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**Final**

**Source Water Assessment**

**for the**

**Crellin Water Company Water System**

**Garrett County, Maryland**

Prepared for:

Maryland Department of the Environment  
Water Management Administration  
Water Supply Program  
1800 Washington Boulevard, Suite 625  
Baltimore, Maryland 21230-1719

Prepared by:

EA Engineering, Science, Technology, Inc.  
15 Loveton Circle  
Sparks, Maryland 21152  
(410) 771-4950

February 2004

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February 2004



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## LIST OF ACRONYMS AND ABBREVIATIONS

CCL	Contaminant Candidate List
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
CHS	Controlled Hazardous Substances
COMAR	Code of Maryland Regulations
DWEL	Drinking Water Equivalent Level
ft	Foot/Feet
gpd	Gallon(s) Per Day
gpm	Gallon(s) Per Minute
GPS	Global Positioning System
GWUDI	Ground Water Under the Direct Influence
in.	Inch(es)
IOC	Inorganic Compound
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
mg/L	Milligram(s) Per Liter
MGS	Maryland Geological Survey
mL	Milliliter(s)
NPL	National Priorities List
pCi/L	Picocurie(s) Per Liter
PVC	Polyvinyl Chloride
PWSID	Public Water System Identification
SDWA	Safe Drinking Water Act
SDWR	Secondary Drinking Water Regulations
SOC	Synthetic Organic Compound
SWAP	Source Water Assessment Plan
SWPA	Source Water Protection Area
SWPP	Source Water Protection Plan
TMB	Trimethylbenzene

**LIST OF ACRONYMS AND ABBREVIATIONS (continued)**

µg/L	Microgram(s) Per Liter
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WHPA	Well Head Protection Area



## EXECUTIVE SUMMARY

EA Engineering, Science, and Technology was tasked to perform a Source Water Assessment for the Crellin Water Company water system in Garrett County, Maryland. The Maryland Department of the Environment (MDE) identifies this water system as Public Water System Identification (PWSID) 0110003. EA has performed this study under Purchase Order No. U00P9200205, as authorized by MDE.

The required components of this report, as described in Maryland's Source Water Assessment Plan (SWAP), are:

- Delineation of the area that contributes water to the source
- Identification of potential sources of contamination
- Determination of the susceptibility of the water supply to contamination
- Recommendations for protecting the drinking water supply

The source of the Crellin Water Company water supply is the Allegheny Formation, which is an unconfined, sandstone and shale aquifer. The Source Water Protection Area (SWPA) for the one ground-water supply well and four springs was delineated using the watershed delineation method. The SWPA is based on land topography, nearby streams, and a calculation of the total ground-water contributing area during a drought. The SWPA is approximately 119 acres and is irregular in shape.

Potential point and non-point sources of contamination within the assessment area were identified based on site visits, a review of MDE databases, and a review of sewer service area and land use maps. No point sources of pollutants were observed within the SWPA. Pastures, forests, and low-density residential areas were observed within the SWPA. Pastures account for 20 percent of the SWPA and can be considered a non-point source of contaminants. Well information and water quality data were also reviewed.

The susceptibility analysis for the Crellin Water Company's water supply is based on a review of the water quality data, potential sources of contamination, aquifer characteristics, and well integrity. It was determined that the Crellin Water Company's water supply is highly susceptible to microbiological contamination, and moderately susceptible to volatile organic compounds and radon-222. The system has a low susceptibility to synthetic organic compounds, inorganic compounds, and other radionuclides.

Recommendations to protect the ground-water supply include creating a SWPA team, resident awareness, and communication with County officials about future planning and land use. In addition, upgrading the supply springs and implementing the MDE recommended pilot study treatment could help to reduce the susceptibility to microbiological contaminants.

## 1. INTRODUCTION

EA Engineering, Science, and Technology was tasked to perform a Source Water Assessment for the Crellin Water Company water system in Garrett County, Maryland. EA has performed this study under Purchase Order No. U00P3200205, as authorized by the Maryland Department of the Environment (MDE).

The Crellin Water Company serves the residents within the Town of Crellin in southwestern Garrett County. The water treatment plant, supply wells and springs for the system are located on property south of the Town of Crellin. The Crellin Water Company serves a population of 230 with 77 connections. One artesian well and four springs supply the water for this system (Figure 1).

### 1.1 GROUND-WATER SUPPLY SYSTEM INFORMATION

A review of the well data and sanitary surveys of the system indicates that the single supply well, Well 1 (GA880754), was drilled on 28 November 1991, in accordance with the State's current well construction standards, which were implemented in 1973. The lone supply well and four springs have a combined average yield of 30,000 gallons per day (gpd). Of that average, 25,000 gpd is supplied by the four springs.

The production well is an artesian well with a pumping rate of approximately 20 to 40 gallons per minute (gpm). The casing height is 2-ft above the ground surface and in good condition with a tightly sealed, padlocked cap. No spring houses were constructed at the four springs. Springs were identified by PVC intakes and suction lines at the surface of the springs.

Table 1 contains a summary of the well construction data. Table 2 presents a summary of available data on the four springs that supply this system.

**TABLE 1. WELL INFORMATION**

Source ID	Source Name	Permit No.	Total Depth (ft)	Casing Depth (ft)	Aquifer
01	Crellin	GA880754	220	134	Allegheny Formation

**TABLE 2. SPRING INFORMATION**

Source ID	Source Name	Aquifer
01	Spring 1	Allegheny Formation
02	Spring 2	Allegheny Formation
03	Spring 3	Allegheny Formation
04	Spring 4	Allegheny Formation







## 2. DELINEATION OF THE AREA CONTRIBUTING WATER TO SOURCE

For ground-water systems, a wellhead protection area (WHPA) is considered to be the source water protection area (SWPA) for the system. Consistent with the recommended delineation in the Maryland Source Water Assessment Plan (SWAP) (MDE 1999), the watershed drainage area that contributes ground water methodology was used.

This original delineation shape was then modified by accounting for surface water bodies, topography, significant land features, and by using a conservative calculation of total ground-water recharge during a drought. For conservative purposes, a drought condition recharge value of 400 gpd per acre (or approximately 5.4 in. per year) was used to estimate the total ground-water contribution area required to supply the well and springs.

For the Crellin Water Company, the current Water Appropriation Permit issued by the MDE Water Rights Division is for an average withdrawal of 30,000 gpd. To determine the total ground-water contribution area during a drought, the following equation was used:

$$\text{Recharge Area (acre)} = \text{Average Use (gpd)} / \text{Drought Condition Recharge (gpd/acre)}$$

From the equation above, the total ground-water contributing area during a drought is approximately 75 acres. The delineated SWPA is approximately 119 acres (Figure 2), and is therefore adequate to meet the average daily ground-water usage during a drought.





**Figure 2. Town of Crellin  
Source Water Protection Area Map  
with Potential Sources of Contamination**

Source Water Assessment Program  
2003

**Legend:**

- Supply Well
- Supply Spring
- SWPA Boundary

Source: United States Geologic Survey. 1948 (photorevised 1974). 7.5-minute Series Topographic Map for Oakland, Maryland-West Virginia.  
United States Geologic Survey. 1948 (photorevised 1981). 7.5-minute Series Topographic Map for Table Rock, Maryland- West Virginia.

**Scale:**

1000 0 1000 2000 Feet



### **3. INVENTORY OF POTENTIAL CONTAMINANTS WITHIN THE DELINEATED AREA**

A field survey was performed on 11 December 2002 to confirm potential sources of contamination identified in MDE databases around the ground-water well and the springs. These databases include the Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS), which includes National Priorities List (Superfund) sites, Maryland Registered Underground Storage Tank (UST) sites, Maryland Leaking Underground Storage Tank (LUST) sites, landfills, pesticide dealers, ground-water discharge permits, and Controlled Hazardous Substances (CHS) generator sites.

#### **3.1 POINT SOURCES**

No point source contaminants were identified during the site visit or reported in the databases reviewed (Figure 2).

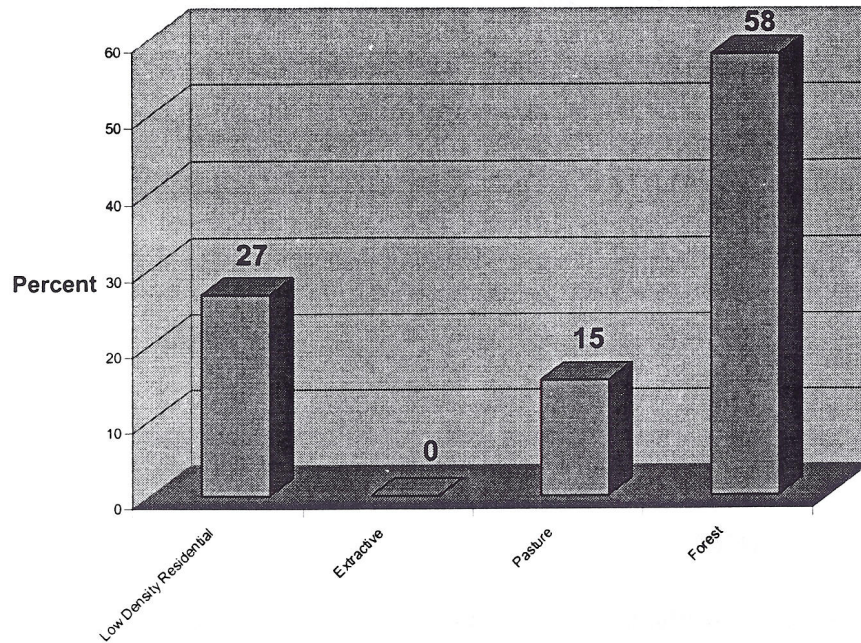
#### **3.2 NON-POINT SOURCES**

Using the Maryland Office of Planning 2000 Land Use/Land Cover map for Garrett County, potential non-point sources within the SWPA were also evaluated by land use designation (Figure 3). A summary of the percent and acreage of each type of land use is presented in the graphs on the following page.

