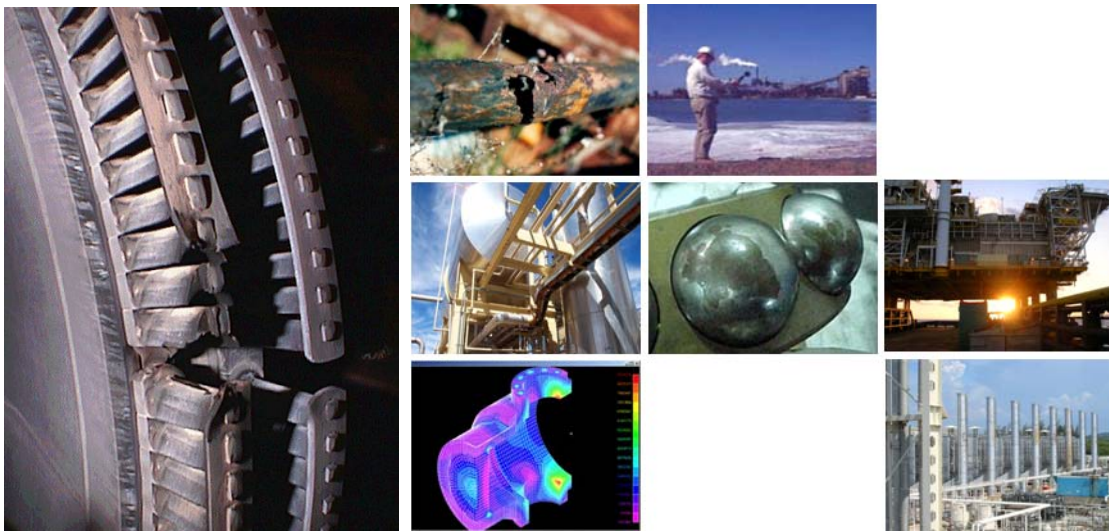




ALINTA WAGERUP COMMISSIONING: NOISE COMPLIANCE REPORT



SINCLAIR KNIGHT MERZ

Rpt02-07250-Rev3 26 Nov 07

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DOCUMENT CONTROL & REVIEW INFORMATION

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SVT Job No: 07250

SVT Document No: Rpt02-07250Rev3-26 Nov 07

Rev	Description	Prepared	Reviewed	Date
3	Third issue	Granger Bennett	Jim Mcloughlin	26 Nov 07
2	Second issue	Granger Bennett	Jim Mcloughlin	23 Nov 07
1	First issue	Granger Bennett	Jim Mcloughlin	7 Nov 07
B	Issued for client review	Granger Bennett	SKM	1 Nov 07
A	Issued for review	Granger Bennett	Jim Mcloughlin	20 Oct 07

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1. INTRODUCTION

This report presents the results from site measurements taken at the Alinta Wagerup Gas Turbine power generation plant. The measurements were taken in accordance with ISO 8297:199(E). The results are captured in TrI01-7250-Rev 1 12 Sept 07 and also electronically in Bruel and Kjaer logging files.

The aim of this report is to present the results of the site measurements against the requirements of the Environmental Protection (Noise) Regulations 1997 as considered in the noise assessment for the proposal (SVT report 05302-Rev 3, May 2006) and summarised in the project Environmental Impact Statement (WP03100-EV-RP-0004-Rev 1).

Specifically, three key requirements are as follows:

- 1) Sound Power Levels (SWL) of the GT's (Gas Turbines) to be no higher than 104dB(A) for both units (101dB(A) per unit) in order to be considered not significantly contributing to an exceedance of the assigned noise levels at the nearest noise sensitive premise; and
- 2) Noise levels at the Alinta/Alcoa site boundary to not exceed 65dB(A) (60dB(A) should tonality be present) to comply with industry-to-industry assigned levels.
- 3) Noise levels at the closest residence.

2. APPLICABLE DOCUMENTS

SVT Doc 05302-Rev 3 May 2006: *'Noise Assessment for the Alinta Wagerup Power Proposal'*

SVT Doc TrI01-7250-Rev1 12 Sept 07: *'Trial Sheet for the noise measurement of the Wagerup power station commissioning'*

ISO 8297:1994(E): *'Acoustics – Determination of sound power levels of multisource industrial plants for evaluation of sound pressure levels in the environment – Engineering method'*

Government Gazette (No.190) of 31 Oct 1997: *'Environmental Protection (Noise) Regulations 1997'*.

3. MEASUREMENT EXECUTION

The measurements were executed in accordance with ISO 8297:199(E). The measurement contour is shown in appendix A. Each measurement was taken at a height of 11m. Two separate measurements were taken. The first measurement was taken on the 11 Oct 2007 at 10:05 with GT02 running at base load on gas and GT01 not operating. The second measurement was taken on the 18 Oct 2007 at 11:10 with GT01 running on fuel oil at base load and GT02 not operating.

Weather conditions and measuring equipment information such as model, calibration date and other related information are captured in the documents titled *'Trial Sheet for the noise measurement of the Wagerup power station commissioning'* (SVT Doc TrI01-7250-Rev1 12 Sept 07).

