

DRINKING WATER QUALITY IN NEW ORLEANS

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About NRDC

The Natural Resources Defense Council is a national nonprofit environmental organization with more than 1.2 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, and Beijing. Visit us at www.nrdc.org.

Table of Contents

Summary	iv
Introduction	1
Water Sampling Protocols	3
Conclusion and Recommendations	11
Contaminants by Location	12
Appendix	26
Endnotes	30

Summary

- Researchers from NRDC (Natural Resources Defense Council) and the People’s Environmental Center worked with community partners in New Orleans to test the drinking water at 30 locations throughout the city. The team tested for bacteria, parasites, and disinfection byproducts.
- Our testing found evidence of mixed bacterial contamination in three samples at levels above nonenforceable guideline values. On retesting of these sites, one sample contained coliform bacteria but did not contain E. coli, which is known to infect humans.
- The levels of disinfection byproducts were within legal limits, although some individual chemicals in these categories were above health goals.
- Very limited testing did not detect parasites such as giardia or cryptosporidium, although these results should be regarded with caution because these contaminants are notoriously difficult to detect.
- The quality of New Orleans drinking water and the condition of the distribution system should continue to be studied until confidence in the system is completely restored.

Introduction

Many people have raised questions and concerns about the quality and safety of the drinking water in New Orleans after the flooding of the city in 2005. The floods temporarily shut down the East Bank Water Treatment Plant, damaged other water treatment facilities, and ruptured more than 20,000 water pipes. Pipes ruptured both because of damage from the roots of falling trees and from subsidence of the soil underground. There were published estimates of 100 million gallons of water per day leaking underground throughout the system during the months following the flooding.¹

According to newspaper reports, in June 2006 the New Orleans water system was still losing 85 million gallons of water daily, representing more than two-thirds of the total leaving the treatment stations.² Between August 2005 and June 2006, the New Orleans Sewerage and Water Board reportedly repaired approximately 17,000 leaks.³ By September 2006 the volume of water leaking out of the system was still estimated at 40 million to 50 million gallons per day.⁴ This means that major leaks in the system remain, and that more needs to be done to repair the breaks and to assure the quality of the water at the tap.

According to the Sewerage and Water Board, the cost of repairing the system is in the range of \$2.2 billion, including \$200 million to repair the East Bank Water Treatment Plant, \$400 million to repair the power plant, and approximately \$1.6 million to repair the damage to the pipes in the distribution network.

When water mains rupture, the pressure in nearby sections of the water system decreases significantly. As a result of the low water pressure, contaminants from outside the pipes can be sucked into the system. Contaminated soil, effluent from adjacent broken sewer mains, or petroleum spills can be pulled into the drinking water system through breaks in the pipes. As a result, even if the water that is leaving the treatment plant is safe to drink, the water may become contaminated on the way to the tap.

The New Orleans Sewerage and Water Board has declared that New Orleans water is safe to drink; its “Consumer Confidence Report” issued in June 2006 showed no contaminants. However, the board did not report testing at the tap in previously flooded neighborhoods. NRDC requested data from the Sewerage and Water Board, including system maps, locations of water main breaks, and results of water quality tests throughout the system. Unfortunately, despite many requests made over a period of approximately six months, we have not received the desired information.

Water Sampling Protocols

In response to community concerns about potential contamination of drinking water, a coalition of nonprofit, nongovernmental groups sampled and tested New Orleans drinking water on three separate occasions between June and October 2006. Table 1 lists the contaminants we detected, their guidance or regulatory levels, and their health effects. Guidance (or guideline) levels are suggested health-based concentration limits for contaminants that are not yet regulated by law. Regulatory levels are strict concentration limits set by federal, state, or local regulations.

June Sampling Event

On June 12, 2006, individuals from Common Ground collected five samples from the Upper and Lower Ninth Wards in New Orleans. These samples were analyzed by Glenrose Engineering of Austin, Texas, for approximately 170 chemical contaminants, including metals, common pesticides, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and others. Appendix A gives the full list of contaminants included in this round of sampling.

September Sampling Event

On September 5–8, 2006, scientists from NRDC conducted sampling at 30 locations across the East Bank of the city of New Orleans and tested for bacterial contaminants, byproducts of disinfection, and parasites (tests for petroleum products, industrial chemicals, heavy metals, and pesticides were not included). This area is served by Mississippi River water treated at a single treatment plant, the Carrollton Water Treatment Plant located at 8800 South Claiborne Avenue. This facility uses a chloramine disinfection process. Locations of sampling sites are shown in Figure 1. Our team sampled at private homes with the consent of the owner, and also collected samples from public institutions such as schools, hospitals, restaurants, and City Hall.

