



OPERATIONAL PLAN

City of Elliot Lake Drinking Water System

Revision 9

This Operational Plan defines and documents the Quality Management System (QMS) for the City of Elliot Lake Drinking Water System. It sets out the policies and procedures with respect to quality management in accordance with the requirements of the Province of Ontario's Drinking Water Quality Management Standard (DWQMS).

OPERATIONAL PLAN REVISION HISTORY

Date	Revision	Description of Revision
August 8, 2012	2	Operational Plan updated
December 17, 2012	3	Element 15 updated
November 25, 2013	4	Removal of Mechanic for Element 9 & 10
January 19, 2014	5	Reference to ORO responsibility in Element 9
November 25, 2014	6	Change of position – Top Management
February 6, 2015	7	Amendments to Document and Records
January 18, 2016	8	Updated signed commitment
January 18, 2016	8	Job titles and new flow chart
September 20, 2016	9	Job Title Change
September 20, 2016	9	Raw water characteristics updated to 2015

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1 Quality Management System (QMS)

The City of Elliot Lake Quality Management System (QMS) is structured and documented with the purpose of:

1. Establishing policy and objectives with respect to the effective management and operation of the Drinking Water System;
2. Understanding and controlling the risks associated with the Drinking Water System's * activities and processes;
3. Achieving continuous improvement of the QMS and the Drinking Water System's performance.

*The Drinking Water System encompasses the Water Treatment Plant (WTP), and the Distribution System.

2 Quality Management System Policy

The Corporation of the City of Elliot Lake, as the owner and the operating authority of the Drinking Water System, is committed to:

- Managing the treatment, distribution and supply of clean, safe drinking water to its consumers,
- Ensuring that its drinking water system operation meets or exceeds all applicable legislative and regulatory requirements, through the continual maintenance and improvement of its QMS.

3 Commitment and Endorsement

This Operational Plan supports the overall goal of the City of Elliot Lake to provide safe drinking water.

The Operations Department is responsible for developing, implementing, maintaining and continually improving its QMS and will do so in a manner that ensures compliance with applicable legislation. Through the endorsement of this Operational Plan, the Owner commits to cooperating in any reasonable request of the Operations Department to facilitate this goal.

Top management of the Operating Authority and the Owner represented by Mayor and Chief Administrative Officer (CAO) have approved the QMS for the Drinking Water System as documented in this Operational Plan.

Operating Authority Endorsement & Approval



Sean McGhee
Director of Operations

18 January 2016

Date

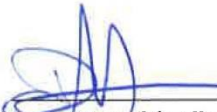
Owner Endorsement & Approval



Jeff Renaud
Chief Administrative Officer

Jan 18/16

Date



Dan Marchisella
Mayor

Jan 18, 2016.

Date

4 Quality Management System Representative (QMS Rep)

All personnel have a role and associated responsibilities within the QMS. The QMS Representative for the City of Elliot Lake is the Working Foreman of Operations.

The QMS Rep is responsible for:

- Administering the QMS by ensuring processes and protocol needed for the QMS are established and maintained,
- Reporting on QMS performance and identifying opportunities for improvement,
- Ensuring that current versions of documents related to the QMS are in use,
- Ensuring personnel are aware of all applicable legislative and regulatory requirements that pertain to their operational duties, and
- Promoting awareness of the QMS to Water Systems personnel.

4 Document and Records Control

Refer to Appendix A for QMS Procedure QMSP-01 Document and Records Control.

5 Drinking Water System

Owner and Operating Authority

The City of Elliot Lake is the Owner and the Operating Authority for the Drinking Water System.

