_____Report_to_the____ Commissioner of Agriculture Colorado Department of Agriculture



Ground Water Monitoring Activities High Plains Ogallala Aquifer 1997-1998

Bradford Austin Agricultural Chemicals Program Water Quality Control Division Colorado Department of Public Health and Environment

COLORADO DEPARTMENT OF HEALTH Water Quality Control Division Ag Chemicals Program

Executive Summary

The Water Quality Control Division (WQCD) of the Colorado Department of Public Health and Environment (CDPHE) has responsibility under the Agricultural Chemicals and Ground Water Protection Program (SB 90-126) to conduct monitoring for the presence of commercial fertilizers and pesticides in ground water. This data assists the Commissioner of Agriculture in determining whether agricultural operations are impacting ground water quality.

This report has been prepared to provide a summary of the High Plains Ogallala Aquifer ground water monitoring work completed in May 1998. The 1997 monitoring program focused on groundwater quality in the High Plains of Colorado. The High Plains or Ogallala Aquifer underlies some 12,000 square miles of eastern Colorado. This area is one of Colorado's major agricultural regions and unique in that the underlying Ogallala Aquifer is the sole source for water in the region.

One hundred twenty nine (129) wells were sampled for nitrate and 45 pesticides. In all cases existing wells were used. The majority of these wells were privately owned and permitted as domestic wells.

All wells sampled tested positive for the presence of Nitrate, there were no non detects. Nitrate analysis showed that 6 % of all the wells exceeded the nitrate drinking water standard of 10 mg/L. Pesticide data revealed three pesticides, Atrazine, Bromacil, and Prometon present in the well samples. The breakdown product of Atrazine, Deethyl Atrazine was also present in several samples. The concentration of Atrazine in one well was reported as 4.0 ug/L. This was the only exceedence of a water quality standard (3.0 ug/L) in this survey.

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LIST OF ACRONYMS USED IN THIS REPORT

CDPHE

Colorado Department of Public Health and Environment

CDA Colorado Department of Agriculture CSU Colorado State University EPA United States Environmental Protection Agency GIS Geographic Information System MCL Maximum Contaminate Level Milligrams per Liter (for water equivalent to parts per million) mg/L ug/L Micrograms per Liter (for water equivalent to parts per billion) QA Quality Assurance QC Quality Control SB 90-126 Senate Bill 90-126 of the Colorado General Assembly ug/L Micrograms per Liter (for water equivalent to parts per billion) USDA United States Department of Agriculture WQCD Water Quality Control Division of the Colorado Department of Public Health and Environment

Introduction

The Water Quality Control Division (WQCD) of the Colorado Department of Public Health and Environment (CDPHE) has responsibility under the Agricultural Chemicals and Ground Water Protection Program (SB 90-126) to conduct monitoring for the presence of commercial fertilizers and pesticides in ground water. The Agricultural Chemicals Program has been established to provide current, scientifically valid, ground water quality data to the Commissioner of Agriculture. Prior to passage of SB 90-126, a lack of data had prevented an accurate assessment of impacts to groundwater quality from agricultural operations. This program will assist the Commissioner of Agriculture in determining to what extent agricultural operations are impacting ground water quality. The program also assists the Commissioner in identifying those aquifers that are vulnerable to contamination. The philosophy adopted is to protect ground water and the environment from impairment or degradation due to the improper use of agricultural chemicals, while allowing for their proper and correct use.

This report has been prepared to provide a summary of the High Plains Ogallala Aquifer ground water monitoring work completed in May 1998. The monitoring program involved the collection and laboratory analysis of ground water samples from private wells located throughout the High Plains of Colorado. This monitoring program was planned to meet the objectives necessary for a preliminary determination of the existence of agricultural chemicals in the ground water in a safe, cost effective, and timely manner.

The ground water quality sampling program is intended to fulfill the following objectives:

- 1. Determine if agricultural chemicals are present in the ground water.
- 2. Provide data to assist the Commissioner of Agriculture in the identification of potential agricultural management areas.

The factors considered in selecting an area for monitoring are:

- 1. Agricultural chemicals are used in the area.
- 2. The ground water in the area is shallow in depth or vulnerable.
- 3. The majority of the agricultural chemical use is on irrigated land.
- 4. The soil types are conducive to leaching.
- 5. The alluvial and /or shallow bedrock aquifers are utilized for domestic water supplies.

Before an area is selected for monitoring, CDPHE contacts interested parties to inform them of the sampling program and SB 90-126, and how we envision its implementation. CDPHE then coordinates closely with federal agencies, county extension agents, conservancy districts, and local health officials in the project area.

Ground Water Monitoring Program

The 1997 monitoring program focused on groundwater quality in the High Plains of Colorado. Colorado's High Plains region includes most of the state east of the foothills of the Rocky Mountains, but excludes the valleys of the South Platte and Arkansas rivers. The High Plains or Ogallala Aquifer in Colorado is part of the largest aquifer system in the United States. The Ogallala Aquifer underlies some 12,000 square miles of eastern Colorado and is the sole source of water for that region of the state. Agriculture is the basis for the economy in the High Plains and the majority of the region is either cropland or pasture.

The High Plains survey was the largest sampling project, both in geographic area and number of sample points, the program has ever attempted. One hundred forty four samples were collected over a eight month period (Figure 1). All wells were sampled for the basic water quality constituents, nitrate and forty six pesticides. In all cases existing wells were used. Most of these wells were privately owned and permitted as domestic wells. Well coverage is not uniformly distributed as efforts were concentrated in those areas representative of irrigated agriculture.

Wells were selected for sampling based on a favorable location within the irrigated areas and the boundaries of the High Plains aquifer. General well and site conditions, and cooperation of the well owner were important factors. The wells were sampled once between July, 1997 and May, 1998 by Brad Austin and John Colbert of CDPHE. Field sampling procedures followed the protocol developed by the ground water quality monitoring working group of the Colorado nonpoint task force.

Well samples were analyzed for basic water quality constituents, nitrate, and selected pesticides. A list of analytes is presented in Table 1. The basic inorganic analysis was performed by the Soils Laboratory at CSU with all samples split with the CDPHE Laboratory for nitrate. Comparison of these split parameters shows consistent results between the two laboratories. The Colorado Department of Agriculture, Standards Laboratory performed the laboratory analysis for nitrate as nitrogen and selected pesticides. Temperature, conductivity, total dissolved solids, and pH were measured in the field.

The pesticide analysis was compiled based on those substances that have recently been, or are currently being utilized in the area according to local agricultural representatives. Budget restrictions would not allow testing for all pesticides used in the study area. To reduce the analysis cost, each pesticide was weighted according to its chemical properties of persistence and mobility in the environment, amount of active ingredient used per acre, and the amount of acreage within the study area that the pesticide was used on. Pesticides were then selected according to their final score and the ability of the laboratory to detect their presence.



FIGURE 1 - Study Area and sampling locations. Map showing the boundary of the High Plains Qgallala study area and well locations sampled in 1997 and 1998.

TABLE 1 - LIST OF ANALYTES

Colorado High Plains Ogallala Aquifer Ground Water Analysis, 1997 - 1998

BASIC WATER QUALITY CONSTITUENTS

Boron	pH
Bicarbonate	Sodium
Calcium	Specific Conductance (TDS)
Carbonate	Sulfate
Chloride	Potassium
Magnesium	Alkalinity, total as CaCO ₃
Nitrate	Hardness, total as CaCO ₃
Ammonia	Solids, Total Dissolved

PESTICIDE COMPOUNDS

Trade	Common	Use	Trade	Common	Use
Name	Name		Name	Name	
Harness	Acetachlor	Herb	Prometon	Prometone	Herb
Lasso	Alachlor	Herb	Princep	Simazine	Herb
AAtrex	Atrazine	Herb	Treflan	Trifluralin	Herb
Balan	Benfluralin	Herb			
Hyvar	Bromacil	Herb	Weed BGone	2,4-D	Herb
Captane	Captan	Fungi	Banvel	Dicamba	Herb
Lorsban	Chlorpyrifos	Insect	Kilprop	MCPP	Herb
Bladex	Cyanazine	Herb	Agritox	MCPA	Herb
Dacthal	DCPA	Herb	Tordon	Picloram	Herb
Diazinon	Diazinon	Insect			
Casoron	Dichlobenil	Herb	Temik	Aldicarb	Insect
Cygon	Dimethoate	Insect	Sevin	Carbaryl	Insect
Velpar	Hexazinone	Herb	Furadan	Carbofuran	Insect
Gamma-mean	Lindane	Insect	Lannate	Methomyl	Insect
Malathion	Malathion	Insect	DPX	Oxamyl	Insect
Ridomil	Metalaxyl	Fungi	Baygon	Propoxur	Insect
Marlate	Methoxychlor	Insect			
Dual	Metolachlor	Herb			
Sencor	Metribuzin	Herb			
Prowl	Pendimethalin	Herb			

GROUND WATER MONITORING RESULTS

The results from this sampling program have been entered into the CDPHE Groundwater Quality Data System, a database specifically designed and maintained by the WQCD to store ground water quality data. Reports may be generated from the database on ground water quality in any area of the state from all data sources available. A complete printout of all water quality data from this survey is provided in the Appendix.

Analysis of the nitrate data indicates that ground water in the majority of the area sampled does show minor levels of nitrate contamination. It can not be determined from this analysis the source of the nitrate, but our experience in other areas of the state suggest application of chemical fertilizer as the most likely source. Nitrate analysis showed that approximately 6 % of all the wells exceeded the nitrate drinking water standard of 10 mg/L. This compares quite favorably with other areas of the state were nitrate exceedences ranged from 10% to 34% of the samples. While overall nitrate levels were low, this contaminate was present in every well, with no wells testing non-detect for nitrate. The drinking water standard is used as a benchmark for nitrate levels in all wells regardless of current use. In the High Plains study, all wells sampled were domestic supply wells.

Eight (8) of the one hundred twenty nine (129) wells sampled (6%) showed nitrate levels in excess of the EPA standard for drinking water (10 mg/L) (Figure 2). The remaining one hundred twenty one (121) wells (94%) tested positive for nitrate but were below the EPA standard. No samples tested below the detection level of 0.5 mg/L. Looking at the breakout of those eight wells that exceeded the drinking water standard for nitrate, we see that five



FIGURE 2 - Nitrate levels in High Plains Ogallala ground water Chart showing distribution of nitrate levels in wells sampled in 1997 and 1998 Colorado High Plains.

wells had a nitrate concentration in the thirteen to fifteen milligrams per litter range. Only three wells in this survey tested for nitrate above twenty milligrams per litter.



