NIAGARA COUNTY
DEPARTMENT OF HEALTH

SUMMARY REPORT FOR

PRIVATE WATER WELL PROJECT,

TOWNS OF LEWISTON AND PORTER,

NIAGARA COUNTY, NEW YORK

March 2006

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1. INTRODUCTION

1.1 OVERVIEW

A safe and clean water supply is of vital importance to the health of the citizens of Niagara County. In response to concerns from members of the public, the Niagara County Department of Health conducted a focused sampling of selected private water wells in September and October of 2005. The concerns that were raised relate to the legacy contamination from historic activities at the Lake Ontario Ordnance Works (LOOW) or subsequent industrial activities that may have adversely affected groundwater quality in private wells.

The purpose of this project was to identify the water quality of active wells in the Project Area (defined below). The Project was not intended as a migration analysis of potential contamination from the LOOW. The wells sampled were limited to locations where the well owners agreed to participate and where those wells were actually being used for either potable or non-potable use. In all, thirteen wells were sampled. None of the sampled wells were located within the perimeter of the former 7,500-acre LOOW.

This project included the following tasks:

- i) updating the County Health Dept. private well inventory in the Project Area which was generally properties north of Route 104 and west of Ransomville Road not including the Village of Lewiston
- ii) evaluation and selection of wells for sampling;
- iii) collection and analysis of samples from selected wells;
- iv) data evaluation and reporting.

1.2 PRIVATE WATER WELL PROJECT BACKGROUND

NCDOH proposed to conduct a Private Water Well Project at the end of 2004. An ad-hoc volunteer committee was formed in September 2004 to provide input to NCDOH. The committee included the Niagara County Public Health Director, NCDOH engineering staff, and representation from the New York State Department of Health (NYSDOH), the Erie County Public Health Laboratories, a consulting hydrogeologist (King Groundwater Science, Inc.) and community representatives who also represent Residents For Responsible Government, Inc. (RRG), or Niagara Health Science Report, Inc. NCDOH completed a private well inventory survey update in the first half of 2005, together with a proposal for sampling selected private wells. The Sampling Plan was implemented in second half of 2005. (see Appendix E and F)

<u>Public Water</u>:
A public water supply sourced from the upper Niagara River has been available and utilized by almost all county residents for several decades. The municipal water supplies meet or exceed all drinking water standards and are monitored on a continuous basis. Prior to the installation of the public water supply, groundwater from private wells was the primary source of drinking water in the Project Area.

<u>LOOW Site History</u>:
The LOOW was established by the Federal Government in 1942 to produce TNT explosives for the World War II war effort. The original property boundaries encompassed 7,500 acres of land in the Towns of Lewiston and Porter, but after the war, 5,000 acres of undeveloped land was sold. A large number of activities have occurred on the developed portion of the LOOW over the past 62 years, including TNT production, storage and disposal of radioactive material, high energy fuel research,

NIKE missile launch facility, municipal and hazardous waste landfilling and chemical weapons storage. Nearby activities currently include a public school campus, a campground and a fish hatchery. Many residences have been built within the original LOOW boundary. Investigations have found that soil and groundwater under previously developed portions of the LOOW have been contaminated with a wide variety of constituents. Some remediation activities have been completed and others are being planned. Risk assessments that address risk to human health are in progress for some portions of the property by the U.S. Army Corp of Engineers.

Well Inventory:
The "Project Area" around the LOOW was defined as those parts of Lewiston and Porter that are north of route 104 and west of Ransomville Road (excluding the Village of Lewiston). In the summer of 2004, a brief questionnaire (see Appendix B) was distributed to 219 residents believed to have private wells in the Project area, seeking information concerning their water wells. Of the 219 questionnaires distributed, 159 were ultimately returned. From the returned information, 117 private wells were identified, 11 are actively used as a source of drinking water, 8 are used for other non-potable activity (such as lawn watering), 20 are abandoned and 78 report the wells are not in use.

The inventory was also updated by accessing the following sources of information:

i) Town of Lewiston/Porter officials (Town Halls and water departments)
ii) Local residents via requests in local newspaper;
iii) U.S. Geological Survey, New York Resources Division, "Groundwater in the Niagara Falls Area, New York", report (1964) via the U.S. Army Corp of Engineers;
iv) NCDOH Files
v) Drive-by identification;
vi) Local well driller logs

A revised well inventory for the study area was updated through spring of 2005 and a proposal for the sampling of selected private wells was developed during the summer of 2005.

Sampling activities occurred as follows:

Activity	*Dates*
Obtained access permission from well owners to sample 13 wells	Summer 2005
Conducted well inspections and collected private water well samples from the 13 wells.	June-October 2005
Sample analyses and data validation	October-January 2006
Advisory letters for "unfit" water sent to homeowners	October 2005
Development of Project Summary Report	February 2006
Results to well owners and public	March 2006

2. PRIVATE WATER WELL INVENTORY

In 2004, a survey of home/property owners located within the project area was conducted to update the department's private water well inventory. The well inventory was updated based on information obtained during the private well inspections and from well/property owners.

The inventory lists 117 private wells. Of these wells:

- 11 wells were reportedly used for potable (drinking water) purposes (this includes an additional well outside the defined project area for comparative purposes and has been considered part of this project),
- 8 wells were reportedly used for non-drinking water purposes,
- 20 wells were not accessible, filled in, buried, or abandoned,
- 78 wells were reported as not in use. (most reporting not currently usable due to a lack of a working pump and/or were not needed as a water source).

Since no historical well logs were produced or could be found for any of the private wells sampled, the underlying geology penetrated by the wells was not determined.

3. PRIVATE WELL SAMPLING AND ANALYSES

3.1 SAMPLED WELL LOCATIONS

All wells except one, were located within the Towns of Porter and Lewiston, and none were within the former boundary of the LOOW. Eight wells were located within postal zip code 14174, four wells were located with postal zip code 14131 and one location was within postal code 14094. Well identification numbers and postal zip codes are shown with the results in Appendix A.

For the 19 active wells identified, 14 private well owners agreed to have their wells sampled. Five well owners chose not to participate. One well was located about 9 miles east of the Project Area for comparative purposes. After confirming owner permission, each well was initially inspected and basic data such as location, access, size (width/depth) was collected by NCDOH personnel. Inspection and sampling of the wells began on September 12, 2005 and was completed on October 11, 2005. Of the 14 active wells identified, 13 wells were sampled during this period. One well was not sampled because it was poorly constructed and maintained, and would not likely provide a representative groundwater sample.

The sampled wells consisted of five dug wells that were between 17 and 32 feet deep, and eight drilled wells with depths between 30 and 86 feet. One drilled well was not accessible for a depth measurement.

3.2 WELL SAMPLING

The 13 private wells were inspected and sampled in accordance with the procedures described in the Sampling Plan.

As part of the well inspection process, the well owner was interviewed to obtain information on the well location, construction and usage. The wells were then physically inspected to verify the well construction and condition. The well casing diameter, water depth, well depth were measured where possible. If present, the type of well pumping and piping system and water treatment system were also noted.

All non-dedicated field instruments were decontaminated prior to use and between sampling locations. The private wells were purged prior to sampling using the existing well pumping system where possible (e.g. through tap). Purged well water was discharged into drainage ditches, or onto the ground surface.

Two of the large diameter, dug wells (ID #5 and #15) required a purging process that took several hours with a portable pump. Eleven wells were purged using the resident's existing well pump. Wells purged using the existing well pumps were run for a minimum of 15 minutes.

Twelve wells (plus one duplicate sample) were sampled on September 12, 13 & 14, 2005. One additional well was sampled on October 11, 2005 due to a slow recovery rate from the original purging of the well.

3.3 SAMPLE ANALYSES

The water well samples were analyzed for the following parameters:

- i) field measured parameters (i.e., temperature, turbidity, pH, conductivity)
- ii) bacteriological (total coliform, heterotrophic plate count, Escherichia coli [E. Coli])
- iii) conventional chemistry (chloride, nitrate, phenol)
- iv) fluoride
- v) lithium
- vi) 7 drinking water metals (arsenic, boron, copper, lead, magnesium, nickel, vanadium)
- vii) nuclear chemistry analysis (gross alpha, gross beta)
- viii) 9 radiological isotopes (cesium-134, cesium-137, cobalt-60, potassium-40, uranium-235, uranium -238, thorium-232, radium-226, ruthenium-106)
- ix) polychlorinated biphenyls (PCBs) screen
- x) 52 volatile organic compounds
- xi) 19 semi-volatile organic compounds

All chemical analyses except for bacteriological and radiological parameters were performed by Eastern Laboratory Services, Ltd. (ELS Ltd.) located at 390 North Pennsylvania, South Waverly, PA. 18840. Bacteriological analyses were performed by the Erie County Department of Health, Public Health Laboratory located at 462 Grider Street, Buffalo, NY 14215. The radiological screening and analyses were conducted by the New York State Department of Health (NYSDOH) Wadsworth Laboratory located at Empire State Plaza, P.O. Box 509 Albany, New York 12201-0509

All three laboratories were certified at the time of analysis under the NYSDOH's Environmental Laboratory Approval Program (ELAP). The nuclear chemistry analysis for gross alpha and gross beta used EPA method 900.0 and specific radionuclides were analyzed with a general screening procedure.

All field measurements were performed by NCDOH.

Quality assurance analyses included one duplicate sample, one matrix spike/matrix spike duplicate (MS/MSD) sample and one rinse blank sample. A trip blank for volatile organic compounds (VOC) analysis accompanied the sample shipment.

4. DISCUSSION OF RESULTS

The analytical results for all parameters are tabulated with the regulatory reference standards (Objective MCL) in Appendix A. Specific well location identifiers are not included in this report to protect the privacy of the well owners.

Regulatory reference standards were used to assess the results of the sample analyses. These standards specify the maximum allowable concentrations of an analyte or Maximum Contaminant Level (MCL) allowed in drinking water. The New York State Department of Health (NYSDOH) and the United States Environmental Protection Agency (USEPA) have determined these standards are protective of human health for drinking water. If an MCL for drinking water was not available for a compound, then the New York State Department of Environmental Conservation (NYSDEC) Class GA (classification denoting protection for drinking water) groundwater standard was provided. The USEPA reference standard is found in Appendix C.

Also reported is the "Range High" and "Range Low". The range is included so that the well owner participant can compare their specific results with the highest and lowest result observed for each parameter for the wells sampled during this project.

Many of the tabulated results indicate a numerical value preceded by a "<" symbol (i.e. less than). This symbol was inserted when the laboratory did not detect the chemical constituent above the detection limit for the analytical method. The detection limit is the numerical value which follows the "less than" symbol. In the case of coliform and E.coli analyses, some results indicate that the "Most Probable Number" of bacteria in the water was "> 200". This means that the number was "greater than 200" colonies per 100 ml of water. The presence of coliform or E. coli bacteria make the water "unfit" for potable use.

4.1 REPORTING OF RESULTS TO WELLOWNERS

Tabulated results are found in Appendix A. Result specific notification letters to the well owners informing them of their well sampling results, which included laboratory data for their respective wells, was mailed on March 15, 2006.

The results of bacteriological analyses indicated eleven wells were in violation of bacteriologic standards for drinking water. Notification letters for the potable wells indicating that this water that was "unfit" for drinking were sent to the affected well-owners immediately upon receipt of bacteriological laboratory results in October 2005.

A letter with all laboratory results and a copy of this report was provided to each participating well owner.

4.2 FIELD RESULTS

Two turbidity measurements (at 6.5 NTU and 17 NTU) exceeded the MCL of 5.0 NTU established by the regulatory agencies. All of the pH results were within an acceptable range (6.5-8.5). Groundwater temperature measurements ranged from 14 to 18.5 ^{o}C. Conductivity results are not reported in Appendix A due to a field operation error.

4.3 BACTERIOLOGICAL ANALYSIS

The water analysis report for 11 of 13 private wells indicated that the water was **unfit** for human consumption as members of the coliform group were noted in excess of water quality limits at the time of sampling.

Immediate notification was made to all potable well owners regarding the unsatisfactory condition of their well. Procedures to properly disinfect their well were provided and follow-up sampling was offered to the well owners. Potential sources of contamination are identified in this procedure. A copy of the disinfection procedure and additional information concerning proper well construction as provided to the well owners is contained in Appendix D.

4.4 CONVENTIONAL CHEMISTRY

One of 13 chloride sample results (at 278mg/l) showed a concentration above the drinking water standard of 250 mg/l.

One of 13 phenol sample results (at 0.025mg/l) was above the current NYSDEC groundwater standard of 0.001 mg/l. However, the result was within NYSDOH drinking water standards (0.05mg/l).

All nitrate results were below the objectives set by the maximum contaminant levels established by the regulatory agencies.

4.5 FLUORIDE

All fluoride results were below the objectives set by the maximum contaminant levels established by the regulatory agencies.

