2020 Year End Report: Gravenhurst Potable Water Plant (PWP)

Drinking Water Works Permit: 143-209

Municipal Drinking Water License: 143-109

Ministry of Environment and Climate Change Waterworks #: 220002100

Engineering and Public Works Department

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Introduction

The Gravenhurst Potable Water Plant (PWP) services the community of Gravenhurst and is owned and operated by the District Municipality of Muskoka.

It was constructed in 1983 and has an initial design capacity of 9,996 m^3/d. The water system currently serves a population of approximately 7,000 people.

The plant operates under licence 143-109 and permit 143-209, issued in September 2020 under the Municipal Drinking Water Licencing Program. The plant also presently operates under Ministry of Environment, Conservation and Parks (MOECP) permit to take water #2320-8G2MLQ (expires February 28, 2021), which permits the operation of up to 10,000 m^3 per day.

The Raw Water intake structure is located near Brydon's Bay on Lake Muskoka approximately 11.5 meters deep and 1,000 meters from shore. The plant process is a direct filtration plant, with supplementary pH adjustment. The facility includes an intake crib, intake pipe, fixed screen, and a low lift pumping station. The treatment plant consists of flash mixing, four variable speed flocculators, and four dual media filters. Also located at the treatment plant are 2 backwash holding tanks, two contact chambers, two clear wells, 4 high lift pumps, 2 backwash pumps, chemical storage, preparation, and feed equipment.

The distribution system includes two elevated storage tanks supplying the Town of Gravenhurst and an in-ground reservoir servicing Corrections Canada Institutions.

All treatment control systems use a Supervisory Control And Data Acquisition (SCADA) system for process control and monitoring.

Legislation Requirements

Safe Drinking Water Act

In the Part Two Report of the Walkerton Inquiry, Commissioner Dennis O'Connor recommended that the Ontario Government enact a Safe Drinking Water Act to deal with matters related to treatment and distribution of drinking water. The Safe Drinking Water Act (SDWA) received royal assent in December, 2002.

The purpose of the Act is to gather in one place all legislation and regulations relating to the treatment and distribution of drinking water. The Act serves to protect human health through the control and regulation of drinking water systems and drinking water testing.

The foundation provisions of the Safe Drinking Water Act include:

- Purpose of the Act
- Definitions
- Minister's Powers and Duties
- Inspections
- Compliance and Enforcement
- Appeals and Offences

Ontario Regulations

The Ontario Government has enacted several supporting regulations under the SDWA (2002). These regulations combine previous requirements under the Ontario Water Resources Act and the new requirements under the SDWA. Key components of the regulations include:

- System Categories
- Groundwater Under Direct Influence Of Surface Water (GUDI)
- Exemptions
- Approval of Systems
- Treatment
- Testing and Operational Checks (General Rules)
- Operational Checks
- Microbiological Testing
- Chemical Testing
- Adverse Conditions
- Corrective Action
- Engineer's and Summary Reports

Municipal Drinking Water Licenses / Certificates of Approval

The Municipal Drinking Water Licensing Program has replaced the Certificate of Approval program for municipal residential drinking water systems. The Ontario Government has implemented the Municipal Drinking Water Licensing Program (MDWLP) as recommended by Justice O'Connor in the Part II Report of the Walkerton Inquiry. Justice O'Connor recommended a new approvals framework for municipal drinking water systems, which would require owners to obtain a license to operate their systems as well as incorporate the concept of quality management into their operations.

A municipal drinking water license is an approval that is issued by the MOECC to owners under the Safe Drinking Water Act, 2002 for the operation of municipal residential drinking water systems. The District of Muskoka operated under various Certificates of Approval until October 2010 when the operating licenses were issued.