FIGURE 3 - Breakdown of nitrate levels in High Plains Ogallala ground water Chart showing the breakdown of nitrate levels in wells sampled in 1997 and 1998 Colorado High Plains.

Due to the unusually high percentage of well samples falling into the 0.5 to 9.9 mg/L concentration range for nitrate (94%), a second graph was prepared to break down that range. In Figure 3 above, we see that in fifty percent (50%) of the wells sampled, the nitrate concentration falls in the range of just above the detection limit to one quarter of the maximum allowable level. In eighty percent of the samples, the nitrate concentration is less than one half the maximum limit for drinking water.

A map prepared on a geographic information system (GIS) (Figure 4) shows the location of the wells and the nitrate results graphed in Figures 2 and 3. Wells on the map have been color coded according to the nitrate level measured in the well. The wells in green have nitrate levels above the laboratory detection level of 0.5 mg/L up to one half the drinking water standard (5.0 mg/L). Wells in yellow indicate nitrate present in the sample at greater than one half the standard (5.1 mg/L) but less than 10 mg/L. Wells presented in red indicate nitrate levels exceeding the EPA drinking water standard.



FIGURE 4 - Location of wells and nitrate levels. Map showing the locations and nitrate levels in ground water in High Plains Ogallala study area, 1997 - 1998.

Pesticide data revealed three pesticides, Atrazine, Prometon, and Bromacil present in the well samples. The breakdown product of Atrazine, Deethyl Atrazine was also present in several samples. The concentration of Atrazine in one well exceeded the water quality standard of 3.0 ug/L. That well, located in the town of Springfield, had been taken out of service at the time the sample was taken.

Table 2 provides details on the three different pesticides detected in High Plains ground water. In nine (9) of the one hundred twenty nine (129) wells sampled the herbicide Atrazine was detected (7%). Atrazine is a herbicide commonly used for weed control and often found in ground water in agricultural areas due to its chemical properties of persistence and mobility. Deethyl Atrazine was detected in seven (7) wells, two of which also contained Atrazine. Deethyl Atrazine is a breakdown product of Atrazine and when found alone indicates that Atrazine was present at an earlier time in this area. The detection limit of the laboratory analysis is 0.1 ug/l or ppb for both products. Three (3) wells (2%) contained the herbicide Prometon, a non selective herbicide used on highway and railroad right of ways and industrial areas for complete vegetation control. Two wells detected positive for the herbicide Bromacil. There was only the one occurrence, described above, of a pesticide detection a level higher than the EPA drinking water standard.

Pesticide	Detections	Range	DL	MCL
Atrazine	9	0.1 - 4.2	0.1	3
Deethyl Atrazine	7	0.1 - 1.3	0.1	
Prometon	3	0.1 - 1.4	0.1	100
Bromacil	2	0.5 - 1.1	0.4	90

TABLE 2 - Results of Pesticide Analysis, High Plains Ogallala, 1997-1998.

Amounts are given in micrograms per liter (ug/L), a unit of measurement for pesticide concentrations in water that is equivalent to parts per billion.

Detections - The number of wells testing positive for that pesticide.

Range - The range of concentration values for that pesticide in those wells.

DL - Minimum concentration that can be detected by the laboratory.

MCL - the maximum amount allowed in drinking water, if no MCL has been established the number given is the lifetime drinking water health advisory.

The location of the pesticide detections are plotted in Figure 5. Due to the scale of the map, multiple detections in and around the Town of Springfield plot on top of each other. Of the twenty one (21) detections listed in Table 2, six (6) wells contain more than one pesticide. In all six cases, the pesticides detected are Atrazine in combination with either Deethyl Atrazine, Prometon, or Bromacil. These wells are plotted in red. In sum total, there are fourteen (14) wells containing twenty one (21) pesticide detections plotted. Five (5) of these fourteen (14) wells are in the vicinity of the Town of Springfield.



FIGURE 5 - Location of pesticide detections. Map showing the location and type of pesticide detected in High Plains Ogallala study area, 1997-1998.

The monitoring program included sample collection, laboratory analysis, and data analysis and storage. Due to the vast size of this area, over 12,000 square miles, this survey does not fully establish a baseline for agricultural chemicals in ground water in this area. At some time in the future, additional data collected by local and Federal agencies should be added to the study. Upon completion of more sampling and a full analysis, which should include integration with previous and current studies by other agencies, the resulting sampling program will provide the basis for determining a groundwater quality baseline for this region.

All sampling was performed by Brad Austin and John Colbert of CDPHE, July 1997 through May, 1998. Field sampling procedures followed the protocol developed by the ground water quality monitoring working group of the Colorado nonpoint task force.

The results from this sampling program have been entered into the CDPHE Groundwater Quality Data System maintained at CDPHE and a printout of all water quality data from this survey is provided in the Appendix. The following section in this report describes the protocol for sampling and analysis.

The WQCD intends to include, in the final analysis of the High Plains Ogallala Aquifer, all available ground water quality data. Results from previous and ongoing studies by other agencies in the area will be integrated into this analysis.

Future additions and actions in this area

The local Groundwater Management Districts, in cooperation with the Office of the State Engineer and this program, conducted a sampling program in 1997 concurrently with this effort. Their monitoring activities were concentrated in those areas of the Ogallala overlain by dry land farming. This combination of different monitoring priorities will allow both surveys to be combined at a later date to form a more complete picture of the regional ground water quality in the Ogallala Aquifer. As time permits this data will be incorporated into the final analysis for water quality in this area. Other efforts are also actively engaged in collecting ground water quality data. Unfortunately, this data is not always readily available due to concerns about privacy and future use of the data. The program hopes that as the monitoring effort continues and the public grows comfortable with our goals and intent, this valuable source of data will become available and enhance our understanding of the overall ground water quality of the state.

Recent development of confined animal feeding operations in the High Plains has heightened public awareness of the potential for impacts to water quality. The Program has responded to these concerns by offering technical assistance to local water quality groups, ground water management districts, and other local water suppliers and entities interested in evaluating water quality in their area. Presentations of how the program works, past and present water quality projects, and plans for future projects with request for local input are made at every opportunity. We consider this type of outreach an important part of the customer service component of the program.

FIELD OPERATIONS

SCHEDULING

All wells were scheduled for sampling by WQCD personnel between July 1997 and May, 1998. The exact dates for sampling were subject to laboratory schedules, sample holding times, well owner availability, and travel times.

SAMPLE WELL SELECTION

The rationale used in selecting wells for this monitoring project are listed below.

- 1. Low flow, domestic use wells are preferred;
- 2. Completed within the uppermost aquifer in the area;
- 3. Well currently in use or at least has a working pump installed;
- 4. Direction of ground water flow;
- 5. Wellhead and casing in good physical condition and availability of completion information documentation;
- 6. Wellhead area free of point sources of contamination;
- 7. Well owner consent to participate in the monitoring program;

The ground water contaminants of concern that may be encountered in the area include nitrates and pesticides, other contaminates may exist in minor amounts.

KEY PERSONNEL

The sampling survey was conducted by:

Brad Austin, Ground Water Geologist and Program Manager John Colbert, Physical Sciences Tech

SITE ACCESS AND LOGISTICS

Access to the sampling sites and scheduling with land owners will be the responsibility of the field personnel. Consent for access to the property and for sampling the well will have been received prior to site entry.

QUALITY ASSURANCE / QUALITY CONTROL

SAMPLE COLLECTION METHODS

All samples were collected in accordance with the Non-Point Source Task Force protocol for sampling of ground water. Samples were collected from existing wells via outside hydrants or whatever means available prior to any type of treatment (i.e. water softener). As a rule of thumb, three times the volume of water in the well casing plus any volume contained within the associated piping was purged prior to sampling. Rather than attempt to calculate these volumes, a determination of when fresh formation water has reached the point of sampling was verified by measuring pH, conductivity and temperature. A field portable instrument for measuring pH, conductivity and temperature was used for this purpose at each well site. For each well, the pH, conductivity and temperature were measured at periodic intervals (approximately every 5 minutes) while the well was being purged. Water samples were collected when solution chemistry of the ground water had stabilized such that three consecutive readings were within 5 %. It can be reasonably assumed that a stabilization in the values of these parameters indicates that the casing and piping have been purged and fresh formation water had reached the sampling point.

Negative bias (loss of constituent) is of significant concern in sampling for volatile compounds. Therefore, great care was taken in sample collection to minimize degassing by operating the sampling port at a low volume. Samples for volatile constituents and those samples which require field filtration were collected first. Samples for nitrate and inorganic analysis were collected next. Samples collected for dissolved metals analysis were filtered in the field with a 0.45 micron size filter.

In addition, the sampling team collected quality assurance samples consisting of field blanks and periodic duplicate samples. Field blanks were utilized for field QA/QC performance and subjected to all conditions to which the samples were exposed. Duplicate samples were prepared for lab calibration checks.

The following types of samples were provided for quality assurance:

1. Field Blank

A blank ground water sample was periodically collected to check field decontamination procedures. The blank was prepared by pouring laboratory supplied deionized water through decontaminated sampling equipment following the collection of possible contaminated samples.

2. Duplicates

Random duplicate groundwater samples were collected to compare laboratory analysis procedures as well as sample collection procedure. Ground water samples were protected from undue exposure to light during handling, storage, and transport. Samples were stored on ice to prevent temperature extremes and transported to the CDA, or CSU laboratory and analyzed within the recommended holding periods. Documentation of actual sample storage and treatment were handled as part of the chain of custody procedures.

DECONTAMINATION PROCEDURES

Wells were sampled to minimize the potential for cross contamination. Decontamination procedures were adhered to between each sampling event. All common sampling equipment was decontaminated prior to and between all sampling events by washing with a non phosphate detergent and triple rinsing with deionized water. Since pesticides were the constituents of most concern due to the low levels detectable, no sampling equipment was common between wells for the pesticide sampling.