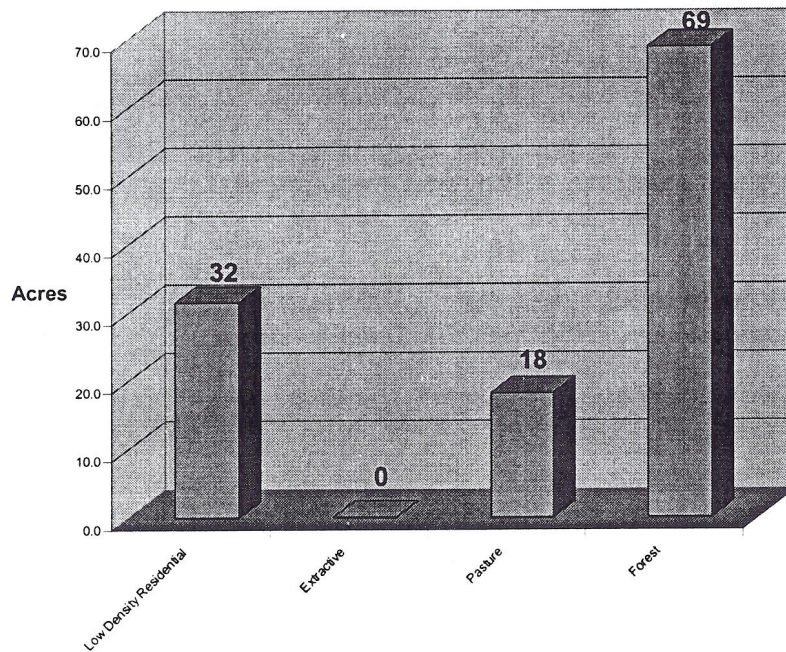
From an interpretation of the graphs, forest (69 acres), low-density residential (32 acres), and pasture (18 acres) account for nearly all of the SWPA (119 acres). Residential areas can have septic fields that impact local ground water by adding nitrates. Excessive animal waste in pasture areas can be a source of nitrate pollution in ground water. Therefore, there is potential for the migration of contaminants into the ground water.

Using the 1993 Garrett County sewerage coverage map from the Maryland Office of Planning, potential non-point sources from other septic system users in the SWPA were assessed (Figure 4). By overlaying the SWPA on the sewerage coverage layer in ArcView GIS, it was determined that 100 percent of the SWPA does not have public sewer service and is not planned for service for at least 10 years.

PERCENTAGE OF EACH LAND USE TYPE



ACREAGE OF EACH LAND USE TYPE







**Figure 3. Town of Crellin  
Land Use Map of the  
Source Water Protection Area**  
Source Water Assessment Program  
2003



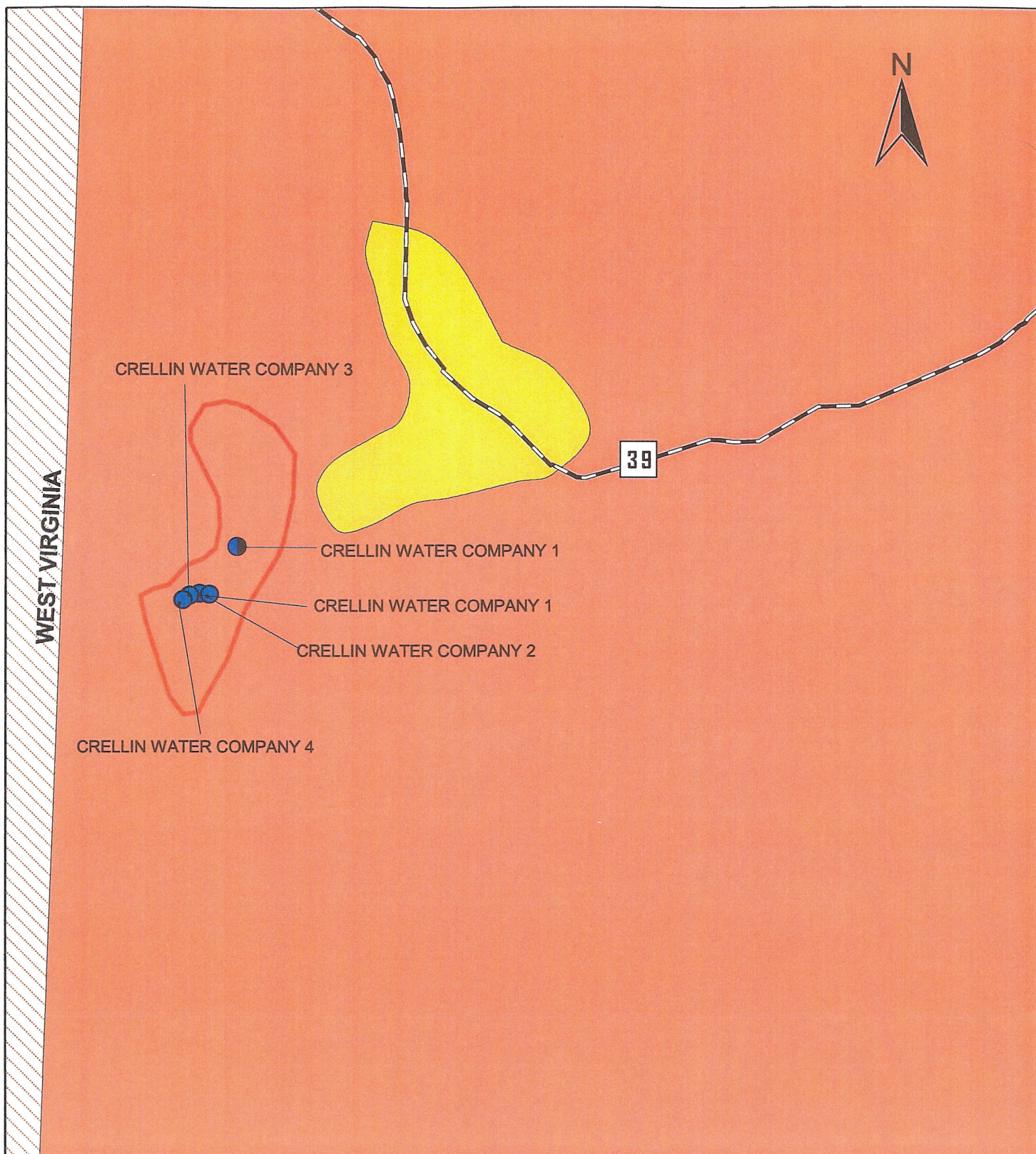
**Scale:** 2000 0 2000 Feet

**Legend:**

- Supply Well
  - Supply Spring
  - Major Roads
  - SWPA Boundary
  - West Virginia
- Land Use**
- |                                                                                                                               |                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <span style="background-color: #f8d7da; width: 20px; height: 10px; display: inline-block;"></span> Low Density Residential    | <span style="background-color: #d6d8db; width: 20px; height: 10px; display: inline-block;"></span> Extractive |
| <span style="background-color: #f3d5e5; width: 20px; height: 10px; display: inline-block;"></span> Medium Density Residential | <span style="background-color: #fff3cd; width: 20px; height: 10px; display: inline-block;"></span> Cropland   |
| <span style="background-color: #f8d7da; width: 20px; height: 10px; display: inline-block;"></span> High Density Residential   | <span style="background-color: #d4edda; width: 20px; height: 10px; display: inline-block;"></span> Pasture    |
| <span style="background-color: #fff3cd; width: 20px; height: 10px; display: inline-block;"></span> Commercial                 | <span style="background-color: #d4edda; width: 20px; height: 10px; display: inline-block;"></span> Forest     |

Source: Maryland Office of Planning, 2000.





# **Figure 4. Town of Crellin Sewer Service Map of the Source Water Protection Area**

Source Water Assessment Program  
2003

## **Legend:**

- |                 |                           |
|-----------------|---------------------------|
| ● Supply Well   | <b>Sewer</b>              |
| ● Supply Spring | ■ No planned service area |
| □ SWPA Boundary | ■ Existing service area   |
| — Major Roads   |                           |
| ▨ West Virginia |                           |

**Scale:** 1000 0 1000 2000 Feet

Source: Maryland Office of Planning, 1993.



#### 4. REVIEW OF WATER QUALITY DATA

Water quality data was obtained from the MDE Water Supply Program database of Safe Drinking Water Act (SDWA) contaminants. The reported results are for finished (treated) ground water (unless noted).

A review of the water quality data from 1991-2002 has been performed for Crellin Water Company's finished water samples. The results of the ground-water sample analyses are shown in Appendix A.

Ground-water analytical results were compared to 50 percent of the United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs) or the USEPA Secondary Drinking Water Regulations (SDWR). If no MCL or SDWR was available, the Drinking Water Equivalent Level (DWEL) was substituted as recommended by the USEPA Office of Water.

##### 4.1 GENERAL WATER QUALITY PARAMETERS

One ground-water sample collected on 1 May 1996 was reported with a pH of 6.3. This is less than the SDWR range of 6.5 to 8.5. SDWR parameters are non-enforceable federal guidelines regarding cosmetic effects, such as tooth or skin discoloration, or aesthetic effects, such as taste, odor, or color.

Another water sample collected on 6 November 1996 was reported with a pH of 6.8, which is within the normal range.

##### 4.2 VOLATILE ORGANIC COMPOUNDS

No volatile organic compounds (VOCs) were reported in the ground-water samples at concentrations greater than 50 percent of the comparison criteria.

A low-level concentration of methylene chloride (2 µg/L) was detected in a ground-water sample collected on 14 February 1991. Methylene chloride has a USEPA MCL of 5 µg/L.

A low-level concentration (0.6 µg/L) of 1,2,4-trimethylbenzene (TMB) was detected in a ground-water sample collected on 14 February 1991. This compound is presently on the Contaminant Candidate List (CCL), created by USEPA to identify compounds that do not currently have an MCL, but are targeted for future research for the purpose of establishing an MCL.

