APPENDIX R

SOUND AND VIBRATION MODELLING REPORTS

R-1 Acoustic Assessment
R-2 Vibration and Overpressure Sound Assessment
R-3 Acoustic Guidelines Memo

APPENDIX R-1

ACOUSTIC ASSESSMENT

ACOUSTICAL ASSESSMENT REPORT
RAINY RIVER GOLD PROJECT

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EXECUTIVE SUMMARY

The Rainy River Gold Project (RRGP) is a gold exploration project situated in the Township of Chapple, approximately sixty-five kilometres (by road) northwest of Fort Frances in northwestern Ontario. The RRGP site and surrounding lands are dominantly privately held, with Rainy River Resources Ltd. (RRR) holding a considerable private land package. RRR has been exploring the RRGP property since 2005, with the objective of constructing, operating and eventually reclaiming a new open pit and underground gold mine and milling complex on the site. RRR is pursuing environmental approvals for the development of open pit and underground gold mine at this location. AMEC Environment & Infrastructure, a division of AMEC Americas Limited, was retained by RRR to prepare an Acoustic Assessment Report for the RRGP site.

RRR is required to complete a Standard Environmental Assessment pursuant to the *Canadian Environmental Assessment Act, 2012* and an Individual Environmental Assessment pursuant to the Ontario *Environmental Assessment Act*. This acoustical assessment report has been completed as a supplement to a Federal and Provincial environmental assessment.

The major sources of sound that are anticipated from the mining operations at the RRGP site include underground ventilation fans and heavy equipment such as blast-hole-drills, excavators, track dozers, front-end loaders, motor graders and onsite truck traffic.

Sound emissions from the ore process plant will be minimal as most of the plant equipment is enclosed within the plant building. The primary sources of sound from the ore process plant will be the primary crusher, dust collectors, emergency generators and substation transformers.

A total of 18 representative worse-impacted points of reception were identified and considered in the acoustic assessment. Thirty-five sound sources were identified as being significant from the RRGP non-blasting operations.

The significant sound sources considered in the model for the worse-impact include blast hole drills, reverse circulation drills, excavators (both electric and diesel powered), wheel loader, motor graders, track dozers, truck traffic / routes, underground ventilation fans for the mining operations, crusher, dust collectors, and emergency generators and substation transformers for the ore process plant, and other auxiliary operations. A continuous operating hour was assumed in the sound impact assessment. The site is expected to operate 24 hours per day and 7 days per week. However, the emergency generators are expected to be tested during daytime only (i.e., 07:00 to 19:00). Hourly truck traffic count for the line sources (i.e., onsite haul route) for the worse-impact year were calculated based on the material movement required as per RRGP Prefeasibility Study.

Receptor sound impact associated with the operation of the facility was assessed through predictive acoustic modelling. The Ministry of Environment exclusionary sound limits were used for the assessment as the measured ambient sound levels were below these exclusionary limits.

Where preliminary equipment selections have been made, source sound levels were obtained from the equipment manufacturers. Where the design has not progressed sufficiently to provide equipment types or sizes, reasonable sound emission specifications were estimated and/or taken from database for similar equipment.

Based on the results of this acoustic assessment, under worst-case sound emission scenario, the RRGP is in compliance with the applicable MOE NPC-232 guidelines for daytime, evening and night-time operations with the mitigation considered in the assessment in place. The sound levels at the receptor reported as part of this acoustic assessment represent the worst-case operational impact; assuming all significant sound sources are operating simultaneously, during daytime, evening and night-time hours. No additional sound mitigation is required for its proposed operation.

Vibration and overpressure sound from blasting operations are assessed separately as they are governed by a different set of guidelines and criteria and are provided under a separate cover.

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1.0 INTRODUCTION

The Rainy River Gold Project (RRGP) is a gold exploration project situated in the Township of Chapple located primarily on privately held lands, approximately sixty-five kilometres (by road) northwest of Fort Frances in northwestern Ontario. Rainy River Resources Ltd. (RRR) has been exploring the RRGP property since 2005, with the objective of constructing, operating and eventually reclaiming a new open pit and underground gold mine and milling complex on the site. RRR is pursuing environmental approvals for the development of open pit and underground gold mine. AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC), was retained by RRR to prepare an Acoustic Assessment Report for the RRGP.

RRR is required to complete a Standard Environmental Assessment pursuant to the *Canadian Environmental Assessment Act, 2012* and an Individual Environmental Assessment pursuant to the Ontario *Environmental Assessment Act*. This acoustical assessment report has been completed as a supplement to a Federal and Provincial environmental assessment.

The main source of vibration (ground borne) and overpressure sound from mining operations at the RRGP site is from use of explosives (blasting). Vibration and overpressure sound from blasting operations are assessed separately as they are governed by a different set of guidelines and criteria, and provided under a separate cover. Therefore, this assessment concentrates on potential sound impacts from RRGP operations, other than blasting.

2.0 DESCRIPTION OF THE PROPOSED UNDERTAKING

The proposed RRGP site include an open pit, underground mine and a process plant. Open pit mining operations will occur at a rate of approximately 21,000 tonnes per day (tpd) of ore, supported by a planned 1,000 tpd underground mining operation. For contingency purposes, a nominal 20% additional ore throughput should be considered above the planned output. Overburden and mine rock stripped from the open pit will be stored in adjacent stockpiles. Ore will be processed in an onsite ore process plant.

2.1 Mining

An open pit and an underground mine is proposed for the RRGP. Sound from mining operations is primarily from the open pit and the activities on the ore stockpile, overburden stockpile, west mine rock stockpile, east mine rock stockpile and onsite truck traffic. The major sound sources that are anticipated from the mining operations at the RRGP site include underground ventilation fans and heavy equipment such as blast-hole-drills, excavators, track dozers, front-end loaders, motor graders and onsite truck traffic.

The main source of vibration (ground borne) from mining operations at the RRGP site is from blasting. Blasting is also associated with overpressure sound, which is shock wave generated during blasting. Vibration and overpressure sound from blasting operations are assessed

separately as they are governed by a different set of guidelines and criteria and provided under a separate cover.

2.2 Ore Processing

The mill for ore processing is to be located at the RRGP site. Sound emissions from the ore process plant will be minimal as most of the plant equipment is enclosed within the plant building. The primary sources of sound from the ore process plant area will be the primary crusher, dust collectors, emergency generators and substation transformers and are included for the acoustic assessment. Unlike the mining operations, no major vibration sources are expected in the ore process plant.

The points of reception (POR) locations with respect to the RRGP site are shown in Figure 1.

3.0 BASELINE STUDIES

A baseline sound survey was conducted for the RRGP site area by Klohn Crippen Berger (KCB) between 2009 and 2010 with monitoring locations included both human and wildlife receptors (KCB 2011). Additional baseline sound measurements were conducted by AMEC and RRR between August 17 and August 27, 2012 at four representative human receptors to determine the existing sound environment in the area surrounding the proposed project (AMEC 2013).

3.1 Sound Baseline Completed by KCB (2009 to 2010)

The baseline sound measurements were conducted at seven locations by KCB and the measurement locations included both residential and wildlife habitat sensitive areas. The measurements were conducted in accordance with the Ministry of the Environment (MOE) Sound Pollution Control document NPC-103. Baseline measurements were completed using Quest Model 2900 advanced Integrating Sound Level Meters. The measurements recorded in hourly energy equivalent sound levels L_{eq} (i.e., the energy-average sound level taken over the period) and ninetieth percentile sound levels L_{90} (i.e., sound levels that exceed 90% of the time). For Class 3 Areas, L_{90} represent background sound levels (see section 7.0 below).