CONTROL OF CONTAMINATED MATERIALS

The sampling team disposed of all wastes produced during the investigation in accordance with Federal and State regulations. Disposable sampling equipment was bagged, removed from the site, and disposed of as a nonhazardous material.

LABORATORY ANALYSES

All water samples were analyzed for selected pesticides currently used in the area and basic inorganic minerals including nitrate. Table 3 provides a listing of the laboratories used, the chemicals analyzed by each, and their detection limits. All collected samples (classified as environmental samples) were transported to the designated laboratory as medium hazard and analyzed accordingly. EPA analytical methods for each parameter group were as follows:

pesticides solid phase extraction: GC/MSD inorganics varies with analyte

Table 3 - Laboratories, Methods and Detection Levels

Colorado Department of Agriculture Standards Laboratory

PESTICIDE ANALYSIS

Pesticide	Pesticide	Pesticide	Chemical	ЕРА	MDL
Trade Name	Common Name	Use	Туре	Method	(ug/L)
Harness	Acetachlor	Herb	acetoalinide	525.1 .	0.1
Lasso	Alachlor	Herb	OrganoCL	525.1	0.1
AAtrex	Atrazine	Herb	Triazine	525.1	0.1
	Deethyl Atrazine		Triazine	525.1	0.2
	Deisopropyl Atrazin	e	Triazine	525.1	0.2
Balan	Benfluralin	Herb	OrganoFL	525.1	0.2
Hyvar	Bromacil	Herb	uracil	525.1	0.4
Captane	Captan	Fungi	carboximide	525.1	1.4
Lorsban	Chlorpyrifos	Insect	OrganoPH	525.1	0.1
Bladex	Cyanazine	Herb	Triazine	525.1	0.2
Dacthal	DCPA	Herb	phthalic acid	525.1	0.1
Dazzel	Diazinon	Insect	OrganoPH	525.1	0.2
Barrier	Dichlobenil	Herb	nitrile	525.1	0.1
Cygon	Dimethoate	Insect	OrganoPH	525.1	0.5
	p,p-DDT	Insect	OrganoCL	525.1	0.4
	Endrin	Insect	OrganoCL	525.1	0.3
	Heptachlor	Insect	OrganoCL	525.1	0.6
	Heptachlor epoxide	Insect	OrganoCL	525.1	0.8
Velpar	Hexazinone	Негь	Triazine	525.1	0.1
Gamma-mean	Lindane	Insect	OrganoCL	525.1	0.1
Malathion	Malathion	Insect	OrganoPH	525.1	0.1
Ridomil	Metalaxyl	Fungi	acvlalanine	525.1	02
Marlate	Methoxychlor	Insect	OrganoCL	525.1	0.9
Dual	Metolachlor	Herb	acetamide	525.1	01
Sencor	Metribuzin	Herb	Triazine	525.1	0.5
Prowl	Pendimethalin	Herb	dinitroaniline	525.1	1.2
Primatol	Prometon	Herb	triazine	525.1	0.1
Princep	Simazine	Herb	triazine	525.1	0.2
Treflan	Trifluralin	Herb	OrganoFL	525.1	0.3
Weed B Gone	2.4-D	Herb	PhenovyAcid	515 2	0.2
Banvel	Dicamba	Herb	Renzoic A cid	515.2	0.2
Кіргор	МСРР	Herth	Denzoucaciu	515.2	0.1
Agritox	МСРА	Herh	Phenovy A cid	515 2	2.V 2.0
Tordon	Picloram	Herh	Picolinio A sid	515.2	2.0
	2 IVIVI UIII	11010	FICULIICACIO	515.2	0.55

Table 3, continued - Laboratories, Methods and Detection Levels

Colorado Department of Agriculture Standards Laboratory

PESTICIDE ANALYSIS

Pesticide Trade Name	Pesticide Common Name	Pesticide Use	Chemical Type	EPA Method	MDL (ug/L)
Temik	Aldicarb	Insect	Carbamate	531.1	1.0
	Aldicarb sulfone		Carbamate	531.1	2.0
	Aldicarb sulfoxide		Carbamate	531.1	2.0
Sevin	Carbaryl	Insect	Carbamate	531.1	2.0
Furadan	Carbofuran	Insect	Carbamate	531.1	1.5
	3-Hydroxycarbofura	n	Carbamate	531.1	2.0
	Methiocarb	Insect	Carbamate	531.1	4.0
Lannate	Methomyl	Insect	Carbamate	531.1	1.0
	1-Naphthol		Carbamate	531.1	1.0
DPX	Oxamyl	Insect	Carbamate	531.1	2.0
Baygon	Propoxur	Insect	Carbamate	531.1	1.0
INORGANIC A	NALVSIS				MDI

INORGANIC ANALISIS	EPA Method	MDL (mg/L)
Nitrate/Nitrite as N	300	0.5

Colorado State University Soil, Water, and Plant Testing Laboratory

ROUTINE WATER ANALYSIS

Basic Water Quality Parameters	Method	Reporting Limit (mg/L)
Boron	EPA 200.0	0.01
Bicarbonate	APHA 2320B	0.1
Calcium	EPA 200.0	0.1
Carbonate	APHA 2320B	0.1
Chloride	EPA 300.0	0.1
Magnesium	EPA 200.0	0.1
Nitrate	EPA 300.0	0.1
pH	EPA 150.1	0.1 pH unit
Sodium	EPA 200.0	0.1
Specific conductance (TDS)	EPA 120.1	1.0 uS/cm
Sulfate	EPA 300.0	0.1
Potassium	EPA 200.0	0.1
Alkalinity, total	Titration	1.0
Solids, Total Dissolved	Gravimetric	10.0
Hardness, total as CaCO ₃	Calculation	1.0

Sample bottles were provided by the lab and were part of the quality control program. All samples were handled and preserved in accordance with the requirements of the laboratory used for that analysis. Calibration and operation of all monitoring equipment followed the instrument manufacturer's instructions.

CHAIN OF CUSTODY

All samples were handled in accordance with standard laboratory chain of custody protocol after collection and identification.

Appendix

Laboratory data

1997

	sulfate	0.1 mg/l	166.0	0.000	335.6	250.7	53.1	97.2	45.9	52.0	50.5	5.5	58.5	50.5	55.1	50.5	35.5	55.9	75.9	70.7	353.1	55.9	72.0	70.5	35.5	150.3	68.5	95.5	55.5	50.5	47.2	45.9
·	bicarbonate	0.1 mg/l	214 E		184.5	129.0	217.3	149.9	155.6	158.6	155.5	149.8	137.8	147.0	148.6	148.2	149.5	167.2	200.0	165.6	102.8	144.8	171.7	171.5	155.7	143.3	161.2	155.4	158.3	172.0	161.5	155.2
	carbonate	0.1 mg/l	101		1.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	€0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	boron	0.01 mg/l	0.15		0.13	0.08	0.16	0.10	0.12	0.11	0.11	0.11	0.13	0.10	0.11	0.11	0.12	0.10	0.08	0.11	0.07	0.09	0.08	0.11	0.09	0.04	0.07	0.08	0.04	0.07	0.06	0.10
	potassium	0.1 mg/l	CV		0.0	3.3	4.7	3.4	3.8	3.9	3.6	3.5	4.9	3.8	4.0	4.0	4.1	3.1	3.3	2.8	4.3	2.7	3.1	2.6	2.5	3.1	2.6	3.4	2.4	2.8	2.7	2.6
	sodium	0.1 mg/l	18 7		2. I	2.7	35.1	9.6	14.5	12.2	11.9	16.4	7.4	9.5	17.4	12.5	11.7	27.5	21.4	40.3	28.1	29.6	24.0	37.3	34.4	6.3	20.3	23.3	14.0	21.2	21.2	27.2
	magnesium	0.1 mg/l	7 70		80.0	47.1	4.9	28.3	7.6	11.7	8.2	7.9	16.2	9.5	7.8	9.5	11.1	10.7	14.1	8.7	21.3	7.7	11.3	11.3	7.3	11.2	10.3	17.8	9.1	11.2	9.4	8.0
	calcium	0.1 mg/l	82.3		08.0	65.3	67.4	47.1	40.6	42.3	42.2	36.5	54.7	47.6	38.4	42.2	45.6	37.0	52.5	32.9	122.5	36.7	49.2	30.7	28.1	92.3	41.2	65.1	49.1	43.5	37.4	33.0
	conduct	1.0 uo/cm	750		1,001	(2)	653	295	316	305	288	286	415	292	300	295	330	371	380	325	775	305	350	341	310	485	315	465	310	310	322	313
	Hq	0.1 pH ut	76	0	0, L - 1	(.)	7.7	7.5	7.5	7.8	7.4	7.4	7.6	7.4	7.4	7.8	7.9	7.6	7.6	7.5	7.7	7.5	7.8	7.4	7.4	7.7	7.6	7.2	7.5	7.3	7.5	7.4
	Date		6/19/97	E/10/07	19/9/10	16/18/9/	6/14/97	6/20/97	76/7/7	17/17	7/8/97	7/8/97	7/8/97	7/8/97	79/97	7/9/97	7/9/97	7/14/97	7/15/97	7/15/97	7/15/97	7/15/97	7/15/97	7/15/97	7/15/97	7/16/97	7/16/97	7/21/97	7/21/97	7/22/97	7/22/97	7/22/97
	COUNTY		Kit Carson			Kit Carson																										
	WELL ID		HP97-001		1001 000	E00-764H	HP97-004	HP97-005	HP97-006	HP:97-007	HP97-008	HP97-009	HP97-011	HP97-012	HP97-013	HP97-014	HP97-015	HP97-016	710-799H	HP97-018	HP97-019	HP97-021	HP97-022	HP97-023	HP97-024	HP97-025	HP97-026	HP97-027	HP97-028	HP97-029	HP97-031	HP97-032

