Ground Water Quality Technical Report No. 28

Treasure Valley Nutrient-Pathogen Validation Study

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Cover Photo:

View looking southeast (upgradient ground water direction) with the Primrose subdivision in the foreground.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Introduction

Since the mid to late 1990s, the Idaho Department of Environmental Quality (DEQ), in cooperation with the State of Idaho District Health Departments, has implemented some form of evaluation process to examine nutrient and pathogen impacts to ground water and surface water quality resulting from residential and commercial developments utilizing on-site wastewater systems (OSWW). This evaluation process was formalized in 2001 with the development of the Nutrient-Pathogen (NP) Guidance (IDEQ, 2002).

The process outlined in the guidance relies heavily on predictive modeling because, with the exception of Large Soil Absorption Systems and Central Systems, no monitoring is typically required after development proceeds. As a result, the conservatism of model assumptions and the accuracy of model predictions are unknown.

As a first step toward improving the reliability of predictions and decision-making based on those predictions, a reconnaissance study of ground water impacts from established subdivisions employing OSWW was conducted in the Treasure Valley.

Objectives

The objectives of the study were to:

- Determine if ground water impacts in the vicinity of subdivisions employing OSWW could be identified and, if present, could be attributed to OSWW use.
- Compare impacts, if present, with results predicted from NP evaluations conducted at the time of subdivision platting or obtained from current NP guidance (IDEQ, 2002).
- Provide recommendations based on the study results for improvements to current NP evaluation procedures and suggestions for additional monitoring.

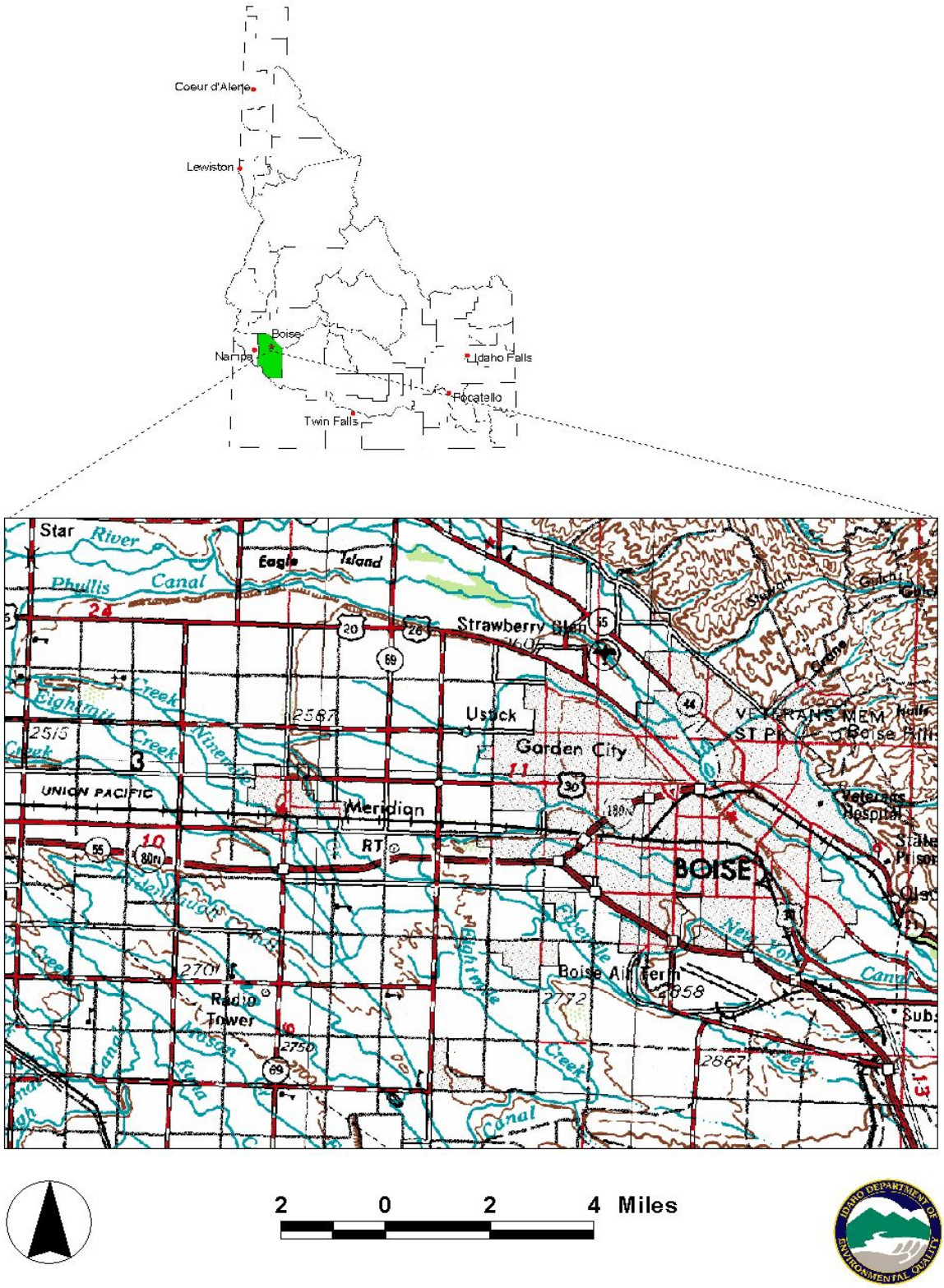
Study Design

With the assistance of Central District Health Department staff, three (3) subdivisions that employ OSWW were selected. All three subdivisions are located in Ada County in southwestern Idaho in the central portion of the Boise River valley known as the Treasure Valley (Figure 1). The criteria used for selection included the age of the subdivision, based on the year it was platted; on-site system density; lot size; the degree to which the subdivision was "built out"; the availability of domestic wells available for sampling; and whether a NP study had been completed for the subdivision. The subdivisions selected were the Primrose, Foxtail, and Chisum Valley subdivisions. The locations of these subdivisions in the Treasure Valley are shown in Figure 2.

Domestic wells in each of these subdivisions were selected for sampling based on location in relation to assumed ground water flow direction, owner permission, and

availability of drillers' logs. Wells were typically sampled at an outside faucet. The faucet was turned on and field parameters (pH, specific conductance, and temperature) were monitored. Samples were taken when all field parameters had stabilized.

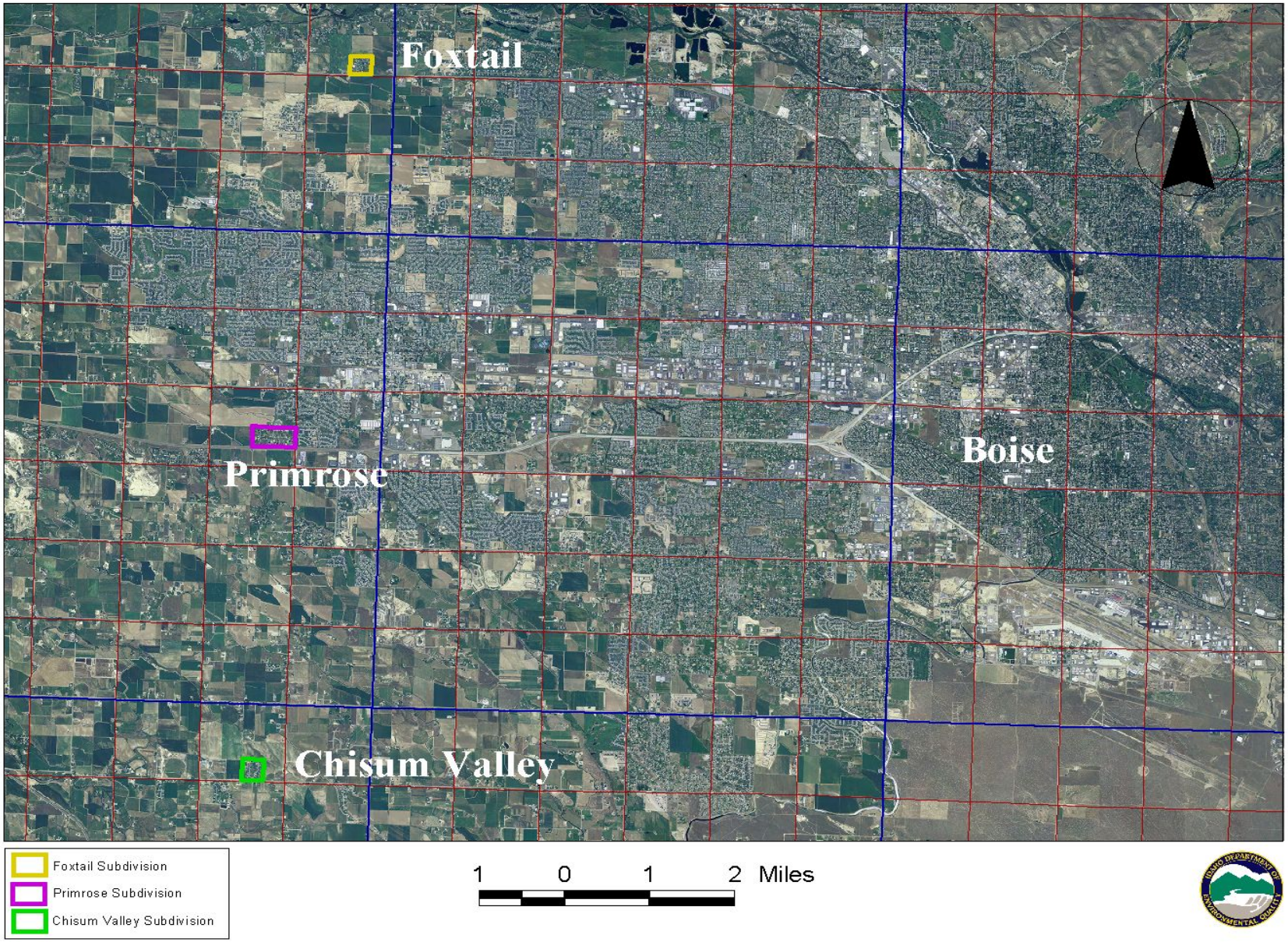
Figure 1. Location of Nutrient-Pathogen (NP) Validation Study Area



d:\projects\npstudies\primrose\primrose.apr

June 27, 2006

Figure 2. Location of the Three Nutrient-Pathogen (NP) Validation Study Site Locations in the Treasure Valley



Parameters were selected for laboratory analyses that were thought to be indicative of potential impacts from OSWW systems. These parameters included:

- Total Coliform (count)
- Caffeine (detection limit of 0.05 micrograms per liter [µg/l])
- Methylene Blue Active Substances (MBAS) (milligrams per liter [mg/l])
- Total Dissolved Solids (TDS) (mg/l)
- Chloride (Cl) (mg/l)
- Ammonia Nitrogen (N) (mg/l)
- Nitrate + Nitrite Nitrogen (NO2+NO3-N) (mg/l)
- Total Kjeldahl Nitrogen (mg/l)
- Total Phosphorus (P) (mg/l)
- $\delta^{15}N$ Stable Isotope (per mil [‰])

Water levels were not measured in the wells during sampling.

A total of 24 domestic wells were sampled in the three study sites: ten in the Primrose subdivision, six in the Foxtail subdivision, and eight in the Chisum Valley subdivision. One duplicate sample was taken in each subdivision for Quality Assurance (QA) purposes. The location of the lots in each subdivision where wells were sampled is shown in Figures 3 through 5. Well logs that were available for sampled wells are provided in Appendix A.

Site Characteristics

The Treasure Valley is part of the westernmost portion of a sediment-filled topographic depression known as the Western Snake River Plain (Petrich and Urban, 2004). The shallow ground water flow system underlying the subdivisions occurs in the sediments and basalts of the Pleistocene-age Snake River Group. The direction of ground water flow at the sites is to the northwest.

Background nitrate concentrations in ground water were estimated based on sampling of local domestic wells from the Statewide Ground Water Monitoring Network (SMN), DEQ ground water studies in Ada County (IDEQ, 1996), and monitoring wells installed as part of the NP evaluations performed at the sites.

Well locations for background estimations were typically within ½ mile of subdivision boundaries. Across all sites, nitrate ranges from < 0.05-8.0 mg/l. At the Primrose subdivision, three upgradient wells sampled in 1995 had an average nitrate concentration of 3.2 mg/l and orthophosphate concentration of 0.03 mg/l. At the Foxtail subdivision, three upgradient wells sampled in 1995 had an average nitrate concentration of 3.8 mg/l. This is significantly different from the value of 1.0 mg/l obtained by Terracon (1996) during sampling of a temporary monitoring well installed for the NP evaluation. At the Chisum Valley subdivision, two upgradient SMN wells have been sampled a total of

seven times. Average nitrate and orthophosphate concentrations in these wells has been 6.1 mg/l and 0.045 mg/l, respectively. This contrasts with average nitrate concentrations from the three on-site monitoring wells installed by Terracon (1998) of 2.02 mg/l. These same Terracon monitoring wells also contained an average of 2.12 mg/l ammonia.

Primrose Subdivision

The Primrose Subdivision is located in the NE ¼ of the SE ¼ of Section 14, Township 3N and Range 1W. The subdivision is bordered on the south by Interstate 84, on the east by Linder Road and a sewered subdivision, on the north by minor residential development and a school, and on the west by agricultural land (Figure 3). The subdivision contains 71 lots on approximately 80 acres, for an average lot size of about 1 acre. The subdivision was platted in 1978 and is fully built out.

Wells are generally relatively shallow in depth (50-80 feet below ground surface) and completed with solid casing to within 5-10 feet of the total depth of the well, with no screened sections. Ground water occurs in sandy Quaternary alluvial sediments interbedded with silty fine sand and silt (Othberg and Stanford, 1992 and Othberg, 1994). Based on well log descriptions, ground water may occur under confined/semi-confined conditions. Multiple water-bearing zones are typically present, and water is withdrawn from the deepest zone, typically 40-60 feet below the depth at which water was first encountered. The degree that upper water-bearing zones are isolated from where water is withdrawn is unknown. The depth to ground water is noted as 5-15 feet, while first water is typically encountered at depths of 3-40 feet, indicative of variably confined conditions.

Foxtail Subdivision

The Foxtail subdivision is located in the SW ¼ of the SE ¼ of Section 24, Township 4N and Range 1W. It is located south of the Boise River on West Chinden Boulevard. It is bordered by a golf course to the west and residential/agricultural property to the north, south, and east (Figure 4). The subdivision contains 14 lots on approximately 30 acres, for an average lot size of about 2 acres. The subdivision was platted in 1996 and is fully built out.

Ground water occurs in ancestral Boise River terrace gravels, sands, and clays that are mapped as part of the Whitney Terrace (Othberg and Stanford, 1992 and Othberg, 1994). Ground water is first encountered at depths of 10-40 feet, with static water levels ranging from 20-50 feet, indicating generally unconfined conditions. Wells are generally completed to depths of 100-200 feet. Typical completions include casing to depth with a short screened interval (10 feet) at the bottom of the well.

Chisum Valley Subdivision

The Chisum Valley subdivision is located in the SW ¼ of the SE ¼ of Section 2, Township 2N and Range 1W. It is north of Columbia Road and west of Linder Road on the southern margin of the Treasure Valley. It is bordered by residential development to the south and agricultural land to the north, west, and east (Figure 5). The subdivision

contains 30 lots on approximately 47 acres, for an average lot size of about 1.5 acres. The subdivision was platted in 1998 and is fully built out.

Ground water occurs in alternating sandy/clayey alluvial sediments underlying basalts of the Indian Creek rock unit (Othberg and Stanford, 1992 and Othberg, 1994). Ground water is typically encountered at depths of 50-150 feet, with static water levels ranging from 60-100 feet under variably confined conditions. Wells are completed to depths of 200 feet or more as either open-hole or with a screened interval in a deeper sand layer.

Prior Nutrient-Pathogen (NP) Investigations

The NP evaluations completed for the selected sites are not equivalent to the evaluations typically performed under the current guidance. The Primrose subdivision, given its age (late 1970s), did not have an NP evaluation completed prior to development. The NP evaluation performed for the Foxtail subdivision (Terracon, 1996) consisted of installation of monitoring wells, performance of aquifer tests, and limited water quality sampling. This information was combined to provide a general evaluation of site conditions and the potential for ground water impacts. The NP evaluation performed for the Chisum Valley subdivision (Terracon, 1998) consisted of installation of monitoring wells, performance of aquifer tests, ground water sampling, and modeling of impacts from one drainfield. In order to provide consistent comparisons to the field data, a screening level evaluation using the DEQ mass balance spreadsheet was completed for each subdivision.