Previous Certificates of Approval were required for the establishment, replacement or alteration of all municipal drinking water systems. The MOECC issued Certificates of Approval to ensure that all undertakings comply with the legislation (i.e. Acts and Regulations) and the Ministry's Environmental Guidelines and Procedures developed to provide consistency of approach to various aspects of environmental protection throughout the province. Municipal Drinking Water Licenses and Permits similar to previous Certificates of Approval provide specific details about the drinking water system including:

- Drinking Water System Description
- Definitions and Information

- General Information – Compliance, Other Legal Requirements, Adverse Effects, Inspections
- Performance – Rated Capacity, Management of Residue
- Monitoring and Recording – Flow Measuring Devices, Sampling
- Operations and Maintenance

Comparison to Rated Capacity and Flow Rates

The Gravenhurst Potable Water Plant has a rated capacity of 10,000 m^3/day. In 2020, the total monthly average flow for the year was 2,751 m^3/day. The maximum day flow for the year was 4,128 m^3/day, however the 3-year average for maximum day flow is 4,193 m^3/day. This represents 41% of the plant design capacity. There are process issues associated with this flow and providing potable water in excess of the historical maximum day values is presently impossible; upgrades are ongoing that will correct this situation.

Monthly flows are shown in the attached table.

The Permit to Take Water (PTTW #2320-8G2MLQ) permits 10,000 m^3/day; therefore there were no exceedances of this permit.

Summary of Analytical Results

A total of 418 microbiological regulatory tests were performed in 2020 and compliance with Provincial standards was achieved throughout the entire year.

There were 950 free chlorine residual tests performed in the distribution system and all results were satisfactory. Staff continue to routinely sample all areas of the system to ensure adequate free chlorine residuals are available throughout the distribution system.

A summary of other analytical results is also shown in this report.

Summary of Treatment Chemicals

The following chemicals are used for the treatment of drinking water at the Gravenhurst PWP:

- Polyaluminum Chloride : Coagulant
- Sodium Hydroxide: pH Adjustment
- Cationic Polymer: Filter Aid
- Hydrofluosilicic Acid: Fluoride Dental supplement
- Hydrated Lime: Alkalinity
- Carbon Dioxide: pH Adjustment
- Sodium Hypochlorite: Disinfectant

A table summarizing the chemical use and average dosages is included in this report.

Documentation of System Repairs and Upgrades

There was significant capital upgrades performed in 2020. Contract 18-432-257 continued with the conversion of the existing direct filtration water treatment plant to conventional drinking water treatment by the addition of a settling process prior to filtration. In addition, upgrades were performed to the remaining two (2) of the four (4) existing mixed media filters were completed.

External Audits

MOE Inspection

A MOE inspection was completed on August 5, 2020 and is attached to this report. The overall rating was 100%.

DWQMS Audit

In 2020 all drinking water systems within the District had an off-site external audit performed. There were no minor non-conformances reported and all drinking water systems have been recertified. Overall, all drinking water systems are performing satisfactorily.

Gravenhurst Water Distribution Summary 2020

New Services:

45 customers connected to existing serviced properties in 2020.

Broken Watermains:

One water main break (Hahne Drive) occurred in 2020.

Service Leaks:

There were no service leaks to report in 2020.

Service Relocation:

There were no service relocations to report in 2020.

Frozen Services:

No municipal water services were frozen in 2020.

Replacement Watermains:

No watermain replacement occurred in 2020.

New Watermains:

There was one section of new water main on Daffodil Court in 2020. Approximately 200 meters.

New Watermain Valve:

One new valve in the Hutton subdivision (Daffodil Court).

Fire Hydrants:

There are 473 Municipality assumed hydrants maintained by the District in the Town of Gravenhurst. They were inspected, operated, and/or flushed at least once, pumped dry in the fall, and scoped during the winter months to ensure they are not susceptible to freezing. One new hydrant in Hutton Subdivision (Daffodil Court) in 2020.

Meter Installations:

A total of 134 water meters were installed / replaced in Gravenhurst in 2020 as part of the aged meter change out program.

Service Box Maintenance:

District field staff excavated and repaired 10 curb stops and boxes in 2020. Field staff also responded to 164 water turn on/off requests in 2020.

Air-Vacuum Release Valves:

Sixteen (16) air release valves were inspected and tested for proper operation in 2020. Each of the chambers was inspected and pumped out as required.

