

## EXECUTIVE SUMMARY

HGC Engineering was retained by Union Gas Limited to undertake an Acoustic Assessment of their Electrical Power Generators in Ontario. This assessment applies to power generators located at Union Gas Service Centres and Gate Stations used for emergency (standby) power. Power generators located at Union Gas Compressor Stations have been assessed as part of those facilities and are not addressed in this document.

An initial screening process, outlined in the HGC Engineering report dated June 27, 2008 [1], identified 11 generators that required detailed Acoustic Assessment Reports, which were prepared in a consolidated assessment report by HGC Engineering dated June 26, 2009 [2]. Subsequent reports established that sound emissions from all assessed generators comply with the applicable limits of the Ontario Ministry of the Environment and Climate Change (“MOECC”), with the exception of the North Bay Service Centre. Since the last report, noise control measures have been implemented at the North Bay Service Centre, as detailed herein, such that all assessed power generators comply with the applicable limits of the MOECC.



## Union Gas Brantford Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re $10^{-12}$ W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	91*	O	S	S
NS-02	Ventilation Intake	86*	O	S	U
NS-03	Ventilation Exhaust	87*	O	S	U

\* Time-weighted source. Reported sound power level does not include time weighting factor.

### Legend

#### Sound Characteristics

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### Source Location

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception	
		R1	
		Dist [m]	$L_{EQ}$ [dBA]
NS-01	Combustion Exhaust	236	25
NS-02	Ventilation Intake	243	8
NS-03	Ventilation Exhaust	233	36

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, $L_{EQ}$ [dBA]	Verified by Acoustic Audit	Performance Limit, $L_{EQ}$ [dBA]	Compliance with Performance Limit
R1	2 storey home approx. 240 m west of power generator	36	Y*	50	Y

\* Power generator was not audible or measurable at R1 - audit type measurements were conducted on Union Gas property to verify accuracy of the acoustic model - agreement found to be within 1 dBA.



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## Union Gas Headquarters, Chatham Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	101*	O	S	S
NS-02	Ventilation Louvre	108*	O	S	U
NS-03	Remote Cooler	114*	O	S	U

\* Time-weighted source. Reported sound power level does not include time weighting factor.

### **Legend**

#### **Sound Characteristics**

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### **Noise Control Measures**

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### **Source Location**

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception			
		R1		R2	
		Dist [m]	L <sub>EQ</sub> [dBA]	Dist [m]	L <sub>EQ</sub> [dBA]
NS-01	Combustion Exhaust	214	39	259	37
NS-02	Ventilation Louvre	210	43	254	42
NS-03	Remote Cooler	219	44	256	41

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	2 storey retirement home approx. 210 m northeast of power generator	51	Y	52	Y
R2	Multi-storey apartment building approx. 255 m east of power generator	49	N	52	Y



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## Union Gas North Bay Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	86	O	S	S
NS-02	Ventilation Intake	102	O	S	U
NS-03	Ventilation Exhaust	81	O	S	S

### Legend

#### Sound Characteristics

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### Source Location

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception			
		R1		R2	
		Dist [m]	L <sub>EQ</sub> [dBA]	Dist [m]	L <sub>EQ</sub> [dBA]
NS-01	Combustion Exhaust	84	40	109	37
NS-02	Ventilation Intake	85	39	110	39
NS-03	Ventilation Exhaust	83	34	108	32

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	Rear yard of home approx. 80 m south of power generator	43	N	50	Y
R2	2 storey home approx. 110 m south of power generator	41	N	50	Y



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## Union Gas Thunder Bay Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	90*	O	S	S
NS-02	Ventilation Louvre	87*	O	S	U
NS-03	Remote Cooler	102*	O	S	U

\* Time-weighted source. Reported sound power level does not include time weighting factor.