In addition, for the Primrose subdivision, a more detailed NP evaluation using the Horizontal Planar Source (HPS) model (Galya, 1987) was performed. The HPS model accommodates multiple sources, incorporates three-dimensional dispersion, and makes predictions of concentration at any number of locations for any specified depth below the water table. For this simulation, the drainfield for each lot in the subdivision, including its approximate location in the subdivision, was treated as an individual source. The direction of ground water flow was assumed to be to the west-northwest. Nitrate concentrations were predicted at 28 locations along the western and northern downgradient boundary of the subdivision. Locations were equally spaced at 100 foot intervals along the boundary. At each location, concentrations were predicted at the water table and at 15 and 50 foot depths below the water table.

Figure 3. Location of Lots with Wells Sampled in the Primrose Subdivision

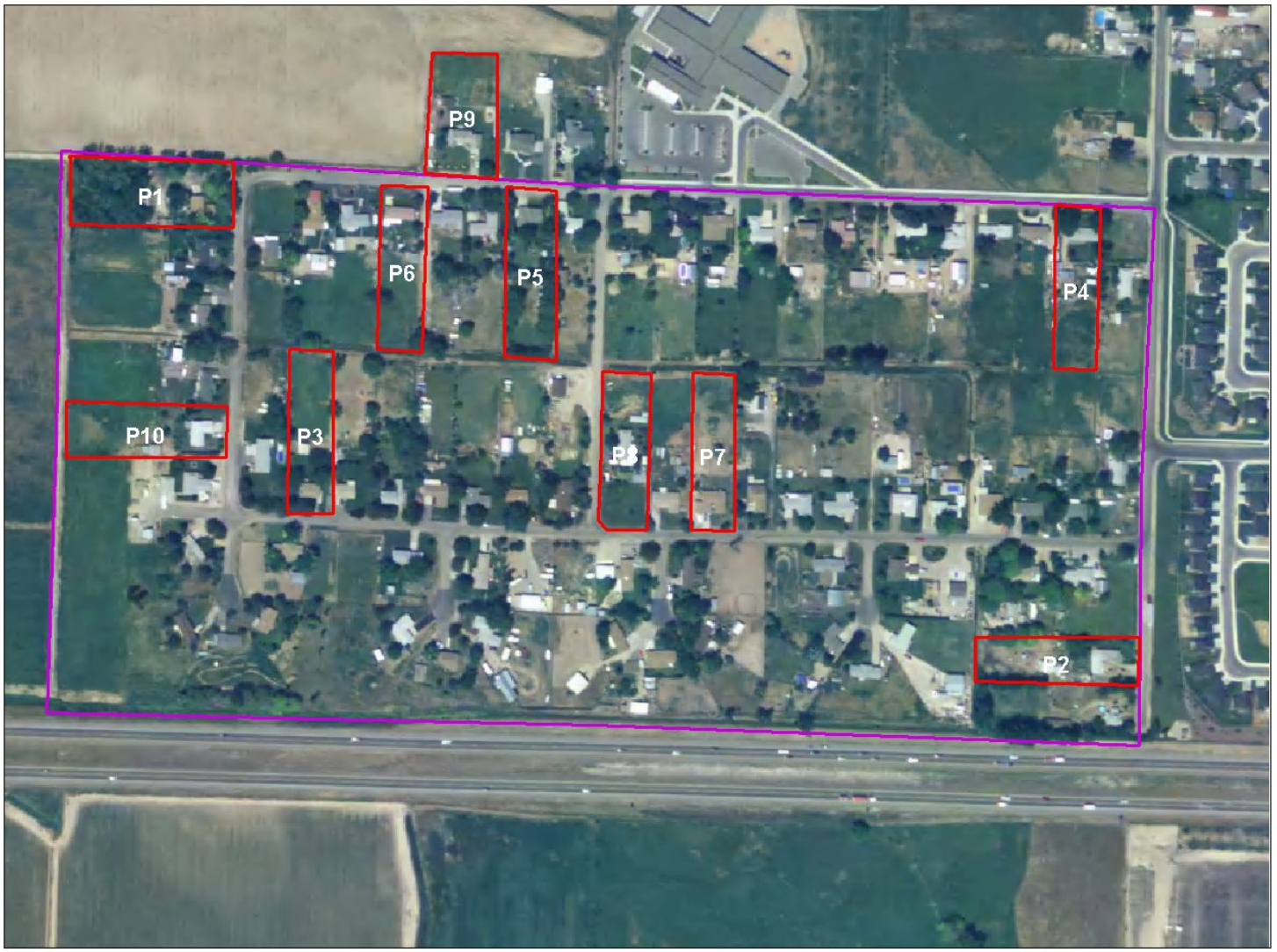


Figure 4. Location of Lots with Wells Sampled in the Foxtail Subdivision

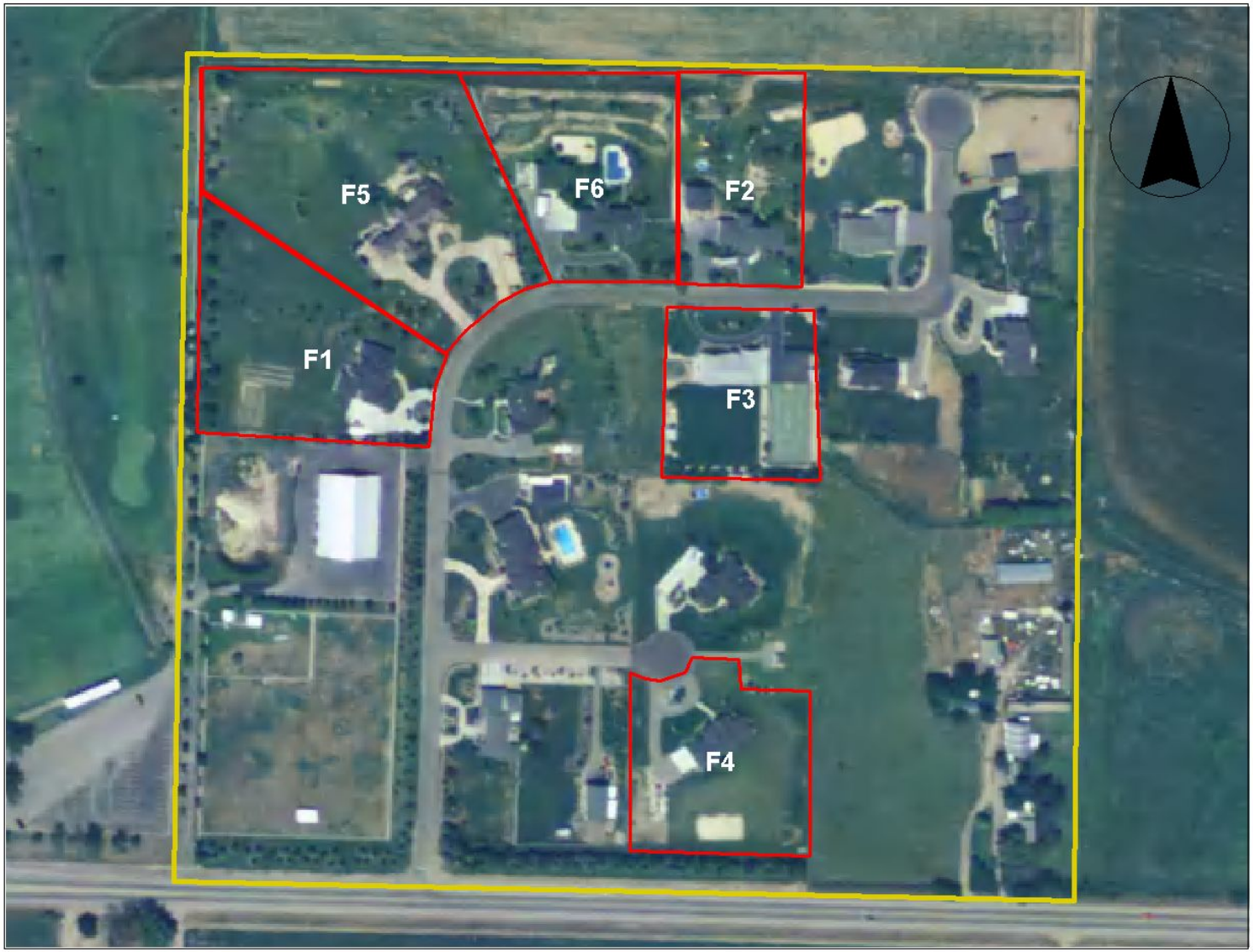
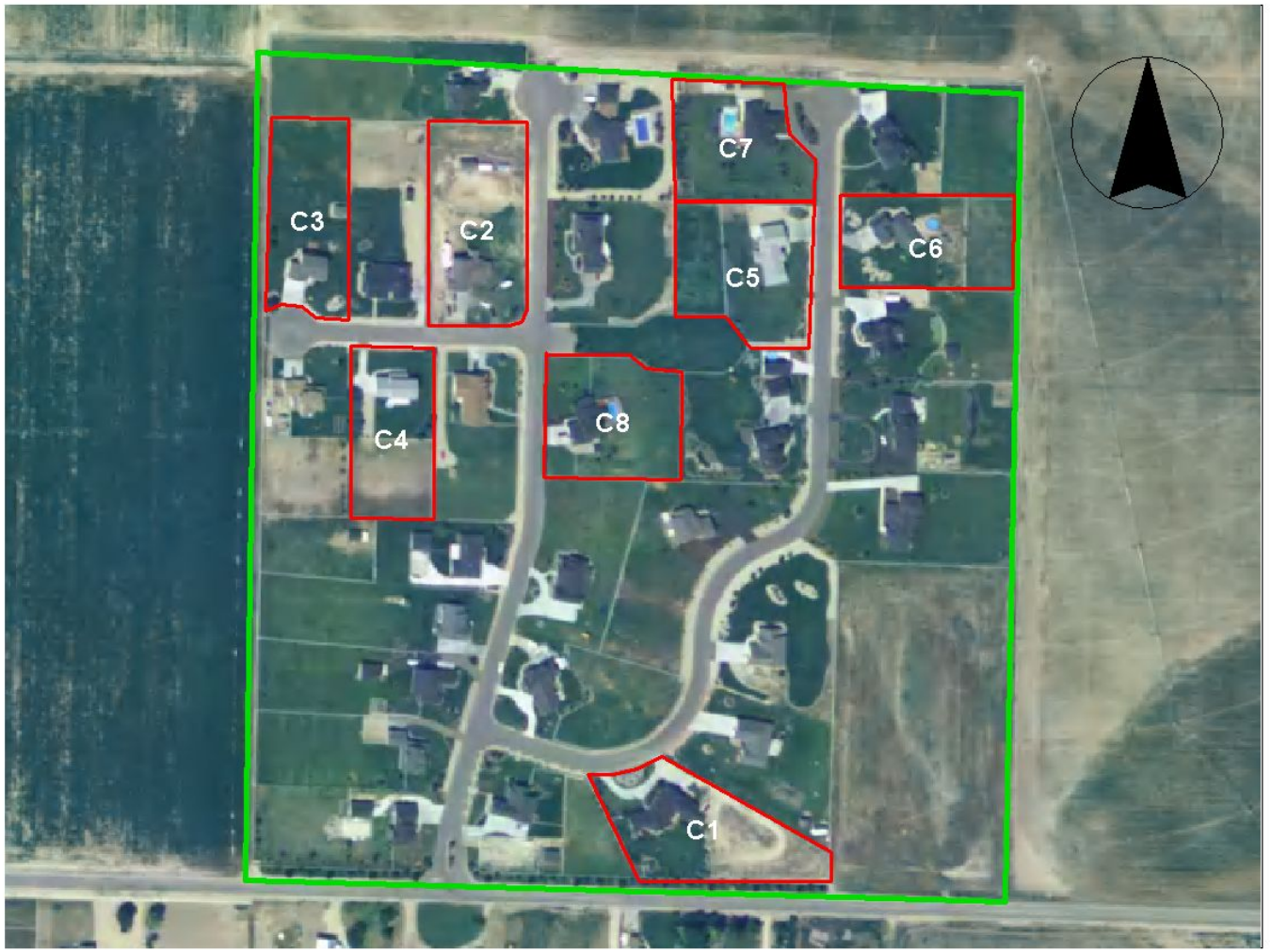


Figure 5. Location of Lots with Wells Sampled in the Chisum Valley Subdivision



Results

The results of chemical analyses for the three sites are provided in Table 1. The results of field measurements taken during well sampling are provided in Table 2.

For all samples in all subdivisions, the analytical results for caffeine and MBAS (surfactants) were below reporting limits (0.05 µg/l and 0.025 mg/l, respectively). Ammonia-N was detected above the reporting limit of 0.030 mg/l in only one well, in the Primrose subdivision. Detections of total coliform (greater than one colony forming unit) were noted in six wells (P1, P6-P10), all in the Primrose subdivision (see Figure 3). Following receipt of these microbiological results, these six wells were resampled on August 24, 2005 for total coliform, E. coli, and nitrate. These resample results are presented in Table 3. Resample results indicated generally lower total coliform detections than in the previous sampling event and no E. coli detections. Nitrate levels showed no particular trend, with concentrations in some wells higher and others lower than measured in the previous event.

For the remaining constituents analyzed (total P, Cl, nitrate, and $\delta^{15}N$), Figure 6 presents box and whisker diagrams that compare their general statistical characteristics by subdivision.

Measured ground water nitrate concentrations and $\delta^{15}N$ isotope ratios for each subdivision are presented in Figures 7-9. Nitrate concentrations did not appear to be elevated compared to estimated background concentrations. The highest measured nitrate concentration, 6.24 mg/l, was found in well C5 in the Chisum Valley subdivision, which also had the highest mean nitrate concentration of all three sites. Nitrate concentrations in the Foxtail subdivision occurred in a distinct pattern, with very low values located in the southwestern half (lots F1, F4, and F5; see Figure 8) and uniformly higher values in the northeastern half (lots F2, F3, and F6). Nitrate concentrations in the other subdivisions did not follow any clear pattern. For example, in the Primrose subdivision, the two wells that were seemingly in the most upgradient locations (P2 and P4; see Figure 7) had the highest and some of the lowest nitrate concentrations measured. Only average nitrate concentrations (3.4 mg/l) were measured in the most downgradient well, P1.

Chloride concentrations showed large variability, but in general, mean concentrations across subdivisions were similarly low, with values of 8.1, 8.49, and 10.67 mg/l for the Primrose, Foxtail, and Chisum Valley subdivisions, respectively.

Constituents that showed the greatest variation between subdivisions were total P and $\delta^{15}N$. The mean total P concentration in Primrose wells, 0.134 mg/l, was 4-8 times higher than the mean value found in the other subdivisions, as well as in ground water upgradient of Primrose itself.

Mean $\delta^{15}N$ values continually increased from Chisum Valley to Foxtail to Primrose. The mean $\delta^{15}N$ for the Primrose subdivision was 7.5‰. The highest value of 9.33 for all samples also occurred in Primrose. The $\delta^{15}N$ values from the Primrose subdivision are at the upper end of values considered typical of soil nitrogen sources and at the lower end of values for animal waste (Wilcox et al., 2005). Figure 7 illustrates the relationship between nitrate and $\delta^{15}N$ for the sampled wells. Figure 10 shows that as nitrates increase, $\delta^{15}N$ also increases in the Primrose subdivision. No clear relationship was seen, however, in the other two subdivisions. The nitrate- $\delta^{15}N$ relationship in the Primrose subdivision indicates human or animal waste sources as the primary source for the nitrate found in ground water beneath the subdivision.

Field parameter measurements (Table 2) indicate that the pH is significantly lower in ground water at the Primrose subdivision (pH 7.0) than at Foxtail (pH 7.5) and Chisum Valley (pH 7.6). This may be indicative of the acidifying effect of nitrification of wastewater effluent from the higher density of drainfields in this subdivision. Oxidation reduction potential (ORP) values were typically positive, and dissolved oxygen values were elevated in measurements taken at the Foxtail and Chisum Valley subdivisions and at one site in the Primrose subdivision. This indicates that ground water at all sites is generally oxic.