Equipment included sterile sample bottles and manifest forms (provided by Underwriters Laboratories), a portable chlorine meter, clean beakers, carrying tray, gloves, ice, cooler, timepiece, and field notebook. When possible, water samples were taken at the point of water use (i.e., at indoor faucets). Except where noted, water was run for 10 minutes prior to filling the sample bottles. Residual chlorine and temperature readings were taken by collecting water in a clean beaker that had been rinsed with the same water, adding the reagent provided, and inserting the portable chlorine meter into the beaker until the readings were displayed on the unit. Labeled sample bottles were filled with the sample water according to the instructions provided by the laboratory, sealed, and placed immediately on ice. Samples were sent by overnight shipment to Underwriters Laboratories in South Bend, Indiana.

October Sampling Event

Three sites were sampled again on October 26, 2006, by the People's Environmental Center to further evaluate elevated heterotrophic plate counts (HPC) found during the September sampling. The protocol and laboratory were the same as those used during the September sampling event.

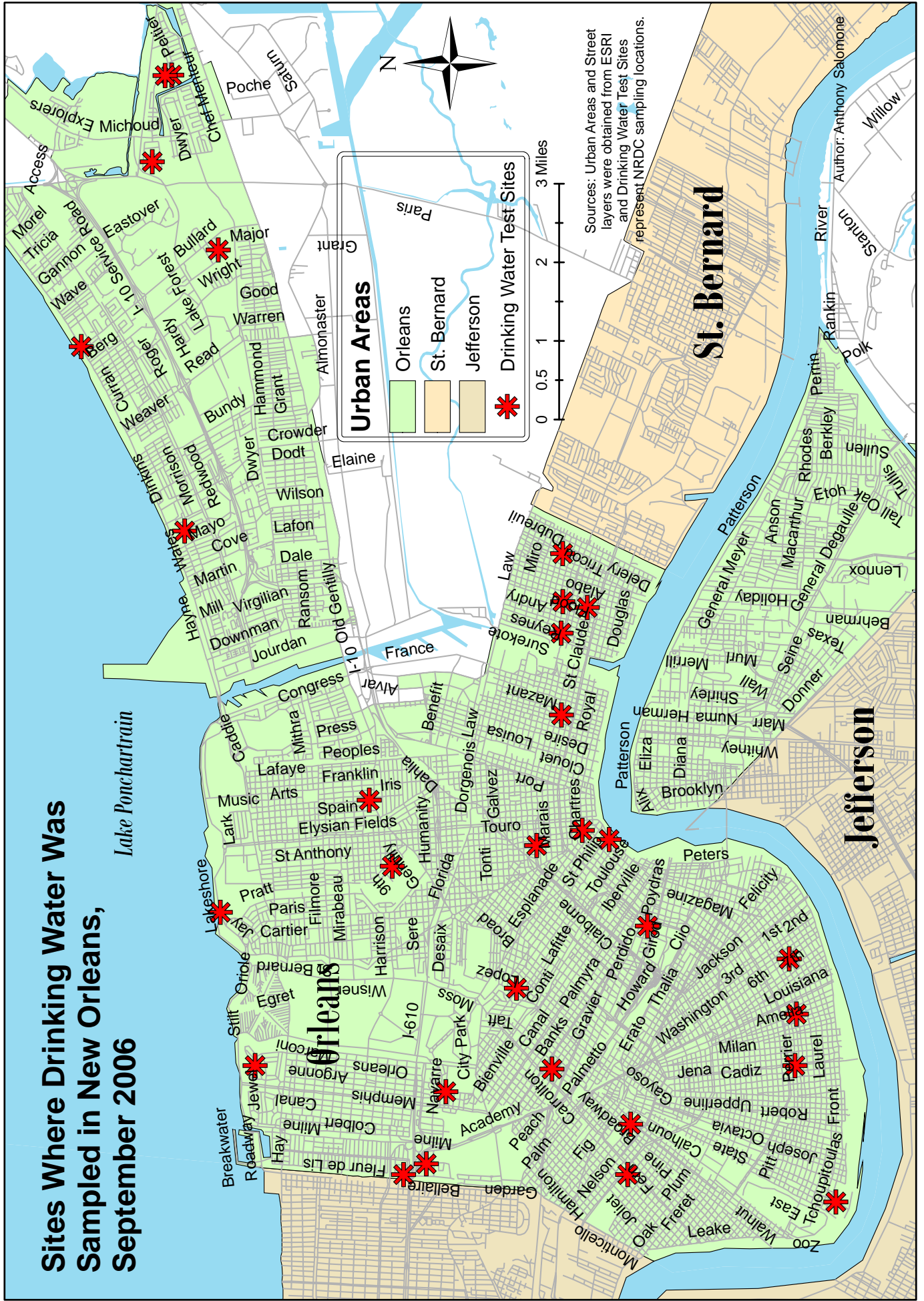
Table 1: Contaminants Detected in New Orleans Water