The L_{eq} value between measurements fluctuated between +2.0 and -2.5dB. According to the standard this equates to a 95% confidence figure for one determination on the measurement contour. A 100% confidence figure can not be achieved using this or any other measurement technique as the spatial variations in the recordings occur in the near field due to the inhomogeneous distribution in the noise sources within the plant.



3.1.1 Omitted Measuring Points

Due to inaccessibility measuring point 24 was not taken. The standard allows for 10% of the selected positions to be omitted. Considering that there were 27 measuring points 2.7 points could be omitted on the contour as shown in Appendix A. As only one measuring position was omitted the measurement contour is still valid.

3.1.2 Measurement Errors

- 1) **Spatial Errors**. An elevated work platform (EWP) was used to take the measurements. This and the surveying of the measurement positions will induce an error on the measurement contour. It has been calculated that a 1dB¹ error can be expected due to spatial errors in the measurement position.
- 2) **Background Noise**. At various measurement positions it was noted that Alcoa refinery noise was dominant and as a result those measurement positions were corrected by 1dB². The following comments are made regarding Alcoa noise and other noise sources:
 - **Alcoa refinery**: Alcoa refinery noise could be clearly heard at measurement locations 1, 2, 3, 16, 17, 18 and 21 to 27. As a result 1dB was used to correct the averaged sound levels for each 1/3rd Octave band.
 - **Road Noise**: Road noise did not affect any of the measurements.
 - **Site Construction Activity**: All construction site activity was stopped while the measurements were being taken.
- 3) **Proximity of Reflecting Surfaces**. Due to the proximity of GT01 to GT02 it was impossible to obtain a measurement contour that would avoid all reflecting surfaces. The measurement points affected by reflecting surfaces were compensated for by 1dB in each octave band.
- 4) **Wind speed and Direction**. The wind speed stayed more or less constant at 8km/h and 12km/h for the duration of the measurements on GT01 and GT02 consecutively. During the measurement of GT 01 and 02 the wind direction changed by 160° for GT01 and 240° for GT02.

3.1.3 Boundary Measurements

Appendix B shows the boundary measurement positions. These measurements were taken for each GT operating at base load. To determine the influence of the Alcoa refinery noise the boundary measurements were taken just before and directly after the GT's shutdown.

3.1.4 Stack Measurements

Stack measurements were taken of the GT running on fuel oil. These measurements were taken on the stack platform with a sound intensity probe that was positioned on the stack lip. The intensity measurement was then taken walking around the circumference of the stack.

¹ This is based on a total cumulative 5m spatial error in length, breadth and height of the measurement contour.

² ISO 8297:1994(E)



4. RESULTS

4.1 Gas Turbine Results

The recorded 1/3rd Octave dB(Z) measurements are given in appendix C and D for GT01 and GT02. It is interesting to note that while differences in the measurements for GT01 (running on fuel oil) and GT02 (running on gas) were measured in the 12.5 to 50Hz 1/3 Octave bands, measurements above the 50Hz 1/3 Octave band are very similar (see Figure 4-1). This indicates that the two GT's are approximately, from an acoustical point of view, identical to each other, even when they are running on different fuels.

The calculated sound power level (SWL) for the two GT's is given in Table 4-1.

Table 4-1 Calculated Sound Power Level for GT01 and 02.

Gas Turbine	SWL(L _{WA})	Comments
01	100.8	Turbine running on fuel oil.
02	100.16	Turbine running on gas.

4.2 Tonality

Tonality as defined by the Environmental Protection Act states that a signal is tonal if the A-weighted sound pressure level differs by more than 3dB in any 1/3rd Octave Band between 25Hz and 20 000Hz. Should noise at a receptor include tonal character, then a 5dB(A) adjustment to noise emissions is made – in effect applying a 5dB(A) penalty to assigned noise levels. It must be noted that tonality is relevant only at the receiving premises and not at the source. The near field measurements as shown in Figure 4-1 shows that, in the near field, above the 25Hz 1/3 Octave Band the GTs do have some tonal components when assessed at source. However, as will be discussed later, tonality from the GTs was not evident at the Alcoa/Alinta boundary due to masking by ambient noise from Alcoa's operations.



Wagerup Leq for GT01 and GT02 (ISO8297)

