NDGW10	8/4/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW10	10/19/2011	<0.005		<0.005		<0.1		<0.001	
CONFIDENTIAL	NDGW10	4/6/2012	<0.005		<0.005		<0.1		<0.001	
Well 14509529AAAD	NDGW14	9/2/2010	<0.005		<0.005		<0.1		<0.001	
Well 14509529AAAD	NDGW14	1/14/2011	<0.005		<0.005		<0.1		<0.001	
Well 14509529AAAD	NDGW14	5/3/2011	<0.005		<0.005		<0.1		<0.001	
Well 14509529AAAD	NDGW14	7/20/2011	<0.005		<0.005		<0.1		<0.001	
Well 14509529AAAD	NDGW14	10/17/2011	<0.005		<0.005		<0.1		<0.001	
Well 14509529AAAD	NDGW14	4/5/2012	<0.005		<0.005		<0.1		<0.001	
Well 14509529AAAD	NDGW14	10/18/2012	<0.005		0.003		<0.05		<0.00	
MW-1	NDGW01	9/3/2010	<0.005		<0.005		0.4		0.001	
MW-1	NDGW01	9/7/2010	-		0.002		0.2		<0.001	
MW-1	NDGW01	10/8/2010	<0.005		<0.005		0.1		<0.001	
MW-1	NDGW01	11/24/2010	<0.005		0.005		0.3		<0.001	
MW-1	NDGW01	1/13/2011	<0.005		<0.005		0.2		<0.001	
MW-1	NDGW01	1/13/2011	<0.005		0.005		0.3		<0.005	
MW-1	NDGW01	2/23/2011	<0.005		<0.005		0.1		<0.001	
MW-1	NDGW01	3/27/2011	<0.005		0.005		0.3		<0.001	
MW-1	NDGW01	5/3/2011	<0.005		<0.005		<0.1		<0.001	
MW-1	NDGW01	5/31/2011	<0.005		<0.005		<0.1		<0.001	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Cr	Total Cr QC	Dissolved Fe	Dissolved Fe QC	Total Hg	Total Hg QC	Total Pb	Total Pb QC
Units			mg/L		mg/L		mg/L		mg/L	
CONFIDENTIAL	NDGW12	9/2/2010	<0.001		-		-		<0.001	
CONFIDENTIAL	NDGW12	1/13/2011	<0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW12	1/13/2011	<0.005		-		-		<0.005	
CONFIDENTIAL	NDGW12	5/3/2011	<0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW12	7/19/2011	<0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW12	10/19/2011	<0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW12	4/6/2012	<0.01		<0.03		<0.0001		<0.01	
CONFIDENTIAL	NDGW10	9/2/2010	<0.01		<0.03		<0.001		<0.1	
CONFIDENTIAL	NDGW10	9/2/2010	<0.001		-		-		<0.001	
CONFIDENTIAL	NDGW10	1/13/2011	<0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW10	1/13/2011	<0.005		-		-		<0.005	
CONFIDENTIAL	NDGW10	5/4/2011	<0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW10	7/19/2011	0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW10	8/4/2011	<0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW10	10/19/2011	<0.01		<0.03		<0.001		<0.01	
CONFIDENTIAL	NDGW10	4/6/2012	<0.01		<0.03		<0.0001		<0.01	
Well 14509529AAAD	NDGW14	9/2/2010	<0.01		0.05		<0.001		<0.01	
Well 14509529AAAD	NDGW14	1/14/2011	<0.01		0.13		<0.001		<0.01	
Well 14509529AAAD	NDGW14	5/3/2011	<0.01		1.04		<0.001		<0.01	
Well 14509529AAAD	NDGW14	7/20/2011	<0.01		1.59		<0.001		<0.01	
Well 14509529AAAD	NDGW14	10/17/2011	<0.01		3.58		<0.001		<0.01	
Well 14509529AAAD	NDGW14	4/5/2012	<0.01		3.24		<0.0001		<0.01	
Well 14509529AAAD	NDGW14	10/18/2012	<0.005		2.93		<0.0001		<0.001	
MW-1	NDGW01	9/3/2010	<0.01		0.66		<0.001		0.01	
MW-1	NDGW01	9/7/2010	0.011		-		-		0.00637	
MW-1	NDGW01	10/8/2010	<0.01		0.14		<0.001		<0.01	
MW-1	NDGW01	11/24/2010	0.02		0.11		<0.00005		<0.01	
MW-1	NDGW01	1/13/2011	0.01		0.06		<0.001		<0.01	
MW-1	NDGW01	1/13/2011	0.0222		-		-		0.00738	
MW-1	NDGW01	2/23/2011	<0.01		0.21		<0.001		<0.01	
MW-1	NDGW01	3/27/2011	0.02		0.05		<0.001		<0.01	
MW-1	NDGW01	5/3/2011	<0.01		<0.03		<0.001		<0.01	
MW-1	NDGW01	5/31/2011	<0.01		<0.03		<0.001		<0.01	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Se	Total Se QC
Units			mg/L	
CONFIDENTIAL	NDGW12	9/2/2010	<0.001	
CONFIDENTIAL	NDGW12	1/13/2011	<0.005	
CONFIDENTIAL	NDGW12	1/13/2011	<0.005	
CONFIDENTIAL	NDGW12	5/3/2011	0.005	
CONFIDENTIAL	NDGW12	7/19/2011	0.005	
CONFIDENTIAL	NDGW12	10/19/2011	0.005	
CONFIDENTIAL	NDGW12	4/6/2012	0.005	
CONFIDENTIAL	NDGW10	9/2/2010	<0.005	
CONFIDENTIAL	NDGW10	9/2/2010	<0.001	
CONFIDENTIAL	NDGW10	1/13/2011	<0.005	
CONFIDENTIAL	NDGW10	1/13/2011	<0.005	
CONFIDENTIAL	NDGW10	5/4/2011	<0.005	
CONFIDENTIAL	NDGW10	7/19/2011	<0.005	
CONFIDENTIAL	NDGW10	8/4/2011	<0.005	
CONFIDENTIAL	NDGW10	10/19/2011	<0.005	
CONFIDENTIAL	NDGW10	4/6/2012	0.01	
Well 14509529AAAD	NDGW14	9/2/2010	<0.005	
Well 14509529AAAD	NDGW14	1/14/2011	<0.005	
Well 14509529AAAD	NDGW14	5/3/2011	<0.005	
Well 14509529AAAD	NDGW14	7/20/2011	<0.005	
Well 14509529AAAD	NDGW14	10/17/2011	<0.005	
Well 14509529AAAD	NDGW14	4/5/2012	<0.005	
Well 14509529AAAD	NDGW14	10/18/2012	<0.001	
MW-1	NDGW01	9/3/2010	<0.005	
MW-1	NDGW01	9/7/2010	<0.001	
MW-1	NDGW01	10/8/2010	<0.005	
MW-1	NDGW01	11/24/2010	<0.005	
MW-1	NDGW01	1/13/2011	<0.005	
MW-1	NDGW01	1/13/2011	<0.005	
MW-1	NDGW01	2/23/2011	<0.005	
MW-1	NDGW01	3/27/2011	<0.005	
MW-1	NDGW01	5/3/2011	<0.005	
MW-1	NDGW01	5/31/2011	<0.005	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Dissolved Ca	Dissolved Ca QC	Dissolved K	Dissolved K QC	Dissolved Mg	Dissolved Mg QC	Dissolved Na	Dissolved Na QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-1	NDGW01	7/10/2011	37		4		11		111	
MW-1	NDGW01	7/18/2011	38		4		11		106	
MW-1	NDGW01	8/16/2011	42		4		12		116	
MW-1	NDGW01	9/6/2011	41		4		12		118	
MW-1	NDGW01	10/18/2011	44		4		13		125	
MW-1	NDGW01	4/5/2012	51		4		14		124	
MW-1	NDGW01	10/18/2012	71		5		21		128	
MW-2	NDGW02	9/3/2010	39		7		17		125	
MW-2	NDGW02	9/7/2010	47		5		21		144	
MW-2	NDGW02	10/8/2010	46		6		20		145	
MW-2	NDGW02	11/24/2010	52		5		23		155	
MW-2	NDGW02	1/13/2011	51		6		23		162	
MW-2	NDGW02	1/13/2011	56		9		25		158	
MW-2	NDGW02	2/23/2011	46		5		21		160	
MW-2	NDGW02	3/27/2011	48		6		20		164	
MW-2	NDGW02	5/2/2011	50		4		21		152	
MW-2	NDGW02	6/1/2011	51		4		22		157	
MW-2	NDGW02	7/9/2011	50		4		22		159	
MW-2	NDGW02	7/18/2011	50		5		21		156	
MW-2	NDGW02	8/15/2011	49		4		21		164	
MW-2	NDGW02	9/6/2011	48		5		21		170	
MW-2	NDGW02	10/18/2011	51		5		21		175	
MW-2	NDGW02	4/5/2012	46		4		19		154	
MW-2	NDGW02	10/17/2012	44		4		20		148	
MW-3	NDGW03	9/3/2010	42		7		12		73	
MW-3	NDGW03	9/8/2010	44		5		13		68	
MW-3	NDGW03	10/8/2010	47		6		12		88	
MW-3	NDGW03	11/24/2010	55		6		15		110	
MW-3	NDGW03	1/13/2011	58		7		16		122	
MW-3	NDGW03	2/23/2011	56		6		16		147	
MW-3	NDGW03	3/27/2011	57		8		16		137	
MW-3	NDGW03	5/2/2011	56		6		15		142	
MW-3	NDGW03	6/1/2011	52		6		15		131	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Ag	Total Ag QC	Total As	Total As QC	Total Ba	Total Ba QC	Total Cd	Total Cd QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-1	NDGW01	7/10/2011	<0.005		<0.005		<0.1		<0.001	
MW-1	NDGW01	7/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-1	NDGW01	8/16/2011	<0.005		<0.005		<0.1		<0.001	
MW-1	NDGW01	9/6/2011	<0.005		<0.005		<0.1		<0.001	
MW-1	NDGW01	10/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-1	NDGW01	4/5/2012	<0.005		<0.005		<0.1		<0.001	
MW-1	NDGW01	10/18/2012	<0.001		<0.001		0.08		<0.001	
MW-2	NDGW02	9/3/2010	<0.005		<0.005		0.2		<0.001	
MW-2	NDGW02	9/7/2010	-		0.002		0.22		<0.001	
MW-2	NDGW02	10/8/2010	<0.005		<0.005		0.2		<0.001	
MW-2	NDGW02	11/24/2010	<0.005		0.033		2.4		0.001	
MW-2	NDGW02	1/13/2011	<0.005		<0.005		0.2		<0.001	
MW-2	NDGW02	1/13/2011	<0.005		0.017		1.33		<0.005	
MW-2	NDGW02	2/23/2011	<0.005		0.006		0.4		<0.001	
MW-2	NDGW02	3/27/2011	<0.005		0.015		1.1		<0.001	
MW-2	NDGW02	5/2/2011	<0.005		<0.005		<0.1		<0.001	
MW-2	NDGW02	6/1/2011	<0.005		<0.005		<0.1		<0.001	
MW-2	NDGW02	7/9/2011	<0.005		<0.005		<0.1		<0.001	
MW-2	NDGW02	7/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-2	NDGW02	8/15/2011	<0.005		<0.005		<0.1		<0.001	
MW-2	NDGW02	9/6/2011	<0.005		<0.005		<0.1		<0.001	
MW-2	NDGW02	10/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-2	NDGW02	4/5/2012	<0.005		<0.005		<0.1		<0.001	
MW-2	NDGW02	10/17/2012	<0.001		<0.001		0.05		<0.001	
MW-3	NDGW03	9/3/2010	<0.005		<0.005		0.3		<0.001	
MW-3	NDGW03	9/8/2010	-		0.004		0.52		0.00143	
MW-3	NDGW03	10/8/2010	<0.005		<0.005		0.2		<0.001	
MW-3	NDGW03	11/24/2010	0.005		0.020		1.2		0.001	
MW-3	NDGW03	1/13/2011	<0.005		<0.005		0.3		<0.001	
MW-3	NDGW03	2/23/2011	<0.005		<0.005		0.2		<0.001	
MW-3	NDGW03	3/27/2011	<0.005		<0.005		0.4		<0.001	
MW-3	NDGW03	5/2/2011	<0.005		<0.005		<0.1		<0.001	
MW-3	NDGW03	6/1/2011	<0.005		<0.005		<0.1		<0.001	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Cr	Total Cr QC	Dissolved Fe	Dissolved Fe QC	Total Hg	Total Hg QC	Total Pb	Total Pb QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-1	NDGW01	7/10/2011	<0.01		<0.03		<0.001		<0.01	
MW-1	NDGW01	7/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-1	NDGW01	8/16/2011	<0.01		<0.03		<0.001		<0.01	
MW-1	NDGW01	9/6/2011	<0.01		<0.03		<0.001		<0.01	
MW-1	NDGW01	10/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-1	NDGW01	4/5/2012	<0.01		<0.03		<0.0001		<0.01	
MW-1	NDGW01	10/18/2012	<0.005		<0.03		<0.0001		<0.001	
MW-2	NDGW02	9/3/2010	<0.01		0.72		<0.001		<0.01	
MW-2	NDGW02	9/7/2010	0.0199		-		-		0.0072	
MW-2	NDGW02	10/8/2010	<0.01		0.06		<0.001		<0.01	
MW-2	NDGW02	11/24/2010	0.12		0.39		<0.00005		0.04	
MW-2	NDGW02	1/13/2011	0.01		<0.03		<0.001		<0.01	
MW-2	NDGW02	1/13/2011	0.066		-		-		0.0218	
MW-2	NDGW02	2/23/2011	0.02		0.34		<0.001		<0.01	
MW-2	NDGW02	3/27/2011	0.06		0.07		<0.001		0.02	
MW-2	NDGW02	5/2/2011	<0.01		<0.03		<0.001		<0.01	
MW-2	NDGW02	6/1/2011	<0.01		<0.03		<0.001		<0.01	
MW-2	NDGW02	7/9/2011	<0.01		<0.03		<0.001		<0.01	
MW-2	NDGW02	7/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-2	NDGW02	8/15/2011	<0.01		<0.03		<0.001		<0.01	
MW-2	NDGW02	9/6/2011	<0.01		<0.03		<0.001		<0.01	
MW-2	NDGW02	10/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-2	NDGW02	4/5/2012	<0.01		<0.03		<0.0001		<0.01	
MW-2	NDGW02	10/17/2012	<0.005		<0.03		<0.001		<0.001	
MW-3	NDGW03	9/3/2010	0.01		0.65		<0.001		<0.01	
MW-3	NDGW03	9/8/2010	0.0174		-		-		0.016	
MW-3	NDGW03	10/8/2010	<0.01		0.09		<0.001		<0.01	
MW-3	NDGW03	11/24/2010	0.08		0.39		<0.0005		0.03	
MW-3	NDGW03	1/13/2011	0.02		<0.03		<0.001		<0.01	
MW-3	NDGW03	2/23/2011	0.01		0.04		<0.001		<0.01	
MW-3	NDGW03	3/27/2011	0.02		0.03		<0.001		<0.01	
MW-3	NDGW03	5/2/2011	<0.01		<0.03		<0.001		<0.01	
MW-3	NDGW03	6/1/2011	<0.01		<0.03		<0.001		<0.01	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Se	Total Se QC
Units			mg/L	
MW-1	NDGW01	7/10/2011	<0.005	
MW-1	NDGW01	7/18/2011	<0.005	
MW-1	NDGW01	8/16/2011	<0.005	
MW-1	NDGW01	9/6/2011	<0.005	
MW-1	NDGW01	10/18/2011	<0.005	
MW-1	NDGW01	4/5/2012	<0.005	
MW-1	NDGW01	10/18/2012	<0.001	
MW-2	NDGW02	9/3/2010	<0.005	
MW-2	NDGW02	9/7/2010	0.00122	
MW-2	NDGW02	10/8/2010	<0.005	
MW-2	NDGW02	11/24/2010	<0.005	
MW-2	NDGW02	1/13/2011	<0.005	
MW-2	NDGW02	1/13/2011	<0.005	
MW-2	NDGW02	2/23/2011	<0.005	
MW-2	NDGW02	3/27/2011	<0.005	
MW-2	NDGW02	5/2/2011	<0.005	
MW-2	NDGW02	6/1/2011	<0.005	
MW-2	NDGW02	7/9/2011	<0.005	
MW-2	NDGW02	7/18/2011	<0.005	
MW-2	NDGW02	8/15/2011	<0.005	
MW-2	NDGW02	9/6/2011	<0.005	
MW-2	NDGW02	10/18/2011	<0.005	
MW-2	NDGW02	4/5/2012	<0.005	
MW-2	NDGW02	10/17/2012	<0.001	
MW-3	NDGW03	9/3/2010	<0.005	
MW-3	NDGW03	9/8/2010	0.00141	
MW-3	NDGW03	10/8/2010	<0.005	
MW-3	NDGW03	11/24/2010	0.005	
MW-3	NDGW03	1/13/2011	<0.005	
MW-3	NDGW03	2/23/2011	<0.005	
MW-3	NDGW03	3/27/2011	<0.005	
MW-3	NDGW03	5/2/2011	<0.005	
MW-3	NDGW03	6/1/2011	<0.005	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Dissolved Ca	Dissolved Ca QC	Dissolved K	Dissolved K QC	Dissolved Mg	Dissolved Mg QC	Dissolved Na	Dissolved Na QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-3	NDGW03	7/9/2011	51		5		14		139	
MW-3	NDGW03	7/18/2011	50		5		13		141	
MW-3	NDGW03	8/15/2011	50		5		14		144	
MW-3	NDGW03	9/6/2011	47		5		13		144	
MW-3	NDGW03	10/18/2011	51		5		13		146	
MW-3	NDGW03	4/5/2012	49		5		13		143	
MW-3	NDGW03	10/17/2012	51		5		15		136	
MW-4	NDGW04	10/8/2010	51		7		21		141	
MW-4	NDGW04	11/24/2010	89		8		39		279	
MW-4	NDGW04	1/12/2011	101		8		46		298	
MW-4	NDGW04	1/13/2011	81		8		37		288	
MW-4	NDGW04	2/23/2011	93		7		40		301	
MW-4	NDGW04	3/27/2011	85		8		34		279	
MW-4	NDGW04	5/2/2011	105		7		48		307	D
MW-4	NDGW04	6/1/2011	103		8		51		348	
MW-4	NDGW04	7/9/2011	95		7		41		296	
MW-4	NDGW04	7/18/2011	94		6		42		293	
MW-4	NDGW04	8/18/2011	97		7		41		309	
MW-4	NDGW04	9/6/2011	99		7		38		316	
MW-4	NDGW04	10/18/2011	108		7		41		327	
