Table 3-1
Summary of Results
2003 LUB GWMA Synoptic Sampling Event Report

Statistical Method Used on Censored Data	Parameter	Ammonia + Ammonium	Bromide	Calcium	Chloride	Fluoride	Iron	Magnesium	Manganese	Nitrate-Nitrogen	Perchlorate	Phosphorus	Potassium	Sodium	Sulfate
	Units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µg/l	mg/l	mg/l	mg/l	mg/l
	# samples (1)	134	133	135	133	133	135	135	135	134	133	135	135	135	133
	% nondetectable	76%	74%	0%	0%	0%	42%	0%	61%	4%	46%	9%	0%	0%	0%
Substitution of one-half the detection limit	*Minimum*	0.05	0.1	11.1	3.68	0.0802	0.005	5.6	0.001	0.025	0.5	0.005	2.59	6.5	0.667
	Median	0.05	0.1	64.6	27	0.269	0.017	23.3	0.001	7.77	1.14	0.0532	6.7	40.8	36.8
	Mean	0.09	0.24	70.12	46.64	0.32	0.27	26.63	0.039	12.97	2.33	0.11	7.07	48.87	54.63
	Maximum	1.23	2.09	227	229	1.48	6.52	84.9	0.950	51.1	24.8	2.98	14.6	239	253
	Standard Deviation	0.12	0.35	39.8	46.3	0.19	0.95	15.4	0.136	13.2	3.29	0.30	2.67	35.2	49.8
	Inter Quartile Range	0.02	0.10	47.8	47.0	0.17	0.07	16.8	0.008	15.3	2.25	0.08	3.93	34.2	48.9
	Variance	6.79	0.13	1580	2145	0.04	0.89	237	0.02	174	10.8	0.09	7.12	1236	2484
	Skewness	57.77	3.23	1.09	1.92	2.62	5.42	1.37	5.05	1.25	3.75	7.81	0.71	2.67	1.87
	Normal Distribution? (2)	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	Natural Log Distribution? (2)	No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes	No
MLE or K-M (9)	*Median*	0.05	0.07	--	--	--	0.017	--	0.0009	7.66	1.18	0.05	--	--	--
	Mean	0.08	0.23	--	--	--	0.27	--	0.126	12.95	2.57	0.11	--	--	--
	Federal Primary Drinking Water Standard (3)					4.0				10					
	Federal Secondary Drinking Water Standard (4)				250	2.0	0.3		0.05						250
	Other Comparison Values	30 (5)		approx. 300 mg/l in alluvial aquifers (6)				generally <40 (6)	0.3 (5)		1 to 24.5 ppb (7)	total phosphate generally < 10 (6)	up to 50 (6)	20 mg/l (for those on a 500 mg/day restricted sodium diet) (8)	500 (5)
	Any Problems Identified?	Probably not; less than lifetime health advisory	Probably not; not a priority pollutant or carcinogen	Probably not; within naturally occurring levels; some intake of this nutrient is required for good health	No; less than standard	No; less than standard	Yes; 1 domestic and 16 monitoring wells exceed standard; some intake of this nutrient is required for good health	Probably not; not a priority pollutant or carcinogen; some intake of this nutrient is required for good health	Yes; 3 domestic, 1 irrigation, 1 industrial, and 16 monitoring wells exceed secondary standard. 1 domestic and 5 monitoring wells exceed the lifetime health advisory; some intake of this nutrient is required for good health	Yes; 14 domestic, 26 monitoring, and 10 irrigation wells exceed standard	Perhaps; depending on how much perchlorate is in milk and food, and what the eventual standard is. See footnote (7)	Probably not; not a priority pollutant or carcinogen	Probably not; not a priority pollutant or carcinogen; some intake of this nutrient is required for good health	Perhaps: 47 domestic, 1 community, and 75 other wells exceed advisory level; some intake of this nutrient is required for good health	Probably not; only 1 well (an irrigation well) exceeded the 250 mg/l standard