The measured ambient background sound level at the locations surrounding RRGP site ranged from 30 to 40 dBA (i.e., L_{90}). Details of the measurements are provided in the KCB Baseline Report are summarized in Table 1.

3.2 Sound Baseline Completed by RRR and AMEC

The baseline sound level measurements were conducted at four locations by RRR and AMEC, and the measurement locations were human receptors. The measurements were completed for about two weeks using Larson Davis model SoundTrack LxT Integrating Sound Level Meters equipped with long term measurement gear including wind screens and bird spikes. The measurements were conducted in accordance with the MOE NPC-103 guideline. Sound monitor

Unit 1 was placed near the intersection of Gallinger Road and Korpi Road (UTM coordinate 15U 0431183E 54116440N). Sound monitor Unit 2 was placed just west of Heatwole Road and south of Teeple Road (UTM coordinate 15U 0430995E 5408044N). Sound monitor Unit 3 was placed near the intersection of Pine River Road and Hwy 600 (UTM coordinate 15U 0419667E 5410094N). Sound monitor Unit 4 was placed near the intersection of Tait Road and McMillan Road (UTM coordinate 15U 0426050E 5407172N). Sound monitoring locations are shown in Figure 2.

The additional baseline sound measurements conducted by AMEC and RRR recorded hourly L_{eq} and L_{90}. Sound level measurements conducted by AMEC and RRR were recorded continuously for daytime (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) periods during weekdays and weekends. The hourly sound levels were averaged logarithmically for daytime, evening time and night-time periods to calculate the overall equivalent sound level for each location over the course of measurement period. The monitoring was carried out during proper weather conditions with no precipitation and low wind speeds. The measured ambient background sound level at the RRGP site by RRR and AMEC ranged from 21 to 43 dBA (i.e., L_{90}). Details of the measurements are provided in KCB (2011) and AMEC (2013) and the results of the baseline sound level measurements are summarized in Table 1.

4.0 SOUND SOURCE SUMMARY

The major operation sound sources that are anticipated from the mining operations at the RRGP site include underground ventilation fans and heavy equipment such as blast-hole drills, excavators, track dozers, front-end loaders, motor graders and onsite truck traffic.

Sound emissions from the ore process plant will be minimal as most of the plant equipment is enclosed within the plant building. The primary sources of sound from the ore process plant will be primary crusher, dust collectors, emergency generators and substation transformers.

Thirty-five sound sources were identified as being significant from the RRGP operations. The significant sound sources considered in the model for the worse-impact include three blast hole drills, two reverse circulation drills, four excavators (two diesel powered and two electric powered), one wheel loader, two motor graders, six track dozers, five truck routes, three underground ventilation fans for the mining operations, and one crusher, two dust collectors and four emergency generators (i.e., one 2.5 MW, two 1.5 MW and one 250 kW units) and two substation transformers for the ore process plant and other auxiliary operations. In the sound impact assessment, a continuous operating hour was assumed. The site is expected to operate 24 hours per day and 7 days per week. However, the emergency generators are expected to be tested during daytime period only (i.e., 07:00 to 19:00). Hourly truck traffic count for the line sources (i.e., onsite haul route) for the worse-impact year was calculated based on the material movement required as per RRGP Prefeasibility Study (BBA 2012).

Where preliminary equipment selections have been made, source sound levels were obtained from the equipment manufacturers. Where the design has not progressed sufficiently to provide equipment types or sizes, reasonable sound emission specifications were estimated and/or taken from database for similar equipment. The sound sources considered in the assessment are presented in Table 2 and are shown in Figure 3.

Under MOE NPC-104 sound guidelines, additional penalties apply to sound sources with annoying natures, including tonal sounds, quasi-impulsive sounds, and beating sounds (sounds with cyclically varying amplitudes). A tonal penalty of 5 dB was applied to transformers as per MOE's publication NPC-104 and was incorporated in the acoustic assessment. The manufacturer sound levels for the equipment and sound calculations are provided in Appendix A.

5.0 MITIGATION MEASURES SUMMARY

RRR has been supportive and sound mitigation proposed measures such as selection of quieter equipment and their operations have already been integrated in the modelling. These measures are inherent to the current design of the RRGP site and are reflected in the sound model predictions. The following mitigation options are considered in the assessment:

- Extra quiet mining trucks (CAT 793F XQ) are used for material movement (sound power levels 112 dBA);
- Two of three excavators proposed for the open pit are electric drive (i.e., 8 dB quieter than the equivalent diesel units);
- Mitigated emergency diesel generators (85 dBA @ 15 m for 1.5 MW and 2.5 MW units and 65 dBA @ 15 m for 250 kW unit) with enclosures/silencers/mufflers are proposed and the testing and maintenance operations of those units are limited to daytime hours only (07:00 to 19:00); and
- RC drills are restricted to operate during daytime hours only.

6.0 POINT OF RECEPTION SUMMARY

Sound sensitive receptors of interest under NPC-205 and NPC-232 guidelines include the following sound sensitive land uses:

- Permanent, seasonal, or rental residences;
- Hotels, motels and campgrounds;
- Schools, universities, libraries and daycare centres;

- Hospitals and clinics, nursing / retirement homes; and
- Churches and places of worship.

A total of 18 representative worse-impacted POR were identified and considered in the acoustic assessment. The PORs considered in the assessment are shown in Figure 1. The receptor location considered for all PORs are at 4.5 m above grade as they are the worse-impact location (i.e., the highest window level for a two-storey house).

7.0 APPLICABLE SOUND GUIDELINES

There are three classes of acoustical environment with regard to the assessment of sound to classify ambient background sound environments per MOE NPC-205 and NPC-232 Guidelines. The MOE classifications based on ambient background sound are given below:

- Class 1 Area is used to describe an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the urban hum.

- Class 2 Area defines an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas. That means, absence of urban hum or a low ambient sound level is expected during early evening (i.e., between 19:00 and 23:00) than that in Class 1 Areas.

- Class 3 Area means a rural area with an acoustical environment dominated by natural sounds having little or no road traffic. Examples are small communities with populations of less than 1,000, agricultural areas, rural recreational areas such as a cottage or a resort area and wilderness areas.

The applicable guidelines used for the RRGP non-blasting operations are the MOE "Stationary Source" guidelines for Class 3 Areas, set out in Publication NPC-232 as the site is located in a rural area. The guidelines also stipulate that the assessment consider the potential sound impact during a predictable worse case hour of operation, which is defined as a situation when the normally busy activity of the sources coincides with an hour low background sound.

The applicable guideline for this project NPC-232 states that the steady one hour sound levels (L_{eq} (1hr)) from stationary sound sources in Class 3 Areas shall not exceed that of the background, where the background (typically caused by natural sound) is considered to be:

- The higher of 45 dBA or background sound, during daytime hours (0700 - 1900h); and

- The higher of 40 dBA, or background sound, during the early evening (1900 - 2300h) and night-time (2300 - 0700h) periods.

These exclusionary limits were adopted since the measured existing ambient sound levels for daytime, evening and night-time hours (for both Leq and L90 levels) surrounding the RRGP site were lower than the MOE exclusionary limits.

