Report on Water Quality

Gifford, Arkansas

And Surrounding Area

Arkansas Department of Pollution Control & Ecology
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INTRODUCTION

A water quality survey was conducted in Hot Spring County near the town of Gifford, Arkansas. The survey was conducted in response to complaints by area residents, who were concerned about the potential impacts to water quality by Willamette Industries. Willamette manufactures MDF hardboard, a medium density fiberboard made with wood fibers and resins. Presently Willamette discharges noncontact cooling water under permit conditions established by the Department, and also has both an Air Permit and a Storm Water Discharge Permit.

A reconnaissance was conducted on July 22, 1996, in order to identify possible surface and subsurface sampling sites. The surface water sampling stations were chosen to evaluate water quality upstream and downstream from Willamette Industries and Spurlock Adhesives. The creeks chosen for purposes of sampling and analyses included Big Creek, Rayburn, and Francois and their upper tributaries. Ground water sampling sites were chosen based on two criteria; first, to establish background (upgradient from Willamette) and downgradient water quality conditions and, second, to evaluate water quality from wells at locations where residents had experienced various illnesses.

Sampling was conducted predominantly on July 23, 1996, although two additional ground water samples were collected on July 29, 1996. A 2-liter plastic container was used for collection of nutrients and general water chemistry including chlorides and sulfates. Volatile organics were collected in OVA glass vials with teflon septum tops; semivolatiles were collected in 1-liter glass containers; and metals were collected in pre-cleaned plastic bottles preserved with concentrated nitric acid. Ground water samples were also analyzed for fecal coliform within 6 hours of the sampling event. Eight surface water samples and eight ground water samples were collected for a total of 16 water samples. Figure 1 denotes the locations for all surface water sampling sites and Figure 2 contains the ground water sampling locations.

GENERAL WATER QUALITY

A list of general water quality parameters are provided in Tables 1 and 2. Table 1 lists the minimum, maximum and average concentrations for selected parameters from samples taken from stream samples north of Gifford and in the vicinity of Willamette Industries and Spurlock Adhesives. Table 2 presents the same set of statistical analyses for the ground water samples taken for the investigation.