Notes:
(1) 135 wells were sampled but 2 bottles opended during transit so the number of samples analyzed ranged from 133 to 135, depending on the analyte.
(2) Data distributions were evaluated using the Ryan-Joiner method with a confidence level of 95%.
(3) Primary Drinking Water Standards are legally enforceable standards that apply to public water systems for specific contaminants that can adversely affect public health.
(4) Secondary Drinking Water Standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects or aesthetic effets in drinking water.
(5) A Lifetime Health Advisory is the concentration in drinking water that is not expected to cause any adverse noncarcinogenic effects over a lifetime of exposure, with a margin of safety.
(6) Value cited in "Study and Interpretation of the Chemical Characteristics of Natural Water" by J.D. Hem, 1985. USGS Water Supply Paper 2254.
(7) There is no national or Oregon standard for perchlorate. Individual states have set their own guidance concentrations which range from 1 ug/l to 18.5 ug/l. On 1/26/06, EPA published an assessment guidance with a preliminary remediation goal of 24.5 ug/l for perchlorate in drinking water. This would be considered a “safe” level and the highest concentration of perchlorate in drinking water that is not expected to pose any significant risk to human health. In addition to perchlorate being found in water, it may also accumulate in food (including milk). If the additional exposures from these other sources are included, the level that would be considered safe in drinking water would be lower than 24.5 ug/l.
(8) A Drinking Water Advisory is a nonregulatory concentration of a contaminant in water that is likely to be without adverse effects on both health and aesthetics.
(9) Maximum Likelihood Estimation (MLE) was used on data sets with 50% to 80% censoring. The Kaplan-Meier (K-M) method was used on data sets with <50% censoring.

Table 4-1
Summary of Trend Evaluation
2003 LUB GWMA Synoptic Sampling Event Report

Well ID (1)	June/July 1992 Nitrate (mg/l)	Sept/Oct 2003 Nitrate (mg/l)	1992 to 2003 Change	Is there a "significant difference" in concentration? (2)	Slope between two Synoptic Sampling Events (mg/l/yr)	Seasonal-Kendall Trend (3)		Are Synoptic Event results representative of S-K trend DIRECTION?	Are Synoptic Event results representative of S-K trend MAGNITUDE?