System Description

Water Treatment Plant

The WTP is classified as a Class 2 plant located at 200 Spine Road in the City of Elliot Lake. It is a direct filtration plant with the following characteristics:

Intake

- a 295m long, 900 mm diameter high density polyethylene raw water intake pipe with fiberglass intake structure and crib having a capacity of 36,000 m³/day;

Low-Lift Pumping Station

- A low-lift pumping station having a firm capacity of 28,900 m³/day, equipped with two (2) removable manually cleaned inlet screens, four (4) vertical turbine low-lift pumps (1 pump at 5,200 m³/day; 2 pumps, each at 18,100 m³/day; and 1 pump at 8,200 m³/day),
- One (1) venturi tube water meter on the raw water main located in the main plant;

Plant Enclosure Building

A plant enclosure building approximately 100 m long by 30 m wide by 8 m high housing laboratory, workshop, garage, office and washroom facilities and process systems equipment as follows:

Mixing

Two (2) cell rapid mix tanks with one (1) 15 kW mixer and one 3.75 kW submersible. Total residence time at design flow 5 min.

Flocculation Tanks

Four (4) parallel set of three (3) hydraulic spiral flow flocculation tanks arranged in series; Three (3) rectangular filters with dual media (anthracite/sand) and hydraulic surface wash rated at 10.0 m/hr at design flow each equipped with filter to waste system, Two (2) vertical turbine backwash pumps each rated at 250 l/s and capable of providing backwash rate of 45 m/h with both pumps in operation

Clearwell

A 2,300 m³ capacity baffled Clearwell with a common filter effluent chamber, and two independent storage/chlorine contact tanks each of which can be isolated for service, High lift pumping station

Four (4) vertical turbine centrifugal high lift pumps as follows:

One (1) pump rated at 3 900 m³/day

Two (2) pumps rated at 8 600 m³/day

One (1) pump rated at 18 600 m³/day

One (1) venturi tube flow meter installed on the high lift pump header.

Disinfection System

A chlorine gas disinfection system consisting of two (2) one ton cylinder weight scales with vacuum regulators and three (3) (1 duty, 2 stand-by) 90 kg/d capacity chlorinators with storage space for seven (7) one-ton cylinders and all associated equipment including gas detector and alarm system, all located in a separate room of the Plant Enclosure Building.

Chlorine solution feed lines to the chlorine solution diffusers located in the raw well and the filter effluent chamber

Chemical Storage and Feed System

Coagulant feed system consisting of one 27,000 l capacity PACl (or alternative liquid alum) storage tank with a remote filling system, two (2) (one duty, one stand-by) chemical feed metering pumps with a flow capacity of 17.6 l/h, and chemical feed line(s) to the rapid mix tank

pH/Alkalinity Adjustment

Pre and post lime feed systems for alkalinity and pH adjustment consisting of:

One thirty ton silo and volumetric feeder into a slurry make-up tank and

two Peristaltic pumps with a flow capacity of 476 l/h

a stand-by hopper, volumetric feeder and feed pump as a complete stand-by to the silo system together with chemical feed lines to raw water pipe just up-stream of the rapid mix tank and to the high lift pump header

Fluoride

A fluoride feed system consisting of a 4,500 l hydrofluosilicic acid bulk storage tank and one metering pump with a flow capacity of approximately 3.3 l/h

Residue Management System

A filter backwash wastewater settling and disposal facility consisting of:

Three (3) settling surge tanks capacity 235 m³ each

One (1) sludge holding/thickening tank capacity 60 m³

Two (2) sludge pumps each rated at a capacity of 4 l/s (one duty one standby) for transfer of sludge from the settling tanks to the sludge holding tank or for tank truck loading