MW-4	NDGW04	4/5/2012	113		7		42		302	
MW-4	NDGW04	10/17/2012	128		7		51		310	D
MW-5	NDGW05	3/27/2011	52		7		17		228	
MW-5	NDGW05	5/3/2011	50		5		17		214	
MW-5	NDGW05	6/1/2011	45		4		16		206	
MW-5	NDGW05	7/10/2011	41		4		13		196	
MW-5	NDGW05	7/18/2011	43		4		13		195	
MW-5	NDGW05	8/16/2011	41		4		13		205	
MW-5	NDGW05	9/7/2011								
MW-5	NDGW05	10/18/2011	40		4		13		213	
MW-5	NDGW05	4/5/2012	42		4		13		206	
MW-5	NDGW05	10/17/2012	39		4		13		187	
MW-6	NDGW06	3/27/2011	63		6		21		205	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Ag	Total Ag QC	Total As	Total As QC	Total Ba	Total Ba QC	Total Cd	Total Cd QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-3	NDGW03	7/9/2011	<0.005		<0.005		<0.1		<0.001	
MW-3	NDGW03	7/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-3	NDGW03	8/15/2011	<0.005		<0.005		<0.1		<0.001	
MW-3	NDGW03	9/6/2011	<0.005		<0.005		<0.1		<0.001	
MW-3	NDGW03	10/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-3	NDGW03	4/5/2012	<0.005		<0.005		<0.1		<0.001	
MW-3	NDGW03	10/17/2012	<0.001		<0.001		0.07		<0.001	
MW-4	NDGW04	10/8/2010	<0.005		0.021		1.7		0.002	
MW-4	NDGW04	11/24/2010	<0.005		0.008		0.4		<0.001	
MW-4	NDGW04	1/12/2011	<0.005		<0.005		0.21		<0.005	
MW-4	NDGW04	1/13/2011	<0.005		<0.005		0.2		<0.001	
MW-4	NDGW04	2/23/2011	<0.005		<0.005		0.1		<0.001	
MW-4	NDGW04	3/27/2011	<0.005		<0.005		0.2		<0.001	
MW-4	NDGW04	5/2/2011	<0.005		<0.005		0.1		<0.001	
MW-4	NDGW04	6/1/2011	<0.005		<0.005		<0.1		<0.001	
MW-4	NDGW04	7/9/2011	<0.005		<0.005		<0.1		<0.001	
MW-4	NDGW04	7/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-4	NDGW04	8/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-4	NDGW04	9/6/2011	<0.005		<0.005		<0.1		<0.001	
MW-4	NDGW04	10/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-4	NDGW04	4/5/2012	<0.005		<0.005		<0.1		0.008	
MW-4	NDGW04	10/17/2012	<0.001		<0.001		0.07		<0.001	
MW-5	NDGW05	3/27/2011	<0.005		<0.005		0.2		<0.001	
MW-5	NDGW05	5/3/2011	<0.005		<0.005		<0.1		<0.001	
MW-5	NDGW05	6/1/2011	<0.005		<0.005		<0.1		<0.001	
MW-5	NDGW05	7/10/2011	<0.005		<0.005		<0.1		<0.001	
MW-5	NDGW05	7/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-5	NDGW05	8/16/2011	<0.005		<0.005		<0.1		<0.001	
MW-5	NDGW05	9/7/2011								
MW-5	NDGW05	10/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-5	NDGW05	4/5/2012	<0.005		<0.005		<0.1		<0.001	
MW-5	NDGW05	10/17/2012	<0.001		<0.001		<0.05		<0.001	
MW-6	NDGW06	3/27/2011	<0.005		<0.005		<0.1		<0.001	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Cr	Total Cr QC	Dissolved Fe	Dissolved Fe QC	Total Hg	Total Hg QC	Total Pb	Total Pb QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-3	NDGW03	7/9/2011	<0.01		<0.03		<0.001		<0.01	
MW-3	NDGW03	7/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-3	NDGW03	8/15/2011	<0.01		<0.03		<0.001		<0.01	
MW-3	NDGW03	9/6/2011	<0.01		<0.03		<0.001		<0.01	
MW-3	NDGW03	10/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-3	NDGW03	4/5/2012	<0.01		<0.03		<0.0001		<0.01	
MW-3	NDGW03	10/17/2012	<0.005		<0.03		<0.0001		<0.001	
MW-4	NDGW04	10/8/2010	0.18		0.34		<0.001		0.06	
MW-4	NDGW04	11/24/2010	0.04		0.33		<0.00005		0.01	
MW-4	NDGW04	1/12/2011	0.0154		-		-		<0.005	
MW-4	NDGW04	1/13/2011	0.02		<0.03		<0.001		<0.01	
MW-4	NDGW04	2/23/2011	<0.01		0.13		<0.001		<0.01	
MW-4	NDGW04	3/27/2011	0.02		0.10		<0.001		<0.01	
MW-4	NDGW04	5/2/2011	<0.01		0.17		<0.001		<0.01	
MW-4	NDGW04	6/1/2011	<0.01		0.38		<0.001		<0.01	
MW-4	NDGW04	7/9/2011	<0.01		0.16		<0.001		<0.01	
MW-4	NDGW04	7/18/2011	<0.01		0.17		<0.001		<0.01	
MW-4	NDGW04	8/18/2011	<0.01		0.28		<0.001		<0.01	
MW-4	NDGW04	9/6/2011	<0.01		0.19		<0.001		<0.01	
MW-4	NDGW04	10/18/2011	<0.01		0.29		<0.001		<0.01	
MW-4	NDGW04	4/5/2012	0.03		0.04		<0.0001		<0.01	
MW-4	NDGW04	10/17/2012	<0.005		0.17		<0.0001		<0.001	
MW-5	NDGW05	3/27/2011	0.02		1.66		<0.001		<0.01	
MW-5	NDGW05	5/3/2011	<0.01		<0.03		<0.001		<0.01	
MW-5	NDGW05	6/1/2011	<0.01		<0.03		<0.001		<0.01	
MW-5	NDGW05	7/10/2011	<0.01		<0.03		<0.001		<0.01	
MW-5	NDGW05	7/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-5	NDGW05	8/16/2011	<0.01		<0.03		<0.001		<0.01	
MW-5	NDGW05	9/7/2011								
MW-5	NDGW05	10/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-5	NDGW05	4/5/2012	<0.01		<0.03		<0.001		<0.01	
MW-5	NDGW05	10/17/2012	<0.005		<0.03		<0.0001		<0.001	
MW-6	NDGW06	3/27/2011	<0.01		0.04		<0.001		<0.01	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Se	Total Se QC
Units			mg/L	
MW-3	NDGW03	7/9/2011	<0.005	
MW-3	NDGW03	7/18/2011	<0.005	
MW-3	NDGW03	8/15/2011	<0.005	
MW-3	NDGW03	9/6/2011	<0.005	
MW-3	NDGW03	10/18/2011	<0.005	
MW-3	NDGW03	4/5/2012	<0.005	
MW-3	NDGW03	10/17/2012	<0.001	
MW-4	NDGW04	10/8/2010	<0.005	
MW-4	NDGW04	11/24/2010	<0.005	
MW-4	NDGW04	1/12/2011	<0.005	
MW-4	NDGW04	1/13/2011	<0.005	
MW-4	NDGW04	2/23/2011	<0.005	
MW-4	NDGW04	3/27/2011	<0.005	
MW-4	NDGW04	5/2/2011	<0.005	
MW-4	NDGW04	6/1/2011	<0.005	
MW-4	NDGW04	7/9/2011	<0.005	
MW-4	NDGW04	7/18/2011	<0.005	
MW-4	NDGW04	8/18/2011	<0.005	
MW-4	NDGW04	9/6/2011	<0.005	
MW-4	NDGW04	10/18/2011	<0.005	
MW-4	NDGW04	4/5/2012	<0.005	
MW-4	NDGW04	10/17/2012	<0.001	
MW-5	NDGW05	3/27/2011	<0.005	
MW-5	NDGW05	5/3/2011	<0.005	
MW-5	NDGW05	6/1/2011	<0.005	
MW-5	NDGW05	7/10/2011	<0.005	
MW-5	NDGW05	7/18/2011	<0.005	
MW-5	NDGW05	8/16/2011	<0.005	
MW-5	NDGW05	9/7/2011		
MW-5	NDGW05	10/18/2011	<0.005	
MW-5	NDGW05	4/5/2012	<0.005	
MW-5	NDGW05	10/17/2012	<0.001	
MW-6	NDGW06	3/27/2011	<0.005	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Dissolved Ca	Dissolved Ca QC	Dissolved K	Dissolved K QC	Dissolved Mg	Dissolved Mg QC	Dissolved Na	Dissolved Na QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-6	NDGW06	5/3/2011	69		5		24		192	
MW-6	NDGW06	6/1/2011	60		5		23		193	
MW-6	NDGW06	7/10/2011	53		4		19		172	
MW-6	NDGW06	7/18/2011	51		4		18		171	
MW-6	NDGW06	8/16/2011	47		4		16		164	
MW-6	NDGW06	9/7/2011	44		4		16		169	
MW-6	NDGW06	10/18/2011	46		4		16		173	
MW-6	NDGW06	4/5/2012	36		3		12		150	
MW-6	NDGW06	10/18/2012	55		4		20		178	
MW-7	NDGW07	3/27/2011	46		6		19		234	
MW-7	NDGW07	5/2/2011	46		6		20		243	
MW-7	NDGW07	6/1/2011	38		5		18		221	
MW-7	NDGW07	7/9/2011	76		6		31		285	
MW-7	NDGW07	7/18/2011	136	D	8		55		346	D
MW-7	NDGW07	8/16/2011	221		9		92		458	D
MW-7	NDGW07	9/7/2011	256		10		108		521	
MW-7	NDGW07	10/18/2011	381		12		159		647	
MW-7	NDGW07	4/5/2012	469		13		183		800	D
MW-7	NDGW07	10/18/2012	162		9		66		419	D
MW-8S	NDGW08	3/27/2011	161		9		72		383	D
MW-8S	NDGW08	5/2/2011	254		9		115		434	D
MW-8S	NDGW08	6/1/2011	820	D	19		393	D	859	D
MW-8S	NDGW08	7/10/2011	685	D	20		316	D	1210	D
MW-8S	NDGW08	7/18/2011	632	D	16		300		1090	D
MW-8S	NDGW08	8/16/2011	529		15		249		965	D
MW-8S	NDGW08	9/7/2011	434		13		204		886	
MW-8S	NDGW08	10/18/2011	370		12		175		784	
MW-8S	NDGW08	4/5/2012	194		9		87		463	D
MW-8S	NDGW08	10/18/2012	136		8		63		401	D
MW-8D	NDGW09	3/27/2011	32		7		11		231	
MW-8D	NDGW09	5/5/2011	4		3		2		471	
MW-8D	NDGW09	6/1/2011	3		3		2		451	
MW-8D	NDGW09	7/10/2011	3		3		2		470	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Ag	Total Ag QC	Total As	Total As QC	Total Ba	Total Ba QC	Total Cd	Total Cd QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-6	NDGW06	5/3/2011	<0.005		<0.005		<0.1		<0.001	
MW-6	NDGW06	6/1/2011	<0.005		<0.005		<0.1		<0.001	
MW-6	NDGW06	7/10/2011	<0.005		<0.005		<0.1		<0.001	
MW-6	NDGW06	7/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-6	NDGW06	8/16/2011	<0.005		<0.005		<0.1		<0.001	
MW-6	NDGW06	9/7/2011	<0.005		<0.005		<0.1		<0.001	
MW-6	NDGW06	10/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-6	NDGW06	4/5/2012	<0.005		<0.005		<0.1		<0.001	
MW-6	NDGW06	10/18/2012	<0.001		<0.001		<0.05		<0.001	
MW-7	NDGW07	3/27/2011	<0.005		<0.005		0.1		<0.001	
MW-7	NDGW07	5/2/2011	<0.005		<0.005		<0.1		<0.001	
MW-7	NDGW07	6/1/2011	<0.005		<0.005		<0.1		<0.001	
MW-7	NDGW07	7/9/2011	<0.005		<0.005		<0.1		<0.001	
MW-7	NDGW07	7/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-7	NDGW07	8/16/2011	<0.005		<0.005		0.2		<0.001	
MW-7	NDGW07	9/7/2011	<0.005		<0.005		0.2		<0.001	
MW-7	NDGW07	10/18/2011	<0.005		<0.005		0.2		<0.001	
MW-7	NDGW07	4/5/2012	<0.005		0.005		0.3		<0.001	
MW-7	NDGW07	10/18/2012	<0.001		<0.001		0.1		<0.001	
MW-8S	NDGW08	3/27/2011	<0.005		<0.005		0.1		<0.001	
MW-8S	NDGW08	5/2/2011	<0.005		<0.005		0.1		<0.001	
MW-8S	NDGW08	6/1/2011	<0.005		<0.005		0.2		<0.001	
MW-8S	NDGW08	7/10/2011	<0.005		<0.005		0.2		<0.001	
MW-8S	NDGW08	7/18/2011	<0.005		0.006		0.2		<0.001	
MW-8S	NDGW08	8/16/2011	<0.005		<0.005		0.1		<0.001	
MW-8S	NDGW08	9/7/2011	<0.005		<0.005		0.1		<0.001	
MW-8S	NDGW08	10/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-8S	NDGW08	4/5/2012	<0.005		<0.005		<0.1		<0.001	
MW-8S	NDGW08	10/18/2012	<0.001		0.003		<0.05		<0.001	
MW-8D	NDGW09	3/27/2011	<0.005		<0.005		<0.1		<0.001	
MW-8D	NDGW09	5/5/2011	<0.005		<0.005		<0.1		<0.001	
MW-8D	NDGW09	6/1/2011	<0.005		<0.005		<0.1		<0.001	
MW-8D	NDGW09	7/10/2011	<0.005		<0.005		<0.1		<0.001	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Cr	Total Cr QC	Dissolved Fe	Dissolved Fe QC	Total Hg	Total Hg QC	Total Pb	Total Pb QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-6	NDGW06	5/3/2011	<0.01		<0.03		<0.001		<0.01	
MW-6	NDGW06	6/1/2011	<0.01		<0.03		<0.001		<0.01	
MW-6	NDGW06	7/10/2011	<0.01		<0.03		<0.001		<0.01	
MW-6	NDGW06	7/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-6	NDGW06	8/16/2011	<0.01		<0.03		<0.001		<0.01	
MW-6	NDGW06	9/7/2011	<0.01		<0.03		<0.001		<0.01	
MW-6	NDGW06	10/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-6	NDGW06	4/5/2012	<0.01		<0.03		<0.0001		<0.01	
MW-6	NDGW06	10/18/2012	<0.005		<0.03		<0.0001		<0.001	
MW-7	NDGW07	3/27/2011	0.02		0.10		<0.001		<0.01	
MW-7	NDGW07	5/2/2011	<0.01		0.11		<0.001		<0.01	
MW-7	NDGW07	6/1/2011	<0.01		0.20		<0.001		<0.01	
MW-7	NDGW07	7/9/2011	<0.01		0.76		<0.001		<0.01	
MW-7	NDGW07	7/18/2011	<0.01		1.38		<0.001		<0.01	
MW-7	NDGW07	8/16/2011	<0.01		2.51		<0.001		<0.01	
MW-7	NDGW07	9/7/2011	<0.01		2.98		<0.001		<0.01	
MW-7	NDGW07	10/18/2011	<0.01		4.02		<0.001		<0.01	
MW-7	NDGW07	4/5/2012	<0.01		4.23		<0.001		<0.01	
MW-7	NDGW07	10/18/2012	<0.005		2.25		<0.0001		<0.001	
MW-8S	NDGW08	3/27/2011	<0.01		0.05		<0.001		<0.01	
MW-8S	NDGW08	5/2/2011	<0.01		6.29		<0.001		<0.01	
MW-8S	NDGW08	6/1/2011	<0.01		21.00	D	<0.001		<0.01	
MW-8S	NDGW08	7/10/2011	<0.01		25.90	D	<0.001		<0.01	
MW-8S	NDGW08	7/18/2011	<0.01		25.60	D	<0.001		<0.01	
MW-8S	NDGW08	8/16/2011	<0.01		22.60		<0.001		<0.01	
MW-8S	NDGW08	9/7/2011	<0.01		18.40		<0.001		<0.01	
MW-8S	NDGW08	10/18/2011	<0.01		17.00		<0.001		<0.01	
MW-8S	NDGW08	4/5/2012	<0.01		10.10		<0.0001		<0.01	
MW-8S	NDGW08	10/18/2012	<0.005		6.82		<0.0001		<0.001	
MW-8D	NDGW09	3/27/2011	<0.01		0.04		<0.001		<0.01	
MW-8D	NDGW09	5/5/2011	<0.01		<0.03		<0.001		<0.01	
MW-8D	NDGW09	6/1/2011	<0.01		<0.03		<0.001		<0.01	
MW-8D	NDGW09	7/10/2011	<0.01		0.04		<0.001		<0.01	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Se	Total Se QC
Units			mg/L	
MW-6	NDGW06	5/3/2011	<0.005	
MW-6	NDGW06	6/1/2011	<0.005	
MW-6	NDGW06	7/10/2011	<0.005	
MW-6	NDGW06	7/18/2011	<0.005	
MW-6	NDGW06	8/16/2011	<0.005	
MW-6	NDGW06	9/7/2011	<0.005	
MW-6	NDGW06	10/18/2011	<0.005	
MW-6	NDGW06	4/5/2012	<0.005	
MW-6	NDGW06	10/18/2012	0.001	
MW-7	NDGW07	3/27/2011	<0.005	
MW-7	NDGW07	5/2/2011	<0.005	
MW-7	NDGW07	6/1/2011	<0.005	
MW-7	NDGW07	7/9/2011	<0.005	
MW-7	NDGW07	7/18/2011	<0.005	
MW-7	NDGW07	8/16/2011	0.006	
MW-7	NDGW07	9/7/2011	<0.005	
MW-7	NDGW07	10/18/2011	<0.005	
MW-7	NDGW07	4/5/2012	0.025	
MW-7	NDGW07	10/18/2012	<0.001	
MW-8S	NDGW08	3/27/2011	<0.005	
MW-8S	NDGW08	5/2/2011	<0.005	
MW-8S	NDGW08	6/1/2011	0.018	
MW-8S	NDGW08	7/10/2011	0.018	
MW-8S	NDGW08	7/18/2011	0.022	
MW-8S	NDGW08	8/16/2011	0.021	
MW-8S	NDGW08	9/7/2011	0.021	
MW-8S	NDGW08	10/18/2011	<0.005	
MW-8S	NDGW08	4/5/2012	<0.005	
MW-8S	NDGW08	10/18/2012	<0.001	
MW-8D	NDGW09	3/27/2011	<0.005	
MW-8D	NDGW09	5/5/2011	<0.005	
MW-8D	NDGW09	6/1/2011	<0.005	
MW-8D	NDGW09	7/10/2011	<0.005	

