Summary of Compliance Inspection Reports for Drinking Water Systems in the Mississippi-Rideau Watershed Region

Source Water Protection – Mississippi-Rideau Watershed Region

December 2008

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1.0 Introduction

The following is a summary of Compliance Inspection Reports produced by the Ministry of the Environment (MOE) for water systems in the Mississippi-Rideau watershed region. A listing of these systems and their corresponding dates of inspection can be found in Appendix A. The purpose of these reports was to determine compliance with MOE legislation and policies related to drinking water, specifically the Safe Drinking Water Act and the Ontario Water Resources Act. MOE inspectors performed in-depth physical inspections of the systems, interviewed plant operators, conducted water sampling and subsequently produced a document outlining non-compliance and best-practice issues, as well as suggestions for resolving such issues. An overview of the protocol for these inspections can be found in Appendix B. Since many water systems have been inspected numerous times, only the most current flow rate and population statistics were used.

This summary concentrates on the negative environmental and ecological issues brought up in the inspection reports, in order to identify relevant water issues. The main issues brought up for each water system are listed in Table 1. Many issues included in the Inspection Reports were not expanded upon in this summary. These included management issues such as processes, documents, operations manuals, logbooks, contingency/emergency planning, security, certification and training, and reporting and corrective actions. The water systems are only examined with respect to their source water quality, treated water quality, water quantity and water conservation.

This report is organized according to each water system's classification as large municipal residential, non-municipal year-round residential or non-municipal seasonal residential.

Table 1. Main issues for the Mississippi-Rideau water systems

System Classification	System Name	Main Issues
Large Municipal Residential – Surface Water	Perth	-E.coli, total coliform and fecal coliform present in raw water -low chlorine residual in some areas
	Lemieux Island	-exceedences for alkalinity, colour, DOC, organic nitrogen, temperature and turbidity in raw water
	Britannia	-suspended solids and phosphorus loadings noted in raw water -Cryptosporidium and Giardia cysts reported in raw water -raw water vulnerable to microbiological contamination from municipal, industrial and agricultural sources -total coliforms present in treated water on several occasions -low disinfectant residual on several occasions -exceedences in chloramines, fluoride, HPC and THMs in treated water
	Carleton Place	-raw water affected by seasonal water quality changes -exceedences in THMs and total coliforms in treated water on two separate occasions -exceedences of rated plant capacity on several occasions

		-no leak detection program in place
	Smiths Falls	-potential contamination possible in clear wells -THM exceedence in treated water on one occasion
Large Municipal Residential – Groundwater	Carp	-more than 10% of distributed water unaccounted for
	Kemptville	-unused well recommended for abandonment using correct procedures -residual disinfectant not measured as often as required -permitted instantaneous takings consistently exceeded
	Munster	-more than 10% of distributed water unaccounted for
	King's Park	-more than 10% of distributed water unaccounted for
	Almonte	-municipal sewage lagoon located within the 2-year capture zone for one of the wells -power works yard located within the 50 day capture zone for one of the wells -occasional exceedences in water takings
	Merrickville	-exceedences in HPC and background colonies in raw water on two separate occasions -more than 10% of distributed water unaccounted for
	Westport	-historical detections of E.coli and total coliforms in one of the wells -elevated levels of sodium found in treated water -two exceedences in rated plant capacity noted -Village of Westport encouraged to be more aggressive with promotion of water conservation
Large Municipal Residential – Stand-Alone Distribution System	Montague	-water use not metered -no proactive leak detection program in place -more than 10% of distributed water unaccounted for
Non-Municipal Year-Round Residential System	Crestview Park	-no water treatment provided -many issues of non-compliance -numerous adverse water quality incidents, mostly for total coliforms and background colonies -no flow records maintained
	Clayton Seniors Housing	-exceedences in drinking water standards for Uranium
	Edge Town Apartments	-well surround could act as a conduit for surface water into the aquifer
	Carswell	-old well did not meet construction standards -presence of total coliforms on several occasions -no water treatment provided
Non-Municipal Seasonal Residential System	Clayton Lakeside	-no water treatment provided -presence of E.coli and total coliforms on several occasions -water source under direct influence of surface water
Non-Municipal Non-Residential System	R.K.Y. Camp	-no testing of raw water -testing of distribution water not frequent enough

2.0 Large Municipal Residential Systems – Surface Water Sources

A large municipal residential system is defined as serving over 100 private residences. The following large municipal residential systems draw their raw water from surface water. Many surface water sources are known to have water issues regarding control of zebra mussels, turbidity, E. Coli, total coliform (TC), fecal coliform counts and bacterial contamination. It is thus imperative that water treatment include the required chemically assisted filtration and disinfection.

2.1 Perth Water Treatment Plant

Treatment for the Perth Water Treatment Plant included coagulation/flocculation, sedimentation, dual media filtration, and disinfection using a clearwell. pH was controlled using lime. Granular activated carbon was added to the filter beds to control colour, taste and odour. Chlorine dioxide and sodium hypochlorite were used for pretreatment of the raw water, and sodium hypochlorite was also used for secondary disinfection.

2.1.1 Source Water Quality

In 2005, raw water was drawn from the Tay River, and was found to have detections of E.Coli, total coliform (TC) and fecal coliform. Potential sources of contamination noted in the Tay River were from bridge crossings, upstream farming operations, a golf course, an upstream calcite plant and a landfill site. Notification procedures were in place with the golf course, Parks Canada and landfill operators for cases of unusual or abnormal discharges to the river. It was noted that several pesticides are used at the golf course. Raw water samples are tested for pesticides on a quarterly basis.

2.1.2 Treated Water Quality

Two adverse test results were reported in 2005, both with exceedences for total coliforms. Re-sampling showed satisfactory results for both samples. A sampling for chlorine residual at the 3-M factory showed a comparatively low chlorine residual, however after re-sampling at a different location in the factory the result was found to be satisfactory. The maintenance manager at 3-M was advised to allow the taps to run for several minutes every morning to ensure adequate residual is maintained in the plumbing at the facility. In 2006 there were four adverse water quality incidents reported, two for Trihalomethanes, one for Heterotrophic Plate Counts and one for free chlorine levels greater than 4.0 mg/L.

2.1.3 Water Quantity

The population served by the Perth plant was 6,200 people. The PTTW for the Perth plant was issued in 2006, and approves a maximum taking of 9,092,000 L/day. The rated capacity for the plant was 9,090,000 L/day, although the average day flow was well below 80% of the rated capacity. The system also included an elevated storage tower with a volume of 945 m^3.

2.1.4 Water Conservation

Water meters were used by all consumers, and a proactive leak detection program was in place. It was estimated that more than 90% of the total distributed water was accounted for. It was suggested to the town of Perth that they may want to consider an education and outreach program on how consumers can reduce their water use.

2.2 Lemieux Island Water Treatment Plant

Treatment at the Lemieux Island Water Treatment Plant included coagulation/flocculation, sedimentation and dual media filtration using twelve high rate gravity filters. A clearwell was used for disinfection by sodium hypochlorite, ammonia and sodium hydroxide. Fluoridation and pH adjustment procedures were also used at the facility.

2.2.1 Source Water Quality

Water for the Lemieux plant was taken from the Ottawa River, which is noted to have increased organic materials and suspended solids due to forestry operations. A 2001 engineering report found exceedences in the raw water parameters for alkalinity, colour, DOC, organic nitrogen, temperature and turbidity. A 2006 ministry sample collection showed detections total coliforms and E. Coli in the raw water.