### Legend

#### Sound Characteristics

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### Source Location

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception			
		R1		R2	
		Dist [m]	L <sub>EQ</sub> [dBA]	Dist [m]	L <sub>EQ</sub> [dBA]
NS-01	Combustion Exhaust	383	26	393	21
NS-02	Ventilation Louvre	386	30	398	30
NS-03	Remote Cooler	388	36	397	35

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	2 storey future home approx. 380 m northwest of power generator	37	N*	50	Y
R2	1 storey home approx. 400 m northwest of power generator	36	N*	50	Y

\* Power generator was not audible or measurable at R1 or R2 - audit type measurements were conducted on Union Gas property to verify accuracy of the acoustic model - agreement found to be within 1 dBA.



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## Union Gas Dunnville Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	93*	O	S	S

\* Time-weighted source. Reported sound power level does not include time weighting factor.

### **Legend**

#### **Sound Characteristics**

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### **Noise Control Measures**

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### **Source Location**

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception	
		R1	
		Dist [m]	L <sub>EQ</sub> [dBA]
NS-01	Combustion Exhaust	63	41

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	1 storey home approx. 60 m east of power generator	41	Y	50	Y



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## Union Gas Leamington Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	93*	O	S	S

\* Time-weighted source. Reported sound power level does not include time weighting factor.

### Legend

#### Sound Characteristics

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### Source Location

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception			
		R1		R2	
		Dist [m]	L <sub>EQ</sub> [dBA]	Dist [m]	L <sub>EQ</sub> [dBA]
NS-01	Combustion Exhaust	111	43	57	46

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	2 storey home approx. 110 m north of power generator	43	Y	50	Y
R2	8 storey apartment building approx. 55 m northeast of power generator	46	N	50	Y



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## Union Gas London Commissioners Road Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
S1	300 kW Standby Natural Gas Generator	95	O	T	E

**Legend**

**Sound Characteristics**

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

**Noise Control Measures**

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

**Source Location**

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception		Point of Reception		Point of Reception	
		R1		R2		R3	
		Dist [m]	L <sub>EQ</sub> [dBA]	Dist [m]	L <sub>EQ</sub> [dBA]	Dist [m]	L <sub>EQ</sub> [dBA]
S1	300 kW Standby Natural Gas Generator	166	41	151	42	155	41

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	Base Line Road West Apartment Façade	41	N	50	Y
R2	Commissioners Road West Apartment Façade	42	N	50	Y
R3	Commissioners Road West Apartment Façade	41	N	50	Y

**Note:** This information was extracted from the Conestoga-Rovers & Associates report entitled "Streamlined Application for Certificate of Approval (Air & Noise) for a Standby Generator, Union Gas, London, Ontario" dated September 2011.



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## Union Gas Simcoe Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	82*	O	S	S

\* Time-weighted source. Reported sound power level does not include time weighting factor.

### Legend

#### Sound Characteristics

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### Source Location

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception			
		R1		R2	
		Dist [m]	L <sub>EQ</sub> [dBA]	Dist [m]	L <sub>EQ</sub> [dBA]
NS-01	Combustion Exhaust	32	26	59	23

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	Rear yard of home approx. 30 m north of power generator	26	N*	45	Y
R2	Rear yard of home approx. 60 m southwest of power generator	23	N*	45	Y

\* Power generator was not audible or measurable at R1 or R2 - audit type measurements were conducted on Union Gas property to verify accuracy of the acoustic model - agreement found to be within 1 dBA.



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## Union Gas Sudbury Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	72*	O	S	S
NS-02	Ventilation Louvre	92*	O	S	U

\* Time-weighted source. Reported sound power level does not include time weighting factor.

### **Legend**

#### **Sound Characteristics**

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### **Noise Control Measures**

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### **Source Location**

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception			
		R1		R2	
		Dist [m]	L <sub>EQ</sub> [dBA]	Dist [m]	L <sub>EQ</sub> [dBA]
NS-01	Combustion Exhaust	128	4	225	13
NS-02	Ventilation Louvre	128	33	227	37

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	1 storey home approx. 130 m northwest of power generator	33	N*	50	Y
R2	2 storey home approx. 225 m northeast of power generator	37	N*	50	Y

\* Power generator was not audible or measurable at R1 or R2 - audit type measurements were conducted on Union Gas property to verify accuracy of the acoustic model - agreement found to be within 1 dBA.