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Dissolved Ca	Dissolved Ca QC	Dissolved K	Dissolved K QC	Dissolved Mg	Dissolved Mg QC	Dissolved Na	Dissolved Na QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-8D	NDGW09	7/18/2011	3		3		2		449	
MW-8D	NDGW09	8/16/2011	3		3		2		492	
MW-8D	NDGW09	9/7/2011	4		2		2		426	
MW-8D	NDGW09	10/18/2011	3		3		2		475	
MW-8D	NDGW09	4/5/2012	3		2		2		448	
MW-8D	NDGW09	10/18/2012	3		3		2		467	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Ag	Total Ag QC	Total As	Total As QC	Total Ba	Total Ba QC	Total Cd	Total Cd QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-8D	NDGW09	7/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-8D	NDGW09	8/16/2011	<0.005		<0.005		<0.1		<0.001	
MW-8D	NDGW09	9/7/2011	<0.005		<0.005		<0.1		<0.001	
MW-8D	NDGW09	10/18/2011	<0.005		<0.005		<0.1		<0.001	
MW-8D	NDGW09	4/5/2012	<0.005		<0.005		<0.1		<0.001	
MW-8D	NDGW09	10/18/2012	<0.001		<0.001		<0.05		<0.001	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Cr	Total Cr QC	Dissolved Fe	Dissolved Fe QC	Total Hg	Total Hg QC	Total Pb	Total Pb QC
Units			mg/L		mg/L		mg/L		mg/L	
MW-8D	NDGW09	7/18/2011	<0.01		0.04		<0.001		<0.01	
MW-8D	NDGW09	8/16/2011	<0.01		<0.03		<0.001		<0.01	
MW-8D	NDGW09	9/7/2011	<0.01		<0.03		<0.001		<0.01	
MW-8D	NDGW09	10/18/2011	<0.01		<0.03		<0.001		<0.01	
MW-8D	NDGW09	4/5/2012	<0.01		<0.03		<0.0001		<0.01	
MW-8D	NDGW09	10/18/2012	<0.005		0.03		<0.0001		<0.001	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-4 Metal Results