FIGURE 1 - SURFACE WATER SAMPLING LOCATIONS

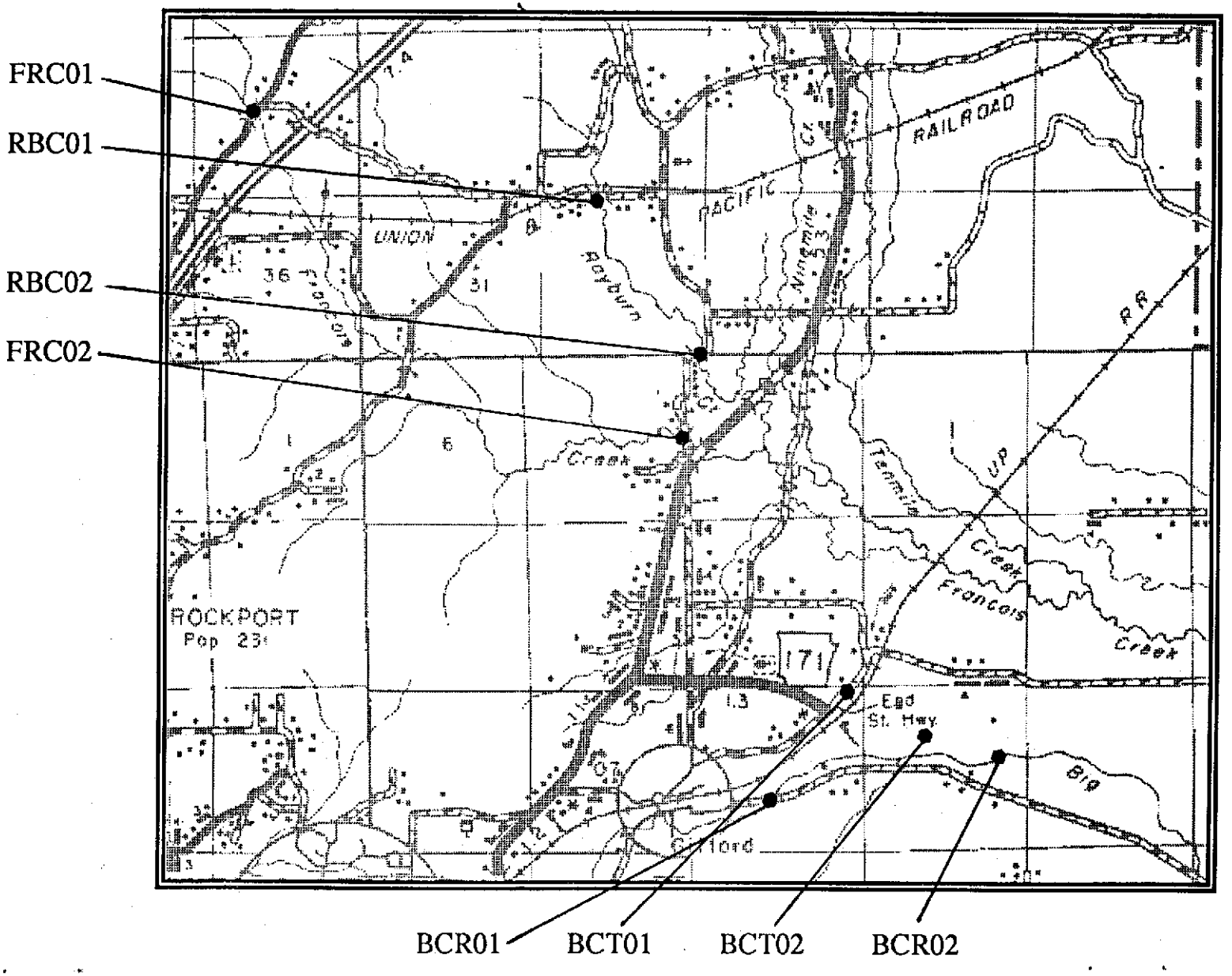

FIGURE 2 - GROUND WATER SAMPLING LOCATIONS

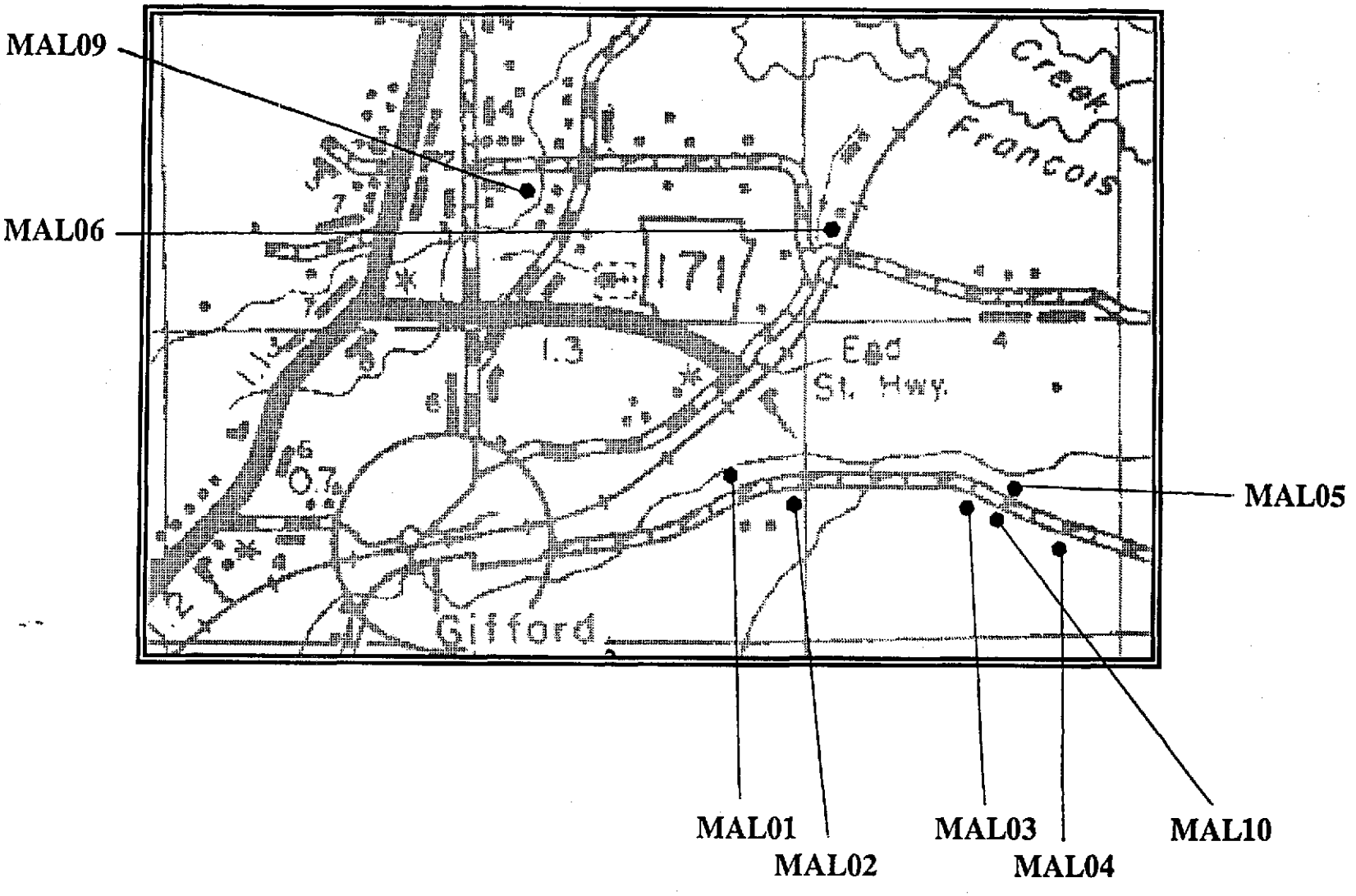

Table 1. Statistical analyses of selected parameters from stream samples.

	Al µg/L	Fe µg/L	Mn µg/L	Zn µg/L	Ca mg/L	K mg/L	Na mg/L	Mg mg/L	NH_3-N mg/L	NO_3-N mg/L	SO_4 mg/L	Cl mg/L	TDS mg/L
min.	44	74	78	4.8	1.8	0.5	0.04K*	0.3	0.05K	0.15	3.9	2.7	44
max.	306	919	616	18.7	6.8	2.7	12.5	1.6	1.5	0.54	21.0	12.0	103
ave.	150	400	314	12.1	4.3	1.3	3.1	1.0	0.22	0.35	11.6	3.7	62

* actual value is known to be less than value given

Table 2. Statistical analyses of selected parameters from well samples.

	Al µg/L	Fe µg/L	Mn µg/L	Zn µg/L	Ca mg/L	K mg/L	Na mg/L	Mg mg/L	NH_3-N mg/L	NO_3-N mg/L	SO_4 mg/L	Cl mg/L	TDS mg/L
min.	16K	25	6.4	21	0.3	0.2	1.0	0.4	0.05K	0.08	1.3	1.7	24
max	171	52,600	162	619	5.8	1.0	5.6	1.7	0.11	3.1	8.8	7.2	76
ave.	74	161*	56	238	2.6	0.6	2.8	0.8	0.05	1.1	3.6	3.9	46

* value of 52,600 not included in mean value

The overall quality of both the surface and ground water in the area is very good. Surface water quality tended to fit the data noted for this ecoregion. One exception was the elevated ammonia concentration of 1.5 mg/L. This sample was taken downstream from the permitted discharge at Spurlock Adhesives, which contains various ammonia concentrations from onsite process water. Dissolved oxygen was also included in the field analysis of surface water and was generally above 6.0 mg/L, except in three locations: FRC02, BCT01, and BCT02. BCT01 and 02 were above and below Willamette in a location where beavers had dammed the flow creating a shallow bog, which reflect the greater oxygen demand.

Ground water was of very good quality, except for one well (MAL05), which had an iron content of 52.6 mg/L and five wells (MAL01, 03, 05, 09, and 10) which had detections of fecal coliform. The iron concentration in MAL05 was exceptionally high and is believed to be the from the holding tank or other metal sources. While there is no health standard for iron, a secondary drinking water standard of 0.3 mg/L is recommended because of staining and other household problems due to excessive amounts. Fecal coliform is commonly detected in wells that are in close proximity to septic systems. The maximum contaminant level (MCL) for fecal coliform in public water systems is 0 colonies/100 ml. Although private wells are not regulated under the Safe Drinking Water Act, users are normally advised to boil their water when fecal coliform is present.

The average concentration of 46 mg/L total dissolved solids for the ground water samples (Table 2) indicates a very soft water which is low in dissolved solids. One interesting fact is that the average concentration for most of the inorganic parameters in the ground water was in close comparison to the surface water quality. The metals were slightly lower, which may reflect the retardation of the metals in the vadose zone by oxidation, ion exchange or other means. Zinc was considerably higher in the ground water samples, which is most likely a result of the plumbing.

Organic Chemistry

Semivolatile and volatile organics were detected in both surface and subsurface samples, although additional data suggest that most of these detections were the result of contamination in the sampling and/or analyses phase and, as such, was not in the water at the time of sampling. All organic parameters which were above detection limit do not have either established MCLs or MCL goal concentrations, except for pentachlorophenol, which has an mcl of 0.001 mg/L, and benzo(a)pyrene, which has a MCL of 0.002 mg/L.