2.2.2 Treated Water Quality

During the inspection period for 2009, samples of treated water were taken, and were found to meet applicable standards from the Ministry of the Environment. The results were comparable to the historical results from the City of Ottawa. In 2006, the concentrations of fluoride were found to exceed one half of the maximum allowable concentration, therefore the frequency of sampling and testing of fluoride was required to be increased to once every three months. Sampling was already occurring on a continuous basis, therefore this requirement was met. In 2005, the concentrations of aluminum exceeded operational guidelines three times.

2.2.3 Water Quantity

The Lemieux plant served a population of 806,000. The PTTW allowed a maximum taking of 325,000,000 L/day. The rated capacity of the Lemieux Island plant was 290,000,000 L/day. The maximum raw water taking in 2006 was reported to be 200,200,000 L/day. There were no exceedences reported.

2.2.4 Water Conservation

Water use by consumers was fully monitored, and a proactive leak detection program was in place. More than 90% of the total amount of water distributed by the system was accounted for. The City of Ottawa had an education campaign in place to inform residents about proper lawn-watering practices and water conservation. On November 26, 2007 there was a major failure of a 1220 mm watermain on a feed trunk. Repairs were completed within 72 hours and the line was returned to service.

2.3 Britannia Water Treatment Plant

Treatment at the Britannia Water Treatment Plant included coagulation/flocculation, sedimentation, dual media filtration (using high rate gravity filters), and disinfection using three separate clearwells. Disinfection was achieved by sodium hypochlorite, ammonia, chlorine, sodium hydroxide and hydrofluosilicic acid.

2.3.1 Source Water Quality

The Britannia plant received its raw water from the Ottawa River, which is known for having low turbidity and high colour. Forestry-related activities, along with effluent from pulp and paper mills, have contributed to suspended solids loadings and biochemical oxygen demand in the river. There were also phosphorus loadings due to municipal and agricultural sources. There have been reports of Cryptosporidium and Giardia cysts found through monitoring since 1994.

A 2001 engineering reports found the Ottawa River source water to be vulnerable to microbiological contamination from stormwater runoff, municipal wastewater effluent, industrial effluent and agricultural runoff.

2.3.2 Treated Water Quality

Treated water from the Britannia plant was tested during a 2007 inspection, and was found to meet all Ontario Drinking Water Quality Standards. A review of 2005 and 2006 monitoring data (provided by the plant) showed the presence of total coliforms on several occasions and two occurrences of low disinfectant residual in the distribution system.

A 2004 report found four separate parameters which exceeded half the Ontario standards (Chloramine, Fluoride, HPC and Trihalomethanes). As a result of this, the plant has been required to increase their frequency of sampling for these four parameters. There were two cases in 2005 of low chloramine residual. Both cases were isolated incidents, and after inspection and flushing of the affected watermains, the total chlorine concentrations returned to acceptable levels.

2.3.3 Water Quantity

806,000 people are served by the Britannia plant. The PTTW allowed for a maximum raw water taking of 360,000,000 L/d. The rated capacity of the plant was 360,000,000 L/d. The annual average daily flow was found to be less than 80% of the plant capacity.

2.3.4 Water Conservation

Water use by consumers was fully monitored, and a proactive leak detection program was in place. Proposed water loss reduction programs were being investigated for future implementation. The City of Ottawa had an education campaign in place to inform residents about proper lawn-watering practices and water conservation. On November 26, 2007 there was a major failure of a 1220 mm watermain on a feed trunk. Repairs were completed within 72 hours and the line was returned to service.

2.4 Carleton Place Drinking Water System

The Carleton Place Drinking water system included some pretreatment (pre-chlorination with chlorine gas, dependent on the seasonal and source water conditions). The treatment system included coagulation/flocculation, clarification, sedimentation, and filtration using three cylindrical double compartment dual media gravity filters. After filtration, water was treated with chlorine gas and fluoride. The system was also equipped to provide chloramination and ammonia treatment, for times when there were exceedences in trihalomethanes in the distribution system.

2.4.1 Source Water Quality

Raw water for the Carleton Place plant was drawn from the Mississippi River, and Mississippi Lake. These sources are affected by seasonal and weather-related events which cause temporary water quality changes. This is due to recreational and agricultural activities which take place near the water body. It was noted that there were measures in place to control zebra mussel formation. There was no raw water sampling done in the last inspection (2007).

Raw water samples from 2002 and 2003 showed occasional detections of E. Coli, total coliforms, and HPC bacteria.

2.4.2 Treated Water Quality

Treated water from the Carleton Place plant was tested during a 2008 inspection, and was found to meet all Ontario Drinking Water Quality Standards. This result was comparable to the owner's sampling results, and monitoring data from the plant showed similar results.

There were two recent reports of adverse water quality incidents. A July 2005 sample showed exceedences of trihalomethanes, and a April 2006 sample showed detections of total coliforms. Re-sampling in both cases resulted in drinking water standards being met.

2.4.3 Water Quantity

9,500 people were served by the Carleton Place plant. The PTTW allowed for a maximum raw water taking of 12,000,000 L/d. The rated capacity of the plant was 11,999,520 L/d. There were seven exceedences of the rated capacity between July 2005 and May 2006, and it was determined that these exceedences were for an accepted reason (maintenance and operation of the drinking-water system). Between May 2006 and May 2007, there were 13 exceedences for the rated capacity. The reasons for the exceedences were not always clearly evident, so the operating authority was encouraged to note reasons for each exceedence in the logbook. The annual average daily flow rate was less than 80% of the capacity of the plant.

2.4.4 Water Conservation

Residential users of the Town of Carleton Place were not metered. The Town was considering installing meters at the time of the last inspection (2008); however, they

were unlikely to begin installing meters until the plant approaches capacity. Industrial, institutional and commercial users were fully metered. Less than 10% of the distributed water was estimated to be unaccounted for, and there was a leak detection program in place. A by-law was in place to restrict lawn watering within the Town of Carleton Place from May 15 to September 3.

2.5 Smiths Falls Water Treatment Plant

Treatment at the Smiths Falls Water Treatment Plant included coagulation/flocculation, sedimentation, dual media filtration (using five granular activated carbon and sand filters). Clear wells were used for disinfection. Pre-chlorination at the plant was moved to the filtration influent trough in order to reduce byproducts such as trihalomethanes. A new water treatment plant is planned for construction, with an anticipated completion date of July 2009.

2.5.1 Source Water Quality

Raw water for the Smiths Falls plant was drawn from the Rideau River. It was noted in previous inspections that there were potential contamination issues with the clear wells at the plant. There was a concern that contaminants may be able to permeate several different components of the clear wells. A new water treatment plant is under plans for construction, where these problems will be addressed. In June 2003 and August 2002, a beach located between the raw water intake and the Smiths Falls WTP was closed due to elevated counts of E. Coli.

2.5.2 Treated Water Quality

A 2008 drinking water audit at the Smiths Falls plant showed that samples complied with the Ontario Drinking Water Quality Standards, with the exception of two distribution samples for total trihalomethanes which narrowly exceeded the standard. Historical monitoring results were comparable to the 2008 audit results. There was one adverse test result in August 2005 for trihalomethanes, after which the pre-chlorine feed was moved to the filter influent. Upon resampling, results returned to normal. In July 2007 and November 2006, total coliforms were detected in the distribution system (in both cases, the required corrective actions took place).