Contaminant	Regulatory Limit⁵	Health Concerns
<i>Bacteriological</i>		
Heterotrophic plate count	500 (guideline) colonies	Indicator of poor maintenance of a drinking water system; possible risk to immunocompromised people
Total Coliform bacteria	0 colonies	Indicator of E. coli and related bacteria (see below)
E. coli bacteria	0 colonies	Diarrhea, cramps, nausea, vomiting, headaches; possibility of severe illness in children, the elderly, and people with immune deficiencies
<i>Disinfection Byproducts</i>		
Residual chlorine	0.5 to 4.0 mg/L	If high: eye/nose/throat irritation, stomach discomfort, anemia If low: increased risk of bacterial contamination
Bromodichloromethane	0 µg/L (guideline)	Cancer; kidney, liver, central nervous system problems; miscarriage
Bromoform	0 µg/L (guideline)	Cancer; kidney, liver, central nervous system problems; miscarriage
Dibromochloromethane	60 µg/L (guideline)	Cancer; kidney, liver, central nervous system problems; miscarriage
Chloroform	0.2 mg/L (WHO guideline)	Cancer; kidney, liver, central nervous system problems; miscarriage
Total Trihalomethanes	80 µg/L	Cancer; kidney, liver, central nervous system problems; miscarriage
Dibromoacetic acid	0 µg/L (guideline)	Cancer
Dichloroacetic acid	300 µg/L	Cancer
Monobromoacetic acid	None	Cancer
Monochloroacetic acid	0.02 mg/L (WHO guideline)	Cancer
Trichloroacetic acid	0.2 mg/L (WHO guideline)	Cancer
Total haloacetic acids	60 µg/L	Cancer
Parasites		
Giardia	0 µg/L (guideline)	Bloating, nausea, cramps, diarrhea, flatulence
Cryptosporidium	0 (guideline)	Watery diarrhea, cramps, vomiting; can become severe and chronic in people with immune deficiencies; can be fatal in debilitated people, the elderly, or infants
<i>Other Contaminants</i>		
Barium	2000 µg/L	Increased blood pressure at high doses
Lead	15 µg/L (action level)	Impaired physical or mental development; harm to attention span and learning abilities; kidney problems and high blood pressure

Contaminant	Regulatory Limit⁵	Health Concerns
Selenium	50 µg/L	Hair or fingernail loss, loss of sensation in fingers or toes, circulatory problems at high levels; essential mineral at low levels
Phenol	None	Irritation of skin, eyes, and mucous membranes after short-term exposure at high levels

Note: World Health Organization (WHO) guideline levels are listed in cases where no EPA guideline level exists.⁶ However, for some compounds there are not enough data from which to derive guideline values (e.g., monobromoacetic acid), and in these cases no organizational body has issued guideline levels.

Sites Where Drinking Water Was Sampled in New Orleans, September 2006



Results

Test results are presented in three forms: detectable, non-detectable, and quantifiable. Detectable contaminants are present in the sample, but they are present at levels too low to specifically enumerate with the testing instrument used. *Non-detectable* contaminants are not present at the lower limit of detection for the testing instrument. *Quantifiable* contaminants are present in the sample at levels high enough to indicate a specific concentration.

Chemical Contaminants

The tests done by Common Ground in June 2006 for 170 chemical contaminants did not detect pesticides, polycyclic aromatic hydrocarbons, or most chemical contaminants at quantifiable concentrations. Trihalomethanes (THMs) were the only contaminants that were detected in all five samples, and the concentrations were well below regulatory limits, averaging about 25 micrograms per liter ($\mu\text{g/L}$) of total THMs, in comparison with the EPA regulatory limit of 80 $\mu\text{g/L}$. The other contaminants found at quantifiable concentrations included barium, selenium, total phenols, and lead. The concentrations of barium and selenium were far below regulatory limits. Phenols were detected in three out of five samples, but there is no regulatory limit to which to compare them. Lead was detected in one sample at 14.3 $\mu\text{g/L}$, which is above the guideline level of zero. Lead is a contaminant that can leach from old drinking water pipes and especially from old household plumbing. A number of contaminants were detected at trace levels in one or more samples. However, the levels were so low that the lab was unable to quantify the concentration in the water. These included acetone, benzidine, chloromethane, xylene, nitrophenol, 4,4'-DDE, arsenic, methoxychlor, delta-BHC, and heptachlor. Table 2 summarizes the quantifiable results from the June 2006 independent sampling.