Table 3 lists the drinking water standards and health advisories for the organic chemicals detected in the samples. The parameters identified with an asterisk (*) were found in most all of the samples, both stream and ground water, and in the trip blanks and reagent blanks. These chemicals are known generally as "plasticisers" and found in numerous products including cleaners, disinfectants and plastics. These chemicals are frequently found in well water samples as a result of plastic (pvc) plumbing. Because they were found in the blanks, and have been found in many other samples within the last few weeks, they are believed to be the direct result of laboratory contamination, most likely from cleaning products used by the janitors.

Acetone and methylene chloride are common laboratory contaminants, which are found by many laboratories in a high percentage of samples. These chemicals are used primarily as a rinsate and solvent, respectively; are highly volatile and slightly to highly soluble; and, are used in large quantities by the laboratory. Most water open to the laboratory environment will commonly show variable concentrations of both chemicals. Acetone was also detected in the trip blank at 12.8 ug/L.

Pentachlorophenol has been used for many years as a wood-treatment chemical. Pentachlorophenol is a common contaminant detected in both soils and ground water at various wood-treatment facilities. Low concentrations in water are possible wherever water comes in contact with penta-treated lumber, including lumber used for railroad ties. Only two samples (FRC01 and BCT01) had detectable concentrations of pentachlorophenol, and both were surface water sites upstream from Willamette. Site BCT01 was immediately adjacent to a railroad, which may account for the positive detection. Both samples were below the MCL for Pentachlorophenol.

Acetophenone is used in several products including perfume, solvents and food flavorings. There is no MCL for this chemical and it was detected in only two stream samples, one above and below Willamette.

Phenanthrene, Anthracene, Fluoranthene, Benzo(a)Anthracene, Chrysene, Naphthalene, Benzo(b)Fluoranthene, Benzo(k)Fluoranthene, Dibenzo(a-j)acridine, Indeno(1-2-3-cd)pyrene, Benzo(g-h-i)perylene, 3-Methylcholanthrene and Benzo(a)pyrene are all polyaromatic hydrocarbons (PAH) which are components of asphalt, tar, and combustion products.

Table 3. Drinking Water Regulations and Health Advisories for Detect Organics

Chemicals	Standards				Health Advisories								
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/L)	MCL (mg/L)	Status HA	One-day (mg/L)	Ten-day (mg/L)	Longer-term (mg/L)	Longer-term (mg/L)	RfD (mg/kg/day)	DWEL (mg/L)	Lifetime (mg/L)	mg/l at 10^{-4} Cancer Risk	Cancer Group
Acetone	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	--	--	--	--	--	--	--	--	0.3	--	--	--	D
Benzo(a)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	B2
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	0.0002	B2
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	0.0002	B2
Benzo(g-h-i)perylene	--	--	--	--	--	--	--	--	--	--	--	--	D
Benzo(a)pyrene	F	zero	0.002	--	--	--	--	--	--	--	--	0.0002	B2
*Bis(2-ethylhexyl)phthalate	--	--	--	--	--	--	--	--	--	--	--	--	--
*Butyl-benzyl-phthalate	--	--	--	--	--	--	--	--	0.2	7	--	--	C
Chrysene	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzo(a-j)acridine	--	--	--	--	--	--	--	--	--	--	--	--	--
*Diethyl-phthalate	--	--	--	D	--	--	--	--	0.8	30	5	--	D
*2-4-Dimethylphenol	--	--	--	--	--	--	--	--	--	--	--	--	--
*Di-n-butyl-phthalate	--	--	--	--	--	--	--	--	--	--	--	--	--
*Di-n-octyl-phthalate	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1-2-3-cd)pyrene	--	--	--	D	--	--	--	--	--	--	--	--	B2
3-Methylcholanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	--	--	--	F	0.5	0.5	0.4	1	0.004	0.1	0.02	--	D
Pentachlorophenol	F	zero	0.001	F	1	0.3	0.3	1	0.03	1	--	--	B2
Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane	--	--	--	--	--	--	--	--	--	--	--	--	--
2-4-6-Trichlorophenol	L	--	--	D	--	--	--	--	--	--	--	0.3	B2

These compounds are found in tar roofing materials, tires, fireplace ashes, cigarettes, creosote-treated lumber, diesel and other common sources. Three or more of these contaminants were found in five wells: MAL02, MAL03, MAL04, MAL09 and MAL10. Concentrations were generally less than 0.1 ug/L. Benzo(a)pyrene was found in MAL09 and MAL10 at concentrations ranging from 0.16 to 0.20 μg/L, which is below the mcl of 2.0 μg/L.

Trichlorofluoromethane was found in MAL02 at a concentration of 2.97 ug/L with a detection limit of 2.0 ug/L. Trichlorofluoromethane is a freon and the source was most likely a spray can or any other source of freon. 2-4-6 Trichlorophenol was found in MAL05 at a concentration of 0.196 ug/L with a detection limit of 0.0074 ug/L. The source for this contaminant was most likely a pesticide as it is used commonly as a herbicide, fungicide or defoliant.

DISCUSSION OF RESULTS

A total of 25 volatile and semivolatile organic compounds were found in both the stream and ground water samples. This sampling event was one of the first sampling events performed by the laboratory on a recently purchased "ion trap" mass spectrophotometer. With this instrument, the laboratory is able to detect organic chemicals at concentrations lower than obtained with previously used instrumentation. Because the laboratory is able to detect chemicals in the parts per trillion range, contamination during the sampling, handling and analyses phases can result in detectable values, which would otherwise be reported as nondetect.

Contamination of the samples can occur along several steps of the investigation. At the trace levels detected in the samples, contamination of the bottles previous to use is a possibility. At every point in the sampling and analyses phase where the bottle is open to the atmosphere, an opportunity for contamination exists. Conversely, chemicals can be lost during the extraction and capture phases prior to the analyses of the organic chemical. As an example, a duplicate was taken for QA/QC purposes at MAL09. Bis(2-ethylhexyl)phthalate, Dimethylbenzo(a)anthracene and phenol were found in the original at concentrations of 3.3740 μg/L 0.14894 μg/L, and 0.1245 respectively; however, they were not found in the duplicate sample. Conversely, fluoranthene and 3-3'-Dichlorobenzidine were found in the duplicate at 0.00305 μg/L and 0.02468 μg/L, respectively; however, they were not found in the original. Chemicals detected in the original, but not detected in the duplicate, are not reportable because of the lack of verification.

These discrepancies bring into question the results of the well water analyses, and suggest that contamination may have occurred during the sampling and analyses phases. Although there are many sources for PAHs in the environment, there was no apparent primary source in the area to account for the high percentage of wells (63%) with PAH detections. A resampling of the wells should be conducted to verify the results of the semivolatile analyses.

SUMMARY

In general, both the surface and subsurface water quality is very good in the area surrounding Gifford, Arkansas. The surface water below Willamette has been dammed by beavers and, as such, has resulted in a bog with correspondingly low dissolved oxygen. Concentrations of general water quality parameters were in agreement with historical water quality data for this ecoregion area.