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BDL - Below detection limit

listed at head of collum

Appendix

Laboratory data

MELL ID	COUNTY	Date	Hq	conduct	calcium	magnesium	sodium	potassium	boron	carbonate	bicarbonate	sulfate
			0.1 pH ut	1.0 uo/cm	0.1 mg/l	0.1 mg/l	0.1 mg/l	0.1 mg/l	0.01 mg/l	0.1 mg/l	0.1 mg/l	0.1 mg/l
HP97-033	Kit Carson	7/22/97	7.8	320	39.9	13.1	17.2	2.4	0.08	<0.1	159.9	42.0
HP97-034	Kit Carson	7/22/97	7.3	340	34.4	12.0	29.3	2.4	0.09	<0.1	170.4	60.5
HP97-035	Kit Carson	7/27/97	7.8	328	42.4	9.1	21.0	2.4	0.07	<0.1	158.4	55.4
HP97-036	Kit Carson	7/23/97	7.3	395	61.3	13.7	11.1	2.6	0.04	<0.1	156.7	65.3
HP97-037	Kit Carson	7/23/97	7.1	310	44.8	10.2	17.0	2.2	0.05	<0.1	151.0	68.5
HP97-038	Kit Carson	7/23/97	7.4	315	47.2	9.6	21.2	2.9	0.04	<0.1	161.9	75.8
HP97-039	Kit Carson	7/28/97	7.6	750	82.3	27.7	36.7	4.2	0.15	<0.1	214.5	155.9
HP97-041	Cheyenne	7/29/97	7.5	725	65.3	47.1	2.7	3.3	0.08	<0.1	129.0	250.7
HP97-042	Cheyenne	7/29/97	7.7	653	67.4	4.9	35.1	4.7	0.16	<0.1	217.3	53.1
HP97-043	Cheyenne	7/30/97	7.5	295	47.1	28.3	9.6	3.4	0.10	40.1	149.9	97.2
HP97-044	Cheyenne	8/11/97	7.5	316	40.6	7.6	14.5	3.8	0.12	<0.1	155.6	20.5
HP97-045	Cheyenne	8/12/97	7.8	305	42.3	11.7	12.2	3.9	0.11	<0.1	158.6	52.0
HP97-046	Cheyenne.	8/12/97	7.4	288	42.2	8.2	11.9	3.6	0.11	<0.1	155.5	50.5
HP97-047	Cheyenne	8/12/97	7.4	286	36.5	7.9	16.4	3.5	0.11	<0.1	149.8	5.5
HP97-048	Cheyenne	8/12/97	7.7	420	56.7	16.8	8.5	4.6	0.13	<0.1	145.0	50.3
HP97-049	Cheyenne	8/12/97	7.6	415	54.7	16.2	7.4	4.9	0.13	<0.1	137.8	58.5
HP97-051	Cheyenne	8/13/97	7.4	300	38.4	7.8	17.4	4.0	0.11	<0.1	148.6	45.1
HP97-052	Cheyenne	8/13/97	7.8	295	42.2	9.5	12.5	4.0	0.11	<0.1	148.2	25.5
HP97-053	Cheyenne	8/13/97	7.9	330	45.6	11.1	11.7	4.1	0.12	<0.1	149.5	35.5
HP97-054	Yuma	8/26/97	7.4	914	131.0	31.5	54.7	10.4	0.12	<0.1 <0.1	262.3	45.0
HP97-055	Yuma	8/26/97	7.7	305	37.7	11.1	22.7	4.2	0.08	<0.1	171.7	48.5
HP97-056	Yuma	8/26/97	7.7	226	41.0	12.7	18.3	4.9	0.09	<0.1	179.5	55.7
HP97-057	Yuma	8/26/97	7.0	304	42.8	11.3	16.9	4.1	0.05	<0.1	154.9	54.5
HP97-058	Yuma	8/27/97	7.5	324	39.6	9.9	15.4	4.0	0.05	<0.1	137.4	70.2
HP97-059	Kit Carson	9/8/97	7.5	325	43.1	13.1	17.6	3.0	0.06	<0.1	179.3	50.1
HP97-061	Kit Carson	9/8/97	7.3	248	46.0	6.7	7.3	2.7	0.02	<u>6.1</u>	132.6	50.5
HP97-062	Kit Carson	9/8/97	7.4	269	49.4	9.1	8.9	3.0	0.03	<0.1	151.2	45.6
HP97-063	Washington	26/6/8	7.4	353	56.0	11.0	11.1	3.7	0.04	<0.1	162.2	75.5
HP97-064	Washington	26/8/6	7.4	369	59.2	14.3	14.4	4.5	0.05	<0.1	174.8	98.5

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Appendix

BDL - Below detection limit

listed at head of collum

Laboratory data

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	sulfate	0.1 mg/l	45.6	70.3	76.5	70.0	71.5	35.5	50.2	55.6	52.3	42.7	55.1	45.0	50.5	35.2	30.1	38.5	95.6	142.5	77.2	65.1	77.5	80.1	45.2	69.2	85.2	71.5	62.3	99.1	80.1	
-	bicarbonate	0.1 mg/l	142.2	176.6	179.6	168.6	154.7	202.4	190.3	187.0	157.1	220.3	179.4	175.1	169.0	163.5	176.1	168.7	192.5	235.6	189.3	188.8	220.9	215.7	173.6	126.5	125.2	135.2	162.4	128.2	135.2	i
	carbonate	0.1 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<u>6</u> .1	<0.1	<0.1	<u>60.1</u>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	boron	0.01 mg/l	0.03	0.07	0.06	0.07	0.06	0.03	0.09	0.07	0.50	0.06	0.06	0.08	0.08	0.06	0.09	0.08	0.06	0.09	0.12	0.08	0.09	0.06	0.06	0.04	0.02	0.03	0.02	0.02	0.02	
	potassium	0.1 mg/l	3.4	4.2	4.4	3.9	3.5	1.8	2.1	3.8	3.4	4.0	4.2	4.2	4.5	3.1	6.7	6.3	5.6	9.1	7.4	6.1	8.3	7.9	5.2	5.2	5.9	6.2	5.8	6.5	5.6	
	sodium	0.1 mg/l	9.5	14.7	12.1	15.2	16.1	10.5	39.2	24.6	21.5	22.5	21.3	17.4	16.7	13.2	10.6	12.5	8.3	30.2	15.6	14.3	19.2	14.2	10.2	10.9	8.2	9.1	9.8	11.7	10.6	
	magnesium	0.1 mg/l	6.4	14.5	12.5	12.3	10.7	7.8	12.5	13.1	10.5	13.2	10.2	12.7	12.0	11.0	14.8	11.2	10.2	24.3	17.6	13.6	16.3	15.9	12.3	13.3	11.1	13.1	12.5	12.5	6.7	
	calcium	0.1 mg/l	50.7	44.2	45.3	40.6	39.4	66.5	36.8	47.5	44.9	41.3	42.5	41.9	42.7	45.4	43.7	41.6	83.8	81.9	65.0	61.0	64.0	72.9	49.2	45.9	50.2	44.9	45.5	56.5	52.1	
	conduct	1.0 uo/cm	273	337	300	304	375	350	339	356	330	306	289	317	328	317	320	275	390	580	425	375	400	405	280	327	336	295	295	360	287	
	Hq	0.1 pH ut	7.5	7.5	2.6	7.6	7.6	7.5	7.3	7.3	7.5	7.7	7.7	7.5	7.0	7.5	7.4	7.1	7.5	7.4	7.1	7.5	7.5	7.3	7.2	8.0	7.8	8.0	8.1	8.0	8.0	
	Date		6/6/6	6/6/6	6/6/6	9/10/97	9/10/97	9/16/97	9/16/97	7/16/97	9/16/97	9/17/97	9/17/97	9/17/97	9/17/97	9/17/97	9/29/97	9/29/97	9/30/97	9/30/97	9/30/97	9/30/97	9/30/97	10/1/97	10/1/97	10/14/97	10/15/97	10/15/97	10/15/97	10/21/97	10/22/97	
	COUNTY		Kit Carson	Lincoln	Lincoln	Yuma	Yuma	Yuma	Yuma	Yuma	Yuma	Yuma	Yuma	Yuma	Yuma	Phillips																
	WELL ID		HP97-065	HP97-066	HP97-067	HP97-068	HP97-069	HP97-071	HP97-072	HP97-073	HP97-074	HP97-075	HP97-076	HP97-077	HP97-078	HP97-079	HP97-081	HP97-082	HP97-083	HP97-084	HP97-085	HP97-086	HP97-087	HP97-088	HP97-089	HP97-091	HP97-092	HP97-093	HP97-094	HP97-095	960-799H	

