MINISTRY OF THE ENVIRONMENT

CORPORATION OF THE NATION MUNICIPALITY
VILLAGE OF LIMOGES

FIRST ENGINEERS' REPORT
FOR
WATER WORKS

LIMOGES WATER TREATMENT PLANT AND ASSOCIATED WELLS

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1. Introduction

.1 Mandate

The firm Lecompte Engineering Ltd. has been retained by the Nation Municipality by resolution no. 291-2003 to prepare the first Engineers' Report in accordance to the Drinking Water Protection Regulation (DWPR) for the Limoges water works.

.2 Terms of Reference

The report is prepared in accordance with the "Terms of Reference for Engineers' Reports for Water Works", dated August 2000 and revised December 2003. Refer to Appendix 1.

2. Objectives of the Report

The objectives of the present report are to access the potential for microbiological contamination of the drinking water system:

- To identify operational and physical improvements to the collection, production, treatment, storage and supply of water necessary to mitigate this potential problem by using multiple barrier concepts:

- To identify a monitoring regime for the entire drinking water system in order to ensure compliance with the Drinking Water Quality Standard (DWQS) Regulation. Drinking Water Systems (DWS) Regulation and Disinfection Procedure, and conformance to the Ontario Drinking Water Standards. Objectives and Guidelines (ODWSOG).

3. Compilation of Certificates of Approval and Permits

.1 Certificates of Approval

The Certificates of Approval (C of A) related to the supply, treatment and storage works are listed in Table 1 in chronological order together with a brief description of the works. A copy for each of these certificates is included in Appendix 2. They are summarized as follows:

Table 1 - Certificates of Approval		
Certificate No.	**Description of the Works**	**Date Issued**
7-0224-83-006 Water	Approval for water work facilities, well pumphouse, reservoir and pumphouse to be constructed to serve the community of Forest Park in the Township of Cambridge (now part of the Nation Municipality)	May 3, 1983
7-1250-97-986 Water	Approval for a communal water treatment and supply system to be constructed to serve the Village of Limoges in the Township of Cambridge (now part of the Nation Municipality)	Jan 9, 1998
Amendment to 7-1250-97-986 Water	Permit for the construction of a raw watermain on Russland Road from the supply wells and on Limoges Road to the water treatment plant	Jul 27, 1998
Amendment to 7-1250-97-986 Water	Permit for the construction of a watermain crossing under highway 417, two supply wells and modifications at the water treatment plant	Nov 5, 1998
Amendment to 7-1250-97-986 Water	Permit for the construction of an on-ground water reservoir and booster pump building plus one additional clarifier train complete with a dual filter media	Mar 15, 1999
Amendment to 7-0224-83-006 Water	Permit for the modification to the Forest Park pumphouse and reservoir consisting of a chlorination system, an automatic chlorine residual analyser, a new pressure transducer, a fill valve with PLC and telemetry system connected to the Limoges water treatment plant SCADA and decommissioning of the existing Forest Park water supply wells	Jul 27, 2000
0307-5QENDY Water	This certificate revoked and replaced C of A No. 7-1250-97-986 and reflected the requirements of the Safe Drinking Water Act (SDWA) and its regulations	Aug 29, 2003

The works described under C of A No. 7-0224-83-006 and its amendments are not part of the Limoges water works for the purpose of collection, production, treatment, storage or supply of water. They are part of the water distribution works and in-distribution storage works whose sole purpose is water demand management.

.2 Permits to Take Water

The permits to take water (PTTW) are listed in Table 2 hereafter in chronological order. A copy for each permit is also included in Appendix 3.

Table 2 - Permits To Take Water

Permit No.	Description	Expiry Date
97-P-4001	Permit for the taking of water from two wells located on Lot 21, Concession 7, Township of Russell, United Counties of Prescott & Russell for municipal water supply to phase 1 of the Village of Limoges and the community of Forest Park. The combined rate of taking from well no. 1 and well no. 2 shall not exceed 1,038.9 L/min or 1,496 m^3/day.	Nov 14, 2011
03-P-4045	Permit for the taking of water from two wells located on Lot 21, Concession 7, Township of Russell, United Counties of Prescott & Russell for municipal water supply to phase 2 of the Village of Limoges and the community of Forest Park. The combined rate of taking from well no. 1 and well no. 2 shall not exceed 1,444 L/min or 2,080 m^3/day. The special conditions attached with the permit require the development of a groundwater monitoring program in consultation with the City of Ottawa in order to monitor the effects of the Limoges well field on the Vars well field including nearby wells.	May 2, 2013

4. General Description of the Supply, Treatment and Storage Works

The Village of Limoges water works is comprised of the following systems:

- Two well pumping stations, a raw watermain from the well field to the water treatment plant, a water treatment plant, an on-ground water reservoir and a booster pumping station;
- The water from the two supply wells is treated at the plant by using aeration, potassium permanganate injection, coagulant and polymer injection, flocculation, clarification, anthracite and greensand filtration and chlorination. The treated water is pumped directly into the water distribution system.

A schematic process flow diagram with process units and equipments identified is included at the end of this report.

The descriptions of the facilities are included in Appendix 4. It includes the types, number and size of all process units and equipments to be specified in the Consolidated Certificate of Approval (CC of A) together with critical process design parameters. This document will be submitted electronically to the Ontario Ministry of the Environment for the preparation of the CC of A.

5. Assessment of Potential for Microbiological Contamination

.1 General

A visual inspection of the two supply wells and the water treatment plant was carried out on May 14, 2004 by the consultant with the operating authority of the drinking water system.

The available records for microbiological testing for the last three years as well as the Ontario Ministry of the Environment inspection (compliance) reports have been reviewed. Refer to Appendices 5, 6, 7 and 8.

As well, agricultural maps, the official plan, the municipal groundwater study, the proposal for groundwater modelling and capture zone determination have been reviewed in order to assess the level of protection for the water sources. Refer to Appendices 9, 10, 11, 12 and 13.

The findings at each well and treatment process site are described hereafter.

.2 Well No. 1

Supply well no. 1 is a 250 mm diameter, 24.5 meter deep drilled well complete with an outer protective steel casing of 500 mm in diameter extending 6.0 meters below the ground surface. The annular spacing between the inner well casing and outer protective casing is filled with cement grout. The well was completed by Envirotechau Limited of Montreal, Quebec, a certified well driller back in 1994. The well is enclosed inside a pumphouse with a concrete floor located approximately 250 mm above the surrounding ground at the site. The well casing is raised above the floor by 200 mm on which the pump unit sits securely on the casing and concrete pedestal. The well is located on a parcel of land, 45 meters wide by 112 meters deep, owned by the municipality.

The stratigraphy of the soil at the wells was obtained from Golder Associates Ltd. Report no. 931-2894, dated September 1994 and is as follows:

Table 3 - Stratigraphy of Soil at Well No. 1		
Nomenclature	**Depth (m)**	**Thickness (m)**
Ground Surface	0.00	
Brown mottled *silty fine sand*	0.40	0.40
Brown pinkish mottled grey *silty clay*	3.30	2.90
Grey *silty clay*	4.10	0.80
Compact grey *medium to compact sand* Trace silt	6.10	2.00
Loose to compact black-greyish *medium to compact sand* trace silt	10.7	4.60
Compact to dense black-greyish *sand and gravel* Trace silt	12.2	1.50
Compact grey *fine sand* Trace silt	13.1	0.90
Compact black-greyish *medium to coarse sand* Trace silt	14.9	1.80
Compact black-grey *gravel* *Medium to coarse sand*. trace silt	16.4	1.50
Dense to compact black-greyish *medium to coarse sand* Fine silty sand seams	24.2	7.80
Glacial till Bottom of well	24.5	0.30
Limestone bedrock		
Screen Casing:	14.0	
First section		4.50
	18.5	
	21.5	
Second section		3.00
	24.5	