4.6 LITHIUM

All lithium results were below the objectives set by the maximum contaminant levels established by the regulatory agencies.

4.7 DRINKING WATER METALS

All copper, nickel, vanadium results were below the objectives set by the maximum contaminant levels established by the regulatory agencies. The maximum observed boron concentration was equivalent to the MCL.

One of 13 arsenic sample results (at 0.014mg/l) showed a concentration above the drinking water standard of 0.010 mg/l.

One of 13 sample results indicated lead at 0.023mg/l, which was above the drinking water action level of 0.015 mg/l and reported manganese at 0.31mg/l, with a drinking water standard of 0.3 mg/l. However, the 0.31mg/l result must be rounded to the same number of significant digits as the MCL in question to determine if it was exceeded. In this instance, the 0.31mg/l is rounded to 0.3mg/l. Therefore the objective was not exceeded.

One other sample indicated manganese (at 0.55mg/l) above the drinking water objective of 0.3mg/l.

4.8 NUCLEAR CHEMISTRY ANALYSIS (GROSS ALPHA, GROSS BETA)

The gross alpha and gross beta measurements were below the objectives established by the regulatory agencies in all samples.

4.9 NUCLEAR CHEMISTRY SCREENING

All parameters (uranium-238, thorium-232, potassium-40, ruthenium-106, cesium-134, cesium-137, cobalt-60, radium-226, uranium-235) were below detection limits and the objectives set by the maximum contaminant levels established by the regulatory agencies.

Well #15 indicated radium-226 activity of 8+/-5 pCi/L in the initial screen, which was potentially above the 5 pCi/L MCL. But a recount of this sample indicated the activity of Radium-226 was <3 pCi/L. The explanation provided by the laboratory was that the screening method counted the gamma emission for Bismuth-214, which is a decay product of Radium-226, in order to estimate the concentration of Radium-226. However, the presence of dissolved Radon-222 in the water, which also decays to Bismuth-214, will cause a higher activity for Bismuth-214 and therefore an apparently higher Radium-226 concentration. The recount confirmed the lower level of Radium-226 in the water and attributed the initial observation as probable naturally occurring radon in the water.

4.10 POLYCHLORINATED BIPHENYLS (PCBS) SCREEN

One of 13 scans indicated a "presence" of PCB's which triggered a follow up sampling that quantified seven aroclors (selected classes of PCBs representing the most available PCB's in the United States). The confirmatory analysis determined that the PCB's were not detected with a detection limit of 0.2 ug/L and therefore below the maximum contaminant level (0.5 ug/L). All PCB sampling utilized approved drinking water analytical methods. See Appendix F.

4.11 VOLATILE ORGANIC COMPOUNDS

All parameters were below the objectives set by the maximum contaminant levels established by the regulatory agencies. All results were less than the detection limit, except one detection of methylene chloride. This sample was from equipment rinsate. The laboratory reported that it suspected this detection to be the result of random air contamination by the laboratory.

4.12 SEMI-VOLATILE ORGANIC COMPOUNDS

All parameters were below the objectives set by the maximum contaminant levels established by the regulatory agencies.

5. CONCLUSIONS

This project sampled a limited number of water wells that were made available to NCDOH by voluntary participation of the well owners. Important information concerning well construction details was typically not available. Any well in use and made available by the well owners was included in the project regardless of its location within the project area. The samples were analyzed for a suite of analytes that were considered to be useful in assessing groundwater quality and to address the concern that potential LOOW contaminants may be present. This project was not a study of chemical migration from the LOOW site and should never be referenced as for that purpose.

Therefore, the results represent only a small sampling of groundwater used for potable or non-potable uses in the area surveyed, and are useful in assessing the groundwater quality in the individual wells, and should not be used for any other purpose.

The Findings of the Private Water Well Project include:

- The number of active wells identified in the Project area was small. Nineteen of 117 wells identified (16%) were reported as active. Eleven of the 117 wells identified (9%) were reportedly used for drinking water purposes, although six of these well owners reported the wells were secondary sources and utilized public water as their primary drinking water source.
- Eleven of the thirteen wells sampled (85%) were bacteriological **unfit** for human consumption as members of the coliform group were noted in excess of water quality limits at the time of sampling.
- Bacteriological contamination was found to represent the most common exceedance in this sampling with the potential to cause adverse health effects. (The Department always advises all well owners to conduct a minimum annual bacteriological water quality monitoring.)
- Elevated turbidity (measure of the cloudiness of water) exceeded MCL standards in two wells. Water with high turbidity has an increased chance of having disease-causing organisms.
- Five wells violated the regulatory MCL for one parameter. In each case the parameter was different; chloride, phenol, arsenic, manganese, lead.
- All sampled wells met safe drinking water standards with respect to radiological quality.

<u>NCDOH Actions:</u>

Arsenic and Lead: Advisories were issued to the appropriate well owners to include the possible sources of contamination as well as potential adverse health effects that could result. Recommendations were made to not use the well water for human consumption or culinary purposes without first adequately treating it.

Chloride: An advisory was issued to the appropriate well owner regarding the dietary intake of chloride. No adverse health effect was identified for the observed concentrations. The MCL for chloride is the level above which the taste of water may become objectionable. In addition, to the adverse taste effects, high chloride concentration levels in the water contribute to the deterioration of domestic plumbing and water heaters. Elevated chloride concentrations may also be associated with the presence of sodium in drinking water.

Manganese: An advisory was issued to the appropriate well owner regarding dietary intake of manganese. No adverse health effect was identified for the observed concentrations. However, many people's diets lead them to consume even higher amounts of manganese, especially those who consume high amounts of vegetable or are vegetarian. The infant population is of greatest concern. It is recommended that drinking water with high manganese concentrations not be used to make infant formula that already contains manganese.

Excess manganese produces a brownish color in laundered goods and impairs the taste of tea, coffee, and other beverages. Concentrations may cause a dark brown or black stain on porcelain plumbing fixtures. As with iron, manganese may form a coating on distribution pipes. These may slough off, causing brown blotches on laundered clothing or black particles in the water.

Phenol: Information regarding the intake of phenol was provided to the appropriate well owner. No adverse health effect was identified for the observed concentrations. The USEPA has adopted a Reference Dose (RfD) for phenol that is an estimate of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Typical use would result in a RfD well within acceptable limits. This is a rare case where the NYSDEC groundwater standard is more restrictive than the state and federal drinking water standard.

Further information regarding the parameters that exceeded MCL standards is found in Appendix E

6. ACKNOWLEDGEMENTS

The NCDOH would like to thank the well owners for their cooperation in this project as well as the ad-hoc committee input. The Department would like to underscore the importance of safe drinking water and is proud to provide its services to insure every member of Niagara County has clean and safe drinking water. Well water presents a valuable resource to the county residents and vigilant precautions are necessary to see this resource remains protected and that those who utilize the resource are properly educated with respect to the maintenance and monitoring efforts needed to guarantee safe drinking water.

APPENDIX A

RESULTS TABLE

NCDOH
Private Well Sampling Results Fall 2005

Sample Number	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12(#11dup)	#13	#15	#14(Rinsate)	Trip Blank	Range High	Range Low	Objectives	Objectives
ZIP Code	14131	14131	14174	14174	14174	14174	14174	14131	14174	14131	14094	14094	14174	14174						
Type	Dug	Dug	Drilled	Dug	Dug	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled	Dug						
Diameter	60"	48"	6"	60"	36"	6"	6"	6"	3"	6"	8"	8"	8"	36"						
Depth (from top of casing)	32' 4"	17' 8"	86' 3"	28'	27' 8"	24' 9"	80'	38' 7"	30	64' 10"	48' 9"	48' 9"	deep	27' 7"						
Depth to water (from top of casing)	5' 3"	36"	24' 3"	8'	25' 1"	14'7"	60'	11' 3"	~25	20' 8"	17' 5"	17' 5"	unknown	11' 11"						
Well owners reported usage	Potable	Potable	Potable	Non-Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Potable	Potable	Potable	Non-Potable						
Field Results																				
Date Sampled	9/12/2005	9/12/2005	9/12/2005	9/12/2005	9/13/2005	9/13/2005	9/13/2005	9/13/2005	9/13/2005	9/13/2005	9/14/2005	9/14/2005	9/14/2005	10/11/2005	9/14/2005	8/30/2005				
Temp (Degree C)	14.3	14.2	17.5	18.5	17.5	16.1	16.1	15.9	21.2	18.2	17	17.1	18.4	14	27.3		18.5	14	NA	
Turbidity (Nephelometric Turbidity Units - NTU)	0.6	1.9	1.1	3.9	5.6	1.4	0.5	2.2	17	0.85	1.8	5	1.6	6.5	0.0		17	0.5	5	NYSDOH
pH (SU)	6.9	7.56	7.47	7.11	6.93	7.1	7.7	7.99	7.87	7.25	7.07	7.05	7.92	6.95	6.82		7.99	6.9	6.5-8.5	USEPA-SS
Bacteriologic																				
Coliform, Total (Colilert) (Most Probable Number - MPN)	>200	200	NEG	>200	>200	>200	165	205	200	32	>200		NEG	>200		NEG	>200	NEG	0/NEG	NYSDOH
Heterotrophic Plate Count (CFU/100ml)	5415	1482	75	1390	570	741	15	100	64	10	456		4	175		15	5415	4	500 TT	USEPA-SS
E Coli - MUG (Colilert) (MPN)	NEG	NEG	NA	>200	NEG	1	NEG	NEG	74	NEG	NEG		NA	NEG		NA	>200	NEG	0/NEG	NYSDOH
Conventional Chemistry Parameters by APHA/EPA Methods	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Chloride	223	34	6	7	156	52	8	278	146	172	23	19	6	31	3		278	6	250	NYSDOH
Nitrate/Nitrite as N	4.03	<0.05	<0.05	1.13	0.41	<0.05	<0.05	<0.05	<0.05	0.51	6.41	6.43	<0.05	2.1	<0.05		6.43	<0.05	10	NYSDOH
Phenol	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	<0.025	<0.025	<0.025	<0.025		0.025	<0.025	0.001	NYSDEC
Fluoride by Ion Selective Electrode	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Fluoride	0.3	0.3	0.3	0.2	0.3	<0.2	0.5	0.5	0.2	0.2	<0.2	<0.2	0.4	0.2	<0.2		0.5	<0.2	2.2	NYSDOH
Metals by EPA 200 Series Methods	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Lithium	0.1	<0.10	<0.10	<0.10	<0.10	0.1	<0.10	0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		0.2	<0.1	NA	
Drinking Water Metals by EPA 200 Series Methods	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Arsenic	<0.005	<0.005	0.014	<0.005	<0.005	<0.005	0.01	<0.005	0.008	<0.005	<0.005	<0.005	0.009	<0.005	<0.005		0.014	<.005	0.010	NYSDOH
Boron	0.13	0.32	0.52	<0.10	<0.10	<0.10	0.5	1	<0.10	0.2	0.16	0.15	0.52	0.1	<0.10		1	<0.10	1	NYSDEC
Copper	<0.50	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.5	<0.25		0.5	<0.25	1.3 AL	NYSDOH
Manganese	0.025	0.024	0.03	<0.0050	0.02	0.55	0.022	0.031	0.31	0.017	0.03	0.0082	0.019	0.024	<0.0050		0.55	<0.0050	0.3	NYSDOH
Nickel	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020		ND	ND	0.1	NYSDEC
Lead	<0.001	<0.001	<0.001	0.003	0.006	<0.001	<0.001	<0.001	0.023	<0.001	<0.001	0.001	<0.001	0.01	<0.001		0.023	<0.001	0.015 AL	NYSDOH
Vanadium	<0.040	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020		<0.020	<0.040	NA	
Nuclear Chemistry EPA 900 Series Methods	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	
Gross Beta	<10	4. +/- 2.	6. +/- 3.	<3.	<5.	<4.	5. +/- 2.	9. +/- 4.	<4.	<4.	4. +/- 2.	<3.	4. +/- 2.	5. +/- 3.	<0.9		9. +/- 4	<3	50	NYSDOH
Gross Alpha	7. +/- 5.	<1.3	<1.5	<0.9	<4.	<2.	1.5 +/- 1.4	<2.	<2.	<2.	4.0 +/- 1.8	4. +/- 3.	<0.6	8. +/- 3.	<0.2		7. +/- 5	<0.6	15	NYSDOH
Nuclear Chemistry Screen	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	
Uranium - 238 (TH - 234)	<120	<120	<130	<120	<130	<130	<120	<150	<140	<120	<130	<140	<120	<150	<160		<160	<120	20	NYSDOH
Thorium - 232 (AC - 228)	<5.	<4.	<4.	<3.	<5.	<5.	<3.	<4.	<5.	<3.	<6.	<6.	<3.	<2.	<5.		<6	<2	2.4	NYSDOH
Potassium - 40	<20	<13	<16	<7.	<20	<12	<14	<16	<20	<12	<18	<20	<12	<9.	<12		<20	<7	320	NYSDOH
Ruthenium - 106	<16	<8.	<16	<10	<14	<16	<6.	<18	<14	<9.	<11	<14	<6.	<8.	<9.		<18	<6	30	NYSDOH
Cesium - 134	<1.7	<0.5	<1.8	<0.7	<2	<1.3	<1.0	<1.4	<1.5	<1.0	<1.8	<1.7	<0.8	<0.8	<1.6		<2.	<0.5	60	NYSDOH
Cesium - 137	<1.6	<0.7	<1.7	<0.8	<1.5	<1.7	<1.0	<1.4	<1.9	<1.2	<1.1	<1.6	<1.0	<1.5	<1.7		<1.9	<0.7	200	NYSDOH
Cobalt - 60	<1.1	<0.8	<1.3	<0.5	<0.9	<1.8	<1.1	<1.3	<1.1	<1.0	<1.3	<1.7	<0.7	<1.1	<1.3		<1.8	<0.5	100	NYSDOH
Radium - 226 (BI - 214)	<6.	<4.	<4.	<4.	<4.	<4.	<3.	<5.	<4.	<3.	<4.	<5.	<3.	<3	<5		<6	<3	5	NYSDOH
Uranium - 235	<18	<8.	<13	<8.	<15	<15	<8.	<16	<13	<4.	<14	<15	<8.	<8.	<14		<18	<4	20	NYSDOH
EPA 508 PCBs Screen	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
PCBs as Aroclors (screen)	absence	absence	absence	absence	absence	absence	absence	presence	absence	absence	absence	absence	absence	absence	absence		presence	absence	absence	NYSDOH
EPA 508 Organochlorine Pesticides and PCBs								ug/l											ug/l	
PCB-1016								<0.20											0.5	NYSDOH
PCB-1221								<0.20											0.5	NYSDOH
PCB-1232								<0.20											0.5	NYSDOH
PCB-1242								<0.20											0.5	NYSDOH
PCB-1248								<0.20											0.5	NYSDOH
PCB-1254								<0.20											0.5	NYSDOH
PCB-1260								<0.20											0.5	NYSDOH