Locates:

Field staff addressed 795 written locate requests in 2020

Table 1 Water Flow Summary - 2020

Month	Total Monthly (m^3)	Average Day Flow (m^3/d)	Maximum Day Flow (m^3/d)	Minimum Day Flow (m^3/d)
January	71,953	2,321	2,711	1,664
February	66,164	2,282	2,621	1,722
March	73,496	2,371	2,760	1,751
April	71,586	2,386	2,820	2,045
May	86,545	2,792	3,494	1,954
June	95,684	3,189	3,924	2,273
July	105,526	3,404	4,128	2,721
August	96,126	3,101	3,770	2,532
September	84,867	2,829	3,181	1,980
October	89,038	2,872	3,452	2,330
November	81,501	2,717	3,392	2,233
December	83,324	2,688	3,183	2,264

Total Flow: 1,005,808
Average Day: 2,750.8
Maximum Day: 4,127.9
Minimum Day: 1,663.7

Table 2 Raw Water Monthly Analysis Summary 2020 Part 1

Month	Alkalinity (mg/L)	Hardness (mg/L)	pH	Turbidity (ntu)	True Colour (tcu)	Temperature (Celsius)
January	8.0	13	6.77	0.39	15	2.6
February	7.8	12	6.73	0.36	13	2.5
March	7.8	13	6.83	0.30	14	2.5
April	7.3	12	6.94	0.37	16	4.2
May	7.1	11	6.87	0.39	22	6.6
June	6.9	11	6.75	0.39	25	9.7
July	6.8	12	6.55	0.39	18	12.6
August	7.1	13	6.56	0.35	16	11.4
September	7.7	13	6.72	0.36	13	13.1
October	8.3	12	6.86	0.37	17	13.9
November	8.1	13	6.87	0.37	20	8.7
December	8.2	12	6.98	0.36	24	4.7
Average	7.6	12	6.79	0.37	18	7.7

Table 3 Raw Water Monthly Analysis Summary 2020 Part 2

Month	Microcystin (ug/L)	TDS (mg/L)	Langliers Saturation Index	Total Coliforms (CFU/100mL)	E. Coli (CFU/100mL)	Total Number of Samples
January	Not Sampled	Not Sampled	Not Sampled	7.0	0.0	4
February	Not Sampled	Not Sampled	Not Sampled	4.0	0.0	4
March	Not Sampled	Not Sampled	Not Sampled	4.0	0.0	5
April	Not Sampled	52.8	-3.0	4.0	0.0	4
May	0.1	Not Sampled	Not Sampled	5.0	0.0	4
June	0.1	Not Sampled	Not Sampled	6.0	0.0	5
July	0.1	Not Sampled	Not Sampled	25.0	0.0	4
August	0.1	54.2	-3.4	37.0	0.0	5
September	0.1	Not Sampled	Not Sampled	11.0	0.0	4
October	0.1	Not Sampled	Not Sampled	5.0	0.0	4
November	0.1	Not Sampled	Not Sampled	20.0	4.0	5
December	Not Sampled	Not Sampled	Not Sampled	6.0	1.0	4
Average	0.1	53.5	-3.2	11.2	0.4	4

Table 4 Chemical Usage Summary: CO2

Month	Average Dosage mg/L	Total kg
January	44.7	3,490.8
February	43.8	3,163.7
March	44.8	3,554.3
April	41.0	3,147.0
May	42.8	3,976.8
June	45.8	4,709.7
July	42.2	4,874.4
August	42.8	4,477.4
September	45.1	4,147.1
October	47.7	4,579.4
November	42.7	3,749.9
December	42.2	3,812.7
Average	43.8	3973.6

Total Yearly Kilograms: 47,683

Table 5 Chemical Usage Summary: Hydrated Lime

Month	Average Dosage mg/L	Total kg
January	29.3	2,293.0
February	30.0	2,166.0
March	29.5	2,340.9
April	27.9	2,144.9
May	27.5	2,553.2
June	28.0	2,881.3
July	28.4	3,270.1
August	29.3	3,060.8
September	30.4	2,796.2
October	28.8	2,767.0
November	25.3	2,216.5
December	22.9	2,070.3
Average	28	2546.7