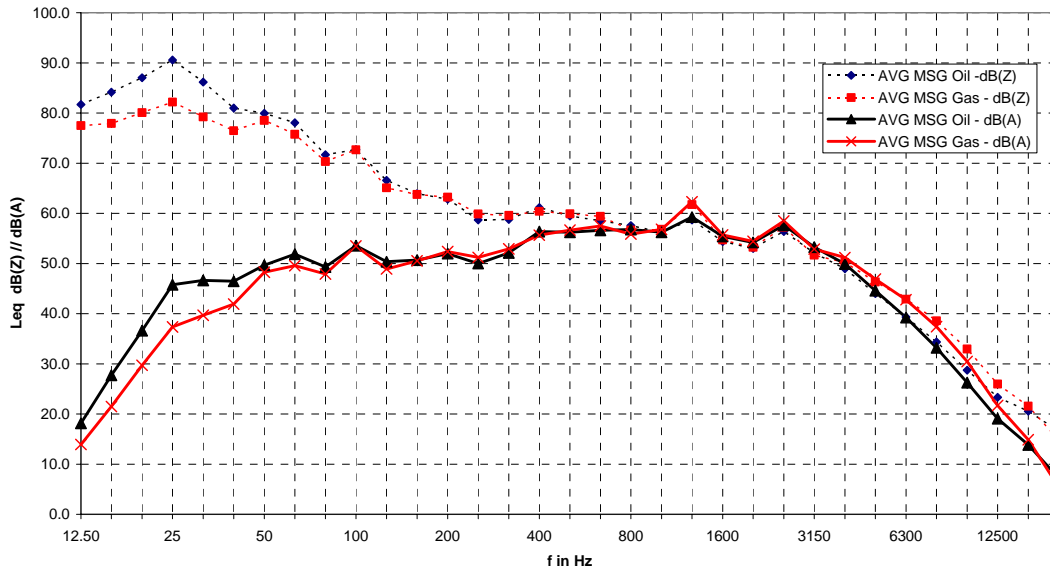


Figure 4-1 Comparison between GT01 and GT02 measured values; linear (dB(Z)) and A-weighted (dB(A)).

4.3 Boundary Results

Perimeter measurements were taken at positions as indicated in appendix B. Positions 10 to 14 are the industry to industry boundary on the western side, between Alcoa and Alinta. Measurements taken at these positions are shown in Table 4-2. As can be seen from the table the Alcoa noise dominated the boundary measurements, with measured ambient noise levels in excess of 60dB(A) at the boundary. It was therefore impossible to measure the industry to industry boundary noise as a result of the GT's in isolation.

Table 4-2 Industry to industry boundary measurements.

Position	GT01 Fuel Oil (L_{Aeq})	GT02 Gas (L_{Aeq})	Alcoa Noise
P10a	65.1	64.0	63.6
P10	60.8	59.3	60.2
P11	63.0	62.0	62.1
P12	63.9		63.5
P13	62.8		61.7
P14	60.2		59.6



There are no noise sensitive receiving premises directly on the eastern boundary of the Alinta site. At this location the site is bordered by Willowdale Road. Beyond this road the land is owned by Alcoa.

Positions 2 to 9 are at Alinta's eastern site boundary. Measurements taken at these positions are shown in Table 4-3. Some noise levels at these locations were marginally above 60 dB(A) and were influenced by noise from the GTs as well as ambient noise from Alcoa. However, the extra distance to Alcoa's property on the opposite side of Willowdale Road ensures that noise levels will be below 60 dB(A) on Alcoa's property.

Table 4-3 : Eastern Site Boundary Noise Levels

Location	GT01 fuel oil	GT02 gas
P2	57.1	54.3
P3	57.4	57.0
P4	58.0	59.6
P5	61.5	59.7
P6	60.5	60.6
P7	57.5	61.0
P8	57.5	61.4
P9	58.8	60.5



4.4 Stack Sound Power Level (SWL)

A sound intensity probe was used to determine the SWL of the GT's stack. The calculated SWL of the stack is 94.7 dB(A)³ when running on fuel oil.

4.5 Noise Impact Assessment at Nearest Residence

The nearest noise sensitive premises to the Alinta facility is some 1500m to the SSE and is referred to as R6 in previous reports (SVT report 05302-Rev 3, May 2006). The L_{A10} night-time assigned noise level at this location is 35 dB(A). However, because ambient noise levels at R6 already exceed this level, the contribution of the Alinta facility to noise received at this location must not exceed 30 dB(A) in order to comply with the Environmental Protection (Noise) Regulations 1997.

The sound power limits set for the GTs were based on the results of noise modeling which showed that a level of 30 dB(A) would not be exceeded (under worst-case conditions for sound propagation) at the nearest residence if the two units were operating simultaneously with a source sound power level of 101 dB(A) per unit.

The sound power evaluation presented in section 4.1 of this report demonstrates compliance with the sound power limit of 101 dB(A) per unit. Also, there is no significant difference between the modeled spectral content and the measured data as shown in Table 4-4. This implies that a high degree of confidence can be placed in the compliance assessment based on the noise modelling previously undertaken. Therefore, it is reasonable to assume that the contribution of the GTs operating simultaneously will not meet or exceed 30 dB(A) at R6.

Table 4-4 Comparison between model and measured results for a GT running on fuel oil and gas.

	63	125	250	500	1k	2k	4k	8k
Modeled	116	108	102	98	95	91	88	85
Gas	113	106	98	97	96	93	87	78
Oil	115	106	98	97	95	92	87	74

(Note the modelled sound power level presented above has been adjusted to an overall level of 101 dB(A) to allow direct comparison with measured values.)

Ambient noise logging was conducted at R6 for a period of 4 weeks prior to the commissioning of the GTs. These results show that typical ambient L_{A90} noise levels are between 40 dB(A) and 45 dB(A) and the lowest noise levels (L_{90} of L_{A90}) are approximately 37 dB(A). (Refer SVT report Rpt02-07250-RevA 19 Oct 07.) Consequently it would be expected that noise from the GTs would be inaudible at this location. This has been supported by observations recorded during several site visits during which SVT personnel have been unable to hear the GTs at R6. Noise logging at R6 during commissioning showed that it was impossible to determine the noise from the GT's as the noise field at R6 was dominated by Alcoa refinery and on some occasions wind noise.