2.5.3 Water Quantity

8,777 people were served by the Smiths Falls plant. The PTTW allowed for a maximum raw water taking of 18,100,000 L/d. The plant capacity was also noted as 18,100,000 L/d. The annual average daily flow rate was less than 80% of the capacity of the plant.

2.5.4 Water Conservation

Water use was fully metered for consumers, and water conservation was being practiced by systematically increasing water use rates. The plant had a proactive leak detection program in place. Over 90% of the distributed water was accounted for.

3.0 Large Municipal Residential Systems – Groundwater Sources

A large municipal residential system is defined as serving over 100 private residences. The following systems utilize groundwater, which requires disinfection as the minimum level of treatment.

3.1 Carp Well Supply

The Carp Well Supply drew its water from two drilled overburden wells. Raw water was disinfected prior to entering the reservoir using a sodium hypochlorite solution.

3.1.1 Source Water Quality

The Carp system used one of its wells as a "standby" well, as it exhibited higher concentrations of ammonia and sulphur. Wells were alternated every two weeks to make sure that they were both capable of functioning properly. Potential risks to the water source included a nearby gas station and a feed mill approximately 100 metres from the wells.

3.1.2 Treated Water Quality

Samples were taken during a 2006 water audit, and did not show any exceedences for Ontario Drinking Water Quality Standards. These results were comparable to historical monitoring results.

3.1.3 Water Quantity

1,140 people were served by the Carp system. The PTTW allowed for a maximum raw water taking of 2,782,080 L/d. The plant capacity was also noted as 2,782,000 L/d. The annual average daily flow rate was less than 80% of the capacity of the plant.

3.1.4 Water Conservation

Consumer water use in Carp was fully metered, and there was a proactive leak detection program in place. More than 10% of the distributed water was estimated to be unaccounted for. There was no formal water conservation program in place.

3.2 Kemptville Well Supply and Distribution System

The Kemptville well supply system consisted of three pumping stations which fed into a common distribution system. All three pumping stations used a sodium hypochlorite solution for disinfection.

3.2.1 Source Water Quality

Kemptville drew its raw water from three municipal wells. It was apparent that the owner was taking steps to prevent contamination and entry of foreign materials into the wells. A 2006 engineer's report noted potential sources of microbiological

contamination. There was a well which was currently not being used, which was recommended to be abandoned using proper procedures. It was also noted in 2008 that two of the wells had casings that were over 60 years old and that they may not be water tight. It was recommended that the municipality consider the installation of well liners and a more thorough well inspection to address well liner feasibility.

3.2.2 Treated Water Quality

During the 2007 inspection period, there were two incidents of adverse water quality, due to total coliforms. There was a corrective action required in this case, due to incorrect resampling methods after the incident. In 2006, it was noted that the residual disinfectant was not measured as often as required (seven times per week). In 2003 there seven instances where the free chlorine residuals were below the 0.2 mg/L minimum required to allow the longest retention time in the water distribution system. In 2008, there was one incident of adverse conditions, where a treated water sample was found to have 5 cft/100ml of E. coli and 59 cfu/100ml of Total Coliforms. A boil water advisory was issued in the area. After resampling it was determined that the adverse conditions were no longer present.

3.2.3 Water Quantity

3,500 people were served by the Kemptville system. The PTTW allowed for a maximum raw water taking of 6,274,000 L/d (combined). The plant capacity was also noted as 6,274,000 L/d (combined). Records indicated that daily permitted rates of taking were not exceeded; however, there were consistent daily exceedences of the instantaneous rate of taking (L/min). The exceedences were generally related to pump start up. The annual average daily flow rate was less than 80% of the capacity of the plant.

3.2.4 Water Conservation

Consumer water use in Kemptville was fully metered, and there was a proactive leak detection program in place. More than 90% of the distributed water was accounted for. A water conservation program is in place by the use of a 100% user pay system.

3.3 Munster Hamlet Well Supply

The Munster Hamlet Well Supply consisted of two drilled bedrock wells. Disinfection was achieved through injection of a sodium hypochlorite solution, after which water was transferred to an above ground reservoir to allow for an appropriate contact time.

3.3.1 Source Water Quality

There were no major sources of contamination within 100 metres of the two wells. A sewage lagoon complex was located further west, however there was no longer any sanitary waste directed to the lagoon complex due to a new sanitary forcemain. A 2001 engineer's report recommended several mitigation activities to reduce potential for microbiological contamination, including the following:

-Provide a water tight seal between the well casing and well buildings

-Implement well head protection measures

-Limit access to reservoir and reservoir disinfection protocol
-Ensure maintenance work on process equipment be done only by certified operators.

All of the recommended activities have been completed by the city since 2001.

3.3.2 Treated Water Quality

Samples were taken during a 2008 water audit, and did not show any exceedences for Ontario Drinking Water Quality Standards. These results were comparable to historical monitoring results.

3.3.3 Water Quantity

1,350 people are served by the Munster system. The PTTW allowed for a maximum raw water taking of 2,362,000 L/d. The plant capacity was also noted as 2,161,000 L/d. The annual average daily flow rate was less than 80% of the capacity of the plant. There was one high water demand incident which occurred on October 13, 2004 at a school as a result of unauthorized hydrant flushing, however this exceedence was considered necessary and for an accepted reason.

3.3.4 Water Conservation

Consumer water use in Munster was fully metered, and there was a proactive leak detection program in place. More than 10% of the distributed water was unaccounted for. There was a bylaw in place to suspend any lawn and/or garden watering activities during periods of high water demand.

3.4 Kings Park Well Supply

The well supply for the Kings Park Subdivision in Richmond, Ontario, consisted of two deep groundwater wells. Sodium hypochlorite injections were used for disinfection, along with several chlorine contact chambers. Demand on the system was relatively low, therefore the two wells were operated on an alternating basis.

3.4.1 Source Water Quality

It was noted that all sources of pollution were within an acceptable separation distance from each of the wells. There was some concern about the lack of evidence showing that adequate sealing materials had been used in the construction of the wells. A seal assessment report was completed in 2006, which indicated that there was no negative impact on the wells. An engineer's report from 2001 indicated that there were no indicators of surface water contamination from 1998 to 2000.

The 2001 engineer's report noted the following three sources of potential microbiological contamination:

-Jock River and flood plain
-Richmond Sewage Pumping Station
-Richmond Wastewater Lagoons

3.4.2 Treated Water Quality

Samples were taken during a 2009 water audit, and did not show any exceedences for Ontario Drinking Water Quality Standards. These results were comparable to historical monitoring results. In 2003 there were four occasions where bacteriological standards were not met. Three of these cases were due to the presence of total coliforms in distributed water, and one case was for HPC counts above 2000 CFU/mL in distributed water. There were also five cases of turbidity exceedences in 2002 and 2003. In 2007 there were elevated levels of residual chlorine in the distribution system. The situation was corrected shortly thereafter.

3.4.3 Water Quantity

510 people were served by the Kings Park system. The PTTW allowed for a maximum raw water taking of 2,620,000 L/d. The plant capacity was also noted as 2,620,000 L/d. The annual average daily flow rate was less than 80% of the plant's capacity.

3.4.4 Water Conservation

Consumer water use in Kings Park was fully metered, and there was a proactive leak detection program in place. More than 10% of the distributed water was unaccounted for. A by-law was in place in order to restrict lawn/garden watering or street washing when needed. An education campaign was introduced in 2004 to give presentations and seminars on water conservation.

3.5 Almonte (Mississippi Mills) Well Supply

The Almonte well supply drew its water from five drilled bedrock wells. Sodium hypochlorite was used for disinfection for all five wells.