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## Union Gas London North Gate Station Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re 10 <sup>-12</sup> W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Combustion Exhaust	80*	O	S	S
NS-02	Ventilation Intake	89*	O	S	U
NS-03	Ventilation Exhaust	92*	O	S	U

\* Time-weighted source. Reported sound power level does not include time weighting factor.

### Legend

#### Sound Characteristics

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### Source Location

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception	
		R1	
		Dist [m]	L <sub>EQ</sub> [dBA]
NS-01	Combustion Exhaust	94	19
NS-02	Ventilation Intake	95	23
NS-03	Ventilation Exhaust	94	40

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L <sub>EQ</sub> [dBA]	Verified by Acoustic Audit	Performance Limit, L <sub>EQ</sub> [dBA]	Compliance with Performance Limit
R1	Rear yard of home approx. 95 m northeast of power generator	40	Y	50	Y



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## Union Gas Waterloo Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re $10^{-12}$ W]	Source Location	Sound Characteristic	Noise Control Measure
S1	250 kW Standby Natural Gas Generator	105	O	T	E

### Legend

#### Sound Characteristics

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### Source Location

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception		Point of Reception		Point of Reception	
		R1		R2		R3	
		Dist [m]	$L_{EQ}$ [dBA]	Dist [m]	$L_{EQ}$ [dBA]	Dist [m]	$L_{EQ}$ [dBA]
S1	250 kW Standby Natural Gas Generator	693	38	704	37	685	38

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, $L_{EQ}$ [dBA]	Verified by Acoustic Audit	Performance Limit, $L_{EQ}$ [dBA]	Compliance with Performance Limit
R1	Mayview Crescent Residence Façade	38	N	50	Y
R2	Golden Eagle Road Residence Façade	37	N	50	Y
R3	Bathurst Drive Childcare Facility Façade	38	N	50	Y

**Note:** This information was extracted from the Conestoga-Rovers & Associates report entitled "Streamlined Application for Certificate of Approval (Air & Noise) for a Standby Generator, Union Gas, Waterloo, Ontario" dated September 2011.



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## Union Gas Hamilton Service Centre Power Generator

**Table A1: Noise Source Summary Table**

Source ID	Source Description	Sound Power Level [dBA re $10^{-12}$ W]	Source Location	Sound Characteristic	Noise Control Measure
S1	Standby Generator	103	O	S, T	E

### Legend

#### Sound Characteristics

S: Steady  
Q: Quasi-steady impulsive  
I: Impulsive  
B: Buzzing  
T: Tonal  
C: Cyclically varying  
O: Occasional

#### Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler  
A: Acoustic Lining, Plenum  
B: Barrier, Berm, Screening  
L: Lagging (Acoustical Wrapping)  
E: Acoustic Enclosure  
O: Other  
U: Currently Uncontrolled

#### Source Location

O: Outdoors  
I: Indoors

**Table A2: Point of Reception Noise Impact Table**

Source ID	Source Name	Point of Reception		Point of Reception	
		POR1		POR2	
		Dist [m]	$L_{EQ}$ [dBA]	Dist [m]	$L_{EQ}$ [dBA]
S1	Standby Generator	158	38	239	41

**Table A3: Acoustic Assessment Summary Table**

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, $L_{EQ}$ [dBA]	Verified by Acoustic Audit	Performance Limit, $L_{EQ}$ [dBA]	Compliance with Performance Limit
POR1	Ivybridge Drive Residence Façade	38	N	50	Y
POR2	Ivybridge Drive Residence Façade	41	N	50	Y

**Note:** This information was extracted from the Conestoga-Rovers & Associates report entitled "Acoustic Assessment Report, Union Gas, Hamilton, Ontario" dated July 2012.



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