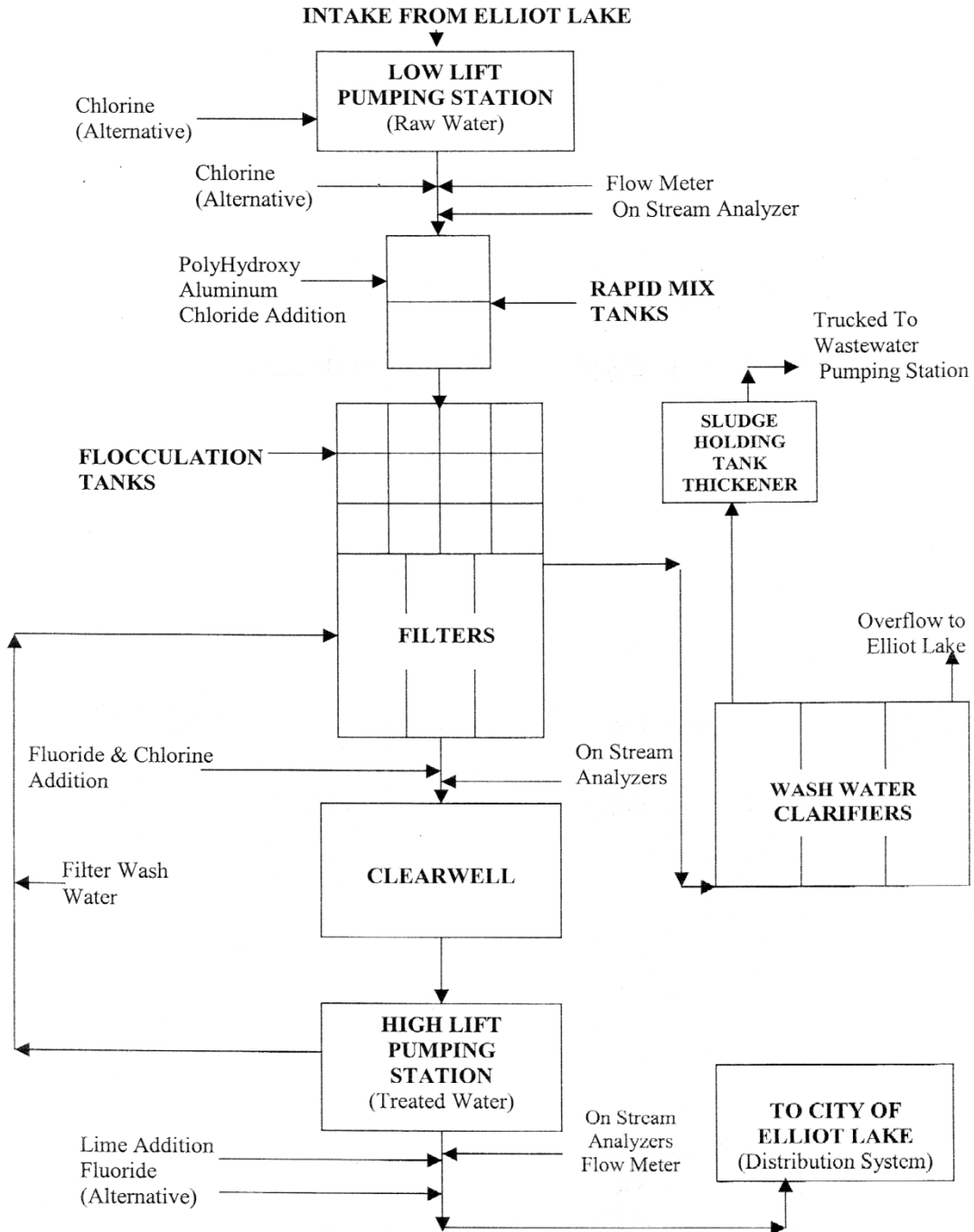
Supernatant is discharged to Elliot Lake

Stand-by Power Facility

A 550 kW diesel engine driven stand-by power generator set and associated equipment, located in a separate room of the Plant Enclosure Building, sized to operate sufficient pumps and systems to produce average day flow from the plant Together with all associated piping, electrical and mechanical equipment, ventilation, monitoring, control, metering, and alarm systems, and instrumentation.

The process flow schematic for the Water Treatment plant is located on the following page.

**ELLIOT LAKE MUNICIPAL WATER TREATMENT PLANT FLOW
DIAGRAM**



Distribution System

The water distribution system is classified as a Class 1 Distribution System, servicing a population of approximately 12,000 with approximately 6,500 service connections. Construction of the system occurred between the 1950's and the 1970's.

The distribution system consists of a total of approximately 60 km of cast iron, ductile iron and plastic pipes of sizes ranging from 150 mm diameter to 600 mm diameter. There are approximately 400 hydrants and two water storage tanks (standpipes) with total storage volume of approximately 9,400 m³.