3.5.1 Source Water Quality

A municipal sewage lagoon was within the 2 year capture zone for one of the wells. There was also an Ottawa River Power Corporation works yard which was within the 50 day capture zone for that well. Several monitoring wells were installed down-gradient of the sewage lagoon in 2003, and after sampling it was shown that there was evidence of impact from the sewage lagoon. It was recommended that three of the wells be tested on a quarterly basis. Test results for one of the wells showed a high concentration of chloride, which could be due to road salt. Four of the wells were noted for elevated concentrations of sodium. In June of 2003 there were two instances of background bacteria counts of more than 80 counts/100mL. During the 2007 round of sampling, E. Coli and total coliforms were shown to be absent from all raw water samples.

3.5.2 Treated Water Quality

Samples were taken during a 2008 water audit, and did not show any exceedences for Ontario Drinking Water Quality Standards. These results were comparable to historical monitoring results. One of the wells showed elevated levels of sodium, and resampling confirmed the results; however, the results are still within Ontario Drinking

Water Quality Standards. Reviews during a 2000 inspection showed unsafe drinking water quality (detections of E. Coli and total coliforms). However, the distribution system was flushed of bacterial contamination after the incident. Audit samples during 2008 showed compliance with Ontario Drinking Water Quality Standards.

3.5.3 Water Quantity

4,700 people are served by the Almonte system. The PTTW allowed for a maximum raw water taking of 6,894,620 L/d. The plant capacity was also noted as 6,894,720 L/d. One of the wells was experiencing occasional exceedence periods in 2005 lasting just over a minute, due to a valve malfunction. The valve was replaced in November 2005. There were also four exceedences for another well in 2005. In 2007, there were several exceedences for three of the wells.

3.5.4 Water Conservation

Consumer water use was fully metered, and there was a proactive leak detection program in place. There was a by-law in place limiting access to hydrants.

3.6 Merrickville Drinking Water System

The Merrickville system drew its water from three drilled wells. Sodium hypochlorite was used for disinfection.

3.6.1 Source Water Quality

There was an above-ground storage tank installed in proximity to the source wells and the clear well/reservoir for the drinking water system. The storage tank is equipped with secondary containment. As well, the source wells were located adjacent to a municipal roadway which is likely subject to road salt/sand mixture during winter road maintenance. There were no noted historical fluctuations in water quality.

3.6.2 Treated Water Quality

There was an exceedence for Heterotrophic Plate Count on June 1, 2006 during a Ministry audit sampling. The site was re-sampled the same day, and showed compliance with Ontario Drinking Water Quality Standards. Historical monitoring data also showed compliance with drinking water quality standards, except for one adverse sample on June 28, 2005 for background colonies. Re-sampling showed compliance with drinking water quality standards. In November 2003 there was also an incident where the turbidity of the treated water exceeded 1.0 NTU for longer than 15 minutes.

3.6.3 Water Quantity

860 to 957 people were served by the Merrickville system. The PTTW allowed for a maximum raw water taking of 4,295,061 L/d. The plant capacity was noted as 1,880,000 L/d. The plant takes on average approximately 10% of the maximum allowable takings, and the annual average daily flow was less than 80% of the capacity of the plant.

3.6.4 Water Conservation

Consumer water use in Merrickville was fully metered, and there was a proactive leak detection program in place. More than 10% of the distributed water was unaccounted for.

3.7 Westport Drinking Water System

The Westport Drinking Water System drew its water from two drilled wells. Sodium hypochlorite was used for disinfection, and sodium hexametaphosphate was used for iron sequestering for raw water from both wells.

3.7.1 Source Water Quality

Historical microbiological sampling showed detections of E. Coli and total coliforms in one of the wells (Well 2). This was thought to be due to another well (Well 1), which was in close proximity to surface water sources. Well 1 was therefore abandoned in February 2005. In 2007 there were total coliforms detected in the raw water from well 2. All sources of pollution were within an adequate separation distance of each well.

3.7.2 Treated Water Quality

Drinking water samples were taken during a 2008 audit, and were shown to be compliant with Ontario Drinking Water Quality Standards. Historical monitoring results were comparable to the 2007 audit. Two samples (from January 2005 and January 2006) showed elevated concentrations of sodium. Re-sampling confirmed that there were elevated (in excess of 20 mg/L) concentrations of sodium in the treated water. There were also two incidents of exceedences between 2003-2004 for sodium and total coliforms, along with 15 reported incidents where the free chlorine residual in the treated water was less than 0.05 mg/L.

3.7.3 Water Quantity

549 people were served by the Westport system. The PTTW allowed for a maximum raw water taking of 1,423,000 L/d. The plant capacity was also noted as 898,560 L/d. The annual average daily flow was less than 80% of the capacity of the plant. There were two exceedences of the rated capacity in July and September, 2005. Both of the incidents occurred due to power outages. In 2007 there were several exceedences of the maximum water taking, most of them due to filling of the water tower.

3.7.4 Water Conservation

Consumer water use in Westport was fully metered, and there was a proactive leak detection program in place. More than 90% of the distributed water was accounted for. There was a bylaw in place in order to call for water restrictions during times of drought or for other reasons. The Village of Westport has been encouraged to be more aggressive with the promotion of water conservation.

4.0 Large Municipal Residential – Stand-Alone Distribution Systems

A large municipal residential system is defined as serving over 100 private residences. A stand-alone distribution system receives treated water from a separate distribution system.

4.1 Montague Distribution System

The Montague Distribution System received its treated water from the Smiths Falls Distribution System. Refer to section 2.6 (Smiths Falls Water Treatment Plant) for more information on source and treated water quality.

4.1.1 Water Conservation

Consumer water use was not fully metered. There was no proactive leak detection program in place and it was estimated that more than 10% of the distributed water was not accounted for.

5.0 Non-Municipal Year-Round Residential Systems

A non-municipal year-round residential system is not managed by a municipality, but owned and operated by a private company. Residences are served all year long.

5.1 Crestview Park Well Supply

The Crestview Park Well Supply and distribution system serviced a mobile home park. There was no water treatment provided and the raw groundwater was therefore considered potable.

5.1.1 Source/Treated Water Quality

There were several issues of non-compliance identified during the 2004 inspection, including the following:

-Operating without a Certificate of Approval
-Failure to provide a minimum level of treatment
-Failure to conduce water sampling and analysis
-Failure to provide a certified operator for the waterworks
-Improperly constructed and maintained well casing.

A Provincial Officer's Order was issued in September 2001, requiring the owner of the water works to comply with the above issues. The owner did not address the issues within the required time, and appeared in Provincial Court in April 2003. Convictions were registered on all counts. The owner began weekly bacteriological sampling in April 2003. There have been numerous adverse water quality incidents that have taken place since that time, mostly for total coliforms and background colonies.

5.1.2 Water Quantity

There was no PTTW required for the Crestview Park system. There were no flow records maintained, although it was estimated that there was a daily water taking of 22,000 L/day.

5.1.3 Water Conservation

There was no formal water conservation plan in place; however, the owner has verbally asked tenants to restrict lawn watering and car washing during the summer.

5.2 Clayton Seniors Housing Well Supply

The Clayton Seniors Housing Well Supply serviced a health care residential facility for seniors. Water was drawn from a single drilled well, and was treated using sodium hypochlorite.