NCDOH
Private Well Sampling Results Fall 2005

Sample Number	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12(#11dup)	#13	#15	#14(Rinsate)	Trip Blank	Range High	Range Low	Objectives	Objectives
EPA 502.2 Volatile Organic Compounds (NY List)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Bromobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Bromochloromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Bromomethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
n-Butylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
sec-Butylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
tert-Butylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Carbon tetrachloride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Chlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Chloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Chloromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
2-Chlorotoluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
4-Chlorotoluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Dibromomethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,2-Dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,3-Dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,4-Dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Dichlorofluoromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,1-Dichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,2-Dichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,1-Dichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
cis-1,2-Dichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
trans-1,2-Dichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,2-Dichloropropane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,3-Dichloropropane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
2,2-Dichloropropane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,1-Dichloropropene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
cis-1,3-Dichloropropene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
trans-1,3-Dichloropropene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Ethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Isopropylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
p-Isopropyltoluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Methylene chloride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3*	<0.5	ND	ND	5	NYSDOH
n-Propylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Styrene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,1,1,2-Tetrachloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,1,2,2-Tetrachloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Tetrachloroethene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Toluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,2,3-Trichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,2,4-Trichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,1,1-Trichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,1,2-Trichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Trichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Trichlorofluoromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,2,3-Trichloropropane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
1,2,4-Trimethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Vinyl chloride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	2	NYSDOH
m,p-Xylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
o-Xylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH
Methyl tert-butyl ether (MTBE)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	ND	5	NYSDOH

NCDOH
Private Well Sampling Results Fall 2005

Sample Number	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12(#11dup)	#13	#15	#14(Rinsate)	Trip Blank	Range High	Range Low	Objectives	Objectives
EPA 525.2 Semivolatile Organic Compounds	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
Alachlor	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	2	NYSDOH
Aldrin	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	50	NYSDOH
Atrazine	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	3	NYSDOH
Benzo (a) pyrane	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	0.2	NYSDOH
Di(2-ethylhexyl)adipate	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00		ND	ND	50	NYSDOH
Di(2-ethylhexyl)phthalate	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00		ND	ND	5	NYSDOH
Butachlor	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	50	NYSDOH
Endrin	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	2	NYSDOH
Heptachlor	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	0.4	NYSDOH
Heptachlor epoxide	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	0.2	NYSDOH
Hexachlorobenzene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	1	NYSDOH
Hexachlorocyclopentadiene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	50	NYSDOH
HCH-gamma (Lindane)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	0.2	NYSDOH
Methoxychlor	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	40	NYSDOH
Metolachlor	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00		ND	ND	50	NYSDOH
Metribuzin	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00		ND	ND	50	NYSDOH
Propachlor	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	50	NYSDOH
Simazine	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	4	NYSDOH
Dieldrin	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		ND	ND	50	NYSDOH

i) NYSDOH-New York State Department of Health; Water Quality Standard - Part Five of the NYS Sanitary Code "Public Water Supplies"
ii) USEPA-United States Environmental Protection Agency; Water Quality Standard - 40 Code of Federal Regulations "National Primary Drinking Water Regulations"
iii) NYSDEC-New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) June 1998 Ground Water Quality Standards
iv) AL-Action Level, The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
v) MCL-Maximum Contaminate Level, The highest level of a contaminant that is allowed in drinking water
vi) NA-Not Applicable
vii) SS-Secondary Standard. Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water.
viii) TT-Treatment Technique A required process intended to reduce the level of a contaminant in drinking water
ix) ND-Not Detected
x) Exceeds the Objective MCL
xi) You will note that many results are preceded by a "<" (less than) symbol. This indicates that the laboratory was not able to quantify the concentration of a parameter above the detection limit, and the chemical is therefore considered to be "not detected".
xii) * Methylene Chloride Suspected to be random air contaminate by the laboratory
xiii) To determine if an Objective MCL was exceeded, results must be rounded to the same # of significant figures as the MCL

APPENDIX B

B.1. SAMPLE WATER WELL INITIAL SURVEY COVER LETTER

Dear Resident,

The Niagara County Department of Health is preparing a well survey of selected areas of the Towns of Porter and Lewiston. The purpose of the survey is to identify the location and operability of existing groundwater wells in the study area. Owners of existing wells may opt to request the Department to perform a sanitary survey of the well that will evaluate the construction, location, and usage information. The Department may be able to provide sampling for different parameters as well as provide information to ensure safe drinking water, advise about well protection or information regarding techniques for proper closure for aquifer protection.

Currently, the Department is sending the enclosed questionnaire to approximately 150 property owners where department files have indicated the presence of a private well.
The Department asks that you complete the survey and return it to the Department in the enclosed pre-addressed stamped envelope.

Please note that the Niagara County Health Department considers private well data "***sensitive***". This means that private well data should be used only to provide the homeowner the best service and information with regard to the protection of his/her private water supply. Any gathered data regarding the specific location, owner, address will not be made public so as to not provide a marketing tool for a third party as well as other ethical reasons. Protection of Niagara Counties' groundwater aquifer is our primary concern and the Department will maintain its' files with regard to private water supplies with discretion and ***will not divulge specific well locations without the owners consent.***

Please note that if a friend or neighbor has a well and did not receive a copy of this survey, they may request one by calling the Department at 439-7443.

You may direct any questions regarding this survey to [redacted] P.E., Supervisory Public Health Engineer at [redacted]

Very truly yours,

[redacted]
Director of Environmental Health

B.2 SURVEY FORM

NIAGARA COUNTY DEPARTMENT OF HEALTH WATER WELL SURVEY FORM

Name ______________________________ Date ____________

Mailing Address ______________________________

Phone ______________________________

Phone (alternate) ______________________________

Address of property with well….if different from above ______________________________

1. Do you have one or more water wells on this property? a) yes b) no
   (it need not be in current use.) If no, stop now and return survey
2. Is the well currently a) used b) unused c) abandoned…filled in (yes / no)
3. Is the well(s) used for drinking water? a) always b) never c) sometimes
   - if you answered always or sometimes, is public water also available at this address? a) yes b) no
4. Is the well used for other purposes (like car washing, lawn watering, bathing...? a) yes b) no

   If yes, describe other use ______________________________
5. Is there a conditioner, softener, chlorinator, filter, or other form of treatment for the system? a) yes b) no

   if yes, describe ______________________________
6. What is the frequency of use? a) daily b) weekly c) monthly d) seasonally e) sporatically
7. Approximate date last used ______________________________

Well Information:

Total Depth (feet below ground surface) a) 0-10 b) 10-20 c) 20-30 d) 30-40 e) 40 or more

Open / Screened interval (length in feet) a) 0-10 b) 10-20 c) 20-30 d) 30-40 e) 40 or more
< Open interval is the length of the well that has been left as an open hole.>
<Screened interval is the length of the screen installed in the well.>

Casing Type a) Steel b) Stone c) PVC d) None e) other

Well Construction a) dug b) drilled c) open or uncased

Well Diameter (in inches) a) 0-6 b) 6-12 c) 12-24 d) 24 or more

Year Constructed ____________________

Name of Well Drilling Company that Installed or Maintained Well ____________________

Disclosure Information

Please Choose One

a) This information is only intended for use by the Niagara County Health Department to provide the homeowner with information to ensure safe water drinking water, advise for well protection or information regarding techniques for proper closure for aquifer protection. My permission is required to release the data to any other party.
b) You may release the data as part of any of a "Freedom of Information"' request the department receives for the data.

B.3 SAMPLE WATER WELL FOLLOWUP SURVEY COVER LETTER

Re: Request to sample well water

Dear resident:

During the fall of 2004, the Niagara County Department of Health initiated a Water Well Survey in the Lewiston-Porter Area. The department identified 110 wells of which 14 were reported to be in active use. Your well is identified as one of the 14 active wells and is considered eligible for further testing at no cost to you. The purpose of the well sampling is to address concerns of some citizens that legacy contamination due to historic activities at the Lake Ontario Ordnance Works (LOOW) or subsequent industrial activities may have adversely affected groundwater quality outside of the LOOW area currently being studied. We have no evidence that this has occurred and this study hopes to confirm that private water well users have safe drinking water.

We intend to analyze your water samples for parameters that might be related to LOOW contaminants as well as a general potable water testing criteria. These parameters include:

- gross alpha, gross beta and gamma radiation (past and current radioactive materials on LOOW)
- electrical conductivity, pH, temperature, chloride (general indicators of water quality)
- nitrate, boron, lithium, fluoride, PCB's, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, (LOOW contaminants previously identified)
- phenol, volatile organic compounds, lead, nitrite (general indicators of chemical impact)
- total coliform/E. coli (bacterial contamination)

Since this study utilizes private water wells, it will be conducted on a voluntary basis. Only those wells for which permission to sample is obtained will be sampled. The cost of the study will be shared between the Niagara County Department of Health and the New York State Department of Health.

Sampling will be conducted by the Niagara County Department of Health and/or its consultant. Oversight and assistance will be provided by the New York State Department of Health.

It is anticipated that sampling of the wells will be conducted in spring 2005 with study results to be available by summer 2005.

The sample results of each well will be shared with each well owner but the identity will not be published in our report. The reported results will also include the range detected for each parameter analyzed from all wells in this study. The results will be compared to State Department of Environmental Conservation (NYSDEC), State Department of Health (NYSDOH) and United States Environmental Protection Agency (USEPA) groundwater and drinking water standards so that you know how your water compares.

Summarized results lacking specific address identifiers may also be shared with other interested parties such as the NYSDOH, NYSDEC, U.S. Corp of Army Engineers, the public and the media.

Your continued cooperation in this study is very much appreciated, as it will allow the Department to begin to address community public health concerns as they relate to groundwater issues. We will phone you to setup an appointment to collect the water samples in the near future.
Please feel free to call us at 439-7444 with your questions and/or concerns.