³ As fuel oil was found to be the noisier mode of operation the stack measurement is only shown for fuel oil. This measurement is taken in isolation and not included in the SWL of the GT's as it is estimated that the contour measurement included noise from the stack.



5. CONCLUSION

The Sound Power Levels of GT01 and GT02 are within the limits required to demonstrate compliance with the Environmental Protection (Noise) Regulations 1997. The calculated results are:

- GT01 on Fuel Oil: 100.8dB(A)
- GT02 on Gas: 100.2dB(A)

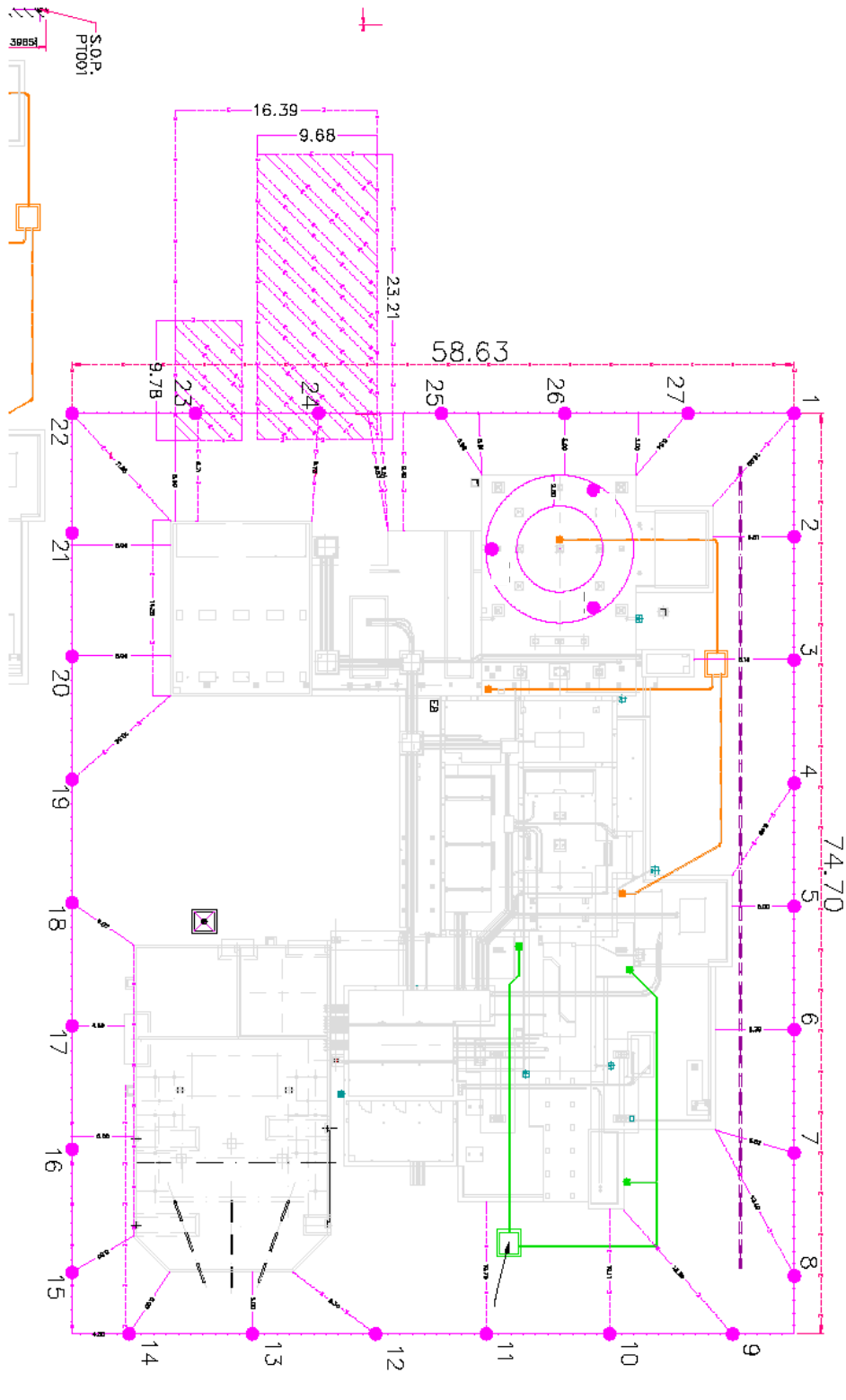
The industry/industry boundary measurements were dominated by Alcoa noise. However, based on the modelling conducted in the noise assessment, it can be assumed that the GT noise levels at the boundary will be less than 60dB(A) as the SWL of the units is below 101dB(A) and operation of the GT's produced only a marginal increase in boundary noise above the ambient level from Alcoa's operation.

Noise logging at R6 during commissioning showed that it was impossible to determine the noise from the GT's as the noise field at R6 was dominated by Alcoa refinery and on some occasions wind noise. This has been supported by observations recorded during several site visits during which SVT personnel have been unable to hear the GTs at R6.

Based on the above SVT confidently conclude that noise emissions from the Alinta facility fully comply with regulatory noise limits at the nearest noise sensitive residence.