Nutrient-Pathogen (NP) Predictions

DEQ mass balance spreadsheet results for the three subdivisions are presented in Figures 11-13. The second box down on the right-hand side of each spreadsheet contains the average nitrate concentration for each subdivision. Based on the predicted results of the analyses, it is estimated that nitrate impacts from all three subdivisions, as measured by the average nitrate concentration in the upper 30 feet of the water column at the property boundary, would exceed the concentration guideline for non-degradation used in the NP guidance (IDEQ, 2002) of 1.0 mg/l plus background. The Chisum Valley subdivision exceeded this guideline by the greatest amount. This is likely due to the combination of a moderate drainfield density and low aquifer hydraulic conductivity. The predicted value for this subdivision also differed from the average measured nitrate value by the largest amount of any of the sites (22.3 mg/l predicted vs. 4.4 mg/l measured).

The next largest exceedance was found for the Primrose subdivision (4.1 mg/l over the suggested criteria). Hydraulic conductivity can provide a significant degree of dilution of nutrients, and the hydraulic conductivity value used for the Primrose subdivision was the highest of the three study sites. However, the shape of the subdivision, its orientation with respect to the direction of ground water flow, and higher drainfield density likely reduce the dilution of nutrients by stacking drainfields along ground water flowpaths and concentrating, rather than spreading out, their effluent.

Results of the more detailed modeling of nitrogen impacts in the Primrose subdivision using the HPS model are provided in Table 4 and Appendix B. Table 4 shows the predicted increases in nitrogen concentrations, assuming a background concentration of

0.0 mg/l, at selected depths at 28 locations along the downgradient subdivision boundary (see Figure 14 for reference). Locations are numbered in increasing order beginning with Location 1 at the southwestern corner, increasing to Location 12 at the northwest corner, and finishing with Location 28, which is three-quarters of the distance east along the northern boundary. Appendix B provides a copy of the output from the model simulation.

The highest concentration increases were predicted in the northwestern corner of the subdivision (Locations 10-12), corresponding to the downgradient points that reflect the impacts from the greatest number of upgradient sources. Throughout the 28 locations, nitrogen concentrations at the water table are more variable than those at depth. This is a function of two variables: the proximity of any given prediction point to a particular upgradient drainfield source, and the degree to which dispersive spreading tends to integrate impacts from multiple sources.

If the nitrate concentration increases predicted by the HPS model at 15 feet are used as an average for the 0-30 foot depth interval and averaged over all 28 locations, the predicted nitrate increase of 5.1 mg/l, when added to the assumed background concentration of 3.2 mg/l, equals the same 8.3 mg/l value that was calculated as the average concentration over a 30 foot depth interval in the DEQ mass balance spreadsheet. While the mass balance spreadsheet does not provide detailed locational concentration predictions and may thus underestimate maximum concentrations, this comparison provides some support to its use as a screening tool, provided the appropriate input parameter values are used.

The predicted nitrate concentration increases at 50 feet below the water table for the area in the extreme northwest downgradient (Locations 10-12) averaged about 1.0 mg/l. If this value is added to the assumed background concentration of 3.2 mg/l, it results in a predicted nitrate concentration of 4.2 mg/l. This value is more in line with actual nitrate concentrations measured in wells from this subdivision.

Table 1. Selected Ground Water Chemical Concentrations for Wells in the Primrose, Chisum Valley, and Foxtail Subdivisions

Sample ID	Date	Total Coliform (count)	Caffeine (µg/l) (1)	MBAS(2) (mg/l)	TDS (3) (mg/l)	Chloride (mg/l)	Ammonia as N (mg/l)	NO2+NO3-N (4) (mg/l)	Total Phosphorus (mg/l)	δ15N (‰) (5)
Primrose										
05-P1	2-Jun-2005	>200	<0.05	<0.0250	346	17.70	<0.030	3.41	0.081	9.33
05-P2	2-Jun-2005	<1	<0.05	<0.0250	351	6.50	<0.030	5.86	0.104	
05-P3	2-Jun-2005	<1	<0.05	<0.0250	276	5.49	<0.030	2.81	0.071	7.82
05-P4	2-Jun-2005	<1	<0.05	<0.0250	284	5.66	<0.030	2.22	0.042	8.1
05-P5	2-Jun-2005	<1	<0.05	<0.0250	353	11.00	<0.030	4.09	0.283	7.92
05-P6	2-Jun-2005	62	<0.05	<0.0250	292	9.00	<0.030	4.01	0.169	7.33
05-P7	2-Jun-2005	>200	<0.05	<0.0250	281	3.46	<0.030	1.80	0.093	
05-P8	2-Jun-2005	32	<0.05	<0.0250	298	3.38	0.07	1.51	0.134	5.68
05-P8-QA	2-Jun-2005	29								5.88
05-P9	2-Jun-2005	4	<0.05	<0.0250	388	13.00	<0.030	5.49	0.259	7.92
05-P10	8-Jun-2005	1	<0.05	<0.0250	339	5.79	<0.030	2.45	0.100	5.93
Mean					**321**	**8.10**		**3.37**	**0.134**	**7.50**
Chisum Valley										
05-C1	8-Jun-2005	<1	<0.05	<0.0250	274	2.89	<0.030	4.33	0.020	3.51
05-C2	8-Jun-2005	<1	<0.05	<0.0250	391	6.51	<0.030	5.07	0.010	5.38
05-C3	8-Jun-2005	<1	<0.05	<0.0250	445	16.20	<0.030	5.00	0.020	5.71
05-C4	8-Jun-2005	<1	<0.05	<0.0250	396	10.90	<0.030	3.09	0.010	5.1
05-C5	8-Jun-2005	<1		<0.0250	483	12.70	<0.030	6.24	0.020	6.03
05-C6	8-Jun-2005	<1	<0.05	<0.0250	402	16.90	<0.030	3.12	0.010	5.83
05-C6-QA	8-Jun-2005	<1	<0.05	<0.0250	409	17.00	<0.030	3.09	0.010	5.88
05-C7	8-Jun-2005	<1	<0.05	<0.0250	415	14.90	<0.030	3.93	0.020	6.56
05-C8	8-Jun-2005	<1	<0.05	<0.0250	418	4.35	<0.030	4.43	0.020	4.65
Mean					**403**	**10.67**		**4.40**	**0.016**	**5.35**
Foxtail										
05-F1	9-Jun-2005	<1	<0.05	<0.0250	220	10.40	<0.030	0.43	0.070	
05-F2	9-Jun-2005	<1	<0.05	<0.0250	328	8.65	<0.030	3.70	0.020	6.85
05-F3	9-Jun-2005	<1	<0.05	<0.0250	367	8.71	<0.030	3.68	0.010	6.72
05-F4	9-Jun-2005	<1	<0.05	<0.0250	194	13.20	<0.030	0.44	0.070	
05-F5	9-Jun-2005	<1	<0.05	<0.0250	192	5.36	<0.030	0.95	0.010	8.48
05-F5-QA	9-Jun-2005	<1	<0.05	<0.0250	191	5.37	<0.030	0.93	0.010	
05-F6	9-Jun-2005	<1	<0.05	<0.0250	198	4.62	<0.030	3.92	0.020	4.89
Mean					**250**	**8.49**		**2.19**	**0.033**	**6.74**

Column Heading Notes: (1) micrograms per liter, (2) Methylene Blue Active Substances, (3) Total Dissolved Solids, (4) Nitrate + Nitrite Nitrogen, (5) per mil.

Table 2. Selected Ground Water Field Parameters for Wells in the Primrose, Chisum Valley, and Foxtail Subdivisions

Sample ID	pH	Specific Conductance (umhos/cm)	Oxidation-Reduction Potential (ORP) (millivolts)	Temperature (degrees C)	Dissolved Oxygen (mg/l)
Primrose					
05-P1	6.29	682		13.9	
05-P2	7.03	627		14.2	
05-P3	7.16	485		14.4	
05-P4	6.99	539		13.2	
05-P5	7.17	655		13.9	
05-P6	7.00	584		13.8	
05-P7	7.51	495		14.8	
05-P8	7.02	483		14.1	
05-P9	6.99	706		13.7	
05-P10	6.81	539	104	14.3	6.01
Mean	**7.00**	**580**		14.0	
Chisum Valley					
05-C1	7.48	447	128	14.9	5.7
05-C2	7.45	636	80	14	3.32
05-C3	7.69		105	13.9	
05-C4	7.79	674	42	14.6	6.6
05-C5	7.78	741	100	14	6.32
05-C6	7.71	657	89	13.9	6.29
05-C7	7.59	711	123	14.9	6.66
05-C8	7.58	659	125	14.3	5.65
Mean	**7.63**	**646**		14.3	
Foxtail					
05-F1	7.73	313	615	18	5.95
05-F2	7.53	605	242	13.5	
05-F3	7.38	603	195	15.8	
05-F4	7.41	332	663	16.3	
05-F5	7.84	340	236	14.8	
05-F6	7.51	381	195	13.6	
Mean	**7.57**	**429**		**15.3**	

Table 3. Results of Resampling Selected Wells in Primrose Subdivision on August 24, 2005

Sample ID	Date	Total Coliform (count)	E. Coli (count)	Nitrate + Nitrite Nitrogen (NO2+NO3-N) (mg/L)
Primrose				
05-P1	24-Aug-2005	1	<1	3.40
05-P6	24-Aug-2005	3.1	<1	3.81
05-P7	24-Aug-2005	42	<1	2.58
05-P8	24-Aug-2005	6.1	<1	4.00
05-P9	24-Aug-2005	<1	<1	4.82
05-P10	24-Aug-2005	<1	<1	2.22

Figure 6. Box and Whisker Diagrams for Total Phosphorus (P), Chloride (Cl), Nitrate + Nitrite Nitrogen (NO2+NO3-N), and $\delta^{15}N$ in Ground Water at the Primrose, Foxtail, and Chisum Valley Subdivisions

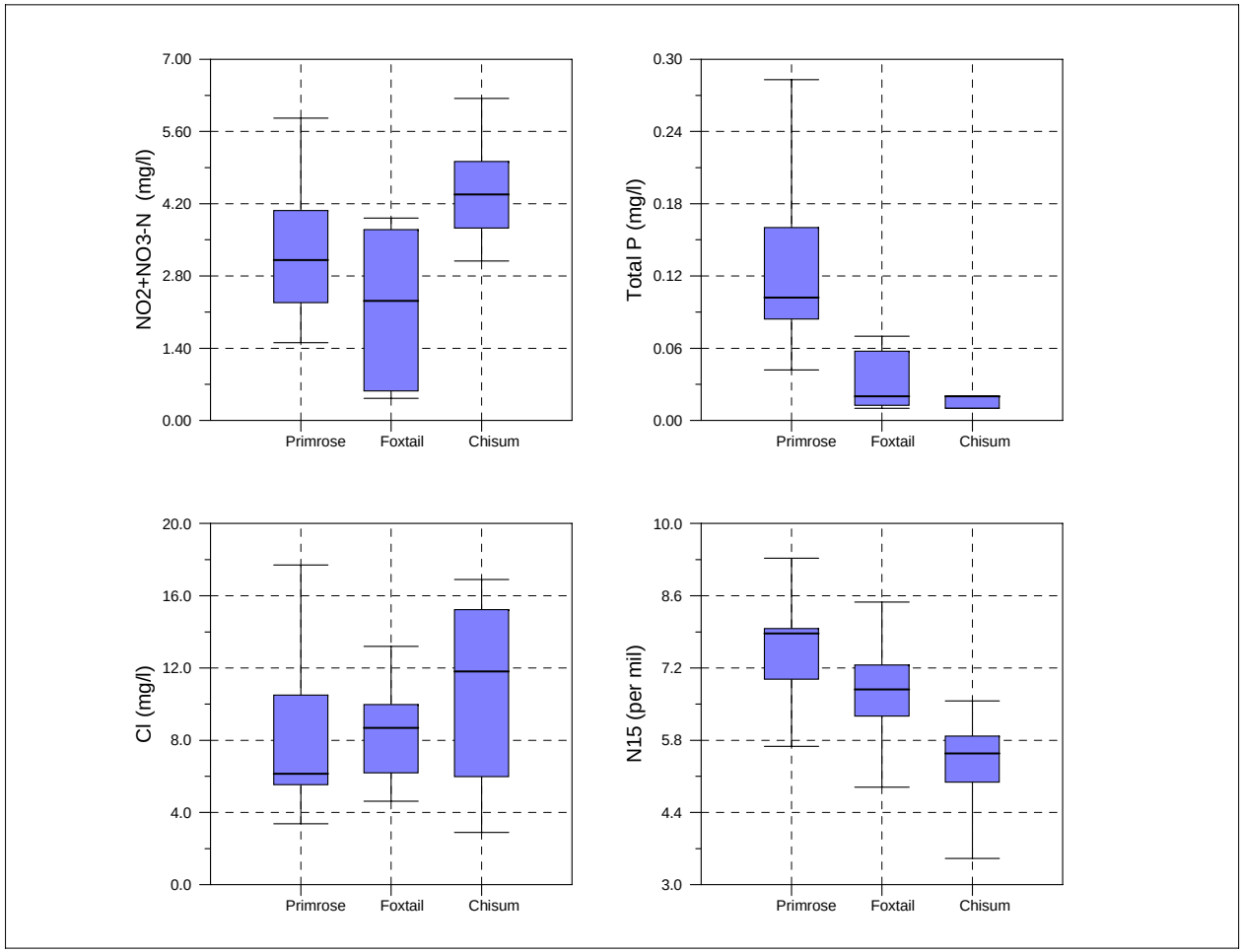


Figure 7. Measured Groundwater Nitrate Concentrations and N15 Stable Isotope Ratios in Wells Sampled in the Primrose Subdivision

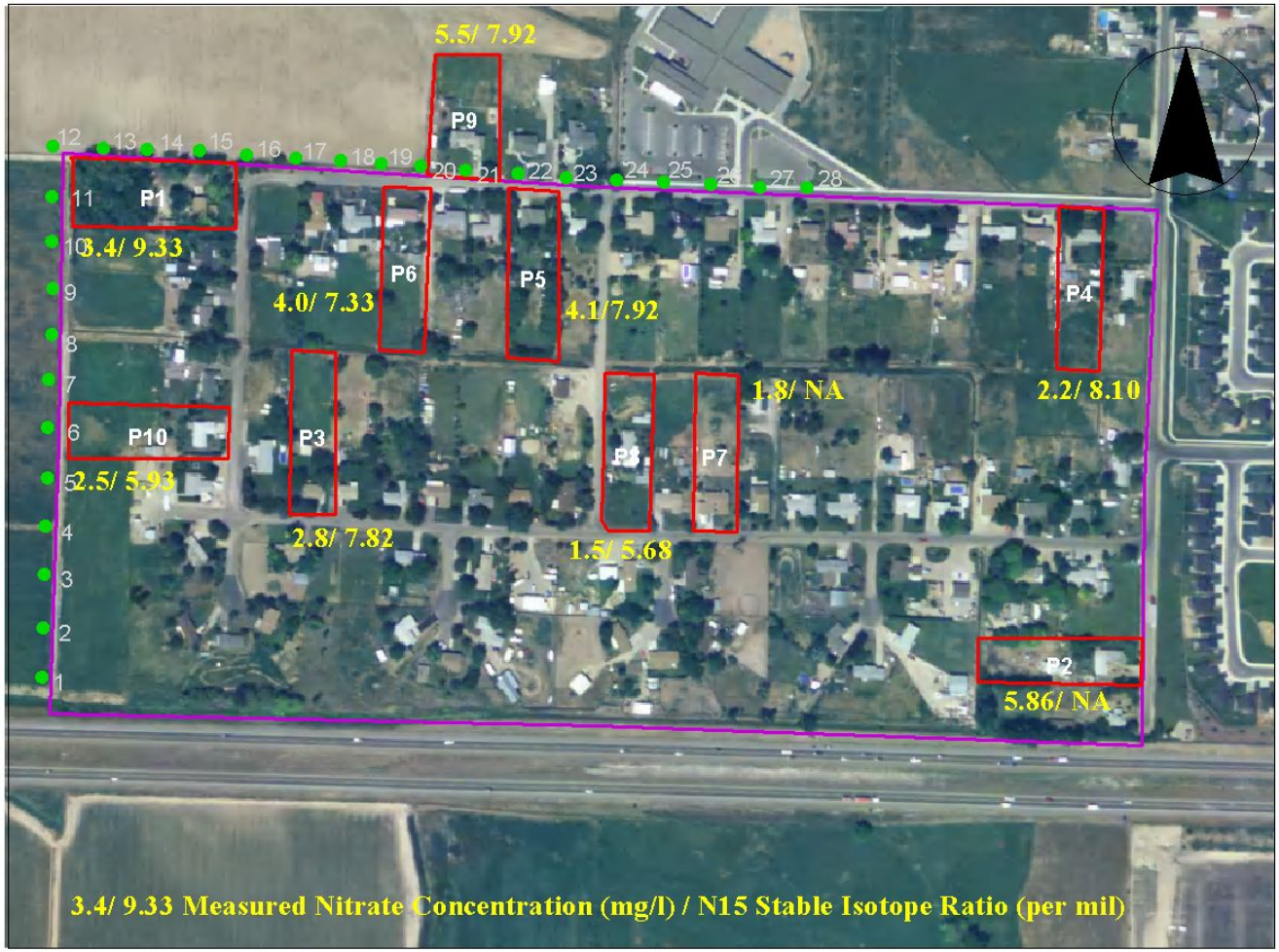


Figure 8. Measured Ground Water Nitrate Concentrations and N15 Stable Isotope Ratios in Wells Sampled in the Foxtail Subdivision