BDL - Below detection limit listed at head of collum

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Laboratory data

MELL ID	COUNTY	Date	Hq	conduct	calcium	magnesium	sodium	potassium	boron	carbonate	bicarbonate	sulfate
			0.1 pH ut	1.0 uo/cm	0.1 mg/l	0.1 mg/l	0.1 mg/l	0.1 mg/l	0.01 mg/l	0.1 mg/l	0.1 mg/l	0.1 mg/l
												2
HP97-097	Phillips	10/22/97	8.0	295	52.1	9.1	10.9	4.6	0.04	<0.1	147.2	45.5
HP97-098	Logan	10/22/97	8.0	320	44.4	10.4	18.7	3.3	0.04	<0.1	135.7	69.5
HP97-099	Logan	10/23/97	8.0	260	44.4	9.2	4.7	4.1	<0.01	<0.1	152.3	25.6
HP97-101	Phillips	10/23/97	7.9	263	40.3	10.0	11.0	5.0	0.03	<0.1	136.0	41.6
HP97-102	Phillips	10/23/97	7.8	353	60.3	10.0	12.5	5.9	0.03	<0.1	139.0	85.3
HP97-103	Phillips	10/23/97	8.1	253	36.5	7.2	14.8	4.2	0.06	<0.1	120.1	19.2
HP97-104	Sedgwick	11/3/97	7.9	381	63.5	12.8	7.8	5.3	0.01	<0.1	146.4	95.9
HP97-105	Sedgwick	11/4/97	8.0	296	49.1	10.3	12.2	5.0	0.02	<0.1	111.1	74.1
HP97-106	Sedgwick	11/4/97	7.9	295	49.2	10.7	12.7	5.3	0.02	<0.1	136.5	65.2
HP97-107	Sedgwick	11/4/97	8.1	285	50.5	10.4	7.3	5.0	<0.01	<0.1	125.6	61.6
HP97-108	Sedgwick	11/5/97	8.0	279	43.8	10.2	12.5	5.5	0.03	<0.1	121.1	62.3
HP97-109	Sedgwick	11/5/97	7.9	350	47.9	10.4	15.6	6.0	0.03	<0.1	110.2	85.9
HP97-111	Baca	11/18/97	7.5	1,170	146.8	47.1	77.6	4.3	0.25	<0.1	171.3	522.5
HP97-112	Baca	11/18/97	7.7	458	69.4	8.4	9.7	3.1	0.06	<0.1	129.0	125.1
HP97-113	Baca	11/18/97	7.7	710	129.2	21.5	15.5	4.0	0.07	<0.1	112.1	286.5
HP97-114	Baca	11/18/97	7.5	840	118.6	24.5	49.8	3.8	0.21	<0.1	147.2	354.0
HP97-115	Baca	11/18/97	7.7	3150	329	131	360.1	5.5	1.33	<0.1	260.1	1540.2
HP97-116	Baca	11/18/97	7.4	066	144.96	39.9	68.2	4.4	0.22	<0.1	164.3	435.6
HP97-117	Baca	11/18/97	7.4	989	115.0	40.0	81.7	4.8	0.27	<0.1	160.4	465.4
HP97-118	Baca	11/18/97	7.4	1,230	170.6	40.0	93.7	4.5	0.31	<0.1	161.2	586.9
HP97-119	Baca	11/18/97	7.3	1,200	187.0	45.1	82.9	4.0	0.38	<0.1	203.5	641.8
HP97-122	Phillips	12/2/97	7.7	450	73.6	13.1	12.3	6.7	0.08	<u>60.1</u>	137.7	125.6
HP97-123	Philtips	12/2/97	7.8	480	58.1	10.1	15.6	5.7	0.08	<0.1	148.6	80.7
HP97-124	Phillips	12/2/97	7.9	302	37.7	8.3	9.2	5.3	0.04	<0.1	116.5	55.6
HP97-125	Yuma	3/17/98	7.7	326	34.7	10.4	14.2	7.3	0.09	<0.1	175.0	10.2
HP97-126	Yuma	3/18/98	7.7	298	28.2	12.5	13.8	6.7	0.05	<u>6.1</u>	165.3	8.4
HP97-127	Yuma	3/18/98	7.5	403	35.7	14.2	27.1	7.2	0.09	<0.1	216.3	8.3
HP97-128	Yuma	3/18/98	7.7	347	35.0	14.9	13.8	5.7	0.04	<0.1	187.3	6.5
HP97-129	Yuma	3/18/98	1.7	275	25.6	12.0	11.8	5.7	0.04	<0.1	155.1	6.4

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BDL - Below detection limit listed at head of collum

Appendix

Laboratory data

MELL ID	COUNTY	Date	Ha	conduct	calcium	magnesium	sodium	potassium	boron	carbonate	bicarbonate	sulfate
			0.1 pH ut	1.0 uo/cm	0.1 mg/l	0.1 mg/l	0.1 mg/l	0.1 mg/l	0.01 mg/l	0.1 mg/l	0.1 mg/l	0.1 mg/l
	;											
HP97-131	Yuma	4/13/98	7.8	302	30.2	12.1	14.0	7.1		<0.1	167.3	0.8
HP97-132	Yuma	4/13/98	7.8	331	31.5	13.6	15.5	7.5		<0.1	172.3	11.7
HP97-133	Yuma	4/14/98	7.7	337	33.1	13.9	13.8	0.8		<0.1	190.4	12.8
HP97-134	Yuma	4/14/98	7.7	328	35.9	12.2	15.1	8.0		<0.1	188.7	12.1
HP97-135	Yuma	4/14/98	7.7	301	36.7	10.5	10.1	6.9		<0.1	170.3	18.2
HP97-136	Yuma	4/14/98	7.7	337	39.8	10.8	17.1	6.9		<0.1	179.7	14.9
HP97-137	Yuma	4/14/98	7.7	443	36.5	13.8	40.0	8.1		<0.1	196.6	46.7
HP97-138	Baca	5/5/98	7.4	712	84.3	26.6	23.6	2.9	0.11	<0.1	159.5	172.1
HP97-139	Baca	5/5/98	7.6	1,010	121.3	42.5	35.4	3.9	0.10	<0.1	153.5	309.4
HP97-141	Baca	5/5/98	7.6	425	36.2	21.4	18.7	2.1	0.13	<0.1	187.5	44.
HP97-142	Baca	5/5/98	7.7	463	37.3	26.1	24.6	2.4	0.15	<0.1	215.9	44.1
HP97-143	Baca	5/6/98	7.6	1,250	121.6	43.2	117.6	4.4	0.49	<0.1	196.3	497.7
HP97-144	Baca	5/6/98	7.5	2,860	293.8	24.2	269.2	7.6	0.76	<0.1	214.0	1022.1

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BDL - Below detection limit listed at head of collum

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Laboratory data

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	Deisopropyl At	0.2 ug/L		BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL															
	Deethyl At	0.2 ug/L		BDL	BOL	BDL	BDL	BDL	BDL	BDL	JOB	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BOL	BDL	BDL	BDL						
	Atrazine	0.1 ug/L		BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BOL	BDL															
	Alachior	0.1 ug/L		BDL	JOB	BOL	BDL																					
	Acetachlor	0.1 ug/L		BDL																								
	Nitrate as N	0.5 mg/L		8.9	7.9	7.3	5.1	3.1	2.8	3.1	2.4	2.6	6.7	2.9	2.7	2.4	2.7	1.8	2.3	2.1	32.8	2.5	2.1	1.9	2.0	13.8	1.8	13.4
	diss. solids	10.0 mg/l		563	833	505	400	339	272	286	279	268	323	273	275	270	271	307	370	330	639	286	337	330	270	415	313	386
	alkalinity	1.0 mg/l		176	151	106	178	123	128	130	127	123	113	113	120	122	121	137	164	136	84	119	141	141	128	117	113	127
	hardness	1.0 mg/l		319	618	356	188	234	133	154	139	123	203	158	128	144	159	136	189	118	393	123	169	123	100	276	145	236
	chlorine	0.1 mg/l		39.9	115.5	5.3	15.9	1.7	3.7	2.8	3.9	35.7	31.3	2.5	1.6	0.0	11.1	5.0	2.2	L'L	5.1	6.0	3.0	3.7	3.9	2.1	2.1	22.8
	MELL ID			HP97-001	HP97-002	HP97-003	HP97-004	HP97-005	HP97-006	HP97-007	HP97-008	HP97-009	HP97-011	HP97-012	HP97-013	HP97-014	HP97-015	HP97-016	HP97-017	HP97-018	HP97-019	HP97-021	HP97-022	HP97-023	HP97-024	HP97-025	HP97-026	HP97-027

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Appendix

BDL - Below detection limit listed at head of collum

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HP97-028 HP97-029 HP97-031 HP97-032

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Ogallala Aquifer High Plains

Deisopropyl At 0.2 ug/L BO B BDL BOL BD BDL BDL BDL BD **Deethyl At** 0.2 ug/L BOL BD B BD 0.1 BOL Atrazine 0.1 ug/L BDL BDL BDL BDL BOL Alachior 0.1 ug/L BD B BOL BDL Nitrate as N Acetachlor 0.1 ug/L BDL BDL BOL 0.5 mg/L 14.0 1.9 4.9 1.8 **2**.2 3 4 8 2 2 3 3 3 8 4.9 1.9 2.6 1.9 2.6 2.2 2.3 8 8.1 4.4 9.4 diss. solids 284 320 330 299 324
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 273</th 10.0 mg/l alkalinity 113
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 153 135 209 154 157 144 159 456 140 155 153 1.0 mg/l 5.3 15.9
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 1.9 2.6 2.6 39.9 35.8 3.4 2.4 14.4 1.6 0.0 2.8 3.8 2.3 chlorine 11.1 4.4 0.1 mg/l HP97-045 HP97-046 HP97-047 HP97-047 HP97-042 HP97-043 HP97-044 HP97-035 HP97-036 HP97-034 HP97-038 HP97-039 HP97-049 HP97-033 HP97-052 HP97-053 HP97-054 HP97-055 HP97-056 HP97-058 WELL ID HP97-037 HP97-041 HP97-051 HP97-057

BDL - Below detection limit listed at head of collum

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BD BDL Б BDL Ĩ

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HP97-062 HP97-063 HP97-064

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HP97-059

HP97-061

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Appendix

Laboratory data

MELL ID	chlorine	hardness	alkalinity	diss. solids	Nitrate as N	Acetachlor	Alachlor	Atrazine	Deethvl At	Deisoaroovt At
	0.1 mg/l	1.0 mg/l	1.0 mg/l	10.0 mg/l	0.5 mg/L	0.1 ug/L	0.1 ug/L	0.1 ug/L	0.2 ug/L	0.2 ug/L
HP97-065	9.0	153	113	271	3.5	BDL	BDL	BDL	BDI	ICIB
HP97-066	4.3	170	113	334	4.3	BDL	BDL	BDL	BDL	BDL
HP97-067	5.2	164	113	339	2.7	BDL	BDL	BDL	BDL	BDL
HP97-068	3.4	152	113	317	2.4	BDL	BDL	BDL	BDL	BOL
HP97-069	7.5	142	113	306	2.3	BDL	BDL	BDL	BDL	BDL
HP97-071	7.2	198	166	338	3.3	BDL	BOL	BDL	BDL	BDL
HP97-072	5.3	143	156	337	1.6	BDL	BOL	BDL	BDL	BDL
HP97-073	21.5	172	153	369	3.6	BDL	BDL	BDL	BDL	BDL
HP97-074	7.2	155	129	303	2.1	BDL	BDL	BDL	BDL	BDL
HP97-075	2.6	157	181	361	1.9	BDL	BDL	BDL	BDL	BDL
HP97-076	3.2	148	147	322	2.0	BDL	BDL	BDL	BDL	BDL
HP97-077	3.4	157	144	305	2.1	BDL	BDL	BDL	BDL	BDL
HP97-078	6.2	156	139	306	2.3	BDL	BDL	BDL	BDL	BDL
HP97-079	12.7	158	134	286	2.3	BOL	BDL	BDL	BDL	BDL
HP97-081	1.9	170	144	290	6.3	BDL	BDL	BDL	BOL	BDL
HP97-082	1.4	150	138	281	1.2	BDL	BDL	BDL	BDL	BDL
HP97-083	7.5	251	158	420	15.3	BDL	BDL	0.1	1.3	BDL
HP97-084	25.9	304	193	555	5.4	BDL	BDL	BDL	BDL	BDL
HP97-085	13.5	235	155	400	13.4	BDL	BDL	BDL	BDL	BDL
HP97-086	3.7	208	155	359	6.4	BDL	BDL	BDL	BDL	BDL
HP97-087	3.1	227	181	415	5.1	BDL	BDL	BDL	BDL	BDL
HP97-088	3.5	247	177	415	4.4	BDL	BDL	BDL	0.12	BDL
HP97-089	1.9	173	142	299	1.5	BDL	BDL	BDL	BDL	BDL
HP97-091	3.5	169	104	280	4.5	BDL	BDL	BDL	0.18	BOL
HP97-092	4.4	171	103	292	1.7	BDL	BDL	BDL	BDL	BDL
HP97-093	4.0	166	111	285	1.4	BDL	BDL	BDL	BDL	BDL
HP97-094	1.7	165	133	302	1.8	BDL	BDL	BDL	BDL	BDL
HP97-095	1.3	192	105	321	4.1	BDL	BDL	BDL	BOL	BDL
HP97-096	2.2	162	111	296	2.3	BDL	BDL	BDL	BDL	BDL
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BDL - Below detection limit listed at head of collum