Ground water in the area is soft and very low in total dissolved solids, which ranged from 24 to 76 mg/L. In the area surrounding Willamette, ground water levels are very shallow, and most wells were only 4-10 feet in depth. Many of these wells are open to the surface and are vulnerable to surface sources of contamination, in addition to septic influences. Five of the wells had positive detections for fecal coliform and five of the wells also had detections of PAHs. Although there is an MCL established for only two of the PAHs, various health advisories are cited by the EPA for individual PAHs, and these detections should be verified. If the detection of these chemicals are verified, the Health Department should be notified and recommendations made to the well owners on the water as an available drinking water source.

Based on the results of the present investigation, there are no major health concerns related to ground water quality in the area, with the exception of the fecal coliform detections. In lieu of proper well construction and adequate casing, it would be advisable for residents in the area to boil their water or obtain drinking water from another source. The wells which are presently uncovered should be covered to avoid surface contaminant sources which could impair existing water quality.

APPENDIX 1

Surface Water Quality Data

STATIONS		FRC01	RBC01	RBC02	FRC02	BCT01	BCT02	BCR02	BCR01
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Cd	ug/L	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5
Cr	ug/L	<1	<1	<1	<1	<1	<1	<1	<1
Pb	ug/L	<2	<2	<2	<2	<2	<2	<2	<2
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
DO	mg/L	6.8	6.2	6.4	1.7	1.2	2.1	6.7	6.5
pH		6.10	5.07	5.4	5.75	5.95	6.59	5.65	4.93
Water Temp	Deg. C	23.2	24.0	24.0	26.0	25.5	27.4	23.5	23.2
Semi-volatiles	Units	Data	Data	Data	Data	Data	Data	Data	Data
2-Picoline	ug/L	<.12580	<.10721	<.09733	<.06405	<.12686	<.15436	<.16509	<.18916
Aniline	ug/L	<.03301	<.02813	<.02554	<.01681	<.03329	<.04050	<.04332	<.04963
Phenol	ug/L	<.01495	<.01347	<.02013	<.01391	<.01322	<.01466	<.01772	<.01158
Bis(2-chloroethyl)-Ether	ug/L	<.07464	<.06361	<.05775	<.03801	<.07527	<.09159	<.09796	<.11224
2-Chlorophenol	ug/L	<.01973	<.01902	<.01403	<.01940	<.01637	<.01646	<.01940	<.01388
1-3-Dichlorobenzene	ug/L	<.01604	<.02380	<.01244	<.01457	<.01338	<.00780	<.01113	<.01085
1-4-Dichlorobenzene	ug/L	<.01662	<.02466	<.01290	<.01509	<.01387	<.00808	<.01153	<.01124
1-2-Dichlorobenzene	ug/L	<.01731	<.02569	<.01344	<.01573	<.01445	<.00842	<.01201	<.01171
2-Methylphenol	ug/L	<.03114	<.02877	<.02262	<.01170	<.01467	<.02833	<.03252	<.02160
Acetophenone	ug/L	<.01113	<.01508	<.01096	<.01130	.05375	.05753	<.00993	<.00586
N-Nitroso-di-n-propylamine	ug/L	<.08102	<.17506	<.06870	<.10352	<.03831	<.08180	<.13093	<.08480
4-Methylphenol	ug/L	<.02410	<.02226	<.01750	<.00905	<.01135	<.02192	<.02517	<.01671
Hexachloroethane	ug/L	<.02909	<.04230	<.03418	<.04353	<.03940	<.04274	<.05825	<.04205
Nitrobenzene	ug/L	<.03550	<.05539	<.02985	<.04147	<.03615	<.03847	<.04575	<.03225
N-Nitrosopiperidine	ug/L	<.03250	<.04180	<.01615	<.02022	<.01639	<.01857	<.01646	<.01527
Isophorone	ug/L	<.01924	<.01981	<.01107	<.02855	<.01405	<.01917	<.01561	<.01696
2-Nitrophenol	ug/L	<.02614	<.01851	<.01158	<.01676	<.01287	<.01495	<.02091	<.01550
2-4-Dimethylphenol	ug/L	?6.3240	?4.2518	?5.2552	?4.0939	?4.9383	?4.2076	?4.8944	?4.3387
Bis(2-chloroethoxy)methane	ug/L	<.03393	<.02948	<.02560	<.01869	<.03678	<.04471	<.04436	<.05235
2-4-Dichlorophenol	ug/L	<.01185	<.01379	<.01151	<.00972	<.01174	<.00797	<.00897	<.01179
1-2-4-Trichlorobenzene	ug/L	<.01239	<.00980	<.00759	<.00908	<.01155	<.01000	<.01511	<.00789
2-6-Dichlorophenol	ug/L	<.01280	<.01490	<.01244	<.01050	<.01269	<.00861	<.00970	<.01274
4-Chloroaniline	ug/L	<.01375	<.00936	<.01177	<.00701	<.00738	<.00973	<.00865	<.00778
Naphthalene	ug/L	<.00632	<.00621	<.00438	<.00672	<.00564	<.00566	<.00619	<.00456