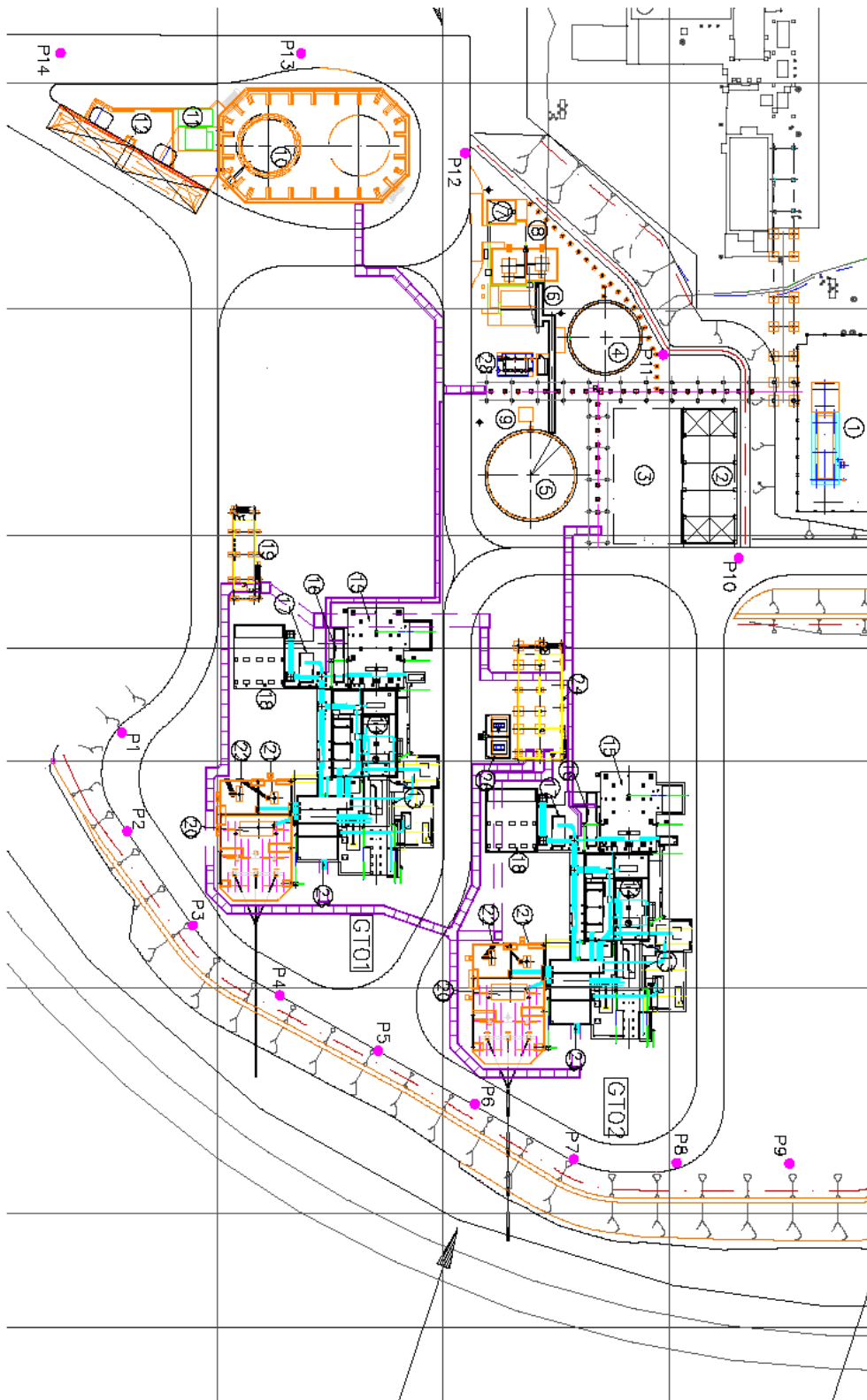


APPENDIX A : GT 01 AND 02 MEASUREMENT CONTOUR





APPENDIX B : PERIMETER MEASUREMENT POSITIONS





APPENDIX C : 1/3RD OCTAVE DB(Z) RECORDINGS FOR GT01

Frequency [Hz]	25	31.50	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000		
Position																																
1	85.9	80.4	83.1	76.3	74.7	71.4	68.6	67.1	63.4	58.1	55.3	55.5	54.4	53.5	53.6	53.1	52.0	51.8	50.4	48.4	48.9	50.9	43.5	38.9	38.0	30.9	25.4	19.9	17.5	17.1		
2	85.8	83.2	81.8	74.1	73.7	70.5	74.9	66.0	63.4	61.6	55.1	55.0	55.1	54.3	53.4	52.1	51.3	54.4	49.6	48.5	51.3	56.0	45.0	39.8	36.0	29.1	25.1	19.5	18.2	19.7		
3	85.1	83.2	83.1	77.3	72.7	69.7	71.3	66.6	63.8	59.8	57.8	55.3	56.0	56.3	56.6	54.1	53.5	54.5	51.1	49.7	52.8	55.1	46.4	42.5	37.3	30.4	25.1	18.6	15.4	15.7		
4	87.7	82.8	83.4	83.5	73.8	71.6	68.8	65.3	63.4	63.7	57.1	55.8	59.0	56.8	57.9	54.9	55.6	59.0	53.8	51.4	58.8	54.3	52.0	47.5	38.8	32.7	28.9	21.6	19.0	20.0		
5	86.5	80.6	81.0	79.4	79.4	70.2	70.1	63.1	61.9	60.2	57.3	56.7	57.0	58.3	58.9	56.7	57.6	66.6	55.9	53.3	61.1	53.0	54.6	46.1	39.9	34.8	28.7	22.1	20.4	16.9		
6	88.9	83.3	77.6	78.0	74.8	68.3	69.7	63.0	62.3	60.5	56.9	56.4	58.3	58.8	58.6	59.8	58.2	62.2	58.1	55.4	59.8	53.7	52.5	47.7	41.6	36.6	30.6	24.2	21.2	16.1		
7	89.9	83.9	74.9	78.8	73.6	70.1	70.7	63.6	61.5	66.4	57.7	58.2	59.0	59.3	58.4	58.4	56.7	60.8	56.5	54.2	61.8	54.7	52.6	47.9	42.1	37.1	31.0	25.9	22.6	16.7		
8	88.8	84.6	79.3	76.5	76.3	67.5	68.4	62.8	60.0	58.8	54.7	57.2	57.0	58.3	56.5	56.8	55.2	58.1	53.3	52.7	58.3	52.5	48.5	44.4	39.5	35.7	30.2	24.2	18.8	14.6		
9	84.5	79.8	75.6	76.5	73.7	67.1	79.2	64.3	60.9	62.0	55.1	56.0	57.6	59.6	58.0	56.6	56.0	58.4	54.1	53.1	57.7	51.1	48.2	44.9	40.2	36.9	30.1	24.1	20.6	12.6		
10	82.4	78.6	73.0	74.5	72.4	66.7	72.8	65.3	61.8	65.1	57.3	57.0	60.8	61.9	58.9	58.3	56.6	59.8	53.8	53.7	57.2	49.8	48.7	46.4	42.3	40.0	31.5	24.0	21.0	11.8		
11	80.9	77.3	73.8	74.2	73.3	67.5	68.1	65.1	60.0	61.2	57.0	60.9	60.1	59.2	60.6	59.3	59.0	60.6	54.9	54.0	57.3	50.8	49.7	46.3	42.3	38.7	30.9	23.6	22.4	12.4		
12	83.6	78.3	76.7	76.1	75.8	67.2	68.5	62.3	58.2	60.7	54.5	56.4	58.1	59.3	57.0	57.0	55.8	56.8	53.3	51.5	55.9	48.1	46.8	42.4	37.3	33.8	27.7	21.6	21.8	11.5		
13	85.3	81.5	76.6	75.9	75.5	66.2	78.1	63.4	56.6	59.5	54.0	57.8	56.7	55.5	56.5	55.5	53.9	57.6	51.1	49.5	53.7	46.3	45.4	41.3	35.7	31.4	25.0	18.9	17.4	16.0		