8.0 CONSTRUCTION SOUND

Construction sound is excluded from the applicable MOE Sound Control document NPC-232.

The construction activities at the RRGP site includes construction of onsite haul route, tailings management area (TMA), process plant, ancillary buildings and 230 kilovolt transmission line, development of ponds and realignment of Highway 600. Construction activities will contribute to a temporary increase in sound levels at the project site, as is typical of any site development work. This is unavoidable but is relatively short term for any individual point of reception such as residences near the site. Activities involving heavy machinery and sound emitting construction activities will be limited to short time periods within the overall estimated construction timeframe of about 12 months. Therefore, construction sound assessment is considered as insignificant.

The MOE guideline that addresses construction sound is NPC-115 "Construction Equipment." It provides equipment sound levels at reference distance individually and is not required to comply with the operation sound guidelines.

9.0 IMPACT ASSESSMENT

The sound control benefit during pit and stockpile phasing is a considerations, whereby at the peak operation year (Year 2020), the pit will go deeper and the stockpiles will grow higher. This will provide some screening to the equipment and operations at the site. Further, the equipment and truck requirements will also be change during the course of the project, with less heavy equipment and truck round trips at the beginning of the project (e.g., Year 2015) than that during the peak operation year (e.g., Year 2020). Both of these sound control factors have been considered with respect to the assessment of the RRGP site. As such, the sound levels are predicted for the Year 2015 (i.e., beginning of the project) and Year 2020 (i.e., peak operation year).

9.1 Methodology

The sound assessment for the RRGP operations was conducted using Cadna/A software, a computerized version of the ISO 9613 environmental sound propagation algorithms (accepted by the MOE), produced by Datakustik GmbH. Offsite sound exposures due to the mining operations along with the ore process plant operations were modelled. All sound sources were assumed to operate simultaneously to model the worst-case scenario. The sound propagation model is in accordance with ISO Standard 9613, Part 1: Calculation of the absorption of sound by the atmosphere, 1993 and Part 2: General method of calculation (ISO 1996).

In order to provide an accurate prediction of sound levels at particular receptors, due to sound emissions from a specific source(s) the modelling took into account the following factors:

- Source sound power level and directivity;
- Distance attenuation;
- Source-receptor geometry including heights and elevations;
- Barrier effects of the building and surrounding topography;
- Ground and air (atmospheric) attenuation; and
- Meteorological effects on sound propagation.

The site is expected to operate 24 hours per day and 7 days per week. Therefore, the predictable worst-case site impact with onsite truck hauling is modelled and assessed. The emergency generators are included for the daytime operation as their testing is expected to occur during daytime hours only.

9.2 Modelling Results

Daytime, evening and night-time sound levels emanating from the RRGP site are modelled for two worse-case scenarios:

- Year 2015 (i.e., beginning of the project); and
- Year 2020 (i.e., peak operation year).

Sound levels (L_{eq}) in dBA for worst-case operations were predicted at the representative points of reception POR01 through POR18 using the sound emissions from the individual significant sources as summarized in Table 1. Sound contours have been generated for worst-case (i.e., Year 2020) daytime, and evening and night-time operation scenarios, and are shown in Figures 4 and 5.

Predicted sound levels for the RRGP site are summarized in Table 3 for year 2015 and year 2020. The results indicate that the modelled sound levels are not expected to exceed the criteria limits and the RRGP operation is expected to be in compliance with MOE NPC-232 sound guidelines.

10.0 CONCLUSIONS

An acoustical assessment has been completed for the proposed RRGP operations. As currently configured, the sound level contribution from the RRGP at the representative POR is not expected to exceed the applicable guideline limits any time of the day. Therefore, the RRGP site is expected to be in compliance with the applicable MOE NPC-232 guidelines for its proposed operations with the mitigation considered in this assessment in place. No additional sound mitigation is required for its proposed operation.

11.0 REFERENCES

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Ministry of the Environment. 1995. Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban) Publication NPC-205, October 1995.

Ministry of the Environment. 1995. Sound Level Limits for Stationary Sources in Class 3 Areas (Rural). Publication NPC-232.

12.0 CLOSING

This acoustic assessment report was prepared by AMEC for the sole benefit of of RRR for specific application to the RRGP by AMEC. The quality of information, conclusions and estimates contained herein are consistent with the level of effort involved in AMEC's services and based on: i) information available at the time of preparation, ii) data supplied by outside sources and iii) the assumptions, conditions and qualifications set forth in this document. This report is intended to be used by RRR only, and its nominated representatives, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk. This report has been prepared in accordance with generally accepted industry-standard. No other warranty, expressed or implied, is made.

If you require further information regarding the above or the project in general, please contact the undersigned at (905) 568-2929. Thank you for the opportunity to be of service to Rainy River Resources Ltd.

Yours truly,
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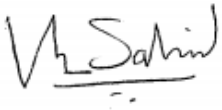

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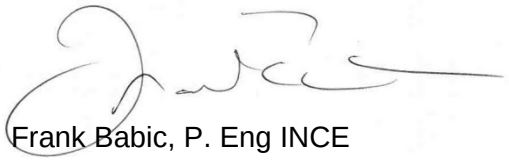

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Table 1: Baseline Sound Monitoring Results

Location ID	Monitoring Location	Monitoring Period	Maximum Hourly L_{eq} (dBA)	Average L_{eq} (dBA)	Average L_{90} (dBA)
AMEC-RRR Measurements					
Unit1	North east of RRGP	August 17 - August 27 2012 (Daytime)	58	46	34
Unit 2	South east of RRGP		40	51	42
Unit3	West side of RRGP		63	43	34
Unit4	South side of RRGP		63	46	43
Unit1	North east of RRGP	August 17 - August 27 2012 (Night-time)	55	32	21
Unit 2	South east of RRGP		31	34	28
Unit3	West side of RRGP		59	32	27
Unit4	South side of RRGP		57	31	32
KCB Measurements [1]					
N1	Human Receptor [2]	June/July 2009, September 2010 and October 2010	72/79	43/49	30/39
N3	Wildlife Receptor		77	45	33
N4	Wildlife Receptor		77	40	30
N5	Wildlife Receptor		77	36	26
N6	Human Receptor		79	47	40
N7	Human Receptor		84	48	34
N8	Human Receptor		79	46	32

Notes: [1] Data recorded was not differentiated between day and night-time periods.
[2] Measurements for two seasons.

