



AMENDING APPROVAL

PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT R.S.A. 2000, c.E-12, as amended.

APPROVAL NO. 928-02-02

APPLICATION NO. 005-928

EFFECTIVE DATE: June 25, 2003

EXPIRY DATE: December 1, 2009

APPROVAL HOLDER City Of Lethbridge

ACTIVITY: Construction, Operation and Reclamation of a waterworks system

..... for the City of Lethbridge

..... is amended as per the attached terms and conditions.

Designated Director under the Act DAVE MCGEE

Date Signed June 25, 2003

TERMS AND CONDITIONS ATTACHED TO APPROVAL

Environmental Protection and Enhancement Act Approval No. 928-02-00 is hereby further amended as follows:

1. **SECTION 1.1: DEFINITIONS** is amended by replacing 1.1.2 (l) with the following:

1.1.2 (l) “*Giardia* cyst log removal” means the base 10 logarithm of the ratio of the raw water concentration of total *Giardia* cysts to the potable water concentration of total *Giardia* cysts;

2. **SECTION 1.1: DEFINITIONS** is amended by adding the following:

1.1.2 (u) “Virus log removal” means the base 10 logarithm of the ratio of the raw water concentration of viruses to the potable water concentration of viruses;

(v) “UV” means ultraviolet light;

(w) “treated water” means water that has been partially treated by the water treatment plant but has not undergone complete treatment;

(x) “filtered water” means water immediately after a filter before it is combined with any other filtered water, undergone any additional treatment, or had any additional chemical added to it;

(y) “potable water” means water that has undergone complete treatment through the water treatment plant.

3. **SECTION 3.1: CONSTRUCTION** is amended by adding the following:

3.1.2 The approval holder shall construct the UV Disinfection System according to the application received by the Director on November 29, 2002 and additional information submitted to the Director as part of the application.

3.1.3 The approval holder shall commence operation of the UV Disinfection System by December 1, 2003.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4. **SECTION 4.1: WATERWORKS SYSTEM** is amended by replacing 4.1.1 with the following:

4.1.1 Up to and including December 31, 2003 the waterworks system shall consist of:

- (a) a surface water supply from the Oldman River with the diversion weir located at NE 25-8-22-W4M;
- (b) a water treatment plant located at SE 36-8-22-W4M with treatment capabilities for:
 - (i) taste and odour control when required,
 - (ii) corrosion and scale control,
 - (iii) pre-treatment chlorination,
 - (iv) flocculation,
 - (v) clarification,
 - (vi) dual media filtration,
 - (vii) disinfection, and
 - (viii) fluoridation;
- (c) a clearwell with a total volume of 5,500 cubic metres;
- (d) treated water reservoirs as listed in Appendix I with a total volume of 77,200 cubic metres;
- (e) two metered truck fill stations located on 13 Street North and 24 Avenue South, and
- (f) a water distribution system within the City of Lethbridge.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

5. **SECTION 4.1: WATERWORKS SYSTEM** is amended by adding the following:
- 4.1.2 Effective January 1, 2004 the approval holder shall operate and maintain a waterworks system which shall include all of the following:
- (a) a source consisting of surface water from the Oldman River located at NE 25-8-22 W4M;
 - (b) a water treatment plant with treatment capabilities for:
 - (i) taste and odour control when required,
 - (ii) corrosion and scale control,
 - (iii) pre-treatment chlorination,
 - (iv) flocculation,
 - (v) clarification,
 - (vi) chlorine gas disinfection
 - (vii) dual media filtration,
 - (viii) UV disinfection,
 - (ix) fluoridation,
 - (x) chloramination
 - (c) a clearwell with a total volume of 5,500 cubic metres;
 - (d) potable water reservoirs as listed in Appendix I with a total volume of 77,200 cubic metres;
 - (e) two metered truck fill stations located on 13 Street North and 24 Avenue South; and
 - (f) a water distribution system.
- 4.1.3 Effective January 1, 2004 the approval holder shall receive the *Giardia* cyst log removal credit listed in TABLE 4-1A when the associated condition is achieved.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4-1A – GIARDIA CYST LOG REMOVAL CREDITS

TREATMENT PROCESS	CONDITION	GIARDIA CYST LOG REMOVAL CREDIT
Conventional Clarification and Filtration	Turbidity of Filtered Water limit in Table 5-2	3.0
UV Disinfection	UV Transmittance, UV Sensor Reading, and the Flow rate through each UV reactor limits in TABLE 5-2	1.0

4.1.4 Effective January 1, 2004 the approval holder shall receive the Virus log removal credit listed in TABLE 4-1B when the associated condition is achieved.