14	86.7	82.4	74.9	75.1	74.1	65.2	67.6	56.7	54.8	56.0	52.1	55.1	57.0	52.9	54.7	53.7	51.2	54.7	49.6	47.7	52.4	44.2	43.3	38.0	32.8	28.6	21.6	15.0	12.5	8.4		
15	87.5	81.9	76.3	74.4	74.5	63.9	63.3	56.8	54.9	54.9	51.8	53.4	57.0	52.1	51.1	51.1	48.6	51.8	46.6	45.3	50.4	43.3	41.2	35.8	30.9	24.9	18.9	13.5	10.3	8.6		
16	86.6	82.9	73.1	74.3	73.9	65.7	65.6	59.3	56.3	55.7	52.6	51.5	57.4	54.0	51.6	50.7	49.3	54.6	47.4	45.5	49.0	44.1	42.7	36.9	31.3	25.1	19.7	17.5	11.1	9.2		
17	88.2	83.6	72.3	76.3	73.7	67.5	66.6	61.7	60.0	58.4	55.5	54.7	58.0	56.9	56.5	53.9	51.9	53.9	49.3	48.8	52.5	46.0	46.7	38.6	34.9	29.8	24.6	19.4	14.1	11.6		
18	88.3	86.3	73.4	77.9	72.7	69.1	65.3	61.9	61.3	58.6	57.4	56.1	61.4	59.1	56.3	54.8	54.4	55.4	52.1	50.7	53.6	47.6	46.5	40.6	37.2	32.0	26.9	21.4	17.5	14.7		
19	88.5	84.4	74.9	78.9	71.0	67.9	67.9	63.2	61.3	60.3	60.4	57.7	60.5	57.7	56.9	55.3	53.6	55.5	52.6	51.2	52.7	48.9	48.3	41.3	37.8	33.3	28.3	24.3	22.2	16.8		
20	90.1	83.1	76.3	78.1	73.9	66.6	67.2	63.1	62.4	63.3	60.1	58.9	64.2	59.6	56.6	55.3	54.2	56.5	53.6	52.7	53.3	50.0	47.5	43.0	39.5	36.0	31.7	29.5	28.6	21.1		
21	87.5	82.6	76.0	73.8	73.0	68.7	70.0	64.1	63.5	63.2	59.4	58.7	63.6	58.6	55.8	55.7	53.6	54.3	52.9	52.0	52.9	49.1	46.4	42.3	38.8	35.3	31.3	29.5	28.4	20.6		
22	89.8	82.7	76.3	72.6	72.4	67.4	66.3	62.9	63.4	60.8	56.4	56.6	61.9	57.3	55.8	54.8	52.6	54.1	51.2	50.4	51.7	48.2	44.9	42.1	36.7	31.8	26.7	22.6	21.2	16.9		
24	88.0	82.3	83.6	76.6	75.7	71.1	68.9	67.6	65.7	61.1	58.5	58.4	60.4	57.3	56.4	56.5	54.5	54.9	53.0	52.3	52.6	50.3	47.0	43.9	40.6	35.6	30.8	26.4	23.3	18.6		
25	87.4	84.8	82.5	81.0	78.9	72.5	71.7	68.4	66.3	60.7	59.9	58.9	64.4	59.5	57.1	56.4	54.5	54.9	52.5	52.0	52.4	49.5	45.6	40.4	38.1	32.8	28.2	25.2	22.7	20.5		
26	89.2	89.9	81.9	79.9	85.1	77.5	74.3	68.8	66.0	60.1	56.8	56.8	59.5	56.2	55.5	55.5	53.6	54.1	52.7	51.5	51.0	52.1	46.4	42.5	38.7	34.7	31.6	27.3	24.1	23.1		
27	91.3	89.7	83.1	78.5	83.0	75.2	73.5	71.4	65.3	60.2	56.4	54.3	54.7	54.3	54.0	52.5	51.9	51.8	50.2	49.7	50.0	52.3	43.5	38.9	35.0	30.4	27.5	23.4	21.7	22.6		
Average	87.1	82.8	77.9	76.9	75.1	68.9	69.9	64.0	61.5	60.4	56.4	56.5	58.8	57.2	56.3	55.3	54.1	56.4	52.3	51.0	54.2	50.1	47.1	42.3	37.8	33.0	27.6	22.4	19.8	15.9		