Total Yearly Kilograms: 30,560

Table 6 Chemical Usage Summary: Coagulant

Month	Average Dosage mg/L	Total kg
January	22.4	1,755
February	22.2	1,603
March	22.4	1,775
April	22.4	1,724
May	22.6	2,099
June	22.7	2,338
July	22.9	2,646
August	19.7	2,058
September	17.9	1,646
October	17.8	1,715
November	17.8	1,564
December	16.1	1,453
Average	20.6	1865

Total Yearly Kilograms: 22,376

Table 7 Chemical Usage Summary: Sodium Hydroxide

Month	Average Dosage mg/L	Total kg
January	17.1	1,386
February	17.2	1,265
March	17.8	1,497
April	16.6	1,302
May	14.2	1,349
June	14.7	1,542
July	13.5	1,567
August	12.4	1,322
September	13.0	1,212
October	13.8	1,348
November	12.2	1,106
December	12.3	1,126
Average	14.6	1335

Total Yearly Kilograms: 16,021

Table 8 Chemical Usage Summary: Fluoride

Month	Average Dosage mg/L	Total kg
January	0.39	28.0
February	0.42	27.5
March	0.45	33.2
April	0.46	33.0
May	0.46	39.7
June	0.45	43.0
July	0.44	46.4
August	0.43	41.3
September	0.40	34.3
October	0.43	38.2
November	0.45	37.0
December	0.46	38.0
Average	0.44	37

Total Yearly Kilograms: 440

Table 9 Chemical Usage Summary: Sodium Hypochlorite

Month	Average Dosage mg/L	Total kg
January	1.68	136.8
February	1.42	104.1
March	1.14	96.0
April	1.09	85.7
May	1.68	159.8
June	1.80	188.6
July	2.50	288.7
August	3.70	395.4
September	3.72	346.3
October	3.39	332.0
November	3.35	304.6
December	2.94	268.6
Average	2.68	263

Total Yearly Kilograms: 2,707

Table 11 Chemical Usage Summary: Cationic Polymer

Month	Average Dosage mg/L	Total kg
January	3.5	92
February	3.4	82
March	3.6	93
April	3.6	91
May	4.4	115
June	5.3	133
July	5.9	152
August	5.3	136
September	4.6	115
October	4.7	121
November	4.3	108
December	4.3	110
Average	4.4	112

Total Yearly Kilograms: 1,347

Gravenhurst Certification of Reports

I certify that the information in this document and all attachments are correct, accurate, and complete to the best of my knowledge

Marcus Firman, C.E.T.
Director, Water and Wastewater Services

Mark Pringle, C.E.T.
Manager of Water and Wastewater Operations

Drinking-Water Systems Regulation O. Reg. 170/03

Part III Form 2
Section 11. ANNUAL REPORT.

Drinking-Water System Number:	**220002100**
Drinking-Water System Name:	Muskoka Beach Water Treatment Plant
Drinking-Water System Owner:	District Municipality of Muskoka
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 01 to December 31, 2020

Complete if your Category is Large Municipal Residential or Small Municipal Residential

Does your Drinking-Water System serve more than 10,000 people? Yes [ ] No [X]

Is your annual report available to the public at no charge on a web site on the Internet? Yes [X] No [ ]

Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

District Municipality of Muskoka
70 Pine Street
Bracebridge, Ontario
P1l 1N3
(705) 645-6764
www.muskoka.on.ca

Complete for all other Categories.

Number of Designated Facilities served:

N.A.

Did you provide a copy of your annual report to all Designated Facilities you serve?
Yes [ ] No [ ]

Number of Interested Authorities you report to:

Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility?
Yes [ ] No [ ]

List Drinking-Water Systems, if any, which receive all of their drinking water from your system:

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?
Yes [ ] No [ ]

Indicate how you notified system users that your annual report is available, and is free of charge.
[X] Public access/notice via the web
[X] Public access/notice via Government Office
[X] Public access/notice via a newspaper

[X] Public access/notice via Public Request
[ ] Public access/notice via a Public Library
[ ] Public access/notice via other method

Describe your Drinking-Water System

The water treatment plant in Gravenhurst was originally constructed in 1983. Significant improvements to process monitoring, control, and chemical feed systems were completed in 2004. The treatment process consists of chemically assisted coagulation-flocculation and direct filtration using dual media filters with a combination of sand and anthracite coal. Disinfection in a chlorine contact chamber followed by final pH adjustment and fluoridation completes the treatment process. The water system currently serves a population of approximately 7,000 people. The rated water production of the plant is 9,996 cubic meters per day. Our raw water source is Lake Muskoka. Our intake is located approximately 11.5 meters deep, about 1000 meters from shore.