A concentration of naphthalene (4 µg/L) was detected in a ground-water sample collected on 14 February 1991 and is less than the DWEL of 700 µg/L.

Toluene (1 µg/L) was detected in a ground-water sample collected on 14 February 1991, which is below the MCL of 1,000 µg/L.

A low-level concentration of toluene (1 µg/L) was reported in a water sample collected on 14 February 1991. No subsequent samples have been reported to contain toluene. This compound is typically added to gasoline as an octane booster or as a solvent for paint, lacquer, and adhesives. This trace concentration could be the result of an unidentified local release or spill, sampling error, or from cross-contamination.

The surface springs used in this system are susceptible to surface runoff that could contain VOCs from potential upgradient sources as many VOCs dissolve readily in water. The springs are not currently protected from surface water runoff.

Based on the water quality data reviewed, the absence of observed or reported facilities that could cause VOC contamination in and adjacent to the SWPA, and the use of springs as a ground-water source, the water supply for the Crellin Water Company has a moderate susceptibility to VOCs.

## 5.2 SYNTHETIC ORGANIC COMPOUNDS

No SOC were reported in the ground-water samples at concentrations greater than 50 percent of the USEPA MCL.

Di(2-ethylhexyl)phthalate (2.3 µg/L) was detected in one water sample at a concentration less than the MCL, and was the result of laboratory cross-contamination. No other samples were reported to contain detectable concentrations of this compound.

No other SOC contaminants were detected in water samples collected. SOC do not readily dissolve in water and have a high affinity to sorb to soil particles. From well construction data for the Town of Crellin, there is approximately 130 ft of overburden that will buffer the aquifer from SOC contamination.

Based on the water quality data reviewed, the absence of point sources of SOC, and well construction information, the water supply for the Crellin Water Company has a low susceptibility to SOC contamination.

## 5.3 INORGANIC COMPOUNDS

One hundred percent of the SWPA is not served by public sanitary sewer systems. No septic systems or settling ponds were observed during the site visit. Wastewater from septic systems generally has high concentrations of nitrate. Elevated levels could occur due to an influx of agricultural animal waste, agricultural chemicals or fertilizers, and/or septic system effluent into the drinking water. Concentrations of nitrate have been generally reported between 0.4 and 1.1 mg/L, which is less than the MCL.

No point sources of IOC were reported or identified during the site visit. While pastures and residential areas in the SWPA were identified from land use mapping, it does not appear from the water quality review that they are currently impacting ground-water quality.



Based on the water quality reviewed and non-point sources of IOCs, the water supply for the Crellin Water Company has a low susceptibility to IOCs.

## 5.4 RADIONUCLIDES

Radon-222 was reported at a concentration greater than the 50 percent MCL of 300 pCi/L in a water sample collected 21 December 1999. The reported concentration was 335 pCi/L, which is slightly greater than the more conservative proposed MCL.

Radon-222 is typically produced as a by-product of the radioactive decay of minerals such as uranium in the subsurface rock aquifer. The MCL of 300 pCi/L is currently not enforceable and MDE is awaiting USEPA's final rule to determine how radon will be regulated for public water systems (USEPA 1999).

Also, gross beta and gross alpha were reported in concentrations less than the MCL for those compounds.

Based on the water quality review and the aquifer characteristics, the water supply for the Crellin Water Company is moderately susceptible to radon-222 and has a low susceptibility to other radionuclides.

## 5.5 MICROBIOLOGICAL CONTAMINANTS

Total coliform bacteria were reported in water samples from June and July 1997, and total coliforms and fecal coliforms were detected in samples from September 2000. From an assessment of GWUDI ground-water results by MDE, the ground-water supply, specifically from the four springs, has already been identified as under the direct influence of surface water.

Fecal coliforms are a subset of total coliforms and are a good indicator of surface water contamination, and of the potential presence of waterborne pathogens associated with fecal contamination (USEPA 2001).

From documentation reviewed, the lone supply well was constructed after 1973, the year that proper well construction standards were required. The wellhead was observed to be in good repair.

The springs do not have a protective structure to prevent surface runoff infiltration.

Due to the GWUDI status of the springs, MDE has initiated a ground-water pilot study for the system. The study uses a series of filters and treatment systems to eliminate, or reduce, microbiological contaminants. A schematic of the pilot study design is in Appendix B.

Based on the water quality reviewed, the GWUDI results for the four supply springs, and the lack of protective spring structures, the Crellin Water Company has a high susceptibility to microbiological contaminants.

## **6. RECOMMENDATIONS FOR PROTECTING THE WATER SUPPLY**

With the information contained in this report, the Crellin Water Company has a basis for better understanding of the risks to its drinking water supply. Being aware of the SWPA, knowing potential contaminant sources, evaluating current and future development, working with agricultural producers and soil conservation agencies, and effective outreach and education are examples of management practices that will help protect the water supply.

Recommendations for the protection of the ground-water supply are intended for the water supplier and its residents. Specific management recommendations for consideration are listed below.

### **6.1 PROTECTION TEAM**

The team should represent all the interests in the community, such as water suppliers, community associations officers, the County Health Department, local planning agencies, local businesses, developers, property owners, and residents within and near the SWPAs. The team should work to reach a consensus on how to protect the water supply.

### **6.2 PUBLIC AWARENESS AND OUTREACH**

The water supplier should consider discussing with property owners and businesses located within the SWPA the activities that could have impacts to the ground water and its quality.

The water supplier should also consider sending pamphlets, flyers, or bill stuffers to its residents to educate them about the SWPA. An example pamphlet, "Gardening in a Wellhead Protection Area," is available from MDE. The residents should also be encouraged to notify the water supplier of any significant spills from gasoline or any other potentially hazardous substances.

Placing signs at the SWPA boundaries is an effective way to make the public aware of protecting their source of water supply, and to help in the event of spill notification and response.

The Executive Summary of this report should be listed in the Consumer Confidence Report for the water system, and should also indicate that the report is available to the general public by contacting the water supplier, the local library, or MDE.

### **6.3 PLANNING/NEW DEVELOPMENT**

The water supplier should also inform the Garrett County Health and Planning Departments of any concerns about future development or zoning changes for properties that are within the SWPA.

### **6.4 MONITORING**

The water supplier should continue to monitor the ground water for all SDWA contaminants as required by MDE.



Annual raw water sampling at the springs and the well for microbiological contaminants is a good way to check the integrity of each source type.

## **6.5 CONTINGENCY PLAN**

As required by the Code of Maryland Regulations (COMAR) 26.04.01.22, all water system owners are required to prepare and submit for approval a plan to provide safe drinking water under emergency conditions.

The water supplier should develop a Spill Contingency Plan. Quick and effective spill response in the event of accidental spills or leaks is an important element in the water supplier's Source Water Protection Plan (SWPP). This plan should identify the procedures and resources to be used to mitigate any discharge of oil or hazardous substances in the SWPA. It should also establish responsibilities, duties, procedures, and resource containment, mitigation, and cleanup of accidental discharges of oil and hazardous substances that may occur within the SWPA. In all cases when spills may present a significant risk of contamination to ground water within the SWPA the local fire department should be notified of the incident.

## **6.6 CHANGES IN USES**

The water supplier is required to inform the Water Supply Program at MDE of any changes to pumping rates and when a change in the number of springs or wells used is anticipated. Any changes to the pumping rate and/or the number of supply springs or wells will affect the size and shape of the SWPA.

## **6.7 CONTAMINANT SOURCE INVENTORY UPDATES/INSPECTIONS**

The water supplier should conduct its own survey of the SWPA to ensure that there are no additional potential sources of contamination.

A regular inspection and maintenance program of the supply well should be considered to prevent a failure in the well's integrity, which could provide a pathway for contaminants to the aquifer.

Any depressions around the wellhead should be filled and graded to prevent surface water ponding that could occur during rain events. This will help to prevent surface water infiltration into the well.

## **6.8 PURCHASE CONSERVATION EASEMENTS OR PROPERTY**

Loans are available for the purchase of property or for the purchase of easements for protection of the water supply. Eligible property must lie within the designated SWPA. Loans are currently offered at zero percent interest and zero points. Please contact the Water Supply Program of the MDE for more information.

## 6.9 SPRING UPGRADES

In addition to the pilot treatment study, the water supplier should consider implementing protective encasements around the springs to prevent surface water runoff from impacting water quality.

Springs can become contaminated when barnyards, sewers, septic tanks, and other sources of pollution are located on higher adjacent land. In addition, while the springs are located near the headwaters of mountain streams, where the watersheds are generally heavily forested and uninhabited by man, pathogenic bacteria (in addition to soil bacteria) have been found in the water (USEPA 1982). The basic features of a spring encasement structure are as follows:

- An open-bottom, watertight basin intercepting the source, which extends to bedrock or a system of collection pipes and a storage tank
- A cover that prevents the entrance of surface drainage or debris into the storage tank
- Provision for the cleanout and emptying of the tank contents such as sediment or debris
- Provision for overflow pipe or spillway with pipe to channel
- A connection to the distribution system or auxiliary supply

## 7. REFERENCES

The following sources of information were consulted as a part of this investigation:

1. Maryland Geological Survey (MGS). 1980. *Garrett County Water-Well Records, Chemical-Quality Data, Ground-Water Use, Coal Test-Hole Data and Surface-Water Data*. 102 pp.
2. Maryland Department of the Environment (MDE), Water Supply Program. 1999. *Maryland's Source Water Assessment Plan*. 36 pp.
3. United States Department of Agriculture Soil Conservation Service. 1974. Soil Survey of Garrett County, Maryland. Washington, D.C.
4. United States Environmental Protection Agency (USEPA). 1999. *Proposed Radon in Drinking Water Rule*. EPA 815-F-99-006. USEPA Office of Water.
5. United States Environmental Protection Agency (USEPA). 1982. *Manual of Individual Water Supply Systems*. EPA 5700982004. USEPA Office of Water. October.
6. United States Environmental Protection Agency (USEPA). 2001. *A Small Systems Guide to the Total Coliform Rule*. EPA 816-R-01-017A. USEPA Office of Water. June.