APPENDIX D : 1/3RD OCTAVE DB(Z) RECORDINGS FOR GT02

Frequency [Hz]	25	31.50	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000		
Position																																
1	78.6	77.7	80.0	77.8	74.4	70.7	70.5	66.5	64.5	59.3	56.9	55.3	53.7	53.5	51.9	51.4	54.9	50.3	48.9	52.7	49.3	48.1	42.3	41.5	38.5	32.8	23.7	18.3	12.3			
2	77.8	76.4	76.0	76.0	71.6	70.0	67.6	65.2	67.6	57.5	55.2	53.9	54.2	53.7	53.0	49.9	52.1	58.3	50.6	48.7	55.1	49.6	47.5	43.2	41.9	38.8	32.8	26.7	20.9	14.2		
3	77.8	75.4	79.7	77.8	71.7	68.6	68.8	65.5	60.9	59.0	55.5	55.4	53.2	53.7	56.1	51.7	53.6	60.1	50.8	48.9	56.6	49.0	48.7	46.0	41.0	36.7	33.9	31.4	29.7	24.5		
4	78.9	74.6	77.6	78.1	73.0	69.0	71.7	63.3	62.9	62.3	56.9	54.4	55.2	56.9	57.8	53.3	54.5	60.3	53.0	51.5	58.4	51.3	52.2	46.8	42.5	39.2	36.2	32.3	29.8	24.3		
5	81.1	75.4	75.6	77.4	76.0	66.9	70.9	62.0	62.7	59.1	57.1	56.3	58.1	61.1	58.4	55.8	56.5	68.8	57.1	53.9	62.1	53.5	54.5	49.0	43.6	39.1	34.4	29.5	25.7	19.6		
6	80.6	76.9	73.4	76.8	73.1	66.7	77.2	62.7	60.6	63.8	57.4	58.7	54.1	58.5	62.8	57.0	60.0	70.7	56.0	55.5	61.9	53.3	54.0	48.7	44.0	39.2	33.6	28.4	24.5	15.8		
7	82.4	77.6	69.8	76.2	70.7	68.2	77.7	62.4	60.7	63.9	57.1	56.3	54.6	57.8	60.3	56.0	56.3	61.3	53.3	53.6	61.4	51.4	51.6	47.6	43.0	38.0	31.2	24.4	18.2	11.1		
8	78.8	76.2	71.5	76.4	73.6	67.1	66.6	60.5	58.5	59.1	55.7	57.6	57.7	58.7	57.4	57.0	59.8	65.8	55.6	54.2	58.9	54.4	50.8	47.5	43.0	38.4	32.0	23.2	16.1	9.4		
9	76.1	73.4	72.4	77.5	73.2	65.6	71.4	61.6	61.3	59.5	57.0	57.2	56.3	58.0	56.9	54.7	53.9	60.9	51.5	50.7	55.0	48.1	45.6	43.9	39.0	35.0	27.0	18.5	12.7	8.3		
10	77.3	72.7	71.3	77.5	69.4	65.5	66.9	62.4	60.6	62.7	57.7	58.5	59.4	59.8	58.4	55.7	57.2	62.6	54.5	52.8	56.1	50.5	49.0	48.9	43.6	41.8	32.9	25.4	18.8	11.0		
11	75.8	72.9	71.7	74.2	69.7	66.0	68.9	61.9	59.6	60.8	57.0	58.0	59.5	59.3	58.0	57.8	58.6	63.1	55.2	54.1	57.3	51.0	49.2	47.7	43.0	39.4	31.4	23.3	15.3	9.2		
12	76.0	73.9	71.8	74.7	72.1	65.5	69.6	59.9	58.5	58.2	55.7	55.6	57.2	60.6	59.9	56.1	58.4	63.1	53.6	51.5	55.1	48.6	47.7	44.7	40.6	36.8	31.3	23.1	15.9	9.1		
13	75.2	74.4	71.4	71.4	70.6	63.1	59.5	57.4	58.5	60.5	54.9	53.3	54.9	57.5	57.6	52.8	62.2	59.0	50.2	48.5	53.0	44.8	44.6	39.6	35.4	30.3	23.3	15.2	9.3	7.5		