Table 2: Sound Source Summary

Source ID	Source Description	Sound Power Level (dBA)	Source Location [1] (I or O)	Sound Characteristics [2] (S,Q,I,B,T,C)	Noise Control Measures [3] (S,A,B,L,E,O,U)
BD1	Blast Hole Drill 1	119	O	S	U
BD2	Blast Hole Drill 2	119	O	S	U
BD3	Blast Hole Drill 3	119	O	S	U
C	Crusher	124	O	S	U
E1	Excavator 1	110	O	S	U
E2	Excavator 2	110	O	S	U
E3	Excavator 3	109	O	S	U
E4	Excavator 4	118	O	S	U
DC1	Dust Collector1	101	O	S	U
DC2	Dust Collector 2	101	O	S	U
G1	Genset Engine 1_ 1.5MW	117	O	S	E, S
G3	Genset Engine 1_ 1.5MW	117	O	S	E, S
G2	Genset Engine 2_ 2.5MW	117	O	S	E, S
G4	Gen 4 _ 250 KW	96	O	S	E, S
L1	Wheel Loader 1	119	O	S	U
MG1	Motor Grader 1	111	O	S	U
MG2	Motor Grader 2	111	O	S	U
RD1	RC Drill 1	128	O	S	U
RD2	RC Drill 2	128	O	S	U
SF1	West Raise Heater	120	O	S	U
SF2	East Raise Heater (160000 cfm)	116	O	S	U
SF3	Portal Heater 290000 cfm	119	O	S	U
T1	Transformer 1	113	O	S, T	U
T2	Transformer 2	113	O	S, T	U
TD1	Track Dozer 1	114	O	S	U
TD2	Track Dozer 2	114	O	S	U
TD3	Track Dozer 3	114	O	S	U
TD4	Track Dozer 4	114	O	S	U
TD5	Track Dozer 5	114	O	S	U
TD6	Track Dozer 6	114	O	S	U
TR	Truck (793 XQ)	112	O	S	U

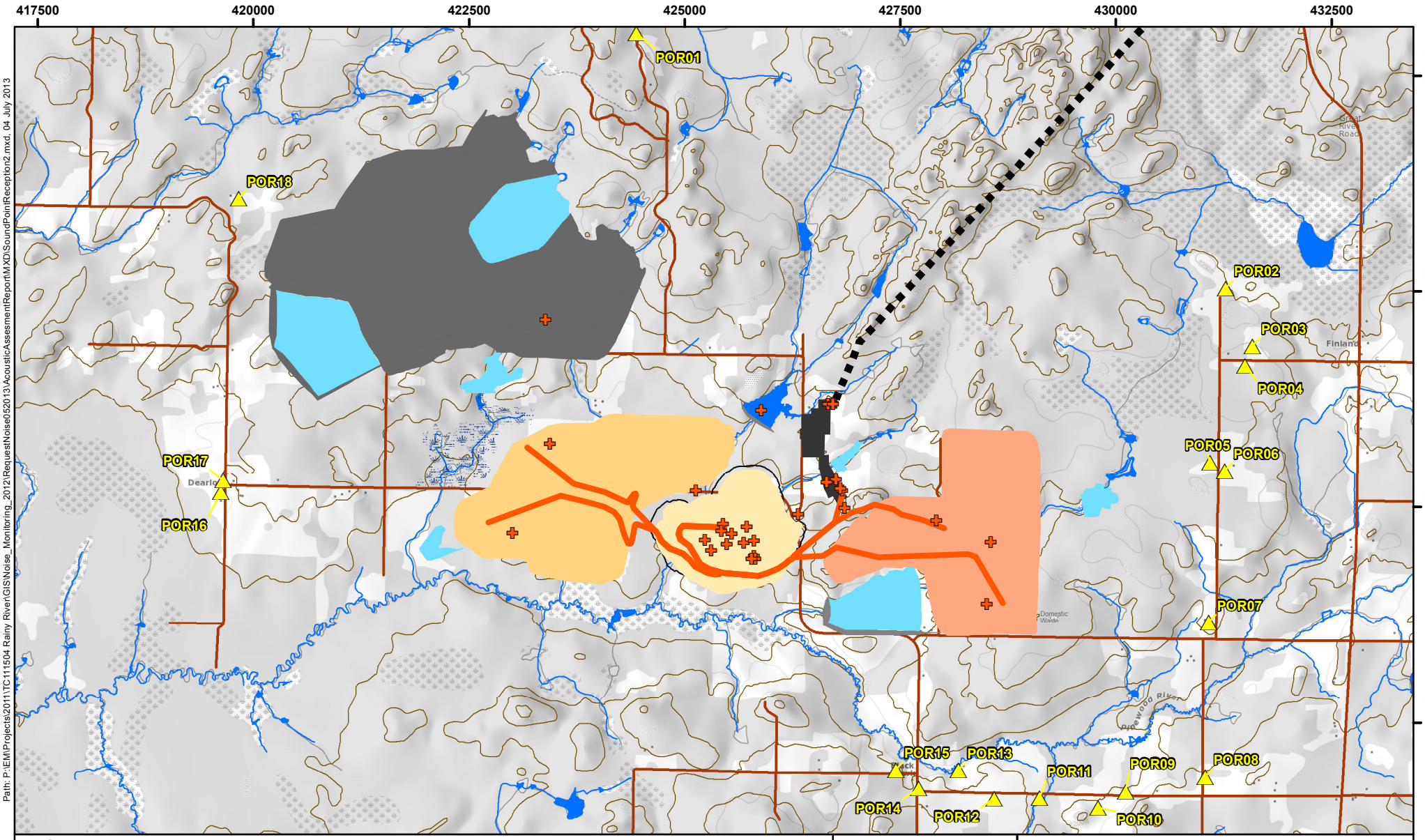
Source Location: O = Outside of building, including the roof, I = Inside of building

Sound Characteristic, per NPC-04: S = Steady; I = Impulsive; T = Tonal; Q = Quasi-Steady Impulsive; B = Buzzing; C = Cyclic
Noise Control Measures to be included: S = Silencer/Muffler; L = Lagging; O = other; A = Acoustic lining, plenum; E = acoustic enclosure; U = uncontrolled; B = Barrier

Table 3: Acoustic Assessment Summary

Point of Reception ID	Point of Reception Description	Time Period	Total Sound Level at POR (dBA)		Performance Limit	Compliance with Performance Limit
			Year 2015	Year 2020	(dBA)	(Yes/No)
POR01	House 01 - North	Daytime	37	38	45	Yes
		Evening	32	33	40	Yes
		Night-time	32	33	40	Yes
POR02	House 02 - East	Daytime	36	38	45	Yes
		Evening	33	34	40	Yes
		Night-time	33	34	40	Yes
POR03	House 03 - East	Daytime	36	38	45	Yes
		Evening	33	34	40	Yes
		Night-time	33	34	40	Yes
POR04	House 04 - East	Daytime	37	38	45	Yes
		Evening	34	35	40	Yes
		Night-time	34	35	40	Yes
POR05	House 05 - East	Daytime	38	40	45	Yes
		Evening	36	36	40	Yes
		Night-time	36	36	40	Yes
POR06	House 06 - East	Daytime	38	39	45	Yes
		Evening	35	36	40	Yes
		Night-time	35	36	40	Yes
POR07	House 07 -Southeast	Daytime	38	39	45	Yes
		Evening	35	36	40	Yes
		Night-time	35	36	40	Yes
POR08	House 08 - South	Daytime	36	38	45	Yes
		Evening	33	34	40	Yes
		Night-time	33	34	40	Yes
POR09	House 09 - South	Daytime	37	39	45	Yes
		Evening	34	35	40	Yes
		Night-time	34	35	40	Yes
POR10	House 10 - South	Daytime	38	40	45	Yes
		Evening	34	36	40	Yes
		Night-time	34	36	40	Yes
POR11	House 11 - South	Daytime	39	41	45	Yes
		Evening	36	37	40	Yes
		Night-time	36	37	40	Yes
POR12	House 12 - South	Daytime	40	42	45	Yes
		Evening	37	38	40	Yes
		Night-time	37	38	40	Yes