Table 2: Test Results for Contaminants in New Orleans Water, June 2006

Contaminant	No. of Samples	Units	Average	Range	Regulatory or Guideline Limit
Bromodichloromethane	5	$\mu\text{g/L}$	7.0	6.4–7.3	0 (guideline)
Dibromochloromethane	5	$\mu\text{g/L}$	2.2	1.3–2.6	60 (guideline)
Bromoform	5	$\mu\text{g/L}$	<1.0	—	0 (guideline)
Chloroform	5	$\mu\text{g/L}$	12.7	1.7–18.0	None
Total Trihalomethanes	5	$\mu\text{g/L}$	26.0	22.2–27.6	80
Barium	5	$\mu\text{g/L}$	57.5	55.5–63.1	2000
Selenium	5	$\mu\text{g/L}$	14.2	13.1–16.3	50
Lead	5	$\mu\text{g/L}$	6.9	<LOD*– 14.3	0 (guideline)
15 $\mu\text{g/L}$ (action level)					
Total Phenols	5	$\mu\text{g/L}$	4.2	<LOD– 5.4	None

*LOD = limit of detection

Chlorine

In September and October 2006, NRDC and the People's Environmental Center focused their testing on residual chlorine, microbial contaminants, and THMs. Table 3 summarizes the results of the testing

in September, and Table 4 shows the October results. Residual chlorine concentrations were within an acceptable range in all samples tested, averaging 2.42 [range 1.43–3.34]. Residual chlorine levels in U.S. water distribution systems typically range from 0.5 mg/L to 2.0 mg/L. However, higher levels could be needed depending on the chlorine demand of the specific system and the type of chlorination used. The residual chlorine levels that we found were adequate.

Bacteria and Parasites

Heterotrophic plate count (HPC) was significantly elevated above the guideline level in three samples (10 percent). Although the EPA nonenforceable guideline limit is 500 colonies, these three samples tested at 1700, 1700, and 5700 colonies. The elevated HPC is an indicator of poor system maintenance. Water systems with a layer of microbial material inside the pipes (known as biofilms) may have a high HPC count even in the presence of a disinfecting agent such as chlorine. HPC counts exceeding 10,000 per milliliter can mask coliform counts, but these samples were not that high. The samples that tested high for HPC were located in Uptown/Carrollton (two sites) and in Village de l'Est. Retesting at these three sites revealed lower HPC (4, 100, and 740 at the three sites). The persistently elevated HPC was in a FEMA trailer in Village de l'Est. See Table 4 for a summary of the retesting.

None of the initial 30 tests were positive for total coliform. However, one of the three retests was positive for total coliform. That site was in Uptown near the intersection of Prytania and Napoleon streets. Total coliform is an indicator of certain types of bacteria in water. However, because coliform may be from a fecal or non-fecal source, the presence of total coliform alone is not a decisive indicator of the health risk of drinking water.

The primary indicator of pathogens in water is *E. coli*, whose presence indicates that the water sample has definitely been in contact with human or animal fecal material. No *E. coli* was found in any of the water samples. The sample that tested positive for total coliform also tested negative for *E. coli*, which means the coliform present were a non-fecal type. The 33 negative samples for *E. coli* from across the city are reassuring and offer some level of confidence that there was no widespread pathogenic bacterial contamination in the city water system at the time of the testing.

Four samples were tested for the parasites giardia and cryptosporidium. All samples were below the laboratory detection limit. This result is difficult to interpret due to the small sample size and the fact that the laboratory detection limit is above the EPA guideline value. Laboratory testing frequently fails to detect these parasites even when they are present in water systems. For that reason, detections of giardia or cryptosporidium in water are very important, but the failure to detect these contaminants in a small number of samples does not mean they are not present.

Disinfection Byproducts

Disinfection byproducts were detected in all the water samples taken in New Orleans. The average concentration of total trihalomethanes (TTHM) was 28.6 micrograms per liter ($\mu\text{g/L}$) [range 24.1–33.2]. This concentration is well below the regulatory limit of 80 $\mu\text{g/L}$. Some individual trihalomethanes were significantly above EPA guideline values, known as Maximal Contaminant Level Goals (MCLG). In particular, the average bromodichloromethane concentration was 10.3 $\mu\text{g/L}$ [range 8.9–12], whereas the MCLG is zero. The average concentration of total haloacetic acids (HAA5) was 13.2 $\mu\text{g/L}$ [range 11.8–15.2]. This is significantly below the regulatory limit of 60 $\mu\text{g/L}$. Although there are no MCLGs for most of the haloacetic acids, there was one sample—taken at Children's Hospital—that contained a concentration of dibromoacetic acid of 11 $\mu\text{g/L}$; this is significantly above the MCLG of zero for that chemical. The average and range of concentrations of the major contaminants are shown in Table 2.

Why Does HPC Matter?