TABLE 4-1B – VIRUS LOG REMOVAL CREDITS

TREATMENT PROCESS	CONDITION	VIRUS LOG REMOVAL CREDIT
Conventional Clarification and Filtration	Turbidity of Filtered Water limit in Table 5-2	2.0

4.1.5 Effective January 1, 2004 the remainders of the *Giardia* Cyst Log Removal and the Virus Log Removal required in TABLE 5-2 that is not given credit for in TABLE 4-1A and TABLE 4-1B shall be achieved by using the CT disinfection concept as described in Alberta Environment’s *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems – December 1997*.

6. **SECTION 4.5: EMERGENCY REPORTING** is amended by replacing 4.5.7 (d) with the following:

4.5.7 (d) turbidity of the water entering the distribution system exceeds 1.0 NTU.

7. **SECTION 4.5: EMERGENCY REPORTING** is amended by deleting “**CHLORINE CONTACT TIME** Not used at this time”.

8. **SECTION 4.5: EMERGENCY REPORTING** is amended by adding the following:

UV DISINFECTION (Effective January 1, 2004)

4.5.9 Any failure of the UV disinfection system must be reported immediately as per Condition 2.1.1 to the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

CHLORINE CONTACT TIME (Effective January 1, 2004)

4.5.10 If the daily concentration of free chlorine residuals in the water measured at the location point where the Virus log reduction is determined is less than 0.5 mg/L as free chlorine residual, the approval holder shall immediately:

- (a) increase disinfection until the concentration of free chlorine residuals of at least 0.5 mg/L free chlorine residuals is achieved;
- (b) increase free chlorine residuals monitoring frequency to a minimum of once per hour until a concentration of free chlorine residuals of at least 0.5 mg/L as free chlorine residual is achieved; and
- (c) report to the Director at 1-780-422-4505.

4.5.11 If the disinfection of the water entering the distribution system does not meet the required Virus log reduction the approval holder shall:

- (a) optimize the disinfection systems as follows:
 - (A) increase disinfection until the concentration of free chlorine residual at the location point where Virus log reduction is determined is able to achieve the required CT value; or
 - (B) increase the contact time through the volume where a free chlorine residual is maintained;
- (b) report to the Director at 1-780-422-4505; and
- (c) take additional corrective action as authorized in writing by the Director.

9. **SECTION 5.1: WATERWORKS** is amended replacing 5.1.1 with the following:

5.1.1 The waterworks system shall be operated to comply as follows:

- (a) up to and including December 31, 2003 the limits specified in TABLE 5-1; and
- (b) effective January 1, 2004 the limits specified in TABLE 5-2.

10. **SECTION 5.1: WATERWORKS** is amended by adding the following:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 5-2: LIMITS