Very truly yours,

[redacted].
Director of Environmental Health

APPENDIX C

REGULATORY REFERENCE STANDARDS

EPA National Primary Drinking Water Standards

	Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal
OC	Acrylamide	TT[8]	Nervous system or blood problems;	Added to water during sewage/wastewater increased risk of cancer treatment	zero
OC	Alachlor	0.002	Eye, liver, kidney or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops	zero
R	Alpha particles	15 picocuries per Liter (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation	zero
IOC	Antimony	0.006	Increase in blood cholesterol; decrease in blood sugar	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder	0.006
IOC	Arsenic	0.010 as of 1/23/06	Skin damage or problems with circulatory systems, and may have increased risk of getting cancer	Erosion of natural deposits; runoff from orchards, runoff from glass & electronics production wastes	0
IOC	Asbestos (fibers >10 micrometers)	7 million fibers per Liter (MFL)	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits	7 MFL
OC	Atrazine	0.003	Cardiovascular system or reproductive problems	Runoff from herbicide used on row crops	0.003
IOC	Barium	2	Increase in blood pressure	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	2
OC	Benzene	0.005	Anemia; decrease in blood platelets; increased risk of cancer	Discharge from factories; leaching from gas storage tanks and landfills	zero
OC	Benzo(a)pyrene (PAHs)	0.0002	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines	zero
IOC	Beryllium	0.004	Intestinal lesions	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries	0.004
R	Beta particles and photon emitters	4 millirems per year	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation	zero
DBP	Bromate	0.010	Increased risk of cancer	Byproduct of drinking water disinfection	zero
IOC	Cadmium	0.005	Kidney damage	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints	0.005
OC	Carbofuran	0.04	Problems with blood, nervous system, or reproductive system	Leaching of soil fumigant used on rice and alfalfa	0.04
OC	Carbon tetrachloride	0.005	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities	zero
D	Chloramines (as Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort, anemia	Water additive used to control microbes	MRDLG=4[1]

LEGEND

D	Disinfectant	IOC	Inorganic Chemical	OC	Organic Chemical
DBP	Disinfection Byproduct	M	Microorganism	R	Radionuclides

1

	Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal
OC	Chlordane	0.002	Liver or nervous system problems; increased risk of cancer	Residue of banned termiticide	zero
D	Chlorine (as Cl2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort	Water additive used to control microbes	MRDLG=4[1]
D	Chlorine dioxide (as ClO2)	MRDL=0.8[1]	Anemia; infants & young children: nervous system effects	Water additive used to control microbes	MRDLG=0.8[1]
DBP	Chlorite	1.0	Anemia; infants & young children: nervous system effects	Byproduct of drinking water disinfection	0.8
OC	Chlorobenzene	0.1	Liver or kidney problems	Discharge from chemical and agricultural chemical factories	0.1
IOC	Chromium (total)	0.1	Allergic dermatitis	Discharge from steel and pulp mills; erosion of natural deposits	0.1
IOC	Copper	TT[7]; Action Level = 1.3	Short term exposure: Gastrointestinal distress. Long term exposure: Liver or kidney damage. People with Wilson's Disease should consult their personal doctor if the amount of copper in their water exceeds the action level	Corrosion of household plumbing systems; erosion of natural deposits	1.3
M	*Cryptosporidium*	TT[3]	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
IOC	Cyanide (as free cyanide)	0.2	Nerve damage or thyroid problems	Discharge from steel/metal factories; discharge from plastic and fertilizer factories	0.2
OC	2,4-D	0.07	Kidney, liver, or adrenal gland problems	Runoff from herbicide used on row crops	0.07
OC	Dalapon	0.2	Minor kidney changes	Runoff from herbicide used on rights of way	0.2
OC	1,2-Dibromo-3-chloropropane (DBCP)	0.0002	Reproductive difficulties; increased risk of cancer	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards	zero
OC	o-Dichlorobenzene	0.6	Liver, kidney, or circulatory system problems	Discharge from industrial chemical factories	0.6
OC	p-Dichlorobenzene	0.075	Anemia; liver, kidney or spleen damage; changes in blood	Discharge from industrial chemical factories	0.075
OC	1,2-Dichloroethane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero
OC	1,1-Dichloroethylene	0.007	Liver problems	Discharge from industrial chemical factories	0.007
OC	cis-1,2-Dichloroethylene	0.07	Liver problems	Discharge from industrial chemical factories	0.07
OC	trans-1,2-Dichloroethylene	0.1	Liver problems	Discharge from industrial chemical factories	0.1
OC	Dichloromethane	0.005	Liver problems; increased risk of cancer	Discharge from drug and chemical factories	zero
OC	1,2-Dichloropropane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero
OC	Di(2-ethylhexyl) adipate	0.4	Weight loss, live problems, or possible reproductive difficulties	Discharge from chemical factories	0.4
OC	Di(2-ethylhexyl) phthalate	0.006	Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories	zero
OC	Dinoseb	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables	0.007
OC	Dioxin (2,3,7,8-TCDD)	0.00000003	Reproductive difficulties; increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories	zero
OC	Diquat	0.02	Cataracts	Runoff from herbicide use	0.02
OC	Endothall	0.1	Stomach and intestinal problems	Runoff from herbicide use	0.1

LEGEND

D	Disinfectant	IOC	Inorganic Chemical	OC	Organic Chemical
DBP	Disinfection Byproduct	M	Microorganism	R	Radionuclides

	Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal
OC	Endrin	0.002	Liver problems	Residue of banned insecticide	0.002
OC	Epichlorohydrin	TT[8]	Increased cancer risk, and over a long period of time, stomach problems	Discharge from industrial chemical factories; an impurity of some water treatment chemicals	zero
OC	Ethylbenzene	0.7	Liver or kidneys problems	Discharge from petroleum refineries	0.7
OC	Ethylene dibromide	0.00005	Problems with liver, stomach, reproductive system, or kidneys; increased risk of cancer	Discharge from petroleum refineries	zero
IOC	Fluoride	4.0	Bone disease (pain and tenderness of the bones); Children may get mottled teeth	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories	4.0
M	*Giardia lamblia*	TT[3]	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
OC	Glyphosate	0.7	Kidney problems; reproductive difficulties	Runoff from herbicide use	0.7
DBP	Haloacetic acids (HAA5)	0.060	Increased risk of cancer	Byproduct of drinking water disinfection	n/a[6]
OC	Heptachlor	0.0004	Liver damage; increased risk of cancer	Residue of banned termiticide	zero
OC	Heptachlor epoxide	0.0002	Liver damage; increased risk of cancer	Breakdown of heptachlor	zero
M	Heterotrophic plate count (HPC)	TT[3]	HPC has no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.	HPC measures a range of bacteria that are naturally present in the environment	n/a
OC	Hexachlorobenzene	0.001	Liver or kidney problems; reproductive difficulties; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories	zero
OC	Hexachlorocyclopentadien e	0.05	Kidney or stomach problems	Discharge from chemical factories	0.05
IOC	Lead	TT[7]; Action Level = 0.015	Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities; Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits	zero
M	*Legionella*	TT[3]	Legionnaire's Disease, a type of pneumonia	Found naturally in water; multiplies in heating systems	zero
OC	Lindane	0.0002	Liver or kidney problems	Runoff/leaching from insecticide used on cattle, lumber, gardens	0.0002
IOC	Mercury (inorganic)	0.002	Kidney damage	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and croplands	0.002
OC	Methoxychlor	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock	0.04
IOC	Nitrate (measured as Nitrogen)	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	10
IOC	Nitrite (measured as Nitrogen)	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	1

LEGEND

D	Disinfectant	IOC	Inorganic Chemical	OC	Organic Chemical
DBP	Disinfection Byproduct	M	Microorganism	R	Radionuclides

3

	Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal
OC	Oxamyl (Vydate)	0.2	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, and tomatoes	0.2
OC	Pentachlorophenol	0.001	Liver or kidney problems; increased cancer risk	Discharge from wood preserving factories	zero
OC	Picloram	0.5	Liver problems	Herbicide runoff	0.5
OC	Polychlorinated biphenyls (PCBs)	0.0005	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemicals	zero
R	Radium 226 and Radium 228 (combined)	5 pCi/L	Increased risk of cancer	Erosion of natural deposits	zero
IOC	Selenium	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum refineries; erosion of natural deposits; discharge from mines	0.05
OC	Simazine	0.004	Problems with blood	Herbicide runoff	0.004
OC	Styrene	0.1	Liver, kidney, or circulatory system problems	Discharge from rubber and plastic factories; leaching from landfills	0.1
OC	Tetrachloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from factories and dry cleaners	zero
IOC	Thallium	0.002	Hair loss; changes in blood; kidney, intestine, or liver problems	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories	0.0005
OC	Toluene	1	Nervous system, kidney, or liver problems	Discharge from petroleum factories	1
M	Total Coliforms (including fecal coliform and *E. coli*)	5.0%[4]	Not a health threat in itself; it is used to indicate whether other potentially harmful bacteria may be present[5]	Coliforms are naturally present in the environment as well as feces; fecal coliforms and *E. coli* only come from human and animal fecal waste.	zero
DBP	Total Trihalomethanes (TTHMs)	0.10 0.080 after 12/31/03	Liver, kidney or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection	n/a[6]
OC	Toxaphene	0.003	Kidney, liver, or thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle	zero
OC	2,4,5-TP (Silvex)	0.05	Liver problems	Residue of banned herbicide	0.05
OC	1,2,4-Trichlorobenzene	0.07	Changes in adrenal glands	Discharge from textile finishing factories	0.07
OC	1,1,1-Trichloroethane	0.2	Liver, nervous system, or circulatory problems	Discharge from metal degreasing sites and other factories	0.20
OC	1,1,2-Trichloroethane	0.005	Liver, kidney, or immune system problems	Discharge from industrial chemical factories	0.003
OC	Trichloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from metal degreasing sites and other factories	zero
M	Turbidity	TT[3]	Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (e.g., whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing micro-organisms such as viruses, parasites and some bacteria. These organisms can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.	Soil runoff	n/a
R	Uranium	30 ug/L as of 12/08/03	Increased risk of cancer, kidney toxicity	Erosion of natural deposits	zero

LEGEND

D	Disinfectant	IOC	Inorganic Chemical	OC	Organic Chemical
DBP	Disinfection Byproduct	M	Microorganism	R	Radionuclides

4

	Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal
OC	Vinyl chloride	0.002	Increased risk of cancer	Leaching from PVC pipes; discharge from plastic factories	zero
M	Viruses (enteric)	TT[3]	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
OC	Xylenes (total)	10	Nervous system damage	Discharge from petroleum factories; discharge from chemical factories	10

NOTES

1. Definitions:
   - Maximum Contaminant Level Goal (MCLG)—The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.
   - Maximum Contaminant Level (MCL)—The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
   - Maximum Residual Disinfectant Level Goal (MRDLG)—The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
   - Maximum Residual Disinfectant Level (MRDL)—The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
   - Treatment Technique (TT)—A required process intended to reduce the level of a contaminant in drinking water.
2. Units are in milligrams per liter (mg/L) unless otherwise noted. Milligrams per liter are equivalent to parts per million (ppm).
3. EPA's surface water treatment rules require systems using surface water or ground water under the direct influence of surface water to (1) disinfect their water, and (2) filter their water or meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels:
   - *Cryptosporidium* (as of 1/1/02 for systems serving >10,000 and 1/14/05 for systems serving <10,000) 99% removal.
   - *Giardia lamblia*: 99.9% removal/inactivation
   - Viruses: 99.99% removal/inactivation
   - *Legionella*: No limit, but EPA believes that if *Giardia* and viruses are removed/inactivated, *Legionella* will also be controlled.
   - Turbidity: At no time can turbidity (cloudiness of water) go above 5 nephelometric turbidity units (NTU); systems that filter must ensure that the turbidity go no higher than 1 NTU (0.5 NTU for conventional or direct filtration) in at least 95% of the daily samples in any month. As of January 1, 2002, for systems serving >10,000, and January 14, 2005, for systems serving <10,000, turbidity may never exceed 1 NTU, and must not exceed 0.3 NTU in 95% of daily samples in any month.
   - HPC: No more than 500 bacterial colonies per milliliter.
   - Long Term 1 Enhanced Surface Water Treatment (Effective Date: January 14, 2005); Surface water systems or (GWUDI) systems serving fewer than 10,000 people must comply with the applicable Long Term 1 Enhanced Surface Water Treatment Rule provisions (e.g. turbidity standards, individual filter monitoring, *Cryptosporidium* removal requirements, updated watershed control requirements for unfiltered systems).
   - Filter Backwash Recycling: The Filter Backwash Recycling Rule requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the state.
4. No more than 5.0% samples total coliform-positive in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Every sample that has total coliform must be analyzed for either fecal coliforms or *E. coli* if two consecutive TC-positive samples, and one is also positive for *E. coli* fecal coliforms, system has an acute MCL violation.
5. Fecal coliform and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Disease-causing microbes (pathogens) in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These pathogens may pose a special health risk for infants, young children, and people with severely compromised immune systems.
6. Although there is no collective MCLG for this contaminant group, there are individual MCLGs for some of the individual contaminants:
   - Haloacetic acids: dichloroacetic acid (zero); trichloroacetic acid (0.3 mg/L)
   - Trihalomethanes: bromodichloromethane (zero); bromoform (zero); dibromochloromethane (0.06 mg/L)
7. Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L.
8. Each water system must certify, in writing, to the state (using third-party or manufacturer's certification) that when it uses acrylamide and/or epichlorohydrin to treat water, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows: Acrylamide = 0.05% dosed at 1 mg/L (or equivalent); Epichlorohydrin = 0.01% dosed at 20 mg/L (or equivalent).