STATIONS		FRC01	RBC01	RBC02	FRC02	BCT01	BCT02	BCR02	BCR01
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Hexachlorobutadiene	ug/L	<.02042	<.01428	<.01294	<.01249	<.00914	<.01290	<.00974	<.01263
N-Nitrosodibutylamine	ug/L	<.10182	<.06759	<.07752	<.10669	<.09537	<.07768	<.08319	<.06335
4-Chloro-3-methylphenol	ug/L	<.02278	<.02145	<.01613	<.00925	<.01153	<.02225	<.02370	<.01621
2-Methylnaphthalene	ug/L	<.00704	<.00909	<.00693	<.00870	<.00621	<.00959	<.00914	<.00458
Hexachlorocyclopentadiene	ug/L	<.03745	<.02509	<.03241	<.02995	<.03378	<.02899	<.02634	<.02844
1-2-4-5-Tetrachlorobenzene	ug/L	<.00733	<.01080	<.01121	<.00972	<.00871	<.00890	<.01406	<.00896
2-4-6-Trichlorophenol	ug/L	<.01493	<.02202	<.02282	<.01240	<.02116	<.02270	<.01892	<.01735
2-4-5-Trichlorophenol	ug/L	<.01350	<.01991	<.02064	<.01121	<.01913	<.02052	<.01710	<.01569
2-Chloronaphthalene	ug/L	<.00506	<.00543	<.00477	<.00410	<.00550	<.00335	<.00396	<.00510
1-Chloronaphthalene	ug/L	<.00455	<.00489	<.00429	<.00368	<.00494	<.00301	<.00356	<.00459
2-Nitroaniline	ug/L	<.17591	<.16539	<.28452	<.15238	<.54151	<.50417	<.59062	<1.0147
Dimethyl-phthalate	ug/L	<.00606	<.00741	<.00657	<.00538	<.00825	<.00459	<.00559	<.00605
2-6-Dinitrotoluene	ug/L	<.05078	<.04566	<.02955	<.03620	<.02661	<.02591	<.03191	<.02933
Acenaphthylene	ug/L	<.00853	<.00752	<.00652	<.00595	<.00601	<.00478	<.00867	<.00577
3-Nitroaniline	ug/L	<.05486	<.04147	<.03203	<.02772	<.03335	<.03092	<.03150	<.02667
Acenaphthene	ug/L	<.00996	<.00978	<.00571	<.01082	<.01406	<.00990	<.01286	<.00570
Pentachlorobenzene	ug/L	<.01300	<.01691	<.00630	<.01468	<.02246	<.01206	<.01860	<.00854
Dibenzofuran	ug/L	<.00566	<.00677	<.00394	<.00419	<.00723	<.00489	<.00579	<.00316
2-4-Dinitrotoluene	ug/L	<.03401	<.03058	<.01979	<.02424	<.01782	<.01735	<.02137	<.01965
4-Nitrophenol	ug/L	<.08236	<.03313	<.06018	<.04079	<.05049	<.05431	<.06323	<.06955
2-Naphthylamine	ug/L	<.03039	<.02700	<.01613	<.01615	<.01883	<.01364	<.01795	<.01308
2-3-4-6-Tetrachlorophenol	ug/L	<.03107	<.01853	<.01413	<.02479	<.01544	<.02603	<.02312	<.02482
1-Naphthylamine	ug/L	<.03240	<.02878	<.01720	<.01721	<.02007	<.01454	<.01914	<.01395
Diethyl-phthalate	ug/L	<.00761	?.05764	?.04092	?.03642	?.05938	?.03641	<.00877	?.02316
Fluorene	ug/L	<.00867	<.01021	<.00877	<.00899	<.00842	<.00756	<.00747	<.00591
4-Chlorophenyl-phenyl-ether	ug/L	<.01144	<.00796	<.00650	<.00790	<.01226	<.00816	<.00903	<.01032
4-Nitroaniline	ug/L	<.06331	<.04785	<.03697	<.03199	<.03849	<.03568	<.03635	<.03078
4-6-Dinitro-2-methylphenol	ug/L	<.03111	<.03187	<.02634	<.03419	<.03713	<.03125	<.03639	<.02189
Diphenylamine	ug/L	<.00630	<.00424	<.00553	<.00338	<.00490	<.00605	<.00662	<.00710
1-2-Diphenylhydrazine	ug/L	<.01261	<.02025	<.01206	<.01617	<.01683	<.01493	<.02130	<.01672
Phenacetin	ug/L	<.01912	<.01156	<.01131	<.01103	<.02147	<.01426	<.01822	<.01378
4-Bromophenyl-phenyl-ether	ug/L	<.00903	<.01233	<.00690	<.00839	<.01003	<.01268	<.00962	<.01118
Hexachlorobenzene	ug/L	<.01975	<.01701	<.01810	<.02371	<.02061	<.01742	<.02614	<.01957
Pentachlorophenol	ug/L	.17535	<.02887	<.02799	<.02142	.11447	<.02938	<.04988	<.02812

STATIONS		FRC01	RBC01	RBC02	FRC02	BCT01	BCT02	BCR02	BCR01
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Pentachloronitrobenzene	ug/L	<.04101	<.04510	<.02651	<.02945	<.03527	<.02103	<.04409	<.03286
4-Aminobiphenyl	ug/L	<.01473	<.00991	<.01291	<.00790	<.01145	<.01415	<.01546	<.01658
Pronamide	ug/L	<.00943	<.01295	<.00900	<.00587	<.01764	<.01691	<.00969	<.01141
Phenanthrene	ug/L	<.00502	<.00742	<.00633	<.00499	<.00940	<.00540	<.00902	<.00763
Anthracene	ug/L	<.00446	<.00659	<.00562	<.00444	<.00835	<.00479	<.00801	<.00678
Di-n-butyl-phthalate	ug/L	?.12888	?.17450	?.09848	?.14656	?.11630	?.20672	?.13266	?.16134
Fluoranthene	ug/L	<.00623	<.00429	<.00318	<.00588	<.00736	<.00350	<.00407	<.00459
Pyrene	ug/L	<.00628	<.00420	<.00298	<.00574	<.00695	<.00346	<.00415	<.00409
Dimethylaminoazobenzene	ug/L	<.01233	<.00862	<.00828	<.00803	<.00678	<.00837	<.00780	<.00983
Butyl-benzyl-phthalate	ug/L	?.24807	?.14732	?.15631	?.19873	?.16831	?.15875	?.07371	?.08144
Benzo(a)anthracene	ug/L	<.00512	<.00377	<.00355	<.00425	<.00617	<.00635	<.00593	<.00511
3-3'-Dichlorobenzidine	ug/L	<.02238	<.01189	<.00964	<.01145	<.01670	<.01758	<.01816	<.01251
Chrysene	ug/L	<.00448	<.00330	<.00310	<.00371	<.00540	<.00555	<.00519	<.00447
Bis(2-ethylhexyl)phthalate	ug/L	?3.4414	?2.3816	?2.2450	?1.7993	?2.4070	?1.1316	?1.0467	?.78555
Di-n-octyl-phthalate	ug/L	?.09791	?.08994	?.08099	?.06926	?.08270	?.08674	?.07219	?.07104
Benzo(b)fluoranthene	ug/L	<.01117	<.00584	<.00515	<.00556	<.00936	<.00952	<.01034	<.00786
Benzo(k)fluoranthene	ug/L	<.00679	<.00355	<.00313	<.00338	<.00569	<.00579	<.00629	<.00478
Benzo(a)pyrene	ug/L	<.00994	<.00519	<.00458	<.00495	<.00833	<.00847	<.00920	<.00699
Dimethylbenzo(a)anthracene	ug/L	<.01383	<.00922	<.01203	<.00961	<.01493	<.01438	<.01725	<.02214
3-Methylcholanthrene	ug/L	<.00903	<.00649	<.01013	<.00675	<.00925	<.00936	<.01372	<.01069
Dibenzo(a-j)acridine	ug/L	<.00831	<.00462	<.00428	<.00727	<.00739	<.00586	<.00795	<.00558
Indeno(1-2-3-cd)pyrene	ug/L	<.00427	<.00301	<.00233	<.00292	<.00462	<.00368	<.00506	<.00254
Dibenz(a-h)anthracene	ug/L	<.00726	<.00578	<.00726	<.00661	<.00504	<.00574	<.00671	<.00621
Benzo(g-h-i)perylene	ug/L	<.00604	<.00425	<.00330	<.00412	<.00653	<.00521	<.00716	<.00359
Volatiles	Units	Data	Data	Data	Data	Data	Data	Data	Data
Chloromethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1-Dichloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromoform	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1,2,2-Tetrachloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Vinyl_Chloride	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromomethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5