Heterotrophic plate count (HPC) is a measurement of mixed bacteria in water. This test provides a quantitative assessment of the viable bacteria in a water sample that are able to grow under the standardized test conditions. HPC testing may be used to monitor changes in the quality of water throughout a distribution system, thus giving an indication of the effectiveness of chlorination or other disinfection in the system as well as the possible existence of cross-connections, sediment accumulation, and other problems within the distribution lines. Although industry and several government agencies state that HPC poses no health risk, that statement remains somewhat controversial. HPC includes some opportunistic pathogens that may pose risks to immunocompromised people. Examples of bacteria that may be included in HPC include *Aeromonas*, *Acinetobacter*, *Corynebacterium*, *Klebsiella*, *Legionella*, *Moraxella*, *Mycobacteria*, *Pseudomonas*, *Staphylococcus*, and *Vibrio*. Bacteria in all of these genera can affect humans under certain circumstances. Also, HPC levels that are high can interfere with coliform testing and may mask fecal or total coliform.

Reference: Pavlov, D. "Potentially pathogenic features of heterotrophic plate count bacteria isolated from treated and untreated drinking water." *Int J Food Microbiol.* 2004;92(3):275–87.

Table 3: Test Results for Contaminants in New Orleans Water, September 2006

Contaminant	No. of Samples	Units	Average	Range	Regulatory or Guideline Limit
Heterotrophic plate count	30	colonies	326.4	0.5–5700	500 (guideline)
Total coliform bacteria	30	colonies	0	0	0
E. coli bacteria	30	colonies	0	0	0
Residual chlorine	30	mg/L	2.42	1.43–3.20	Between 0.5– 4.0
Contaminant	No. of Samples	Units	Average	Range	Regulatory or Guideline Limit
Bromodichloromethane	30	µg/L	10.3	8.9–12.0	0 (guideline)
Bromoform	30	µg/L	0.7	0.5–1.0	0 (guideline)
Dibromochloromethane	30	µg/L	5.9	4.8–7.0	60 (guideline)
Chloroform	30	µg/L	11.6	9.4–14.0	None
Total Trihalomethanes	30	µg/L	28.6	24.1–33.2	80
Dibromoacetic acid	10	µg/L	2.2	1.1–11.0	None
Dichloroacetic acid	10	µg/L	8.5	0.8–11.0	300
Monobromoacetic acid	10	µg/L	1.5	0.5–12.0	None
Monochloroacetic acid	10	µg/L	1.5	1.0–6.0	None
Trichloroacetic acid	10	µg/L	5.2	2.6–29.8	None
Total Haloacetic acids	10	µg/L	13.2	11.8–15.2	60
Giardia	4	colonies	<9.26*	—	0 (guideline)
Cryptosporidium	4	colonies	<9.26*	—	0 (guideline)

*This is the limit of detection of the laboratory sampling method.

Table 4: Retesting of Three Samples of New Orleans Water, October 2006

Contaminant	No. of Samples	Units	Average	Range	Regulatory
or Guideline Limit					
Heterotrophic plate count	3	Present or not present	281	4–740	500 (guideline) colonies
Total coliform bacteria	3	Present or not present	Not	Negative at two sites, positive at one site	0 colonies
E. coli bacteria	3	Present or not present	Not	Negative at all three sites	0 colonies
Residual chlorine	3	mg/L	2.34	1.63–3.34	Between 0.5– 4.0

*Nonnumerical value

Conclusions and Recommendations

The results of our testing do not positively indicate health risks related to water quality; however, the presence of total coliform in one sample does raise a potential concern. Furthermore, the quality of New Orleans drinking water and the condition of the distribution system should continue to be studied until confidence in the system is completely restored.

Contaminants by Location

Uptown

Location: Private home near South Carrollton Ave. and South Claiborne Ave.

Date: September 5, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	5700	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	1.96	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.9	0 (guideline)
Dibromochloromethane	6.7	60 (guideline)
Chloroform	12	None
Total Trihalomethanes	30.6	80
Dibromoacetic acid	1.5	None
Dichloroacetic acid	7.9	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.6	None
Total Haloacetic acids	12	60
Giardia	<9.091*	0 (guideline)
Cryptosporidium	<9.091*	0 (guideline)

*This is the limit of detection of the laboratory sampling method.

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Public building near Henry Clay Ave. and Tchoupitoulas St.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	170	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.33	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.8	0 (guideline)
Dibromochloromethane	6.3	60 (guideline)
Chloroform	13	None
Total Trihalomethanes	31.1	80
Dibromoacetic acid	11	None

Chemical	Measured Level	Regulatory Level
Dichloroacetic acid	0.8	300
Monobromoacetic acid	12	None
Monochloroacetic acid	6	None
Trichloroacetic acid	29.8	None
Giardia	<9.091*	0 (guideline)
Cryptosporidium	<9.091*	0 (guideline)

*This is the limit of detection of the laboratory sampling method.

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Public building at Napoleon Ave. near Prytania St.

Date: September 8, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	1700	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.51	Between 0.5–4.0
Bromodichloromethane	9.3	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.6	60 (guideline)
Chloroform	9.8	None

Total Trihalomethanes 25.4 80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Lakeview

Location: Private home near East Lakeshore Pkwy. and Canal Blvd.