LEGEND

D	Disinfectant	IOC	Inorganic Chemical	OC	Organic Chemical
DBP	Disinfection Byproduct	M	Microorganism	R	Radionuclides

National Secondary Drinking Water Standards

National Secondary Drinking Water Standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

Contaminant	Secondary Standard
Aluminum	0.05 to 0.2 mg/L
Chloride	250 mg/L
Color	15 (color units)
Copper	1.0 mg/L
Corrosivity	noncorrosive
Fluoride	2.0 mg/L
Foaming Agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Silver	0.10 mg/L
Sulfate	250 mg/L
Total Dissolved Solids	500 mg/L
Zinc	5 mg/L

Office of Water (4606M)
EPA 816-F-03-016
www.epa.gov/safewater
June 2003

APPENDIX D

PRIVATE WATER SUPPLY DISINFECTION PROCEDURE

Improper construction, protection or location of a well is a common cause of well contamination.

In general, wells should be located uphill, with a minimum setback distance away from any standing water, privy, cesspool, tile field, leaching pit or other sewage disposal system or know source of pollution. Minimum setback distances can be found on the back of this document. Upon receipt of a laboratory report indicating that a well water sample is bacteriology contaminated, all water used for drinking or culinary purposes should first be boiled to maintain a rolling boil for a minimum of two minutes prior to use. Where a public water supply is available, every effort should be made to use this water supply in preference to any private well water supply.

In the absence of a public water supply, one should try to find and remove the probable cause of pollution. The cause could be holes in the side of the casing, channels along the length of the casing leading to the well, or crevices in rock connecting surface pollution with the water-bearing strata. An inspection should be made of the top and inside of the casing, with the aid of a mirror or strong light, to determine if water is entering the well from close to the surface or through the bottom of the casing. If deficiencies are found, a competent well driller should engaged to investigate the possibility of sealing the opening, installing an inner casing, or installing a new casing carefully sealed in rock with cement grout.

All existing wells used for domestic water supplies which may be subject to contamination should be reconstructed so as to produce safe water, or, if this is not practicable, the well should be abandoned and safe supplies developed by constructing new wells, or water should be obtained from other safe sources.

Dug wells with stone or brick casing should be protected to a minimum depth of 10 feet from existing grade. In addition, dug wells should have a cover, which is watertight and extends downward at least 2 inches over the wall or curbing of the well with a proper seal.

After the improvements have been completed, the well should be disinfected with unscented (regular-blue cap) chlorine bleach such as Clorox Ultra. Only Clorox Ultra or Bison Brand bleach containing 6.00% available chlorine have been formally approved for drinking water use and can be purchased in most drug and grocery stores. Mix two-quarts of bleach in 10 gallons of tap water. Turn the electrical power off to the well pump. Place a clean garden hose connected to an outdoor faucet inside the well casing. Turn the electrical power back on and open the water spigot to the hose and allow it to run. Pour the solution into the well casing while it is being pumped. Keep pumping the well until chlorine odor appears at all indoor and outdoor taps and then shut off all taps with the exception of the hose spigot. It may be necessary to open a valve or plug in the top of the pressure tank if so equipped, in order to permit the concentrated chlorine solution to come into contact with the entire inside of the tank. Air must again be introduced into the pressure tank and the opening closed. Continue running water through the hose inside the well to recirculate the chlorine-treated water. Use the hose to also wash down the inside of the well casing.

After one hour of recirculating the water, shut off all faucets to stop the pump. Disconnect the power supply to the pump and remove the hose. Mix two more quarts of bleach in 10 gallons of water and pour this chlorine solution into the well. Disinfect the well cap and seal by rinsing with a chlorine solution. Replace the cap and well seal. Allow the well to stand idle for at least 8 hours and preferably 12 to 24 hours. Avoid using the well during this time. Pump the well to waste away from grass and shrubbery through the storage tank and taps, until the odor of chlorine disappears.

After all the chlorine is pumped out, a water sample should be collected and tested by the Niagara County Department of Health to determine whether all bacteriological contamination has been eliminated. No water quality sample will be taken if there is any chlorine present.

This procedure is to remove bacteriological contamination in the well casing and/or piping in the house; the disinfection procedure is no assurance that the water entering the well or spring is free of pollution.

Required Minimum Separation Distances to Protect Water Wells From Contamination

Contaminant Source	Distance (Feet)[1]
Chemical storage sites not protected from the elements (e.g., salt and sand/salt storage)[2]	300
Landfill waste disposal area, or hazardous or radiological waste disposal area[2]	300
Land surface application or subsurface injection of effluent or digested sludge from a Municipal or public wastewater treatment facility	200
Land surface application or subsurface injection of septage waste	200
Land surface spreading or subsurface injection of liquid or solid manure[3]	200
Manure piles[4]	200
Barnyard, silo, barn gutters and animal pens [5,6]	100
Cesspools (i.e. pits with no septic tank pretreatment)	200
Wastewater treatment absorption systems located in coarse gravel or in the direct path of drainage to a well	200
Fertilizer and/or pesticide mixing and/or clean up areas	150
Seepage pit (following septic tank)[5]	150
Underground single walled chemical or petroleum storage vessels	150
Absorption field or bed[5]	100
Contained chemical storage sites protected from the elements (e.g., salt and sand/salt storage within covered structures)[7]	100
Septic system components (non-watertight)[5]	100
Intermittent sand filter without a watertight liner[5]	100
Sanitary Privy pit[5]	100
Surface wastewater recharge absorption system for storm water from parking lots, roadways or driveways[5]	100
Cemeteries	100
Sanitary privy with a watertight vault	50
Septic tank, aerobic unit, watertight effluent line to distribution box	50
Sanitary sewer or combined sewer	50
Surface water recharge absorption system with no automotive-related wastes (e.g., clear-water basin, clear-water dry well)	50
Stream, lake, watercourse, drainage ditch, or wetland	25
All known sources of contamination otherwise not shown above	100

Notes for Table:

[1] The listed water well separation distances from contaminant sources shall be increased by *50%* whenever aquifer water enters the water well at less than 50 feet below grade. If a *50%* increase in separation distances can not be achieved, then the greatest possible increase in separation distance shall be provided with such additional measures as needed to prevent contamination. The oversized borehole grout shall be as deep as necessary to prevent contamination with a minimum depth of 19 feet.

[2] Water wells shall not be located in a direct line of flow from these items, nor in any contaminant plume created by these items, except with such additional measures (e.g., sentinel groundwater monitoring, hydraulic containment, source water treatment) as needed to prevent contamination.

[3] For the purpose of well location, all tillable fields should be considered subject to manure spreading. Water wells may be located a minimum of 100 feet from areas subject to land spreading of manure provided a proper evaluation supports a reduced separation distance. On-site evaluations of agricultural properties done per agricultural environmental management (AEM) or comprehensive nutrient management plan (CNMP) programs by a certified nutrient management planner or soil and water conservation district (SWCD) official could provide such documentation.

[4] Water wells may be located 100 feet from temporary (30 days or less) manure piles/staging areas that are controlled to preclude contamination of surface or groundwater or 100 feet from otherwise managed manure piles that are controlled pursuant to regulation in a manner that prevents contamination of surface or groundwater.

[5] When these contamination sources are located in coarse gravel or are located upgrade and in the direct path of drainage to a water well, the water well shall be located at least 200 feet away from the closest part of these sources.

[6] Animal pen does not include small pet shelters or kennels housing 3 or fewer adult pets.

[7] Chemical storage sites as used in this entry do not include properly maintained storage areas of chemicals used for water treatment nor areas of household quantities of commonly used domestic chemicals.

APPENDIX E

ADDITIONAL INFORMATION REGARDING PARAMETERS THAT EXCEEDED MCL STANDARDS

The following notes are related to those parameters which were found to exceed MCLs in private well water during this project.

Unsatisfactory Bacteriological Results

Water with presence of coliform or E. coli are advised to boil all water used for drinking or culinary purposes. For proper disinfection, a rolling boil must be maintained for a minimum of one minute.

- **DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST.** Bring all water to a boil, let it boil for one minute, and **let it cool** before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, brushing teeth, washing dishes, and food preparation **until satisfactory results are confirmed by laboratory analysis**. Boiling kills bacteria and other organisms in the water.
- Fecal coliform or E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
- The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care providers.

The well may not be protected in accordance with generally accepted standards. Attached for informational purposes is a drawing of a properly constructed well reprinted with permission from the NYSDOH Rural Water Supply booklet. It is possible that the source of the bacteriological contamination is incidental. The department recommends that water continue to be boiled until the private well has been properly disinfected and satisfactory water quality is confirmed through laboratory analysis. A copy of the procedure for disinfecting a well is attached.

Since public water is available to service the areas of this project, this department recommends consideration of connecting to the public water supply. The public water supply is continually monitored for water quality and is a proven safe and sanitary drinking water source. Please contact the Town of Lewiston/Porter/Newfane Water Department at 754-8218/791-3831/778-8587 if this option is chosen.

If a private well water source is used for human consumption, it is strongly recommend that the water be analyzed for bacteriological water quality by a New York state certified laboratory on a quarterly basis.

Turbidity

High levels of turbidity may indicate an increased chance that the water may contain disease-causing organisms.

Potential Contaminant Source: Soil runoff

USEPA Potential Health Effects from Ingestion of Water:

Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (e.g., whether disease-causing organisms are present).

Recommendation:

DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a boil, let it boil for one minute, and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, washing dishes, brushing teeth, and food preparation until further notice.

Turbidity has no direct health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease causing organisms. These organisms include bacteria, viruses, and parasites, which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. People with severely compromised immune systems, infants, and some elderly may be at increased risk. These people should seek advice about drinking water from their health care providers.

The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice

Reference
USEPA National Primary Drinking Water Regulations, List of Contaminants & their MCL's, EPA 816-F-02-013 July 2002

<u>**Arsenic**</u>

One well water sample showed an arsenic level of 0.014 milligram-per-liter (mg/l). This is above the current drinking water standard of 0.010 mg/l, which was adopted on January 23, 2006. It should be noted that at the time of sampling, this well water was within drinking water standards, which was just recently made more restrictive.

However, if a person consumes two-liters per day from this well water source, that would result in an individual having an arsenic uptake of 0.028 mg/day. The USEPA has adopted a Reference Dose (RfD) of 0.0003 mg/kg/day for arsenic. This is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Assuming a typical adult weighing 70 kg (155 lbs.) would result in a dose of 0.021 mg/day. As you can see, if a typical adult is consuming two liters per day from this well (uptake of 0.028 mg/kg) they would exceed the RfD for arsenic.

Potential Contaminant Source:

Erosion of natural deposits; runoff from orchards, runoff from glass & electronics production waste.

Arsenic occurs naturally in rocks and soil, water, air, and plants and animals. It can be further released into the environment through natural activities such as volcanic action, erosion of rocks and forest fires, or through human actions. Approximately 90 percent of industrial arsenic in the U.S. is currently used as a wood preservative, but arsenic is also used in paints, dyes, metals, drugs, soaps and semi-conductors. High arsenic levels can also come from certain fertilizers, animal feeding operations, pesticides and fungicides. Industry practices such as copper smelting, mining and coal burning also contribute to arsenic in our environment.

USEPA Potential Health Effects from Ingestion of Water:

Some people who drink water-containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.

Human exposure to arsenic can cause both short and long term health effects. Short or acute effects can occur within hours or days of exposure. Long or chronic effects occur over many years. Long term exposure to arsenic has been linked to cancer of the bladder, lungs, skin, kidneys, nasal passages, liver and prostate.

Recommendation:

The department recommends that you not use your well for human consumption or culinary purposes. Treatment techniques are available for you're well supply to remove arsenic. If you required further information please contact this department at 716-439-7452.

Reference
USEPA National Primary Drinking Water Regulations, List of Contaminants & their MCL's, EPA 816-F-02-013 July 2002 & EPA 816-F-03-016 June 2003
USEPA Health Advisories for Drinking Water Contaminants, Appendix D, Maximum Contaminate Levels and Health Advisory, September 30, 1999.

Chloride

One water sample showed a chloride level of 278 milligram-per-liter (mg/l). This is above the drinking water standard of 250 mg/l. Current human dietary intake of chloride varies largely with the intake of salt. Estimates range from 2,400 to 14,400 mg/day from sodium chloride (table salt). Assuming a two-liter per day human consumption rate from this well water source would result in a chloride uptake of 556 mg/day. Therefore, the well water supply could contribute approximately 23% to the water consumer's daily lower estimate of total chloride intake.