STATIONS		FRC01	RBC01	RBC02	FRC02	BCT01	BCT02	BCR02	BCR01
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Trichlorofluoromethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1-Dichloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Methylene_Chloride	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Trans-1,2-Dichloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Cis-1,2-Dichloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
2,2-Dichloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromochloromethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroform	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1,1-Trichloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dichloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1-Dichloropropene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Carbon_Tetrachloride	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dichloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Trichloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Dibromomethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromodichloromethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Cis-1,3-Dichloropropene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Toluene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Trans-1,3-Dichloropropene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1,2-Trichloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,3-Dichloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Dibromochloromethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dibromoethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Tetrachloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1,1,2-Tetrachloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Ethyl_Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Styrene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Ortho_Xylene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2,3-Trichloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Isopropylbenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
2-Chlorotoluene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
N-Propyl_Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5

STATIONS		FRC01	RBC01	RBC02	FRC02	BCT01	BCT02	BCR02	BCR01
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
4-Chlorotoluene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,3,5-Trimethylbenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Tert-Butyl_benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2,4-Trimethylbenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,3-Dichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Sec-Butyl_Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,4-Dichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
P-Isopropyl_Toluene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
N-Butyl_Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dibromo-3-Chloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2,4-Trichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Naphthalene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2,3-Trichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Hexachlorobutadiene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Para_Xylene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Meta_Xylene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Acetone	ug/L	<12.5	<12.5	<12.5	<12.5	~20.90	<12.5	<12.5	~13.84
Methyl_Ethyl_Ketone	ug/L	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5
Parameter		Data	Data	Data	Data	Data	Data	Data	Data
Al	ug/L	123.3	145.3	108.2	58.2	126.2	44.1	306.2	285.5
Cu	ug/L	<2	<2	<2	<2	<2	<2	<2	<2
Ca	mg/L	2.6	5.8	5.3	3.9	5.4	6.8	2.0	1.8
Fe	ug/L	317.0	74.4	108.0	919.0	583.0	692.0	491.0	341.0
K	mg/L	1.0	1.1	1.4	0.8	2.1	2.7	0.8	0.5
Mg	mg/L	0.9	1.6	1.5	0.3	0.3	1.3	0.5	0.6
Mn	ug/L	77.5	506.0	392.0	616.0	207.0	285.0	128.0	107.0
Na	mg/L	3.8	<0.04	0.5	<0.04	1.4	12.5	4.5	1.7
Zn	ug/L	6.9	14.4	12.2	4.8	14.5	7.7	18.7	15.5
Hardness	mg/L	10	21	19	11	15	22	7	7
Ni	ug/L	<5	5.9	<5	<5	<5	<5	<5	<5
B	ug/L	12.3	21.3	20.8	8.9	18.3	33.9	16.6	12.4
Be	ug/L	<2	<2	<2	<2	<2	<2	<2	<2

STATIONS		FRC01	RBC01	RBC02	FRC02	BCT01	BCT02	BCR02	BCR01
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Ba	ug/L	56.3	100.5	131.5	117.9	222.4	130.7	150.7	156.9
Co	ug/L	<3	<3	<3	3.1	<3	<3	<3	3.0
V	ug/L	<5	<5	<5	<5	<5	<5	<5	<5
NH3-N	mg/L	<0.05	<0.05	<0.05	<0.05	0.117	1.506	0.175	<0.05
CL	mg/L	2.733	2.832	2.747	2.709	2.930	12.531	2.771	2.495
NO3-N	mg/L	0.338	0.357	0.365	0.146	0.383	0.440	0.542	0.289
O-PHOS	mg/L	0.097	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
T-PHOS	mg/L	0.077	<0.03	<0.03	0.056	0.117	0.147	0.046	<0.03
SO4	mg/L	10.0	21.0	18.9	8.8	6.4	3.9	8.8	7.6
TOC	mg/L	10.3	6.1	5.1	12.2	18.5	15.6	17.6	14.8
BOD	mg/L	1.7	1.5	1.6	3.2	---	---	2.5	1.0
Turbidity	NTU	51	9.4	6.0	14	50	33	26	14
TSS	mg/L	17.0	4.0	6.0	17.5	27.5	59.0	29.0	10.5
TDS	mg/L	50	58	50	44	74	103	70	57
Parameter		Data	Data	Data	Data	Data	Data	Data	Data
Formaldehyde	mg/L	0.05	<0.05	<0.05 m	<0.05	<0.05	<0.05	<0.05	<0.05

Appendix 2

Ground Water Quality Data

STATIONS		MAL01	MAL02	MAL03	MAL04	MAL05	MAL06	MAL09	MAL10
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Cd	ug/L	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5
Cr	ug/L	<1	<1	<1	<1	<1	<1	<1	<1
Pb	ug/l	<2	<2	<2	<2	<2	2.7	<2	<2
Semi-volatiles	Units	Data	Data	Data	Data	Data	Data	Data	Data
2-Picoline	ug/L	<.18866	<.17580	<.15970	<.16671	<.14344	<.09887	<.08125	<.04517
Aniline	ug/L	<.04577	<.04265	<.03874	<.04044	<.03480	<.02398	<.02170	<.01206
Phenol	ug/L	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	.12448	<.10000
Bis(2-chloroethyl)-Ether	ug/L	<.10890	<.10148	<.09218	<.09623	<.08280	<.05707	<.04531	<.02519
2-Chlorophenol	ug/L	<.01311	<.01038	<.01371	<.01013	<.01070	<.00864	<.01511	<.01146
1-3-Dichlorobenzene	ug/L	<.01015	<.00484	<.00904	<.00893	<.00738	<.00977	<.01393	<.02041
1-4-Dichlorobenzene	ug/L	<.00966	<.00461	<.00860	<.00850	<.00703	<.00930	<.01327	<.01944
Benzyl-alcohol	ug/L	<.02196	<.02949	<.01766	<.01853	<.01352	<.01201	<.03374	<.03410
1-2-Dichlorobenzene	ug/L	<.01130	<.00539	<.01006	<.00995	<.00822	<.01088	<.01472	<.02157
2-Methylphenol	ug/L	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000
Acetophenone	ug/L	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000
N-Nitroso-di-n-propylamine	ug/L	<.03872	<.06168	<.02801	<.03093	<.04392	<.02604	<.03220	<.02263
4-Methylphenol	ug/L	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000
Hexachloroethane	ug/L	<.03052	<.04448	<.04851	<.03316	<.02465	<.01576	<.08581	<.03253
Nitrobenzene	ug/L	<.06410	<.08653	<.05106	<.04045	<.08160	<.06603	<.06523	<.05081
N-Nitrosopiperidine	ug/L	<.02419	<.02548	<.02667	<.01971	<.03077	<.02015	<.04190	<.02503
Isophorone	ug/L	<.01316	<.02410	<.01549	<.00910	<.01623	<.00879	<.01366	<.01707
2-Nitrophenol	ug/L	<.01855	<.02538	<.01039	<.01173	<.02236	<.01708	<.03353	<.01596
2-4-Dimethylphenol	ug/L	<8.0000	<8.0000	<8.0000	<8.0000	<8.0000	<8.0000	<8.0000	<8.0000
Bis(2-chloroethoxy)methane	ug/L	<.05861	<.05484	<.06051	<.05654	<.05038	<.03485	<.02157	<.01342
2-4-Dichlorophenol	ug/L	<.01399	<.01744	<.01512	<.01601	<.01430	<.01243	<.01953	<.01652
1-2-4-Trichlorobenzene	ug/L	<.01300	<.00966	<.01668	<.01196	<.01193	<.01064	<.01740	<.00936
2-6-Dichlorophenol	ug/L	<.01420	<.01769	<.01534	<.01624	<.01450	<.01261	<.02194	<.01857
4-Chloroaniline	ug/L	<.00731	<.00930	<.00795	<.00679	<.00706	<.00467	<.01256	<.00845
Naphthalene	ug/L	<.00493	<.00392	<.00629	<.00416	<.00455	<.00369	.01097	.00925
Hexachlorobutadiene	ug/L	<.01001	<.01027	<.00939	<.00861	<.01051	<.01131	<.03139	<.03298
N-Nitrosodibutylamine	ug/L	<.03877	<.06143	<.04467	<.03898	<.05940	<.03191	<.02222	<.03604
4-Chloro-3-methylphenol	ug/L	<.01979	<.01573	<.01907	<.01091	<.01176	<.00914	<.02141	<.01516
2-Methylnaphthalene	ug/L	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000