Point of Reception ID	Point of Reception Description	Time Period	Total Sound Level at POR (dBA)		Performance Limit	Compliance with Performance Limit
			Year 2015	Year 2020	(dBA)	(Yes/No)
POR13	House 13 - South	Daytime	41	42	45	Yes
		Evening	38	38	40	Yes
		Night-time	38	38	40	Yes
POR14	House 14 - South	Daytime	41	44	45	Yes
		Evening	38	39	40	Yes
		Night-time	38	39	40	Yes
POR15	House 15 - South	Daytime	42	45	45	Yes
		Evening	39	40	40	Yes
		Night-time	39	40	40	Yes
POR16	House 16 - West	Daytime	36	39	45	Yes
		Evening	32	35	40	Yes
		Night-time	32	35	40	Yes
POR17	House 17 - West	Daytime	36	39	45	Yes
		Evening	32	35	40	Yes
		Night-time	32	35	40	Yes
POR18	House 18 - Northwest	Daytime	35	37	45	Yes
		Evening	31	32	40	Yes
		Night-time	31	32	40	Yes



LEGEND

- Receptor (labelled with ID)
- Point Source
- Line Source
- Existing Roads
- Contours, 10 m interval

Proposed Site Features

- Open Pit
- Tailings Management Area
- Overburden / West Mine Rock Stockpile
- Ore / East Mine Rock Stockpile
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

NOTES:
-

0 1 2 4 6 8 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

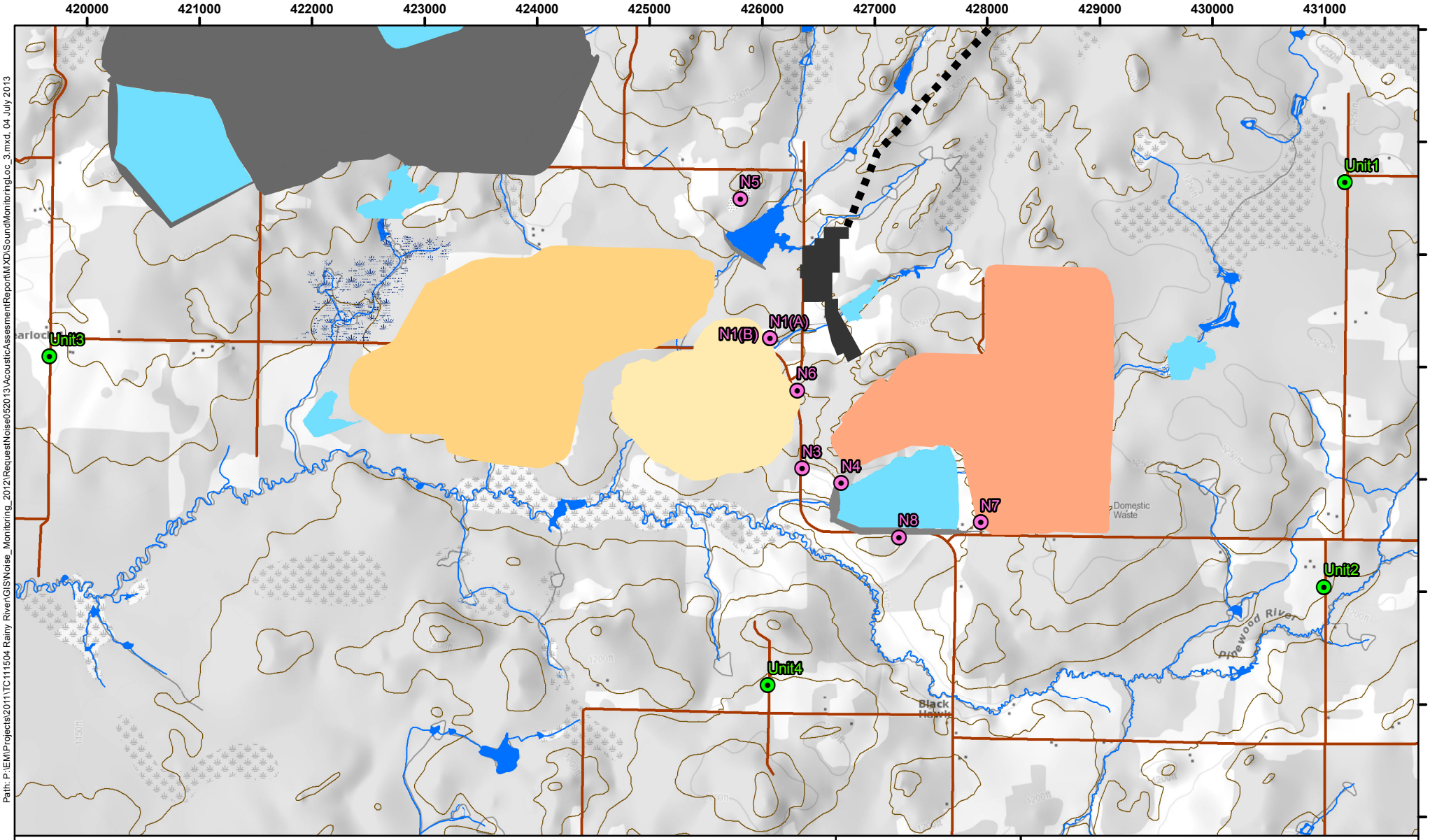
N W E S

RAINY RIVER amec

RAINY RIVER GOLD PROJECT

Site Aerial Map

PROJECT N°: TC111504	**FIGURE: 1**
SCALE: 1:61,100	DATE: June 2013



LEGEND

- Klohn Crippen Berger Baseline Noise Station (2009-2010)
- Rainy River Resources Baseline Noise Station (2012)

Proposed Site Features

- Open Pit
- Tailings Management Area
- Overburden / West Mine Rock Stockpile
- Ore / East Mine Rock Stockpile
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