A 1,527 m³(336,030 gal) standpipe and a 7,870m³(1,731,490 gal) standpipe are both located on Roman Avenue.

Refer to Appendix N for diagrams of the Distribution System.

Water Source

General Characteristics

The source water is Elliot Lake. The lake is characterized as low in turbidity, low to very low in color and very low alkalinity.

Raw Water Characteristics at Intake (based on 2015 data)

Characteristic	Minimum	Maximum	Annual Average
Temperature (°C)	4.9	13.3	8.5
Colour (TCU)	12	18	13.5
Turbidity (NTU)	0.29	.94	0.42
pH	5.87	6.95	6.17
Alkalinity	7	12	10
Conductivity (uS/cm)	76	86	81
<i>E. coli</i> (CFU/100 mL)	0	10	.89
Total Coliforms	0	53	11

Common Fluctuations and Threats

There is no identified fluctuation of the water source, and no threats to the quality of the water source.

Operational Challenges

There are no identified operational challenges resulting from the quality of the water source.

6 Risk Assessment

Refer to Appendix B for QMS Procedure QMSP-02 Risk Assessment and Risk Assessment Outcomes.

7 Risk Assessment Outcomes

Refer to Appendix B for Summary of Risk Assessment Outcomes.

8 Organizational Structure, Roles, Responsibilities and Authorities

Owner and Operating Authority

The Owner of the Water Systems is the City of Elliot Lake, as represented by Mayor and CAO.

The Operating Authority is the City of Elliot Lake as represented by the Operations Department. The Operations Department operates and maintains the drinking water system via the Plants Department and the Public Works Department.

The Plants Department operates and maintains the WTP and Standpipes. The Public Works Department operates and maintains the Distribution System.

Organizational Structure

The organization flowchart below presents the structure of the Operating Authority.

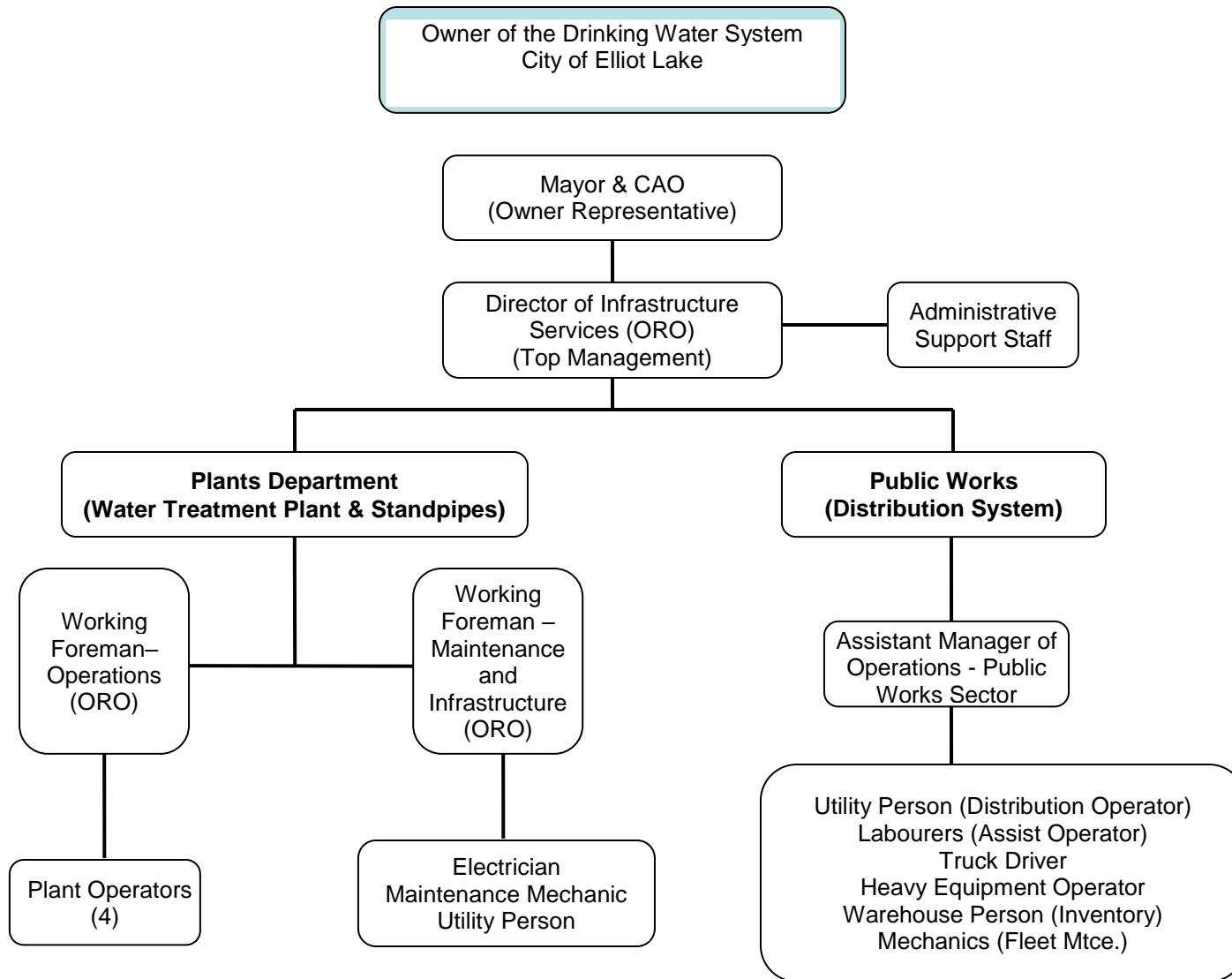
QMS Roles, Responsibilities and Authorities