Sample ID[1]	Study ID	Date Collected	Total Se	Total Se QC
Units			mg/L	
MW-8D	NDGW09	7/18/2011	<0.005	
MW-8D	NDGW09	8/16/2011	<0.005	
MW-8D	NDGW09	9/7/2011	<0.005	
MW-8D	NDGW09	10/18/2011	<0.005	
MW-8D	NDGW09	4/5/2012	<0.005	
MW-8D	NDGW09	10/18/2012	<0.001	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	ethanol (64-17-5)	ethanol QC	methanol (67-56-1)	methanol QC	isopropanol (67 63 0)	isopropanol QC	isobutanol (78 83 1)	isobutanol QC	isopropyl ether (108-20-3)	isopropyl ether QC	styrene (100-42-5)	styrene QC
Units			mg/L		mg/L		µg/L		ug/L		ug/L		µg/L	
CW-5	NDGW16	9/2/2010	---		---		---		---		---		<1.0	
CW-5	NDGW16	9/2/2010	---		---		---		---		---		<0.5	
CW-5	NDGW16	1/13/2011	---		---		---		---		---		<1.0	
CW-5	NDGW16	1/13/2011	---		---		---		---		---		<0.5	
CW-5	NDGW16	5/4/2011	---		---		---		---		---		<1.0	
CW-5	NDGW16	7/19/2011	---		---		---		---		---		<1.0	
CW-5	NDGW16	10/19/2011	---		---		---		---		---		<1.0	
CW-5	NDGW16	4/6/2012	---		---		---		---		---		<1.0	
CW-4	NDGW15	9/2/2010	---		---		---		---		---		<1.0	
CW-4	NDGW15	9/2/2010	---		---		---		---		---		<0.5	
CW-4	NDGW15	1/13/2011	---		---		---		---		---		<1.0	
CW-4	NDGW15	1/13/2011	---		---		---		---		---		<0.5	
CW-4	NDGW15	5/4/2011	---		---		---		---		---		<1.0	
CW-4	NDGW15	7/19/2011	---		---		---		---		---		<1.0	
CW-4	NDGW15	10/19/2011	---		---		---		---		---		<1.0	
CW-4	NDGW15	4/6/2012	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	9/2/2010	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	9/2/2010	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW11	1/13/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	1/13/2011	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW11	5/4/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	7/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	10/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	4/6/2012	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	10/7/2010	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	10/7/2010	---		---		---		---		---		<0.5	
Truchan Depot	NDGW13	1/13/2011	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	1/13/2011	---		---		---		---		---		<0.5	
Truchan Depot	NDGW13	5/4/2011	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	7/19/2011	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	10/19/2011	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	4/6/2012	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	9/2/2010	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	9/2/2010	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW12	1/13/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	1/13/2011	---		---		---		---		---		<0.5	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	tert amyl alcohol (75 85 4)	tert amyl alcohol QC	tert butyl alcohol (75 65 0)	tert butyl alcohol QC	methyl tert-butyl ether (1634-04-4)	methyl tert-butyl ether QC	ethyl tert-butyl ether (637-92-3)	ethyl tert butyl ether QC	tert-amyl methyl ether (994-05-8)	tert-amyl methyl ether QC	methylene chloride (75-09-2)	methylene chloride QC
Units			ug/L		µg/L		µg/L		µg/L		µg/L		µg/L	
CW-5	NDGW16	9/2/2010	---		---		---		---		---		<1.0	
CW-5	NDGW16	9/2/2010	---		---		---		---		---		<0.5	
CW-5	NDGW16	1/13/2011	---		---		---		---		---		<1.0	
CW-5	NDGW16	1/13/2011	---		---		---		---		---		<0.5	
CW-5	NDGW16	5/4/2011	---		---		---		---		---		<1.0	
CW-5	NDGW16	7/19/2011	---		---		---		---		---		<1.0	
CW-5	NDGW16	10/19/2011	---		---		---		---		---		<1.0	
CW-5	NDGW16	4/6/2012	---		---		---		---		---		<1.0	
CW-4	NDGW15	9/2/2010	---		---		---		---		---		<1.0	
CW-4	NDGW15	9/2/2010	---		---		---		---		---		<0.5	
CW-4	NDGW15	1/13/2011	---		---		---		---		---		<1.0	
CW-4	NDGW15	1/13/2011	---		---		---		---		---		<0.5	
CW-4	NDGW15	5/4/2011	---		---		---		---		---		<1.0	
CW-4	NDGW15	7/19/2011	---		---		---		---		---		<1.0	
CW-4	NDGW15	10/19/2011	---		---		---		---		---		<1.0	
CW-4	NDGW15	4/6/2012	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	9/2/2010	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	9/2/2010	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW11	1/13/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	1/13/2011	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW11	5/4/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	7/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	10/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW11	4/6/2012	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	10/7/2010	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	10/7/2010	---		---		---		---		---		<0.5	
Truchan Depot	NDGW13	1/13/2011	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	1/13/2011	---		---		---		---		---		<0.5	
Truchan Depot	NDGW13	5/4/2011	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	7/19/2011	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	10/19/2011	---		---		---		---		---		<1.0	
Truchan Depot	NDGW13	4/6/2012	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	9/2/2010	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	9/2/2010	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW12	1/13/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	1/13/2011	---		---		---		---		---		<0.5	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	chloroform (67-66-3)	chloroform QC	benzene (71-43-2)	benzene QC	toluene (108-88-3)	toluene QC	ethylbenzene (100-41-4)	ethylbenzene QC
Units			µg/L		µg/L		µg/L		µg/L	
CW-5	NDGW16	9/2/2010	<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	9/2/2010	<0.5		<0.5		<0.5		<0.5	
CW-5	NDGW16	1/13/2011	<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	1/13/2011	<0.5		<0.5		<0.5		<0.5	
CW-5	NDGW16	5/4/2011	<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	7/19/2011	<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	10/19/2011	<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	4/6/2012	<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	9/2/2010	<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	9/2/2010	<0.5		<0.5		<0.5		<0.5	
CW-4	NDGW15	1/13/2011	<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	1/13/2011	<0.5		<0.5		<0.5		<0.5	
CW-4	NDGW15	5/4/2011	<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	7/19/2011	<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	10/19/2011	<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	4/6/2012	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	9/2/2010	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	9/2/2010	<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW11	1/13/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	1/13/2011	<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW11	5/4/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	7/19/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	10/19/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	4/6/2012	<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	10/7/2010	<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	10/7/2010	<0.5		<0.5		<0.5		<0.5	
Truchan Depot	NDGW13	1/13/2011	<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	1/13/2011	<0.5		<0.5		<0.5		<0.5	
Truchan Depot	NDGW13	5/4/2011	<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	7/19/2011	<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	10/19/2011	<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	4/6/2012	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	9/2/2010	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	9/2/2010	<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW12	1/13/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	1/13/2011	<0.5		<0.5		<0.5		<0.5	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	m+p xylene (108-38-3, 106-42-3)	m+p xylene QC	o xylene (95-47-6)	o xylene QC	total xylenes (1330-20-7)	total xylenes QC	bromodichloromethane (75-27-4)	bromodichloromethane QC	chlorodibromomethane (124-48-1)	chlorodibromomethane QC	dichlorodifluoromethane (75 71 8)	dichlorodifluoromethane QC
Units			µg/L		µg/L		µg/L		ug/L		µg/L		µg/L	
CW-5	NDGW16	9/2/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	9/2/2010	-		-		<0.5		<0.5		<0.5		<0.5	
CW-5	NDGW16	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	1/13/2011	-		-		<0.5		<0.5		<0.5		<0.5	
CW-5	NDGW16	5/4/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	7/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	10/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-5	NDGW16	4/6/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	9/2/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	9/2/2010	-		-		<0.5		<0.5		<0.5		<0.5	
CW-4	NDGW15	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	1/13/2011	-		-		<0.5		<0.5		<0.5		<0.5	
CW-4	NDGW15	5/4/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	7/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	10/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CW-4	NDGW15	4/6/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	9/2/2010	<1.0		<1.0		<1.0		<1.0		<1.0		0.54	J
CONFIDENTIAL	NDGW11	9/2/2010	-		-		<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW11	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	1/13/2011	-		-		<0.5		<0.5		<0.5		0.59	
CONFIDENTIAL	NDGW11	5/4/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	7/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	10/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW11	4/6/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	10/7/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	10/7/2010	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
Truchan Depot	NDGW13	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	1/13/2011	-		-		<0.5		<0.5		<0.5		<0.5	
Truchan Depot	NDGW13	5/4/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	7/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	10/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Truchan Depot	NDGW13	4/6/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	9/2/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	9/2/2010	-		-		<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW12	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	1/13/2011	-		-		<0.5		<0.5		<0.5		<0.5	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	ethanol (64-17-5)	ethanol QC	methanol (67-56-1)	methanol QC	isopropanol (67 63 0)	isopropanol QC	isobutanol (78 83 1)	isobutanol QC	isopropyl ether (108-20-3)	isopropyl ether QC	styrene (100-42-5)	styrene QC
Units			mg/L		mg/L		µg/L		ug/L		ug/L		µg/L	
CONFIDENTIAL	NDGW12	5/3/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	7/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	10/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	4/6/2012	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	9/2/2010	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	9/2/2010	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW10	1/13/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	1/13/2011	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW10	5/4/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	7/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	8/4/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	10/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	4/6/2012	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	9/2/2010	---		---		---		---		---		0.25	J
Well 14509529AAAD	NDGW14	1/14/2011	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	5/3/2011	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	7/20/2011	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	10/17/2011	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	4/5/2012	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	10/18/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-1	NDGW01	9/3/2010	---		---		---		---		---		<1.0	
MW-1	NDGW01	9/7/2010	---		---		---		---		---		<0.5	
MW-1	NDGW01	10/8/2010	---		---		---		---		---		<1.0	
MW-1	NDGW01	11/24/2010	---		---		---		---		---		<1.0	
MW-1	NDGW01	1/13/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	1/13/2011	---		---		---		---		---		<0.5	
MW-1	NDGW01	2/23/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	3/27/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	5/3/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	5/31/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	7/10/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	7/18/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	8/16/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	9/6/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	10/18/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	4/5/2012	---		---		---		---		---		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	tert amyl alcohol (75 85 4)	tert amyl alcohol QC	tert butyl alcohol (75 65 0)	tert butyl alcohol QC	methyl tert-butyl ether (1634-04-4)	methyl tert-butyl ether QC	ethyl tert-butyl ether (637-92-3)	ethyl tert butyl ether QC	tert-amyl methyl ether (994-05-8)	tert-amyl methyl ether QC	methylene chloride (75-09-2)	methylene chloride QC
Units			ug/L		µg/L		µg/L		µg/L		µg/L		µg/L	
CONFIDENTIAL	NDGW12	5/3/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	7/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	10/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW12	4/6/2012	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	9/2/2010	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	9/2/2010	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW10	1/13/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	1/13/2011	---		---		---		---		---		<0.5	
CONFIDENTIAL	NDGW10	5/4/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	7/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	8/4/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	10/19/2011	---		---		---		---		---		<1.0	
CONFIDENTIAL	NDGW10	4/6/2012	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	9/2/2010	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	1/14/2011	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	5/3/2011	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	7/20/2011	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	10/17/2011	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	4/5/2012	---		---		---		---		---		<1.0	
Well 14509529AAAD	NDGW14	10/18/2012	<50		<5.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	9/3/2010	---		---		---		---		---		<1.0	
MW-1	NDGW01	9/7/2010	---		---		---		---		---		<0.5	
MW-1	NDGW01	10/8/2010	---		---		---		---		---		<1.0	
MW-1	NDGW01	11/24/2010	---		---		---		---		---		<1.0	
MW-1	NDGW01	1/13/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	1/13/2011	---		---		---		---		---		<0.5	
MW-1	NDGW01	2/23/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	3/27/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	5/3/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	5/31/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	7/10/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	7/18/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	8/16/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	9/6/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	10/18/2011	---		---		---		---		---		<1.0	
MW-1	NDGW01	4/5/2012	---		---		---		---		---		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	chloroform (67-66-3)	chloroform QC	benzene (71-43-2)	benzene QC	toluene (108-88-3)	toluene QC	ethylbenzene (100-41-4)	ethylbenzene QC
Units			µg/L		µg/L		µg/L		µg/L	
CONFIDENTIAL	NDGW12	5/3/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	7/19/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	10/19/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	4/6/2012	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	9/2/2010	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	9/2/2010	<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW10	1/13/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	1/13/2011	<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW10	5/4/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	7/19/2011	<1.0		4.7		<1.0		<1.0	
CONFIDENTIAL	NDGW10	8/4/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	10/19/2011	<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	4/6/2012	<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	9/2/2010	<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	1/14/2011	<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	5/3/2011	<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	7/20/2011	<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	10/17/2011	<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	4/5/2012	<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	10/18/2012	<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	9/3/2010	13		<1.0		<1.0		<1.0	
MW-1	NDGW01	9/7/2010	10.4		<0.5		<0.5		<0.5	
MW-1	NDGW01	10/8/2010	6		<1.0		<1.0		<1.0	
MW-1	NDGW01	11/24/2010	4.2		<1.0		<1.0		<1.0	
MW-1	NDGW01	1/13/2011	2.7		<1.0		<1.0		<1.0	
MW-1	NDGW01	1/13/2011	2.64		<0.5		<0.5		<0.5	
MW-1	NDGW01	2/23/2011	2		<1.0		<1.0		<1.0	
MW-1	NDGW01	3/27/2011	1.9		<1.0		<1.0		<1.0	
MW-1	NDGW01	5/3/2011	<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	5/31/2011	<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	7/10/2011	<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	7/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	8/16/2011	<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	9/6/2011	<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	4/5/2012	<1.0		<1.0		<1.0		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	m+p xylene (108-38-3, 106-42-3)	m+p xylene QC	o xylene (95-47-6)	o xylene QC	total xylenes (1330-20-7)	total xylenes QC	bromodichloromethane (75-27-4)	bromodichloromethane QC	chlorodibromomethane (124-48-1)	chlorodibromomethane QC	dichlorodifluoromethane (75 71 8)	dichlorodifluoromethane QC
Units			µg/L		µg/L		µg/L		ug/L		µg/L		µg/L	
CONFIDENTIAL	NDGW12	5/3/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	7/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	10/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW12	4/6/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	9/2/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	9/2/2010	-		-		<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW10	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	1/13/2011	-		-		<0.5		<0.5		<0.5		<0.5	
CONFIDENTIAL	NDGW10	5/4/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	7/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	8/4/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	10/19/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
CONFIDENTIAL	NDGW10	4/6/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	9/2/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	1/14/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	5/3/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	7/20/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	10/17/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Well 14509529AAAD	NDGW14	10/18/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	9/3/2010	<1.0		<1.0		<1.0		1.1		0.26	J	<1.0	
MW-1	NDGW01	9/7/2010	-		-		<0.5		<0.5		<0.5		<0.5	
MW-1	NDGW01	10/8/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	11/24/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	1/13/2011	-		-		<0.5		<0.5		<0.5		<0.5	
MW-1	NDGW01	2/23/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	3/27/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	5/3/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	5/31/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	7/10/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	7/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	8/16/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	9/6/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-1	NDGW01	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	ethanol (64-17-5)	ethanol QC	methanol (67-56-1)	methanol QC	isopropanol (67 63 0)	isopropanol QC	isobutanol (78 83 1)	isobutanol QC	isopropyl ether (108-20-3)	isopropyl ether QC	styrene (100-42-5)	styrene QC
Units			mg/L		mg/L		µg/L		ug/L		ug/L		µg/L	
MW-1	NDGW01	10/18/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-2	NDGW02	9/3/2010	---		---		---		---		---		<1.0	
MW-2	NDGW02	9/7/2010	---		---		---		---		---		<0.5	
MW-2	NDGW02	10/8/2010	---		---		---		---		---		<1.0	
MW-2	NDGW02	11/24/2010	---		---		---		---		---		<1.0	
MW-2	NDGW02	1/13/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	1/13/2011	---		---		---		---		---		<0.5	
MW-2	NDGW02	2/23/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	3/27/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	5/2/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	6/1/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	7/9/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	7/18/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	8/15/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	9/6/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	10/18/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	4/5/2012	---		---		---		---		---		<1.0	
MW-2	NDGW02	10/17/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-3	NDGW03	9/3/2010	---		---		---		---		---		<1.0	
MW-3	NDGW03	9/8/2010	---		---		---		---		---		<0.5	
MW-3	NDGW03	10/8/2010	---		---		---		---		---		<1.0	
MW-3	NDGW03	11/24/2010	---		---		---		---		---		<1.0	
MW-3	NDGW03	1/13/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	2/23/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	3/27/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	5/2/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	6/1/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	7/9/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	7/18/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	8/15/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	9/6/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	10/18/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	4/5/2012	---		---		---		---		---		<1.0	
MW-3	NDGW03	10/17/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-4	NDGW04	10/8/2010	---		---		---		---		---		<1.0	
MW-4	NDGW04	11/24/2010	---		---		---		---		---		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	tert amyl alcohol (75 85 4)	tert amyl alcohol QC	tert butyl alcohol (75 65 0)	tert butyl alcohol QC	methyl tert-butyl ether (1634-04-4)	methyl tert-butyl ether QC	ethyl tert-butyl ether (637-92-3)	ethyl tert butyl ether QC	tert-amyl methyl ether (994-05-8)	tert-amyl methyl ether QC	methylene chloride (75-09-2)	methylene chloride QC
Units			ug/L		µg/L		µg/L		µg/L		µg/L		µg/L	
MW-1	NDGW01	10/18/2012	<50		<5.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	9/3/2010	---		---		---		---		---		<1.0	
MW-2	NDGW02	9/7/2010	---		---		---		---		---		<0.5	
MW-2	NDGW02	10/8/2010	---		---		---		---		---		<1.0	
MW-2	NDGW02	11/24/2010	---		---		---		---		---		<1.0	
MW-2	NDGW02	1/13/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	1/13/2011	---		---		---		---		---		<0.5	
MW-2	NDGW02	2/23/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	3/27/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	5/2/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	6/1/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	7/9/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	7/18/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	8/15/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	9/6/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	10/18/2011	---		---		---		---		---		<1.0	
MW-2	NDGW02	4/5/2012	---		---		---		---		---		<1.0	
MW-2	NDGW02	10/17/2012	<50		<5.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	9/3/2010	---		---		---		---		---		<1.0	
MW-3	NDGW03	9/8/2010	---		---		---		---		---		<0.5	
MW-3	NDGW03	10/8/2010	---		---		---		---		---		<1.0	
MW-3	NDGW03	11/24/2010	---		---		---		---		---		<1.0	
MW-3	NDGW03	1/13/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	2/23/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	3/27/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	5/2/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	6/1/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	7/9/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	7/18/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	8/15/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	9/6/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	10/18/2011	---		---		---		---		---		<1.0	
MW-3	NDGW03	4/5/2012	---		---		---		---		---		<1.0	
MW-3	NDGW03	10/17/2012	<50		<5.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	10/8/2010	---		---		---		---		---		<1.0	
MW-4	NDGW04	11/24/2010	---		---		---		---		---		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	chloroform (67-66-3)	chloroform QC	benzene (71-43-2)	benzene QC	toluene (108-88-3)	toluene QC	ethylbenzene (100-41-4)	ethylbenzene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-1	NDGW01	10/18/2012	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	9/3/2010	4.6		<1.0		<1.0		<1.0	
MW-2	NDGW02	9/7/2010	2.45		<0.5		<0.5		<0.5	
MW-2	NDGW02	10/8/2010	0.3		<1.0		<1.0		<1.0	
MW-2	NDGW02	11/24/2010	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	1/13/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	1/13/2011	<0.5		<0.5		<0.5		<0.5	
MW-2	NDGW02	2/23/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	3/27/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	5/2/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	6/1/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	7/9/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	7/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	8/15/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	9/6/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	4/5/2012	<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	10/17/2012	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	9/3/2010	0.97	J	<1.0		0.21	J	<1.0	
MW-3	NDGW03	9/8/2010	0.79		<0.5		<0.5		<0.5	
MW-3	NDGW03	10/8/2010	2.4		0.29	J	0.27	J	<1.0	
MW-3	NDGW03	11/24/2010	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	1/13/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	2/23/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	3/27/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	5/2/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	6/1/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	7/9/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	7/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	8/15/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	9/6/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	4/5/2012	<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	10/17/2012	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	10/8/2010	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	11/24/2010	2.1		<1.0		<1.0		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	m+p xylene (108-38-3, 106-42-3)	m+p xylene QC	o xylene (95-47-6)	o xylene QC	total xylenes (1330-20-7)	total xylenes QC	bromodichloromethane (75-27-4)	bromodichloromethane QC	chlorodibromomethane (124-48-1)	chlorodibromomethane QC	dichlorodifluoromethane (75 71 8)	dichlorodifluoromethane QC
Units			µg/L		µg/L		µg/L		ug/L		µg/L		µg/L	
MW-1	NDGW01	10/18/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	9/3/2010	<1.0		<1.0		<1.0		1.6		0.58	J	<1.0	
MW-2	NDGW02	9/7/2010	-		-		<0.5		<0.5		<0.5		<0.5	
MW-2	NDGW02	10/8/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	11/24/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	1/13/2011	-		-		<0.5		<0.5		<0.5		<0.5	
MW-2	NDGW02	2/23/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	3/27/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	5/2/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	6/1/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	7/9/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	7/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	8/15/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	9/6/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-2	NDGW02	10/17/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	9/3/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	9/8/2010	-		-		<0.5		<0.5		<0.5		<0.5	
MW-3	NDGW03	10/8/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	11/24/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	2/23/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	3/27/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	5/2/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	6/1/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	7/9/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	7/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	8/15/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	9/6/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-3	NDGW03	10/17/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	10/8/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	11/24/2010	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	ethanol (64-17-5)	ethanol QC	methanol (67-56-1)	methanol QC	isopropanol (67 63 0)	isopropanol QC	isobutanol (78 83 1)	isobutanol QC	isopropyl ether (108-20-3)	isopropyl ether QC	styrene (100-42-5)	styrene QC
Units			mg/L		mg/L		µg/L		ug/L		ug/L		µg/L	
MW-4	NDGW04	1/12/2011	---		---		---		---		---		<0.5	
MW-4	NDGW04	1/13/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	2/23/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	3/27/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	5/2/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	6/1/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	7/9/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	7/18/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	8/18/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	9/6/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	10/18/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	4/5/2012	---		---		---		---		---		<1.0	
MW-4	NDGW04	10/17/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-5	NDGW05	3/27/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	5/3/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	6/1/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	7/10/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	7/18/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	8/16/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	9/7/2011	---		---		---		---		---		---	
MW-5	NDGW05	10/18/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	4/5/2012	---		---		---		---		---		<1.0	
MW-5	NDGW05	10/17/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-6	NDGW06	3/27/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	5/3/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	6/1/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	7/10/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	7/18/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	8/16/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	9/7/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	10/18/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	4/5/2012	---		---		---		---		---		<1.0	
MW-6	NDGW06	10/18/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-7	NDGW07	3/27/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	5/2/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	6/1/2011	---		---		---		---		---		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	tert amyl alcohol (75 85 4)	tert amyl alcohol QC	tert butyl alcohol (75 65 0)	tert butyl alcohol QC	methyl tert-butyl ether (1634-04-4)	methyl tert-butyl ether QC	ethyl tert-butyl ether (637-92-3)	ethyl tert butyl ether QC	tert-amyl methyl ether (994-05-8)	tert-amyl methyl ether QC	methylene chloride (75-09-2)	methylene chloride QC
Units			ug/L		µg/L		µg/L		µg/L		µg/L		µg/L	
MW-4	NDGW04	1/12/2011	---		---		---		---		---		0.62	
MW-4	NDGW04	1/13/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	2/23/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	3/27/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	5/2/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	6/1/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	7/9/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	7/18/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	8/18/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	9/6/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	10/18/2011	---		---		---		---		---		<1.0	
MW-4	NDGW04	4/5/2012	---		---		---		---		---		<1.0	
MW-4	NDGW04	10/17/2012	<50		<5.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	3/27/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	5/3/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	6/1/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	7/10/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	7/18/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	8/16/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	9/7/2011	---		---		---		---		---		---	
MW-5	NDGW05	10/18/2011	---		---		---		---		---		<1.0	
MW-5	NDGW05	4/5/2012	---		---		---		---		---		<1.0	
MW-5	NDGW05	10/17/2012	<50		<5.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	3/27/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	5/3/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	6/1/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	7/10/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	7/18/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	8/16/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	9/7/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	10/18/2011	---		---		---		---		---		<1.0	
MW-6	NDGW06	4/5/2012	---		---		---		---		---		<1.0	
MW-6	NDGW06	10/18/2012	<50		<5.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	3/27/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	5/2/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	6/1/2011	---		---		---		---		---		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	chloroform (67-66-3)	chloroform QC	benzene (71-43-2)	benzene QC	toluene (108-88-3)	toluene QC	ethylbenzene (100-41-4)	ethylbenzene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-4	NDGW04	1/12/2011	0.93		<0.5		<0.5		<0.5	
MW-4	NDGW04	1/13/2011	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	2/23/2011	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	3/27/2011	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	5/2/2011	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	6/1/2011	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	7/9/2011	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	7/18/2011	<1.0		<1.0		1.3		<1.0	
MW-4	NDGW04	8/18/2011	<1.0		<1.0		2		<1.0	
MW-4	NDGW04	9/6/2011	<1.0		<1.0		1.5		<1.0	
MW-4	NDGW04	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	4/5/2012	<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	10/17/2012	<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	3/27/2011	<1.0		1.5		2.6		<1.0	
MW-5	NDGW05	5/3/2011	<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	6/1/2011	<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	7/10/2011	<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	7/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	8/16/2011	<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	9/7/2011	---		---		---		---	
MW-5	NDGW05	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	4/5/2012	<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	10/17/2012	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	3/27/2011	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	5/3/2011	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	6/1/2011	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	7/10/2011	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	7/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	8/16/2011	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	9/7/2011	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	4/5/2012	<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	10/18/2012	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	3/27/2011	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	5/2/2011	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	6/1/2011	<1.0		<1.0		<1.0		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	m+p xylene (108-38-3, 106-42-3)	m+p xylene QC	o xylene (95-47-6)	o xylene QC	total xylenes (1330-20-7)	total xylenes QC	bromodichloromethane (75-27-4)	bromodichloromethane QC	chlorodibromomethane (124-48-1)	chlorodibromomethane QC	dichlorodifluoromethane (75 71 8)	dichlorodifluoromethane QC
Units			µg/L		µg/L		µg/L		ug/L		µg/L		µg/L	
MW-4	NDGW04	1/12/2011	-		-		<0.5		<0.5		<0.5		<0.5	
MW-4	NDGW04	1/13/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	2/23/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	3/27/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	5/2/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	6/1/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	7/9/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	7/18/2011	1		<1.0		1.7		<1.0		<1.0		<1.0	
MW-4	NDGW04	8/18/2011	1.4		<1.0		1.4		<1.0		<1.0		<1.0	
MW-4	NDGW04	9/6/2011	1.3		<1.0		1.4		<1.0		<1.0		<1.0	
MW-4	NDGW04	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-4	NDGW04	10/17/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	3/27/2011	3.2		2.6		5.8		<1.0		<1.0		<1.0	
MW-5	NDGW05	5/3/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	6/1/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	7/10/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	7/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	8/16/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	9/7/2011	---		---		---		---		---		---	
MW-5	NDGW05	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-5	NDGW05	10/17/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	3/27/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	5/3/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	6/1/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	7/10/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	7/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	8/16/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	9/7/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-6	NDGW06	10/18/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	3/27/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	5/2/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	6/1/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	ethanol (64-17-5)	ethanol QC	methanol (67-56-1)	methanol QC	isopropanol (67 63 0)	isopropanol QC	isobutanol (78 83 1)	isobutanol QC	isopropyl ether (108-20-3)	isopropyl ether QC	styrene (100-42-5)	styrene QC
Units			mg/L		mg/L		µg/L		ug/L		ug/L		µg/L	
MW-7	NDGW07	7/9/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	7/18/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	8/16/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	9/7/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	10/18/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	4/5/2012	---		---		---		---		---		<1.0	
MW-7	NDGW07	10/18/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-8S	NDGW08	3/27/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	5/2/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	6/1/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	7/10/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	7/18/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	8/16/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	9/7/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	10/18/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	4/5/2012	---		---		---		---		---		<1.0	
MW-8S	NDGW08	10/18/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	
MW-8D	NDGW09	3/27/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	5/5/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	6/1/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	7/10/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	7/18/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	8/16/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	9/7/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	10/18/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	4/5/2012	---		---		---		---		---		<1.0	
MW-8D	NDGW09	10/18/2012	<1.0		<1.0		<50		<50		<1.0		<1.0	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	tert amyl alcohol (75 85 4)	tert amyl alcohol QC	tert butyl alcohol (75 65 0)	tert butyl alcohol QC	methyl tert-butyl ether (1634-04-4)	methyl tert-butyl ether QC	ethyl tert-butyl ether (637-92-3)	ethyl tert butyl ether QC	tert-amyl methyl ether (994-05-8)	tert-amyl methyl ether QC	methylene chloride (75-09-2)	methylene chloride QC
Units			ug/L		µg/L		µg/L		µg/L		µg/L		µg/L	
MW-7	NDGW07	7/9/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	7/18/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	8/16/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	9/7/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	10/18/2011	---		---		---		---		---		<1.0	
MW-7	NDGW07	4/5/2012	---		---		---		---		---		<1.0	
MW-7	NDGW07	10/18/2012	<50		302		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	3/27/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	5/2/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	6/1/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	7/10/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	7/18/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	8/16/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	9/7/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	10/18/2011	---		---		---		---		---		<1.0	
MW-8S	NDGW08	4/5/2012	---		---		---		---		---		<1.0	
MW-8S	NDGW08	10/18/2012	<50		232		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	3/27/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	5/5/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	6/1/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	7/10/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	7/18/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	8/16/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	9/7/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	10/18/2011	---		---		---		---		---		<1.0	
MW-8D	NDGW09	4/5/2012	---		---		---		---		---		<1.0	
MW-8D	NDGW09	10/18/2012	<50		<5.0		<1.0		<1.0		<1.0		<1.0	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	chloroform (67-66-3)	chloroform QC	benzene (71-43-2)	benzene QC	toluene (108-88-3)	toluene QC	ethylbenzene (100-41-4)	ethylbenzene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-7	NDGW07	7/9/2011	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	7/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	8/16/2011	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	9/7/2011	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	4/5/2012	<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	10/18/2012	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	3/27/2011	<1.0		<1.0		4.2		<1.0	
MW-8S	NDGW08	5/2/2011	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	6/1/2011	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	7/10/2011	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	7/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	8/16/2011	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	9/7/2011	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	4/5/2012	<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	10/18/2012	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	3/27/2011	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	5/5/2011	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	6/1/2011	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	7/10/2011	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	7/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	8/16/2011	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	9/7/2011	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	10/18/2011	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	4/5/2012	<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	10/18/2012	<1.0		<1.0		<1.0		<1.0	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-5 Volatile Organic Compound Results