## SOURCES OF DATA

Water Appropriation and Use Database  
Public Water Supply Inspection Reports  
Monitoring Reports  
MDE Water Supply Program Oracle Database  
MDE Waste Management Sites Database  
Maryland Office of Planning 2000 Garrett County Land Use Map  
Maryland Office of Planning 1993 Garrett County Sewer Service Map  
USGS Topographic 7.5-minute Quadrangle Map – 1948 Oakland, Maryland Quad  
USGS Topographic 7.5-minute Quadrangle Map – 1948 Table Rock, Maryland/West Virginia Quad



## **Appendix A**

### **Summary of Crellin Water Company Water Sample Analysis**



# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	2/14/1991	1,1,1,2-TETRACHLOROETHANE	--	
01	1/18/1995	1,1,1,2-TETRACHLOROETHANE	--	
01	4/26/1995	1,1,1,2-TETRACHLOROETHANE	--	
01	7/13/1995	1,1,1,2-TETRACHLOROETHANE	--	
01	11/9/1995	1,1,1,2-TETRACHLOROETHANE	--	
01	11/6/1996	1,1,1,2-TETRACHLOROETHANE	--	
01	7/30/1997	1,1,1,2-TETRACHLOROETHANE	--	
01	8/6/1998	1,1,1,2-TETRACHLOROETHANE	--	
01	12/21/1999	1,1,1,2-TETRACHLOROETHANE	--	
01	2/14/1991	1,1,1-TRICHLOROETHANE	--	
01	1/18/1995	1,1,1-TRICHLOROETHANE	--	
01	4/26/1995	1,1,1-TRICHLOROETHANE	--	
01	7/13/1995	1,1,1-TRICHLOROETHANE	--	
01	11/9/1995	1,1,1-TRICHLOROETHANE	--	
01	11/6/1996	1,1,1-TRICHLOROETHANE	--	
01	7/30/1997	1,1,1-TRICHLOROETHANE	--	
01	8/6/1998	1,1,1-TRICHLOROETHANE	--	
01	12/21/1999	1,1,1-TRICHLOROETHANE	--	
01	2/14/1991	1,1,2,2-TETRACHLOROETHANE	--	
01	1/18/1995	1,1,2,2-TETRACHLOROETHANE	--	
01	4/26/1995	1,1,2,2-TETRACHLOROETHANE	--	
01	7/13/1995	1,1,2,2-TETRACHLOROETHANE	--	
01	11/9/1995	1,1,2,2-TETRACHLOROETHANE	--	
01	11/6/1996	1,1,2,2-TETRACHLOROETHANE	--	
01	7/30/1997	1,1,2,2-TETRACHLOROETHANE	--	
01	8/6/1998	1,1,2,2-TETRACHLOROETHANE	--	
01	12/21/1999	1,1,2,2-TETRACHLOROETHANE	--	
01	2/14/1991	1,1,2-TRICHLOROETHANE	--	
01	1/18/1995	1,1,2-TRICHLOROETHANE	--	
01	4/26/1995	1,1,2-TRICHLOROETHANE	--	
01	7/13/1995	1,1,2-TRICHLOROETHANE	--	
01	11/9/1995	1,1,2-TRICHLOROETHANE	--	
01	11/6/1996	1,1,2-TRICHLOROETHANE	--	
01	7/30/1997	1,1,2-TRICHLOROETHANE	--	
01	8/6/1998	1,1,2-TRICHLOROETHANE	--	
01	12/21/1999	1,1,2-TRICHLOROETHANE	--	
01	2/14/1991	1,1-DICHLOROETHANE	--	
01	1/18/1995	1,1-DICHLOROETHANE	--	
01	4/26/1995	1,1-DICHLOROETHANE	--	
01	7/13/1995	1,1-DICHLOROETHANE	--	
01	11/9/1995	1,1-DICHLOROETHANE	--	
01	11/6/1996	1,1-DICHLOROETHANE	--	
01	7/30/1997	1,1-DICHLOROETHANE	--	
01	8/6/1998	1,1-DICHLOROETHANE	--	
01	12/21/1999	1,1-DICHLOROETHANE	--	
01	2/14/1991	1,1-DICHLOROETHYLENE	--	
01	1/18/1995	1,1-DICHLOROETHYLENE	--	

-- = Not Detected

\* = Secondary Drinking Water Regulations

^ = Drinking Water Equivalence Level

+ = Drinking Water Advisory Level

CCL = Contaminant Candidate List



# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	4/26/1995	1,1-DICHLOROETHYLENE	--	
01	7/13/1995	1,1-DICHLOROETHYLENE	--	
01	11/9/1995	1,1-DICHLOROETHYLENE	--	
01	11/6/1996	1,1-DICHLOROETHYLENE	--	
01	7/30/1997	1,1-DICHLOROETHYLENE	--	
01	8/6/1998	1,1-DICHLOROETHYLENE	--	
01	12/21/1999	1,1-DICHLOROETHYLENE	--	
01	2/14/1991	1,1-DICHLOROPROPENE	--	
01	1/18/1995	1,1-DICHLOROPROPENE	--	
01	4/26/1995	1,1-DICHLOROPROPENE	--	
01	7/13/1995	1,1-DICHLOROPROPENE	--	
01	11/9/1995	1,1-DICHLOROPROPENE	--	
01	11/6/1996	1,1-DICHLOROPROPENE	--	
01	7/30/1997	1,1-DICHLOROPROPENE	--	
01	8/6/1998	1,1-DICHLOROPROPENE	--	
01	12/21/1999	1,1-DICHLOROPROPENE	--	
01	2/14/1991	1,2,3-TRICHLOROBENZENE	--	
01	1/18/1995	1,2,3-TRICHLOROBENZENE	--	
01	4/26/1995	1,2,3-TRICHLOROBENZENE	--	
01	7/13/1995	1,2,3-TRICHLOROBENZENE	--	
01	11/9/1995	1,2,3-TRICHLOROBENZENE	--	
01	11/6/1996	1,2,3-TRICHLOROBENZENE	--	
01	7/30/1997	1,2,3-TRICHLOROBENZENE	--	
01	8/6/1998	1,2,3-TRICHLOROBENZENE	--	
01	12/21/1999	1,2,3-TRICHLOROBENZENE	--	
01	2/14/1991	1,2,3-TRICHLOROPROPANE	--	
01	1/18/1995	1,2,3-TRICHLOROPROPANE	--	
01	4/26/1995	1,2,3-TRICHLOROPROPANE	--	
01	7/13/1995	1,2,3-TRICHLOROPROPANE	--	
01	11/9/1995	1,2,3-TRICHLOROPROPANE	--	
01	11/6/1996	1,2,3-TRICHLOROPROPANE	--	
01	7/30/1997	1,2,3-TRICHLOROPROPANE	--	
01	8/6/1998	1,2,3-TRICHLOROPROPANE	--	
01	12/21/1999	1,2,3-TRICHLOROPROPANE	--	
01	2/14/1991	1,2,4-TRICHLOROBENZENE	--	
01	1/18/1995	1,2,4-TRICHLOROBENZENE	--	
01	4/26/1995	1,2,4-TRICHLOROBENZENE	--	
01	7/13/1995	1,2,4-TRICHLOROBENZENE	--	
01	11/9/1995	1,2,4-TRICHLOROBENZENE	--	
01	11/6/1996	1,2,4-TRICHLOROBENZENE	--	
01	7/30/1997	1,2,4-TRICHLOROBENZENE	--	
01	8/6/1998	1,2,4-TRICHLOROBENZENE	--	
01	12/21/1999	1,2,4-TRICHLOROBENZENE	--	
01	2/14/1991	1,2,4-TRIMETHYLBENZENE	0.6	CCL
01	1/18/1995	1,2,4-TRIMETHYLBENZENE	--	
01	4/26/1995	1,2,4-TRIMETHYLBENZENE	--	
01	7/13/1995	1,2,4-TRIMETHYLBENZENE	--	

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	11/9/1995	1,2,4-TRIMETHYLBENZENE	--	
01	11/6/1996	1,2,4-TRIMETHYLBENZENE	--	
01	7/30/1997	1,2,4-TRIMETHYLBENZENE	--	
01	8/6/1998	1,2,4-TRIMETHYLBENZENE	--	
01	12/21/1999	1,2,4-TRIMETHYLBENZENE	--	
01	2/14/1991	1,2-DICHLOROETHANE	--	
01	1/18/1995	1,2-DICHLOROETHANE	--	
01	4/26/1995	1,2-DICHLOROETHANE	--	
01	7/13/1995	1,2-DICHLOROETHANE	--	
01	11/9/1995	1,2-DICHLOROETHANE	--	
01	11/6/1996	1,2-DICHLOROETHANE	--	
01	7/30/1997	1,2-DICHLOROETHANE	--	
01	8/6/1998	1,2-DICHLOROETHANE	--	
01	12/21/1999	1,2-DICHLOROETHANE	--	
01	2/14/1991	1,2-DICHLOROPROPANE	--	
01	1/18/1995	1,2-DICHLOROPROPANE	--	
01	4/26/1995	1,2-DICHLOROPROPANE	--	
01	7/13/1995	1,2-DICHLOROPROPANE	--	
01	11/9/1995	1,2-DICHLOROPROPANE	--	
01	11/6/1996	1,2-DICHLOROPROPANE	--	
01	7/30/1997	1,2-DICHLOROPROPANE	--	
01	8/6/1998	1,2-DICHLOROPROPANE	--	
01	12/21/1999	1,2-DICHLOROPROPANE	--	
01	2/14/1991	1,3,5-TRIMETHYLBENZENE	--	
01	1/18/1995	1,3,5-TRIMETHYLBENZENE	--	
01	4/26/1995	1,3,5-TRIMETHYLBENZENE	--	
01	7/13/1995	1,3,5-TRIMETHYLBENZENE	--	
01	11/9/1995	1,3,5-TRIMETHYLBENZENE	--	
01	11/6/1996	1,3,5-TRIMETHYLBENZENE	--	
01	7/30/1997	1,3,5-TRIMETHYLBENZENE	--	
01	8/6/1998	1,3,5-TRIMETHYLBENZENE	--	
01	12/21/1999	1,3,5-TRIMETHYLBENZENE	--	
01	2/14/1991	1,3-DICHLOROPROPANE	--	
01	1/18/1995	1,3-DICHLOROPROPANE	--	
01	4/26/1995	1,3-DICHLOROPROPANE	--	
01	7/13/1995	1,3-DICHLOROPROPANE	--	
01	11/9/1995	1,3-DICHLOROPROPANE	--	
01	11/6/1996	1,3-DICHLOROPROPANE	--	
01	7/30/1997	1,3-DICHLOROPROPANE	--	
01	8/6/1998	1,3-DICHLOROPROPANE	--	
01	12/21/1999	1,3-DICHLOROPROPANE	--	
01	2/14/1991	1,3-DICHLOROPROPENE	--	
01	1/18/1995	1,3-DICHLOROPROPENE	--	
01	4/26/1995	1,3-DICHLOROPROPENE	--	
01	7/13/1995	1,3-DICHLOROPROPENE	--	
01	11/9/1995	1,3-DICHLOROPROPENE	--	
01	11/6/1996	1,3-DICHLOROPROPENE	--	