List all water treatment chemicals used over this reporting period

Sodium Hypochlorite, Sodium hydroxide, Polyaluminum Chloride, Carbon Dioxide, Hydrated Lime, Sodium Permanganate, Fluoride, Cationic Polymer

Were any significant expenses incurred to?

[ ] Install required equipment
[ ] Repair required equipment
[ ] Replace required equipment

Describe

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
May 22, 2020	Odour	N/A	N/A	Visit Customer	May 22, 2020
May 27, 2020	Total Coliform	14	Cfu/100 ml	Resample	May 27, 2020

Microbiological testing done under section 8-2 during this reporting period

	Number of Samples	Range of E.Coli Or Fecal Results (#-#)	Range of Total Coliform Results (#-#)	Number of HPC Samples Or Background Colony Counts	Range of HPC Results (#-#) Or Background Colony Counts
Raw	52	0-15	0-64	0	N/A

Treated	52	0-0	0-0	52	0 - 42
Distribution	314	0-0	0 - 11	213	0 - 14

Operational testing done under Schedule 7, 8 or 9 during the period covered by this Annual Report.

	Number of Grab Samples	**Range of Results (min # - max #)**	**Geometric Mean**
Turbidity	**8760**	0.02 - 0.15	0.04
Chlorine	**8760**	1.73 - 2.73	2.02
Chlorine Residual Distribution System	**8760**	0.70 – 1.46	1.08
Fluoride (If the DWS provides fluoridation)	**8760**	0.47 - 0.81	0.62

***NOTE**: For continuous monitors use 8760 as the number of samples.*

***NOTE**: Record the unit of measure if it is **not** milligrams per litre.*

Summary of additional testing and sampling carried out in accordance with the requirement of an approval or order.

Summary of Inorganic parameters tested during this reporting period or most recent sample results.

Parameter	**Sample Date**	**Result Value**	**Unit of Measure**	**Exceedance**
Antimony	May 7/20	0.09<MDL	µg/L	No
Arsenic	May 7/20	0.2<MDL	µg/L	No
Barium	May 7/20	12.4	µg/L	No
Boron	May 7/20	9	µg/L	No
Cadmium	May 7/20	0.014	µg/L	No
Chromium	May 7/20	0.20	µg/L	No
Lead*	May 7/20		µg/L	No
Mercury	May 7/20	0.01<MDL	µg/L	No
Selenium	May 7/20	0.04<MDL	µg/L	No
Sodium	May 7/20	15.7	mg/L	No
Uranium	May 7/20	0.004	µg/L	No
Fluoride	May 7/20	0.56	mg/L	No
Nitrite	Feb 4/20	0.003<MDL	mg/L	No
Nitrate	Feb 4/20	0.204	mg/L	No
Nitrite	May 7/20	0.003<MDL	mg/L	No
Nitrate	May 7/20	0.205	mg/L	No
Nitrite	Aug 18/20	0.003<MDL	mg/L	No
Nitrate	Aug 18/20	0.246	mg/L	No
Nitrite	Nov 10/20	0.003<MDL	mg/L	No
Nitrate	Nov 10/20	0.200	mg/L	No

*only for drinking water systems testing under Schedule 15.2; this includes large municipal non-residential systems, small municipal non-residential systems, non-municipal seasonal residential

systems, large non-municipal non-residential systems, and small non-municipal non-residential systems.