5.2.1 Source/Treated Water Quality

There were no obvious sources of pollution in and around the source well, and the owner was maintaining the well in a sufficient manner to prevent entry into the well of surface water and foreign materials. Records showed that the treated water met all the Ontario Drinking Water Quality Standards, with the exception of Uranium. The health unit reviewed the data and indicated that it did not consider the levels of Uranium a health hazard at that time. The exceedence was minor (0.024mg/L where the standard is 0.02mg/L), so the health unit advised that no additional actions were necessary at that time.

5.2.2 Water Quantity

There was no PTTW required for the Clayton Seniors Housing Well Supply. There were no flow records maintained, although it was noted that the peak flow for the system was 57.29 litres per minute.

5.2.3 Water Conservation

There was no formal water conservation plan in place.

5.3 Edge Town Apartments Well Supply

The Edge Town Apartments Well Supply serviced a six unit rural apartment building occupied year-round. The system consisted of a single drilled well, and the water was treated using filtration and UV treatment.

5.3.1 Source/Treated Water Quality

There were no obvious sources of pollution in and around the source well. Some slumping of the soil surrounding the well was observed during the 2008 inspection, and it was noted that this could act as a conduit for surface water to enter the aquifer. The owner is required to apply clean fill around the base of the well casing, and maintain a sloped grade away from the well. The well owner was not able to show that the raw or treated water was being tested at the required frequency. Samples were collected during

a 2008 audit, which showed no exceedences in the Ontario Drinking Water Quality Standards.

5.3.2 Water Quantity

There was no PTTW required for the Edge Town Apartments Well Supply. There were no flow records maintained, although it was noted that the recommended flow for the system was 22.75 litres per minute.

5.3.3 Water Conservation

There was no formal water conservation plan in place.

5.4 Carswell Well Supply

The Carswell well supply was a 17-unit mobile home park occupied on a year-round basis. The well supply consisted of two drilled wells and a pumphouse. Chlorination was not provided, so the raw water was considered to be potable.

5.4.1 Source/Treated Water Quality

It was noted that there were three septic tanks and septic beds on the property, more than 100 metres from the wells. There were also two fuel oil tanks (belonging to the mobile home units) approximately 60 feet and 90 feet from the wells and pumphouse. There were several potential issues noted with the well maintenance for one of the wells, which could allow entry of surface water and foreign materials. The owner was provided with a list of six recommendations in order to meet construction requirements. Samples were collected during a 2008 audit, which showed no exceedences in the Ontario Drinking Water Quality Standards. A review of historical sampling records found that the presence of total coliforms had been detected on numerous occasions, and that the wells were never resampled after the adverse test results. After the inspection, the owner was notified that the installment of treatment equipment was required.

5.4.2 Water Quantity

There was no PTTW required for the Carswell Well Supply. There were no flow records maintained, although it was noted that the recommended flow for the system was 38 litres per minute.

5.4.3 Water Conservation

There was no formal water conservation plan in place.

6.0 Non-Municipal Seasonal Residential Systems

A non-residential and seasonal residential system serves a designated facility and also some residences for part of the year.

6.1 Clayton Lakeside Well Supply

The Clayton Lakeside well supply and distribution system serviced a campground facility. The system consisted of a single drilled well, with no treatment. Historically, Purol (a 10.8% sodium hypochlorite solution) has been used to shock the source well when there have been adverse microbiological drinking water test results.

6.1.1 Source/Treated Water Quality

Samples taken in August 2005 confirmed the presence of E. coli and elevated total coliforms at multiple locations in the drinking water system. The well supply was located within five to eight metres of a sewage holding tank. The owner was told to immediately end the use of the sewage holding tank until it could be relocated. There have also been 16 adverse drinking water samples taken since July 2004 where detections of total coliforms were reported, and two samples where E. coli was detected. This was determined to be due to the direct influence of surface water. Attempts to end the microbiological contamination have not been successful, and it has been recommended that the site undergo a professional investigation.

6.1.2 Water Quantity

A PTTW was not required for this site. The daily water taking for the campground was approximately 47,985 L/d, for a population of 100 people.

7.0 Non-Municipal Non-Residential Systems

A non-municipal, non-residential system does not serve a major residential development, trailer park or campground, is not capable of supplying water at a rate of more than 250,000 L/day, and serves a designated facility.

7.1 R.K.Y Camp Well Supply

The R.K.Y Camp well supply serviced a non-profit residential camp for youths. The system consisted of a single drilled well. Treatment included chlorination, iron removal, water softener, two filters and an ultra violet disinfection unit.

7.1.1 Source/Treated Water Quality

There were no obvious sources of pollution around the drilled well. The well has a secure cap, although the well is buried underground and could not be observed at the time of the inspection. Raw water samples were not being collected for analysis by the owner, and treated water samples were not being collected at the required frequency. Samples were collected during a 2008 audit, which showed no exceedences in the Ontario Drinking Water Quality Standards.

7.1.2 Water Quantity

A PTTW was not required for this site. The daily water taking for the campground was not provided.

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Appendix A: Water Systems Information

System Classification	Name	Municipality	Date(s) of Inspection	Water Source	Population Served	PTTW Max. Rate (L/day)	Plant Capacity (L/day)
Large Municipal Residential – Surface Water	Perth	Lanark	September 30, 2003; July 24 – September 29, 2003; January 26, 2005; December 5, 7 & 8, 2005; January 24, 2007; February 13, 2008	Surface Water: Tay River	6,200	9,092,000	9,090,000
	Lemieux Island	Ottawa	June 12, 2000; December 14 & 15, 2005, February 1, 2007; January 21, 2008	Surface Water: Ottawa River	780,000	325,000,000	290,000,000
	Britannia	Ottawa	June 12, 2000; October 26 & 27, 2005, February 12, 2007, January 18, 2008; February 2009	Surface Water: Ottawa River	750,000	360,000,000	360,000,000
	Carleton Place	Lanark	June 12 & 17, 2003; July 25 & 27; May 24, 25, & June 27, 2006; June 5, 2007; June 5, 2008	Surface Water: Mississippi River	9,500	12,000,000	11,999,520
	Smiths Falls	Lanark	April 2, 1996; September 26, 2005; October 23 & 24, 2003; September 29 & 30, 2004; September 27, 28 & October 3, 2005; November 7, 2006; November 26, 2007; November 2008	Surface Water: Rideau River	8,777	18,100,000	18,100,000
Large Municipal Residential – Groundwater	Carp	Ottawa	September 23, 2003; June 7, 2005; May 4, 2006	Groundwater: Wells	1,140	2,782,080	2,782,000
	Kemptville	Leeds & Grenville	July 30 & 31, 2003; July 27 & 28, 2004; June 20, 22 & 27, 2005; August 15 & 16, 2006; October 10, 2007; August 26, 2008	Groundwater: Wells	3,500	6,274,000	6,274,000
	Munster	Ottawa	February 16, 2998; July 13, 2000; October 28, 2003; September 27, 2004; June 22, 2005; May 1, 2006; May 31, 2007; September 9, 2008	Groundwater: Wells	1,350	2,362,000	2,161,000
	King's Park	Ottawa	November 12, 1997; July 13, 2000; December 16, 2003; October 27, 2004; January 31, 2006; January 9, 2007;	Groundwater: Wells	510	2,620,000	2,620,000