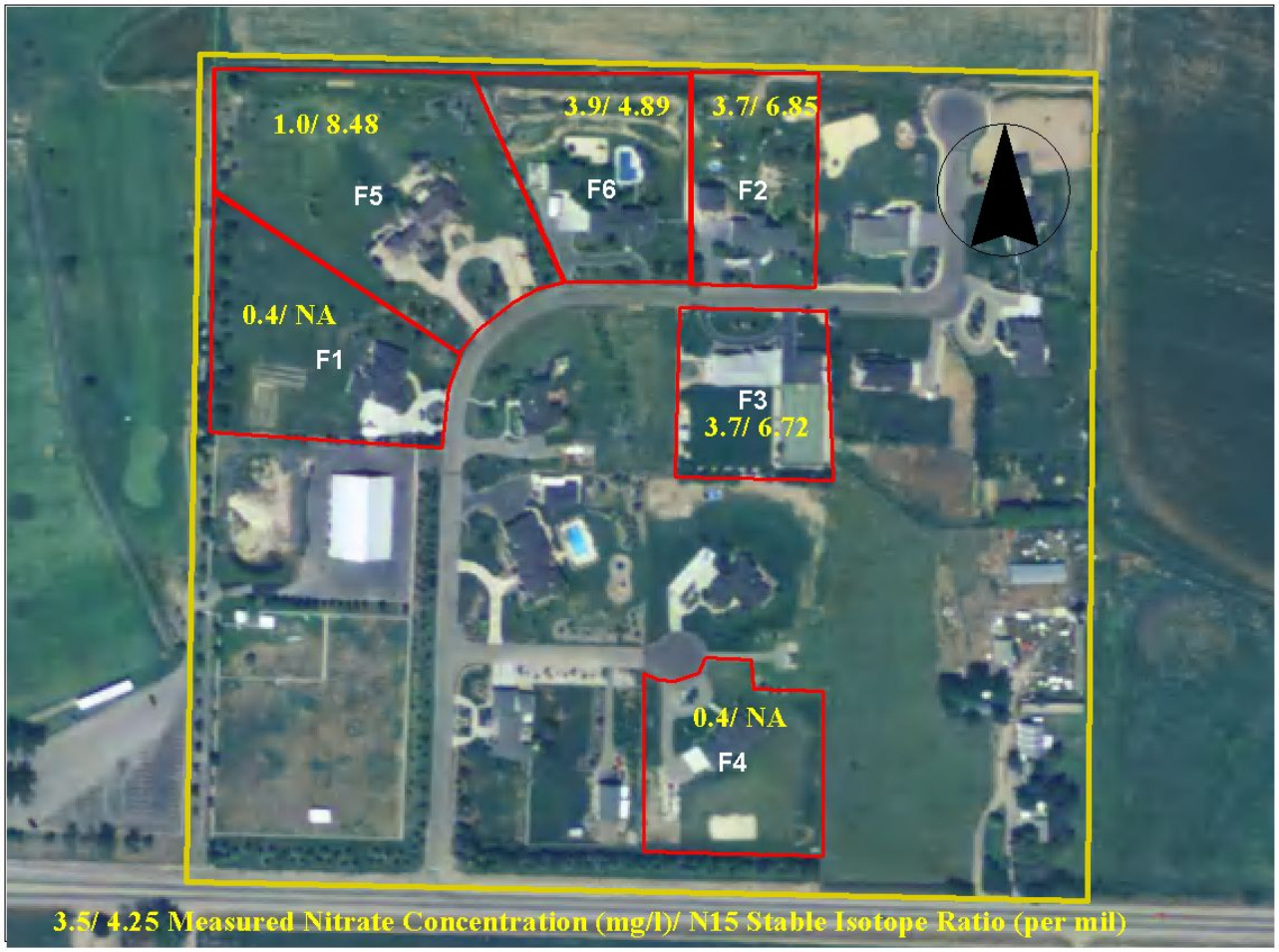


Figure 9. Measured Ground Water Nitrate Concentrations and N15 Stable Isotope Ratios in Wells Sampled in the Chisum Valley Subdivision

Figure 10. Relationship of Ground Water Nitrate-Nitrogen and $\delta^{15}N$ in the Primrose, Chisum Valley, and Foxtail Subdivisions

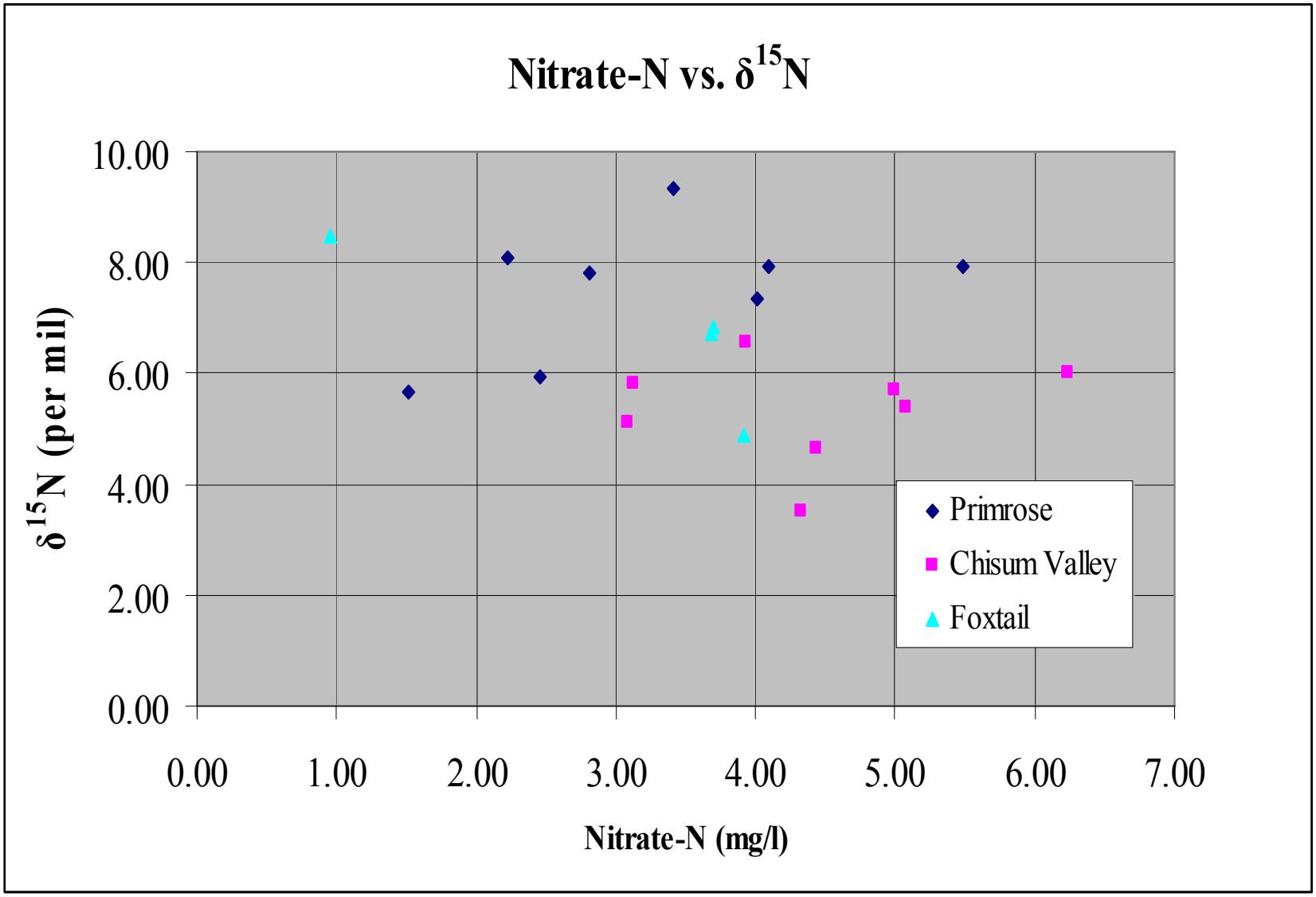
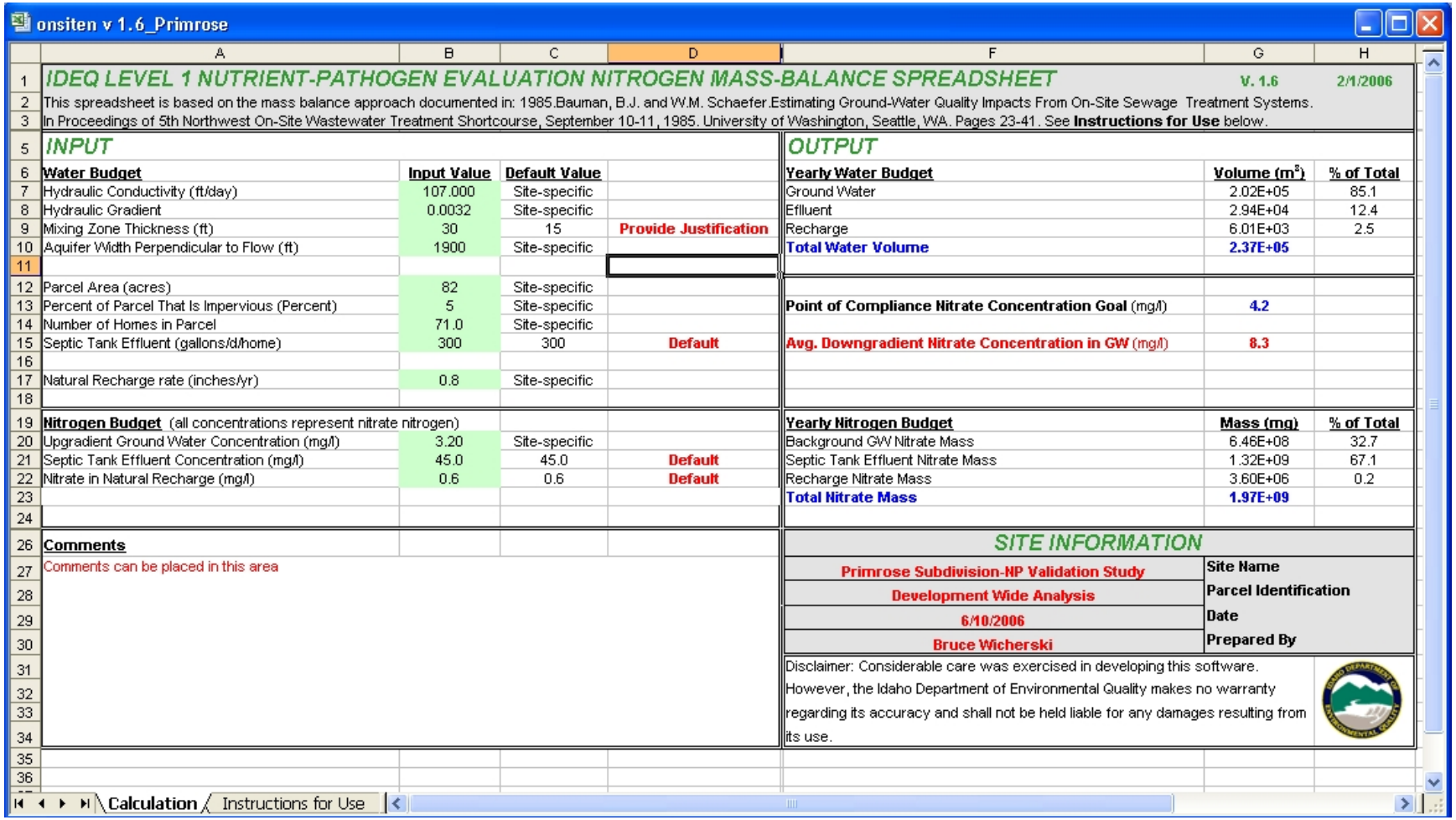


Figure 11. Nutrient-Pathogen (NP) Evaluation Output of IDEQ Mass Balance Spreadsheet for Primrose Subdivision



onsiten v 1.6_Primrose

IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET V. 1.6 2/1/2006

This spreadsheet is based on the mass balance approach documented in: 1985.Bauman, B.J. and W.M. Schaefer.Estimating Ground-Water Quality Impacts From On-Site Sewage Treatment Systems. In Proceedings of 5th Northwest On-Site Wastewater Treatment Shortcourse, September 10-11, 1985. University of Washington, Seattle, WA. Pages 23-41. See **Instructions for Use** below.

INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	107.000	Site-specific	
Hydraulic Gradient	0.0032	Site-specific	
Mixing Zone Thickness (ft)	30	15	Provide Justification
Aquifer Width Perpendicular to Flow (ft)	1900	Site-specific	
Parcel Area (acres)	82	Site-specific	
Percent of Parcel That Is Impervious (Percent)	5	Site-specific	
Number of Homes in Parcel	71.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	0.8	Site-specific	

Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.20	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Nitrate in Natural Recharge (mg/l)	0.6	0.6	Default

Comments

Comments can be placed in this area

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	2.02E+05	85.1
Effluent	2.94E+04	12.4
Recharge	6.01E+03	2.5
Total Water Volume	2.37E+05	

Point of Compliance Nitrate Concentration Goal (mg/l)	4.2
Avg. Downgradient Nitrate Concentration in GW (mg/l)	8.3

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	6.46E+08	32.7
Septic Tank Effluent Nitrate Mass	1.32E+09	67.1
Recharge Nitrate Mass	3.60E+06	0.2
Total Nitrate Mass	1.97E+09	

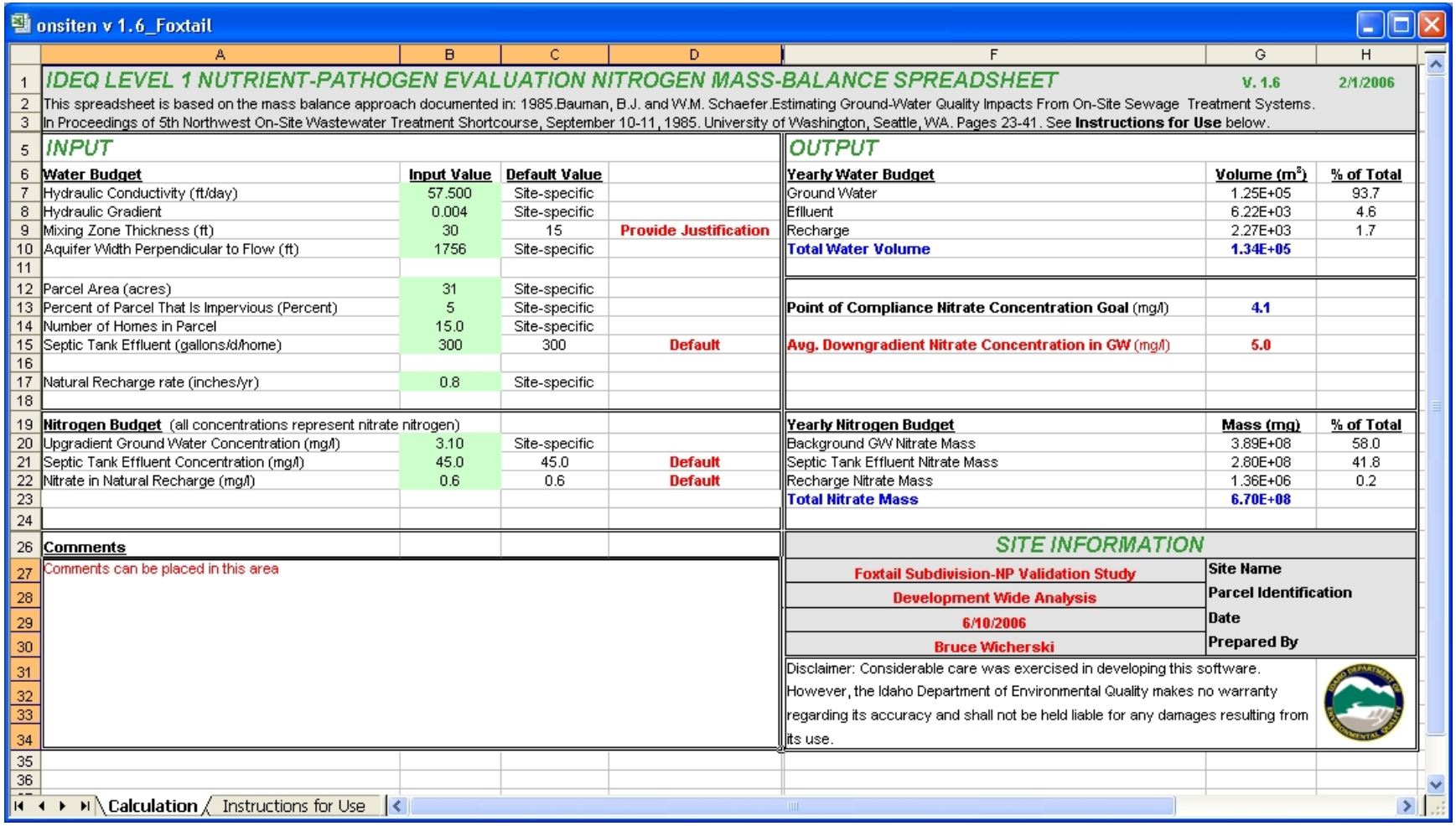
SITE INFORMATION

Primrose Subdivision-NP Validation Study	Site Name
Development Wide Analysis	Parcel Identification
6/10/2006	Date
Bruce Wicherski	Prepared By

Disclaimer: Considerable care was exercised in developing this software. However, the Idaho Department of Environmental Quality makes no warranty regarding its accuracy and shall not be held liable for any damages resulting from its use.