14	78.0	74.0	68.2	73.0	71.3	63.4	71.4	57.9	55.4	56.9	54.4	55.8	56.6	54.3	53.5	51.4	53.6	58.8	50.3	47.0	51.9	44.2	43.1	38.2	33.6	29.2	22.6	14.0	8.8	7.3		
15	77.3	74.3	71.3	73.9	72.5	65.7	75.5	59.8	55.2	55.1	55.2	57.7	54.4	55.1	55.1	51.3	51.6	57.0	48.5	46.3	52.3	43.7	44.1	37.9	33.0	27.2	20.7	12.5	8.9	7.5		
16	78.9	74.2	68.6	72.9	70.7	64.3	67.2	57.7	55.2	55.0	54.2	56.7	58.7	54.1	53.2	51.6	50.3	53.7	49.0	47.7	50.9	45.3	46.7	38.6	34.7	29.2	22.3	14.7	10.3	7.8		
17	79.7	76.5	68.7	75.2	72.9	68.3	65.9	60.9	59.1	59.5	56.1	54.2	60.0	58.4	56.0	54.3	52.7	58.0	49.6	48.2	51.8	46.8	45.8	41.7	37.5	33.3	27.3	20.6	14.1	8.9		
18	81.6	80.3	70.4	77.2	70.4	67.5	67.7	61.6	60.7	60.7	58.6	57.9	61.4	58.7	58.3	54.6	53.1	56.8	51.3	50.4	53.5	48.2	47.9	43.0	39.7	35.5	31.4	26.9	22.7	14.4		
19	80.4	76.1	74.8	76.1	70.7	66.5	65.3	63.2	62.0	64.2	60.4	59.4	61.0	58.5	59.0	55.6	53.7	58.9	53.4	51.9	53.6	50.0	48.3	43.6	41.6	37.3	32.5	28.0	26.5	15.9		
20	81.8	76.9	73.1	75.4	72.7	68.7	70.5	63.8	65.8	65.7	61.4	60.5	64.7	61.0	58.8	57.2	55.9	57.9	55.9	54.3	55.1	52.3	48.8	45.7	43.4	39.7	36.2	34.2	35.3	24.9		
21	81.2	73.8	76.3	73.4	70.8	67.2	69.4	62.7	63.6	64.5	61.1	61.3	67.2	61.6	56.8	56.5	55.6	59.6	54.4	52.4	53.9	50.5	47.7	44.8	43.0	39.3	35.4	32.7	33.6	23.3		
22	78.1	75.9	70.2	70.5	70.0	66.7	67.9	61.6	61.9	62.8	59.7	59.7	64.3	59.0	56.3	56.0	54.6	56.6	53.3	51.8	52.8	50.0	48.0	44.5	41.6	37.5	33.8	26.2	24.1	14.2		
23	78.4	77.8	75.4	70.3	73.3	68.5	69.0	64.2	63.8	62.9	61.6	60.7	60.5	59.6	57.9	55.9	55.6	57.0	54.8	54.0	54.5	52.2	49.4	47.0	45.3	41.5	37.1	31.5	31.3	21.8		
25	80.0	79.1	77.6	77.6	79.5	70.9	73.8	66.2	64.2	62.9	61.0	59.1	59.1	58.2	58.8	55.8	54.1	54.6	52.9	52.7	53.6	52.6	49.9	48.8	48.6	44.8	41.1	34.5	30.7	21.5		
26	82.0	81.7	78.9	76.6	80.7	74.3	73.8	69.1	65.1	62.9	59.7	57.9	58.5	55.9	56.4	54.4	52.5	52.3	51.1	50.6	50.7	50.9	46.5	45.5	47.4	41.7	37.3	24.9	20.9	13.4		
27	80.8	82.0	76.1	79.3	79.8	72.6	71.5	67.2	65.4	61.6	59.2	56.8	55.6	54.1	54.8	52.0	52.0	53.2	50.6	50.5	50.4	50.1	45.5	43.4	41.2	36.5	32.9	22.6	17.0	11.2		
Averaged	79.0	76.2	73.5	75.5	72.9	67.6	69.8	62.6	61.3	60.8	57.6	57.3	58.1	57.6	57.1	54.5	54.6	59.4	52.6	51.2	55.0	49.7	48.3	44.5	41.2	37.1	31.7	24.9	20.7	14.2		