			October 3, 2007; January 6, 2009.				
	Almonte	Lanark	June 7, 2000; November 27, 2003; December 1, 2003; November 7 & 9, 2005; December 14 & 15, 2005; January 10, 2007; February 5, 2008	Groundwater: Wells	4,660	6,894,620	6,894,720
	Merrickville	Leeds & Grenville	December 17, 1999; September 13, 2000; August 13 & 14, 2003; June 17 & 18, 2004; May 31, 2005; May 29 & 30, 2006; May 31, 2007	Groundwater: Wells	1,000	4,295,061	1,880,000
	Westport	Leeds & Grenville	February 10, 1998; June 22, 2000; January 28 & 29, 2004; January 26, 2005; November 25, 2005; February 15, 2007; February 5, 2008	Groundwater: Wells	549	1,423,000	898,560
Large Municipal Residential - Stand-Alone Distribution System	Montague	Lanark	September 30, 2004; September 7, 2005; December 19, 2006	Surface Water: Smiths Falls Water Treatment Plant	350	N/A	N/A
Non-Municipal Year-Round Residential System	Crestview Park	Lanark	April 7, 2004	Groundwater: Well	N/A	N/A	N/A
	Clayton Seniors Housing	Mississippi Mills	November 5, 2007	Groundwater: Well	40	N/A	50,112
	Edge Town Apartments	North Grenville	August 6, 2008	Groundwater: Well	N/A	N/A	32,760
	Carswell	Elizabethtown -Kitley	September 3, 2008	Groundwater: Well	N/A	N/A	54,720
Non-Municipal Seasonal Residential System	Clayton Lakeside	Lanark	August 26, 2005	Groundwater: Well	100	Not needed	N/A
Non-Municipal, Non-Residential	R.K.Y Camp	Central Frontenac	July 28, 2008	Groundwater: Well	N/A	N/A	N/A

System							

N/A = not available

Appendix B

Overview of the Ministry of the Environment Municipal Drinking Water Inspections Protocol

Overview of the Ministry of the Environment Municipal Drinking Water Inspections Protocol

Updated October 2003

The Ministry of the Environment (MOE) has developed the *'Drinking Water Inspections Protocol'* (the Protocol) to guide its drinking water inspections. Ministry staff began using it to conduct inspections of drinking water systems, effective November 2002. The Protocol is more comprehensive than any in earlier use and includes the inspection of source, treatment and distribution of drinking water systems. It addresses the recommendations of the Report related to inspections on the Walkerton Inquiry (the O'Connor Report) Parts One and Two. The Protocol will be updated as needed on an ongoing basis to ensure it remains relevant with the legislation and with new developments in drinking water standards.

The Protocol builds on the one implemented by the Ministry in the fall of 2000. The Ministry reviewed the O'Connor Report to ensure that the Protocol met the recommendations that could be implemented without new regulations and legislation. The Ministry also reviewed protocols from other jurisdictions -- specifically the US Environmental Protection Agency, and the states of Michigan, Colorado, Maryland and Massachusetts – and used their best practices to assist in the development of this protocol.

1 What to expect when inspected

Ministry of the Environment Inspectors will notify the water system owner and operator approximately one week in advance when they will be conducting an announced inspection. At that time, inspectors will provide the scope of the inspection, and the documents they will need to review while onsite.

During the on-site inspection, inspectors will introduce themselves on arrival; provide information on the reasons for the inspection, the statutory authority (the law) for the inspection and the scope of the inspection. Inspectors also are able to address concerns brought forward and should provide clear, detailed explanations of Ministry requirements where necessary. Inspectors will address issues in a courteous, respectful manner and will treat owners and operators with fairness and consistency. Inspectors will also provide a contact number should further information or feedback be required. Owners and operators are encouraged to ask any questions they may have about the inspection process or Ministry guidelines and requirements.

After the on-site component of the inspection, inspectors are available to answer questions about the inspection. Inspectors may also contact the owner or operator prior to finalizing any orders or inspection reports to clarify information or to discuss details.

Owners and operators can contact their local district office for additional information if needed.

2 The O'Connor Report Recommendations

In the Part One Report of the Walkerton Inquiry, Commissioner Dennis O'Connor made a number of recommendations related to inspections of drinking water systems, including:

- The development of a more comprehensive inspections protocol to ensure the uniformity and adequacy of inspections
- A continued commitment to annual inspections
- Adequate resources to inspect municipal water systems
- A requirement that systems with significant deficiencies be inspected at least once per year
- A combination of announced and unannounced inspections
- Wider distribution of the inspection report -- to the owner, operating authority, and manager of the water system, the local Medical Officer of Health, the MOE's local office and the MOE's Environmental Assessment and Approvals Branch
- Timelines for preparation and delivery of inspection reports and operator responses.

He also wrote that inspections should address the protection of drinking water from source through distribution and that the inspector should ensure the adoption of sound management practices and encourage the adoption of best practices. In addition, he recommended that the Ministry should take action to use mandatory abatement more often.

In the Part Two Report of the Walkerton Inquiry, Commissioner O'Connor also made recommendations related to inspections, including that inspectors:

- be required to review, before beginning an inspection, the data related to the quality of source waters and circumstances relating to changes in land uses or surrounding water;
- identify any problems related to the quality of source waters and recommend the steps required to correct such problems;
- provide a related report to the local conservation authorities;
- ensure sound management practices; and
- provide advice around best operating and management practices.

O'Connor also identified six principles to guide the development of the Protocol and to guide inspectors: effectiveness, a precautionary approach, consistent application, independence from outside influence, transparency, and adequate resources to run the inspections program.

He also recommended that the Ontario government enact a *Safe Drinking Water Act* to deal with matters related to the treatment and distribution of drinking water. The government has moved ahead with the *Safe Drinking Water Act*. It expands on existing policy and practices and introduces new features to protect drinking water in Ontario. It also sets the overarching framework for legislation and regulations relating to the treatment and distribution of drinking water.

3 The Ministry of the Environment's Response to the Report

In response to the O'Connor recommendations related to inspections, MOE has developed an enhanced drinking water inspections program and inspections protocol. To carry out the program, additional staff have been hired and they are located in Ministry offices across the province.

These new staff were already skilled and knowledgeable in water treatment and inspections. In addition, they received more than eight weeks of training, including sessions on water quality, pathogens, source/supply, advanced water treatment processes, distribution, as well as sampling and analysis. This will enable them to be fully qualified to understand the practices of an operator of a treatment or distribution system.

4 Focus and Scope of the Drinking Water Inspections Program

The main focus of the drinking water inspections program is on annual inspections of municipal residential drinking water systems regulated under the *Safe Drinking Water Act* and associated regulations, especially O. Regulation 170/03. As mentioned above, the Protocol was developed to address the recommendations of the O'Connor Commission related to inspections under the current legislative requirements. The Protocol will be updated from time to time to ensure it remains current and thorough.

Ministry of the Environment drinking water system inspections do not add additional regulatory requirements to municipalities, as the purpose of the inspection is to determine compliance with existing legislation. Inspectors will, however, be inspecting parts of the water system that have not recently been part of an inspection, such as the distribution system.

The overall process for conducting an inspection has not changed significantly. Inspectors will still target and schedule inspections based on identified risk factors, and they will pre-plan the inspection to ensure no key steps are missed. They will conduct the inspection, as they always have done, by observing operations in the plants, reviewing records, taking samples, and interviewing plant personnel, and if required, municipal staff as well. As before, they will also write orders to ensure compliance with all applicable legal requirements and they will track and follow up on any orders to ensure they are being complied with in a timely manner. Finally, they will communicate inspection results to the owner and operator as well as other important stakeholders. It is the owner's responsibility to ensure their water works are in compliance with all applicable legal requirements

The Protocol expands the scope of the Ministry's oversight in order to ensure safe drinking water. This will be accomplished by examining the source of water, treatment, and distribution systems. Inspectors will also appraise management practices that effect the operation of the plant and ultimately the safety of drinking water. It also includes sharing and promoting with owners and operators the adoption of best practices to improve performance towards ensuring safe drinking water. Inspections staff will also communicate results more widely – to the owner, Operator, the Medical Officer of Health, the local Conservation Authority, and the Ministry's Environmental Assessment and Approvals Branch.