STATIONS		MAL01	MAL02	MAL03	MAL04	MAL05	MAL06	MAL09	MAL10
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Hexachlorocyclopentadiene	ug/L	<.01329	<.02047	<.01516	<.01824	<.01547	<.01834	<.13520	<.15141
1-2-4-5-Tetrachlorobenzene	ug/L	<.00563	<.00665	<.00540	<.00492	<.00734	<.00457	<.01633	<.01335
2-4-6-Trichlorophenol	ug/L	<.01033	<.01535	<.00989	<.00809	.19619	<.01142	<.01649	<.03520
2-4-5-Trichlorophenol	ug/L	<.01075	<.01598	<.01029	<.00842	<.00767	<.01189	<.01693	<.03615
2-Chloronaphthalene	ug/L	<.00462	<.00663	<.00490	<.00601	<.00557	<.00461	<.00925	<.00755
1-Chloronaphthalene	ug/L	<.00632	<.00906	<.00670	<.00822	<.00762	<.00630	<.01323	<.01080
2-Nitroaniline	ug/L	<.53450	<.75215	<.66295	<.91655	<.57555	<.36111	<.04066	<.08583
Dimethyl-phthalate	ug/L	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000
2-6-Dinitrotoluene	ug/L	<.01811	<.02827	<.02583	<.02905	<.03012	<.02545	<.08972	<.08063
Acenaphthylene	ug/L	<.00508	<.00494	<.00392	<.00453	<.00730	<.00455	<.00856	<.01646
3-Nitroaniline	ug/L	<.02649	<.03716	<.03022	<.02010	<.02506	<.01786	<.04514	<.03559
Acenaphthene	ug/L	<.00653	<.00709	<.01042	<.00919	<.00881	<.00861	<.02126	<.01387
Pentachlorobenzene	ug/L	<.00578	<.00742	<.00573	<.00854	<.00702	<.00861	<.02619	<.02244
Dibenzofuran	ug/L	<.00305	<.00504	<.00487	<.00241	<.00355	<.00348	<.01057	<.00709
2-4-Dinitrotoluene	ug/L	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000
4-Nitrophenol	ug/L	<.03912	<.05558	<.03557	<.03097	<.02904	<.04246	<.05855	<.07105
2-Naphthylamine	ug/L	<.01119	<.01637	<.01398	<.01391	<.01365	<.00947	<.01132	<.01797
2-3-4-6-Tetrachlorophenol	ug/L	<.01383	<.01429	<.01085	<.00944	<.01006	<.00768	<.02300	<.01861
1-Naphthylamine	ug/L	<.01076	<.01573	<.01344	<.01337	<.01312	<.00910	<.01024	<.01625
Diethyl-phthalate	ug/L	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000
Fluorene	ug/L	<.00626	<.00765	<.00637	<.00542	<.00520	<.00510	<.01966	<.00929
4-Chlorophenyl-phenyl-ether	ug/L	<.00403	<.00421	<.00619	<.00452	<.00577	<.00236	<.00703	<.00676
4-Nitroaniline	ug/L	<.03183	<.04464	<.03631	<.02415	<.03011	<.02146	<.05712	<.04503
4-6-Dinitro-2-methylphenol	ug/L	<.01919	<.01851	<.02069	<.02092	<.02438	<.01844	<.05604	<.05078
Diphenylamine	ug/L	<.00489	<.00570	<.00663	<.00513	<.00473	<.00355	<.00932	<.00460
1-2-Diphenylhydrazine	ug/L	<.01804	<.02440	<.01522	<.01200	<.02703	<.02105	<.02820	<.01829
Phenacetin	ug/L	<.01445	<.01953	<.01502	<.01403	<.01185	<.01016	<.03029	<.02853
4-Bromophenyl-phenyl-ether	ug/L	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000	<.10000
Hexachlorobenzene	ug/L	<.01090	<.01157	<.01429	<.01107	<.01469	<.01261	<.02844	<.02561
Pentachlorophenol	ug/L	<.01027	<.02348	<.01618	<.01027	<.01259	<.01096	<.03798	<.02901
Pentachloronitrobenzene	ug/L	<.02091	<.02007	<.03092	<.02274	<.02590	<.02856	<.07596	<.05054
4-Aminobiphenyl	ug/L	<.01043	<.01216	<.01413	<.01095	<.01009	<.00757	<.02593	<.01279
Pronamide	ug/L	<.00608	<.00765	<.00875	<.01901	<.01217	<.01126	<.03055	<.02491
Phenanthrene	ug/L	<.00563	.02536	.13522	.01949	<.00635	<.00552	<.01805	.02616