Calculation | Instructions for Use

Figure 12. Nutrient-Pathogen (NP) Evaluation Output of IDEQ Mass Balance Spreadsheet for Foxtail Subdivision



onsiten v 1.6_Foxtail

IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET V. 1.6 2/1/2006

This spreadsheet is based on the mass balance approach documented in: 1985.Bauman, B.J. and W.M. Schaefer.Estimating Ground-Water Quality Impacts From On-Site Sewage Treatment Systems. In Proceedings of 5th Northwest On-Site Wastewater Treatment Shortcourse, September 10-11, 1985. University of Washington, Seattle, WA. Pages 23-41. See **Instructions for Use** below.

INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	57.500	Site-specific	
Hydraulic Gradient	0.004	Site-specific	
Mixing Zone Thickness (ft)	30	15	Provide Justification
Aquifer Width Perpendicular to Flow (ft)	1756	Site-specific	
Parcel Area (acres)	31	Site-specific	
Percent of Parcel That Is Impervious (Percent)	5	Site-specific	
Number of Homes in Parcel	15.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	0.8	Site-specific	

Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.10	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Nitrate in Natural Recharge (mg/l)	0.6	0.6	Default

Comments

Comments can be placed in this area

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	1.25E+05	93.7
Effluent	6.22E+03	4.6
Recharge	2.27E+03	1.7
Total Water Volume	**1.34E+05**	

Point of Compliance Nitrate Concentration Goal (mg/l)	4.1
Avg. Downgradient Nitrate Concentration in GW (mg/l)	5.0

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	3.89E+08	58.0
Septic Tank Effluent Nitrate Mass	2.80E+08	41.8
Recharge Nitrate Mass	1.36E+06	0.2
Total Nitrate Mass	**6.70E+08**	

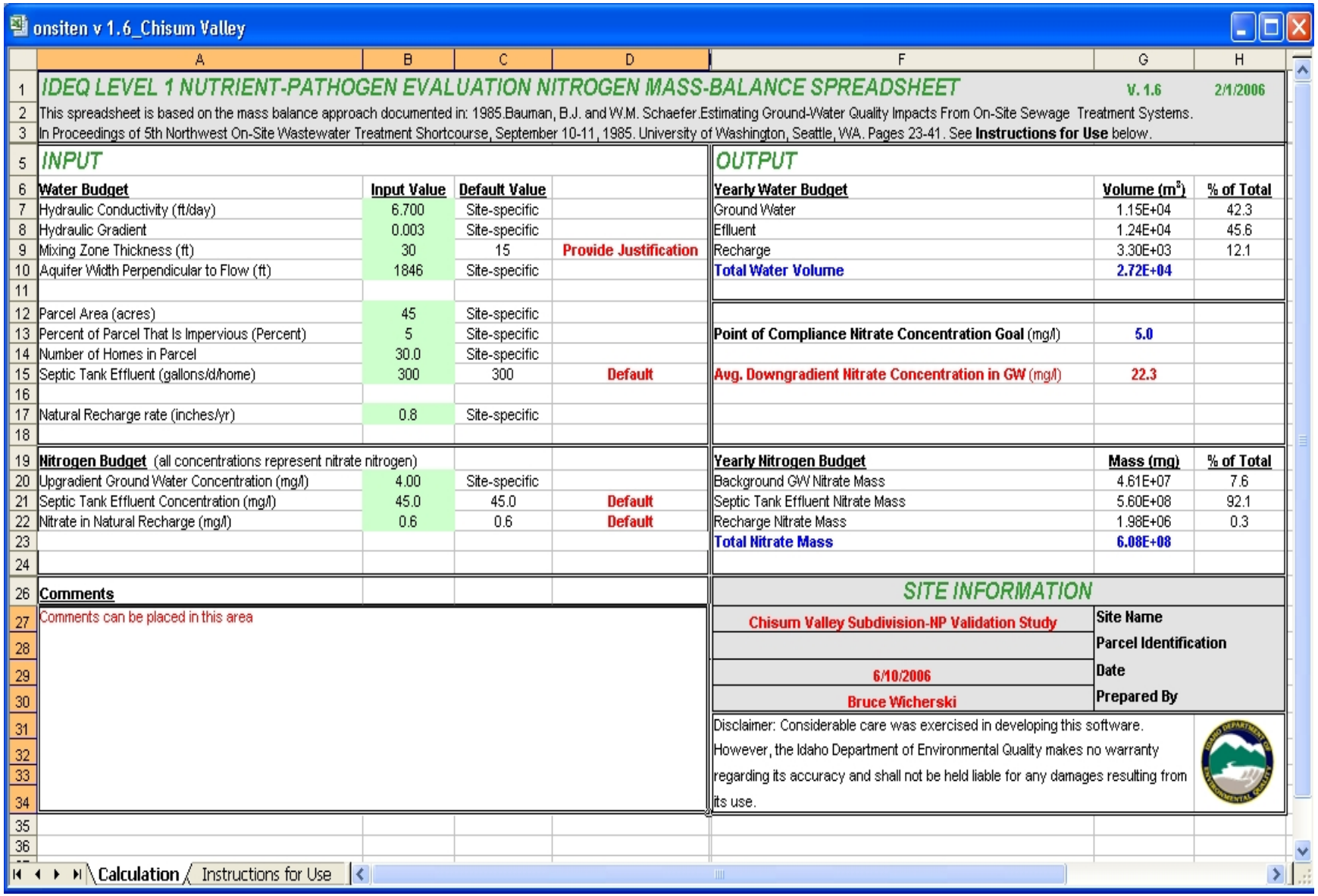
SITE INFORMATION

Foxtail Subdivision-NP Validation Study	Site Name
Development Wide Analysis	Parcel Identification
6/10/2006	Date
Bruce Wicherski	Prepared By

Disclaimer: Considerable care was exercised in developing this software. However, the Idaho Department of Environmental Quality makes no warranty regarding its accuracy and shall not be held liable for any damages resulting from its use.

Calculation | Instructions for Use

Figure 13. Nutrient-Pathogen (NP) Evaluation Output of IDEQ Mass Balance Spreadsheet for Chisum Valley Subdivision



onsiten v 1.6_Chisum Valley

IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET V. 1.6 2/1/2006

This spreadsheet is based on the mass balance approach documented in: 1985.Bauman, B.J. and W.M. Schaefer.Estimating Ground-Water Quality Impacts From On-Site Sewage Treatment Systems. In Proceedings of 5th Northwest On-Site Wastewater Treatment Shortcourse, September 10-11, 1985. University of Washington, Seattle, WA. Pages 23-41. See **Instructions for Use** below.

INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	6.700	Site-specific	
Hydraulic Gradient	0.003	Site-specific	
Mixing Zone Thickness (ft)	30	15	Provide Justification
Aquifer Width Perpendicular to Flow (ft)	1846	Site-specific	
Parcel Area (acres)	45	Site-specific	
Percent of Parcel That Is Impervious (Percent)	5	Site-specific	
Number of Homes in Parcel	30.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	0.8	Site-specific	

Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	4.00	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Nitrate in Natural Recharge (mg/l)	0.6	0.6	Default

Comments

Comments can be placed in this area

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	1.15E+04	42.3
Effluent	1.24E+04	45.6
Recharge	3.30E+03	12.1
Total Water Volume	**2.72E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	5.0
Avg. Downgradient Nitrate Concentration in GW (mg/l)	22.3

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	4.61E+07	7.6
Septic Tank Effluent Nitrate Mass	5.60E+08	92.1
Recharge Nitrate Mass	1.98E+06	0.3
Total Nitrate Mass	**6.08E+08**	

SITE INFORMATION

Chisum Valley Subdivision-NP Validation Study	Site Name
	Parcel Identification
6/10/2006	Date
Bruce Wicherski	Prepared By

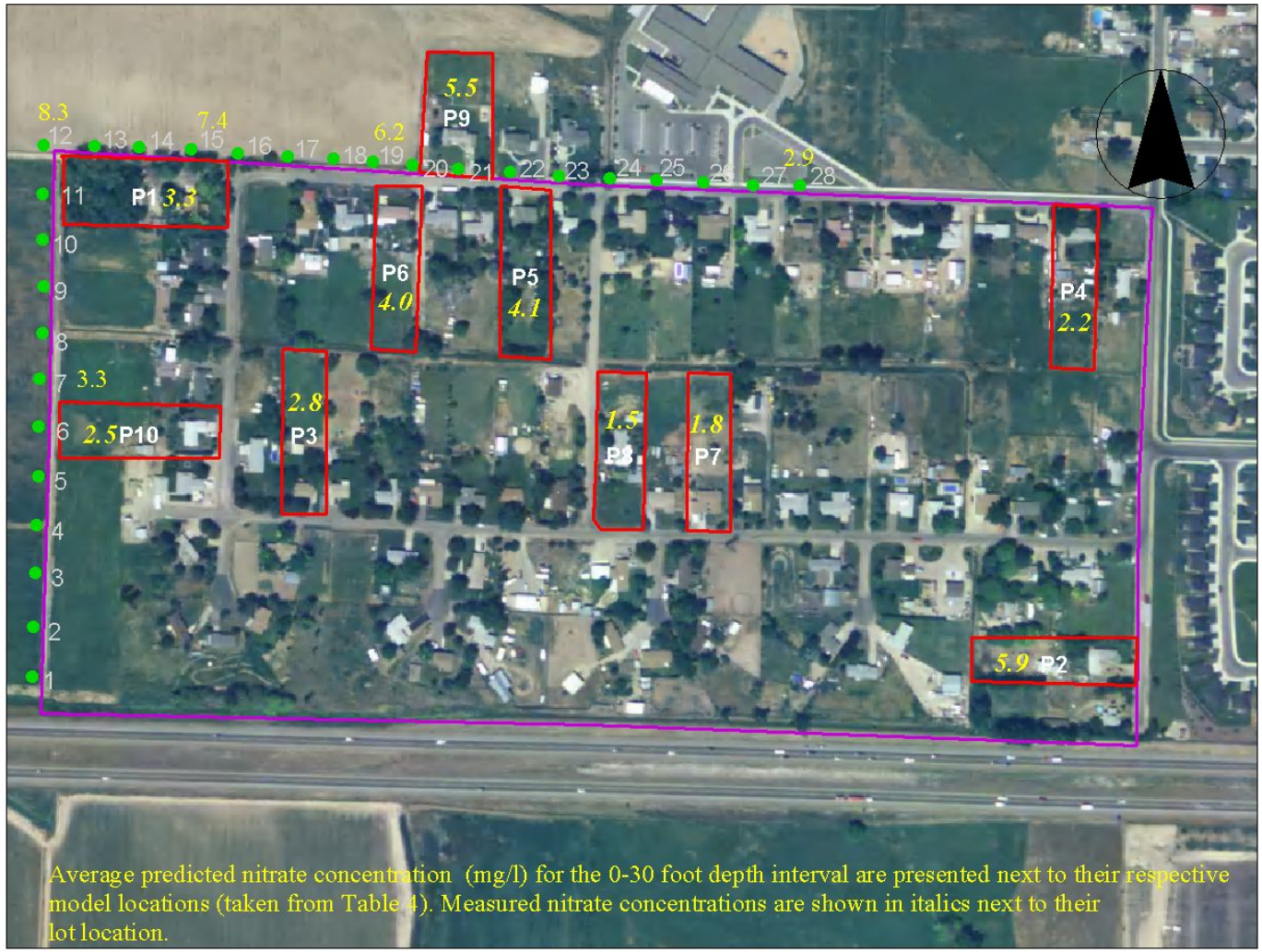
Disclaimer: Considerable care was exercised in developing this software. However, the Idaho Department of Environmental Quality makes no warranty regarding its accuracy and shall not be held liable for any damages resulting from its use.

Calculation | Instructions for Use

Table 4. Summary of Horizontal Planar Source (HPS) Model Predicted Increases in Ground Water Nitrate Concentrations (mg/l) for Selected Locations and Depths Along the Downgradient Boundary of the Primrose Subdivision
Location Numbers are referenced to sites in Figure 14.

	Predicted Nitrate Concentration Increase (mg/l)		
Location Number	Water Table (WT)	15 Feet Below WT	50 Feet Below WT
1	14.8	0.3	
2	5.4	2.0	
3	3.6	2.2	
4	6.7	3.3	
5	1.7	1.3	
6	16.9	3.6	
7	4.1	3.3	
8	3.8	2.8	
9	6.3	3.4	
10	21.5	6.7	0.8
11	12.4	9.2	1.0
12	26.2	8.3	1.1
13	10.0	7.8	1.0
14	9.8	7.6	1.0
15	9.5	7.4	0.9
16	9.3	7.2	0.8
17	9.0	6.9	0.7
18	8.6	6.6	
19	8.2	6.2	
20	7.6	5.8	
21	7.3	5.5	
22	7.3	5.5	
23	7.4	5.6	
24	7.8	5.9	
25	8.0	5.9	
26	7.2	5.4	
27	6.0	4.4	
28	4.1	2.9	

Figure 14. Location of Nitrate Concentration Prediction Points and Predicted Concentrations in Horizontal Planar Source (HPS) Model for Primrose Subdivision



Discussion

The results of ground water sampling of the domestic wells in these three subdivisions indicate clear impacts from on-site wastewater activities in only the Primrose subdivision. The detection of total coliform bacteria in six of the 10 wells sampled from the Primrose subdivision, combined with the significantly elevated total P concentrations and $\delta^{15}N$ values (which are in the lower end of the range that has been observed for human and animal waste sources) demonstrate the impact of the higher density and longer period of use of on-site wastewater systems. Clearly, the presence of total coliform and elevated total P and $\delta^{15}N$ show that subsurface conditions at this subdivision are adequate to allow their detection in the wells that were sampled. It also poses a question as to why elevated levels of constituents such as nitrate were not detected. Definitive data were not gathered during the study to allow an assessment of oxidation-reduction conditions or organic/inorganic carbon concentrations in the aquifer. The fact that ammonia was detected in only one of the wells sampled, combined with elevated dissolved oxygen and positive oxidation–reduction potential measurements, may indicate that aquifer conditions are generally oxic and that the potential for denitrification in the aquifer is low. However, this would still not rule out the possibility of vadose zone denitrification of nitrate below the drainfield and above the water table.