Sample ID[1]	Study ID	Date Collected	m+p xylene (108-38-3, 106-42-3)	m+p xylene QC	o xylene (95-47-6)	o xylene QC	total xylenes (1330-20-7)	total xylenes QC	bromodichloromethane (75-27-4)	bromodichloromethane QC	chlorodibromomethane (124-48-1)	chlorodibromomethane QC	dichlorodifluoromethane (75 71 8)	dichlorodifluoromethane QC
Units			µg/L		µg/L		µg/L		ug/L		µg/L		µg/L	
MW-7	NDGW07	7/9/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	7/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	8/16/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	9/7/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-7	NDGW07	10/18/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	3/27/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	5/2/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	6/1/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	7/10/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	7/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	8/16/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	9/7/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8S	NDGW08	10/18/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	3/27/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	5/5/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	6/1/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	7/10/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	7/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	8/16/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	9/7/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	10/18/2011	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	4/5/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
MW-8D	NDGW09	10/18/2012	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-6 Dissolved Gas Results

Sample ID[1]	Study ID	Date Collected	Methane (74 82 8)	Methane QC	Ethane (74 84 0)	Ethane QC	Ethene (74 85 1)	Ethene QC
Units			mg/L		mg/L		mg/L	
CW-5	NDGW16	9/2/2010	0.001		<0.001		<0.001	
CW-5	NDGW16	9/2/2010	-		-		-	
CW-5	NDGW16	1/13/2011	0.003		<0.001		<0.001	
CW-5	NDGW16	1/13/2011	-		-		-	
CW-5	NDGW16	5/4/2011	0.006		<0.001		<0.001	
CW-5	NDGW16	7/19/2011	0.006		<0.001		<0.001	
CW-5	NDGW16	10/19/2011	0.0037		<0.001		<0.001	
CW-5	NDGW16	4/6/2012	0.0064		<0.0010		<0.0010	
CW-4	NDGW15	9/2/2010	0.002		<0.001		<0.001	
CW-4	NDGW15	9/2/2010	-		-		-	
CW-4	NDGW15	1/13/2011	0.003		<0.001		<0.001	
CW-4	NDGW15	1/13/2011	-		-		-	
CW-4	NDGW15	5/4/2011	0.003		<0.001		<0.001	
CW-4	NDGW15	7/19/2011	0.003		<0.001		<0.001	
CW-4	NDGW15	10/19/2011	0.0037		<0.001		<0.001	
CW-4	NDGW15	4/6/2012	0.0027		<0.0010		<0.0010	
CONFIDENTIAL	NDGW11	9/2/2010	0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW11	9/2/2010	-		-		-	
CONFIDENTIAL	NDGW11	1/13/2011	0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW11	1/13/2011	-		-		-	
CONFIDENTIAL	NDGW11	5/4/2011	0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW11	7/19/2011	0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW11	10/19/2011	0.0018		<0.001		<0.001	
CONFIDENTIAL	NDGW11	4/6/2012	0.0019		<0.0010		<0.0010	
Truchan Depot	NDGW13	10/7/2010	<0.003		<0.001		<0.001	
Truchan Depot	NDGW13	10/7/2010	-		-		-	
Truchan Depot	NDGW13	1/13/2011	0.002		<0.001		<0.001	
Truchan Depot	NDGW13	1/13/2011	-		-		-	
Truchan Depot	NDGW13	5/4/2011	0.002		<0.001		<0.001	
Truchan Depot	NDGW13	7/19/2011	0.002		<0.001		<0.001	
Truchan Depot	NDGW13	10/19/2011	0.0025		<0.001		<0.001	
Truchan Depot	NDGW13	4/6/2012	0.0022		<0.0010		<0.0010	
CONFIDENTIAL	NDGW12	9/2/2010	<0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW12	9/2/2010	-		-		-	
CONFIDENTIAL	NDGW12	1/13/2011	<0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW12	1/13/2011	-		-		-	
CONFIDENTIAL	NDGW12	5/3/2011	<0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW12	7/19/2011	<0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW12	10/19/2011	0.0011		<0.001		<0.001	
CONFIDENTIAL	NDGW12	4/6/2012	<0.0010		<0.0010		<0.0010	
CONFIDENTIAL	NDGW10	9/2/2010	<0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW10	9/2/2010	-		-		-	
CONFIDENTIAL	NDGW10	1/13/2011	<0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW10	1/13/2011	-		-		-	
CONFIDENTIAL	NDGW10	5/4/2011	<0.001		<0.001		<0.001	

Table D-6 Dissolved Gas Results

Sample ID[1]	Study ID	Date Collected	Methane (74 82 8)	Methane QC	Ethane (74 84 0)	Ethane QC	Ethene (74 85 1)	Ethene QC
Units			mg/L		mg/L		mg/L	
CONFIDENTIAL	NDGW10	7/19/2011	0.002		<0.001		<0.001	
CONFIDENTIAL	NDGW10	8/4/2011	0.001		<0.001		<0.001	
CONFIDENTIAL	NDGW10	10/19/2011	0.0013		<0.001		<0.001	
CONFIDENTIAL	NDGW10	4/6/2012	<0.0010		<0.0010		<0.0010	
Well 14509529AAAD	NDGW14	9/2/2010	0.016		<0.001		<0.001	
Well 14509529AAAD	NDGW14	1/14/2011	0.016		<0.001		<0.001	
Well 14509529AAAD	NDGW14	5/3/2011	0.011		<0.001		<0.001	
Well 14509529AAAD	NDGW14	7/20/2011	0.016		<0.001		<0.001	
Well 14509529AAAD	NDGW14	10/17/2011	0.0084		<0.001		<0.001	
Well 14509529AAAD	NDGW14	4/5/2012	0.019		<0.0010		<0.0010	
Well 14509529AAAD	NDGW14	10/18/2012	0.0062		<0.0010		<0.0010	
MW-1	NDGW01	9/3/2010	0.005		0.001		<0.001	
MW-1	NDGW01	9/7/2010	-		-		-	
MW-1	NDGW01	10/8/2010	0.004		0.002		<0.001	
MW-1	NDGW01	11/24/2010	0.003		0.001		<0.001	
MW-1	NDGW01	1/13/2011	0.001		<0.001		<0.001	
MW-1	NDGW01	1/13/2011	-		-		-	
MW-1	NDGW01	2/23/2011	<0.001		<0.001		<0.001	
MW-1	NDGW01	3/27/2011	0.001		<0.001		<0.001	
MW-1	NDGW01	5/3/2011	<0.001		<0.001		<0.001	
MW-1	NDGW01	5/31/2011	<0.001		<0.001		<0.001	
MW-1	NDGW01	7/10/2011	<0.001		<0.001		<0.001	
MW-1	NDGW01	7/18/2011	<0.001		<0.001		<0.001	
MW-1	NDGW01	8/16/2011	<0.001		<0.001		<0.001	
MW-1	NDGW01	9/6/2011	<0.0010		<0.0010		<0.0010	
MW-1	NDGW01	10/18/2011	<0.0010		<0.0010		<0.0010	
MW-1	NDGW01	4/5/2012	0.0011		<0.0010		<0.0010	
MW-1	NDGW01	10/18/2012	<0.0010		<0.0010		<0.0010	
MW-2	NDGW02	9/3/2010	0.002		<0.001		<0.001	
MW-2	NDGW02	9/7/2010	-		-		-	
MW-2	NDGW02	10/8/2010	0.002		<0.001		<0.001	
MW-2	NDGW02	11/24/2010	0.001		<0.001		<0.001	
MW-2	NDGW02	1/13/2011	<0.001		<0.001		<0.001	
MW-2	NDGW02	1/13/2011	-		-		-	
MW-2	NDGW02	2/23/2011	0.001		<0.001		<0.001	
MW-2	NDGW02	3/27/2011	0.001		<0.001		<0.001	
MW-2	NDGW02	5/2/2011	<0.001		<0.001		<0.001	
MW-2	NDGW02	6/1/2011	<0.001		<0.001		<0.001	
MW-2	NDGW02	7/9/2011	<0.001		<0.001		<0.001	
MW-2	NDGW02	7/18/2011	<0.001		<0.001		<0.001	
MW-2	NDGW02	8/15/2011	<0.001		<0.001		<0.001	
MW-2	NDGW02	9/6/2011	<0.0010		<0.0010		<0.0010	
MW-2	NDGW02	10/18/2011	<0.0010		<0.0010		<0.0010	
MW-2	NDGW02	4/5/2012	0.0011		<0.0010		<0.0010	
MW-2	NDGW02	10/17/2012	<0.0010		<0.0010		<0.0010	