PARAMETERS	DESIGNATED SAMPLING LOCATION	LIMIT
<i>Giardia</i> Cyst Log Removal	Demonstrated through the combination of treatment provided	≥ 4.0
Virus Log Removal	Demonstrated through the combination of treatment provided	≥ 4.0
CT performance ratio	Prior to ammonia addition	≥ 1.0
Turbidity of Filtered Water	After each filter and before the water is brought together into a common filtered water header or tank	<p>a) When the monthly average of daily raw water turbidity is ≥ 1.5 NTU the filtered water turbidity shall:</p> <ul style="list-style-type: none"> • be < 0.3 NTU in at least 95% of the measurements or time in each month, and • not exceed 0.3 NTU for more than 12 consecutive hours; • not exceed 1 NTU at any time; <p>b) When the monthly average of daily raw water turbidity is < 1.5 NTU, the filtered water turbidity shall:</p> <ul style="list-style-type: none"> • be < 0.2 NTU in at least 95% of the measurements or time in each month, and • not exceed 0.2 NTU for more than 12 consecutive hours; • not exceed 1 NTU at any time.
Turbidity of Potable Water	Random location in the water distribution system	≤ 5 NTU
Combined Chlorine Residual of Potable Water	Entering the water distribution system	≥ 1.0 mg/L, but < 3.0 mg/L
Combined Chlorine Residual of Potable Water	Random location in the water distribution system	≥ 0.5 mg/L
UV Transmittance of filtered water	Filtered water prior to UV reactor	≥ 80% per cm
UV Sensor Reading	In the UV reactor except during startup and shutdown	As a percentage to demonstrate > 40 mJ/cm ²
Maximum flow rate of water pumped through each UV Reactor	Through each UV reactor chamber	< 50 million litres per day measured instantaneously
pH of Potable Water	Entering the water distribution system	6.5 – 8.5
Fluoride Concentration	Entering the water distribution system	≥ 0.6 mg/L or ≤ 1.0 mg/L

TERMS AND CONDITIONS ATTACHED TO APPROVAL

11. **SECTION 5.1: WATERWORKS** is amended by replacing 5.1.3 with the following:

5.1.3 In addition to the limits specified by 5.1.1 the waterworks system shall be maintained and operated in a manner so that the produced water and distributed water shall comply with the maximum acceptable concentrations specified in the *Guidelines for Canadian Drinking Water Quality (GCDWQ)*, as amended.

12. **SECTION 6.1 WATERWORKS** is amended by replacing 6.1.1 and 6.1.2 with the following:

6.1.1 The approval holder shall monitor the waterworks system as follows:

- (a) up to and including December 31, 2003 as required in TABLE 6-1 and the waste streams from the water treatment plant as required in TABLE 6-2; and
- (b) effective January 1, 2004 as required in TABLE 6-1A and the waste streams from the water treatment plant as required in TABLE 6-2.

6.1.2 The approval holder shall report as follows:

- (a) up to and including December 31, 2003 as required in TABLE 6-1 and TABLE 6-2; and
- (b) effective January 1, 2004 as required in TABLE 6-1A and TABLE 6-2.

13. **SECTION 6.1 WATERWORKS** is amended by adding the following:

TABLE 6-1A: MONITORING AND REPORTING - WATERWORKS SYSTEM

PARAMETERS	FREQUENCY	SAMPLE TYPE	SAMPLING LOCATION	NON-EMERGENCY REPORTING FREQUENCY	
				MONTHLY	ANNUAL
WATERWORKS SYSTEM					
Raw water Turbidity	Continuous monitoring, record daily average once per day	Continuous monitoring	Prior to chemical addition	as per 6.1.5	as per 6.1.8
Raw water pH	Continuous monitoring, record daily average once per day	Continuous monitoring	Prior to chemical addition		
Raw water Fluoride	Once per day	Grab sample	Prior to chemical addition		

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PARAMETERS	FREQUENCY	SAMPLE TYPE	SAMPLING LOCATION	NON-EMERGENCY REPORTING FREQUENCY	
				MONTHLY	ANNUAL
Raw water Volume	Continuous monitoring, record daily total once per day	Continuous monitoring	Entering water treatment plant	as per 6.1.5	as per 6.1.8
Potable Water Volume	Continuous monitoring, record daily total once per day	Continuous monitoring	Entering the water distribution system		
Filtered Water Turbidity	Continuous monitoring, record daily average & daily maximum once per day	Continuous monitoring	After each filter producing water		
CT _{actual} by Free Chlorine	Continuous monitoring, record daily average & daily minimum once per day	Calculated	Prior to ammonia addition		
CT _{required} by Free Chlorine	Continuous monitoring, record daily average once per day	Determined from the "CT Values for inactivation of <i>Viruses</i> by Free Chlorine" in Appendix B of the AENV standards			
CT performance ratio	Continuous monitoring, record daily average & daily minimum once per day	CT _{lowest actual} / CT _{required}	Prior to ammonia addition		
Potable Water Turbidity	Continuous monitoring, record daily average	Continuous monitoring	Entering the water distribution system		
Potable Water Turbidity	Once per week	Grab sample	Random location in the water distribution system		
pH of Potable Water	Continuous monitoring, record daily average	Continuous monitoring	Entering the water distribution system		
Combined Chlorine Residual of Potable Water	Continuous monitoring, record daily average & daily minimum once per day	Continuous monitoring	Entering the distribution system		
Combined Chlorine Residual of Potable Water	Five days per week	Grab sample	Random location in the water distribution system		
Combined Chlorine Residual of Potable Water	Once per week	Grab sample	At each potable water reservoir		
UV transmittance of filtered water	Once per day	Grab	Filtered water prior to entering the UV reactor chamber		
UV sensor reading	Continuous monitoring, record daily average & daily minimum once per day	Continuous monitoring	In the UV reactor chamber		