The lack of measurable impacts in the other subdivisions studied may be attributable to a variety of factors. Both subdivisions have lower densities of drainfields, and the time since full build out of the subdivision has been much shorter than at Primrose. Therefore, the transport time for leaching has been less and may not have been long enough for constituents to reach ground water and for steady-state conditions to be achieved. In addition, the mass loading of nutrients and pathogens to the subsurface is lower. Finally, another significant factor may be the lack of representative monitoring points. The construction of the wells in the Foxtail and Chisum Valley subdivisions are such that uppermost, first-encountered water is being cased out and/or water is being withdrawn primarily from screened intervals at depths of 50-120 feet below the level of the water table. As a result, well sampling does not intercept the most impacted ground water that is located in the upper fifteen to thirty feet of the water column.

Measured concentrations of nitrate were in all cases lower than average concentrations predicted by modeling. The intent of the NP evaluation is to evaluate the potential impacts from a proposed development on the uppermost, first-encountered ground water. Predicted impacts typically reflect average conditions in the upper 15-30 feet of the water column. These water column depths are based on modeling exercises using reasonable values of aquifer dispersivity and detailed field studies of plumes associated with wastewater discharges (DEQ, 2002). The use of mixing zone thickness values that are larger than this is not defensible unless transport distances are very large (on the order of thousands of feet) or other factors exist to spread contamination, such as aquifer heterogeneity or well pumping combined with certain types of well construction.

Conclusions

The following are some of the conclusions that can be drawn from this comparison of measured and predicted nutrient concentrations in ground water at three subdivisions employing onsite wastewater disposal in the Treasure Valley:

- Measurable impacts on ground water quality could only be identified in one of the three subdivisions evaluated. This subdivision has the highest drainfield density and has been fully built out for the longest period of time of all the subdivisions studied.
- Difficulties in quantifying impacts can be attributed to a variety of factors, which include uncertainty as to true background or baseline conditions, vadose zone stratigraphy, and domestic well construction techniques. Alternating layers of coarse and fine sediments, which occur at all the study sites, potentially lengthen flow paths for nutrients, create long vadose zone and aquifer travel times, and lengthen the time before steady state conditions are achieved. Domestic well construction techniques that case out prevent the sampling of potentially higher chemical concentrations at the water table.
- Predicted ground water nitrate concentrations exceeded measured nitrate concentrations at all subdivisions. The same factors that complicate quantification of impacts may also explain the discrepancies seen between predicted and measured concentrations. When model predictions were adjusted to account for the ground water depth sampled by domestic wells at the Primrose subdivision, predictions more closely matched measured values. In addition, attenuation processes in the vadose zone below the drainfields, such as denitrification, may be acting to reduce nitrate concentrations. However, general aquifer conditions at the three subdivisions did not appear to be conducive to promoting attenuation by denitrification in the saturated zone.
- Future validation studies should include installation and sampling of dedicated monitoring wells constructed so as to allow sampling of the uppermost portion of the aquifer.

References

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Appendix A

Available Well Logs for NP Validation Study Sample Locations

Primrose Subdivision Well Logs

Site P1

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

RECEIVED
Department of Water Administration

1. WELL OWNER
Name ROSE VALLEY CONST.
Address 929 N 4th St Meridian, Ida
Owner's Permit No.

2. NATURE OF WORK
☑ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE
☑ Domestic ☐ Irrigation ☐ Test
☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED
☑ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION
Diameter of hole 6 inches Total depth 83 feet
Casing schedule: ☑ Steel ☐ Concrete

Thickness	Diameter	From	To
250 inches	6 inches	+1ft feet	25ft feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet

Was a packer or seal used? ☐ Yes ☑ No
Perforated? ☐ Yes ☑ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation ____ inches by ____ inches

Number	From	To
____ perforations	____ feet	____ feet
____ perforations	____ feet	____ feet
____ perforations	____ feet	____ feet

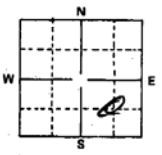
Well screen installed? ☐ Yes ☑ No
Manufacturer's name
Type Model No.
Diameter ___ Slot size ___ Set from ____ feet to ____ feet
Diameter ___ Slot size ___ Set from ____ feet to ____ feet

Gravel packed? ☐ Yes ☑ No Size of gravel
Placed from feet to feet

Surface seal? ☑ Yes ☐ No To what depth 26 feet
Material used in seal ☐ Cement grout ☑ Puddling clay

6. LOCATION OF WELL
Sketch map location must agree with written location.

Lot 1
BLOCK 3



County Ada
NW SE ¼ Sec. 14, T. 3 N, R. 1 W

7. WATER LEVEL
Static water level 9 feet below land surface
Flowing? ☐ Yes ☑ No G.P.M. flow
Temperature ____ ° F. Quality
Artesian closed-in pressure ____ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA
☐ Pump ☑ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
24	30	1½

34138

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
9	0	3	BROWN TOPSOIL		✓
9	3	24	BROWN CLAY & BOULDERS		✓
6	24	70	BROWN SAND & GRAVEL	✓	
6	70	65	BROWN SAND		✓
6	65	79	BROWN CLAY		✓
6 "	79	83	BROWN SAND	✓	

10.
Work started 12-19-11 finished 12-21-11

11. DRILLER'S CERTIFICATION
This well was drilled under my supervision and this report is true to the best of my knowledge.
FRANK SKINNER WELL DRILLING 212
Driller's or Firm's Name Number
P.O. Box 366 Caldwell, Ida
Address
Frank Skinner 1-4-12
Signed By Date

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Site P3

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Rose Valley Const. Inc.

Address 929 W. 4th St. Meridian, Ida

Owner's Permit No. _____

2. NATURE OF WORK

☑ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☑ Domestic ☐ Irrigation ☐ Test

☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED

☑ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole _____ inches Total depth _____ feet

Casing schedule: ☐ Steel ☐ Concrete

Thickness	Diameter	From	To
250 inches	6 inches	+1 feet	24 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was a packer or seal used? ☐ Yes ☑ No

Perforated? ☐ Yes ☑ No

How perforated? ☐ Factory ☐ Knife ☐ Torch

Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☑ No

Manufacturer's name _____

Type _____ Model No. _____

Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☑ No Size of gravel _____

Placed from _____ feet to _____ feet

Surface seal? ☑ Yes ☐ No To what depth 20 feet

Material used in seal ☐ Cement grout ☑ Puddling clay

6. LOCATION OF WELL

Sketch map location must agree with written location.

LOT 10
BLOCK 2
63

N / W / E / S

County ADA

NW SE ¼ Sec. 14, T. 3 N/S, R. 1 E/W

7. WATER LEVEL

Static water level 8 feet below land surface

Flowing? ☐ Yes ☑ No G.P.M. flow _____

Temperature _____ ° F. Quality _____

Artesian closed-in pressure _____ p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☑ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
36	12	1

9. LITHOLOGIC LOG 34137

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
9	0	3	BROWN TOPSOIL		✓
9	3	20	BROWN CLAY BOULDERS	✓	
6	20	51	BROWN SAND	✓	
6	51	65	BROWN CLAY		✓
6	65	74	BLACK SAND	✓	
6	74	79	BROWN CLAY		✓
6	79	83	BROWN SAND	✓	

10. Work started 11-12-71 finished 11-15-71

11. DRILLER'S CERTIFICATION

This well was drilled under my supervision and this report is true to the best of my knowledge.

FRANK SKINNER WELL DRILLING — 212

Driller's or Firm's Name — Number

P.O. Box 366 Caldwell, Ida.

Address

Frank Skinner 11-14-71

Signed By — Date

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Site P4

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Resources

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, **Department of Water Resources within 30** days after the completion or abandonment of the well.

1. WELL OWNER
Name Dave Reeves
Address Meridian, Idaho
Owner's Permit No.

2. NATURE OF WORK
☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE
☒ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)
☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or injection

4. METHOD DRILLED
☐ Cable ☒ Rotary ☐ Dug ☐ Other

5. WELL CONSTRUCTION
Diameter of hole 6 inches Total depth 150 feet
Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	6 inches	+ 1 feet	148½ feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation inches by inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No.
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet

Gravel packed? ☐ Yes ☒ No Size of gravel
Placed from feet to feet

Surface seal depth 32 Material used in seal ☐ Cement grout ☐ Puddling clay ☒ Well cuttings
Sealing procedure used ☐ Slurry pit ☐ Temporary surface casing ☒ Overbore to seal depth

6. LOCATION OF WELL 63
Sketch map location must agree with written location.

N / W / E / S

Subdivision Name Brunross
Lot No. 3 Block No. 1
County Ada
NW¼ SE¼ Sec. 14 T. 3 N. R. 1 E/W

7. WATER LEVEL
Static water level 4 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow
Temperature ° F. Quality
Artesian closed-in pressure p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA
☐ Pump ☐ Bailer ☒ Other

Discharge G.P.M.	Draw Down	Hours Pumped
40	30'	4

9. LITHOLOGIC LOG 105184

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
9"	0	3	Brown clay		X
9"	3	30	Brown gravel & boulders		X
9"	30	32	Brown clay		X
6"	32	40	" "		X
6"	40	60	Brown sand	X	
6"	60	68	" Clay		X
6"	68	75	Brown sand	X	
6"	75	85	" Clay		X
6"	85	100	Brown sand	X	
6"	100	105	" Clay		X
6"	105	120	Brown sand	X	
6"	120	130	" Clay		X
6"	130	140	Brown tuff & sand	X	
6"	140	150	" Clay		X
6"	150	–	Brown sand	X	

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10. Work started 12/12/77 finished 12/13/77

11. DRILLERS CERTIFICATION
Firm Name L.O.S. Well Drilling Firm No. 212
Address 2305 Cayuga Dr. Meridian, Ida. Date 12/29/77
Signed by (Firm Official) Frank Skinner
and
(Operator) Frank Skinner

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

Site P5

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Treasure Valley Construction

Address Rt. 3, Meridian, Idaho 83642

Owner's Permit No. _____

2. NATURE OF WORK

☐ New well ☒ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

_____

3. PROPOSED USE

☒ Domestic ☒ Irrigation ☐ Test

☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED

☒ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 6 inches Total depth 61 feet

Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
250 inches	6 inches	+1 feet	61 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was a packer or seal used? ☐ Yes ☒ No

Perforated? ☐ Yes ☒ No

How perforated? ☐ Factory ☐ Knife ☐ Torch

Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No

Manufacturer's name _____

Type _____ Model No. _____

Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☒ No Size of gravel _____

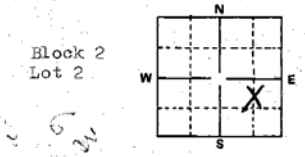
Placed from _____ feet to _____ feet

Surface seal? ☒ Yes ☐ No To what depth 20 feet

Material used in seal ☐ Cement grout ☒ Puddling clay

6. LOCATION OF WELL

Sketch map location must agree with written location.



County Ada

NE ¼ SE ¼ Sec. 14, T. 3 N/S, R. 1 E/W

7. WATER LEVEL

Static water level 7 feet below land surface

Flowing? ☐ Yes ☒ No G.P.M. flow _____

Temperature _____ ° F. Quality _____

Artesian closed-in pressure _____ p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☒ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
25	3'	1

038302

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
9"	0	7	Topsoil		x
9"	7	20	Boulders and clay		x
6"	20	35	Sand	x	
6"	35	42	Brown Clay		x
6"	42	51	Sand	x	
6"	51	60	Yellow clay		x
6"	60	61	Course sand	x	

10.

Work started 7/25/72 finished 7/27/72

11. DRILLER'S CERTIFICATION

This well was drilled under my supervision and this report is true to the best of my knowledge.

Frank Skinner Well Drilling 212

Driller's or Firm's Name Number

Rt. 3, Meridian, Idaho 83642

Address

Signed By Frank H. O'Leary Date 7/28/72

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Site P6

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

15

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Administration within 30 days after the completion or abandonment of the well.

1. WELL OWNER
Name Treasure Valley Const.
Address Rt. 3 Meridian Idaho
Owner's Permit No. _____

2. NATURE OF WORK
☑ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE
☑ Domestic ☐ Irrigation ☐ Test
☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED
☑ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION
Diameter of hole 6 inches Total depth 79 feet
Casing schedule: ☑ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	6 inches	+ 1 feet	75 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was a packer or seal used? ☐ Yes ☑ No
Perforated? ☐ Yes ☑ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

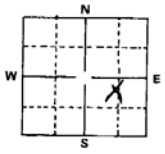
Well screen installed? ☐ Yes ☑ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☑ No Size of gravel _____
Placed from _____ feet to _____ feet

Surface seal? ☑ Yes ☐ No To what depth 20 feet
Material used in seal ☐ Cement grout ☑ Puddling clay

6. LOCATION OF WELL
Sketch map location must agree with written location.

Lot 5
Block 2



County Ada
N½ S.E.¼ Sec. 14 T. 3 N/S R. 1 E/W

7. WATER LEVEL
Static water level 8 feet below land surface
Flowing? ☐ Yes ☑ No G.P.M. flow _____
Temperature _____ ° F. Quality _____
Artesian closed-in pressure _____ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA
☐ Pump ☑ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
30	15	2

9. LITHOLOGIC LOG 041242

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
9	0	1	brown top soil		✓
9	1	20	brown clay + boulders		✓
6	20	70	brown Sandy clay		✓
6	70	77	brown sticky clay		✓
6	77	79	brown sand	✓	

10. Work started 11-25-72 finished 12-1-72

11. DRILLER'S CERTIFICATION
This well was drilled under my supervision and this report is true to the best of my knowledge.

Skinner Bros. Drilling 2 2
Driller's or Firm's Name Number
Rt. 3 Meridian
Address
Earl Skinner 1-6-73
Signed By Date

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Site P7

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

1. WELL OWNER
Name Treasure Valley Const.
Address Rt 3 Meridian, Ida.
Owner's Permit No. _____

2. NATURE OF WORK
☑ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE
☑ Domestic ☐ Irrigation ☐ Test
☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED
☑ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION
Diameter of hole 6 inches Total depth 58 feet
Casing schedule: ☑ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	6 inches	+1½ feet	52 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was a packer or seal used? ☐ Yes ☑ No
Perforated? ☐ Yes ☑ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

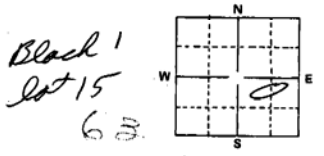
Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☑ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☑ No Size of gravel _____
Placed from _____ feet to _____ feet

Surface seal? ☑ Yes ☐ No To what depth 18 feet
Material used in seal ☐ Cement grout ☑ Puddling clay

6. LOCATION OF WELL
Sketch map location must agree with written location.



County Ada
NE¼ SE¼ Sec. 14, T. 3 N, R. 1 W

7. WATER LEVEL
Static water level 6 feet below land surface
Flowing? ☐ Yes ☑ No G.P.M. flow _____
Temperature _____ ° F. Quality _____
Artesian closed-in pressure _____ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA
☐ Pump ☑ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
30	15	1

31969

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
9	0	2	Brown topsoil		✓
9	2	18	Brown clay & gravel	✓	
6	18	21	Brown clay & gravel		✓
6	21	38	Brown Rock		✓
6	38	55	Brown clay		✓
6	55	58	Brown sand	✓	

10.
Work started 1-20-72 finished 1-26-72

11. DRILLER'S CERTIFICATION
This well was drilled under my supervision and this report is true to the best of my knowledge.
Frank Skinner
Driller's or Firm's Name Well Drilling
Number 212
Address Rt 3 Meridian Idaho
Signed By Frank Skinner
Date 2-10-72

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Site P8

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Treasure Valley Const.
Address Rt. 3 Meridian, Idaho.
Owner's Permit No. _____

2. NATURE OF WORK

☑ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☑ Domestic ☐ Irrigation ☐ Test
☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED

☑ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 6 inches Total depth 56' feet
Casing schedule: ☑ Steel ☐ Concrete

Thickness	Diameter	From	To
250 inches	6 inches	+1½ feet	51 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was a packer or seal used? ☐ Yes ☑ No
Perforated? ☐ Yes ☑ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☑ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet

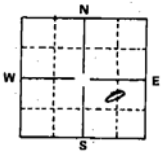
Gravel packed? ☐ Yes ☑ No Size of gravel _____
Placed from _____ feet to _____ feet

Surface seal? ☑ Yes ☐ No To what depth 18 feet
Material used in seal ☐ Cement grout ☑ Puddling clay

6. LOCATION OF WELL

Sketch map location must agree with written location.