Date: September 5, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	92	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.79	Between 0.5–4.0
Bromodichloromethane	12	0 (guideline)
Bromoform	1	0 (guideline)
Dibromochloromethane	6.9	60 (guideline)
Chloroform	12	None
Total Trihalomethanes	31.9	80
Dibromoacetic acid	1.4	None
Dichloroacetic acid	8.2	300
Monobromoacetic acid	0.5	None

Chemical	Measured Level	Regulatory Level
Monochloroacetic acid	1	None
Trichloroacetic acid	2.7	None
Total Haloacetic acids	12.3	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home at Bellaire Dr. near Veterans Blvd.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	4	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.7	Between 0.5–4.0
Bromodichloromethane	9.7	0 (guideline)
Bromoform	0.6	0 (guideline)
Dibromochloromethane	5.4	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	26.7	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home near Marcia Ave. and Bellaire Dr.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.53	Between 0.5–4.0
Bromodichloromethane	9.3	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.4	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	26.4	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Public building at Navarre Ave. and General Diaz St.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	8	500 (guideline)
Total coliform bacteria	0	0

Chemical	Measured Level	Regulatory Level
E. coli bacteria	0	0
Residual chlorine	2.23	Between 0.5–4.0
Bromodichloromethane	9.7	0 (guideline)
Bromoform	0.6	0 (guideline)
Dibromochloromethane	5.3	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	26.6	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Garden District

Location: Public building at Magazine St. and Washington Ave.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.69	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.8	0 (guideline)
Dibromochloromethane	6.5	60 (guideline)
Chloroform	13	None
Total Trihalomethanes	31.3	80
Dibromoacetic acid	1.4	None
Dichloroacetic acid	10	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.8	None
Total Haloacetic acids	14.2	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Public building at Foucher St. near Coliseum St.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	2	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.45	Between 0.5–4.0
Bromodichloromethane	9.9	0 (guideline)
Bromoform	9.9	0 (guideline)

Chemical	Measured Level	Regulatory Level
Dibromochloromethane	6.3	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	28	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Mid City

Location: Private home at South Pierce St. near Baudin St.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.63	Between 0.5–4.0
Bromodichloromethane	12	0 (guideline)
Bromoform	0.8	0 (guideline)
Dibromochloromethane	6.6	60 (guideline)
Chloroform	13	None
Total Trihalomethanes	32.4	80
Dibromoacetic acid	1.3	None
Dichloroacetic acid	8.9	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.8	None
Total Haloacetic acids	13	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home at Hagan Ave. near Dumaine St.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	14	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	3.12	Between 0.5–4.0
Bromodichloromethane	12	0 (guideline)
Bromoform	0.8	0 (guideline)
Dibromochloromethane	6.4	60 (guideline)
Chloroform	14	None
Total Trihalomethanes	33.2	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Gert Town

Location: Private home at Broadway St. near Walmsley Ave.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	8	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.63	Between 0.5–4.0
Bromodichloromethane	9.9	0 (guideline)
Bromoform	0.6	0 (guideline)
Dibromochloromethane	5.5	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	27	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

New Orleans East

Location: Private home at Notaway Lane near Bullard Ave.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.5	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.9	0 (guideline)
Dibromochloromethane	6.4	60 (guideline)
Chloroform	12	None
Total Trihalomethanes	30.3	80
Dibromoacetic acid	1.4	None
Dichloroacetic acid	11	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.6	None
Total Haloacetic acids	15	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Public building at Hayne Blvd. near Bullard Ave.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	280	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	1.66	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.9	0 (guideline)
Dibromochloromethane	6.4	60 (guideline)
Chloroform	12	None
Total Trihalomethanes	30.3	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home at Primrose Dr. near Wales St.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	1	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	1.91	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.8	0 (guideline)
Dibromochloromethane	6	60 (guideline)
Chloroform	12	None
Total Trihalomethanes	29.8	80
Giardia	<9.091*	0 (guideline)
Cryptosporidium	<9.091*	0 (guideline)

*This is the limit of detection of the laboratory sampling method.