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	Ueisopropyi Al	0.2 ug/L	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	- BDL	BDL	BDL	BDL	BDL	BDL
	Deetnyl At	n.z ug/L	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL																
	Atrazine	0.1 ug/L	BDL	0.3	BDL	BDL	2.4	3.9	BDL	BDL	2.8	1.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL											
Alachias		o. I ug/L	BDL	. BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL						
Accession	Acetacillor	0.1 ug/r	BDL	JCB	BDL	BOL	BDL	BDL	BDL	BDL																					
Nitesta an Ni	NILIALE AS N		2.0	3.5	3.8	1.9	3.3	3.1	5.0	2.1	2.0	2.2	1.9	2.1	1.5	2.6	3.8	3.7	22.9	2.0	1.4	6.3	5.1	5.4	4.3	1.3	2.4	1.7	4.7	4.4	1.4
dice colide	40.0 mg/l	1/6111 0.01	289	294	253	259	320	237	349	278	286	267	262	284	991	352	605	725	2,860	- 881	893	1,130	1,173	401	340	236	289	244	332	287	224
alkalinihu	4 0 mo/l	1/Aitt 0.1	121	111	125	111	114	98	120	91	112	103	66	06	140	106	92	121	213	135	131	132	167	113	122	95	144	136	178	154	127
hardneee			167	154	149	142	192	121	211	165	167	169	151	162	560	208	- 411	397	1,360	528	451	590	652	237	186	128	132	121	150	148	114
chlorine			17.6	8.0	7.9	13.2	3.4	31.2	10.9	13.9	3.9	3.8	4.0	4.8	19.7	4.2	31.8	23.3	207.7	21.1	23.8	66.1	2.4	26.6	16.8	2.3	4.4	2.0	2.8	3.4	1.9
			HP97-097	HP97-098	HP97-099	HP97-101	HP97-102	HP97-103	HP97-104	HP97-105	HP97-106	HP97-107	HP97-108	HP97-109	HP97-111	HP97-112	HP97-113	HP97-114	HP97-115	HP97-116	HP97-117	HP97-118	HP97-119	HP97-122	HP97-123	HP97-124	HP97-125	HP97-126	HP97-127	HP97-128	HP97-129

BDL - Below detection limit listed at head of collum

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Laboratory data

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Deisopropyl At	0.2 ug/L	BDL												
Deethyl At	0.2 ug/L	BDL	0.29	0.75										
Atrazine	0.1 ug/L	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	0.12	BDL	BDL	BDL	0.61
Alachlor	0.1 ug/L	BDL												
Acetachlor	0.1 ug/L	BOL	BDL											
Nitrate as N	0.5 mg/L	1.7	2.0	1.3	1.4	1.9	2.1	2.1	3.9	6.0	2.1	2.2	7.7	20.3
diss. solids	10.0 mg/l	252	267	280	280	265	284	358	535	762	327	370	1,091	2,052
alkalinity	1.0 mg/l	137	141	156	155	140	147	161	131	126	154	177	161	175
hardness	1.0 mg/l	125	135	140	140	135	144	148	320	477	178	200	481	833
chlorine	0.1 mg/l	2.9	5.6	1.7	2.0	2.0	4.4	5.8	47.9	68.7	6.7	9.4	76.2	125.1
MELL ID		HP97-131	HP97-132	HP97-133	HP97-134	HP97-135	HP97-136	HP97-137	HP97-138	HP97-139	HP97-141	HP97-142	HP97-143	HP97-144

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BDL - Below detection limit listed at head of collum

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	p.p-DDT	0.4 ug/L		BDL																													
	Dimethoate	0.5 ug/L		BDL	BDL	BDL	BDL	BDL	BOL	BDL																							
	Dichlobenil	0.1 ug/L		BDL	BOL	BDL																											
	Diazinon	0.2 ug/L		BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	-																					
	DCPA	0.1 ug/L		BDL	BOL	BDL	BQ																										
	Cyanazine	0.2 ug/L		BDL																													
	Chlorpyrifos	0.1 ug/L		BDL	BDL	BOL	BDL																										
	Captan	1.4 ug/L		BDL	BOL	BDL																											
	Bromacil	0.4 ug/L		BDt	BDL																												
	Benfluralin	0.2 ug/L		BDL	BDL	BDL	BDL	BDL	BDL.	BDL	BDL	BOL	BOL	BDL	BOL	BDL	BDL	BDL	BDL														
	MELL ID			HP97-001	HP97-002	HP97-003	HP97-004	HP97-005	HP97-006	700-794H	HP97-008	HP97-009	HP97-011	HP97-012	HP97-013	HP97-014	HP97-015	HP97-016	HP97-017	HP97-018	HP97-019	HP97-021	HP97-022	HP97-023	HP97-024	HP97-025	HP97-026	HP97-027	HP97-028	HP97-029	HP97-031	HP97-032	

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BDL - Betow detection limit listed at head of collum

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Ogallala Aquifer High Plains

Laboratory data

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	p,p-DDT	0.4 ug/L		BDL																												
	Dimethoate	0.5 ug/L		BDL	BOL	BDL																										
	Dichlobenil	0.1 ug/L		BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BOL																				
	Diazinon	0.2 ug/L		BDL	BOL																											
	DCPA	0.1 ug/L		BDL	BOL	BDL																										
1	Cyanazine	0.2 ug/L		BDL	BDL	BDL.	BOL	BDL	BOL	BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL															
	Chlorpyrifos	0.1 ug/L		BDL	BOL	BDL	BDL	BDL	BOL	BDL																						
	Captan	1.4 ug/L		BOL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BD	BDL	BDL	BDL	BDL	BDL	B	BDL												
	Bromacil	0.4 ug/L		BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BOL	BDL															
	Benfluralin	0.2 ug/L		BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL																					
	MELL ID			HP97-033	HP97-034	HP97-035	HP97-038	HP97-037	HP97-038	HP97-039	HP97-041	HP97-042	HP97-043	HP97-044	HP97-045	HP97-046	HP97-047	HP97-048	HP97-049	HP97-051	HP97-052	HP97-053	HP97-054	HP97-055	HP97-056	HP97-057	HP97-058	HP97-059	HP97-061	HP97-062	HP97-063	HP97-064

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BDL - Below detection limit listed at head of collum

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Laboratory data

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	0.4 ug/L	BDL	-																												
Dimethoate	0.5 ug/L	BDL	BOL	BDL	-																										
Dichlobenil	0.1 ug/L	BDL	JOa	JOB	BDL	BOL	BDL																								
Diazinon	0.2 ug/L	BDL																													
DCPA	0.1 ug/L	BDL																													
Cyanazine	0.2 ug/L	BDL																													
Chlorpyrifos	0.1 ug/L	BDL	BOL	BDL	BOL	BDL																									
Captan	1.4 ug/L	 BDL	BDL	BD	BDL	BOL	BDL																								
Bromacil	0.4 ug/L	BDL	BOL	BDL																											
Benfluralin	0.2 ug/L	BDL	BDL	BDL	BDL	BDĹ	BDL	BDL	BDĹ	BDL																					
MELL ID		HP97-065	HP97-066	HP97-067	HP97-068	HP97-069	HP97-071	HP97-072	HP97-073	HP97-074	HP97-075	HP97-076	HP97-077	HP97-078	HP97-079	HP97-081	HP97-082	HP97-083	HP97-084	HP97-085	HP97-086	HP97-087	HP97-088	HP97-089	HP97-091	HP97-092	HP97-093	HP97-094	HP97-095	HP97-096	

BDL - Below detection limit listed at head of collum

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Laboratory data

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	p,p-DDT	0.4 ug/L	BDL	BDL	BDL	BDL	BDL	BOL	BDL																						
	Dimethoate	0.5 ug/L	BDL																												
	Dichlobenil	0.1 ug/L	BDL	BOL	BDL	BDL	BDL	BOL	BDL																						
	Diazinon	0.2 ug/L	BDL	BOL	BDL	BOL	BDL	BDL	BOL	BDL																					
	DCPA	0.1 ug/L	BDL	BOL	BOL	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL															
	Cyanazine	0.2 ug/L	BDL	BDL.	BDL																										
	Chlorpyrifos	0.1 ug/L	BDL	BOL	BDL	BDL	BDL	BOL	BDL																						
	Captan	1.4 ug/L	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL	В	BDL	BDL	BDL	BDL	BDL	BQL	闧	BDL								
	Bromacil	0.4 ug/L	BDL	0.5	0.8	BDL																									
	Benfluralin	0.2 ug/L	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL											
	MELL ID		190-797H	HP97-098	HP97-099	HP97-101	HP97-102	HP97-103	HP97-104	HP97-105	HP97-106	HP97-107	HP97-108	HP97-109	HP97-111	HP97-112	HP97-113	HP97-114	HP97-115	HP97-116	HP97-117	HP97-118	HP97-119	HP97-122	HP97-123	HP97-124	HP97-125	HP97-126	HP97-127	HP97-128	HP97-129