Block 1
Lot 13
63



County Ada
NW SE¼ Sec. 14, T. 3 N/S R. 1 E/W

7. WATER LEVEL

Static water level 8 feet below land surface
Flowing? ☐ Yes ☑ No G.P.M. flow _____
Temperature _____ ° F. Quality _____
Artesian closed-in pressure _____ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☑ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
24	10	1

31971

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
9	0	3	Brown Topsoil		✓
9	3	18	Brown Boulders & clay	✓	
6	18	24	" " "		✓
6	24	32	Brown Sand		✓
6	32	54	Brown clay		✓
6	54	56	Brown sand	✓	

10.

Work started 2-16-72 finished 2-18-72

11. DRILLER'S CERTIFICATION

This well was drilled under my supervision and this report is true to the best of my knowledge.

FRANK SKINNER
Driller's or Firm's Name
WELL DRILLING
212
Number
Rt 3 Meridian Idaho
Address
Frank Skinner 2-27-72
Signed By Date

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Site P9

Form 238-7
8/90

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

072118

1. WELL OWNER
Name Steve Burch
Address 844 W 7th St Meridian, Id - 83642
Drilling Permit No. 63-91-2-104
Water Right Permit No. _____

2. NATURE OF WORK
☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE
☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED
☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION
Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	73 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20 Material used in seal: ☐ Cement grout ☐ Bentonite ☒ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL
Sketch map location must agree with written location.

N / W / E / S

Subdivision Name _____
Lot No. _____ Block No. _____
County Ada
SW ¼ NE ¼ Sec. 14, T. 3 N ☒ S ☐ R. 1 E ☐ W ☒

7. WATER LEVEL
Static water level 15 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ °F. Quality _____
Describe artesian or temperature zones below.

8. WELL TEST DATA
☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
40		2

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
9"	0	5	Top Soil		☒
9"	5	7	Brown Clay		☒
9"	7	15	Sand & Gravel		☒
9"	15	20	Sand & Gravel	☒	
6"	20	36	" "	☒	
6"	36	39	Yellow Clay		☒
6"	39	43	Red Sand & Gravel	☒	
6"	43	68	Yellow & White Sand	☒	
6"	68	74	Yellow Clay		☒
6"	74		White Sand	☒	

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JUN 24 1991
Department of Water Resources

RECEIVED
JUN 25 1991
Department of Water Resources
Western Regional Office

10.
Work started 6/06/91 finished 6/06/91

11. DRILLERS CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Firm Name S.O.S. Well Drilling No. 212
Address 4145 N. Blackcat Rd Meridian Id Date 6/8/91
Signed by (Firm Official) Frank Skinner
and
(Operator) _____

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Site P10

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

(#7 1 E.S.)

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

1. WELL OWNER
Name Treasure Valley Const.
Address RT. 3 Meridian Idaho
Owner's Permit No. _____

2. NATURE OF WORK
☑ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE
☑ Domestic ☐ Irrigation ☐ Test
☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED
☑ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION
Diameter of hole 6 inches Total depth 89 feet
Casing schedule: ☑ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	6 inches	+1 feet	86" feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was a packer or seal used? ☐ Yes ☑ No
Perforated? ☐ Yes ☑ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

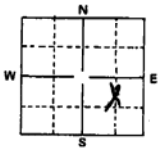
Well screen installed? ☐ Yes ☑ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☑ No Size of gravel _____
Placed from _____ feet to _____ feet

Surface seal? ☑ Yes ☐ No To what depth 20 feet
Material used in seal ☐ Cement grout ☑ Puddling clay

6. LOCATION OF WELL
Sketch map location must agree with written location.

Block 3
Lot 6



County Ada
N½ ¼ SE ¼ Sec. 14, T. 3 N/S, R. 1 E/W

7. WATER LEVEL
Static water level 11 feet below land surface
Flowing? ☐ Yes ☑ No G.P.M. flow _____
Temperature _____ ° F. Quality _____
Artesian closed-in pressure _____ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA
☐ Pump ☑ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
30 g.p.m	10 ft.	2

34147

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
9	0	2	top soil		✓
9	2	6	brown clay		✓
9	6	20	brown clay + boulders		✓
6	20	21	" " "		✓
6	21	50	sand brown fine	✓	
6	50	86	brown clay		✓
6	86	89	coarse brown sand	✓	

10.
Work started 5-2-72 finished 5-5-72

11. DRILLER'S CERTIFICATION
This well was drilled under my supervision and this report is true to the best of my knowledge.

Frank Skinner Well Drilling 212
Driller's or Firm's Name Number
RT. 3 Meridian, Idaho
Address
Earl Skinner 6-7-72
Signed By Date

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Foxtail Subdivision Well Logs

Site F2

Form 238-7
11/97

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

060899

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0001808
DRILLING PERMIT NO. 63-98-W-0146-000
Other IDWR No. _____

2. OWNER:
Name Doug Lasher
Address 578 W Sly Fox
City Meridian State ID Zip 83642

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 4 North ☒ or South ☐
Rge. 1 East ☐ or West ☒
Sec. 24, ____ 1/4 SE 1/4 SW 1/4
(10 acres / 40 acres / 160 acres)
Gov't Lot ____ County ADA
Lat: : : Long: : :
Address of Well Site 578 W Sly Fox
City Meridian
(Give at least name of road + Distance to Road or Landmark)

Lt. 5 Blk. 2 Sub. Name Foxtail

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Gran Bent	0	40	2500#	10" Surf Csg to 33'
			+	10" overbore to 40'

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 169
Was drive shoe seal tested? ☐ Y ☒ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
10"	+1	33	.250	steel	☒	☐	☒	☐
6"	+1½	169	.250	steel	☐	☐	☐	☐
					☒	☐	☒	☐

Length of Headpipe 5' Length of Tailpipe 1'

MICROFILMED JUN 24 1998

9. PERFORATIONS/SCREENS
Perforations / Screens
Method _____
Screen Type Johnson

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
169	179	.20th		5"	Stainless	☐	☒
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
53 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: well cap

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
70		160	3hr

Water Temp. 785° Bottom hole temp. _____
Water Quality test or comments: _____
Depth first Water Encounter 18'

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10"	0	8	Top Soil		
↑	8	13	Brown Clay & Sand		
↓	13	33	Gravel	X	
10"	33	40	Brown Clay		
6"	40	57	Brown Clay		
	57	69	Sand	X	
	69	73	fine Sand	X	
	73	77	Brown Clay		
	77	89	Brown Clay & Sand		
	89	113	Sand	X	
	113	120	Clay & Sand		
	120	148	Sand	X	
	148	163	Sand & Clay	X	
	163	169	Clay		
	169	179	Sand	X	

RECEIVED
MAR 25 1998
Department of Water Resources

RECEIVED
MAR 23 1998
WATER RESOURCES
WESTERN REGION

Completed Depth 179' (Measurable)
Date: Started 3-18-98 Completed 3-20-98

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name CCS Phipps Drilling Firm No. 311
Firm Official _____ Date 3-25-98
and
Driller or Operator _____ Date _____
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Site F3

Form 238-7
3/95

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter or Ballpoint Pen

061967

Office Use Only
Inspected by _____
Twp____ Rge____ Sec____
____1/4 ____1/4 ____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 63-97-W-0750-000
Other IDWR No. D000030

2. OWNER:
Name Doug Lashier Cond.
Address PO Box 583
City Meridian State ID Zip 83686

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 4 North ☑ or South ☐
Rge. 1 East ☐ or West ☑
Sec. 24, ____ 10 acres 1/4 SE 40 acres 1/4 SW 160 acres 1/4
Gov't Lot ____ County ADA
Lat: : : Long: : :
Address of Well Site 577 W. Fox Rd.
(Give at least name of road + Distance to Road or Landmark) City Meridian

Lt.____ Blk.____ Sub. Name____

4. USE:
☑ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other____

5. TYPE OF WORK check all that apply (Replacement etc.)
☑ New Well ☐ Modify ☐ Abandonment ☐ Other____

6. DRILL METHOD
☑ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	29	400	Pour

Was drive shoe used? ☑ Y ☐ N Shoe Depth(s) 158
Was drive shoe seal tested? ☑ Y ☐ N How? Air

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	+2	158	250	Steel	☑	☐	☑	☐
6	+1	28	250	Steel	☑	☐	☑	☐
					☐	☐	☐	☐

Length of Headpipe 10" Length of Tailpipe 0

MICROFILMED
APR 07 1998

9. PERFORATIONS/SCREENS
☐ Perforations Method____
☑ Screens Screen Type Hustler

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
165	175	18		5"	Stainless	☐	☑
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
30 ft. below ground Artesian pressure ____ lb.
Depth flow encountered 175 ft. Describe access port or control devices: CAP

11. WELL TESTS:
☐ Pump ☐ Bailer ☑ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
70	140	140	3 Hr.

Water Temp. 56 Bottom hole temp. 56
Water Quality test or comments: ____
Depth first Water Encountered 33

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
6	0	3	Top Soil		
	3	5	Hard Pan		
	5	13	Brn CLAY		
	13	26	Sand & Gravel		
	26	29	Brn CLAY		
6	29	33	Brn CLAY		
	33	37	Sand	✓	
	37	45	CLAY		
	45	120	Sand & CLAY Layers	✓	
	120	145	SAND	✓	
	145	154	Sand & CLAY Layers	✓	
	154	165	CLAY Tan		
	165	170	CLAY & Sand Layers	✓	
	170	175	SAND	✓	

RECEIVED
NOV 24 1997
WATER RESOURCES
WESTERN REGION
Department of Water Resources

RECEIVED
NOV 26 1997

Completed Depth 175 (Measurable)
Date: Started 11-10-97 Completed 11-11-97

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Trotter Kelly Dr. Way Firm No. 560
Firm Official John [signature] Date 11-17-97
and
Supervisor or Operator____ Date____
(Sign once if Firm Official & Operator)

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Site F5

Form 238-7
3/95

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Use Typewriter or Ballpoint Pen

RECEIVED 0538[illegible]

AUG 24 1999

Department of Water Resources

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____1/4 ____1/4 ____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 0000 7738
Other IDWR No. 63-98-W-0687-000

2. OWNER:
Name Doug Lasher
Address P.O. Box 583
City Meridian State ID Zip 83680

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 4 North ☒ or South ☐
Rge. 1 East ☐ or West ☒
Sec. 24 1/4 SE (10 acres) 1/4 (40 acres) SW (160 acres) 1/4
Gov't Lot ____ County ADA
Lat: : : Long: : :
Address of Well Site 6673 FOX RUN AVE City Meridian
(Give at least name of road + Distance to Road or Landmark)
Lt. ____ Blk. ____ Sub. Name Fox Tail

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other ____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other ____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Grout	103	180	10 Bags	In Slurry Pit
Bentonite	103	-6	66 Bags	Pour

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 281'
Was drive shoe seal tested? ☐ Y ☒ N How? ____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
12"	+1	180	250	Steel	☒	☐	☒	☐
8"	+2	281	250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS
☐ Perforations Method ____
☐ Screens Screen Type ____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
40 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices: well cap

TESTS: ☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. 75° Bottom hole temp. ____
Water Quality test or comments: ____
Depth first Water Encountered 40'

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
12"	0	5	Topsoil		
	5	36	Hard Big Gravel		
	36	69	Course SAND	X	
	69	73	SAND & Clay	X	
12"	73	100	SAND	X	
8"	100	138	SAND	X	
	138	148	Clay		
	148	181	SAND	X	
	181	260	Fine SAND & Clay Layers	X	
	260	300	muddy fine SAND	X	
	300	310	SAND	X	
8"	310		clay		

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AUG 17 1999
WATER RESOURCES
WESTERN REGION

RECEIVED
JAN 11 1999
WATER RESOURCES
WESTERN REGION

MICROFILMED
OCT 13 1999

Completed Depth 310' (Measurable)
Date: Started 9/19/98 Completed 10/4/98

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Phipps Well Drilling Firm No 311
Firm Official [signature] Date 10/19/99
and
Supervisor or Operator [signature] Date 10/22/98
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Site F6

Form 238-7
3/95

C

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT
Use Typewriter or Ballpoint Pen

66618

Office Use Only
Inspected by _____
Twp____ Rge____ Sec ____
____1/4____1/4 ____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 63-97-W 6310 000
Other IDWR No. _____

2. OWNER:
Name Doug Lasher Cont
Address PO Box 583
City Merd. State ID Zip 83680

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 4 North ☒ or South ☐
Rge. 1 East ☐ or West ☒
Sec. 24 ____ 1/4 SE 1/4 (10 acres) SW 1/4 (40 acres) (160 acres)
Gov't Lot ____ County ADA
Lat: : : Long: : :
Address of Well Site 634 S/y Fox St.
(Give at least name of road + Distance to Road or Landmark)
City Merd.
Lt. 4 Blk. 2 Sub. Name Foxtail

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT (Sacks or Pounds)	METHOD
Bentite	0	18	300	Pour
Concrete	6	40	36	Pump

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 141
Was drive shoe seal tested? ☒ Y ☐ N How? Air

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	+2	141	250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe 5 ft Length of Tailpipe /

9. PERFORATIONS/SCREENS
☐ Perforations Method _____
☒ Screens Screen Type Johnson

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
145	155	25		5	Stainless	☐	☒
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
20 ft. below ground Artesian pressure _____ lb.
Depth flow encountered 145-155 ft. Describe access port or control devices: CAP

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
75-100	120	120	3½

Water Temp. 56 Bottom hole temp. 56
Water Quality test or comments: _____
Depth first Water Encountered 15

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10	0	3	Top Soil		
	3	4	Hard Pan		
	4	14	Sandy Brn CLAY		
	14	18	Sand & Gravel	\	
6	18	38	" "		
	38	89	Brn CLAY & Sand layers	\	
	89	135	Tan Clay & Sand layers	\	
	135	143	Tan Clay		
	143	146	SAND	\	
	146	148	Tan CLAY		
	148	154	SAND	\	
	154	156	CLAY		

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JUL 07 1997
WATER RESOURCES
WESTERN REGION

RECEIVED
JUN 25 1997
WATER RESOURCES
WESTERN REGION

RECEIVED
JUL 22 1997
Department of Water Resources

Completed Depth 155 (Measurable)
Date: Started 5-22-97 Completed 5-22-97

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Treasure Valley Drilling Firm No. 560
Firm Official John Pace Date 5-23-97
and
Supervisor or Operator _____ Date _____
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Chisum Valley Subdivision Well Logs

Site C3

Form 238-7
11/97 JGE

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT 054675

Office Use Only
Inspected by
Twp Rge Sec
1/4 1/4 1/4
Lat: Long:

1. WELL TAG NO. D 12013
DRILLING PERMIT NO. 63-99-W-0744-000
Other IDWR No.

2. OWNER:
Name CW Construction
Address 1300 S. Heidi Place
City Meridian State ID Zip 83642

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

Twp. 2 North [X] or South [ ]
Rge. 1 East [ ] or West [X]
Sec. 2 1/4 SW 1/4 SE 1/4
Gov't Lot County Ada
Lat: Long:
Address of Well Site S. Chisom St.
(Give at least name of road + Distance to Road or Landmark) City Meridian
Lt. 4 Blk. 1 Sub. Name Chisom Sub

4. USE:
[X] Domestic [ ] Municipal [ ] Monitor [ ] Irrigation
[ ] Thermal [ ] Injection [ ] Other

5. TYPE OF WORK: check all that apply (Replacement etc.)
[X] New Well [ ] Modify [ ] Abandonment [ ] Other

6. DRILL METHOD:
[X] Air Rotary [ ] Cable [ ] Mud Rotary [ ] Other

7. SEALING PROCEDURES:

Seal/Filter Pack Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	50	600 lbs	Pour

Was drive shoe used? [X] Y [ ] N Shoe Depth(s) 176
Was drive shoe seal tested? [X] Y [ ] N How? Pressure

8. CASING/LINER:

Diameter	From	To	Guage	Material	Casing	Liner	Welded	Threaded
6	+2	176	250	Steel	[X]	[ ]	[X]	[ ]
					[ ]	[ ]	[ ]	[ ]
					[ ]	[ ]	[ ]	[ ]

Length of Headpipe Length of Tailpipe

9. PERFORATIONS/SCREENS:
[ ] Perforations Method
[ ] Screens Screen Type

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						[ ]	[ ]
						[ ]	[ ]
						[ ]	[ ]

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
110 ft. below ground Artesian pressure lb.
Depth flow encountered 176 ft. Describe access port or control devices: Cap

11. WELL TESTS:
[ ] Pump [ ] Bailer [X] Air [ ] Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
75	160	160	4 hours

Water Temp. 56 Bottom hole temp.
Water Quality test or comments:
Depth first Water Encounter 170

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks; Lithology, Water Quality & Temperature	Water Y	Water N
10	0	10	Brown clay		
10	10	18	Lava		
6	18	55	Lava		
6	55	90	Gravel		
6	90	143	Sand & clay strips		
6	143	152	Brown clay		
6	152		Red sand & brown clay		
		170	strips	X	
6	170	176	Brown clay		
6	176	190	Sand & clay strips	X	
6	190	195	Sand	X	

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SEP 21 1999
Department of Water Resources

RECEIVED
SEP 17 1999
WATER RESOURCES
WESTERN REGION

MICROFILMED
NOV 30 1999

Completed Depth 195 (Measurable)
Date: Started 9/10/99 Completed 9/10/99

13. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Treasure Valley Drilling Firm No. 560
Firm Official Date 9/15/99
and
Driller or Operator Date 9/15/99
(Sign once if Firm Official & Operator)

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Site C5

Form 238-7
11/87 JGE

764956

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Office Use Only
Inspected by
Twp Rge Sec
1/4 1/4 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0015048
DRILLING PERMIT NO.
Other IDWR No.