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PARAMETERS	FREQUENCY	SAMPLE TYPE	SAMPLING LOCATION	NON-EMERGENCY REPORTING FREQUENCY	
				MONTHLY	ANNUAL
Flow rate of water pumped through the UV Reactor	Continuous monitoring, record daily average & daily maximum once per day	Continuous monitoring	Through the UV reactor chamber	as per 6.1.5	as per 6.1.8
Raw Water Fluoride Concentration	Once per month, analyzed by an independent laboratory	Grab sample	Prior to chemical addition		
Potable Water Fluoride Concentration	Once per day	Grab sample	Water entering the water distribution system		
Potable Water Fluoride Concentration	Once per month, analyzed by an independent laboratory	Grab sample	Water entering the water distribution system		
Volume of water to which Fluoride was added	Total in a day	Continuous monitoring	After Fluoridation		
Mass of Fluoride added to Water in kg	Total in a day	N/A	N/A		
Mass of Fluoride in the Feeding Equipment in kg	Total in a day	N/A	N/A		
Bacteria in Potable Water (Bacteriological examination)	As required by the Guidelines for Canadian Drinking Water Quality, as amended	Grab sample	Random location in the water distribution system		
APPROVAL CONTRAVENTION EMERGENCY REPORTING					
If any application of fluoride is discontinued				Immediate reporting as per 2.1.1 and Monthly and annual reporting to the Director	
If the disinfection system fails					
If any terms or conditions of this approval have been contravened					
Any emergency reporting as required in Section 4.5					

14. SECTION 6.1 WATERWORKS is amended by replacing 6.1.7 and 6.1.8 with the following:

6.1.7 The approval holder shall submit one copy of an Incident Report of any incident requiring reporting as per 2.1.1 and outlined in TABLE 6-1 and TABLE 6-2. The report shall be submitted to the Director on or before the end of the month following the month in which the information on which the report is based was

TERMS AND CONDITIONS ATTACHED TO APPROVAL

collected.

- 6.1.8 In addition to the requirements of 6.1.1 and 6.1.2, the approval holder shall also include all the following information in the Annual Waterworks Report:
- (a) the monthly average of each parameter monitored, as outlined in TABLE 6-1, TABLE 6-1A, and TABLE 6-2;
 - (b) maximum and minimum daily value of each parameter monitored, as outlined in TABLE 6-1, TABLE 6-1A, and TABLE 6-2, for each month;
 - (c) the result of the chemical analysis of water as required in 6.1.4;
 - (d) name of the supervising operator responsible for the operation of the waterworks system;
 - (e) any incidence which required reporting as per 2.1.1;
 - (f) a calculation of the uncommitted hydraulic reserve capacity for the water treatment plant; and
 - (g) a summary of any operational problems.

15. **APPENDIX I – TREATED WATER STORAGE RESERVOIRS** is replaced by the following:

**APPENDIX I
POTABLE WATER STORAGE RESERVOIRS**

Reservoir Name	Storage Capacity in cubic metres
Uplands	21500
West Lethbridge	23500
North East	13700
Mayor Magrath	18500

DATED June 25, 2003

DESIGNATED DIRECTOR UNDER THE ACT
DAVE MCGEE