Summary of Lead Testing under Schedule 15.1 during this reporting period
(applicable to the following drinking water systems; large municipal residential systems, small municipal residential systems, and small non-municipal non-residential systems)

Location Type	Number of Samples	Range of Lead Results (min#) -(max#)	Geometric Mean Average	Unit of Measure	Number of Exceedances
Plumbing	0	N.A.	N.A.	N.A.	N.A.
Distribution	6	0.03 – 0.43	0.10	µg/L	0

Summary of Organic parameters sampled during this reporting period or most recent

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	May 7/20	0.02<MDL	µg/L	No
Atrazine + N-dealkylated metobolites	May 7/20	0.01<MDL	µg/L	No
Azinphos-methyl	May 7/20	0.05<MDL	µg/L	No
Benzene	May 7/20	0.32<MDL	µg/L	No
Benzo(a)pyrene	May 7/20	0.004<MDL	µg/L	No
Bromoxynil	May 7/20	0.33<MDL	µg/L	No
Carbaryl	May 7/20	0.05<MDL	µg/L	No
Carbofuran	May 7/20	0.01<MDL	µg/L	No
Carbon Tetrachloride	May 7/20	0.17<MDL	µg/L	No
Chlorpyrifos	May 7/20	0.02<MDL	µg/L	No
Diazinon	May 7/20	0.02<MDL	µg/L	No
Dicamba	May 7/20	0.20<MDL	µg/L	No
1,2-Dichlorobenzene	May 7/20	0.41<MDL	µg/L	No
1,4-Dichlorobenzene	May 7/20	0.36<MDL	µg/L	No
1,2-Dichloroethane	May 7/20	0.35<MDL	µg/L	No
1,1-Dichloroethylene (vinylidene chloride)	May 7/20	0.33<MDL	µg/L	No
Dichloromethane	May 7/20	0.35<MDL	µg/L	No
2-4 Dichlorophenol	May 7/20	0.15<MDL	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	May 7/20	0.19<MDL	µg/L	No
Diclofop-methyl	May 7/20	0.40<MDL	µg/L	No
Dimethoate	May 7/20	0.06<MDL	µg/L	No
Diquat	May 7/20	1<MDL	µg/L	No
Diuron	May 7/20	0.03<MDL	µg/L	No
Glyphosate	May 7/20	1<MDL	µg/L	No
Malathion	May 7/20	0.02<MDL	µg/L	No
MCPA	May 7/20	0.00012<MDL	µg/L	No
Metolachlor	May 7/20	0.01<MDL	µg/L	No
Metribuzin	May 7/20	0.02<MDL	µg/L	No
Monochlorobenzene	May 7/20	0.30<MDL	µg/L	No
Paraquat	May 7/20	1<MDL	µg/L	No
Pentachlorophenol	May 7/20	0.15<MDL	µg/L	No

Phorate	May 7/20	0.01<MDL	µg/L	No
Picloram	May 7/20	1.0<MDL	µg/L	No
Polychlorinated Biphenyls(PCB)	May 7/20	0.04<MDL	µg/L	No
Prometryne	May 7/20	0.03<MDL	µg/L	No
Simazine	May 7/20	0.01<MDL	µg/L	No
THM **NOTE: annual average from Distribution**	Feb 4/20 May 7/20 Aug 18/20 Nov 10/20	70	µg/L	No
Terbufos	May 7/20	0.01<MDL	µg/L	No
Tetrachloroethylene	May 7/20	0.35<MDL	µg/L	No
2,3,4,6-Tetrachlorophenol	May 7/20	0.20<MDL	µg/L	No
Triallate	May 7/20	0.01<MDL	µg/L	No
Trichloroethylene	May 7/20	0.44<MDL	µg/L	No
2,4,6-Trichlorophenol	May 7/20	0.25<MDL	µg/L	No
Trifluralin	May 7/20	0.02<MDL	µg/L	No
Vinyl Chloride	May 7/20	0.17<MDL	µg/L	No
HAA5 **(NOTE: annual average from Distribution)**	Feb 4/20	55.2	µg/L	No
	May 7/20	66.8	µg/L	No
	Aug 18/20	54.2	µg/L	No
	Nov 10/20	57.2	µg/L	No
	annual	57.2		No

List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	Date of Sample
THM (NOTE: annual average from Distribution – 9 samples)	69.7	ug/L	annual
HAA5 (annual avg)	57.2	ug/L	annual