.3 Well No. 2

Well no. 2 is a 250 mm diameter, 21.5 meter deep drilled well complete with an outer protective steel casing of 500 mm in diameter extending 9.1 meters below the ground surface. The annular spacing between the inner well casing and outer protective casing is filled with cement grout. The well was completed by Forage Metropolitain of St-Timothy, Quebec, a certified well driller back in 1998. The well is enclosed in a precast concrete chamber. A sump pump is located inside the manhole chamber in order to evacuate water accumulation resulting from snow melt or surface and ground infiltration. The electrical and telemetry controls are housed in an exterior weather proof control panel. The well is located on a parcel of land, 12 meters wide by 18 meters deep, owned by the municipality. The stratigraphy of the soil at well no. 2 is as follows:

Table 4 - Stratigraphy of Soil at Well No. 2		
Nomenclature	**Depth (m)**	**Thickness (m)**
Ground Surface Brown *silty fine sand*	0.00 0.30	0.30
Brown pinkish *silty clay* With sand seams	1.90	1.60
Compact grey *fine silty sand*	4.30	2.40
Compact grey *fine to medium sand* Trace silt	10.4	6.10
Compact to dense black-greyish *medium to compact sand* trace silt	13.1	2.70
Very dense black to grey *gravel* *Medium to coarse sand*. trace silt	14.6	1.50
Very dense black to greyish *medium to coarse sand* Trace silt	16.4	1.80
Loose grey *fine to medium sand* Trace silt	18.4	2.00
Dense black-grey *sand and gravel* Trace silt	21.0	2.60
Very dense grey-black *medium to coarse sand* Some gravel. Bottom of well	21.5	0.50
Screen Casing: First section	16.8 21.45	4.65

The construction of the wells is deemed satisfactory to prevent any risk of contamination from the direct influence of surface water.

The distance between the wells and the nearest surface water body which is the north west branch of the South Indian Creek is approximately 1,100 meters. This water body does not pose any negative impacts on the groundwater.

There is standby power available at both wells.

.4 Influence of Surface Water on Groundwater

The review of the operation records and reports indicate that bacteriological water samples are collected from the raw water at the wells as well as from the treated water from the clearwell and booster pump station at the Limoges water treatment plant. Bacteriological water samples are also collected from the treated water from the Forest Park reservoir.

Upon review of the analysis of the microbiological data collected by the operating authority for the period from April 3, 2001 to December 31, 2003, wells no.1 and no. 2 seem to be under the direct influence of surface water. The data revealed that from 223 raw water samples collected from wells no. 1 and no. 2:

- Five samples were reported to have fecal coliform counts;
- Forty samples were reported to have total coliform counts;
- One hundred and thirty six samples were reported to have heterotropic plate colony (HPC) counts ranging from 2 to 499 c/mL and;
- Forty two samples were reported to have heterotropic plate colony (HPC) counts ranging from 500 c/mL to overgrown.

A total of 476 treated water samples were collected from the locations noted above during the same period. The review of the analysis of the data revealed:

- No samples were reported to have evidence of E. Coli or fecal coliform counts;
- No samples were reported to have total coliform counts;
- One hundred and forty samples were reported to have heterotropic plate colony (HPC) counts ranging from 2 to 499 c/mL and;
- Four samples were reported to have heterotropic plate colony (HPC) counts ranging from 500 c/mL to overgrown. The water sources were all re-sampled and were found free of contamination.

The microbiological results are included in Appendix 5 together with Table 5 showing the number of samples collected on the raw water and treated water sources.

The short term trend is not an indication that the groundwater source is susceptible to surface water contamination because of evidence of E. Coli or fecal coliform counts obtained from the raw water samples collected after the aeration process at the plant.

The analysis of the microbiological data collected by the operating authority for the period from January to March 2001, indicates that wells no. 1 and no. 2 are not under the direct influence of surface water. As well, upon review of the analyses of the water quality testing data collected from monitoring wells as well as domestic wells, before and at the end of the 72 hours and 28 days pumping test respectively, confirmed that the aquifer is not a GUDI. The results are included in Appendix 5 together with Table 6.

The wells supply raw water to the Limoges water treatment plant where a chemically assisted filtration and disinfection process are provided.

Pursuant to the Safe Drinking Water Act (SDWA) and O. Regulation 170/03, the regulation states the following in respect to turbidity monitoring:

"Turbidity

7-3. (1) The owner of a drinking-water system and the operating authority for the system shall ensure that a water sample is taken at least once every month, from a location that is before raw water enters the treatment system, and is tested immediately for turbidity.

(2) If a drinking-water system obtains water from a raw water supply that is surface water and the system provides filtration,

(a) *subsection (1) does not apply; and*

(b) *the owner of the system shall ensure that sampling and testing for turbidity is carried out by continuous monitoring equipment on each filter effluent line."*

Because the Limoges water supply is not a GUDI, section 7-3. (1) of Schedule 7 above governs. Therefore, grab water samples must be taken from each well once every month and tested immediately in order to monitor turbidity.

.5 Treatment Facilities

A description including the types, number and size of all process units and equipments specified in the consolidated certificates of approval in Appendix 3 together with critical process design parameters have been amended based on the following review:

Design Flowrates

The design flowrates (Q) are as follows:

- At low lift pumps and detention tanks

Q = Average Daily Flow X Population at Phase 2 X Peak Factor
= 325 LCD X 3,200 X 2.00
= 2,080 m^3/day
= 24.1 L/sec
= approved rated capacity as indicated on PTTW No. 03-P-4045

- At filters and high lift pumps

Q = 2,080 m^3/day + Backwash Water Volume over a 24 hour period
= 2,080 m^3/day + 94 m^3/day (= 90 m^3/day X 24 / 23)
= 2,174 m^3/day
= 25.2 L/sec

Well Pumps

The well pump capacities at wells no. 1 and no. 2 are equal to the maximum capacity approved by the Permit To Take Water (PTTW).

Tray Aerator

The maximum capacity of the tray aerator is equal to 63 L/sec which exceeds the well pump capacities.

Aeration Basin

A retention time of 63 minutes (92 m^3 / 24.1 L/sec) is adequate to maintain a complete mix condition inside the aeration basin.

Low Lift Pumps

The two 10 HP low lift pumps each rated at 24.1 L/sec against a TDH of 13.7 m are sufficient to service the phase 2 design population.

Permanganate Detention Tanks

A retention time of 5.4 minutes (7.8 m^3 / 24.1 L/sec) inside the detention tanks is adequate to maintain a reaction between the permanganate solution and the water prior to alum injection.

Primary Permanganate Feed Pumps

The feed rate required for a 4% solution of potassium premanganate at a maximum concentration of 5.8 mg $KMnO_4$ / L and a water flow of 24.1 L/sec is 12.6 L/hr. The primary permanganate feed pump capacity of 17.4 L/hr is sufficient.

Secondary Permanganate Feed Pumps

The feed rate required for a 4% solution of potassium premanganate at a maximum concentration of 1.0 mg $KMnO_4$ / L and a water flow of 24.1 L/sec is 2.17 L/hr. The secondary permanganate feed pump capacity of 3.40 L/hr is sufficient.

Coagulant Feed Pumps

The feed rate required for a 48% solution of aluminum sulphate having a density of 1.32 kg/L at a maximum concentration of 45.0 mg Alum / L and a water flow of 24.1 L/sec is 6.16 L/hr. The coagulant feed pump capacity of 9.50 L/hr is sufficient.

Polymer Feed Pumps

The feed rate required for a 1% solution of PASS-100 at a maximum concentration of 1.0 mg PASS-100 / L and a water flow of 24.1 L/sec is 8.67 L/hr. The polymer feed pump capacity of 70 L/hr is about seven times over sized.

Clarifier

A retention time of 40.5 minutes (61.2 m^3 / 25.2 L/sec) is slightly over the design alum contact time requirement of 40 minutes prior to filtration and is therefore adequate.

Filter

The filtration rate per filter train was set to 2.84 USGPM / ft^2 at phase 1 design population, which is equivalent to a flowrate of 313 USGPM or 19.8 L/sec. At phase 2 design population, the filtration rate was raised to 3.46 USGPM / ft^2. This is equal to a flowrate of 382 USGPM or 24.1 L/sec per filter train. The maximum flowrate which one filter train could be operated at is 441 USGPM or 27.8 L/sec based on a filtration rate of 4 USGPM / ft^2.