4.1 Promoting Best Practices

Best practices have been incorporated into the Protocol with the intent of having inspectors review the current practices being employed and providing guidance to owners/operators on areas of the drinking water system that are not specifically addressed within the current regulatory framework. Inspectors will do this in addition to inspecting for compliance with legal requirements in the operations, and management of drinking water systems.

The best practices review may be a result of those identified by other jurisdictions, industry associations, or as a result of inspection activities which identify a need for improvements in operations or management. These practices, while not yet mandatory, will lead to safer drinking water for the consumer or may become regulatory or policy requirements in the future. Therefore, owners and operators may want to develop an awareness of these practices and take measures to implement them so that all drinking water systems continuously improve their processes.

Under the new program, inspectors are encouraged to promote best practices. Inspectors will promote best practices in a number of ways, including verifying that appropriate policies or procedures exist, reviewing policies or procedures, and sharing with water system personnel helpful practices implemented in other water systems. Further, inspectors are encouraged to share the practices of one water system that helped prevent certain situations or occurrences with other water system owners experiencing similar difficulties

The primary purpose for the inspector to gather and share information on best practices is to encourage water system owners and operators to continuously improve measures to protect the safety of drinking water. MOE may use the information to develop guidelines around the preferred content of best practice policies and procedures to ensure they are effective at achieving the desired results.

A NOTE ABOUT THE TERM “BEST PRACTICES”: During the development of the Protocol, a variety of terms (good practices, management practices, generally accepted practices, ministry-endorsed practices) were suggested to describe the promotion of practices that, while outside the current legislative framework, may lead to safer drinking water in Ontario. For simplicity sake, they will be referred to as best practices in this document.

4.2 Passing your inspection - Provincial Officer Orders

The O’Connor report recommended that MOE increase its commitment to the use of mandatory abatement measures. It states that mandatory abatement measures should be the only option to address anything other than technical violations of operational requirements. It goes on to say that voluntary abatement practices for serious deficiencies in water treatment operations should no longer be tolerated and that voluntary abatement is not appropriate for any non-compliance that affects the safety of drinking water.

The Protocol provides specific guidance to inspectors about the type of measure to be used in response to a finding of non-compliance. Voluntary abatement will not be used in response to non-compliance with any legal requirement. This reflects the Ministry’s commitment to make greater use of mandatory abatement in order to protect the safety of the public.
This means inspectors will generally write orders for any findings of non-compliance with statutes, regulations, Certificate of Approval requirements, Permits to Take Water requirements, or previously issued orders. However, inspectors will generally consult with owners and operators about the approach and timing of achieving compliance prior to finalizing an order.
At the end of the inspection, the Ministry will use the information gathered during the inspection to determine whether the drinking water system has passed or failed its inspection. A drinking water system can fail its inspection for the following reasons:

- There is a violation where there is a resulting known or anticipated human health impact Examples include sampling falls short of minimum requirements, level of treatment provided fails to comply with the regulation/ CofA/ POO/ Director’s Order.
- There is a violation where there is a resulting known or anticipated environmental impact Examples include non-compliance with conditions in the PTTW, facility is discharging anything into the environment that causes or is likely to cause an adverse effect.

5 Conducting an inspection

There are six key phases to completing an inspection:

Targeting and Scheduling:

Each year, MOE districts will prepare an annual schedule for inspecting all municipal drinking water systems. Factors they will consider include the time that has elapsed since the last inspection and whether or not there were any significant deficiencies identified during the last inspection that would require follow up.

Pre- planning:

During this phase, inspectors will plan the onsite component of the inspection to ensure it is thorough and focussed on any key areas of concern about the drinking water system. During this stage, inspectors familiarize themselves with the drinking water system they plan to inspect by reviewing Ministry records about the water system (Certificates of Approval, Permits to Take Water, previous Inspection Reports and Orders, Incident Reports, quarterly reports, Engineer's Reports, etc).

The purpose of this phase is to ensure that the inspector understands what sort of system he or she will be inspecting. For example, the inspector needs to know whether the system is a ground or surface water system, the characteristics of the treatment system and the elements of the distribution system.

For an announced inspection, the inspector will notify the water system in advance of the inspection and may provide the operator with a checklist of documents that the inspector will need to review during the inspection.

Conduct the Inspection

This involves a physical inspection of the source, treatment and distribution components of the drinking water system, as well as a review of management practices. During the inspection, the inspector will physically inspect components of the system, interview system personnel, check logs and documents, and take water audit samples. Inspectors will also share and promote best practices where appropriate.

Further information on the inspection itself is provided later in this document.

Enforcement:

Ministry inspections staff are provided with information on the use of mandatory or voluntary abatement measures to ensure compliance with all relevant legislation, regulations, and other tools of compliance. The response to any failure to comply with a legal requirement will be mandatory abatement (normally, an order will be issued).

Track and Assess:

Once the on-site inspection is completed, the inspector will complete a number of post-inspection activities including reviewing the results of the laboratory analysis of the water samples, preparing and distributing the Inspection Report, and monitoring that the owner/operator complies with all mandatory abatement measures resulting from the inspection.

Communications

Ministry inspectors will communicate with key stakeholders (owner, operator, manager, Medical Officer of Health, Conservation Authority, etc) about the inspection results. They will do this by sharing copies of the inspection report and through discussions about inspection results. Prior to the official release of the report, the inspector may contact the owner or operator should the inspector have any questions about the contents of the report.

6 Inspection Activities

6.1 Source

Document Review

Prior to the onsite inspection, inspectors will review control documents to identify any potential issues with the source of drinking water. They will review the Certificate of Approval to familiarize themselves with the water system and to confirm what equipment and treatment are used. They will verify, through a review of the Permit to Take Water and the quarterly reports, that water systems are staying within the allowable limits on the amount of water they are permitted to take. Inspectors will also review “Ground Water Under the Direct Influence of Surface Water” (GUDI) assessments where one has been completed in order to familiarize themselves with conditions affecting the source of ground water. Inspectors will also review Ministry records to confirm whether any adverse results have been reported by the water system since the last inspection.

Physical Inspection of the Source/supply of Water

The source/supply of water will be confirmed and visually inspected, including an inspection of each well head or surface water source, for visual sources of contamination.

Best Practices:

In addition to verifying that legal requirements are being met, inspectors may also check for best practices. Examples of best practices with respect to the source of drinking water include:

- Checking whether raw water monitoring is done for parameters beyond those required by the Certificate of Approval.
- Checking flow records against maximum permitted takings and determining whether the annual average day flow exceeds 80% of the capacity of the plant. If so, the inspector will include in the Inspection Report that the plant is nearing design capacity.

6.2 Treatment

MOE inspectors will continue to inspect municipal water treatment plants. These activities are mostly unchanged from previous inspections prior to the development of this Protocol. Inspectors will assess practices that will directly effect the operation of the plant and ultimately the quality of the water. Inspectors will also confirm that the treatment is effective by ensuring the plant is operating in accordance with all legal requirements and is capable of continuously producing potable water.