						Slope (mg/l/yr)	Significance Level		
UMA028	2.40	5.88	Increased by 3.48 mg/l	Yes	0.310	0.634	99%	Yes	no
UMA029	24.0	45.9	Increased by 21.90 mg/l	Yes	1.951	0.269	80%	Yes	no
UMA033	7.70	7.09	Decreased by 0.61 mg/l	no	-0.054	-0.036	<80%	Yes	Yes
UMA034	2.40	2.00	Decreased by 0.40 mg/l	no	-0.035	0.034	85%	no	
UMA038	2.90	2.40	Decreased by 0.50 mg/l	no	-0.045	-0.066	90%	Yes	Yes
UMA046	0.48	1.96	Increased by 1.48 mg/l	Yes	0.130	-0.007	80%	no	
UMA047	2.60	3.50	Increased by 0.90 mg/l	Yes	0.080	0.072	100%	Yes	Yes
UMA048	1.50	1.65	Increased by 0.15 mg/l	no	0.013	0.030	100%	Yes	Yes
UMA056	6.30	6.46	Increased by 0.16 mg/l	no	0.014	-0.050	99%	no	
UMA058	23.0	9.21	Decreased by 13.80 mg/l	Yes	-1.227	-0.581	99%	Yes	Yes
UMA084	6.90	11.4	Increased by 4.50 mg/l	Yes	0.400	-0.416	99%	no	
UMA085	24.0	35.6	Increased by 11.60 mg/l	Yes	1.033	1.390	99%	Yes	Yes
UMA094	11.0	7.50	Decreased by 3.50 mg/l	Yes	-0.312	-0.255	99%	Yes	Yes
UMA096	31.0	19.6	Decreased by 11.40 mg/l	Yes	-1.016	-0.214	99%	Yes	no
UMA103	24.0	22.9	Decreased by 1.10 mg/l	no	-0.090	0.117	<80%	no	
UMA106	0.70	0.93	Increased by 0.23 mg/l	no	0.020	-0.001	<80%	no	
UMA109	2.30	3.19	Increased by 0.89 mg/l	Yes	0.079	0.245	99%	Yes	no
UMA110	5.40	5.28	Decreased by 0.12 mg/l	no	-0.011	-0.131	<80%	Yes	Yes
UMA112	5.10	3.84	Decreased by 1.26 mg/l	Yes	-0.112	-0.020	<80%	Yes	no
UMA116	3.30	3.26	Decreased by 0.04 mg/l	no	-0.004	0.140	99%	no	
UMA119	9.20	8.24	Decreased by 0.96 mg/l	Yes	-0.085	0.271	99%	no	
UMA122	12.0	28.4	Increased by 16.40 mg/l	Yes	1.460	1.618	99%	Yes	Yes
UMA133	18.0	13.3	Decreased by 4.70 mg/l	Yes	-0.419	-0.135	<80%	Yes	no
UMA144	2.10	9.36	Increased by 7.26 mg/l	Yes	0.647	-0.399	99%	no	
UMA156	7.90	10.8	Increased by 2.90 mg/l	Yes	0.258	0.463	99%	Yes	Yes
UMA160	0.02	18.6	Increased by 18.58 mg/l	Yes	1.654	0.007	99%	Yes	no
UMA164	3.0	4.02	Increased by 1.02 mg/l	Yes	0.091	0.166	99%	Yes	Yes
UMA168	3.80	3.28	Decreased by 0.52 mg/l	Yes	-0.046	-0.128	99%	Yes	no
UMA180	0.70	3.98	Increased by 3.28 mg/l	Yes	0.292	0.398	99%	Yes	Yes
UMA185	0.13	0.16	Increased by 0.03 mg/l	no	0.003	0.002	99%	Yes	Yes
UMA190	0.63	1.45	Increased by 0.82 mg/l	Yes	0.073	0.125	99%	Yes	Yes
UMA191	1.10	0.25	Decreased by 0.85 mg/l	Yes	-0.076	0.041	99%	no	
UMA198	9.0	31.2	Increased by 22.20 mg/l	Yes	1.977	0.967	99%	Yes	no
UMA201	12.0	16.0	Increased by 4.00 mg/l	Yes	0.356	1.124	99%	Yes	no