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location; Private home at Dwyer Rd. near Willowbrook Dr.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	1700	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	1.61	Between 0.5–4.0
Bromodichloromethane	9.7	0 (guideline)
Bromoform	0.6	0 (guideline)

Chemical	Measured Level	Regulatory Level
Dibromochloromethane	5.4	60 (guideline)
Chloroform	12	None
Total Trihalomethanes	27.7	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Public building at Dwyer Rd. near Willowbrook Dr.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	8	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	1.89	Between 0.5–4.0
Bromodichloromethane	10	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.9	60 (guideline)
Chloroform	13	None
Total Trihalomethanes	29.6	80
Dibromoacetic acid	1.1	None
Dichloroacetic acid	9.7	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.6	None
Total Haloacetic acids	13.4	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home near Maple Wood Dr. and Michoud Blvd.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	1.43	Between 0.5–4.0
Bromodichloromethane	10	0 (guideline)
Bromoform	0.8	0 (guideline)
Dibromochloromethane	5.9	60 (guideline)
Chloroform	12	None
Total Trihalomethanes	28.7	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Gentilly

Location: Private home at Arts St. near Gentilly Blvd.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	14	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.28	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.8	0 (guideline)
Dibromochloromethane	6.3	60 (guideline)
Chloroform	13	None
Total Trihalomethanes	31.1	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Public building at Lakeshore Dr. near Elysian Fields

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.03	Between 0.5–4.0
Bromodichloromethane	9.6	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.4	60 (guideline)
Chloroform	9.4	None
Total Trihalomethanes	25.1	80
Dibromoacetic acid	1.2	None
Dichloroacetic acid	8.8	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.7	None
Total Haloacetic acids	12.7	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home at Warrington Dr. near Gentilly Blvd.

Date: September 8, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	41	500 (guideline)
Total coliform bacteria	0	0

Chemical	Measured Level	Regulatory Level
E. coli bacteria	0	0
Residual chlorine	2.78	Between 0.5–4.0
Bromodichloromethane	10	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.6	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	27.3	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Upper Ninth Ward

Location: Private home at Independence St. near Urquhart St.

Date: September 6, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	12	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.62	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.8	0 (guideline)
Dibromochloromethane	6.2	60 (guideline)
Chloroform	12	None
Total Trihalomethanes	30	80
Dibromoacetic acid	1.2	None
Dichloroacetic acid	8.8	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.7	None
Total Haloacetic acids	12.7	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Lower Ninth Ward

Location: Private home at Andry St. near North Claiborne Ave.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	2	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.54	Between 0.5–4.0
Bromodichloromethane	9.2	0 (guideline)

Chemical	Measured Level	Regulatory Level
Bromoform	0.6	0 (guideline)
Dibromochloromethane	4.9	60 (guideline)
Chloroform	9.9	None
Total Trihalomethanes	24.6	80
Dibromoacetic acid	1.2	None
Dichloroacetic acid	8	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.6	None
Total Haloacetic acids	11.8	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home at Urquhart St. near Andry St.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.61	Between 0.5–4.0
Bromodichloromethane	11	0 (guideline)
Bromoform	0.9	0 (guideline)
Dibromochloromethane	7	60 (guideline)
Chloroform	13	None
Total Trihalomethanes	31.9	80
Giardia	<9.756*	0 (guideline)
Cryptosporidium	<9.756*	0 (guideline)

*This is the limit of detection of the laboratory sampling method.

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Public building at Deslonde St. near North Claiborne Ave.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	9	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	3.2	Between 0.5–4.0
Bromodichloromethane	9.9	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.6	60 (guideline)

Chemical	Measured Level	Regulatory Level
Chloroform	11	None
Total Trihalomethanes	27.2	80
Dibromoacetic acid	1.4	None
Dichloroacetic acid	11	300
Monobromoacetic acid	0.5	None
Monochloroacetic acid	1	None
Trichloroacetic acid	2.8	None
Total Haloacetic acids	15.2	60

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home at Tupelo St. near North Prieur St.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	8	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	3.08	Between 0.5–4.0
Bromodichloromethane	8.9	0 (guideline)
Bromoform	0.5	0 (guideline)
Dibromochloromethane	4.8	60 (guideline)
Chloroform	9.9	None
Total Trihalomethanes	24.1	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Location: Private home at Royal St. near Caffin Ave.

Date: September 7, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	1	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.3	Between 0.5–4.0
Bromodichloromethane	9.8	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.4	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	26.9	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Central Business District

Location: Public building near Poydras St. and Loyola Ave.

Date: September 8, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	3.03	Between 0.5–4.0
Bromodichloromethane	10	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.9	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	27.6	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

Tremé

Location: Public building at North Claiborne Ave. and Esplanade Ave.

Date: September 8, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	14	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0
Residual chlorine	2.26	Between 0.5–4.0
Bromodichloromethane	9.1	0 (guideline)
Bromoform	0.7	0 (guideline)
Dibromochloromethane	5.3	60 (guideline)
Chloroform	11	None
Total Trihalomethanes	26.1	80

Note: Units for the microbial contaminants are in colonies. Units for the disinfection byproducts are in micrograms per liter (µg/L).

French Quarter

Location: Public building at Decatur St. near Ursuline Ave.

Date: September 8, 2006

Chemical	Measured Level	Regulatory Level
Heterotrophic plate count	0.5	500 (guideline)
Total coliform bacteria	0	0
E. coli bacteria	0	0

Note: Units for the microbial contaminants are in colonies.