Process Wastewater

The process wastewater is sent directly to the existing sewage collection system. The average day sewage flow for the phase 2 design population of 2,600 people for the Village of Limoges only is 1,010 m^3/day, which includes the infiltration rate. The daily backwash water at the treatment plant is equal to 62 m^3/day at phase 2. The total average day sewage flow corresponds to the waste stabilization pond rated capacity of 1,073 m^3/day as per the C of A no. 3-1820-97-986 (Sewage).

High Lift Pumps

The two 7.5 HP high lift pumps each rated at 25.7 L/sec against a TDH of 14.2 m are sufficient to service the phase 2 design population.

Chlorination Pumps

The feed rate required for a 12% solution of sodium hypochlorite at a maximum concentration of 4.0 mg Cl / L and a water flow of 24.1 L/sec is 2.89 L/hr. The chlorine feed pump capacity of 2.40 L/hr is under rated.

Water Reservoir

The water storage capacity requirements for the water reservoir at phase 2 design population are as follows:

- Minimum Storage Capacity (V_{min}) requirements:
  Fire Storage (V_A) + Equilization Storage (V_B) + Emergency Storage (V_C) + Backwash Water Volume (V_D)

  - Fire Storage
    V_A = fire flow for 3,200 people for a duration of 2 hours
    $= 64.33 \times P^{1/2} \times (1 - 0.01 \times P^{1/2})$ in L/sec where P = population in thousands
    = 113 L/sec X 2 hours
    = 813,600 L or 814 m^3

  - Equilization Storage
    V_B = 25% of maximum day demand
    = 25% X (325 LCD X 3,200 p X 2.0)
    = 25% X 2,080 m^3
    = 520 m^3

  - Emergency Storage
    V_C = 25% of (V_A + V_B)
    = 25% X (814 m^3 + 520 m^3)
    = 334 m^3

  - Backwash Water Volume
    V_D = 62 m^3 at phase 2 design population

The minimum storage capacity required is V_{min} = 1,730 m^3. The total capacity provided at the plant is 1,894 m^3 (1,734 m^3 is the rated capacity of the on-ground reservoir plus 160 m^3 is the capacity of the clearwell). Therefore the actual water storage capacity is sufficient to serve the phase 2 design population.

Booster Pumps

The three 7.5 HP booster pumps each rated at 8.65 L/sec against a TDH of 40 m are sufficient to service the phase 2 design population.

Water Reservoir at Forest Park

The water storage capacity requirements for a population of 600 people are as follows:

- Minimum Storage Capacity (V_{min}) requirements:
  Fire Storage (V_A) + Equilization Storage (V_B) + Emergency Storage (V_C)

  - Fire Storage
    V_A = fire flow for 600 people for a duration of 2 hours
    = 64.33 X $P^{1/2}$ X (1 - 0.01 X $P^{1/2}$) in L/sec where P = population in thousands
    = 49.4 L/sec X 2 hours
    = 356 m^3

  - Equilization Storage
    V_B = 25% of maximum day demand
    = 25% X (325 LCD X 600 p X 2.0)
    = 25% X 390 m^3
    = 97.5 m^3

  - Emergency Storage
    V_C = 25% of (V_A + V_B)
    = 25% X (356 m^3 + 97.5 m^3)
    = 113 m^3

The minimum storage capacity required is V_{min} = 567 m^3. The total capacity provided at the Forest Park pumphouse is 700 m^3. Therefore the actual water storage capacity is sufficient to serve a population of 600 people.

Chlorination Pumps at Forest Park Pumphouse

The feed rate required for a 12% solution of sodium hypochlorite at a maximum concentration of 4.0 mg Cl / L and a water flow of 8.0 L/sec is 0.96 L/hr. The chlorine feed pump capacity of 1.78 L/hr is sufficient.

Booster Pumps at Forest Park Pumphouse

The three 10 HP booster pumps each rated at 8.0 L/sec against a TDH of 42 m are sufficient to service a population of 600 people.

.6 Water Distribution System

The review of the operation records and reports indicate that bacteriological water samples are collected from the water distribution system at the following locations:

- at the point of entry to the distribution system outside the booster pump station near the treatment plant;
- at the old St-Viateur School on Mabel Street in the Village of Limoges;
- at the main sewage pumping station on Des Pins Street in the Village of Limoges;
- at the Forest Park reservoir on Maple Grove street;
- at the point of entry to the Forest Park distribution system in front of the Cambridge Public School on Route 500 (County Road No. 3) as well as occasionally at St-Viateur Nursing Home;
- at the point of entry to the Ben Tardiff Trailer Park distribution system on Route 600 as well as occasionally at various houses in the park;
- occasionally at 31 Manitou Street in the community of Forest Park;
- occasionally at the restaurant located at the corner of Des Pins Street and Limoges Road as well as at the end of King Street in the Village of Limoges.

There is no evidence of microbiological contamination detected within the distribution system for the period from April 3, 2001 to December 31, 2003.

.7 Nature of Soils

According to the "Soil Survey of Russell & Prescott Counties" published by the Ministry of Agriculture dated 1962, the nature of the surfacial soil at the well sites located along Russland Road consists of ***Rubicon and St-Samuel Fine Sand***. The soils are defined as follows:

- Rubicon Fine Sand are light grey depressions and reddish brown hummocks of sandy soils with sorted sand parent material, and;
- St-Samuel Fine Sand are grey mottled sandy soils with sorted non-calcareous fine sand material.

The area is considered flat and depressional as well as poorly drained. Land use is primarily hay fields, pasture lands and wetlands. The vegetation growing on these soils ranges from swamp grasses to trees. The sand deposit is on top of a clay layer of a few feet deep. The water moves very slowly and the soil is often saturated to the surface for several months of the year.

The wells are drilled through a clay cover layer into a shallow and unconfined aquifer called the Sarsfield esker complex. The risks of contamination of the groundwater supply through the well casing is unlikely to occur. However some risks of contamination may occur at the water recharge areas which should be addressed by the municipal groundwater study discussed later in this report.

.3 Official Plan

The Nation Minicipality was created from the amalgamation of three townships and one village back in 1996:

- The Township of Cambridge;
- The Township of South-Plantagenet;
- The Township of Caledonia. and;
- The Village of St-Isidore.

Each of these townships as well as the village had its own official plan. The United Counties of Prescott and Russell, including the Township of Russell, the Nation and other municipalities in eastern Ontario, had developed and ratified on December 31st, 1999 a consolidated official plan. Upon review of section 3.3.9 of the official plan, Russell is the only township in the united counties who has established groundwater protection areas for its supply drinking water sources for the villages of Embrun and Russell.

.9 Municipal Groundwater Studies

Robinson Consultants Inc. are in the final stage of completing a municipal groundwater study report for the Eastern Ontario Water Resources Committee. Part of this study will be addressing and developing well head protection areas for the Limoges/Vars well field.

As well, the City of Ottawa in partnership with the Nation Municipality have retained the services of Golder Associates to complete a groundwater modelling and to determine the water recharge zones for the Vars and Limoges communal wells.

.10 Recommendations

Based on our review of compliance inspection reports. operation reports. maps, official plans. our site inspection as well as the findings above. we recommend that the municipality apply the following measures:

- Grab water samples shall be taken at each supply well in order to monitor turbidity in accordance with the requirements made in section 7-3(1) of O. Reg. 170/03;
- Encourage the implementation of infrastructure development that leads to an overall protection of surface and ground water quality in the well head protection areas as well as in the recharge zones;
- The plant polymer feed pump capacity should be changed to 20 L/hr in order to accurately adjust the feed rate;
- The plant chlorine feed pump capacity should be increased to 3.60 L/hr in order to meet the plant maximum day demand.

6. Characterization of the Raw Water Supply Source

.1 Water Analysis Results

The following water quality tables included in Appendix 14 present the raw water quality for wells no. 1 and no. 2:

- Table 7 - Chemical/Physical Health Related Parameters;
- Table 8 - Microbiological Characteristics Health Related;
- Table 9 - Radiological Health Related Parameters;
- Table 10 - Chemical/Physical Non-Health Related Parameters.