Potential Contaminate Source:

Naturally occurring or indicative of road salt contamination.

NYSDOH Potential Health Effects from Ingestion of Water:

No health effects at this level. The MCL for chloride is the level above which the taste of water may become objectionable. In addition, to the adverse taste effects, high chloride concentration levels in the water contribute to the deterioration of domestic plumbing and water heaters. Elevated chloride concentrations may also be associated with the presence of sodium in drinking water.

Reference
NYSDOH Annual Water Quality Report: Guidance for Water Suppliers, Table 1, January 2006

Lead

A water sample showed a lead level of 0.023 milligram-per-liter (mg/l). This is above the drinking water action level of 0.015 mg/l. Assuming a two-liter per day human consumption rate from this well water source would result in a lead uptake of 0.046 mg/day.

The particular well, which is continuously pumped by a windmill, was running dry at the time of sampling. As a result, the well sample was cloudy and contained sediment as evidenced by elevated turbidity level of 17.0 Nephelometric Turbidity Units (NTU's). The lead analysis conducted on the water sample was for total lead, which includes any lead contained in the sediment. In theory, the dissolved lead in the water should be of a lower concentration that the total lead in a sample, which contained sediment.

Potential Contaminant Source:

Corrosion of household plumbing systems; erosion of natural deposits in soil.

Typically, lead enters water supplies by leaching from lead or brass pipes and plumbing components. New lead pipes and plumbing components containing lead are no longer allowed for this reason; however, many older homes may contain lead pipes. Water is more likely to contain high lead levels if water pipes in or leading to your home are made of lead or contain lead solder.

USEPA Potential Health Effects from Ingestion of Water:

The health effects of lead are most severe for infants and children. For infants and children, exposure to high levels of lead in drinking water can result in delays in physical or mental development. For adults, it can result in kidney problems or high blood pressure. Although the main sources of exposure to lead are ingesting paint chips and inhaling dust, EPA estimates that 10 to 20 percent of human exposure to lead may come from lead in drinking water.

Short-and Long-term effects: Lead can cause a variety of adverse health effects when people are exposed to it at levels above the MCL for relatively short periods of time. These effects may include interference with red blood cell chemistry, delays in normal physical and mental development in babies and young children, slight deficits in the attention span, hearing, and learning abilities of children, and slight increases in the blood pressure of some adults.

Long-term effects: Lead has the potential to cause the following effects from a lifetime exposure at levels above the MCL: stroke, kidney disease, and cancer.

Recommendation:

The department recommends that this well not be used for human consumption or culinary purposes. Treatment techniques are available to remove lead and turbidity. For further information please contact this department at 716-439-7452.

Reference
USEPA National Primary Drinking Water Regulations, List of Contaminants & their MCL's, EPA 816-F-02-013 July 2002

Manganese

One water sample showed a manganese level of 0.55 milligram-per-liter (mg/l). This is above the drinking water standard of 0.3 mg/l. Assuming a two-liter per day human consumption rate from this well water source would result in a manganese uptake of 1.1 mg/day. Therefore, this well water supply could contribute approximately 55% to the water consumer's safe and adequate daily lower estimate of total manganese intake.

Potential Contaminant Source:
According to the NYSDOH, exceedances of this parameter should state that potential contaminant sources are "Naturally occurring or indicative of landfill contamination". Reference from NYSDOH Annual Water Quality Report: Guidance for Water Suppliers, Table 1, January 2006. No attempt to identify a source was made in this project.

NYSDOH Potential Health Effects from Ingestion of Water:

The Food and Nutrition Board of the National Research Council determined an estimated safe and adequate daily dietary intake of manganese to be 2.0-5.0 milligrams (mg) for adults. However, many people's diets lead them to consume even higher amounts of manganese, especially those who consume high amounts of vegetables or are vegetarians. The infant population is of greatest concern. It would be better if drinking water with high manganese concentrations were not used to make infant formula since it already contains manganese.

Excess manganese produces a brownish color in laundered goods and impairs the taste of tea, coffee, and other beverages. Concentrations may cause a dark brown or black stain on porcelain plumbing fixtures. As with iron, manganese may form a coating on distribution pipes. These may slough off, causing brown blotches on laundered clothing or black particles in the water.

Reference
NYSDOH Annual Water Quality Report: Guidance for Water Suppliers, Table 1, January 2006

Phenol

One water sample showed a phenol level of 0.025 milligram-per-liter (mg/l). This is above the current NYSDEC groundwater standard of 0.001 mg/l. Assuming a two-liter per day human consumption rate from this well water source would result in an individual having a phenol uptake of 0.050 mg/day. The USEPA has adopted a Reference Dose (RfD) of 0.06 mg/kg/day for phenol. This is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Assuming a typical adult weighing 70 kg (155 lbs) would result in a RfD of 4.2 mg/day. If a typical adult is consuming two-liters per day from this well (uptake of 0.050mg/kg) you are well within the RfD for phenol.

This is a rare case where the NYSDEC groundwater standard (0.001 mg/l) is more restrictive than the state and federal drinking water standard (0.050mg/l).

Potential Contaminant Source:

Phenol is both a man-made chemical and produced naturally. It is found in nature in some foods and in human and animal wastes and decomposing organic material. The largest single use of phenol is as an intermediate in the production of phenolic resins. Phenol is used in making plywood, pharmaceuticals, adhesives, plastics, and rubber.

The Agency for Toxic Substances and Disease Registry (ASTDR) Potential Health Effects from Ingestion of Water:

It is not known if phenol causes cancer in humans. However, cancer has been shown to occur in mice when phenol was applied to the skin several times each week during the whole lifetime of the animal. When it is applied in combination with certain cancer-causing chemicals, a higher rate of cancer occurs than when the carcinogens are applied alone. Phenol did not cause cancer in mice or rats when they drank water containing phenol for 2 years. The International Agency for Research on Cancer (IARC) considers phenol not classifiable as to its carcinogenicity in humans.

Phenol can have beneficial effects when used for medical reasons. It is an antiseptic (kills germs) when applied to the skin in small amounts and may have antiseptic properties when gargled as a mouthwash. It is an anesthetic (relieves pain) and is a component of certain sore-throat lozenges and throat sprays or gargles. Small amounts of phenol in water have been injected into nerve tissue to lessen pain associated with certain nerve disorders. Phenol destroys the outer layers of skin if allowed to remain in contact with skin, and small amounts of concentrated solutions of phenol are sometimes applied to the skin to remove warts and to treat other skin blemishes and disorders

Reference
Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Public Health Statements. Atlanta, GA: Agency for Toxic Substances and Disease Registry, Division of Toxicology.
USEPA Health Advisories for Drinking Water Contaminants, Appendix D, Maximum Contaminate Levels and Health Advisory, September 30, 1999.

APPENDIX F

PRIVATE WATER WELL SAMPLING PROTOCOLS AND TABLES

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) presents the protocols to be followed for the collection, handling, packaging, and transport of private water well samples. The private water well sampling activities include the following tasks:

i) water well inspection;
ii) purging;
iii) measurements of field parameters; and
iv) sample collection.

The tasks shall be completed in the sequence listed. Each task is further described in the following sections.

2.0 SAMPLE ANALYSES

Groundwater samples shall be collected for analyses of the parameters listed in the Work Plan and/ or Quality Assurance Project Plan.

3.0 WELL INSPECTION

The private well will be inspected to verify information provided on the survey form. This information will include:

i) well construction;
ii) casing type and elevation above grade;
iii) casing/hole internal diameter;
iv) well depth;
v) water level depth;
vi) pumping and piping system description;
vii) water treatment equipment description;
viii) well/ sample location.

At wells where access is available, water level measurements will be accomplished using an electronic water level probe (Hydrometer) and will be referenced to the top of each individual well casing. Height of well casing will also measured from grade. GPS will be used to identify the location and elevation of the well casing.

4.0 PURGING

Purging ensures that water representative of the formation is collected and not standing water in the well casing, pipes, or holding tanks.

Private wells with slow groundwater recovery will be evacuated to dryness at least once and allowed to recover sufficiently for sample collection. Private wells, which the water level recovers sufficiently, will be purged by removing three well volumes of groundwater prior to sampling.

A well volume is calculated as the volume of groundwater (at static condition) contained within the open cavity (e.g., casing) of a well. The volume of any storage tank will be added to the well volume. This volume must be recalculated prior to each sampling event, as the variation of the static water level will vary according to seasonal conditions. To assist in the calculation of well volume, the following volumes of water per foot of submerged cavity are provided:

- 2-inch diameter cavity = 0.163 gallons per foot
- 3-inch diameter cavity = 0.367 gallons per foot
- 4-inch diameter cavity = 0.653 gallons per foot
- 6-inch diameter cavity = 1.469 gallons per foot

The groundwater will be purged from the wells by any of the bailing or pumping methods outlined below:

A. *Bailing* -Bottom-loading Teflon or stainless steel bailers 'will be available at each well for purging activities. Care will be taken to ensure that the bailing wire/ rope does not contact the ground surface and become contaminated.

B. *Pumping with a Peristaltic Pump* -The section of intake tubing used with a peristaltic pump must be Teflon and must be dedicated to the particular well being purged. Use of the peristaltic pump is limited to a maximum suction lift of approximately 20 feet.

C *Pumping with a Bladder Pump* -The suction hose used with a bladder pump must be Teflon and must be dedicated to the particular well being purged. A polyethylene or Teflon airline will be attached to the pump and must be dedicated to the well being purged.

D. *Pumping with a Submersible Pump* -The discharge hose used with the submersible must be Teflon and must be dedicated to the particular well being purged. Submersible pumps may be used with dedicated discharge tubing for purging and/or collection of non- VOC parameters.

E. *Pumping Using Existing Well Pump* -Private wells may be purged using the owner's existing well pumping equipment. Purging in this case will be done at a cold water tap nearest to the well. The tap should not be turned off prior to sampling to avoid releasing any corrosion or other materials, which may be loosened on the inner wall of the piping. Also, the volume of the residence's pressure tank, if present, must be added to the well volume and included in the initial purge. Generally, purging for a 15-minute period will be sufficient.

After purging, field measurements of pH, conductivity, turbidity, and temperature shall be measured and recorded in a bound logbook. General comments will also be recorded at the same time with respect to color, odor, turbidity, and other pertinent data. Field instruments shall be decontaminated prior to use and between well locations in accordance with the decontamination procedures presented in SOP #1. In addition, calibration of field instruments shall be performed as described in the manufacturer's instruction.

Private water well purge water will be allowed to drain to a sink or drain, ground surface, or other method acceptable to the owner. Purging equipment (not supplied by the owner) will be cleaned as described in SOP #1- Decontamination Protocols.

5.0 SAMPLE COLLECTION

Private well samples will be collected immediately following purging and prior to disturbance of the tap flow stream.

Sample collection protocols are as follows:

- New disposable latex gloves will be used when sampling each well. Gloves will be changed prior to collection of each new sample.
- Sampling equipment and field instruments shall be decontaminated as required in the decontamination procedures presented in this section.
- Field instruments shall be calibrated as required in the manufacturer's instructions.
- Groundwater samples shall be collected for chemical analysis using one of the following techniques:

Bailing
A bottom loading stainless steel/Teflon bailer will be used to sample the well. The stainless steel or Teflon bailer will be attached to a polypropylene cord. The bailer cord will be thrown away after each use. This applies to bailers used for development, purging, and sampling.

Bladder Pump
A stainless steel bladder pump with Teflon bladder, Teflon discharge tubing and Teflon or polyethylene air supply line will be used to sample the well. The bladder pump will be attached to polypropylene rope and attached to the well cap for extra support. If a bladder pump is chosen to sample for VOCs, it will be operated in a continuous manner so as not to produce pulsating samples, which are aerated in the return tube, or upon discharge. The Teflon tubing will be dedicated to each well or disposed of after completing the sampling. New polypropylene rope and polyethylene tubing, where applicable, will be used at each well location.

Existing Well Pump (Owner-Supplied)
Taps selected for sample collection should be located as close to the well as possible and upstream of any treatment system or storage/pressure tank. Take note of all water treatment devices in use at the residence (i.e., water softener, filtration unit (sediment, carbon, reverse osmosis, etc)). Leaking taps that allow water to flow out from around the stem of the valve handle and down the outside of the lip are to be avoided as sampling locations. Aerator, strainer, and hose attachments on the tap must be removed before sampling. Whenever a steady flow of water cannot be obtained, sample collection shall be avoided because the temporary fluctuation in line pressure may cause sheets of microbial growth that are lodged in some pipe sections or faucet connections to break loose. The cold water tap shall be opened for 10 to 15 minutes to permit cleaning the service line. A smooth-flowing water stream at moderate pressure without splashing shall be obtained. Then, without changing the water flow, which could dislodge some particles in the faucet, the samples may be collected.