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	7/30/1997	1,3-DICHLOROPROPENE	--	
01	8/6/1998	1,3-DICHLOROPROPENE	--	
01	12/21/1999	1,3-DICHLOROPROPENE	--	
01	2/14/1991	2,2-DICHLOROPROPANE	--	
01	1/18/1995	2,2-DICHLOROPROPANE	--	
01	4/26/1995	2,2-DICHLOROPROPANE	--	
01	7/13/1995	2,2-DICHLOROPROPANE	--	
01	11/9/1995	2,2-DICHLOROPROPANE	--	
01	11/6/1996	2,2-DICHLOROPROPANE	--	
01	7/30/1997	2,2-DICHLOROPROPANE	--	
01	8/6/1998	2,2-DICHLOROPROPANE	--	
01	12/21/1999	2,2-DICHLOROPROPANE	--	
01	2/14/1991	BENZENE	--	
01	1/18/1995	BENZENE	--	
01	4/26/1995	BENZENE	--	
01	7/13/1995	BENZENE	--	
01	11/9/1995	BENZENE	--	
01	11/6/1996	BENZENE	--	
01	7/30/1997	BENZENE	--	
01	8/6/1998	BENZENE	--	
01	12/21/1999	BENZENE	--	
01	2/14/1991	BROMOBENZENE	--	
01	1/18/1995	BROMOBENZENE	--	
01	4/26/1995	BROMOBENZENE	--	
01	7/13/1995	BROMOBENZENE	--	
01	11/9/1995	BROMOBENZENE	--	
01	11/6/1996	BROMOBENZENE	--	
01	7/30/1997	BROMOBENZENE	--	
01	8/6/1998	BROMOBENZENE	--	
01	12/21/1999	BROMOBENZENE	--	
01	2/14/1991	BROMOCHLOROMETHANE	--	
01	1/18/1995	BROMOCHLOROMETHANE	--	
01	4/26/1995	BROMOCHLOROMETHANE	--	
01	7/13/1995	BROMOCHLOROMETHANE	--	
01	11/9/1995	BROMOCHLOROMETHANE	--	
01	11/6/1996	BROMOCHLOROMETHANE	--	
01	7/30/1997	BROMOCHLOROMETHANE	--	
01	8/6/1998	BROMOCHLOROMETHANE	--	
01	12/21/1999	BROMOCHLOROMETHANE	--	
01	2/14/1991	BROMODICHLOROMETHANE	--	
01	7/13/1995	BROMODICHLOROMETHANE	--	
01	11/9/1995	BROMODICHLOROMETHANE	--	
01	11/6/1996	BROMODICHLOROMETHANE	--	
01	7/30/1997	BROMODICHLOROMETHANE	--	
01	8/6/1998	BROMODICHLOROMETHANE	--	
01	12/21/1999	BROMODICHLOROMETHANE	--	
01	2/14/1991	BROMOFORM	--	

-- = Not Detected

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	7/13/1995	BROMOFORM	--	
01	11/9/1995	BROMOFORM	--	
01	11/6/1996	BROMOFORM	--	
01	7/30/1997	BROMOFORM	--	
01	8/6/1998	BROMOFORM	--	
01	12/21/1999	BROMOFORM	--	
01	2/14/1991	BROMOMETHANE	--	
01	1/18/1995	BROMOMETHANE	--	
01	4/26/1995	BROMOMETHANE	--	
01	7/13/1995	BROMOMETHANE	--	
01	11/9/1995	BROMOMETHANE	--	
01	11/6/1996	BROMOMETHANE	--	
01	7/30/1997	BROMOMETHANE	--	
01	8/6/1998	BROMOMETHANE	--	
01	12/21/1999	BROMOMETHANE	--	
01	2/14/1991	CARBON TETRACHLORIDE	--	
01	1/18/1995	CARBON TETRACHLORIDE	--	
01	4/26/1995	CARBON TETRACHLORIDE	--	
01	7/13/1995	CARBON TETRACHLORIDE	--	
01	11/9/1995	CARBON TETRACHLORIDE	--	
01	11/6/1996	CARBON TETRACHLORIDE	--	
01	7/30/1997	CARBON TETRACHLORIDE	--	
01	8/6/1998	CARBON TETRACHLORIDE	--	
01	12/21/1999	CARBON TETRACHLORIDE	--	
01	2/14/1991	CHLOROETHANE	--	
01	1/18/1995	CHLOROETHANE	--	
01	4/26/1995	CHLOROETHANE	--	
01	7/13/1995	CHLOROETHANE	--	
01	11/9/1995	CHLOROETHANE	--	
01	11/6/1996	CHLOROETHANE	--	
01	7/30/1997	CHLOROETHANE	--	
01	8/6/1998	CHLOROETHANE	--	
01	12/21/1999	CHLOROETHANE	--	
01	2/14/1991	CHLOROFORM	--	
01	7/13/1995	CHLOROFORM	--	
01	11/9/1995	CHLOROFORM	--	
01	11/6/1996	CHLOROFORM	--	
01	7/30/1997	CHLOROFORM	--	
01	8/6/1998	CHLOROFORM	--	
01	12/21/1999	CHLOROFORM	--	
01	2/14/1991	CHLOROMETHANE	--	
01	1/18/1995	CHLOROMETHANE	--	
01	4/26/1995	CHLOROMETHANE	--	
01	7/13/1995	CHLOROMETHANE	--	
01	11/9/1995	CHLOROMETHANE	--	
01	11/6/1996	CHLOROMETHANE	--	
01	7/30/1997	CHLOROMETHANE	--	

-- = Not Detected

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	8/6/1998	CHLOROMETHANE	--	
01	12/21/1999	CHLOROMETHANE	--	
01	2/14/1991	cis-1,2-DICHLOROETHYLENE	--	
01	1/18/1995	cis-1,2-DICHLOROETHYLENE	--	
01	4/26/1995	cis-1,2-DICHLOROETHYLENE	--	
01	7/13/1995	cis-1,2-DICHLOROETHYLENE	--	
01	11/9/1995	cis-1,2-DICHLOROETHYLENE	--	
01	11/6/1996	cis-1,2-DICHLOROETHYLENE	--	
01	7/30/1997	cis-1,2-DICHLOROETHYLENE	--	
01	8/6/1998	cis-1,2-DICHLOROETHYLENE	--	
01	12/21/1999	cis-1,2-DICHLOROETHYLENE	--	
01	2/14/1991	DIBROMOCHLOROMETHANE	--	
01	7/13/1995	DIBROMOCHLOROMETHANE	--	
01	11/9/1995	DIBROMOCHLOROMETHANE	--	
01	11/6/1996	DIBROMOCHLOROMETHANE	--	
01	7/30/1997	DIBROMOCHLOROMETHANE	--	
01	8/6/1998	DIBROMOCHLOROMETHANE	--	
01	12/21/1999	DIBROMOCHLOROMETHANE	--	
01	2/14/1991	DIBROMOMETHANE	--	
01	1/18/1995	DIBROMOMETHANE	--	
01	4/26/1995	DIBROMOMETHANE	--	
01	7/13/1995	DIBROMOMETHANE	--	
01	11/9/1995	DIBROMOMETHANE	--	
01	11/6/1996	DIBROMOMETHANE	--	
01	7/30/1997	DIBROMOMETHANE	--	
01	8/6/1998	DIBROMOMETHANE	--	
01	12/21/1999	DIBROMOMETHANE	--	
01	2/14/1991	DICHLORODIFLUOROMETHANE	--	
01	1/18/1995	DICHLORODIFLUOROMETHANE	--	
01	4/26/1995	DICHLORODIFLUOROMETHANE	--	
01	7/13/1995	DICHLORODIFLUOROMETHANE	--	
01	11/9/1995	DICHLORODIFLUOROMETHANE	--	
01	11/6/1996	DICHLORODIFLUOROMETHANE	--	
01	7/30/1997	DICHLORODIFLUOROMETHANE	--	
01	8/6/1998	DICHLORODIFLUOROMETHANE	--	
01	12/21/1999	DICHLORODIFLUOROMETHANE	--	
01	2/14/1991	ETHYLBENZENE	--	
01	1/18/1995	ETHYLBENZENE	--	
01	4/26/1995	ETHYLBENZENE	--	
01	7/13/1995	ETHYLBENZENE	--	
01	11/9/1995	ETHYLBENZENE	--	
01	11/6/1996	ETHYLBENZENE	--	
01	7/30/1997	ETHYLBENZENE	--	
01	8/6/1998	ETHYLBENZENE	--	
01	12/21/1999	ETHYLBENZENE	--	
01	2/14/1991	HEXACHLOROBUTADIENE	--	
01	1/18/1995	HEXACHLOROBUTADIENE	--	