Samples of the raw water were collected and tested for all parameters shown in the tables above, except as noted, in March 2001, February 2003 and May 2003. The raw water quality characteristics are summarized in Table 11 as follows:

Table 11 - Raw Water Quality Charateristics Summary

Parameter	MAC (mg / L)	Wells no. 1 and no. 2		
		May 2003	February 2003	March 2001
From Table 7 - Chemical/Physical Health Related Parameters				
Organics:				
Trihalomethane	0.100	ND	-	0.002
Others	-	ND	-	ND
Inorganics:				
Cyanide (Free)	0.2	ND	-	0.005
Fluoride	1.5	0.3	-	0.1
Lead	0.01	ND	ND	0.0003
Turbidity	1 NTU	2.2	0.55	0.6
From Table 8 - Microbiological Characteristics Health Related (after aeration)				
E. Coli or Fecal Coliform Counts	-	4	1	0
Total Coliform Counts	-	10	22	8
HPC < 500 count / mL	-	69	44	23
>= 500 count / mL	-	20	9	13
From Table 9 - Radiological Health Related Parameters				
Gross Beta Emission	-	ND	0.1	ND
From Table 10 - Chemical/Physical Non-Health Related Parameters				
Aluminum	0.1	ND	ND	0.46
Colour	5 TCU	13	16	16
Dissolved Organic Carbon	5	3.5	5.0	5.6
Hardness (as $CaCO_3$)	80-100	242	236	212
Iron	0.3	0.37	0.38	0.66
Manganese	0.05	0.10	0.10	0.06
Methane	3 L/m^3	ND	-	0.34
Organic Nitrogen	0.15	0.17	ND	0.27
Water pH	6.5-8.5	8.09	8.49	8.73
Sodium	200 or 20	17.9	16.3	15.3
Hydrogen Sulphide	0.05	ND	-	0.05
Total Organic Carbon	5	5.3	6.0	6.0

.4 Recommendation

The recommendation made in the report entitled "THM Optimization Study and Control" dated February 17, 2004 and revised September 28, 2004 included in Appendix 15 should be implemented.

7. Assessment of Operation Procedures

The operational manual was prepared at the time of the plant start-up in 2001. This manual contains all pertinent information of the treatment process including the modification carried out to the process since the commissioning of the plant.

Specific manuals for each monitoring device and magnetic flowmeter as well as technical and operation manuals for the telemetry system are also available on site under separate covers. These manuals contain all relevant operational checks, sampling, testing, reporting and corrective action requirements in accordance with the Drinking Water System Regulation. It also contains information in respect to the operation, maintenance and calibration of flow and analytical monitoring devices.

The current operation and monitoring procedures specified in the manuals and the Certificate of Approval are in our opinion adequate in order to ensure and to mitigate any risks of microbiological contamination of the drinking water.

8. Assessment of Physical Works Associated with the Supply, Treatment and Storage Works

.1 Ability to Comply with Chlorination Procedure

Upon review of the 2001, 2002 and 2003 Performance Assessment Reports (PAR), as prepared by the operating authority, the free chlorine residual and turbidity results are detailed in Table 13 below.

Table 13 - Free Chlorine Residual and Turbidity Results

Year Period	2003 January to December	2002 January to December	2001 April to December
Average Free Chlorine Residual in mg / L			
• At plant clearwell	1.94	1.83	3.72
• At point of entry to the distribution system	1.34	1.32	1.34
Average Turbidity in NTU	0.10	0.09	0.14

The data collected from the continuous recorders by the operating authority were compiled in a monthly table format in Appendix 16 together with the PAR.

Table 14 - Verification of CT Disinfection for Giardia Cyst After Final Disinfection Before First Consumer			
Parameter	**Units**	**Wells No. 1 and No. 2**	
Raw Water Temperature	° C	7	10
Water pH (after aeration)	no unit	8.0	8.5
Average Free Chlorine Residual			
• At plant clearwell	mg Cl / L	1.80	1.80
• At point of entry to the distribution system	mg Cl / L	1.30	1.30
Plant Clearwell (160 m^3 - Three Compartments): The CT provided for disinfection is based on the lowest possible contact time when chlorine is applied to the water inside the smallest compartment when the plant is operating at its maximum capacity, i.e. the worst case scenario has been retained.			
Minimum Volume V_{min}	m^3	12	12
T_{10} / T Ratio	no unit	0.3	0.3
Maximum Flowrate Q_{max}	L / sec	25.7	25.7
	m^3 / min	1.542	1.542
Retention Time			
• $T = (V_{min} / Q_{max}) \times (T_{10} / T)$	min.	2.3	2.3
Contact Time			
• CT = Free Cl X T	mg Cl / L · min	4.1	4.1
Connecting Main (From Plant Clearwell to Water Reservoir)			
Pipe Diameter D	mm	200	200
Pipe Length L	m	103	103
Volume $V_{min} = pi \times D^2 \times L / 4$	m^3	3.24	3.24
T_{10} / T Ratio	no unit	1.0	1.0
Maximum Flowrate Q_{max}	L / sec	25.7	25.7
	m^3 / min	1.542	1.542
Retention Time			
• $T = (V_{min} / Q_{max}) \times (T_{10} / T)$	min.	2.1	2.1
Contact Time			
• CT = Free Cl X T	mg Cl / L · min	3.8	3.8
Water Reservoir (1734 m^3): The CT provided for disinfection is based on the equilization volume only, i.e. the worst case scenario has been retained.			
Minimum Volume V_{min}	m^3	520	520
T_{10} / T Ratio	no unit	0.5	0.5
Maximum Flowrate Q_{max}	L / sec	26.0	26.0
	m^3 / min	1.560	1.560
Retention Time			
• $T = (V_{min} / Q_{max}) \times (T_{10} / T)$	min.	166.6	166.6
Contact Time			
• CT = Free Cl X T	mg Cl / L · min	216.6	216.6
Connecting Main (From the Water Reservoir via the Booster Pump Building to the distribution system at the first consumer)			
Pipe Diameter D	mm	200	200
Pipe Length L	m	47	47
Volume $V_{min} = pi \times D^2 \times L / 4$	m^3	1.48	1.48
T_{10} / T Ratio	no unit	1.0	1.0
Maximum Flowrate Q_{max}	L / sec	26.0	26.0
	M^3 / min	1.560	1.560
Retention Time			
• $T = (V_{min} / Q_{max}) \times (T_{10} / T)$	min.	0.9	0.9
Contact Time			
• CT = Free Cl X T	mg Cl / L · min	1.2	1.2
Total CT prior to first consumer	mg Cl / L · min	225.7	225.7
Corresponding LOG Inactivation for Giardia Cysts		3.3	3.4
Credit LOG Inactivation for greensand filtration		2.0	2.0
Total LOG Inactivation		5.3	5.4

The maximum flow expected in the connecting main from the plant clearwell to the water reservoir occurs when two high lift pumps are in operation.

The maximum flow expected in the connecting main from the water reservoir to the booster pump building occurs when three booster pumps are in operation.

The minimum requirements of 2.0 Log inactivation/removal of Giardia Cysts for groundwater supply not under the direct influence of surface water and of 3.0 Log inactivation/removal of Giardia Cysts for groundwater supply under the direct influence of surface water is achieved prior to the first consumer at the Limoges drinking water system.

Table 15 - Verification of CT Disinfection for Viruses After Final Disinfection Before First Consumer

Parameter	Units	Wells No. 1 and 2	
Raw Water Temperature	° C	7	10
Water pH (after aeration)	no unit	8.0	8.5
Total CT prior to first consumer	Mg Cl / L · min	225.7	225.7
Corresponding LOG Inactivation for Viruses		>>10	>>10

The minimum requirement of 4.0 Log inactivation/removal of Viruses for groundwater supply under the direct influence of surface water is achieved prior to the first consumer at the Limoges drinking water system.