Groundwater will be poured/pumped directly into laboratory-supplied sample containers from the bailer /pump. Sample bottles shall be filled in order of stability and volatilization sensitivity.

Samples shall be collected in the following sequence:
i) in situ measurements: temperature, pH, turbidity and specific conductance;
ii) volatile organic compounds (VOCs);
iii) remaining parameters.

- Samples shall be preserved in accordance with the QAPP and/ or laboratory instructions.
- Samples will be labeled with a unique sample number, date, and time of sample collection, and required analyses.
- Pertinent information about the sample shall be recorded in a bound field logbook.
- Collected samples shall be cooled at 4°C (+/- 2°C) immediately upon collecting, prior to and during shipment. Collected samples shall be packaged in coolers for shipment to the analytical laboratory with sufficient amounts of packing material to cushion sample bottles within the coolers. Each of the coolers will be sealed with a custody seal and custody /packing tape.
- Samples will be delivered to the analytical laboratory within 48 hours from time of collection by overnight commercial courier, Niagara County personnel or contractor personnel.
- Samples will be shipped under standard Chain of Custody protocols presented in the QAPP.
- Field QA/ QC samples will be collected at the frequencies (see the QAPP) specified below:

  i) field duplicate samples - one per 20 investigative samples to be spread out over the sampling event;
  ii) matrix spike/matrix spike duplicate (MS/MSD) - one per 20 investigative samples and a minimum of one per analytical batch;
  iii) trip blanks - one per 20 investigative samples or one per sample shipment, whichever is greater (for aqueous VOC samples only); and
  iv) field (rinse) blanks - one per 20 investigative samples.

- All sampling generated wastes (i.e. gloves, tyveks) will be collected for disposal in accordance with applicable rules and regulations.

6.0 GLASSWARE

All glassware will be prepared and provided by the analytical laboratory. The glassware preparation shall be done by experienced laboratory personnel in accordance with preparation protocols consistent with the analytical methods being used. Sample containers shall be as required by the specified analytical protocols and in accordance with the QAPP

An identification label shall be secured to each sample bottle. The label shall contain the following information:

i) monitoring program name;
ii) sample identification number;
iii) date sampled;
iv) time sampled;
v) samplers' name;
vi) requested analyses.

Clear tape shall be used to secure the label to the sample bottle.

7.0 CHAIN OF CUSTODY/RECORDS

Prior to shipping the samples, a Chain of Custody form shall be completed by the sampler and will contain, at a minimum, the sample number, date and time of sampling, and the name of the sample. The form will be signed, timed, and dated by the sampler when transferring the sample. All sample transfers are to be recorded on the sheet. The Chain of Custody form will consist of four copies, which will be distributed to the shipper, receiving laboratory, and sampler (two copies). The shipper will maintain its copy and the other three copies shall be sealed in plastic and placed within the shipping container. The shipping container shall be sealed with a security seal prior to shipment. Upon receipt, the laboratory shall inspect the seal, remove and sign the Chain of Custody forms, and inspect all samples received. One copy of the form shall be returned to the sampler by the laboratory upon sample receipt. Another copy of the completed form will be included with the analytical data report. The third copy will be retained by the laboratory for their records.

A master sample registry will contain a cross-reference of all sample locations with the sample identification number assigned to each sample. The purpose of the sample identification numbers on the container labels is to maintain the anonymity of the sample submitted for analysis. The analytical laboratories will receive all samples as blind locations.

A field log will be maintained and will include the following information:

1.0 private water well I.D. number;
2.0 owner name, address, and home and work telephone;
3.0 well configuration diagram;
4.0 well depth;
5.0 depth to water;
6.0 well casing diameter;
7.0 well pumping system and piping system (i.e., pipe type, lead-joint construction);
8.0 water well treatment system;
9.0 purge volume, date, and time;
10.0 sampling date and time;
11.0 sample I.D. number;
12.0 field parameters (temperature, pH, turbidity, and specific conductance);
13.0 sample volume;
14.0 important field observations related to sample integrity (i.e. turbidity, presence of immiscible liquids, odor, and color);
15.0 purging and sampling methods (i.e. bailer, bladder pump); and
16.0 chain of custody number.

8.0 DECONTAMINATION PROTOCOLS

8.1 GENERAL

A decontamination and equipment cleaning area is located at the Niagara County Department of Health Rabies Laboratory at the Mount View Campus. This area will be classified as a Temporary Exclusion Zone (EZ) during active decontamination and subject to all the requirements as presented in Section 4.1 of the Health and Safety Plan (HASP). The decontamination area consists of a stainless steel commercial sink. A potable water supply is available.

All decontamination fluids shall be placed in drums. Decontamination fluids with solvents must be segregated from decontamination wash water. All drums must be labeled, securely closed and staged (when full) at a designated location until disposal at an appropriate disposal facility. Decontaminated equipment shall be checked by the Field Coordinator (or designee) prior to leaving the decontamination area and upon completion of the work activities.

8.2 SAMPLING APPARATUS

All non-dedicated small sampling equipment (i.e. knives, bowls, bailers etc.) and field instruments (i.e. steel tapes, meter electrical probes, transducers and other water level measuring devices) shall be decontaminated prior to use in the field and between sample locations. Decontamination procedures are as follows:

i) wash and scrub with low phosphate detergent;
ii) tap water rinse;
iii) rinse with 10 percent nitric acid (HNO3) ultra pure solution (or 1- percent HNO3 ultra pure solution for carbon steel equipment);
iv) tap water rinse;
v) isopropanol rinse[1];
vi) thorough rinse with demonstrated analyte-free water[2];
vii) air dry for 15 minutes; and
viii) wrap in aluminum foil for transport

When cleaning field instruments (e.g., pH meter) only a deionized water rinse is required. All tubing will be dedicated to individual wells and will not be reused at another well location.
If samples for metals analyses are not collected, the acid rinse may be omitted; and if samples for organics analyses are not being collected, the solvent rinse may be omitted.

9.0 QUALITY ASSURANCE PROJECT PLAN

9.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents the policies, organization, objectives, functional activities, and specific Quality Assurance (QA) and Quality Control (QC) activities designed to achieve the

[1] Pesticide-grade isopropanol is used since it does not present as much of health and safety hazard as hexane or methanol. Hexane is not miscible in water and thus, is not an effective rinsing agent unless the equipment is dry. Isopropanol is extremely miscible in water making it an effective rinsing agent on ether wet or dry equipment.
[2] The volume of water used during this rinse must be at least five times the volume of solvent used in step v).

specific data Quality goals associated with the private water well sampling program in the vicinity of the LOOW facility. The QAPP identifies the analytical requirements for the program and describes the data validation process.

9.2 DATA QUALITY OBJECTIVES

The data generated from the private well sampling program will be used to assess the quality of the groundwater in the private wells and to provide additional data for the characterization of groundwater impacts from the LOOW Site.

9.3 SAMPLING PROCEDURES AND HANDLING

The sample container, preservative, and holding time requirements are identified in Table 1.

Sample containers, preservatives, and demonstrated analyte-free water for trip blanks and rinse blanks shall be provided by the laboratory. Sample containers should be pre-preserved by the laboratory.

Measurement data will be generated during field activities. These activities include, but are not limited to, the following:

i) documenting time and weather conditions;
ii) determining pH, specific conductivity, turbidity, and temperature of water samples;
iii) verifying well development and pre-sampling purge volumes;
iv) observation of sample appearance and other conditions; and
v) measuring the total depths and groundwater elevations in wells.

Calibration of field instruments will be conducted daily whenever used during the sampling program. The field equipment will be maintained, calibrated, and operated in a manner consistent with the manufacturer's guidelines.

Quality control procedures for field measurements will be limited to checking the reproducibility of the measurement in the field by obtaining multiple readings and by calibrating the instruments (where appropriate).

Quality control of field sampling activities will involve collecting and analyzing the following samples:

i) field duplicate samples - one per 20 investigative samples to be spread out over the sampling event;
ii) matrix spike/matrix spike duplicate (MS/MSD) - one per 20 investigative samples and a minimum of one per analytical batch;
iii) trip blanks - one per 20 investigative samples or one per sample shipment, whichever is greater (for aqueous VOC samples only); and
iv) field sampling equipment (rinse) blanks -one per 20 investigative samples if dedicated or disposable sampling equipment (i.e., bailer) is not used.

Field duplicate samples will be collected and used to assess the aggregate precision of sampling techniques and laboratory analysis. For every 20 investigative samples, a field duplicate sample will be collected using standard sampling procedures. This duplicate will be submitted "blind" to the laboratory and analyzed for the appropriate parameters.

Trip blanks and rinsate blanks will be used during the sampling programs to detect contamination introduced through sampling procedures and equipment, external field conditions, transit of samples, container preparation, sample storage, or the analytical process.

Rinsate blanks will be collected in the field from deionized water poured into or pumped through the sample collection device following decontamination. Equipment rinsate blanks will not be collected unless cleaning is performed on the equipment.

Trip blanks for VOCs will be prepared by the laboratory at the same time and location as the containers for the particular sampling event. Trip blanks will accompany these containers to and from that event, but are at no time opened or exposed. Trip blanks shall be prepared from deionized water by the laboratory. Trip blanks will be collected for aqueous samples only and will be submitted for VOC analysis only.

9.4 SAMPLE CUSTODY AND DOCUMENT CONTROL

The following documentation procedures will be used during sampling and analysis to provide Chain of Custody control during transfer of samples from collection through storage. Record keeping documentation will include use of the following:

i) field log books (bound with numbered pages) to document sampling activities in the field;

ii) labels to identify individual samples;

iii) Chain of Custody record sheets to document sample IDs and analyses to be performed

iv) laboratory sample custody log books;

v) other evidentiary files generated in the course of the investigation.

9.4.1 Field Log Book

Logbooks will be used in the field to record information. The field logbook will be bound and the information will be entered in indelible ink. Each field logbook page will be signed by the sampler. Field measurements and observations will assist in the interpretation of analytical results obtained and it is important that these measurements and observations be as complete as possible.

In the field, the sampler will record the following information in the field log book (bound) for each sample collected:

i) project number;

ii) sample identification number;

iii) sample matrix;

iv) name of sampler;

v) sample source and location identification;

vi) date and time (in 2400 hour time format) of sample collection and well purging;

vii) time and date;

viii) pertinent data (i.e. depth, water surface elevation, pumping :method);

ix) analysis to be conducted;

x) well purge and sample collection method (i.e. pump/bailer type);

xi) appearance of each sample (i.e., color, turbidity, evidence of soil staining);

xii) preservative added, if any;

xiii) number of sample bottles collected;

xiv) analyses performed in the field (temperature, pH, specific conductance); and

xv) pertinent weather data.

Each field logbook page will be signed by the sampler.

A unique sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. QC samples will also be numbered with a unique sample number.

Sample labels are necessary to identify and prevent misidentification of the samples. The labels shall be affixed to the sample container (not the caps) prior *to* the time of sampling. The labels shall be filled out in waterproof ink at the time of collection.

9.4.2 Chain of Custody Records/Sample Delivery

Chain of Custody forms will be completed for all samples collected to document the transfer of sample containers. All samples will be refrigerated using wet ice at 4°C (+/-2°C) and delivered to the analytical laboratory within 48 hours of collection. All samples will be delivered to the laboratory by commercial courier or NCDOH personnel. The laboratory will maintain all samples at 4°C (+/- 2°C).

The Chain of Custody record, completed at the time of sampling, will contain, but not be limited to, the sample number, date and time of sampling, and the name of the sampler. The chain of custody document will be signed, timed, and dated by the sampler when transferring the samples.

The chain of custody form will consist of four copies, which will be distributed to the receiving laboratory and the NCDOH or sample contractor. The NCDOH/Contractor will retain one copy while the other three copies will be enclosed in a waterproof envelope within the cooler with the samples. The sample number of each sample shipped will be recorded on the form. The cooler will then be sealed properly for shipment and a custody seal attached. The laboratory, upon receiving the samples, will complete the three remaining copies. The laboratory will maintain one copy for their records. One copy will be returned to the NCDOH/Contractor upon receipt of the samples by the laboratory. One copy will be returned to the NCDOH/Contractor with the data deliverables package.

Upon receipt of the cooler at the laboratory, the shipping cooler custody seal will be inspected by the designated sample custodian. The condition of the cooler will be noted on the Chain of Custody form by the sample custodian. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The sample custodian will document the date and time of receipt of the container, and sign the form. The sample custodian will also record the temperature of one sample (or temperature blank) from each cooler and the temperature will be noted on the Chain of Custody.

If damage or discrepancies are noticed (including sample temperature range exceedance), they will be recorded in the remarks column of the record sheet, dated and signed. Any damage or discrepancies will be reported to the analytical laboratory supervisor who will inform the laboratory project manager and laboratory QA Officer before samples are processed. The analytical laboratory will notify NCDOH immediately about any discrepancies noted.