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BDL - Below detection limit

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Laboratory data

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	p,p-DDT	0.4 ug/L	
	Dimethoate	0.5 ug/L	
	Dichlobenil	0.1 ug/L	
	Diazinon	0.2 ug/L	
	DCPA	0.1 ug/L	
	Cyanazine	0.2 ug/L	

p,p-00T	0.4 ug/L	-	BDL	BOL	BDL	BOL	BDL								
Dimethoate	0.5 ug/L		BDL												
Dichlobenil	0.1 ug/L		BDL	. JOB	BDL	BDL	BDL								
Diazinon	0.2 ug/L		BDL												
DCPA	0.1 ug/L		BDL												
Cyanazine	0.2 ug/L		BDL												
Chlorpyrifos	0.1 ug/L		BDL	BOL											
Captan	1.4 ug/L		BDL												
Bromacil	0.4 ug/L		BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL
Benfluralin	0.2 ug/L		BDL												
MELL ID			HP97-131	HP97-132	HP97-133	HP97-134	HP97-135	HP97-136	HP97-137	HP97-138	HP97-139	HP97-141	HP97-142	HP97-143	HP97-144

BDL - Below detection limit listed at head of collum

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Pendimethalin	1.2 ug/L	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BOL	BDL.	BOL	BDL																		
Metribuzin	0.5 ug/L	BOL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL								
 Metolachior	0.1 ug/L	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL															
Methoxychlor	0.9 ug/L	BDL	BDL	BDL	BDL	BDL	TOB	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Metalaxyl	0.2 ug/L	BDL	BDL	BDL	BDL	BDL	BDL	DDB	BDL	BDL	BDL	BDL	BDL	BOL	BDL																
Malathion	0.1 ug/L	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Lindane	0.1 ug/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL								
Hexazinone	0.1 ug/L	 BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL							
Heptachlor epox	0.8 ug/L	BDL	BDL	BOL	BDL																										
Heptachlor	0.6 ug/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BOL								
Endrin	0.3 ug/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL								
WELL ID		HP97-001	HP97-002	HP97-003	HP97-004	HP97-005	HP97-006	HP97-007	HP97-008	HP97-009	HP97-011	HP97-012	HP97-013	HP97-014	HP97-015	HP97-016	HP97-017	HP97-018	HP97-019	HP97-021	HP97-022	HP97-023	HP97-024	HP97-025	HP97-026	HP97-027	HP97-028	HP97-029	HP97-031	HP97-032	

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BDL - Below detection limit listed at head of collum

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Pendimethalin	1.2 ug/L	BDL	BOL	BDL	BDL	BOL	BDL	BDL	BOL	BDL	BDL																				
Metribuzin	0.5 ug/L	BDL																													
Metolachior	0.1 ug/L	BDL	BOL	BDL	BDL	BOL	BDL																								
Methoxychlor	0.9 ug/L	BDL																													
Metalaxyl	0.2 ug/L	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BOL	BDL	BOL	BDL																		
Malathion	0.1 ug/L	BDL	BDL	BDL	BDL	BOL	BDL																								
Lindane	0.1 ug/L	BDL	BOL	BDL	BDL	BDL	BDL	BDL																							
Hexazinone	0.1 ug/L	BOL	BOL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL	BDL																			
Heptachlor epox	0.8 ug/L	BDL	JOB	BDL																											
Heptachlor	0.6 ug/L	BDL	BOL	BDL																											
Endrin	0.3 ug/L	BDL	BDL	BDL	BOL	BDL	BOL	BDt	BDL	BDL	BDL	BDL																			
WELL ID		HP97-033	HP97-034	HP97-035	HP97-036	HP97-037	HP97-038	HP97-039	HP97-041	HP97-042	HP97-043	HP97-044	HP97-045	HP97-046	HP97-047	HP97-048	HP97-049	HP97-051	HP97-052	HP97-053	HP97-054	HP97-055	HP97-056	HP97-057	HP97-058	HP97-059	HP97-061	HP97-062	HP97-063	HP97-064	

High Plains Ogallala Aquifer

1997

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BDL - Below detection limit listed at head of collum

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Laboratory data

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	_	_			_	-			_																						
Dandinaétali			BDL	. BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL																		
Matrihurain	0.5 ug/L		BOL	BDL	BOL	BDL																									
Matolachlor	0.1 ug/L		BDL	BOL	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL																
Mathovvchlor			BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL																				
Metalaxvl	0.2 ug/L		BDL																												
Malathion	0.1 ug/L		BDL	BDL	BDL	BDL	BDL	BOL	BDL																						
Lindane	0.1 ug/L		BDL	BOL	BDL	อีต	BDL	BD																							
Hexazinone	0.1 ug/L		BDL	BDL	BDL	BDI.	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL														
Heptachlor epox	0.8 ug/L		BDL																												
Heptachlor	0.6 ug/L		BOL	BOL	BDL	80L	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL												
Endrin	0.3 ug/L		BDL	BDL	BOL	BDL	BOL	BDL	BOL	BDL	BDL	BOL	BOL	BDL	BD	BO	BDL														
MELL ID			HP97-065	HP97-066	HP97-067	HP97-068	HP97-069	HP97-071	HP97-072	HP97-073	HP97-074	HP97-075	HP97-076	HP97-077	HP97-078	HP97-079	HP97-081	HP97-082	HP97-083	HP97-084	HP97-085	HP97-086	HP97-087	HP97-088	HP97-089	HP97-091	HP97-092	HP97-093	HP97-094	HP97-095	HP97-096

BDL - Below detection limit listed at head of collum

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Pendimethalin	1.2 ug/L	BDL																													
Metribuzin	0.5 ug/L	BDL	BDL	DL	BOL	BDL	BOL	BOL	BOL	BDL	BDL																				
Metolachior	0.1 ug/L	BDL	BDL	TOB	BDL	BOL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL	BDL															
Methoxychlor	0.9 ug/L	BDL																													
Metalaxyl	0.2 ug/L	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL																						
Malathion	0.1 ug/L	BDL	BOL	BDL	BDL	BDL	BDL	BOL	BOL																						
Lindane	0.1 ug/L	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL									
Hexazinone	0.1 ug/L	BDL	BOL	BOL	BDL																										
Heptachlor epox	0.8 ug/L	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BOL	BDL	BOL	BOL	BDL.	BOL	BDL	BDL	BDL	BDL	BDL	BOL											
Heptachlor	0.6 ug/L	BDL	BDL	BOL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BD	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	
Endrin	0.3 ug/L	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BOL	BOL																	
MELL ID	,	HP97-097	HP97-098	HP97-099	HP97-101	HP97-102	HP97-103	HP97-104	HP97-105	HP97-106	HP97-107	HP97-108	HP97-109	HP97-111	HP97-112	HP97-113	HP97-114	HP97-115	HP97-116	HP97-117	HP97-118	HP97-119	HP97-122	HP97-123	HP97-124	HP97-125	HP97-126	HP97-127	HP97-128	HP97-129	

BDL - Below detection limit listed at head of collum

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Laboratory data

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	Pendimethal	1.2 ug/L		BDL												
	Metribuzin	0.5 ug/L		BDL												
	Metolachlor	0.1 ug/L		BDL	BDL	BOL	BDL									
	Methoxychior	0.9 ug/L		BDL												
	Metalaxyl	0.2 ug/L		BDL												
	Malathion	0.1 ug/L		BDL	BDL	BDL	BDL	BDL	- TOB	BDL	BDL	BDL	BDL	BDL	BOL	BDL
	Lindane	0.1 ug/L		BDL												
	Hexazinone	0.1 ug/L		BDL												
	Heptachlor epox	0.8 ug/L	i	BOL	BDL	BOL	BDL	BDL	BDL							
	Heptachlor	0.6 ug/L	i	BUL	BOL	BDL	BOL	BDL								
	Endrin	0.3 ug/L		BUL	BOL	BDL										
	MELL ID			151-784H	HP97-132	HP97-133	HP97-134	HP97-135	HP97-136	HP97-137	HP97-138	HP97-139	HP97-141	HP97-142	HP97-143	HP97-144

BDL - Below detection limit listed at head of collum

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WELLID	Prometone	Simazine	Trifluralin	2.4-D	Dicamba	MCPP	MCPA	Pictoram	Aldicarb	Aldicarb Sulfone	Aldicarb Suffortide
	0.1 ug/L	0.2 ug/L	0.3 ug/L	0.2 ug/L	0.1 ug/L	2.0 ug/L	2.0 ug/L	0.35 ug/l	1.0 ug/L	2.0 ug/L	2.0 ug/L
HP97-001	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-002	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-003	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	JOB	BDL
HP97-004	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL
HP97-005	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-006	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BOL	BDL
HP97-007	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-008	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL
HP97-009	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL
HP97-011	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-012	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-013	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-014	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL
HP97-015	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-016	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-017	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-018	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-019	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL
HP97-021	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL
HP97-022	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL
HP97-023	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-024	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL
HP97-025	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-026	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL
HP97-027	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-028	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-029	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-031	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-032	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
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Aldicarb Sulfoxide	2.0 ug/L	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL																
Aldicarb Suffone	2.0 ug/L	BDL	108	BDL	BOL	BDL	BOL	BDL	BDL																					
Aldicarb	1.0 ug/L	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BOL	В Д	BDL	BDL	BDL	BDL														
Picloram	0.35 ug/l	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BDL																					
MCPA	2.0 ug/L	BDL	BDL	BDL	BDL.	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BD	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BOL
MCPP	2.0 ug/L	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BOL	BDL																			
Dicamba	0.1 ug/L	BDL	BOL	BDL	BOL	BDL																								
2,4-D	0.2 ug/L	BUL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL																			
Trifluralin	0.3 ug/L	BUL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BOL	BD	BOL	BDL	BOL	BDL.	BDL	BDL	BDL	BDL	BDL	BDL.	BDL	BDL	BDL	BDL
Simazine	0.2 ug/L	BUL	BOL	BDL	ខ្ល	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BOL	BOL	BOL	BDL	BDL											
Prometone	0.1 ug/L	BUL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL																
WELL ID		HP8/-033	HP97-034	HP97-035	HP97-036	HP97-037	HP97-038	HP97-039	HP97-041	HP97-042	HP97-043	HP97-044	HP97-045	HP97-046	HP97-047	HP97-048	HP97-049	HP97-051	HP97-052	HP97-053	HP97-054	HP97-055	HP97-056	HP97-057	HP97-058	HP97-059	HP97-061	HP97-062	HP97-063	HP97-064