The water treatment process equipment has been designed to be capable of achieving, at all times, the primary and secondary disinfection using chlorination in accordance with the Ministry's "Procedure for Dinsinfection of Drinking Water in Ontario".

.2 Deviation From the 10 State Standards

Table 16 – Deviation from the 10 State Standards

Parameter	Limoges Water Treatment Plant
Laboratory Facilities	No deviation
Well Construction and Well Pump	See below
Disinfection by Sodium Hypochlorite Injection	See below
Aeration System	No deviation
Iron and Manganese Control	No deviation
Waste Handling Facility	No deviation
Chemical Feed System	No deviation
Pump Installations	No deviation
Finished Water Storage	No deviation
General	No deviation
Clearwell	No deviation
Distribution Storage	No deviation
Water Distribution System	No deviation
Filtration	No deviation

Well Construction: The two well supplies were assessed in respect to the requirements of O. Reg. 903 and were found to be satisfactory and in compliance with the exception that no vents were provided. The proposed well head protection study and capture zone determination discussed previously will make the necessary recommendation in terms of development planning and policy issues in order to mitigate any risks of contamination to the groundwater source from the surface.

Disinfection: The problem experienced with trihalomethane formation potential using disinfection by sodium hypochlorite should be eliminated completely by adding ammonia sulphate (chloramination process).

9. Determination of a Monitoring Program

The monitoring program for the entire water works system is to ensure compliance with the DWQS regulation, DWS regulation and Disinfection Procedure as well as conformance to ODWSOG.

The list of parameters, locations and frequencies of samplings are described in the model conditions of the Consolidated Certificate of Approval herein included in Appendix 4. This list has been reviewed with the operating authority for the drinking water system.

A well inspection and maintenance plan was also developed in order to comply with item 6.10 of the CC of A. Refer to Appendix 17.

10. Conclusion

The Village of Limoges water treatment plant, the two associated supply wells as well as the water storage facilities are in compliance with the Drinking Water Quality Standard Regulation, Drinking Water System Regulation and Disinfection Procedure, and conform to the Ontario Drinking Water Standard, Objectives and Guidelines. The only exceptions to the above noted regulations are in respect with the protection of well head areas and water capture zones, trihalomathane formation potential and turbidity monitoring at each well.

The required contact time for chlorine at the plant as well as the minimum of 0.2 mg Cl / L of free chlorine residual was maintained at all times in the treated water and distribution system respectively for the period starting April 3, 2001 and ending December 31, 2003.

The water treatment plant has been in operation since April 3, 2001 (Refer to Appendix 18) at the following treated water capacities:

Table 17- Treated Water Capacity Assessment			
Year	**2003**	**2002**	**2001**
Average Day Flow m^3 / day	548	575	471
Maximum Day Flow m^3 / day	803	986	942
Rated Capacity m^3 / day	2,080	1,495	1,495
% of Maximum Day / Rated Capacity	38.6	66.0	63.0
Note 1 - Calculated only from April to December 2001. 2 - The rated capacity of the plant was increased on May 5, 2003.			

I, the undersigned, hereby declare that to the best of my knowledge, the information contained herein and the information in support of this submission is complete and accurate in accordance with my obligations under the Professional Engineers Act (RSO 1990) and its regulations.

I further declare that this submission has been prepared in reasonable accordance with the published Terms of Reference for this submission, despite any qualifications in the agreement retaining me, and I also acknowledge that the Director and the Owner will be relying on the accuracy of this Engineers' Report.

Prepared by:
LECOMPTE ENGINEERING LTD.

Gaëtan Beauchesne, P. Eng.
September 28, 2004

Verified by:
LECOMPTE ENGINEERING LTD.

Jacques Lecompte, P. Eng.
September 28, 2004

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- Consolidated CofA does not mention Chloramination at all.

- No Diesel Discription

- Mistake on Page 1 Should Read Equipment and not Facility

Applicant: The Corporation of the Nation Municipality
958 Route 500 West
Casselman, Ontario
K0A 1M0

Site Location: Village of Limoges Water Treatment Plant
209 Limoges Road, Limoges, Ontario
The Nation Municipality, United Counties of Prescott and Russell
K0A 2M0

Pursuant to the Safe Drinking Water Act, 2002, S.O. 2002, c. 32, and the regulations made thereunder and subject to the limitations thereof, this approval is issued under Part V of the Safe Drinking Water Act. 2002, S.O. 2002, c.32 to:

The Corporation of the Nation Municipality
958 Route 500 West
Casselman, Ontario
K0A 1M0

PART 1 – DRINKING WATER SYSTEM DESCRIPTION

1.1 For a drinking water system serving the Village of Limoges and the communities of Forest Park, Ben Tardiff Trailer Park and Le Baron Estates, rated as set out in Part 4 consisting of the following:

Supply

Two (2) wells located approximately 115 meters apart on Russland Road supply raw water to the Limoges Water Treatment Plant.

The exact location of each well is as follows:

Well No.	Lot	Concession	Municipality	UTM Coordinates		Zone
				Northing	Easting	
1	21	7	Twp of Russell	5020780	475300	18T
2	21	7	Twp of Russell	5020840	475410	18T

The well pumping station built on top of well no. 1 is located at 2460 Russland Road and it houses the vertical turbine pump, ~~facilities~~ equipment for occasional chlorination and swabbing of the raw watermain, a sodium hypochlorite system, a 45 kiloWatt diesel standby generator set, associated piping, electrical, well control and SCADA systems.

Well No. 1

Well No. 1 is a 250mm diameter groundwater production well consisting of:

- A vertical turbine pump with rated capacity of 24.1 L/sec (382 USGPM) at a total dynamic head of 19.6m (64ft).
- A rate-of-flow control valve
- A magnetic flow meter
- A sodium hypochlorite system consisting of one (1) 750L solution tank, and one (1) metering pump rated at 398 L/hr.

The second well is located at 2476 Russland Road.

Well No. 2

Well No. 2 is a 250mm diameter groundwater production well enclosed with a pre-cast concrete manhole consisting of:

- A submersible pump with rated capacity of 24.1 L/sec (382 USGPM) at a total dynamic head of 19.6m (64ft)
- A rate-of-flow control valve
- A magnetic flow meter

The electrical, well control and SCADA system are housed in an exterior weather proof control panel.

Treatment

The water treatment plant is located at 209 Limoges Road, on lot 30 and concession 1, in the Nation Municipality, in the United Counties of Prescott & Russell. (UTM Zone 18T coordinates = 5021150 N 479500 E).

The water treatment plant has a capacity of 24.1 L/sec (2080m³/day) and consisting of:

Aeration

- One (1) tray aerator with a capacity of 63 L/sec (1000 USGPM).
- One (1) aeration basin with approximate dimensions of 7.0m in diameter, 2.4m high with a usable volume of 92m³ having a capacity of 25L/sec (396 USGPM) and a corresponding detention time of 61 minutes. The aeration basin is complete with two (2) air blowers (one duly and one standby) each rated at 75 SCFM at 6 psi static pressure, 3.75 kW (5HP), 600V 3ph 60Hz discharging air 1.4m above the ground level.

Low Lift Pumping Station

- A low lift pumping station with two (2) centrifugal pumps each rated at 24.1 L/sec (382 USGPM) at a total dynamic head of 13.7m (45ft), 5.6kW (7.5HP), 600V/3ph/60Hz, 1750 RPM complete with rate-of-flow control valve on each pump.
- One (1) flow meter.

Potassium Permanganate Feed System

- A potassium permanganate feed system with six (6) metering pumps (two primary and four secondary) including two (2) chemical mixers and two (2) detention tanks with approximate dimensions of 1.8m in diameter, 3.1m high with a usable volume of 8.0m³ each. The minimum contact time is 5.0 minutes per detention tank.

Clarifier / Filter Train

- Two (2) clarifier and filter trains. Each train consists of one (1) clarifier with approximate dimensions of 5.4m long by 3.55m wide and 3.6m high complete with two (2) cells dual media filter with approximate dimensions of 3.5m long by 3.5m wide and 3.6m high rated at 70m³/hr. Each filter cell is divided into two equal size compartments having layers of 500mm thick of anthracite (0.90 to 1.00mm effective size, uniformity coefficient <1.5) and 450mm thick of greensand (0.30 to 0.35mm effective size, uniformity coefficient <1.6), complete with automatic electrically actuated valves.