NOTES:
-

Datum: NAD83
Projection: UTM Zone 15N

0 0.75 1.5 3 4.5 6 Kilometres

RAINY RIVER

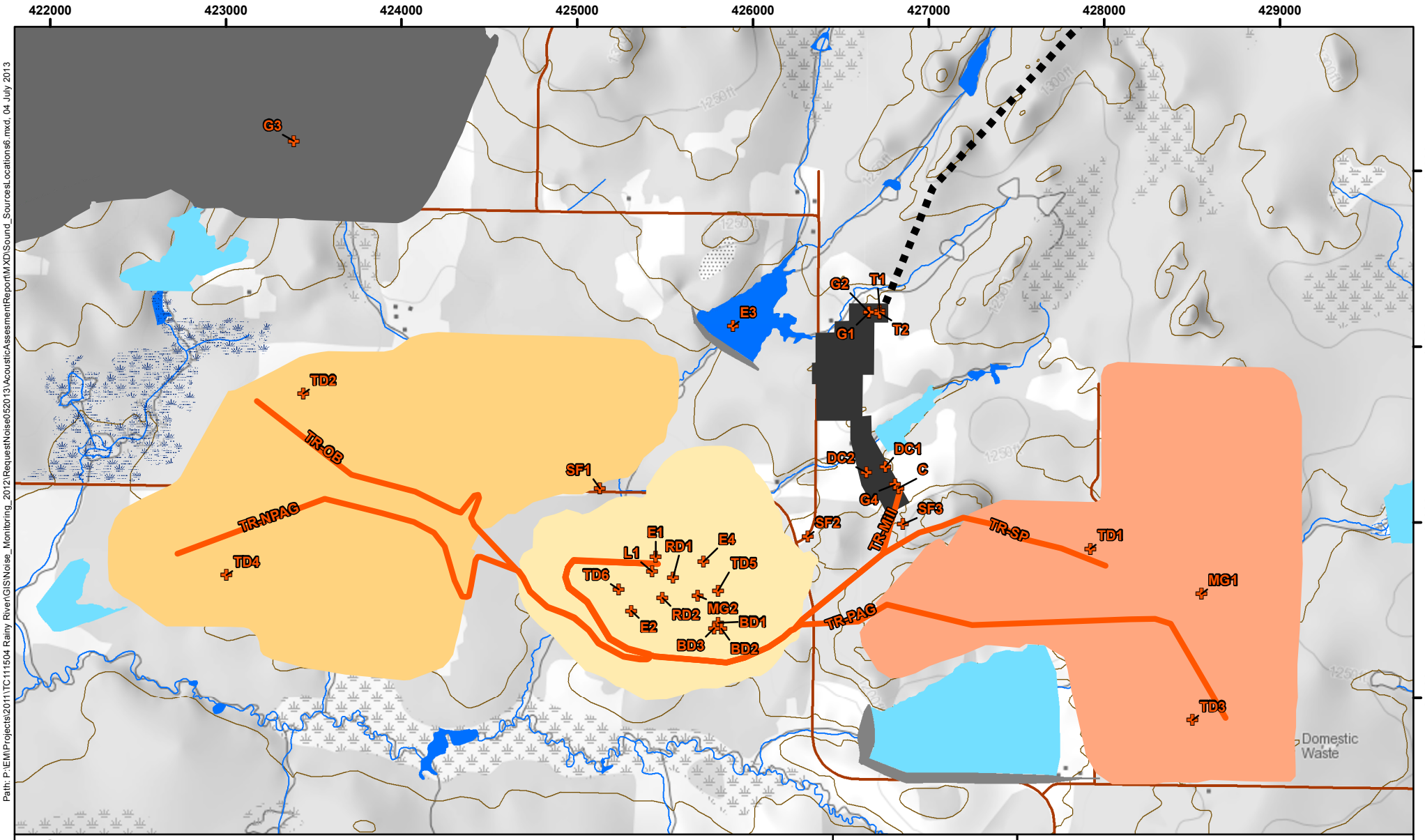
amec

RAINY RIVER GOLD PROJECT

Baseline Sound Monitor Locations

PROJECT N°: TC111504 | **FIGURE: 2**

SCALE: 1:47,000 | DATE: June 2013



Path: P:\EM\Projects\2011\TC111504 Rainy River\GIS\Noise_Monitoring_2012\RequestNoise052013\AcousticAssesmentReportMXD\Sound_SourcesLocations6.mxd, 04 July 2013

LEGEND

- Point Source (labelled with ID)
- Line Source (labelled with ID)
- Existing Roads
- Contours, 10 m interval (LIO-MNR)

Proposed Site Features

- Open Pit
- Tailings Management Area
- Overburden / West Mine Rock Stockpile
- Ore / East Mine Rock Stockpile
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

NOTES:
-

Datum: NAD83
Projection: UTM Zone 15N

0 0.5 1 2 3 4 Kilometres

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RAINY RIVER GOLD PROJECT

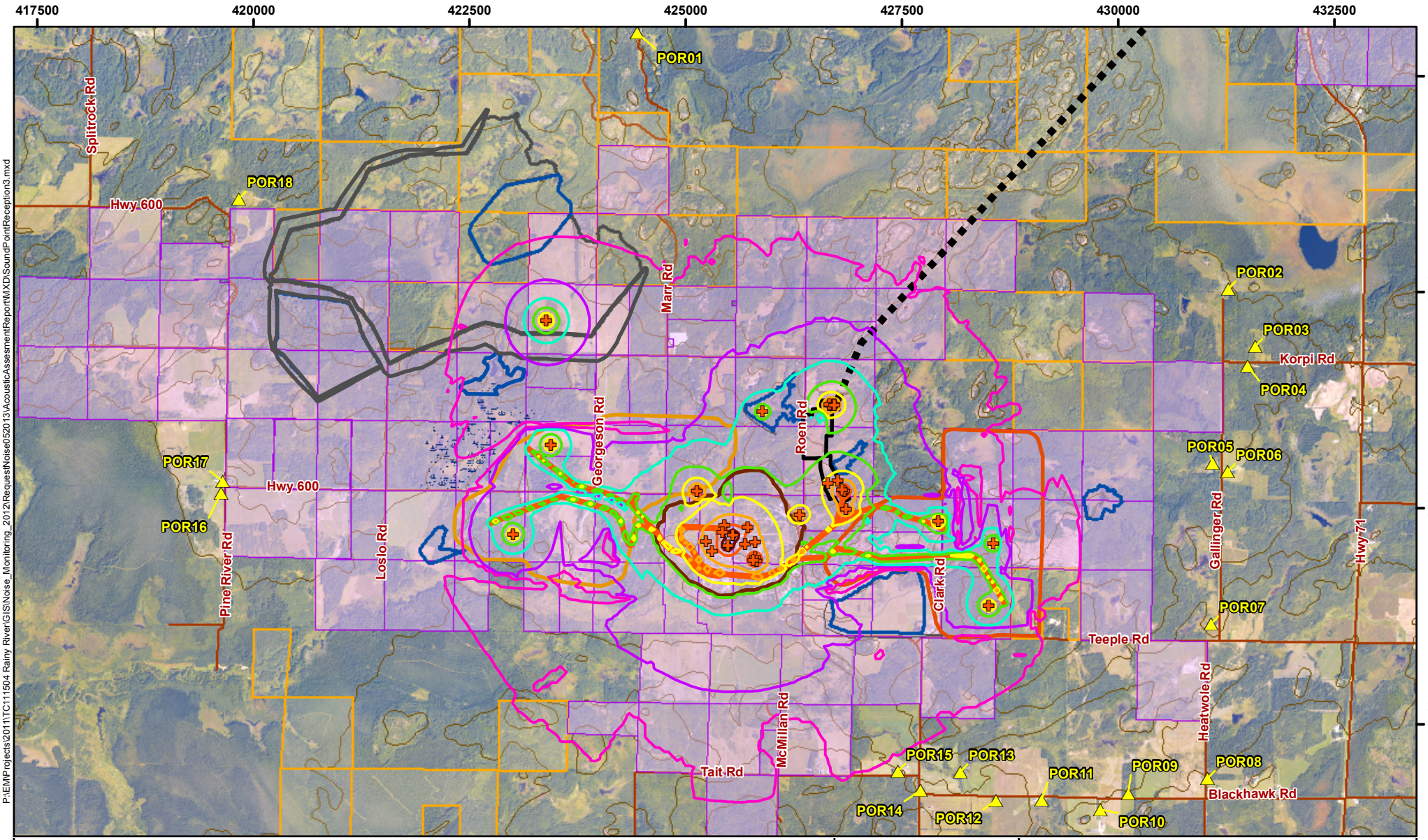
Significant Sound Source Locations

PROJECT N°: TC111504

FIGURE: 3

SCALE: 1:30,000

DATE: June 2013



LEGEND

- Receptor (labelled with ID)
- Point Source
- Line Source
- Existing Roads
- Contours, 10 m interval
- RRR Active Disposition Land
- RRR Active Unpatented Claim Land

Proposed Site Features

- Open Pit
- Tailings Management Area
- Overburden / West Mine Rock Stockpile
- Ore / East Mine Rock Stockpile
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