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**SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS**

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	4/26/1995	HEXACHLOROBUTADIENE	--	
01	7/13/1995	HEXACHLOROBUTADIENE	--	
01	11/9/1995	HEXACHLOROBUTADIENE	--	
01	11/6/1996	HEXACHLOROBUTADIENE	--	
01	7/30/1997	HEXACHLOROBUTADIENE	--	
01	8/6/1998	HEXACHLOROBUTADIENE	--	
01	12/21/1999	HEXACHLOROBUTADIENE	--	
01	2/14/1991	ISOPROPYLBENZENE	--	
01	1/18/1995	ISOPROPYLBENZENE	--	
01	4/26/1995	ISOPROPYLBENZENE	--	
01	7/13/1995	ISOPROPYLBENZENE	--	
01	11/9/1995	ISOPROPYLBENZENE	--	
01	11/6/1996	ISOPROPYLBENZENE	--	
01	7/30/1997	ISOPROPYLBENZENE	--	
01	8/6/1998	ISOPROPYLBENZENE	--	
01	12/21/1999	ISOPROPYLBENZENE	--	
01	2/14/1991	m-DICHLOROBENZENE	--	
01	1/18/1995	m-DICHLOROBENZENE	--	
01	4/26/1995	m-DICHLOROBENZENE	--	
01	7/13/1995	m-DICHLOROBENZENE	--	
01	11/9/1995	m-DICHLOROBENZENE	--	
01	11/6/1996	m-DICHLOROBENZENE	--	
01	7/30/1997	m-DICHLOROBENZENE	--	
01	8/6/1998	m-DICHLOROBENZENE	--	
01	12/21/1999	m-DICHLOROBENZENE	--	
01	2/14/1991	METHYLENE CHLORIDE	2	5
01	1/18/1995	METHYLENE CHLORIDE	--	
01	4/26/1995	METHYLENE CHLORIDE	--	
01	7/13/1995	METHYLENE CHLORIDE	--	
01	11/9/1995	METHYLENE CHLORIDE	--	
01	11/6/1996	METHYLENE CHLORIDE	--	
01	7/30/1997	METHYLENE CHLORIDE	--	
01	8/6/1998	METHYLENE CHLORIDE	--	
01	12/21/1999	METHYLENE CHLORIDE	--	
01	1/18/1995	METHYL-TERT-BUTYL-ETHER	--	
01	1/18/1995	METHYL-TERT-BUTYL-ETHER	--	
01	4/26/1995	METHYL-TERT-BUTYL-ETHER	--	
01	4/26/1995	METHYL-TERT-BUTYL-ETHER	--	
01	7/13/1995	METHYL-TERT-BUTYL-ETHER	--	
01	7/13/1995	METHYL-TERT-BUTYL-ETHER	--	
01	11/9/1995	METHYL-TERT-BUTYL-ETHER	--	
01	11/9/1995	METHYL-TERT-BUTYL-ETHER	--	
01	11/6/1996	METHYL-TERT-BUTYL-ETHER	--	
01	11/6/1996	METHYL-TERT-BUTYL-ETHER	--	
01	7/30/1997	METHYL-TERT-BUTYL-ETHER	--	
01	7/30/1997	METHYL-TERT-BUTYL-ETHER	--	
01	8/6/1998	METHYL-TERT-BUTYL-ETHER	--	

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	8/6/1998	METHYL-TERT-BUTYL-ETHER	--	
01	12/21/1999	METHYL-TERT-BUTYL-ETHER	--	
01	12/21/1999	METHYL-TERT-BUTYL-ETHER	--	
01	2/14/1991	MONOCHLOROBENZENE	--	
01	1/18/1995	MONOCHLOROBENZENE	--	
01	4/26/1995	MONOCHLOROBENZENE	--	
01	7/13/1995	MONOCHLOROBENZENE	--	
01	11/9/1995	MONOCHLOROBENZENE	--	
01	11/6/1996	MONOCHLOROBENZENE	--	
01	7/30/1997	MONOCHLOROBENZENE	--	
01	8/6/1998	MONOCHLOROBENZENE	--	
01	12/21/1999	MONOCHLOROBENZENE	--	
01	2/14/1991	m-XYLENE	--	
01	1/18/1995	m-XYLENE	--	
01	4/26/1995	m-XYLENE	--	
01	7/13/1995	m-XYLENE	--	
01	11/9/1995	m-XYLENE	--	
01	11/6/1996	m-XYLENE	--	
01	7/30/1997	m-XYLENE	--	
01	8/6/1998	m-XYLENE	--	
01	12/21/1999	m-XYLENE	--	
01	2/14/1991	NAPHTHALENE	4	700 ^
01	1/18/1995	NAPHTHALENE	--	
01	4/26/1995	NAPHTHALENE	--	
01	7/13/1995	NAPHTHALENE	--	
01	11/9/1995	NAPHTHALENE	--	
01	11/6/1996	NAPHTHALENE	--	
01	7/30/1997	NAPHTHALENE	--	
01	8/6/1998	NAPHTHALENE	--	
01	12/21/1999	NAPHTHALENE	--	
01	2/14/1991	N-BUTYLBENZENE	--	
01	1/18/1995	N-BUTYLBENZENE	--	
01	4/26/1995	N-BUTYLBENZENE	--	
01	7/13/1995	N-BUTYLBENZENE	--	
01	11/9/1995	N-BUTYLBENZENE	--	
01	11/6/1996	N-BUTYLBENZENE	--	
01	7/30/1997	N-BUTYLBENZENE	--	
01	8/6/1998	N-BUTYLBENZENE	--	
01	12/21/1999	N-BUTYLBENZENE	--	
01	2/14/1991	n-PROPYLBENZENE	--	
01	1/18/1995	n-PROPYLBENZENE	--	
01	4/26/1995	n-PROPYLBENZENE	--	
01	7/13/1995	n-PROPYLBENZENE	--	
01	11/9/1995	n-PROPYLBENZENE	--	
01	11/6/1996	n-PROPYLBENZENE	--	
01	7/30/1997	n-PROPYLBENZENE	--	
01	8/6/1998	n-PROPYLBENZENE	--	

-- = Not Detected

\* = Secondary Drinking Water Regulations

^ = Drinking Water Equivalence Level

+ = Drinking Water Advisory Level

CCL = Contaminant Candidate List



# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	12/21/1999	n-PROPYLBENZENE	--	
01	2/14/1991	o-CHLOROTOLUENE	--	
01	1/18/1995	o-CHLOROTOLUENE	--	
01	4/26/1995	o-CHLOROTOLUENE	--	
01	7/13/1995	o-CHLOROTOLUENE	--	
01	11/9/1995	o-CHLOROTOLUENE	--	
01	11/6/1996	o-CHLOROTOLUENE	--	
01	7/30/1997	o-CHLOROTOLUENE	--	
01	8/6/1998	o-CHLOROTOLUENE	--	
01	12/21/1999	o-CHLOROTOLUENE	--	
01	2/14/1991	o-DICHLOROBENZENE	--	
01	1/18/1995	o-DICHLOROBENZENE	--	
01	4/26/1995	o-DICHLOROBENZENE	--	
01	7/13/1995	o-DICHLOROBENZENE	--	
01	11/9/1995	o-DICHLOROBENZENE	--	
01	11/6/1996	o-DICHLOROBENZENE	--	
01	7/30/1997	o-DICHLOROBENZENE	--	
01	8/6/1998	o-DICHLOROBENZENE	--	
01	12/21/1999	o-DICHLOROBENZENE	--	
01	2/14/1991	o-XYLENE	--	
01	1/18/1995	o-XYLENE	--	
01	4/26/1995	o-XYLENE	--	
01	7/13/1995	o-XYLENE	--	
01	11/9/1995	o-XYLENE	--	
01	11/6/1996	o-XYLENE	--	
01	7/30/1997	o-XYLENE	--	
01	8/6/1998	o-XYLENE	--	
01	12/21/1999	o-XYLENE	--	
01	2/14/1991	p-CHLOROTOLUENE	--	
01	1/18/1995	p-CHLOROTOLUENE	--	
01	4/26/1995	p-CHLOROTOLUENE	--	
01	7/13/1995	p-CHLOROTOLUENE	--	
01	11/9/1995	p-CHLOROTOLUENE	--	
01	11/6/1996	p-CHLOROTOLUENE	--	
01	7/30/1997	p-CHLOROTOLUENE	--	
01	8/6/1998	p-CHLOROTOLUENE	--	
01	12/21/1999	p-CHLOROTOLUENE	--	
01	2/14/1991	p-DICHLOROBENZENE	--	
01	1/18/1995	p-DICHLOROBENZENE	--	
01	4/26/1995	p-DICHLOROBENZENE	--	
01	7/13/1995	p-DICHLOROBENZENE	--	
01	11/9/1995	p-DICHLOROBENZENE	--	
01	11/6/1996	p-DICHLOROBENZENE	--	
01	7/30/1997	p-DICHLOROBENZENE	--	
01	8/6/1998	p-DICHLOROBENZENE	--	
01	12/21/1999	p-DICHLOROBENZENE	--	
01	2/14/1991	P-ISOPROPYLTOLUENE	--	