  - Filtration Rate: 4.2m/hr during normal operation at Q = 24.1 L/sec
  - Backwash Rate: 54.5 L/sec at a maximum rise rate of 36.6 m/hr. (15 USGPM / ft²)

Backwash System

- Three (3) backwash pumps are available as follows:
  - Two (2) vertical-single stage end suction pumps each having a capacity of 55L/sec (872 USGPM) at a total dynamic head of 24.4m (80ft). 19kW (25HP). 575V/3ph/60Hz. 1760 RPM. complete with discharge piping and valving facilities.
  - One (1) submersible pump having a capacity of 45.4 L/sec (720 USGPM) at a total dynamic head of 15.9m (52ft). 11kW (15HP). 575V/3ph/60Hz. 1750 RPM. complete with discharge piping and valving facilities.

Backwash Water Disposal System

The process water used during a backwash sequence is discarded into an existing sewage collection system via a 300mm diameter gravity sewer pipe.

CT Disinfection

CT provided for disinfection. based on the lowest possible contact time. when sodium hypochlorite solution is discharged into the smallest compartment at the plant clearwell:

- Raw Water Temperature: 7 to 10°C
- Water pH (after aeration): 8.0 to 8.5
- Average Free Chlorine Residual Concentration:
  - At plant clearwell = 1.80mg Cl/L
  - At point of entry to the distribution system = 1.30mg Cl/L

- Contact Time:
  - Within plant clearwell — CT in mg Cl/L•min: 4.1
    (Vmin= 12m³. T_{10}/T=0.3. Qmax=25.7L/sec. T=2.3min)
  - Within connecting main from plant clearwell to water reservoir — CT in mg Cl/L•min: 3.8
    (Dia = 200mm. L=103m. T_{10}/T=1.0. Qmax=25.7L/sec. T=2.1min)
  - Within water reservoir — CT in mg Cl/L•min: 216.6
    (Vmin=520m³. T_{10}/T=0.5. Qmax=26.0L/sec. T=166.6min)
  - Within connecting main from the water reservoir via the booster pump building to the distribution system at the first consumer — CT in mg Cl/L•min: 1.2
    (Dia = 200mm. L=47m. T_{10}/T=1.0. Qmax=26.0L/sec. T=0.9min)
  - Total CT prior to the first consumer CT_{TOTAL} = 225.7mg Cl/L•min
    Corresponding LOG Inactivation for Giardia Cysts = 3.3
    Credit LOG Inactivation for greensand filtration = 2.0
    Total LOG Inactivation for Giardia Cysts = 5.3

Continuous Monitoring of Treated Water:

- One (1) on-line free chlorine residual analyser is installed inside the Booster Pump Building. HACH CL 17. p/s 46780-00. 115/230V. current 0.8/0.4A. with alarm contacts. (230VAC 5A resistive). accuracy ± 5% of reading interconnect to the SCADA system.

  High Chlorine Residual Set Point = 3.0mg Cl/L
  Low Chlorine Residual Set Point = 0.2mg Cl/L

- One (1) on-line turbidity meter installed inside the water treatment plant on the high lift pump common discharge header. GLI (Great Lakes Instruments). 95T-1-A0-B1-N-CSA c/w sensor no. PIN 8220TIAOC3NCSA. 115VAC/1ph/60Hz with alarm contacts. accuracy ±2% of reading on all ranges. interconnected to the SCADA system.

  High Turbidity Alarm Set Point = 1.0 NTU

Chemical Feed Systems

- A primary potassium permanganate system consisting of one (1) 265L capacity solution tank and two metering pumps (one duty and one standby) complete with automatic switchover each rated at 17.4 L/hr with the chemical feed line discharging potassium permanganate solution upstream of the detention tanks. Mixing between permanganate solution and incoming water is provided by a static in-line mixer.

- A secondary potassium permanganate system consisting of two (2) 815L capacity solution tanks, two (2) mixers (one per tank), and four (4) metering pumps (two duty and two standby) complete with automatic switchover each rated at 3.4L/hr with chemical feed line discharging potassium permanganate solution upstream of the filter cells. Mixing between permanganate solution and clarified water is provided at the trough.

- A coagulant feed system consisting of one (1) 9090L capacity solution tank, and two (2) metering pumps (one duty and one standby) complete with automatic switchover each rated at 9.5 L/hr with chemical feed line discharging alum solution downstream of the detention tanks. Mixing between alum solution and water is provided by a static in-line mixer.

- A polymer feed system consisting of one (1) 1400L capacity solution tank, and two (2) progressive cavity pumps (one duty and one standby) each rated at 70L/hr with chemical feed line discharging polymer solution downstream of the detention tanks. Mixing between polymer solution and water is provided by a static in-line mixer.

- A disinfection system consisting of one (1) chemical solution tank, 750L usable volume complete with mixer and two (2) chemical metering pumps (one duty and one standby) complete with automatic switchover each rated at 2.4 L/hr with chemical feed line discharging sodium hypochlorite solution downstream of the clearwell prior to the high lift pump common discharge header.

High Lift Pump System

- Two (2) high lift centrifugal pumps (one duty and one standby) each rated at 25.7 L/sec (2220 USGPM) at a total dynamic head of 14.2m (47ft), 5.6kW (7.5HP), 600V/3ph/60Hz, 1750 RPM, complete with suction and discharge piping and valving facilities.

Clearwell

- One (1) concrete tank with approximate working volume of 170m³.

Water Reservoir

- One (1) on-ground water reservoir with approximate working volume of 1734m³.

Miscellaneous

- All associated process piping, valves, flowmeters, controls and instrumentations, laboratory and office facilities, plumbing, ventilation, heating, lighting, power supply and security system, site piping, landscape works and all other items necessary to have a complete and operable water treatment plant.

Booster Pump Building

- A 15.5m x 4.9m booster pumping building housing seven (7) pumps as follows:
    - Three (3) booster pumps each rated at 8.65L/sec (137 USGPM) against a total dynamic head of 40.0m (131ft), 5.6kW (7.5HP), 575V/3ph/60Hz. 3600 RPM.
    - Three (3) fire pumps each rated at 54.9 L/sec (870 USGPM) against a total dynamic head of 25.6m (84ft), 18.6kW (25HP), 575V/3ph/60Hz. 1800 RPM.
    - One (1) backwash pump rated at 54.9 L/sec (870 USGPM) against a total dynamic head of 25.6m (84ft); 18.6kW (25HP), 575V/3ph/60Hz. 1800 RPM.

      Complete with a motor control center panel and associated suction and discharge manifolds and valving facilities, including all associated site piping, valves, flowmeters, electrical, ventilation controls, and instrumentation systems.

Forest Park Pumphouse

The Forest Park pumphouse is located at the end of Maple Groves Street, on lot 28 and concession 6 in the Nation Municipality, in the United Counties of Prescott & Russell (UTM Zone 18T, coordinates = 5014450 N 479100 E).

The 7.0m x 6.0m pumphouse is located above an underground reservoir and is housing the following:

Chemical Feed System

- A post disinfection system consisting of one (1) chemical solution tank, 100L usable volume complete with mixer and two (2) chemical metering pumps (one duty and one standby) complete with automatic switchover, each rated at 1.78 L/hr with chemical feed line discharging sodium hypochlorite solution into the incoming watermain (after the fill valve). Mixing between the chlorine solution and the incoming water is provided by the piping.

Booster Pumps

- Three (3) vertical turbine pumps, each rated at 8.0 L/sec (127 USGPM) against a total dynamic head of 42.0m (138ft), 7.5kW (10HP), 230V/3ph/60Hz, 1750 RPM, complete with a triplex control panel for variable speed drives.

Fire Pump

- One (1) diesel engine driven vertical turbine pump rated at 47.3 L/sec (750 USGPM) against a total dynamic head of 70.0m (230ft).