9.4.3 Sample Documentation In The Laboratory

Each sample or group of samples shipped to the laboratory for analysis will be given a unique identification number. The laboratory Sample Custodian will record the client name, number of samples and date of receipt of samples in the Sample Control logbook.

The laboratory will be responsible for maintaining analytical log books and laboratory data as well as a sample (on hand) inventory for submittal to the NCDOH/Contractor on an "as required" basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory for a period of six years at which time the NCDOH/Contractor will advise the laboratory regarding the need for additional storage.

9.4.4 Storage Of Samples

After the Sample Custodian has completed the Chain of Custody forms and the incoming sample log, the Chain of Custody will be checked to ensure that all samples are stored in the appropriate locations. All samples will be stored within an access controlled custody room and will be maintained at 4°C (+/- 2°C) until all analytical work is complete.

9.5 ANALYTICAL PROCEDURES

Private water well samples collected for laboratory analyses will be analyzed for the parameters listed in Table 2 using the methods indicated.

The targeted detection limits are presented on Table 3 and are based on NYSDOH Part 5, Subpart 5-1, Appendix 5-C drinking water screening criteria latest edition and/or the Class GA groundwater criteria specified in NYSDEC's Draft Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 -Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, dated April 1998. The laboratory will attempt to achieve detection limits lower than the target detection limits, where possible, and will report the lowest achievable detection limits.

Samples may be diluted if analytes of concern generate responses in excess of the linear response of the instrument. When matrix interferences are noted during sample analysis, actions will be taken by the laboratory to try to achieve the specified detection limits. The laboratory will re-extract, and/or use any of the cleanup techniques presented in the analytical methods to eliminate matrix interference. In such cases, the laboratory QA/QC Officer will assure that the laboratory demonstrates good analytical practices and that such practices are documented in order to achieve the specified detection limits.

All sample results will be calculated using the specific procedures for target analyte quantitation as detailed in the appropriate analytical methods.

For GC determinations of specific analytes, the reference retention time (RRT) of the unknown will be compared with that of an authentic standard. Since a true identification by GC is not possible, an analytical run for compound confirmation will be followed according to the specifications in the methods. Peaks must elute within daily retention time windows established for each indicator parameter to be declared a tentative or confirmed identification. Retention time windows are determined using the standard protocol defined in the method.

9.6 LABORATORY QA/QC REOUIREMENTS

9.6.1 QC For Laboratory Analyses

Specific procedures related to internal laboratory QC samples (namely reagent blanks, matrix spike/matrix spike duplicates, surrogates, and laboratory control samples) are described in the following subsections. Re-analysis due to outlying QA/QC results will be in accordance with the analytical methodology employed.

Reporting requirements requested of the laboratory are shown in Table 4.

9.6.2 Blank Samples

A method blank will be analyzed by the laboratory at a frequency of one blank per 20 or less analyses. The method blank, an aliquot of analyte-free water or solvent, will be carried through the entire analytical procedures.

9.6.3 Matrix Spike/Matrix Spike Duplicates (Ms/Msd

An MS/MSD sample will be analyzed at a minimum frequency of one in 20 investigative samples. Acceptable criteria and compounds that will be used for matrix spikes are identified in the appropriate analytical methods. Percent spike recoveries will be used to evaluate analytical accuracy while relative percent deviation (RPD) or the percent difference between duplicate matrix spike analyses will be used to assess analytical precision.

9.6.4 Surrogate Analyses

Surrogates are organic compounds which are similar to the analytes of interest, but which are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Every blank, standard, and environmental sample analyzed by GC or GC/MS" including MS/MSD samples, will be spiked with surrogate compounds prior to sample preparation.

The compounds that will be used as surrogates and the levels of recommended spiking are specified in the methods. Surrogate spike recoveries will be compared with the control limits set by procedures specified in the method (or from laboratory specific control limits) for analytes falling within the quantification limits without dilution. Dilution of samples to bring the analyte concentration into the linear range of calibration
may dilute the surrogates out of the quantitation limit; assessment of analytical quality in these cases will be based on the quality control demonstrated in the laboratory control samples and MS/MSD samples.

9.6.5 Calibration Procedures And Frequency

Calibration of instrumentation is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with certified standard solutions and the linear range established for the analytical method. The frequency of calibration and the concentration of calibration standards is determined by the manufacturers guidelines, the analytical method, or the requirements of special contracts.

A bound notebook will be kept with each instrument requiring calibration in which activities associated with QA monitoring and repairs will be recorded.

9.6.6 Organic Analyses

Quantification for samples that are analyzed by GC or GC/MS shall be performed as specified in the method. Standards containing the compounds of interest will be analyzed at various concentrations (minimum five levels) to establish the linear range of the detector, the limit of detection and the retention time windows. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of >/= O.995). Higher order fits will be allowed if permitted by the method and provided method criteria is met. The resulting calibration curves must meet all method-specified criteria prior to sample analyses.

The calibration curve or average response factor must be verified each day at a frequency specified in the appropriate analytical method. The response from the continuing calibration standard will be checked against the average response factors or calibration curve established during initiation calibration. If deviations in the standard response are greater than those allowed by the method protocols, then a new calibration curve must be prepared.

9.6.7 Inorganic Analyses

All method-specified calibration procedures will be performed and acceptance criteria will be met prior to sample analyses. Standard curves derived from data consisting of one reagent blank and a minimum of three concentrations (one reagent blank and one concentration for trace ICP) will be prepared for each inorganic analyte. Calibrations will be performed using either average response factors, or first-order linear regression (with a correlation coefficient requirement of 0.995). Higher order fits will not be allowed unless the laboratory can demonstrate that the instrument is working properly, and that the instrument response over the concentration range of interest is second order.

Continuing calibration checks and calibration blank analyses must be performed at a minimum frequency of 10 percent or every two hours during an analysis run, whichever is more frequent, and after the last analytical sample. Initial and calibration verification results must fall within the method control limits.

TABLES

TABLE 1 SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS

Groundwater Analysis	*Sample Containers*	*Preservation*	*Maximum Holding Times* (1)
Metals Arsenic, Copper, Manganese, Nickel, Vanadium, Born Lithium and Lead	500 ml plastic	HNO_3 to pH<2	180 days until analysis
Nitrate as N (unchlorinated)	250 ml plastic	Cool @ 4°C H_2S0_4 to pH <2	28 days until analysis
Phenol	500 ml glass amber	H_2S0_4 to pH <2	28 days until analysis
Fluoride, Chloride	250 ml plastic	None	28 days until analysis
Radiological gross alpha, gross beta, gamma	1,000 ml plastic	HNO_3	180 days until analysis
Volatile Organic Compounds	40 ml VOA vials	Cool @ 4°C HCl to pH<2	14 days until analysis
Bis(2-Ethylhexyl)phthalate & Benzo(a) pyrene, & PCB's	1,000ml glass amber	Cool @ 4°C	27 days to extraction 40 days from extraction to analysis
PCB's	500ml glass amber	$Na_2S_20_3$ Cool @ 4°C	7 days to extraction 14 days from extraction to analysis
Total Coliform	100 ml plastic	$Na_2S_20_3$ Cool @ 4°C	6 hours
pH	25 ml plastic	None	Immediately
Conductivity	100 ml plastic	Cool @ 4°C	28 days until analysis
Temperature	1000ml plastic	None	Immediately
Turbidity	100ml plastic	Cool @ 4°C	48 hours until analysis

Notes:
(1) All holding times from collection to analysis, unless otherwise specified.

TABLE 2 SAMPLING AND ANALYSIS PROGRAM SUMMARY

Sample Matrix	*Analytical Parameters*	*Analytical Method*	*Investigative Samples*	*Field Duplicates*	*Equipment Rinse Blanks*	*Trip Blanks*	*MS/MSD*
Groundwater							
	Arsenic, Copper, Manganese, Nickel , Vanadium	EPA 200.7 (2) (3)	13	1	1	0	1/1
	Nitrate as N	EPA 353.2 (2)	13	1	1	0	1/1
	Boron, Lithium, Lead	EPA 200.9 (2)	13	1	1	0	1/1
	Phenol	625.0 (2)	13	1	1	0	1/1
	Fluoride	EPA 340.2	13	1	1	0	1/1
	Chloride	300.0 (2)	13	1	1	0	1/1
	Radiological-gross alpha & beta	EPA 900 (6)	13	1	1	0	1/1
	Radium 226, & 228	EPA 903.0 & 904.0 (6)	13	1	1	0	1/1
	Uranium	EPA 908.0 (6)	13	1	1	0	1/1
	Gamma	EPA 901.1 (6)	13	1	1	0	1/1
	Volatile Organic Compounds	EPA 524.2 (1)	13	1	1	1	1/1
	Bis(2-Ethylhexyl)phthalate & Benzo(a) pyrene	EPA 525.2 (1)	13	1	1	0	1/1
	PCB's	EPA 508	13	1	1	0	1/1
	Total and Dissolved Arsenic	EPA 200.7 (2) (3)	13	1	1	0	1/1
	Total and Dissolved Lead	EPA 200.9 (2)	13	1	1	0	1/1
	Total Coliform	SM 18 9222B (4)	13	1	1	0	1/1

Notes:

(1) Referenced from "Methods for the Determination of Organic Compounds in Drinking Water;" EP'A/600/R-95/131, August 1995, with subsequent revisions.

(2) Referenced from "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983, with subsequent revisions.

(3) Analyses by trace ICP.

(4) Referenced from "Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, with subsequent revisions.

(5) MS/MSD Matrix Spike/Matrix Spike Duplicate

(6) Referenced from ''Prescribed Procedures for Measurement of Radioactivity in Drinking Water,'' EPA 600/4–80–032 , August 1980.

TABLE 3 TARGETED REPORTING LIMITS

Compound	*Units*	*Data Quality Objectives* (1)	*Laboratory Method Detection Limits* (2)	*Laboratory Practical Quantitation Limits* (2)
Metals				
Total and Dissolved Arsenic	ug/l	50	5	10
Copper	ug/l	1000	0.001	
Manganese	ug/l	300		
Nickel	ug/l	200		
Vanadium	ug/l	14		
Total and Dissolved Lead	ug/l	15	0.78	3.0
Boron	ug/l	1000		
Lithium	ug/l	NA		
General Chemistry				
Nitrate as N	ug/l	10,000	80	100
Chloride	ug/l	5,000	300	400
Fluoride	ug/l	1500		
Phenol	ug/l	2		
Radiological				
gross alpha	pCi/l	15	3	
gross beta	pCi/l	50	4	
gamma	pCi/l			
-radium 226	pCi/l	5	1	
-radium 228	pCi/l	5	1	
-uranium	pCi/l	20	2	
Volatile Organic Compounds				
(POCs Table 9D NYSSC)	ug/l	5.0	0.5	0.5
Specific Organic Compounds				
Bis(2-Ethylhexyl)phthalate	ug/l	6.0	0.6	2.0
Benzo(a) pyrene		0.2	0.02	0.1
PCB's	ug/l	0.5	0.1	0.1
Total Coliform	CFU/100ml	*0*	*0*	*0*

(1) Data quality objectives based on most stringent water quality standards from Part 5 of the NYS Sanitary Code current edition or the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) June 1998, where available.

(2) Laboratory MDLs and PQLs are provided for informational purposes, and may be revised slightly based on annual MDL studies. The laboratory will report based on the PQL, and flag as estimated any result detected between the PQL and MDL.

NA Not applicable.
CFU Colony Forming Unit
pCi/l Picocuries per Liter
ug/l Microgram per Liter

TABLE 4 LABORATORY REPORTING DELIVERABLES -FULL DATA PACKAGE,

A detailed report narrative should accompany each submission, summarizing the contents, and results.

A Clam of Custody Documentation and Detailed Narrative (1)

B. Sample Information
- i) date collected
- ii) date extracted or digested
- i) date analyzed
- iv) analytical method and reference

C. Data (including all raw data and contract lab program -like summary forms)
- i) samples
- ii) laboratory duplicates (2)
- iii) method blanks
- iv) spikes; spike duplicates (2), (3)
- v) surrogate recoveries (2)
- vi) internal standard recoveries
- vii) calibration
- ix) any other applicable QC data (e.g. serial dilutions)
- x) TIC'c (if applicable)

D. Miscellaneous
- i) method detection limits and/ or instrument detection limits
- ii) metals run logs
- iii) standard preparation logs
- iv) sample preparation logs

All sample data and its corresponding QA/QC data shall be maintained accessible to NCDOH either in hard copy or disc (computer data files).

Notes:
(1) Any quality control outliers must be addressed and corrective action taken must be specified.
(2) Laboratory must specify applicable control limits for all quality control sample results.
(3) A blank spike must be prepared and analyzed with each sample batch.
TICs Tentatively Identified Compounds.