2. OWNER:
Name Roger & Pam Thorston
Address 5537 N. Koaster
City Boise State ID Zip 83713

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 2 North [X] or South [ ]
Rge. 1 East [ ] or West [X]
Sec. 2 1/4 (10 acres) SW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot County Ada
Lat: Long:
Address of Well Site 7675 McClintock
City Meridian
(Give at least name of road + Distance to Road or Landmark)
Lt. 15 Blk. 1 Sub. Name Chisom Valley

4. USE:
[X] Domestic [ ] Municipal [ ] Monitor [ ] Irrigation
[ ] Thermal [ ] Injection [ ] Other

5. TYPE OF WORK: check all that apply (Replacement etc.)
[X] New Well [ ] Modify [ ] Abandonment [ ] Other

6. DRILL METHOD:
[X] Air Rotary [ ] Cable [ ] Mud Rotary [ ] Other

7. SEALING PROCEDURES:

Seal/Filter Pack Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	18	400 lbs	Pour

Was drive shoe used? [X] Y [ ] N Shoe Depth(s) 158
Was drive shoe seal tested? [X] Y [ ] N How? Air

8. CASING/LINER:

Diameter	From	To	Guage	Material	Casing	Liner	Welded	Threaded
6	+2	158	250	Steel	[X]	[ ]	[X]	[ ]
					[ ]	[ ]	[ ]	[ ]
					[ ]	[ ]	[ ]	[ ]

Length of Headpipe Length of Tailpipe

9. PERFORATIONS/SCREENS:
[ ] Perforations Method
[X] Screens Screen Type PVC

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
160	170	20		4.5	PVC	[ ]	[X]
						[ ]	[ ]
						[ ]	[ ]

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
85 ft. below ground Artesian pressure lb.
Depth flow encountered 160-170 ft. Describe access port or control devices: Cap

11. WELL TESTS:
[ ] Pump [ ] Bailer [X] Air [ ] Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
70	140	140	4 hours

Water Temp. Bottom hole temp.
Water Quality test or comments:
Depth first Water Encounter 90

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10	0	8	Brown Clay		
10	8	18	Lava		
8	18	62	Lava		
6	62	80	Gravel		
6	80	156	Sand & clay strips	X	
6	156	160	Tan Clay		
6	160	170	Sand	X	

RECEIVED
JUN 14 2000
Department of Water Resources

RECEIVED
JUN 14 2000
Department of Water Resources

RECEIVED
JUN 09 2000
WATER RESOURCES
WESTERN REGION

Completed Depth 170 (Measurable)
Date: Started 5/31/2000 Completed 6/1/2000

13. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Treasure Valley Drilling & Pump Firm No. 560
Firm Official Date 6/7/00
and
Driller or Operator Date 6/7/00
(Sign once if Firm Official & Operator)

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Site C6

Form 238-7
11/97

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

054674

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 63-99-W 0726-000
DRILLING PERMIT NO. D00012040
Other IDWR No. _____

2. OWNER:
Name _____
Address Scott Johnson 3095 N. 5 Mile Apt. 102
City Boise State Id. Zip 83713

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 2 North ☐ or South ☐
Rge. 1 East ☐ or West ☒
Sec. 2, ____ 1/4 SW 1/4 SE 1/4
Gov't Lot ____ County Ada
Lat: : : Long: : :
Address of Well Site 7676 S. McClintock
City Meridian
(Give at least name of road + Distance to Road or Landmark)

Lt. 18 Blk. 1 Sub. Name Chisum Valley

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☐ Air Rotary ☒ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	18	8	Overbore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) _____
Was drive shoe seal tested? ☒ Y ☐ N How? Pressure

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	1	217'	250	Steel	☒	☒	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

RECEIVED
SEP 28 1999
Department of Water Resources

RECEIVED
SEP 23 1999
WATER RESOURCES
WESTERN REGION

MICROFILMED
NOV 30 1999

9. PERFORATIONS/SCREENS
Perforations Method _____
Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
65' ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: Sanitary Well Cap

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
150		200	2
50		120	2

Water Temp. 68 Bottom hole temp. _____
Water Quality test or comments: 14 Gr. Hardness
Depth first Water Encounter _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10"	0	8	Dirt	No	
10"	8	18	Black Lava Rock	No	
08"	18	41	Black Lava Rock	No	
06"	41	82	Cemented Gravel	No	
06"	82	211	Heaving Sand	Yes	
06"	211	219	Brown Sticky Clay	No	
06"	219	220	White & Brown Sand/150 gpm	Yes	

Completed Depth 220' (Measurable)
Date: Started 9/1/99 Completed 9/7/99

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Can-Ada Well & Pump Firm No. 304
Firm Official Earl Skinner Date 9/20/99
and
Driller or Operator Earl Skinner Date 9/20/99
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Site C7

770165

Form 238-7
11/97

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0018756
DRILLING PERMIT NO. ____-____-____-_____-_____
Other IDWR No. _____

2. OWNER:
Name Mark Renberg
Address 11400 W. Daniel
City Boise State Id Zip 83713

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 2 North X or South ☐
Rge. 1 East ☐ or West X
Sec. 2, SW 1/4 (10 acres) SE 1/4 (40 acres) ____ 1/4 (160 acres)
Gov't Lot ____ County _____
Lat: : : Long: : :
Address of Well Site McClintock
City Meridian
(Give at least name of road + Distance to Road or Landmark)
Lt. 16 Blk. 1 Sub. Name Chisum Valley

4. USE:
X Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
X New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
X Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	55	700#	overbore

Was drive shoe used? X ☐ N Shoe Depth(s) 212
Was drive shoe seal tested? ☐ Y X N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+2	212	250	Steel	X	☐	X	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe 10' Length of Tailpipe _____

9. PERFORATIONS/SCREENS
Perforations Method _____
Screens Screen Type Nagaoka

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
215	220	.035		5	SS	☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
85 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: Well Cap

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
80			1 hour

Water Temp. 60° Bottom hole temp. _____
Water Quality test or comments: Iron T.O Grains 1
PH 7.5
Depth first Water Encounter 89'

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10	0	4	top soil		
"	4	9	hard pan		
"	9	51	lava		
"	51	55	clay		
6	55	82	gravel		
"	82	89	sand	X	
"	89	150	clay & sand layers	X	
"	150	167	clay		
"	167	191	sand	X	
"	191	210	sand & gravel	X	
"	210	214	clay & sand layers	X	
"	214	215	clay		
"	215	220	sand	X	

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Department of Water Resources

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WATER RESOURCES
WESTERN REGION

Completed Depth 220'
Date: Started 7-30-01 Completed 7-31-01

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Adamson Pump & Drilling No. 0457
Firm Official Dan Adamson Date 8-1-01
and
Driller or Operator Ty Pyle Date 8-1-01
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Appendix B

Horizontal Planar Source (HPS) Model Output File for Primrose Subdivision NP Model

PRIMROSE SUBDIVISION ON-SITE SYSTEM MODELING

20050224 101249.419

HORIZONTAL PLANE SOURCE (HPS) MODEL
ANALYTICAL THREE DIMENSIONAL SOLUTION FOR GROUND-WATER CONTAMINANT TRANSPORT

INPUT VALUES

SOURCE DATA

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
104.5	34.8	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
122.0	0.0	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
108.0	-29.6	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
64.5	-57.5	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
115.0	48.8	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

```
X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   163.8             -48.8               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   177.7               78.4               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   243.9               99.3               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   287.5               31.4               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   266.6              118.5               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   299.7               47.0               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   308.4              149.8               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
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```
   399.0             160.3              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   433.8             108.0              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   411.1             179.4              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   453.0              90.6              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   470.4             231.7              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   524.4             257.8              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   576.7             179.4              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   555.7             264.8              0.0              2.4        15.2
```

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
599.3	170.7	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
611.5	296.2	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
676.0	318.8	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
714.3	256.1	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
703.8	341.5	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
135.9	-228.2	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
162.0	-216.0	0.0	2.4	15.2

```
TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   189.9             -198.6              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   219.5             -184.7              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   249.1             -170.7              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   280.5             -151.6              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   318.8             -132.4              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   351.9             -118.5              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   379.8             -101.0              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
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```
  0.000E+00           4.5000E+01             1.1130E+01             1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   411.1             -87.1              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01             1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   437.3             -69.7              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01             1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   463.4             -57.5              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01             1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   507.0             -41.8              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01             1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   541.8             -22.6              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01             1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   561.0              -7.0              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01             1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   594.1               3.5              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01             1.8624E+04
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X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   622.0              17.4              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   653.3              34.8              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   679.4              43.6              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   705.6              59.2              0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   144.6             -252.6             0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   174.2             -238.7             0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   202.1             -223.0             0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04
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X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   233.4             -209.1               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   259.6             -191.6               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   296.2             -176.0               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   329.3             -155.1               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   362.4             -141.1               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   390.2             -122.0               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   418.1             -104.5               0.0             2.4       15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01             1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
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   440.8              -95.8               0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01              1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   470.4              -80.1               0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01              1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   513.9              -62.7               0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01              1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   545.3              -45.3               0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01              1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   576.7              -31.4               0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01              1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   602.8              -17.4               0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01              1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   634.1               0.0               0.0              2.4        15.2

TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
  0.000E+00           4.5000E+01              1.1130E+01              1.8624E+04

X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
   660.3              17.4               0.0              2.4        15.2
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TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
686.4	24.4	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
712.5	45.3	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
796.2	205.6	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
806.6	174.2	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
824.0	134.1	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
857.1	80.1	0.0	2.4	15.2

TIME(YR)	SOURCE CONCENTRATION(MG/L)	INFILTRATION RATE(M/YR)	SOURCE MASS FLUX(G/YR)
0.000E+00	4.5000E+01	1.1130E+01	1.8624E+04

X LOCATION(M)	Y LOCATION(M)	Z LOCATION(M)	LENGTH(M)	WIDTH(M)
867.6	48.8	0.0	2.4	15.2

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    TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
      0.000E+00           4.5000E+01              1.1130E+01               1.8624E+04

    X LOCATION(M)     Y LOCATION(M)     Z LOCATION(M)     LENGTH(M)     WIDTH(M)
       888.5               7.0               0.0              2.4         15.2

    TIME(YR)    SOURCE CONCENTRATION(MG/L)    INFILTRATION RATE(M/YR)    SOURCE MASS FLUX(G/YR)
      0.000E+00           4.5000E+01              1.1130E+01               1.8624E+04

    GROUND WATER VELOCITY IN X DIRECTION(M/YR)=    127.01
    AQUIFER THICKNESS(M)=  30.50          POROSITY=0.30
    RETARDATION FACTOR= 1.0000E+00     DECAY RATE(YR-1)=0.00000000


PROGRAM RESULTS: MAX. TIME(YEARS)=   30.0

X LOCATION(M)   Y LOCATION(M)   MAX  Z (M)   CONCENTRATION(MG/L)   INT. TIME LIMITS(YRS)
                                                                   START      END

    735.2          344.9           0.0            1.47596E+01      0.0       30.0
    735.2          344.9          -4.6            2.86544E-01      0.0       30.0
    749.1          313.6           0.0            5.40064E+00      0.0       30.0
    749.1          313.6          -4.6            1.99933E+00      0.0       30.0
    766.6          278.7           0.0            3.55933E+00      0.0       30.0
    766.6          278.7          -4.6            2.21550E+00      0.0       30.0
    780.5          247.4           0.0            6.66268E+00      0.0       30.0
    780.5          247.4          -4.6            3.30849E+00      0.0       30.0
    797.9          214.3           0.0            1.70673E+00      0.0       30.0
    797.9          214.3          -4.6            1.26425E+00      0.0       30.0
    815.3          182.9           0.0            1.69258E+01      0.0       30.0
    815.3          182.9          -4.6            3.57166E+00      0.0       30.0
    829.3          153.3           0.0            4.14577E+00      0.0       30.0
    829.3          153.3          -4.6            3.26760E+00      0.0       30.0
    843.2          120.2           0.0            3.78169E+00      0.0       30.0
    843.2          120.2          -4.6            2.79342E+00      0.0       30.0
    860.6           88.9           0.0            6.28145E+00      0.0       30.0
    860.6           88.9          -4.6            3.42563E+00      0.0       30.0
    876.3           57.5           0.0            2.15343E+01      0.0       30.0
    876.3           57.5          -4.6            6.71082E+00      0.0       30.0
    876.3           57.5         -15.2            8.31762E-01      0.0       30.0
    892.0           26.1           0.0            1.24362E+01      0.0       30.0
    892.0           26.1          -4.6            9.16440E+00      0.0       30.0
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892.0	26.1	-15.2	9.92126E-01	0.0	30.0
909.4	0.0	0.0	2.62148E+01	0.0	30.0
909.4	0.0	-4.6	8.25518E+00	0.0	30.0
909.4	0.0	-15.2	1.07076E+00	0.0	30.0
878.0	-17.4	0.0	9.99398E+00	0.0	30.0
878.0	-17.4	-4.6	7.81053E+00	0.0	30.0
878.0	-17.4	-15.2	1.00050E+00	0.0	30.0
846.7	-34.8	0.0	9.76172E+00	0.0	30.0
846.7	-34.8	-4.6	7.63514E+00	0.0	30.0
846.7	-34.8	-15.2	9.74074E-01	0.0	30.0
815.3	-52.3	0.0	9.48285E+00	0.0	30.0
815.3	-52.3	-4.6	7.42925E+00	0.0	30.0
815.3	-52.3	-15.2	9.29179E-01	0.0	30.0
782.2	-66.2	0.0	9.26271E+00	0.0	30.0
782.2	-66.2	-4.6	7.20637E+00	0.0	30.0
782.2	-66.2	-15.2	8.23442E-01	0.0	30.0
752.6	-80.1	0.0	8.98661E+00	0.0	30.0
752.6	-80.1	-4.6	6.93774E+00	0.0	30.0
752.6	-80.1	-15.2	7.04984E-01	0.0	30.0
721.3	-97.6	0.0	8.61190E+00	0.0	30.0
721.3	-97.6	-4.6	6.59735E+00	0.0	30.0
689.9	-111.5	0.0	8.23494E+00	0.0	30.0
689.9	-111.5	-4.6	6.24276E+00	0.0	30.0
656.8	-127.2	0.0	7.64914E+00	0.0	30.0
656.8	-127.2	-4.6	5.77282E+00	0.0	30.0
627.2	-142.9	0.0	7.34193E+00	0.0	30.0
627.2	-142.9	-4.6	5.54071E+00	0.0	30.0
597.6	-158.5	0.0	7.28520E+00	0.0	30.0
597.6	-158.5	-4.6	5.50198E+00	0.0	30.0
569.7	-170.7	0.0	7.44757E+00	0.0	30.0
569.7	-170.7	-4.6	5.61047E+00	0.0	30.0
534.8	-188.2	0.0	7.84453E+00	0.0	30.0
534.8	-188.2	-4.6	5.89552E+00	0.0	30.0
505.2	-202.1	0.0	7.96626E+00	0.0	30.0
505.2	-202.1	-4.6	5.94919E+00	0.0	30.0
472.1	-223.0	0.0	7.22422E+00	0.0	30.0
472.1	-223.0	-4.6	5.37774E+00	0.0	30.0
439.0	-236.9	0.0	6.03088E+00	0.0	30.0
439.0	-236.9	-4.6	4.40320E+00	0.0	30.0
414.6	-250.9	0.0	4.06306E+00	0.0	30.0
414.6	-250.9	-4.6	2.92459E+00	0.0	30.0