Daytime Operations, dBA Contours

- >=45
- >=50
- >=55
- >=60
- >=65
- >=70
- >=75
- >=80
- >=85

NOTES:
-

0 1 2 4 6 8 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

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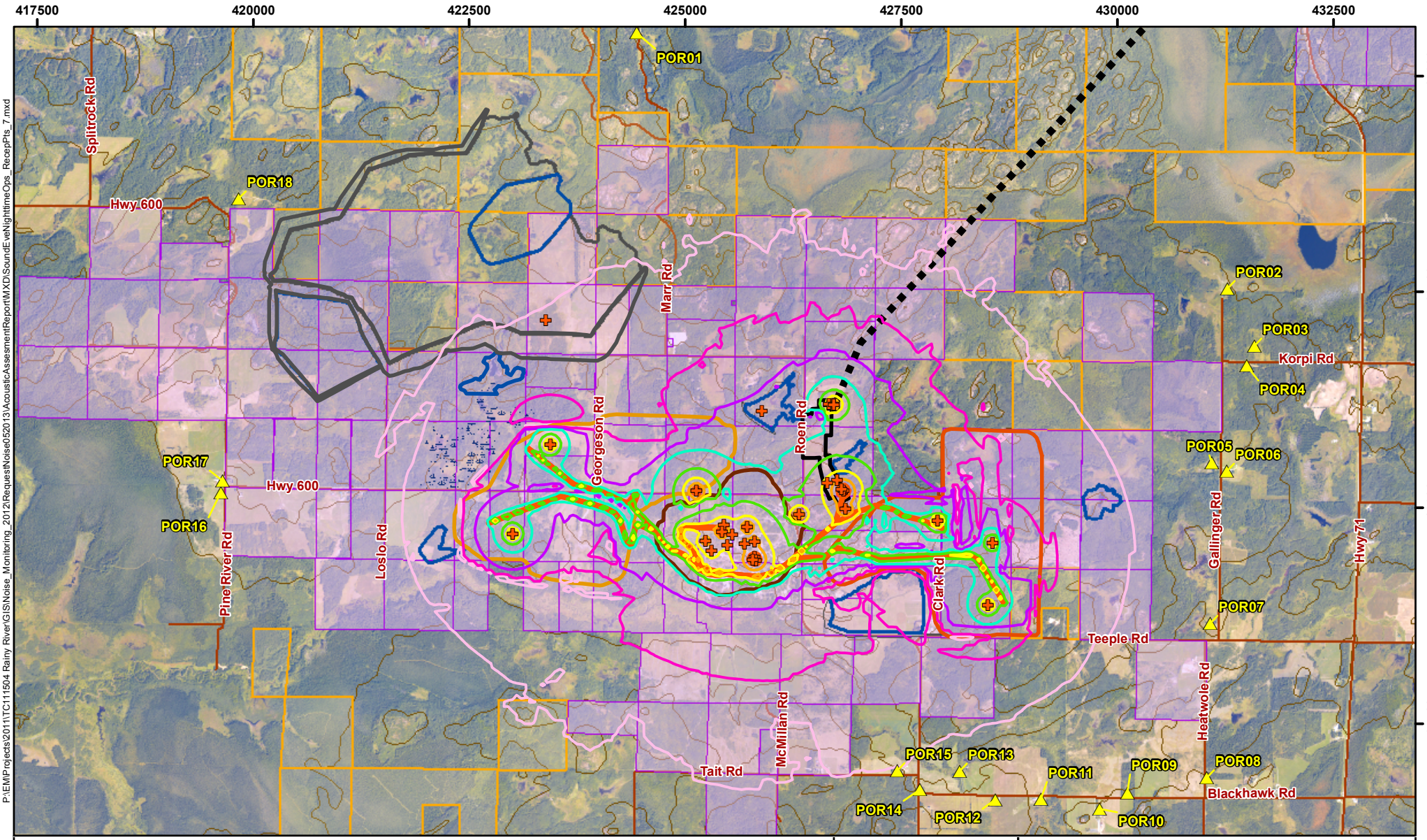
RAINY RIVER GOLD PROJECT

Sound Contours
Worst-Case Daytime Operation

PROJECT N°: TC111504	**FIGURE: 4**
SCALE: 1:61,100	DATE: September 2013



LEGEND

- Receptor (labelled with ID)
- Point Source
- Line Source
- Existing Roads
- Contours, 10 m interval
- RRR Active Disposition Land
- RRR Active Unpatented Claim Land

Proposed Site Features

- Open Pit
- Tailings Management Area
- Overburden / West Mine Rock Stockpile
- Ore / East Mine Rock Stockpile
- Plant Site / Ancillary Facilities
- Ponds
- Transmission Line

Evening and Night-time Operations, dBA Contours

- >=40
- >=45
- >=50
- >=55
- >=60
- >=65
- >=70
- >=75
- >=80
- >=85

NOTES:
-

0 1 2 4 6 8 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

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RAINY RIVER GOLD PROJECT

Sound Contours Worst-Case Evening and Night-time Operations

PROJECT N°: TC111504	**FIGURE: 5**
SCALE: 1:61,100	DATE: September 2013

APPENDIX A

MANUFACTURER'S SOUND DATA AND SOUND CALCULATIONS

CONVERSION OF SOUND PRESSURE LEVELS TO SOUND POWER LEVELS

Project Name: RRGP
Project Number: TC111504
Location: Emo ON

A-WEIGHTING (dB) - Applied to total PWL							
-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1

1/4 WAVELENGTH CRITERION (m)							
1.361	0.686	0.343	0.172	0.086	0.043	0.021	0.011

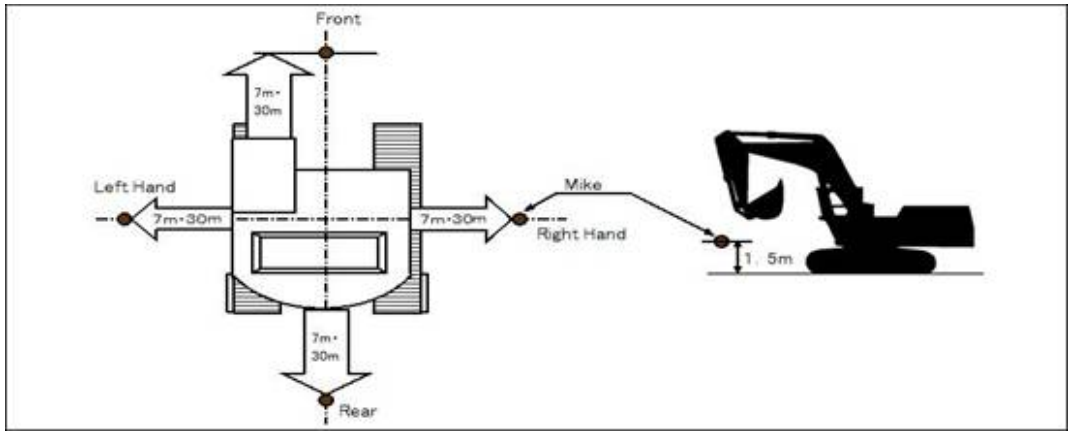
Source ID	Source Description	Calc Type [3] (A, C, or S)	SPL Ref Distance [4] (S or C) (m)	Length [5] (C only) (m)	Area (A only) (m^2)	Partition Coefficient (S or C) (%)	Net Surface Area [6] (m^2)	Spectral Weighting (A or Flat)	Octave Band Sound Pressure Level Data (dB or dBA) [7] 63	125	250	500	1000	2000	4000	8000	Total (dBA)
TD	Track Dozer	S	2.0			50%	25.1	A	116.0	121.0	124.0	119.0	117.0	114.0	108.0	102.0	127.6
Tuck_XQ	793F XQ	S	2.0			50%	25.1	A	109.5	114.5	117.5	112.5	110.5	107.5	101.5	95.5	121.2
G1	Genset 1.5 MW Cat	S	15.0			50%	1413.0	Flat	98.0	107.0	98.0	89.0	83.0	83.0	81.0	84.0	95.2
G2	Genset 2.5 MW Cat	S	15.0			50%	1413.0	Flat	100.0	110.0	100.0	91.0	85.0	85.0	82.0	86.0	97.6
G4	Genset 250 kw Cat	S	15.0			50%	1413.0	Flat	76.1	71.6	68.8	62.5	55.8	51.5	50.2	45.3	64.9
ROC65		S	150.0			50%	141300.0	A				76.0					76.0
E	EX5600	S	7.0			50%	307.7	A				93.0					93.0
L	Loader Cat 994	S	15.0			50%	1413.0	A				87.0					87.0
Sub_Transf	Substation Transformer	A			266.0		266.0	Flat	86.6	88.6	83.6	83.6	77.6	72.6	67.6	60.6	84.0