Continuous monitoring of treated water:

Continuous monitoring of treated water:

- One (1) on line free chlorine residual analyser is installed inside the pumphouse. HACH CL17D. p/s 46780-00. 115V/230V. current 0.8/0.4A. with alarm contacts (230 VAC 5A resistive) accuracy ± 5% of reading interconnected to the Limoges SCADA system.

  High Chlorine Residual Set Point = 5.0mg Cl/L
  Low Chlorine Residual Set Point = 0.2mg Cl/L

- One (1) on line turbidity meter is installed inside the pumphouse on the common pump discharge header. HACH 1720D. PS 1201 power supply and Aquatrend W/SOM Signal Output Module. 115VAC/1ph/60Hz with alarm contacts. accuracy ± 2% of reading on all ranges. interconnected to the Limoges SCADA system.

  High Turbidity Alarm Set Point = 1.0 NTU

Water Reservoir

- A three (3) cells (including pump well) underground water storage reservoir with a total storage volume of 700m³.

Miscellaneous

- All associated process piping. valves. flowmeters. controls and instrumentations. plumbing. ventilation. heating. lighting. power supply and security system. site piping. landscape works and all other items necessary to have a complete and operable booster pumphouse.

1.2 All in accordance with the applications and plans and other supporting documents listed in Schedule "A". and all other Schedules. which are attached to. and form part of this approval. except as specified in the conditions contained herein.

PART 2 – DEFINITIONS AND INFORMATION

2.1 In this approval. unless the context otherwise requires. words and phrases shall be given the same meaning as those set out in the Safe Drinking Water Act. 2002. S.O. 2002. c.32 and any regulations made in accordance with that act.

2.2 In this approval

"approval" means this entire approval document. issued in accordance with section 36 of the SDWA. and includes any schedules to it.

"director" means a director appointed pursuant to s.6 of the SDWA for the purposes of Part V of the SDWA.

"drinking-water system" includes the works set out in Part 1

"provincial officer" means a provincial officer appointed pursuant to s.8 of the SDWA.

"rated capacity" means the maximum flow rate and maximum daily volume of water which can be treated when operating the drinking-water system under design conditions.

"SDWA" means the Safe Drinking Water Act. 2002. S.O. 2002. c.32. as amended.

2.3 The following information is applicable to this approval

"owner" is The Corporation of the Municipality of the Nation. its successors and assignees

"operating authority" is Ontario Clean Water Agency. its successors and assignees.

PART 3 – GENERAL

Compliance

3.1 The owner and operating authority shall operate the drinking-water system in accordance with the SDWA. any applicable regulations made thereunder. and this approval.

3.2 Despite any condition of this approval to the contrary. the owner and operating authority set out in Part 2 are jointly and severally liable to comply with all conditions of this approval.

3.3 The owner and operating authority shall ensure that any person authorized to carry out work on or operate any aspect of the drinking-water system has been informed of the SDWA. all applicable regulations made in accordance with that act. and this approval and shall take all reasonable measures to ensure any such person complies with the same.

3.4 A copy of this approval shall be kept in a conspicuous place so that it is available for reference by all persons responsible for all or part of the operation of the drinking-water system.

Build, etc. in Accordance

3.5 Except as otherwise provided by this approval, the drinking-water system shall be designed. developed. built. operated and maintained in accordance with Part 1 above and the documentation listed in Schedule "A".

Interpretation

3.6 Where there is a conflict between the provisions of this approval and any other document. the following hierarchy shall be used to determine the provision that takes precedence:

i. The SDWA:

ii. A condition imposed in this approval in accordance with s.38 of the SDWA:

iii. Any regulation made under the SDWA;

iv. This approval:

v. Any application documents listed in Schedule "A" from most recent to earliest: and

vi. All other documents listed in Schedule "A" from most recent to earliest.

3.7 The requirements of this approval are severable. If any requirement of this approval. or the application of any requirement of this approval to any circumstance. is held invalid or unenforceable. the application of such requirement to other circumstances and the remainder of this approval shall not be affected thereby.

3.8 Nothing in this approval shall be read to provide relief from the need for strict compliance with the Environmental Assessment Act.

Other Legal Obligations

3.9 The issuance of and compliance with the conditions of. this approval does not:

i relieve any person of any obligation to comply with any provision of any applicable statute. regulation or other legal requirement; or

ii limit in any way the authority of the ministry to require certain steps be taken or to require the owner to furnish any further information related to compliance with this approval.

3.10 For greater clarity, nothing in this approval shall be read to provide relief from regulatory requirements in accordance with section 38 of the SDWA, except as provided in Part 9.

Adverse Effects

3.11 Nothing in this approval shall be read as to permit: i) the discharge of a contaminant into the natural environment that causes or is likely to cause an adverse effect; or ii) the discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters.

3.12 All reasonable steps shall be taken to minimize and ameliorate any adverse effect on the natural environmental or impairment of the quality of water of any water resulting from the operation of the drinking-water system including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

3.13 Fulfillment of one or more conditions imposed by this approval does not eliminate the requirement to fulfill any other condition of this approval or the requirements of any applicable statute, regulation, or other legal requirements resulting from any act or omission that causes or is likely to cause an adverse effect on the natural environment or the impairment of water quality.

Change of Owner

3.14 The owner or the operating authority, as the case may be, shall notify the director, in writing, of any of the following changes within 30 days of the change occurring:

i. change of owner or operating authority;

ii. change of address;

iii. change of partners where the owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O.

iv. change of name of the corporation where the owner or operating authority is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c.C.39.

3.15 In the event of any change in ownership of the drinking-water system, other than change to a successor municipality, the owner shall notify the successor of and provide the successor with a copy of this approval, and the owner shall provide a copy of the notification to the district manager of the local office of the ministry and the director.

Inspections

3.16 No person shall hinder or obstruct a provincial officer in the performance of their duties, including any and all inspections authorized by the SDWA.

Information

3.17 Any information requested, by the ministry, concerning the drinking-water system and its operation under this approval, including but not limited to any records required to be kept by this approval shall be provided to the Ministry, upon request.

3.18 Records required by or created in accordance with this approval, unless specifically referenced in s.12 of O.Reg. 170/03, shall be retained for a least 5 years in a location where a provincial officer who is inspecting the treatment system can conveniently view them.

3.19 The receipt of any information by the ministry or the failure of the ministry to prosecute any person or to require any person to take any action, under this approval or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:

i. an approval, waiver, or justification by the ministry of any act or omission of any person that contravenes any term or condition of this approval or any statute, regulation or other legal requirement, or

ii. acceptance by the ministry of the information's completeness or accuracy.

PART 4 – PERFORMANCE

Rated Capacity

4.1 The drinking-water system shall not be operated to exceed the rated capacity for maximum flow rate and maximum volume set out below:

Treatment System	Maximum Flow Rate (L/sec)	Maximum Daily Volume (m^3/day)
Limoges WTP	24.1	2080

4.2 The groundwater wells have been approved to supply water at the following maximum flow rates:

- Well No. 1 1444 L/min or 2080m³/day
- Well No. 2 1444 L/min or 2080m³/day

Increase to Rated Capacity

4.3 Despite condition 4.1, the drinking water system may be operated at a rate above the rated capacity set out in condition 4.1 where necessary for:

i. fighting a large fire, or

ii. the maintenance of the drinking water system.

4.4 Condition 4.3 shall not be construed to allow drinking-water to be supplied that does not meet all other applicable standards and legal requirements.

PART 5 – MONITORING AND RECORDING

Flow measuring devices

5.1 Install a sufficient number of flow-monitoring devices within the drinking-water system to permit the measurement and recording of:

i. the daily maximum flow rate and maximum daily volume of water conveyed into the treatment system: and

ii. the daily maximum flow rate and maximum daily volume of water conveyed from the treatment system to the distribution system.

5.2 Records shall be maintained that set out the parameters recorded in accordance with condition 5.1, and where the parameters measured exceed the daily peak flow rate and daily maximum volume set out in Part 1, the amount, date, time and duration of the exceedence shall also be recorded.