Document Review

Inspectors will review treatment plant procedures, criteria and documentation related to compliance with legal requirements relating to the operation of the treatment plant. For example, the inspector will familiarize themselves with what is adequate disinfection based on requirements, what is the capacity of treatment facilities and capability of the system to meet design criteria, operation and maintenance procedures, storage of chemicals, turbidity spikes after back-washing and in-plant cross connection controls.

Inspectors will review operator records to ensure that water entering the distribution system is disinfected in accordance with Ministry requirements. They will also confirm that operator logs meet the legal requirements for record keeping. They will also cross check operator records with Ministry records to confirm that adverse results were reported as required by regulation. They will confirm that emergency response plans exist and are posted in municipal drinking water treatment plants.

Physical Inspection

The inspector will review all the unit treatment processes at the plant, including but not limited to, pre-chlorination, flash mixing, coagulation, flocculation, sedimentation, filtration, disinfection, chemical feed systems, controls, waste water treatment, taste and odour control. Inspectors will confirm that equipment (settling tanks, chlorinators, analyzers, alarms etc) required by the Certificate of Approval has been installed and is operational. They will check the overall maintenance and condition of the treatment facility by observing the cleanliness and general repair and determine whether the operators know and understand facility procedures. They will also collect raw and treated water samples for laboratory analysis for audit purposes.

Best Practices

Inspectors will note (for information purposes) any established goals/standards that exceed Ministry requirements. For example, some facilities may have set internal standards for turbidity that are more stringent than those set by the Ministry. The goals and standards established by treatment facilities might be examples of management practices which may be useful in other similar facilities.

6.3 Distribution

The purpose of inspecting the distribution system is to confirm that the distribution system is capable of continuously delivering potable water to the consumer.

Document Review

Part of the inspection of the distribution system includes reviewing maintenance schedules, standard operating procedures, maintenance and

operational logs, as well as other general observations that indicate a well-run and managed facility. Inspectors will confirm whether all monitoring and reporting is being done in accordance with the regulation. They will also confirm what security measures exist around water storage facilities.

Physical Inspection

Inspectors will confirm whether new or repaired water mains are disinfected in accordance with recognized standards. Inspectors will verify that that adequate monitoring of the distribution system is done by the owner; e.g., ensuring chlorine residuals are maintained. The inspector will also physically inspect components of the distribution system and take samples.

Best Practices

Inspectors may confirm that operators are monitoring the reliability of transmission lines to ensure they can provide a continuous supply of water.

6.4 Monitoring, Reporting and Notification and Laboratory Services

Inspectors will ensure that the owner/operator is fulfilling all the monitoring requirements in accordance with regulations, policies and established standards, including continuous recording of water parameters on-site, continuous sampling and appropriate procedures. They will also confirm that the lab analysis is being done by a lab that is properly accredited. During the inspection, the inspector will check that water quantities and quality are being monitored, and verify that the facility is actively managing the sampling processes and acting on the results.

Monitoring

The inspector will also confirm through interviews and document review, that the results of monitoring and/or continuous analysis are being assessed and acted on according to regulation, policy and management practices. The inspector will do that by confirming that the sampling program is in compliance with regulations, and any other criteria required under orders, or Certificates of Approval. The inspector will verify that equipment for continuous analysis of required parameters has been provided, and that the continuous analysis equipment is functioning properly. The inspector will also note any special circumstances that may necessitate a higher frequency of sampling (e.g. source conditions).

Reporting and Notification

The inspector will confirm that adverse results are reported in accordance with all legal requirements. They will also confirm that adverse results are responded to and appropriate corrective actions are carried out as required by regulation.

Laboratory Analysis

In conjunction with the MOE Laboratory Inspection Group, Drinking Water Inspectors will verify that the laboratory analysing the samples is accredited for the parameters being analyzed, and that the owner/operator, along with the laboratory, are fulfilling their responsibility to notify appropriate parties of adverse conditions, in order that all necessary measures can be taken to protect human health.

Best Practices

Examples of best practices include:

- Water systems that are monitoring for additional, non-required parameters
- Confirming whether the operator had identified conditions that are most challenging to the operation of the system and a plan to resolve or treat them has been developed.

6.5 Water System Management Practices

Reviewing water system management practices, whether to monitor compliance or to confirm the existence of sound practices is important to the safety of drinking water. Generally, inspectors will be looking for management practices that relate to having in place the appropriate procedures and systems to ensure that MOE requirements are met, and to ensure that the system responds appropriately to changing demands for drinking water. In particular:

Customer Service:

The inspector will determine that the owner/operator has a process in place for tracking, investigating and responding to drinking-water-system-related complaints as required in Permits to Take Water and Certificates of Approval. In addition, the inspector will review the logs to determine if there are indicators of adverse water conditions or other issues that were the cause of the complaints.

Communication:

The owner/operator of the drinking water system must ensure that results, performance, orders, approvals, and conditions of the drinking water system are effectively communicated to the various stakeholders (e.g. Ministry, Public etc.) in a timely manner. The inspector will confirm that the owner/operator conforms to regulatory requirements and is managing communication activities effectively to notify stakeholders of required drinking water system information.

Security:

The inspector will assess whether the owner/operator of the drinking water system has taken the required measures to secure the various components of the drinking water system against physical intrusion. The inspector also will determine whether the owner/operator is managing security requirements effectively, thereby minimizing potential security threats to the drinking water system.

Human Resources:

The inspector will determine whether operators are trained and appropriately certified in accordance with O. Regulation 435/93. The inspector will also determine whether the owner has established operating procedures and manuals that are readily available to staff and that the owner has appropriate record keeping procedures.

Best Practices

Examples of best practices that the inspector may ask about may include:

- Whether the operator has a strategic plan for the water system.
- Water conservation plans
- Human resources plans to ensure operators are well trained.

7 Annual Inspections

Since 2000, the Ministry, by policy, has committed to annual inspections of all municipal drinking water systems. The *Safe Drinking Water Act* and the proposed Compliance and Enforcement Regulation place certain legal requirements on the Ministry of Environment with respect to the frequency of inspections and follow up where a deficiency (as defined in O Regulation 172/03) is found.

7.1 Unannounced vs. Announced Inspections

At least one inspection of every municipal drinking water system in every three-year period will be unannounced. An unannounced inspection is one where the owner and operator have no advance notice of the inspection.

The ministry expects that even though it is unannounced, an operator will accompany the inspector on the inspection, as the inspector will not be able to complete the inspection without some assistance from the operator. In some small communities, where there is only one operator, or a part-time operator, the inspector runs the risk of finding no operator available. The inspector will assess each situation at the time and may decide to conduct as much of the inspection as she/he can without an operator, or call as they are leaving for the inspection to arrange to meet an operator at the facility.

Additional unannounced inspections (over the three-year cycle) may be carried out on a system considered to pose a risk to the safety of water, or where there is suspicion that records or practices may change prior to an announced inspection.

8 Summary

In summary, the Drinking Water Inspections Protocol is a key step in addressing the recommendations of the O'Connor Report. The Ministry is implementing a rigorous and comprehensive approach in the inspection of municipal residential drinking water systems that focuses on the source, treatment, distribution and management practices, as well as the promotion of best practices. The Ministry of the Environment believes this approach will lead to better protection of drinking water in Ontario. The Protocol will be updated as required by regulatory changes under the *Safe Drinking Water Act* and associated regulations as well as new developments in drinking water safety.

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