Table D-6 Dissolved Gas Results

Sample ID[1]	Study ID	Date Collected	Methane (74 82 8)	Methane QC	Ethane (74 84 0)	Ethane QC	Ethene (74 85 1)	Ethene QC
Units			mg/L		mg/L		mg/L	
MW-3	NDGW03	9/3/2010	0.004		0.002		0.002	
MW-3	NDGW03	9/8/2010	-		-		-	
MW-3	NDGW03	10/8/2010	0.039		0.022		0.01	
MW-3	NDGW03	11/24/2010	0.027		0.016		0.006	
MW-3	NDGW03	1/13/2011	0.007		0.004		<0.001	
MW-3	NDGW03	2/23/2011	0.002		0.002		<0.001	
MW-3	NDGW03	3/27/2011	0.005		0.003		<0.001	
MW-3	NDGW03	5/2/2011	0.003		0.002		<0.001	
MW-3	NDGW03	6/1/2011	<0.001		<0.001		<0.001	
MW-3	NDGW03	7/9/2011	0.002		<0.001		<0.001	
MW-3	NDGW03	7/18/2011	<0.001		<0.001		<0.001	
MW-3	NDGW03	8/15/2011	<0.001		<0.001		<0.001	
MW-3	NDGW03	9/6/2011	<0.001		<0.001		<0.001	
MW-3	NDGW03	10/18/2011	<0.001		<0.001		<0.001	
MW-3	NDGW03	4/5/2012	<0.0010		<0.0010		<0.0010	
MW-3	NDGW03	10/17/2012	<0.0010		<0.0010		<0.0010	
MW-4	NDGW04	10/8/2010	0.012		0.005		0.003	
MW-4	NDGW04	11/24/2010	0.011		0.005		0.002	
MW-4	NDGW04	1/12/2011	-		-		-	
MW-4	NDGW04	1/13/2011	0.003		0.001		<0.001	
MW-4	NDGW04	2/23/2011	0.004		0.002		<0.001	
MW-4	NDGW04	3/27/2011	0.002		<0.001		<0.001	
MW-4	NDGW04	5/2/2011	0.001		<0.001		<0.001	
MW-4	NDGW04	6/1/2011	<0.001		<0.001		<0.001	
MW-4	NDGW04	7/9/2011	<0.001		<0.001		<0.001	
MW-4	NDGW04	7/18/2011	<0.001		<0.001		<0.001	
MW-4	NDGW04	8/18/2011	<0.001		<0.001		<0.001	
MW-4	NDGW04	9/6/2011	<0.0010		<0.0010		<0.0010	
MW-4	NDGW04	10/18/2011	0.0011		<0.0010		<0.0010	
MW-4	NDGW04	4/5/2012	<0.0010		<0.0010		<0.0010	
MW-4	NDGW04	10/17/2012	<0.0010		<0.0010		<0.0010	
MW-5	NDGW05	3/27/2011	0.006		0.006		<0.001	
MW-5	NDGW05	5/3/2011	0.007		0.003		<0.001	
MW-5	NDGW05	6/1/2011	<0.001		<0.001		<0.001	
MW-5	NDGW05	7/10/2011	<0.001		<0.001		<0.001	
MW-5	NDGW05	7/18/2011	<0.001		<0.001		<0.001	
MW-5	NDGW05	8/16/2011	<0.001		<0.001		<0.001	
MW-5	NDGW05	9/7/2011						
MW-5	NDGW05	10/18/2011	<0.001		<0.001		<0.001	
MW-5	NDGW05	4/5/2012	0.0012		<0.0010		<0.0010	
MW-5	NDGW05	10/17/2012	<0.0010		<0.0010		<0.0010	
MW-6	NDGW06	3/27/2011	0.002		0.001		<0.001	

Table D-6 Dissolved Gas Results

Sample ID[1]	Study ID	Date Collected	Methane (74 82 8)	Methane QC	Ethane (74 84 0)	Ethane QC	Ethene (74 85 1)	Ethene QC
Units			mg/L		mg/L		mg/L	
MW-6	NDGW06	5/3/2011	0.008		0.004		<0.001	
MW-6	NDGW06	6/1/2011	0.002		<0.001		<0.001	
MW-6	NDGW06	7/10/2011	0.001		<0.001		<0.001	
MW-6	NDGW06	7/18/2011	<0.001		<0.001		<0.001	
MW-6	NDGW06	8/16/2011	<0.001		<0.001		<0.001	
MW-6	NDGW06	9/7/2011	<0.0010		<0.0010		<0.0010	
MW-6	NDGW06	10/18/2011	<0.0010		<0.0010		<0.0010	
MW-6	NDGW06	4/5/2012	<0.0010		<0.0010		<0.0010	
MW-6	NDGW06	10/18/2012	<0.0010		<0.0010		<0.0010	
MW-7	NDGW07	3/27/2011	0.003		<0.001		<0.001	
MW-7	NDGW07	5/2/2011	0.009		0.004		0.001	
MW-7	NDGW07	6/1/2011	0.001		<0.001		<0.001	
MW-7	NDGW07	7/9/2011	0.003		0.001		<0.001	
MW-7	NDGW07	7/18/2011	0.002		<0.001		<0.001	
MW-7	NDGW07	8/16/2011	0.0021		<0.001		<0.001	
MW-7	NDGW07	9/7/2011	0.0012		<0.001		<0.001	
MW-7	NDGW07	10/18/2011	0.0073		0.0012		<0.001	
MW-7	NDGW07	4/5/2012	0.011		0.018		<0.0010	
MW-7	NDGW07	10/18/2012	0.0022		0.0055		<0.0010	
MW-8S	NDGW08	3/27/2011	0.003		<0.001		<0.001	
MW-8S	NDGW08	5/2/2011	0.014		0.003		0.002	
MW-8S	NDGW08	6/1/2011	0.009		<0.001		<0.001	
MW-8S	NDGW08	7/10/2011	0.026		0.003		<0.001	
MW-8S	NDGW08	7/18/2011	0.019		0.002		<0.001	
MW-8S	NDGW08	8/16/2011	0.027		0.0028		<0.001	
MW-8S	NDGW08	9/7/2011	0.019		0.0021		<0.0010	
MW-8S	NDGW08	10/18/2011	0.016		0.0026		<0.001	
MW-8S	NDGW08	4/5/2012	0.0079		0.0037		<0.0010	
MW-8S	NDGW08	10/18/2012	0.0041		<0.0010		<0.0010	
MW-8D	NDGW09	3/27/2011	0.001		<0.001		<0.001	
MW-8D	NDGW09	5/5/2011	0.006		<0.001		<0.001	
MW-8D	NDGW09	6/1/2011	0.003		<0.001		<0.001	
MW-8D	NDGW09	7/10/2011	0.008		<0.001		<0.001	
MW-8D	NDGW09	7/18/2011	0.005		<0.001		<0.001	
MW-8D	NDGW09	8/16/2011	0.007		<0.001		<0.001	
MW-8D	NDGW09	9/7/2011	0.0054		<0.0010		<0.0010	
MW-8D	NDGW09	10/18/2011	0.0074		<0.0010		<0.0010	
MW-8D	NDGW09	4/5/2012	0.0064		<0.0010		<0.0010	
MW-8D	NDGW09	10/18/2012	0.0065		<0.0010		<0.0010	

Footnote:
[1]Homeowner Names are redacted for Privacy Concerns
J = estimated value. The analyte was present but less than the reporting limit
H = Analysis performed past recommended holding time
D = Reporting limit increased due to sample matrix
MW-5 9/7/2011 Not sampled due to site activity

Table D-7 Glycol Results

Sample ID[1]	Study ID	Date Collected	ethylene glycol (107 21 1)	ethylene glycol QC	propylene glycol (57 55 6)	propylene glycol QC
Units			µg/L		µg/L	
QL						
Well 14509529AAAD	NDGW14	10/18/2012	<5.0		<5.0	
MW-1	NDGW01	10/18/2012	<5.0		<5.0	
MW-2	NDGW02	10/17/2012	<5.0		<5.0	
MW-3	NDGW03	10/17/2012	<5.0		<5.0	
MW-4	NDGW04	10/17/2012	<5.0		<5.0	
MW-5	NDGW05	10/17/2012	<5.0		<5.0	
MW-6	NDGW06	10/18/2012	<5.0		<5.0	
MW-7	NDGW07	10/18/2012	<5.0		<5.0	
MW-8S	NDGW08	10/18/2012	<5.0		<5.0	
MW-8D	NDGW09	10/18/2012	<5.0		<5.0	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Benzo(a)anthracene (56 55 3)	Benzo(a)anthracene QC	Benzo(a)pyrene (50 32 3)	Benzo(a)pyrene QC	Benzo(b)fluoranthene (205 99 2)	Benzo(b)fluoranthene QC	Benzo(k)fluoranthene (207 08 9)	Benzo(k)fluoranthene QC
Units			µg/L		µg/L		µg/L		µg/L	
CW-5	NDGW16	9/2/2010	<10		<10		<10		<10	
CW-5	NDGW16	9/2/2010	<10		<10		<10		<10	
CW-5	NDGW16	1/13/2011	<10		<10		<10		<10	
CW-5	NDGW16	1/13/2011	<10		<10		<10		<10	
CW-5	NDGW16	5/4/2011	<10		<10		<10		<10	
CW-5	NDGW16	7/19/2011	<10		<10		<10		<10	
CW-5	NDGW16	10/19/2011	<10		<10		<10		<10	
CW-5	NDGW16	4/6/2012	<10		<10		<10		<10	
CW-4	NDGW15	9/2/2010	<10		<10		<10		<10	
CW-4	NDGW15	9/2/2010	<10		<10		<10		<10	
CW-4	NDGW15	1/13/2011	<10		<10		<10		<10	
CW-4	NDGW15	1/13/2011	<10		<10		<10		<10	
CW-4	NDGW15	5/4/2011	<10		<10		<10		<10	
CW-4	NDGW15	7/19/2011	<10		<10		<10		<10	
CW-4	NDGW15	10/19/2011	<10		<10		<10		<10	
CW-4	NDGW15	4/6/2012	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	5/4/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	7/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	10/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	4/6/2012	<10		<10		<10		<10	
Truchan Depot	NDGW13	10/7/2010	<10		<10		<10		<10	
Truchan Depot	NDGW13	10/7/2010	<10		<10		<10		<10	
Truchan Depot	NDGW13	1/13/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	1/13/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	5/4/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	7/19/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	10/19/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	4/6/2012	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	1/13/2011	<10		<10		<10		<10	

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Benzo(a)anthracene (56 55 3)	Benzo(a)anthracene QC	Benzo(a)pyrene (50 32 3)	Benzo(a)pyrene QC	Benzo(b)fluoranthene (205 99 2)	Benzo(b)fluoranthene QC	Benzo(k)fluoranthene (207 08 9)	Benzo(k)fluoranthene QC
Units			µg/L		µg/L		µg/L		µg/L	
CONFIDENTIAL	NDGW12	5/3/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	7/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	10/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	4/6/2012	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	5/4/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	7/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	8/4/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	10/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	4/6/2012	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	9/2/2010	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	1/14/2011	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	5/3/2011	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	7/20/2011	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	10/17/2011	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	4/5/2012	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	10/18/2012	<10		<10		<10		<10	
MW-1	NDGW01	9/3/2010	<10		<10		<10		<10	
MW-1	NDGW01	9/7/2010	<10		<10		<10		<10	
MW-1	NDGW01	10/8/2010	<10		<10		<10		<10	
MW-1	NDGW01	11/24/2010	<10		<10		<10		<10	
MW-1	NDGW01	1/13/2011	<10		<10		<10		<10	
MW-1	NDGW01	1/13/2011	<10		<10		<10		<10	
MW-1	NDGW01	2/23/2011	<10		<10		<10		<10	
MW-1	NDGW01	3/27/2011	<10		<10		<10		<10	
MW-1	NDGW01	5/3/2011	<10		<10		<10		<10	
MW-1	NDGW01	5/31/2011	<10		<10		<10		<10	
MW-1	NDGW01	7/10/2011	<10		<10		<10		<10	
MW-1	NDGW01	7/18/2011	<10		<10		<10		<10	
MW-1	NDGW01	8/16/2011	<10		<10		<10		<10	
MW-1	NDGW01	9/6/2011	<10		<10		<10		<10	
MW-1	NDGW01	10/18/2011	<10		<10		<10		<10	
MW-1	NDGW01	4/5/2012	<10		<10		<10		<10	

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Benzo(a)anthracene (56 55 3)	Benzo(a)anthracene QC	Benzo(a)pyrene (50 32 3)	Benzo(a)pyrene QC	Benzo(b)fluoranthene (205 99 2)	Benzo(b)fluoranthene QC	Benzo(k)fluoranthene (207 08 9)	Benzo(k)fluoranthene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-1	NDGW01	10/18/2012	<10		<10		<10		<10	
MW-2	NDGW02	9/3/2010	<10		<10		<10		<10	
MW-2	NDGW02	9/7/2010	<10		<10		<10		<10	
MW-2	NDGW02	10/8/2010	<10		<10		<10		<10	
MW-2	NDGW02	11/24/2010	<10		<10		<10		<10	
MW-2	NDGW02	1/13/2011	<10		<10		<10		<10	
MW-2	NDGW02	1/13/2011	<10		<10		<10		<10	
MW-2	NDGW02	2/23/2011	<10		<10		<10		<10	
MW-2	NDGW02	3/27/2011	<10		<10		<10		<10	
MW-2	NDGW02	5/2/2011	<10		<10		<10		<10	
MW-2	NDGW02	6/1/2011	<10		<10		<10		<10	
MW-2	NDGW02	7/9/2011	<10		<10		<10		<10	
MW-2	NDGW02	7/18/2011	<10		<10		<10		<10	
MW-2	NDGW02	8/15/2011	<10		<10		<10		<10	
MW-2	NDGW02	9/6/2011	<10		<10		<10		<10	
MW-2	NDGW02	10/18/2011	<10		<10		<10		<10	
MW-2	NDGW02	4/5/2012	<10		<10		<10		<10	
MW-2	NDGW02	10/17/2012	<10		<10		<10		<10	
MW-3	NDGW03	9/3/2010	<10		<10		<10		<10	
MW-3	NDGW03	9/8/2010	<10		<10		<10		<10	
MW-3	NDGW03	10/8/2010	<10		<10		<10		<10	
MW-3	NDGW03	11/24/2010	<10		<10		<10		<10	
MW-3	NDGW03	1/13/2011	<10		<10		<10		<10	
MW-3	NDGW03	2/23/2011	<10		<10		<10		<10	
MW-3	NDGW03	3/27/2011	<10		<10		<10		<10	
MW-3	NDGW03	5/2/2011	<10		<10		<10		<10	
MW-3	NDGW03	6/1/2011	<10		<10		<10		<10	
MW-3	NDGW03	7/9/2011	<10		<10		<10		<10	
MW-3	NDGW03	7/18/2011	<10		<10		<10		<10	
MW-3	NDGW03	8/15/2011	<10		<10		<10		<10	
MW-3	NDGW03	9/6/2011	<10		<10		<10		<10	
MW-3	NDGW03	10/18/2011	<10		<10		<10		<10	
MW-3	NDGW03	4/5/2012	<10		<10		<10		<10	
MW-3	NDGW03	10/17/2012	<10		<10		<10		<10	
MW-4	NDGW04	10/8/2010	<10		<10		<10		<10	
MW-4	NDGW04	11/24/2010	<10		<10		<10		<10	