minimum =	-1.227	-0.581
median =	0.014	0.030
average =	0.209	0.162
maximum =	1.977	1.618
# of Increasing Trends =	20	19
# of Decreasing Trends =	14	9
# of Statistically Insignificant Trends =	--	6
TOTAL =	34	34

Synoptic event results are representative of BOTH long term trend direction and magnitude at 14 wells.
Synoptic event results are representative of long term trend direction BUT NOT magnitude at 10 wells.
Synoptic event results ARE NOT representative of long term trend direction at 10 wells.

Notes:

(1) Wells included in this table are the bi-monthy network wells which exhibited detectable nitrate concentrations during both the 1992 and 2003 Synoptic Sampling Events.

(2) A "Significant difference" between the two Synoptic Sampling Events is defined as a relative percent difference of >10% AND an absolute difference of >0.5 mg/l.

(3) The Seasonal-Kendall trend was calculated using all data available from each well; typically from late 1991 through 2004.

Table 5-1
Summary of Perchlorate Detections
2003 LUB GWMA Synoptic Sampling Event Report

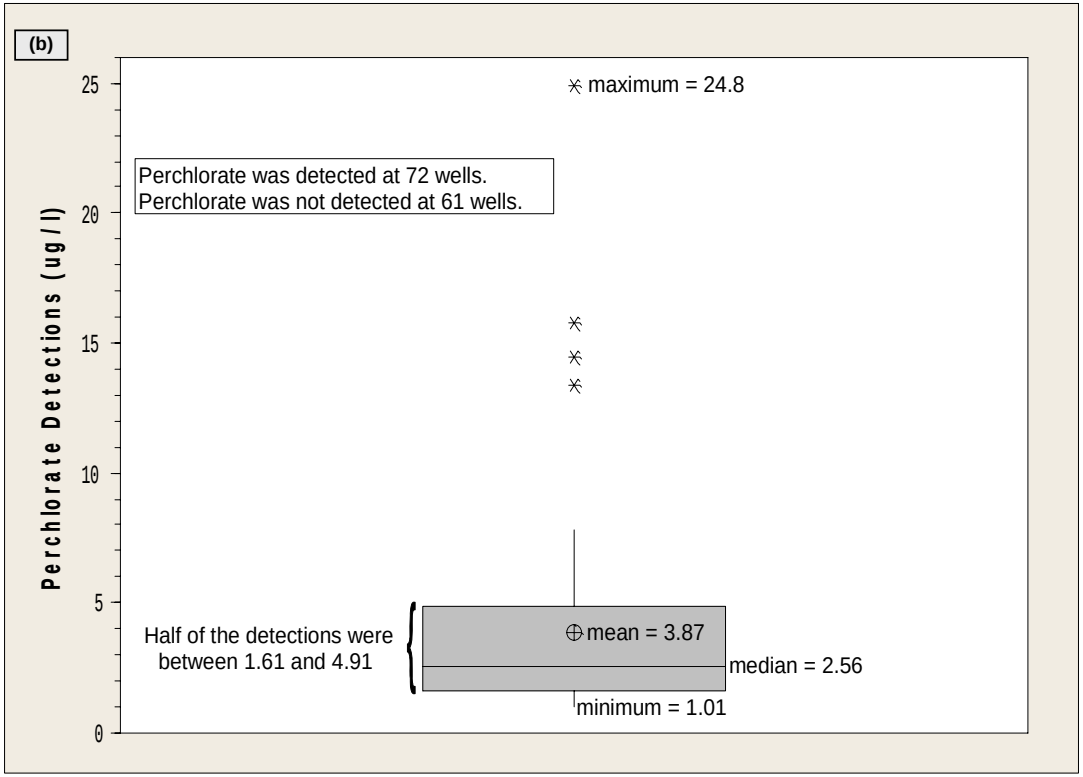
(a)

Well Type	*# Wells Sampled*	*% of Wells Sampled*	*# Wells with perchlorate analyzed (1)*	*# Wells with perchlorate detected (2)*	*% Wells with perchlorate detected*	*# Wells with perchlorate NOT detected*	*% Wells with perchlorate NOT detected*	*Minimum perchlorate detection*	*Median perchlorate detection*	*Average perchlorate detection*	*Maximum perchlorate detection*
Monitoring well	62	46%	61	37	61%	24	39%	1.10	2.89	4.97	24.8
Domestic well	54	40%	54	25	46%	29	54%	1.06	2.17	2.95	6.92
Irrigation well	14	10%	13	9	69%	4	31%	1.01	2.04	2.24	4.23
Industrial well	3	2%	3	0	0%	3	100%	--	--	--	--
Community well	1	1%	1	1	100%	0	0%	1.14	--	--	1.14
Stock Watering well	1	1%	1	0	0%	1	100%	--	--	--	--
TOTAL	**135**	**100%**	**133**	**72**	**54%**	**61**	**46%**	1.01	2.56	3.87	24.8

(1) = Samples from 1 monitoring well and 1 irrigation well were not analyzed for perchlorate because the bottle lid came off during transit.

(2) = Perchlorate values in this table represent "conditioned" data (i.e., duplicate samples have been averaged into one value). Censored data (values reported below the detection limit) are not included in this table.

(b)



Boxplot Explanation:
The lower limit of the box is the 25th percentile (i.e., 25% of the data is less than this value). The upper limit of the box is the 75th percentile. The height of the box is the interquartile range (IQR) and includes half of the data. The median value is labeled and indicated by a line across the box. A plus inside a circle denotes the mean value. Heights of the two box halves depict the skewness (e.g., if the top half is larger the data is positively skewed). Vertical lines are drawn from the top and bottom of the box to the farthest data points within 1.5 times the IQR. Any data points beyond this distance are plotted individually with an asterisk.