STATIONS		MAL01	MAL02	MAL03	MAL04	MAL05	MAL06	MAL09	MAL10
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Anthracene	ug/L	<.00583	.00516	.01737	.00417	<.00657	<.00571	<.01614	<.01681
Di-n-butyl-phthalate	ug/L	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000
Fluoranthene	ug/L	<.00520	.00911	.07223	.00494	<.00239	<.00264	<.00655	.01620
Pyrene	ug/L	<.10000	<.10000	?.11536	<.10000	<.10000	<.10000	<.10000	<.10000
Dimethylaminoazobenzene	ug/L	<.00457	<.00570	<.00512	<.00428	<.00658	<.00657	<.02234	<.02182
Butyl-benzyl-phthalate	ug/L	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000
Benzo(a)anthracene	ug/L	<.00194	<.00278	.04901	<.00216	<.00181	<.00214	.05041	.04861
3-3'-Dichlorobenzidine	ug/L	<.00567	<.00732	<.00535	<.00706	<.00767	<.00466	<.02746	<.03251
Chrysene	ug/L	<.00195	<.00281	.02684	<.00218	<.00183	<.00216	.03507	.03263
Bis(2-ethylhexyl)phthalate	ug/L	?4.5111	?1.8591	?2.3482	?1.2060	?1.5251	?1.2906	3.3740	<1.0000
Di-n-octyl-phthalate	ug/L	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000
Benzo(b)fluoranthene	ug/L	<.00231	<.00277	.02295	<.00285	<.00303	<.00192	.17466	.09048
Benzo(k)fluoranthene	ug/L	<.00175	<.00210	.01645	<.00216	<.00230	<.00145	.24079	.13532
Benzo(a)pyrene	ug/L	<.00229	<.00275	<.00194	<.00284	<.00302	<.00191	.26071	.15596
Dimethylbenzo(a)anthracene	ug/L	<.00455	<.01010	<.00617	<.00639	<.00963	<.00404	.14894	.08309
3-Methylcholanthrene	ug/L	<.00398	<.00551	<.00336	<.00326	<.00490	<.00337	.25797	.21238
Dibenzo(a-j)acridine	ug/L	<.00286	<.00424	<.00234	<.00217	<.00468	<.00144	.15386	.16433
Indeno(1-2-3-cd)pyrene	ug/L	<.00220	<.00217	<.00203	<.00122	<.00214	<.00155	.20152	.16027
Dibenz(a-h)anthracene	ug/L	<.00284	<.00391	<.00398	<.00215	<.00525	<.00349	.18273	.16163
Benzo(g-h-i)perylene	ug/L	<.00239	<.00236	<.00221	<.00133	<.00233	<.00168	.11491	.12224
Volatiles	Units	Data	Data	Data	Data	Data	Data	Data	Data
Chloromethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1-Dichloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromoform	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1,2,2-Tetrachloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Vinyl_Chloride	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromomethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Trichlorofluoromethane	ug/L	<2.5	2.97	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1-Dichloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Methylene_Chloride	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Trans-1,2-Dichloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5

STATIONS		MAL01	MAL02	MAL03	MAL04	MAL05	MAL06	MAL09	MAL10
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
Cis-1,2-Dichloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
2,2-Dichloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromochloromethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroform	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1,1-Trichloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dichloroethane	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1-Dichloropropene	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Benzene	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Carbon_Tetrachloride	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dichloropropane	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Trichloroethene	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Dibromomethane	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromodichloromethane	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Cis-1,3-Dichloropropene	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Toluene	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Trans-1,3-Dichloropropene	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1,2-Trichloroethane	ug/L	<?2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,3-Dichloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Dibromochloromethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dibromoethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Tetrachloroethene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,1,1,2-Tetrachloroethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Ethyl_Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Styrene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Ortho_Xylene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2,3-Trichloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Isopropylbenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Bromobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
2-Chlorotoluene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
N-Propyl_Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
4-Chlorotoluene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,3,5-Trimethylbenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Tert-Butyl_benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2,4-Trimethylbenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5

STATIONS		MAL01	MAL02	MAL03	MAL04	MAL05	MAL06	MAL09	MAL10
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
1,3-Dichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Sec-Butyl_Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,4-Dichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
P-Isopropyl_Toluene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
N-Butyl_Benzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2-Dibromo-3-Chloropropane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2,4-Trichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Naphthalene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
1,2,3-Trichlorobenzene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Hexachlorobutadiene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Para_Xylene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Meta_Xylene	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Acetone	ug/L	~16.62	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	~13.53
Methyl_Ethyl_Ketone	ug/L	<12.5	<2.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5
Parameter		Data	Data	Data	Data	Data	Data	Data	Data
Al	ug/L	171.1	171.4	52.0	<16	<16	94.8	34.1	60.4
Cu	ug/L	13.0	4.9	7.9	13.5	<2	40.9	8.8	<2
Ca	mg/L	1.8	3.7	0.9	1.4	1.6	0.3	4.9	5.8
Fe	ug/L	302.0	39.7	226.0	198.0	52600.0	25.4	112	223
K	mg/L	1.0	0.4	0.7	0.5	0.4	0.9	0.4	0.2
Mg	mg/L	0.4	0.7	0.9	0.5	<0.06	1.7	0.9	0.6
Mn	ug/L	39.2	24.3	6.6	24.9	162.0	26.8	6.4	155
Na	mg/L	5.0	1.8	1.7	1.4	4.5	5.6	1	1.7
Zn	ug/L	87.2	20.9	619.0	336.0	300.0	25.0	34.8	482
Hardness	mg/L	6	12	6	5	<	8	16	17
Ni	ug/L	<5	<5	<5	<5	<5	<5	<5	<5
B	ug/L	12.0	6.4	6.0	6.0	<3	7.1	4.7	6.9
Be	ug/L	<2	<2	<2	<2	7.6	<2	<2	<2
Ba	ug/L	72.6	121.3	27.5	35.8	85.0	56.4	20	45
Co	ug/L	<3	3.0	<3	<3	<3	3.2	<3	3.4
V	ug/L	<5	<5	<5	<5	<5	<5	<5	<5
NH3-N	mg/L	0.076	<0.05	<0.05	<0.05	0.111	<0.05	0.076	0.058

STATIONS		MAL01	MAL02	MAL03	MAL04	MAL05	MAL06	MAL09	MAL10
Parameter	Units	Data	Data	Data	Data	Data	Data	Data	Data
CL	mg/L	6.857	4.602	1.760	1.946	4.258	7.230	2.508	2.288
NO3-N	mg/L	0.405	1.054	1.896	0.150	0.142	3.104	1.946	0.078
O-PHOS	mg/L	0.086	<0.03	<0.03	<0.03	0.118	<0.03	<0.03	<0.03
T-PHOS	mg/L	0.178	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
SO4	mg/L	8.8	2.6	2.6	3.9	2.6	1.3	2.8	4.3
TOC	mg/L	5.0	1.5	2.2	<1	2.2	1.4	1.5	1.4
Turbidity	NTU	470	0.7	3.4	0.6	40	1.6	NA	NA
TSS	mg/L	506.0	<1	5.0	<1	8.0	<1	6	12.5
TDS	mg/L	71	41	31	24	76	40	44	44
Parameter		Data	Data	Data	Data	Data	Data	Data	Data
Formaldehyde	mg/L	<0.05	<0.05	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05
Parameter		Data	Data	Data	Data	Data	Data	Data	Data
Fecal Coliform	Col/100ml	3100	0	~75	0	~3	0	~15	24