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Benzo(a)anthracene (56 55 3)	Benzo(a)anthracene QC	Benzo(a)pyrene (50 32 3)	Benzo(a)pyrene QC	Benzo(b)fluoranthene (205 99 2)	Benzo(b)fluoranthene QC	Benzo(k)fluoranthene (207 08 9)	Benzo(k)fluoranthene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-4	NDGW04	1/12/2011	<10		<10		<10		<10	
MW-4	NDGW04	1/13/2011	<10		<10		<10		<10	
MW-4	NDGW04	2/23/2011	<10		<10		<10		<10	
MW-4	NDGW04	3/27/2011	<10		<10		<10		<10	
MW-4	NDGW04	5/2/2011	<10		<10		<10		<10	
MW-4	NDGW04	6/1/2011	<10		<10		<10		<10	
MW-4	NDGW04	7/9/2011	<10		<10		<10		<10	
MW-4	NDGW04	7/18/2011	<10		<10		<10		<10	
MW-4	NDGW04	8/18/2011	<10		<10		<10		<10	
MW-4	NDGW04	9/6/2011	<10		<10		<10		<10	
MW-4	NDGW04	10/18/2011	<10		<10		<10		<10	
MW-4	NDGW04	4/5/2012	<10		<10		<10		<10	
MW-4	NDGW04	10/17/2012	<10		<10		<10		<10	
MW-5	NDGW05	3/27/2011	<10		<10		<10		<10	
MW-5	NDGW05	5/3/2011	<10		<10		<10		<10	
MW-5	NDGW05	6/1/2011	<10		<10		<10		<10	
MW-5	NDGW05	7/10/2011	<10		<10		<10		<10	
MW-5	NDGW05	7/18/2011	<10		<10		<10		<10	
MW-5	NDGW05	8/16/2011	<10		<10		<10		<10	
MW-5	NDGW05	9/7/2011	---		---		---		---	
MW-5	NDGW05	10/18/2011	<10		<10		<10		<10	
MW-5	NDGW05	4/5/2012	<10		<10		<10		<10	
MW-5	NDGW05	10/17/2012	<10		<10		<10		<10	
MW-6	NDGW06	3/27/2011	<10		<10		<10		<10	
MW-6	NDGW06	5/3/2011	<10		<10		<10		<10	
MW-6	NDGW06	6/1/2011	<10		<10		<10		<10	
MW-6	NDGW06	7/10/2011	<10		<10		<10		<10	
MW-6	NDGW06	7/18/2011	<10		<10		<10		<10	
MW-6	NDGW06	8/16/2011	<10		<10		<10		<10	
MW-6	NDGW06	9/7/2011	<10		<10		<10		<10	
MW-6	NDGW06	10/18/2011	<10		<10		<10		<10	
MW-6	NDGW06	4/5/2012	<10		<10		<10		<10	
MW-6	NDGW06	10/18/2012	<10		<10		<10		<10	
MW-7	NDGW07	3/27/2011	<10		<10		<10		<10	
MW-7	NDGW07	5/2/2011	<10		<10		<10		<10	
MW-7	NDGW07	6/1/2011	<10		<10		<10		<10	

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Benzo(a)anthracene (56 55 3)	Benzo(a)anthracene QC	Benzo(a)pyrene (50 32 3)	Benzo(a)pyrene QC	Benzo(b)fluoranthene (205 99 2)	Benzo(b)fluoranthene QC	Benzo(k)fluoranthene (207 08 9)	Benzo(k)fluoranthene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-7	NDGW07	7/9/2011	<10		<10		<10		<10	
MW-7	NDGW07	7/18/2011	<10		<10		<10		<10	
MW-7	NDGW07	8/16/2011	<10		<10		<10		<10	
MW-7	NDGW07	9/7/2011	<10		<10		<10		<10	
MW-7	NDGW07	10/18/2011	<10		<10		<10		<10	
MW-7	NDGW07	4/5/2012	<10		<10		<10		<10	
MW-7	NDGW07	10/18/2012	<10		<10		<10		<10	
MW-8S	NDGW08	3/27/2011	<10		<10		<10		<10	
MW-8S	NDGW08	5/2/2011	<10		<10		<10		<10	
MW-8S	NDGW08	6/1/2011	<10		<10		<10		<10	
MW-8S	NDGW08	7/10/2011	<10		<10		<10		<10	
MW-8S	NDGW08	7/18/2011	<10		<10		<10		<10	
MW-8S	NDGW08	8/16/2011	<10		<10		<10		<10	
MW-8S	NDGW08	9/7/2011	<10		<10		<10		<10	
MW-8S	NDGW08	10/18/2011	<10		<10		<10		<10	
MW-8S	NDGW08	4/5/2012	<10		<10		<10		<10	
MW-8S	NDGW08	10/18/2012	<10		<10		<10		<10	
MW-8D	NDGW09	3/27/2011	<10		<10		<10		<10	
MW-8D	NDGW09	5/5/2011	<10		<10		<10		<10	
MW-8D	NDGW09	6/1/2011	<10		<10		<10		<10	
MW-8D	NDGW09	7/10/2011	<10		<10		<10		<10	
MW-8D	NDGW09	7/18/2011	<10		<10		<10		<10	
MW-8D	NDGW09	8/16/2011	<10		<10		<10		<10	
MW-8D	NDGW09	9/7/2011	<10		<10		<10		<10	
MW-8D	NDGW09	10/18/2011	<10		<10		<10		<10	
MW-8D	NDGW09	4/5/2012	<10		<10		<10		<10	
MW-8D	NDGW09	10/18/2012	<10		<10		<10		<10	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Chrysene (218 01 9)	Chrysene QC	Dibenz(a,h)anthracene (53 70 3)	Dibenz(a,h)anthracene QC	Indeno(1,2,3 cd)pyrene (193 39 5)	Indeno(1,2,3 cd)pyrene QC	Naphthalene (91 20 3)	Naphthalene QC
Units			µg/L		µg/L		µg/L		µg/L	
CW-5	NDGW16	9/2/2010	<10		<10		<10		<10	
CW-5	NDGW16	9/2/2010	<10		<10		<10		<10	
CW-5	NDGW16	1/13/2011	<10		<10		<10		<10	
CW-5	NDGW16	1/13/2011	<10		<10		<10		<10	
CW-5	NDGW16	5/4/2011	<10		<10		<10		<10	
CW-5	NDGW16	7/19/2011	<10		<10		<10		<10	
CW-5	NDGW16	10/19/2011	<10		<10		<10		<10	
CW-5	NDGW16	4/6/2012	<10		<10		<10		<10	
CW-4	NDGW15	9/2/2010	<10		<10		<10		<10	
CW-4	NDGW15	9/2/2010	<10		<10		<10		<10	
CW-4	NDGW15	1/13/2011	<10		<10		<10		<10	
CW-4	NDGW15	1/13/2011	<10		<10		<10		<10	
CW-4	NDGW15	5/4/2011	<10		<10		<10		<10	
CW-4	NDGW15	7/19/2011	<10		<10		<10		<10	
CW-4	NDGW15	10/19/2011	<10		<10		<10		<10	
CW-4	NDGW15	4/6/2012	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	5/4/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	7/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	10/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW11	4/6/2012	<10		<10		<10		<10	
Truchan Depot	NDGW13	10/7/2010	<10		<10		<10		<10	
Truchan Depot	NDGW13	10/7/2010	<10		<10		<10		<10	
Truchan Depot	NDGW13	1/13/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	1/13/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	5/4/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	7/19/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	10/19/2011	<10		<10		<10		<10	
Truchan Depot	NDGW13	4/6/2012	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	1/13/2011	<10		<10		<10		<10	

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Chrysene (218 01 9)	Chrysene QC	Dibenz(a,h)anthracene (53 70 3)	Dibenz(a,h)anthracene QC	Indeno(1,2,3 cd)pyrene (193 39 5)	Indeno(1,2,3 cd)pyrene QC	Naphthalene (91 20 3)	Naphthalene QC
Units			µg/L		µg/L		µg/L		µg/L	
CONFIDENTIAL	NDGW12	5/3/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	7/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	10/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW12	4/6/2012	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	9/2/2010	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	1/13/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	5/4/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	7/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	8/4/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	10/19/2011	<10		<10		<10		<10	
CONFIDENTIAL	NDGW10	4/6/2012	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	9/2/2010	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	1/14/2011	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	5/3/2011	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	7/20/2011	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	10/17/2011	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	4/5/2012	<10		<10		<10		<10	
Well 14509529AAAD	NDGW14	10/18/2012	<10		<10		<10		<10	
MW-1	NDGW01	9/3/2010	<10		<10		<10		<10	
MW-1	NDGW01	9/7/2010	<10		<10		<10		<10	
MW-1	NDGW01	10/8/2010	<10		<10		<10		<10	
MW-1	NDGW01	11/24/2010	<10		<10		<10		<10	
MW-1	NDGW01	1/13/2011	<10		<10		<10		<10	
MW-1	NDGW01	1/13/2011	<10		<10		<10		<10	
MW-1	NDGW01	2/23/2011	<10		<10		<10		<10	
MW-1	NDGW01	3/27/2011	<10		<10		<10		<10	
MW-1	NDGW01	5/3/2011	<10		<10		<10		<10	
MW-1	NDGW01	5/31/2011	<10		<10		<10		<10	
MW-1	NDGW01	7/10/2011	<10		<10		<10		<10	
MW-1	NDGW01	7/18/2011	<10		<10		<10		<10	
MW-1	NDGW01	8/16/2011	<10		<10		<10		<10	
MW-1	NDGW01	9/6/2011	<10		<10		<10		<10	
MW-1	NDGW01	10/18/2011	<10		<10		<10		<10	
MW-1	NDGW01	4/5/2012	<10		<10		<10		<10	

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Chrysene (218 01 9)	Chrysene QC	Dibenz(a,h)anthracene (53 70 3)	Dibenz(a,h)anthracene QC	Indeno(1,2,3 cd)pyrene (193 39 5)	Indeno(1,2,3 cd)pyrene QC	Naphthalene (91 20 3)	Naphthalene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-1	NDGW01	10/18/2012	<10		<10		<10		<10	
MW-2	NDGW02	9/3/2010	<10		<10		<10		<10	
MW-2	NDGW02	9/7/2010	<10		<10		<10		<10	
MW-2	NDGW02	10/8/2010	<10		<10		<10		<10	
MW-2	NDGW02	11/24/2010	<10		<10		<10		<10	
MW-2	NDGW02	1/13/2011	<10		<10		<10		<10	
MW-2	NDGW02	1/13/2011	<10		<10		<10		<10	
MW-2	NDGW02	2/23/2011	<10		<10		<10		<10	
MW-2	NDGW02	3/27/2011	<10		<10		<10		<10	
MW-2	NDGW02	5/2/2011	<10		<10		<10		<10	
MW-2	NDGW02	6/1/2011	<10		<10		<10		<10	
MW-2	NDGW02	7/9/2011	<10		<10		<10		<10	
MW-2	NDGW02	7/18/2011	<10		<10		<10		<10	
MW-2	NDGW02	8/15/2011	<10		<10		<10		<10	
MW-2	NDGW02	9/6/2011	<10		<10		<10		<10	
MW-2	NDGW02	10/18/2011	<10		<10		<10		<10	
MW-2	NDGW02	4/5/2012	<10		<10		<10		<10	
MW-2	NDGW02	10/17/2012	<10		<10		<10		<10	
MW-3	NDGW03	9/3/2010	<10		<10		<10		<10	
MW-3	NDGW03	9/8/2010	<10		<10		<10		<10	
MW-3	NDGW03	10/8/2010	<10		<10		<10		<10	
MW-3	NDGW03	11/24/2010	<10		<10		<10		<10	
MW-3	NDGW03	1/13/2011	<10		<10		<10		<10	
MW-3	NDGW03	2/23/2011	<10		<10		<10		<10	
MW-3	NDGW03	3/27/2011	<10		<10		<10		<10	
MW-3	NDGW03	5/2/2011	<10		<10		<10		<10	
MW-3	NDGW03	6/1/2011	<10		<10		<10		<10	
MW-3	NDGW03	7/9/2011	<10		<10		<10		<10	
MW-3	NDGW03	7/18/2011	<10		<10		<10		<10	
MW-3	NDGW03	8/15/2011	<10		<10		<10		<10	
MW-3	NDGW03	9/6/2011	<10		<10		<10		<10	
MW-3	NDGW03	10/18/2011	<10		<10		<10		<10	
MW-3	NDGW03	4/5/2012	<10		<10		<10		<10	
MW-3	NDGW03	10/17/2012	<10		<10		<10		<10	
MW-4	NDGW04	10/8/2010	<10		<10		<10		<10	
MW-4	NDGW04	11/24/2010	<10		<10		<10		<10	

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Chrysene (218 01 9)	Chrysene QC	Dibenz(a,h)anthracene (53 70 3)	Dibenz(a,h)anthracene QC	Indeno(1,2,3 cd)pyrene (193 39 5)	Indeno(1,2,3 cd)pyrene QC	Naphthalene (91 20 3)	Naphthalene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-4	NDGW04	1/12/2011	<10		<10		<10		<10	
MW-4	NDGW04	1/13/2011	<10		<10		<10		<10	
MW-4	NDGW04	2/23/2011	<10		<10		<10		<10	
MW-4	NDGW04	3/27/2011	<10		<10		<10		<10	
MW-4	NDGW04	5/2/2011	<10		<10		<10		<10	
MW-4	NDGW04	6/1/2011	<10		<10		<10		<10	
MW-4	NDGW04	7/9/2011	<10		<10		<10		<10	
MW-4	NDGW04	7/18/2011	<10		<10		<10		<10	
MW-4	NDGW04	8/18/2011	<10		<10		<10		<10	
MW-4	NDGW04	9/6/2011	<10		<10		<10		<10	
MW-4	NDGW04	10/18/2011	<10		<10		<10		<10	
MW-4	NDGW04	4/5/2012	<10		<10		<10		<10	
MW-4	NDGW04	10/17/2012	<10		<10		<10		<10	
MW-5	NDGW05	3/27/2011	<10		<10		<10		<10	
MW-5	NDGW05	5/3/2011	<10		<10		<10		<10	
MW-5	NDGW05	6/1/2011	<10		<10		<10		<10	
MW-5	NDGW05	7/10/2011	<10		<10		<10		<10	
MW-5	NDGW05	7/18/2011	<10		<10		<10		<10	
MW-5	NDGW05	8/16/2011	<10		<10		<10		<10	
MW-5	NDGW05	9/7/2011	---		---		---		---	
MW-5	NDGW05	10/18/2011	<10		<10		<10		<10	
MW-5	NDGW05	4/5/2012	<10		<10		<10		<10	
MW-5	NDGW05	10/17/2012	<10		<10		<10		<10	
MW-6	NDGW06	3/27/2011	<10		<10		<10		<10	
MW-6	NDGW06	5/3/2011	<10		<10		<10		<10	
MW-6	NDGW06	6/1/2011	<10		<10		<10		<10	
MW-6	NDGW06	7/10/2011	<10		<10		<10		<10	
MW-6	NDGW06	7/18/2011	<10		<10		<10		<10	
MW-6	NDGW06	8/16/2011	<10		<10		<10		<10	
MW-6	NDGW06	9/7/2011	<10		<10		<10		<10	
MW-6	NDGW06	10/18/2011	<10		<10		<10		<10	
MW-6	NDGW06	4/5/2012	<10		<10		<10		<10	
MW-6	NDGW06	10/18/2012	<10		<10		<10		<10	
MW-7	NDGW07	3/27/2011	<10		<10		<10		<10	
MW-7	NDGW07	5/2/2011	<10		<10		<10		<10	
MW-7	NDGW07	6/1/2011	<10		<10		<10		<10	