Responsibilities for implementing and maintaining individual elements of the QMS are outlined in the QMS Procedures referenced throughout this Operational Plan.

Responsibilities and authorities are outlined below:

Position	Roles, Responsibilities and Authorities
Owner / Owner Representatives	<ul style="list-style-type: none">▪ Allocate the necessary resources for the safe operation of the drinking water system;▪ Allocate the necessary resources to maintain the commitment to the QMS Policy;▪ Establish administrative policies and by-laws for the protection of the drinking water system;
Director of Infrastructure Services	<ul style="list-style-type: none">• Act in capacity of ORO as required;• See Appendix L for details on Roles, Responsibilities and Authorities

Position	Roles, Responsibilities and Authorities
Top Management	
Working Foreman (Operations) QMS Rep	See Appendix L for details on Roles, Responsibilities and Authorities
Working Foreman (Maintenance & Infrastructure)	
Water Treatment Plant Operators	
Maintenance Personnel Electrician Mechanic Utility Person	
Assistant Manager of Operations - Public Works Sector	
Distribution Operator	
Support Staff	
All Staff	



Organization Structure of the Owner and Operating Authority

9 Competencies

Required competencies

Under SDWA, 2002 the regulation O. Reg. 128/04 outlines the requirement for the certification of Water Treatment and Water Distribution Operators.

The competencies required for personnel whose work directly affects drinking water quality are presented below:

Position	Required Competencies
Owner / Owner Representatives	<ul style="list-style-type: none"> • DWQMS Awareness
Director of Infrastructure Services Top Management	See Appendix L for details on Competencies
Working Foreman (Operations) QMS Rep	
Working Foreman (Maintenance and Infrastructure)	
Water Treatment Plant Operators	
Maintenance Personnel Electrician Mechanic Utility Person	
Assistant Manager of Operations Public Works Sector	
UT 1 Distribution Operator	
Support Staff	
All Staff	

Activities to develop and maintain these competencies

Each operator is responsible for keeping their own certifications current. In addition, certification expiry dates are monitored by the Operations support staff and the Working Foreman (Operations).

Plant staff meetings are held for all Plant staff, at which time competency issues are discussed and training needs planned for. Plant meeting minutes are recorded and kept. The Director of Infrastructure Services plans and arranges in-house training for staff to address identified training needs.