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Laboratory data

Aldicarb Sulfox	2.0 ug/L		BUL	BDL	BDL	- BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	B
Aldicarb Sulfone	2.0 ug/L	i	BUL	BDL	BOL	BOL	BOL	BOL	BDL	BOL	BDL																				
Aldicarb	1.0 ug/L		BUL	BOL	BDL	BOL																									
Picloram	0.35 ug/l	l	BUL	BDL	BDL	BDL	BDL	BOL	BDL	BOL																					
MCPA	2.0 ug/L		BUL	BDL	BDL	BDL	BOL	BDL	BDL	BOL	BDL	BOL	BDL	BOĽ	BDL																
MCPP	2.0 ug/L		BUL	BDL																											
Dicamba	0.1 ug/L	l	פר	BD	BDL																										
2.4-D	0.2 ug/L	Č	מת	BDL	BDL	BOL	BOL	BDL	BOL	BDL																					
Trifluralin	0.3 ug/L		פחר	BDL	BDL	BOL	BDL	BOL	BDL																						
Simazine	0.2 ug/L	Ĩ	BUL	BDL	BOL	BDL																									
Prometone	0.1 ug/L		BUL	BOL	BDL																										
WELLID		100 5001	COU-184H	HP97-066	HP97-067	HP97-068	HP97-069	HP97-071	HP97-072	HP97-073	HP97-074	HP97-075	HP97-076	HP97-077	HP97-078	HP97-079	HP97-081	HP97-082	HP97-083	HP97-084	HP97-085	HP97-086	HP97-087	HP97-088	HP97-089	HP97-091	HP97-092	HP97-093	HP97-094	HP97-095	HP97-096

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Suffoxide) ug/L			ק	ומר	ײַב	ק	פר	פר	פר	סר	סר	0L	٦ ر	٥٢	٦	0 D	סר	Ы	Б	Ы	D D	Ы	Ы	Ы	Ы	Ы	Ы	סר	Б	Ы
Aldicarb	2.0					æ			•		8	ED	ß	ß	œ	æ			ß		80	60		8	B	œ	B	B	B	B	8
Aldicarb Suffone	2.0 ug/L		BDL	BDL	BOL	BDL	BOL	BDL																							
Aldicarb	1.0 ug/L		BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL	BOL	BDL													
Picloram	0.35 ug/l		BOL	BDL	BOL	BDL	BDL	BDL	BOL	BDL																					
MCPA	2.0 ug/L		BDL	BDL	BDL	BOL	BDL	BDL	BDL	BOL	BDL	BDL	BDŁ	BDL																	
MCPP	2.0 ug/L	1	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL															
Dicamba	0.1 ug/L		BOL	BDL	BDL .	BDL	BOL	BDL																							
2,4-D	0.2 ug/L		BUL	BDL	BOL	BDL																									
Trifluralin	0.3 ug/L		BDL																												
Simazine	0.2 ug/L		BUL	BDL	ğ	BDL	BDL	BOL	BDL																						
Prometone	0.1 ug/L		BUL	BDL	BDL	BDL	BDĹ	BDL	1.3	BOL	BDL	BDL	0.1	BOL	BOĽ	BDL	BDL	BDL	BDL	BDL	BDL										
MELL ID			180-184H	HP97-098	HP97-099	HP97-101	HP97-102	HP97-103	HP97-104	HP97-105	HP97-106	HP97-107	HP97-108	HP97-109	HP97-111	HP97-112	HP97-113	HP97-114	HP97-115	HP97-116	HP97-117	HP97-118	HP97-119	HP97-122	HP97-123	HP97-124	HP97-125	HP97-126	HP97-127	HP97-128	HP97-129

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BDL - Below detection limit

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-	Aldicarb Sulfoxic	2.0 ug/L	BDL												
	Aldicarb Sulfone	2.0 ug/L	BDL												
	Aldicarb	1.0 ug/L	BDL												
	Picloram	0.35 ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BOL	BOL	BDL	BDL
	MCPA	2.0 ug/L	BDL	BOL											
	MCPP	2.0 ug/L	BDL	BOL	BDL										
	Dicamba	0.1 ug/L	BDL	BOL	BDL	BDL									
	2,4-D	0.2 ug/L	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL
	Trifluralin	0.3 ug/L	BDL												
	Simazine	0.2 ug/L	 BDL	BDL											
	Prometone	0.1 ug/L	BDL	0.12	BDL	BDL	BDL	BDL							
	WELL ID		HP97-131	HP97-132	HP97-133	HP97-134	HP97-135	HP97-136	HP97-137	HP97-138	HP97-139	HP97-141	HP97-142	HP97-143	HP97-144

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Laboratory data

MELL ID	Carbaryl	Carbofuran	3-Hrdroxycarbofuran	Methiocarb	Methomyl	Naphthol	Oxamyl	Propoxur
	2.0 ug/L	1.5 ug/L	2.0 ug/L	4.0 ug/L	1.0 ug/L	1.0 ug/L	2.0 ug/L	1.0 ug/L
HP97-001	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-003	BDL	BDL	BDL	JOB	BDL	BDL	BDL	BDL
HP97-004	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-005	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-006	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL
HP97-007	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-008	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-009	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL
HP97-011	BDL	BDL	BDL	BDL	BDĿ	BDL	BDL	BDL
HP97-012	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-013	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-014	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-015	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-016	BDL	BDL	BDL	BDL	JOB	BDL	BDL	BDL
HP97-017	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-018	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-019	BDL	BOL	BOL	BDL	BDL	BOL	BDL	BDL
HP97-021	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL
HP97-022	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-023	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL
HP97-024	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-025	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL
HP97-026	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-027	BDL	BDL	BDL	BDL	BOL	BOL	BDL	BDL
HP97-028	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-029	BDL	BDL	BOL	BDL	BDL	BOL	BDL	BDL
HP97-031	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-032	BOL	BOL	BDL	BDL	BDL	BDL	BOL	BDL

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Laboratory data

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	Carbaryi	Carboturan	3-Hrdroxycarboruran	Methiocard	Methomyi	Naphthol	Oxamyi	Propoxur
	2.0 ug/L	1.5 ug/L	2.0 ug/L	4.0 ug/L	1.0 ug/L	1.0 ug/L	2.0 ug/L	1.0 ug/L
HP97-033	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-034	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-035	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-036	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-037	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-038	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-039	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BOL
HP97-041	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL
HP97-042	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-043	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-044	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL
HP97-045	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL
HP97-046	TOB	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-047	JOB	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-048	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-049	BDL	108	BOL	BDL	BDL	BDL	BDL	BDL
HP97-051	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL
HP97-052	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-053	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL
HP97-054	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-055	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-056	BDL	BDL	BDL	BDL	BDL	BDL.	BDL	BDL
HP97-057	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-058	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-059	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-061	BOL	BOL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-062	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-063	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL
HP97-064	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

BDL - Below detection limit listed at head of collum

Appendix

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High Plains Ogallala Aquifer

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Propoxili	1.0 ug/L		BOL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	TOB	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BOL	BOL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	
Oxamvl	2.0 ug/L		BDL	BOL	BDL	BDL	BDL	BDL	BOL	BDL																						
Naphthol	1.0 ug/L		BDL																													
Methomvl	1.0 ug/L		BDL	BDL	BDL	BOL	BOL	BDL	BOL	BOL	BOL	BDL	BDL																			
Methiocarb	4.0 ug/L		BDL	BOL	BDL	BDL	BDL	BDL																								
3-Hrdroxvcarbofuran	2.0 ug/L		BOL	BDL	BDL	BDL	BOL	BDL	BDL.	BDL																						
Carbofuran	1.5 ug/L		BDL	BOL	BOL	BDL	BDL	BDL	BDL	BOL	BDL																					
Carbaryl	2.0 ug/L		BDL	BOL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL																				
MELL ID			HP97-065	HP97-066	HP97-067	HP97-068	HP97-069	HP97-071	HP97-072	HP97-073	HP97-074	HP97-075	HP97-076	HP97-077	HP97-078	HP97-079	HP97-081	HP97-082	HP97-083	HP97-084	HP97-085	HP97-086	HP97-087	HP97-088	HP97-089	HP97-091	HP97-092	HP97-093	HP97-094	HP97-095	HP97-096	

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BDL - Below detection limit listed at head of collum

Appendix

Laboratory data

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Propoxur	1.0 ug/L		BOL	BDL	BDL	BDL	BOL	BDL	BDI.																					
Oxamyl	2.0 ug/L		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BDL	BDL	BDL	
Naphthol	1.0 ug/L		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	BDL	BDL	BD	BDL	BDL	BDL	BDL	-							
Methomyl	1.0 ug/L		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Methiocarb	4.0 ug/L	Z	BOL	BDL	BOL	BDL																								
3-Hrdroxycarbofuran	2.0 ug/L	Ĩ	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL	BDL	BDL	BOL	BDL	BOL	BDL	BDL	
Carbofuran	1.5 ug/L	Ž	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	BDL	-																									
Carbaryl	2.0 ug/L		BOL	BD	BDL	-																								
WELL ID		1007 007	HP97-099	HP97-101	HP97-102	HP97-103	HP97-104	HP97-105	HP97-106	HP97-107	HP97-108	HP97-109	HP97-111	HP97-112	HP97-113	HP97-114	HP97-115	HP97-116	HP97-117	HP97-118	HP97-119	HP97-122	HP97-123	HP97-124	HP97-125	HP97-126	HP97-127	HP97-128	HP97-129	

BDL - Below detection limit listed at head of collum

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Laboratory data

MELL ID	Carbaryl	Carbofuran	3-Hrdroxycarbofuran	Methiocarb	Methomyl	Naphthol	Oxamyl	Propoxu
	2.0 ug/L	1.5 ug/L	2.0 ug/L	4.0 ug/L	1.0 ug/L	1.0 ug/L	2.0 ug/L	1.0 ug/L
HP97-131	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BOL
HP97-132	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-133	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-134	BOL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-135	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-136	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-137	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-138	BOL	DL	BDL	BOL	BDL	BOL	BDL	BOL
HP97-139	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-141	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-142	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-143	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HP97-144	BDL	JOB	BDL	BDL	BDL	BDL	BDL	BDL

BDL - Below detection limit listed at head of collum

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