Table D-8 Semivolatile Organic Results

Sample ID[1]	Study ID	Date Collected	Chrysene (218 01 9)	Chrysene QC	Dibenz(a,h)anthracene (53 70 3)	Dibenz(a,h)anthracene QC	Indeno(1,2,3 cd)pyrene (193 39 5)	Indeno(1,2,3 cd)pyrene QC	Naphthalene (91 20 3)	Naphthalene QC
Units			µg/L		µg/L		µg/L		µg/L	
MW-7	NDGW07	7/9/2011	<10		<10		<10		<10	
MW-7	NDGW07	7/18/2011	<10		<10		<10		<10	
MW-7	NDGW07	8/16/2011	<10		<10		<10		<10	
MW-7	NDGW07	9/7/2011	<10		<10		<10		<10	
MW-7	NDGW07	10/18/2011	<10		<10		<10		<10	
MW-7	NDGW07	4/5/2012	<10		<10		<10		<10	
MW-7	NDGW07	10/18/2012	<10		<10		<10		<10	
MW-8S	NDGW08	3/27/2011	<10		<10		<10		<10	
MW-8S	NDGW08	5/2/2011	<10		<10		<10		<10	
MW-8S	NDGW08	6/1/2011	<10		<10		<10		<10	
MW-8S	NDGW08	7/10/2011	<10		<10		<10		<10	
MW-8S	NDGW08	7/18/2011	<10		<10		<10		<10	
MW-8S	NDGW08	8/16/2011	<10		<10		<10		<10	
MW-8S	NDGW08	9/7/2011	<10		<10		<10		<10	
MW-8S	NDGW08	10/18/2011	<10		<10		<10		<10	
MW-8S	NDGW08	4/5/2012	<10		<10		<10		<10	
MW-8S	NDGW08	10/18/2012	<10		<10		<10		<10	
MW-8D	NDGW09	3/27/2011	<10		<10		<10		<10	
MW-8D	NDGW09	5/5/2011	<10		<10		<10		<10	
MW-8D	NDGW09	6/1/2011	<10		<10		<10		<10	
MW-8D	NDGW09	7/10/2011	<10		<10		<10		<10	
MW-8D	NDGW09	7/18/2011	<10		<10		<10		<10	
MW-8D	NDGW09	8/16/2011	<10		<10		<10		<10	
MW-8D	NDGW09	9/7/2011	<10		<10		<10		<10	
MW-8D	NDGW09	10/18/2011	<10		<10		<10		<10	
MW-8D	NDGW09	4/5/2012	<10		<10		<10		<10	
MW-8D	NDGW09	10/18/2012	<10		<10		<10		<10	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

Table D-9 Diesel Range Organics and Gasoline Range Organics Results

Sample ID[1]	Study ID	Date Collected	GRO	GRO QC	DRO	DRO QC
Units			µg/L		µg/L	
CW-5	NDGW16	9/2/2010	<20		<300	
CW-5	NDGW16	9/2/2010	-		-	
CW-5	NDGW16	1/13/2011	<20		<300	
CW-5	NDGW16	1/13/2011	-		-	
CW-5	NDGW16	5/4/2011	<20		<320	
CW-5	NDGW16	7/19/2011	<20		<300	
CW-5	NDGW16	10/19/2011	<20		<300	
CW-5	NDGW16	4/6/2012	<20		<300	
CW-4	NDGW15	9/2/2010	<20		<300	
CW-4	NDGW15	9/2/2010	-		-	
CW-4	NDGW15	1/13/2011	<20		<300	
CW-4	NDGW15	1/13/2011	-		-	
CW-4	NDGW15	5/4/2011	<20		<310	
CW-4	NDGW15	7/19/2011	<20		<300	
CW-4	NDGW15	10/19/2011	<20		<300	
CW-4	NDGW15	4/6/2012	<20		<300	
CONFIDENTIAL	NDGW11	9/2/2010	<20		<300	
CONFIDENTIAL	NDGW11	9/2/2010	-		-	
CONFIDENTIAL	NDGW11	1/13/2011	<20		<300	
CONFIDENTIAL	NDGW11	1/13/2011	-		-	
CONFIDENTIAL	NDGW11	5/4/2011	<20		<310	
CONFIDENTIAL	NDGW11	7/19/2011	<20		<300	
CONFIDENTIAL	NDGW11	10/19/2011	<20		<300	
CONFIDENTIAL	NDGW11	4/6/2012	<20		<300	
Truchan Depot	NDGW13	10/7/2010	<20		<300	
Truchan Depot	NDGW13	10/7/2010	-		-	
Truchan Depot	NDGW13	1/13/2011	<20		<310	
Truchan Depot	NDGW13	1/13/2011	-		-	
Truchan Depot	NDGW13	5/4/2011	<20		<310	
Truchan Depot	NDGW13	7/19/2011	<20		<300	
Truchan Depot	NDGW13	10/19/2011	<20		<310	
Truchan Depot	NDGW13	4/6/2012	<20		<300	
CONFIDENTIAL	NDGW12	9/2/2010	<20		<310	

Table D-9 Diesel Range Organics and Gasoline Range Organics Results

Sample ID[1]	Study ID	Date Collected	GRO	GRO QC	DRO	DRO QC
Units			µg/L		µg/L	
CONFIDENTIAL	NDGW12	9/2/2010	-		-	
CONFIDENTIAL	NDGW12	1/13/2011	<20		<300	
CONFIDENTIAL	NDGW12	1/13/2011	-		-	
CONFIDENTIAL	NDGW12	5/3/2011	<20		<310	
CONFIDENTIAL	NDGW12	7/19/2011	<20		<310	
CONFIDENTIAL	NDGW12	10/19/2011	<20		<300	
CONFIDENTIAL	NDGW12	4/6/2012	<20		<300	
CONFIDENTIAL	NDGW10	9/2/2010	<20		<310	
CONFIDENTIAL	NDGW10	9/2/2010	-		-	
CONFIDENTIAL	NDGW10	1/13/2011	<20		<310	
CONFIDENTIAL	NDGW10	1/13/2011	-		-	
CONFIDENTIAL	NDGW10	5/4/2011	<20		<310	
CONFIDENTIAL	NDGW10	7/19/2011	140		<310	
CONFIDENTIAL	NDGW10	8/4/2011	<20		<310	
CONFIDENTIAL	NDGW10	10/19/2011	<20		<310	
CONFIDENTIAL	NDGW10	4/6/2012	<20		<300	
Well 14509529AAAD	NDGW14	9/2/2010	<20		360	
Well 14509529AAAD	NDGW14	1/14/2011	<20		<310	
Well 14509529AAAD	NDGW14	5/3/2011	<20		<310	
Well 14509529AAAD	NDGW14	7/20/2011	<20		<300	
Well 14509529AAAD	NDGW14	10/17/2011	<20		<300	
Well 14509529AAAD	NDGW14	4/5/2012	<20		<300	
Well 14509529AAAD	NDGW14	10/18/2012	<20		<310	
MW-1	NDGW01	9/3/2010	<20		<320	
MW-1	NDGW01	9/7/2010	-		-	
MW-1	NDGW01	10/8/2010	<20		<300	
MW-1	NDGW01	11/24/2010	<20		<320	
MW-1	NDGW01	1/13/2011	<20		<300	
MW-1	NDGW01	1/13/2011	-		-	
MW-1	NDGW01	2/23/2011	<20		<310	
MW-1	NDGW01	3/27/2011	<20		<310	
MW-1	NDGW01	5/3/2011	<20		<310	
MW-1	NDGW01	5/31/2011	<20		<310	

Table D-9 Diesel Range Organics and Gasoline Range Organics Results

Sample ID[1]	Study ID	Date Collected	GRO	GRO QC	DRO	DRO QC
Units			µg/L		µg/L	
MW-1	NDGW01	7/10/2011	<20		<300	
MW-1	NDGW01	7/18/2011	<20		<300	
MW-1	NDGW01	8/16/2011	<20		<300	
MW-1	NDGW01	9/6/2011	<20		<300	
MW-1	NDGW01	10/18/2011	<20		<300	
MW-1	NDGW01	4/5/2012	<20		<300	
MW-1	NDGW01	10/18/2012	<20		<300	
MW-2	NDGW02	9/3/2010	<20		340	
MW-2	NDGW02	9/7/2010	-		-	
MW-2	NDGW02	10/8/2010	<20		<300	
MW-2	NDGW02	11/24/2010	<20		<310	
MW-2	NDGW02	1/13/2011	<20		<310	
MW-2	NDGW02	1/13/2011	-		-	
MW-2	NDGW02	2/23/2011	<20		<310	
MW-2	NDGW02	3/27/2011	<20		<300	
MW-2	NDGW02	5/2/2011	<20		<310	
MW-2	NDGW02	6/1/2011	<20		<300	
MW-2	NDGW02	7/9/2011	<20		<300	
MW-2	NDGW02	7/18/2011	<20		<300	
MW-2	NDGW02	8/15/2011	<20		<300	
MW-2	NDGW02	9/6/2011	<20		<310	
MW-2	NDGW02	10/18/2011	<20		<300	
MW-2	NDGW02	4/5/2012	<20		<300	
MW-2	NDGW02	10/17/2012	<20		<300	
MW-3	NDGW03	9/3/2010	<20		<350	
MW-3	NDGW03	9/8/2010	-		-	
MW-3	NDGW03	10/8/2010	<20		<300	
MW-3	NDGW03	11/24/2010	<20		<330	
MW-3	NDGW03	1/13/2011	<20		<300	
MW-3	NDGW03	2/23/2011	<20		<320	
MW-3	NDGW03	3/27/2011	<20		<300	
MW-3	NDGW03	5/2/2011	<20		<310	
MW-3	NDGW03	6/1/2011	<20		<300	

Table D-9 Diesel Range Organics and Gasoline Range Organics Results

Sample ID[1]	Study ID	Date Collected	GRO	GRO QC	DRO	DRO QC
Units			µg/L		µg/L	
MW-3	NDGW03	7/9/2011	<20		<310	
MW-3	NDGW03	7/18/2011	<20		<300	
MW-3	NDGW03	8/15/2011	<20		<300	
MW-3	NDGW03	9/6/2011	<20		<300	
MW-3	NDGW03	10/18/2011	<20		<310	
MW-3	NDGW03	4/5/2012	<20		<300	
MW-3	NDGW03	10/17/2012	<20		<300	
MW-4	NDGW04	10/8/2010	<20		320	
MW-4	NDGW04	11/24/2010	<20		<320	
MW-4	NDGW04	1/12/2011	-		-	
MW-4	NDGW04	1/13/2011	<20		<310	
MW-4	NDGW04	2/23/2011	<20		<310	
MW-4	NDGW04	3/27/2011	<20		<300	
MW-4	NDGW04	5/2/2011	<20		<320	
MW-4	NDGW04	6/1/2011	<20		<300	
MW-4	NDGW04	7/9/2011	<20		<300	
MW-4	NDGW04	7/18/2011	<20		<300	
MW-4	NDGW04	8/18/2011	<20		<300	
MW-4	NDGW04	9/6/2011	<20		<300	
MW-4	NDGW04	10/18/2011	<20		<310	
MW-4	NDGW04	4/5/2012	<20		<300	
MW-4	NDGW04	10/17/2012	<20		<300	
MW-5	NDGW05	3/27/2011	81		<310	
MW-5	NDGW05	5/3/2011	<20		<310	
MW-5	NDGW05	6/1/2011	<20		<300	
MW-5	NDGW05	7/10/2011	<20		<300	
MW-5	NDGW05	7/18/2011	<20		<300	
MW-5	NDGW05	8/16/2011	<20		<300	
MW-5	NDGW05	9/7/2011				
MW-5	NDGW05	10/18/2011	<20		<300	
MW-5	NDGW05	4/5/2012	<20		<300	
MW-5	NDGW05	10/17/2012	<20		<300	
MW-6	NDGW06	3/27/2011	<20		<310	

Table D-9 Diesel Range Organics and Gasoline Range Organics Results

Sample ID[1]	Study ID	Date Collected	GRO	GRO QC	DRO	DRO QC
Units			µg/L		µg/L	
MW-6	NDGW06	5/3/2011	<20		<320	
MW-6	NDGW06	6/1/2011	<20		<300	
MW-6	NDGW06	7/10/2011	<20		<300	
MW-6	NDGW06	7/18/2011	<20		<300	
MW-6	NDGW06	8/16/2011	<20		<310	
MW-6	NDGW06	9/7/2011	<20		<310	
MW-6	NDGW06	10/18/2011	<20		<300	
MW-6	NDGW06	4/5/2012	<20		<300	
MW-6	NDGW06	10/18/2012	<20		<300	
MW-7	NDGW07	3/27/2011	<20		<300	
MW-7	NDGW07	5/2/2011	<20		950	
MW-7	NDGW07	6/1/2011	<20		<310	
MW-7	NDGW07	7/9/2011	<20		<300	
MW-7	NDGW07	7/18/2011	<20		<300	
MW-7	NDGW07	8/16/2011	<20		<300	
MW-7	NDGW07	9/7/2011	<20		<300	
MW-7	NDGW07	10/18/2011	<20		<300	
MW-7	NDGW07	4/5/2012	<20		<300	
MW-7	NDGW07	10/18/2012	<20		<300	
MW-8S	NDGW08	3/27/2011	<20		590	
MW-8S	NDGW08	5/2/2011	<20		<300	
MW-8S	NDGW08	6/1/2011	<20		<300	
MW-8S	NDGW08	7/10/2011	<20		<300	
MW-8S	NDGW08	7/18/2011	<20		<300	
MW-8S	NDGW08	8/16/2011	<20		<300	
MW-8S	NDGW08	9/7/2011	<20		<300	
MW-8S	NDGW08	10/18/2011	<20		<310	
MW-8S	NDGW08	4/5/2012	<20		<300	
MW-8S	NDGW08	10/18/2012	<20		<300	
MW-8D	NDGW09	3/27/2011	<20		460	
MW-8D	NDGW09	5/5/2011	<20		<310	
MW-8D	NDGW09	6/1/2011	<20		<310	
MW-8D	NDGW09	7/10/2011	<20		<300	

Table D-9 Diesel Range Organics and Gasoline Range Organics Results

Sample ID[1]	Study ID	Date Collected	GRO	GRO QC	DRO	DRO QC
Units			µg/L		µg/L	
MW-8D	NDGW09	7/18/2011	<20		<300	
MW-8D	NDGW09	8/16/2011	<20		<300	
MW-8D	NDGW09	9/7/2011	<20		<300	
MW-8D	NDGW09	10/18/2011	<20		<300	
MW-8D	NDGW09	4/5/2012	<20		<300	
MW-8D	NDGW09	10/18/2012	<20		<300	

Footnote:

[1]Homeowner Names are redacted for Privacy Concerns

J = estimated value. The analyte was present but less than the reporting limit

H = Analysis performed past recommended holding time

D = Reporting limit increased due to sample matrix

MW-5 9/7/2011 Not sampled due to site activity

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