Appendix: Contaminants Sampled for in New Orleans Drinking Water

Common Ground, June 2006—Five Samples

Total Phenols
Arsenic
Barium
Cadmium
Chromium
Lead
Mercury
Selenium
Silver
Cyanide
1,1,1,2-Tetrachloroethane
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane (Ethylene dibromide)
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,4-Dioxane
2-Butanone (MEK)
2-Chloroethyl vinyl ether
2-Hexanone
4-Methyl-2-pentanone (MIBK)
Acetone (2-Propanone)
Acetonitrile
Acrolein
Acrylonitrile
Benzene
Bromobenzene
Bromodichloromethane
Bromoform (Tribromomethane)
Bromomethane (Methyl bromide)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform (Trichloromethane)
Chloromethane (Methyl chloride)

cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
Dibromochloromethane
Dibromomethane (Methylene bromide)
Dichlorodifluoromethane
Ethylbenzene
Iodomethane (Methyl iodide)
m,p-Xylenes
Methylene chloride (Dichloromethane)
o-Xylene
Styrene
Tetrachloroethene (Perchloroethylene)
Toluene
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene
Trichloroethene
Trichlorofluoromethane
Vinyl acetate
Vinyl chloride
1,2,4-Trichlorobenzene
1,2-Diphenylhydrazine
1-Methylnaphthalene
2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dichlorophenol
2,6-Dinitrotoluene
2-Chloronaphthalene
2-Chlorophenol
2-Methylnaphthalene
2-Methylphenol
2-Nitroaniline
2-Nitrophenol
3,4-Methylphenol (m&p-Cresol)
3,3'-Dichlorobenzidine
3-Nitroaniline
4,6-Dinitro-2-methylphenol
4-Bromophenyl phenyl ether
4-Chloro-3-methylphenol
4-Chloroaniline (p-Chloroaniline)
4-Chlorophenyl phenyl ether
4-Nitroaniline
4-Nitrophenol
7,12-Dimethylbenz[a]anthracene
Acenaphthene
Acenaphthylene
Aniline
Anthracene

Benzidine
Benzoic acid
Benzo[a]anthracene
Benzo[a]pyrene
Benzo[b]fluoranthene
Benzo[g,h,i]perylene
Benzo[j,k]fluoranthene
Benzyl alcohol
bis(2-Chloroethoxy)methane
bis(2-Chloroethyl)ether
bis(2-Chloroisopropyl)ether
bis(2-Ethylhexyl)phthalate
Butyl benzyl phthalate
Chrysene
Di-n-butyl phthalate (Dibutylphthalate)
Di-n-octylphthalate (Dioctylphthalate)
Dibenzofuran
Dibenz[a,h]acridine
Dibenz[a,h]anthracene
Diethylphthalate
Dimethylphthalate
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene (HCCPD)
Hexachloroethane
Indene
Indeno[1,2,3-cd]pyrene
Isophorone
Methylchrysene
N-Nitrosodi-n-propylamine
N-Nitrosodimethylamine
N-Nitrosodiphenylamine naphthalene
Nitrobenzene
Pentachlorophenol
Phenanthrene
Phenol
Pyrene
Pyridine
Quinoline
Benzenethiol/TIC
4,4'-DDD
4,4'-DDE
4,4'-DDT
Aldrin
alpha-BHC (alpha-Hexachlorocyclohexane)
alpha-Chlordane (cis-Chlordane)
beta-BHC (beta-Hexachlorocyclohexane)
delta-BHC (delta-Hexachlorocyclohexane)

Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
gamma-Chlordane (trans-Chlordane)
Heptachlor
Heptachlor epoxide
Lindane (gamma-Hexachlorocyclohexane)
Methoxychlor
Toxaphene
2,4,5,6-Tetrachloro-m-xylene
Decachlorobiphenyl
1,2-Dichloroethane
4-Bromofluorobenzene
Toluene
2,4,6-Tribromophenol
2-Fluorobiphenyl
2-Fluorophenol
Nitrobenzene
Phenol
Terphenyl

ENDNOTES

1 Krupa, M. "Volume of water leaks cut in half." *New Orleans Times Picayune*, September 20, 2006.

2 Krupa, M. "Millions of gallons of water seeping away." *New Orleans Times Picayune*, June 8, 2006.

3 Ibid.

4 Krupa, M. "Volume of water leaks cut in half." *New Orleans Times Picayune*, September 20, 2006.

5 Environmental Protection Agency (EPA), 2006a. "List of Drinking Water Contaminants & MCLs." *Ground Water & Drinking Water*. Accessed 07/28/06. Updated February 28, 2006. <http://www.epa.gov/safewater/mcl.html#8>.

6 World Health Organization. 2004. *Guidelines for Drinking Water Quality Volume 1: Recommendations*, 3rd Edition, Geneva: World Health Organization.