Calibration of flow measuring devices

5.3 All flow measuring devices must be checked and calibrated in accordance with the manufacturer's instructions.

5.4 If the manufacturer's instructions do not indicate how often to check and calibrate the flow measuring devices, the equipment must be checked and calibrated at least once every year during which the drinking-water system is in operation.

PART 6 – OPERATIONS AND MAINTENANCE

Chemical standards

6.1 All chemicals and materials used in the operation of the drinking-water system that come into contact with water within the system shall meet all applicable standards set by both the American Water Works Association (AWWA) and the American National Standards Institute (ANSI) safety criteria standards NSF/60 and NSF/61.

6.2 The most current chemical and material product registration documentation from a testing institution accredited by either the Standards Council of Canada or by the American National Standards Institution shall be available at all times for each chemical and material used in the operation of the drinking-water system that comes into contact with water within the system.

6.3 Condition 6.2 does not apply in the context of any particular chemical or material where the Owner has written documentation signed by the director that indicates that the Ministry is satisfied that the chemical or material is acceptable for use within the drinking-water system and the chemical or material is only used as permitted by the documentation.

Operations manual

6.4 An up-to-date operations manual shall be maintained and made available at the drinking-water system for reference to all persons.

6.5 The operations manual shall include at a minimum:

i. the requirements of this approval and associated procedures;

ii. the operation and maintenance recommendations from the most recent engineers' report:

iii. procedures for the monitoring and recording of in-process parameters necessary for the control of the treatment system and assessing the performance of the drinking-water system:

iv. procedures for the operation and maintenance of monitoring equipment:

v. contingency plans and procedures for the provision of adequate equipment and material to deal with emergencies. upset and equipment breakdown:

6.6 Procedures necessary to the operation of any physical alterations of the drinking-water system shall be incorporated into the operations manual prior to the alterations coming into operation.

Drawings

6.7 An up-to-date Process and Instrumentation Diagram for the treatment system shall be kept on site at the drinking-water system.

6.8 All drawings and diagrams in the possession of the owner or operating authority that show the treatment system as constructed shall be retained.

6.9 An alteration to the treatment system shall be incorporated into Process and Instruction Diagrams and record drawings and diagrams within one year of the substantial completion of the alteration and shall be retained and shall be made readily available for inspection by Ministry staff.

Well Inspection and Maintenance

6.10 A well inspection and maintenance plan shall be developed and implemented within (3) months of the issuance of this Certificate of Approval. The plan shall include:

i. scheduled inspection frequency for all on-site wells (including all production wells, standby wells, test wells, and monitoring wells) by appropriately qualified professional, and

ii. defined well inspection and maintenance procedures for the entire well structure including all above and below grade well components, and

iii. remedial action plans to be implemented where inspection indicates non-compliance with respect to regulatory requirements and/or risk to raw well water quality.

Operational Checks, Sampling and Testing

6.11 The owner and operating authority of the drinking water system shall ensure that samples of raw water and treat water are collected and analysed for a least the following parameters at the indicated locations and frequencies:

RAW WATER
(WATER SAMPLES TAKEN AT DISCHARGE POINTS FROM EACH GROUND WATER WELL)

Frequency	Every 36 Months	Quarterly	Weekly
Parameters	Every Inorganic Parameters set out in Schedule 23 of O.Reg. 170/03 Every Organic Parameters set out in Schedule 24 of O.Reg. 170/03	Alkalinity Hardness Calcium Sodium Iron Copper Lead Zinc Arsenic Aluminum Manganese Conductivity Chloride Sulphate Ammonia – Ammonium (N) Total Kjeldahl Nitrogen Nitrite Nitrogen Nitrate Nitorgen Dissolved Organic Carbon Phenols Total Dissolved Solids	Total Coliforms Fecal Coliforms pH Turbidity Colour

In addition to the above routine sampling program. on-site testing should be performed and results recorded, at the minimum frequency of once a day, for the following parameters:

- pH. Aluminium. Colour. Turbidity. Temperature, Hydrogen Sulphate. Iron and Manganese.

TREATED WATER
(WATER SAMPLES TAKEN AT A POINT AT WHICH WATER ENTERS THE DISTRIBUTION SYSTEM)

Frequency	Every 36 Months	Quarterly	Weekly
Parameters	*Every Inorganic Parameters set out in Schedule 23 of O.Reg. 170/03 *Every Organic Parameters set out in Schedule 24 of O.Reg. 170/03 Every 60 months Sodium	Alkalinity Hardness Calcium Aluminum Iron Copper Lead Zinc Arsenic Manganese Conductivity Chloride Sulphate Ammonia – Ammonium (N) Total Kjeldahl Nitrogen Nitrite Nitrogen Nitrate Nitorgen Dissolved Organic Carbon Total Trihalomethanes	**Total Coliforms **Fecal Coliforms or Escherichia Coli Background Colony Counts or Hetertrophic Plate Counts (on at least 25% of the sample taken under ** above) pH Turbidity Colour Iron Manganese

* If a test result obtained for a parameter listed in Schedule 23 and 24 exceeds half of the standard prescribed for the parameter in Schedule 2 to the ODWQ standard. the frequency of sampling and testing for the parameter shall be increased to quarterly.

In additions to the above routine sampling program. on-site testing should be performed and results recorded. at the minimum frequency of once a day. for the following water parameters:

- pH. Colour. Turbidity. Temperature. Free Chlorine Residual. Total Chlorine Residual. Hydrogen Sulphide. Iron & Manganese.

DISTRIBUTION SYSTEM
(WATER SAMPLES TAKEN AT REMOTE LOCATIONS AT WHICH WATER ENTERS THE DISTRIBUTION SYSTEM)

Frequency	Annually	Quarterly	Weekly
Parameters	Lead	Alkalinity Hardness Calcium Colour Iron Copper pH Aluminum Zinc Arsenic Manganese Conductivity Chloride Sulphate Ammonia + Ammonium (N) Total Kjeldahl Nitrogen Nitrite Nitrogen Nitrate Nitorgen Dissolved Organic Carbon Total Trihalomethanes	Total Coliforms Fecal Coliforms or Escherichia Coli Background Colony Counts or Hetertrophic Plate Counts Total Chlorine Residual Free Chlorine Residual Colour

Note: The minimum number of bacteriological samples to be collected from different locations of sampling points shall be determined by the following formula:

8 – 1 per 1000 population

PART 7 – FUTURE ALTERATIONS

Approved future alterations

8.1 None.

Certificate of compliance

8.2 None.

PART 8 – STUDIES AND UPGRADES REQUIRED

(a) All works and measures necessary to ensure the effective treatment and integrity of the works, including but not limited to:

(i) Provide works necessary to consistently reduce THM in the distribution system to within ODWS.

Requirement not an approval

8.2 The owner shall not construct any works required by this part until all associated approvals. licenses and permits have been obtained from the Ministry.

PART 9 – RELIEF FROM REGULATORY REQUIREMENTS

Relief from regulatory requirements

9.1 Not applicable.

Conditions in exchange for relief from regulatory requirements

9.2 Not applicable.

SCHEDULE –A

The following supporting documents form part of this approval.

1. First Engineers' Report dated October 2004
Plans. Design Brief. and Design calculations submitted with the report.

2. The original applications for approval. including design calculations, engineering drawings and reports. and other supporting documents prepared in support of any previous certificate (s) of approval issued for any works now approved and replaced by this approval. unless this approval states otherwise.

This Certificate of Approval revokes and replaces Certificate (s) of Approval No. 7-1250-97-986 issued on January 9. 1998 and 0307-5QENDY issued on August 29th, 2003.

All or part of this approval may be reviewable in accordance with the provisions of Part X of the SDWA. In accordance with Section 129 (1) of the Safe Drinking Water Act. Chapter 32 Statutes of Ontario. 2002. as amended, you may be written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice. require a hearing by the Tribunal. Section 129 (2) sets out a procedure upon which the 15 days may be extended by the Tribunal Section 129 (3) of the Safe Drinking Water Act. Chapter 32 Statutes of Ontario. 2002. provides that the Notice requiring the hearing shall state.