-- = Not Detected

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Volatile Organic Compounds			µg/L	µg/L
01	11/6/1996	VINYL CHLORIDE	--	
01	7/30/1997	VINYL CHLORIDE	--	
01	8/6/1998	VINYL CHLORIDE	--	
01	12/21/1999	VINYL CHLORIDE	--	
01	2/14/1991	XYLENES, TOTAL	--	
01	1/18/1995	XYLENES, TOTAL	--	
01	4/26/1995	XYLENES, TOTAL	--	
01	7/13/1995	XYLENES, TOTAL	--	
01	11/9/1995	XYLENES, TOTAL	--	
01	11/6/1996	XYLENES, TOTAL	--	
01	7/30/1997	XYLENES, TOTAL	--	
01	8/6/1998	XYLENES, TOTAL	--	
01	12/21/1999	XYLENES, TOTAL	--	
Synthetic Organic Compounds			µg/L	µg/L
01	2/14/1991	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	1/18/1995	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	4/26/1995	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	7/13/1995	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	11/9/1995	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	11/6/1996	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	11/6/1996	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	7/30/1997	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	8/6/1998	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	12/21/1999	1,2-DIBROMO-3-CHLOROPROPANE	--	
01	11/6/1996	2,4,5-T	--	
01	12/21/1999	2,4,5-T	--	
01	11/6/1996	2,4,5-TP (SILVEX)	--	
01	12/21/1999	2,4,5-TP (SILVEX)	--	
01	11/6/1996	2,4-D	--	
01	12/21/1999	2,4-D	--	
01	12/21/1999	3-HYDROXYCARBOFURAN	--	
01	11/6/1996	ALACHLOR (LASSO)	--	
01	12/21/1999	ALACHLOR (LASSO)	--	
01	12/21/1999	ALDICARB	--	
01	12/21/1999	ALDICARB SULFONE	--	
01	12/21/1999	ALDICARB SULFOXIDE	--	
01	11/6/1996	ALDRIN	--	
01	12/21/1999	ALDRIN	--	
01	11/6/1996	ATRAZINE	--	
01	12/21/1999	ATRAZINE	--	
01	11/6/1996	BENZO(a)PYRENE	--	
01	12/21/1999	BENZO(a)PYRENE	--	
01	11/6/1996	BHC-GAMMA(LINDANE)	--	
01	12/21/1999	BHC-GAMMA(LINDANE)	--	
01	11/6/1996	BUTACHLOR (MACHETE)	--	
01	12/21/1999	BUTACHLOR (MACHETE)	--	
01	12/21/1999	CARBARYL	--	

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Synthetic Organic Compounds			µg/L	µg/L
01	12/21/1999	CARBOFURAN	--	
01	11/6/1996	CHLORDANE	--	
01	12/21/1999	CHLORDANE	--	
01	11/6/1996	DALAPON	--	
01	12/21/1999	DALAPON	--	
01	11/6/1996	DECACHLOROBIPHENYL	--	
01	11/6/1996	DI(2-ETHYLHEXYL) ADIPATE	--	
01	12/21/1999	DI(2-ETHYLHEXYL) ADIPATE	--	
01	11/6/1996	DI(2-ETHYLHEXYL) PHTHALATE	--	
01	12/21/1999	DI(2-ETHYLHEXYL) PHTHALATE	2.3	6
01	11/6/1996	DIAZINON (SPECTRACIDE)	--	
01	11/6/1996	DICAMBA	--	
01	12/21/1999	DICAMBA	--	
01	11/6/1996	DIELDRIN	--	
01	12/21/1999	DIELDRIN	--	
01	11/6/1996	DINOSEB	--	
01	12/21/1999	DINOSEB	--	
01	11/6/1996	DURSBAN	--	
01	11/6/1996	ENDRIN	--	
01	12/21/1999	ENDRIN	--	
01	1/18/1995	ETHYLENE DIBROMIDE (EDB)	--	
01	4/26/1995	ETHYLENE DIBROMIDE (EDB)	--	
01	7/13/1995	ETHYLENE DIBROMIDE (EDB)	--	
01	11/9/1995	ETHYLENE DIBROMIDE (EDB)	--	
01	11/6/1996	ETHYLENE DIBROMIDE (EDB)	--	
01	11/6/1996	ETHYLENE DIBROMIDE (EDB)	--	
01	7/30/1997	ETHYLENE DIBROMIDE (EDB)	--	
01	8/6/1998	ETHYLENE DIBROMIDE (EDB)	--	
01	12/21/1999	ETHYLENE DIBROMIDE (EDB)	--	
01	11/6/1996	HEPTACHLOR	--	
01	12/21/1999	HEPTACHLOR	--	
01	11/6/1996	HEPTACHLOR EPOXIDE	--	
01	12/21/1999	HEPTACHLOR EPOXIDE	--	
01	11/6/1996	HEXACHLOROBENZENE (HCB)	--	
01	12/21/1999	HEXACHLOROBENZENE (HCB)	--	
01	11/6/1996	HEXACHLOROCYCLOPENTADIENE	--	
01	12/21/1999	HEXACHLOROCYCLOPENTADIENE	--	
01	12/21/1999	METHOMYL	--	
01	11/6/1996	METHOXYCHLOR	--	
01	12/21/1999	METHOXYCHLOR	--	
01	11/6/1996	METOLACHLOR	--	
01	12/21/1999	METOLACHLOR	--	
01	11/6/1996	METRIBUZIN (SENCOR)	--	
01	12/21/1999	METRIBUZIN (SENCOR)	--	
01	12/21/1999	OXAMYL (VYDATE)	--	
01	11/6/1996	PENTACHLOROPHENOL	--	
01	12/21/1999	PENTACHLOROPHENOL	--	

-- = Not Detected

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
<b>Synthetic Organic Compounds</b>			<b>µg/L</b>	<b>µg/L</b>
01	11/6/1996	PICLORAM	--	
01	12/21/1999	PICLORAM	--	
01	11/6/1996	PROPACHLOR (RAMROD)	--	
01	12/21/1999	PROPACHLOR (RAMROD)	--	
01	11/6/1996	SIMAZINE	--	
01	12/21/1999	SIMAZINE	--	
01	11/6/1996	TOXAPHENE	--	
<b>Radionuclides</b>			<b>pCi/L</b>	<b>pCi/L</b>
00	2/11/1992	GROSS ALPHA	2	15
00	11/9/1995	GROSS ALPHA	--	
01	12/21/1999	GROSS ALPHA	--	
01	12/21/1999	GROSS ALPHA (SHORT TERM)	--	
00	11/9/1995	GROSS BETA	--	
01	12/21/1999	GROSS BETA	2	50
01	12/21/1999	GROSS BETA (SHORT TERM)	--	
01	12/21/1999	RADON-222	335	300
<b>Inorganic Compounds</b>			<b>mg/L</b>	<b>mg/L</b>
01	11/6/1996	ANTIMONY	--	
01	8/25/1999	ANTIMONY	--	
01	8/25/1999	ANTIMONY	--	
01	12/21/1999	ANTIMONY	--	
01	12/8/1993	ARSENIC	--	
01	8/27/1996	ARSENIC	--	
01	11/6/1996	ARSENIC	--	
01	8/25/1999	ARSENIC	--	
01	12/21/1999	ARSENIC	--	
01	11/6/1996	BARIIUM	--	
01	8/25/1999	BARIIUM	0.26	2.0
01	12/21/1999	BARIIUM	0.11	2.0
01	11/6/1996	BERYLLIUM	--	
01	8/25/1999	BERYLLIUM	--	
01	12/21/1999	BERYLLIUM	--	
01	11/6/1996	CADMIUM	--	
01	8/25/1999	CADMIUM	--	
01	12/21/1999	CADMIUM	--	
01	1/22/2002	CHLORIDE	6	250*
01	11/6/1996	CHROMIUM	--	
01	8/25/1999	CHROMIUM	--	
01	12/21/1999	CHROMIUM	--	
01	12/29/1995	FLUORIDE	--	
01	11/6/1996	FLUORIDE	--	

-- = Not Detected

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# SUMMARY OF CRELLIN WATER COMPANY WATER SAMPLE ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	MCL
Inorganic Compounds			mg/L	mg/L
01	8/25/1999	FLUORIDE	0.2	4.0
01	12/21/1999	FLUORIDE	--	
01	11/6/1996	MERCURY	--	
01	8/25/1999	MERCURY	--	
01	12/21/1999	MERCURY	--	
01	11/6/1996	NICKEL	--	
01	8/25/1999	NICKEL	--	
01	12/21/1999	NICKEL	--	
01	12/30/1993	NITRATE	0.63	10
01	12/20/1994	NITRATE	0.6	10
01	5/23/1995	NITRATE	0.45	10
01	5/1/1996	NITRATE	0.5	10
01	11/6/1996	NITRATE	0.4	10
01	8/26/1997	NITRATE	--	
01	8/20/1998	NITRATE	--	
01	8/25/1999	NITRATE	--	
01	12/21/1999	NITRATE	0.7	10
01	3/22/2000	NITRATE	0.7	10
01	3/22/2000	NITRATE	0.7	10
01	3/20/2001	NITRATE	1.1	10
01	1/22/2002	NITRATE	0.7	10
01	12/20/1994	NITRITE	0.5	1
01	11/6/1996	NITRITE	--	
01	8/26/1997	NITRITE	--	
01	11/6/1996	SELENIUM	--	
01	8/25/1999	SELENIUM	--	
01	12/21/1999	SELENIUM	--	
01	11/6/1996	SODIUM	--	
01	8/25/1999	SODIUM	4.8	60 +
01	12/21/1999	SODIUM	2.7	60 +
01	11/6/1996	SULFATE	4.9	250 *
01	11/6/1996	THALLIUM	--	
01	8/25/1999	THALLIUM	--	
01	12/21/1999	THALLIUM	--	
General Water Quality Parameters				
01	5/1/1996	pH	6.3	6.5-8.5 *
01	11/6/1996	pH	6.8	6.5-8.5 *

-- = Not Detected

\* = Secondary Drinking Water Regulations

^ = Drinking Water Equivalence Level

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CCL = Contaminant Candidate List