Every year operators plan for the training they have to take in order to keep their certification current. A training program is established and documented. Plant operator training is tracked by the Working foreman(s) and records of all training and Continuing Education Units (CEUs) are kept by the Operations Department support staff.

Activities to ensure personnel are aware of the relevance of their duties

Further to on-going training, monthly safety meetings are held with Plant staff. In addition, the day to day job functions of each staff provides them with hands on experience of the relevance of their duties. All new staff members are provided orientation.

10 Personnel Coverage

Refer to Appendix C for QMS Procedure QMSP-03 Personnel Coverage.

11 Communications

Refer to Appendix D for QMS Procedure QMSP-04 Communications.

12 Essential Supplies and Services

Refer to Appendix E for QMS Procedure QMSP-05 Essential Supplies and Services.

13 Review and Provision of Infrastructure

Refer to Appendix F for QMS Procedure QMSP-06 Review and Provision of Infrastructure.

14 Infrastructure Maintenance, Rehabilitation and Renewal

The City of Elliot Lake Drinking Water System maintains a program of scheduled inspection and maintenance of infrastructure.

Maintenance plans are developed according to the manufacturer's instructions, regulatory requirements and industry standards. Equipment Operation and Maintenance (O&M) manuals are accessible to staff.

As a minimum, the following Maintenance Activities are conducted:

Water Treatment Plant Planned

- Intake pipe inspection, clean raw water well, testing of back-up diesel generator, calibration of meters/analyzers, valve and pump maintenance.

Water Treatment Plant Unplanned

- Undertake equipment cleaning and repairs as required.

Distribution System Planned

- Fire hydrant inspection and maintenance is done during the fall of each year with some hydrants winterized where required.
- Flushing is done on an annual basis with the most critical areas done on a priority basis.

Distribution System Unplanned

- Repairing of watermain breaks.
- Repairing of water service breaks, valves, and curb boxes.

In addition, service contracts are maintained with specialized service providers for proprietary equipment. These contracts call for the regular servicing of the specialized equipment on a scheduled basis and at any other time as required (see QMS Procedure QMSP-05 Essential Supplies and Services).

Water Treatment Plant planned maintenance is conducted and tracked in accordance with the Monthly/Quarterly/Semi-Annually Maintenance Form maintained by the Working Foreman of Maintenance and Infrastructure. Copies of All Maintenance performed are provided to the Director of Infrastructure Services for review.

The effectiveness of the maintenance system is relayed to the owner in the Summary Report required under Section 22 of Ont. Reg 170/03 which is presented to Council in the first quarter of each year.

Records of all maintenance activities are entered into the distribution system logbooks and the water treatment plant logbook.

Development of a list of capital works required for the water system is done through consultation with staff and discussion with the Director of Infrastructure Services for

planned inclusion into the capital budget, as described in QMS Procedure QMSP-06 Review and Provision of Infrastructure.

The Working Foreman of Maintenance and Infrastructure along with the Director of Infrastructure Services monitor the effectiveness of the various programs on an ongoing basis and make adjustments as required where feasible. In addition, the effectiveness of the overall maintenance program is discussed at the Management Review meeting.

15 Sampling, Testing and Monitoring

Refer to Appendix G for QMS Procedure QMSP-07 Sampling, Testing and Monitoring.

16 Measurement and Recording Equipment Calibration and Maintenance

Refer to Appendix H for QMS Procedure QMSP-08 Measurement and Recording Equipment Calibration and Maintenance.

17 Emergency Management

Refer to Appendix I for QMS Procedure QMSP-09 Emergency Management.

18 Internal QMS Audits

Refer to Appendix J for QMS Procedure QMSP-10 Internal QMS Audits.

19 Management Review

Refer to Appendix K for QMS Procedure QMSP-11 Management Review.

20 Continual Improvement

Through the Internal QMS Audit and Management Review processes, areas of concern as well as opportunities for improvement are identified and addressed by the City of Elliot Lake.