# SUMMARY OF MICROBIOLOGICAL CONTAMINANT ANALYSIS FOR CRELLIN WATER COMPANY WATER SAMPLES

Sample Date	Samples Taken	Total Coliform	Total Fecal	Total Indeterminate	Sample Repeats	Repeat Coliforms	Repeat Fecal	Repeat Indeterminate
1/1/1997	1	0	0	0	--	--	--	--
2/1/1997	1	0	0	0	--	--	--	--
3/1/1997	1	0	0	0	--	--	--	--
4/1/1997	1	0	0	0	--	--	--	--
5/1/1997	1	0	0	0	--	--	--	--
6/1/1997	1	1	0	0	4	1	0	--
7/1/1997	1	1	0	0	4	1	0	--
8/1/1997	1	0	0	0	--	--	--	--
9/1/1997	5	0	0	0	--	--	--	--
10/1/1997	1	0	0	0	--	--	--	--
11/1/1997	1	0	0	0	--	--	--	--
12/1/1997	1	0	0	0	--	--	--	--
1/1/1998	1	0	0	0	--	--	--	--
2/1/1998	2	0	0	0	--	--	--	--
3/1/1998	1	0	0	0	--	--	--	--
4/1/1998	1	0	0	0	--	--	--	--
5/1/1998	1	0	0	0	--	--	--	--
7/1/1998	1	0	0	0	--	--	--	--
8/1/1998	1	0	0	0	--	--	--	--
9/1/1998	1	0	0	0	--	--	--	--
10/1/1998	1	0	0	0	--	--	--	--
11/1/1998	1	0	0	0	--	--	--	--
12/1/1998	1	0	0	0	--	--	--	--
1/1/1999	1	0	0	0	--	--	--	--
2/1/1999	1	0	0	0	--	--	--	--
3/1/1999	1	0	0	0	--	--	--	--
4/1/1999	1	0	0	0	--	--	--	--
5/1/1999	1	0	0	0	--	--	--	--
6/1/1999	1	0	0	0	--	--	--	--
7/1/1999	1	0	0	0	--	--	--	--
8/1/1999	1	0	0	0	--	--	--	--
9/1/1999	1	0	0	0	--	--	--	--
10/1/1999	1	0	0	0	--	--	--	--
11/1/1999	1	0	0	0	--	--	--	--
12/1/1999	1	0	0	0	--	--	--	--
1/1/2000	1	0	0	0	--	--	--	--
2/1/2000	1	0	0	0	--	--	--	--
3/1/2000	1	0	0	0	--	--	--	--
4/1/2000	1	0	0	0	--	--	--	--
5/1/2000	1	0	0	0	--	--	--	--
6/1/2000	1	0	0	0	--	--	--	--
7/1/2000	1	0	0	0	--	--	--	--
8/1/2000	11	0	0	0	--	--	--	--
9/1/2000	1	1	1	0	4	4	4	--

-- = not applicable



# SUMMARY OF MICROBIOLOGICAL CONTAMINANT ANALYSIS FOR CRELLIN WATER COMPANY WATER SAMPLES

Sample Date	Samples Taken	Total Coliform	Total Fecal	Total Indeterminate	Sample Repeats	Repeat Coliforms	Repeat Fecal	Repeat Indeterminate
10/1/2000	3	0	0	0	--	--	--	--
11/1/2000	1	0	0	0	--	--	--	--
12/1/2000	1	0	0	0	--	--	--	--
1/1/2001	1	0	0	0	--	--	--	--
2/1/2001	1	0	0	0	--	--	--	--
3/1/2001	1	0	0	0	--	--	--	--
4/1/2001	1	0	0	0	--	--	--	--
5/1/2001	1	0	0	0	--	--	--	--
6/1/2001	1	0	0	0	--	--	--	--
7/1/2001	1	0	0	0	--	--	--	--
8/1/2001	1	0	0	0	--	--	--	--
9/1/2001	2	0	0	0	--	--	--	--
10/1/2001	1	0	0	0	--	--	--	--
11/1/2001	1	0	0	0	--	--	--	--
12/1/2001	1	0	0	0	--	--	--	--
1/1/2002	1	0	0	0	--	--	--	--
2/1/2002	1	0	0	0	--	--	--	--
3/1/2002	1	0	0	0	--	--	--	--
4/1/2002	1	0	0	0	--	--	--	--
5/1/2002	1	0	0	0	--	--	--	--
6/1/2002	1	0	0	0	--	--	--	--
7/1/2002	1	0	0	0	--	--	--	--

-- = not applicable

**GROUND WATER UNDER DIRECT INFLUENCE (GWUDI) OF SURFACE WATER SAMPLE RESULTS FOR  
THE CRELLIN WATER COMPANY**

Plant ID	Sample Date	Temp (C)	pH	Turbidity (NTU)	Total Coliform (org/100 mL)	Total Fecal (org/100 mL)
01	6/16/1999	12.8	7.25	55	--	--
03	6/16/1999	13.9	7.14	1	7.5	--
01	7/19/1999	22.6	6.8	20	4.2	--
03	7/19/1999	15.6	7.04	0.4	6.4	--
01	9/7/1999	17.1	7.3	26	--	--
03	9/7/1999	16.7	7	0.42	45.3	5.3
01	9/8/1999	17.1	7.2	26	--	--
03	9/8/1999	16.7	7	0.42	34.4	4.2
01	9/9/1999	15	7.3	28	--	--
03	9/9/1999	15	7.1	0.26	36.4	2
01	9/10/1999	15	7.3	27	--	--
03	9/10/1999	14	6.9	0.3	22.2	3.1
03	9/26/2000	10.7	7.25	1.79	200.5	--
03	9/26/2000	9.7	7.1	0.67	165.2	17.8
03	9/26/2000	11	7.65	2.48	200.5	25.4
03	9/27/2000	12	5.95	1.05	118.4	4.2
03	9/27/2000	10.6	5.8	0.23	9.9	--
03	9/27/2000	12	6.5	0.37	--	--
03	9/28/2000	9	6.5	0.2	6.4	--
03	9/28/2000	10	7	0.76	73.8	4.2
03	9/28/2000	10.6	6.2	0.47	28.8	2
03	9/29/2000	10	6.5	0.18	13.7	--
03	9/29/2000	10	6.7	0.53	34.4	2
03	9/29/2000	11.1	7	0.61	42.9	4.2

-- = non detect



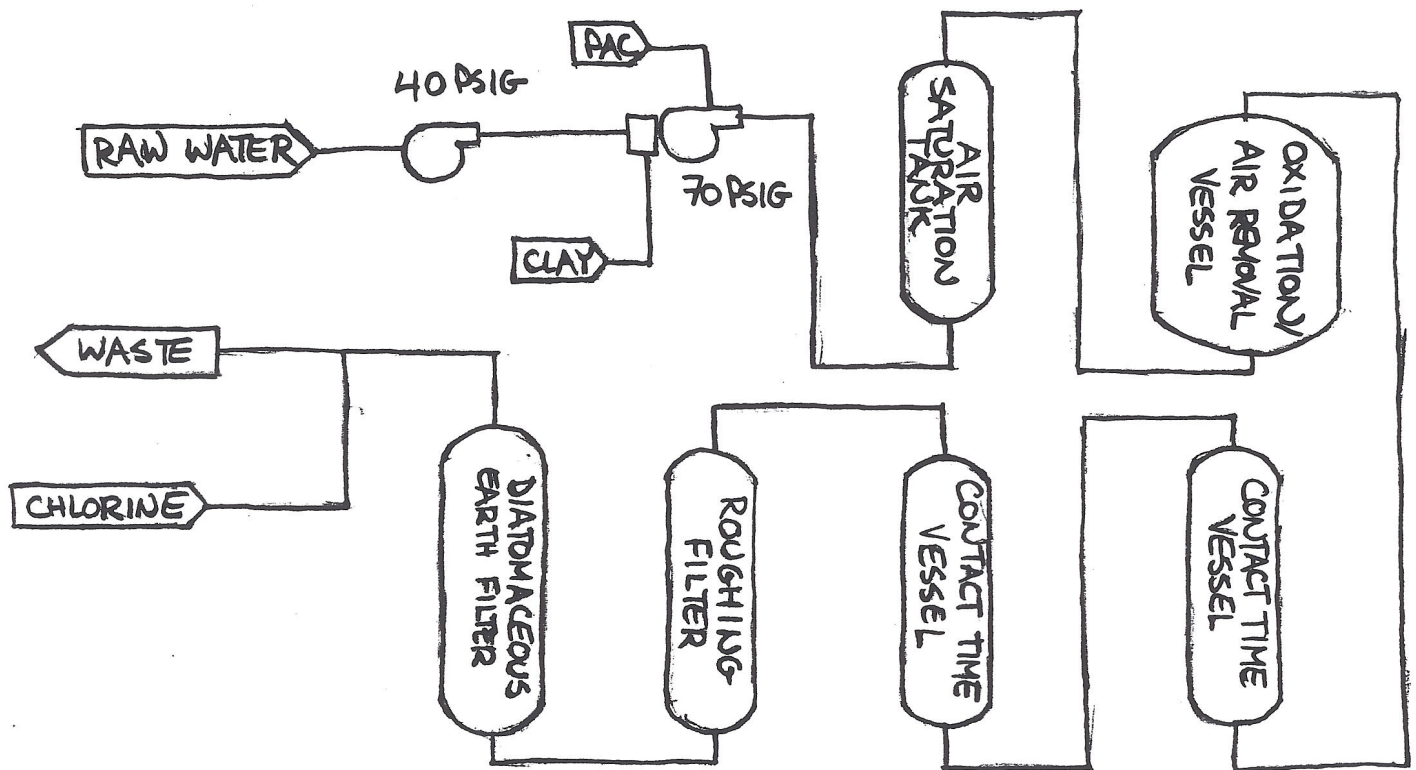
**Appendix B**

**Pilot Study Schematic**

**PLANT SCHEMATIC:**

011-0003 CREWING PILOT STUDY DESIGN

Include all system equipment (softeners, storage tanks, high service pumps, sed basins, etc.) and all chemical application points.



**SOURCE AREA SCHEMATIC:**