Sound Power Level Adjustment (dB)	Purpose	Octave Band Sound Power Level Data (dB or dBA) [8] [7] 63	125	250	500	1000	2000	4000	8000	Total (dBA)
-27.6	shaping	102.4	107.4	110.4	105.4	103.4	100.4	94.4	88.4	114.0
-23.7	shaping	99.8	104.8	107.8	102.8	100.8	97.8	91.8	85.8	111.5
-10.2	shaping	119.3	128.3	119.3	110.3	104.3	104.3	102.3	105.3	116.5
-12.6	shaping	118.9	128.9	118.9	109.9	103.9	103.9	100.9	104.9	116.5
		107.6	103.1	100.3	94.0	87.3	83.0	81.7	76.8	96.4
					127.5					127.5
					117.9					117.9
					118.5					118.5
		110.9	112.9	107.9	107.9	101.9	96.9	91.9	84.9	108.3

2000 Rue John Molson
Laval, Quebec
H7T 0H4

www.wajaxequipment.com

Noise level specification dB(A)								
		EX1900-6	EX2500-6	EX2600-6	EX3600-6	EX5500-6	EX5600-6	EX8000-6
Inside cab	Engine High Idle, No Load	72	72	72	76	75	75	75
7 m from machine	Engine High Idle, No Load	93	93	93	93	93	93	93



The EX1200-6 machine is measured using ISO 6395 different test from larger machines

Noise level secification dB (A)			EX1200-6
Inside cab	engine High idle, No Load		75
6 points on semi-spherical surface (Radius is 4, 10 or 16 m, which is selected according to the size of machine.)	engine High idle, No Load		114

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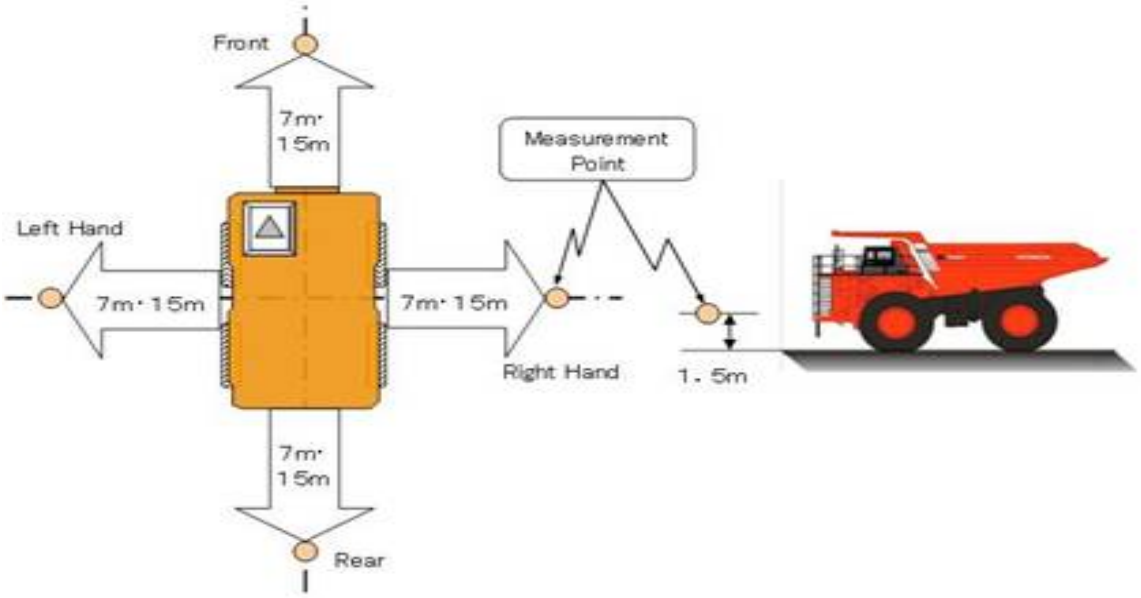
Noise level specification dB(A)					
	Model:	Spec	EH3500ACII	EH4000ACII	EH5000AC-3
Inside cab	Engine High Idle, No Load	≥ 81	79.2	79.9	73.3
7 m from machine	Engine High Idle, No Load	-	87.9	88.0	82.9
15 m from machine	Engine High Idle, No Load	-	82.8	82.9	77.5



16M

Motor Grader

Cat® C13 ACERT™ VHP		
Base Power (1st gear) – Net	221 kW	297 hp
VHP Range – Net	221-233 kW	297-312 hp
VHP Plus Range – Net	221-248 kW	297-332 hp

Gross Vehicle Weight – base		
Total	26 959 kg	59,435 lb
Front axle	7414 kg	16,345 lb
Rear axle	19 545 kg	43,090 lb
Moldboard		
Blade Width	4.9 m	16 ft

16M Motor Grader

The 16M delivers multiple technological breakthroughs to give you the best return on your investment.

Operator Station

✔ A technologically advanced cab, featuring joystick controls, provides unmatched comfort and visibility. **pg. 4**

Steering and Implement Controls

✔ Two joysticks offer precise control and unparalleled ease of operation. This advanced technology makes the 16M the most operator-friendly motor grader in the world. **pg. 6**

Structures, Drawbar, Circle, Moldboard

✔ The 16M frame provides a solid working platform, and the DCM delivers service ease and precise blade control for maximum productivity. **pg. 8**

Integrated Electronic Solutions

✔ Full systems integration with advanced electronics including Cat® Messenger, AccuGrade™ blade control system and Cat ET, create a “Smart Machine” that optimizes performance and availability. **pg. 14**

Work Tools and Attachments

The Work Tools and optional attachments for the 16M expand machine versatility, utilization and performance. **pg. 15**

The 16M motor grader represents a revolution in operational efficiency, visibility, service ease and overall productivity, setting the new standard and building on the legacy of high quality you can trust.

Power Train

✔ An electronically controlled power shift transmission assures smooth shifting and maximum power to the ground. A modular rear axle and hydraulic brakes simplify serviceability and reduce operating costs. **pg. 10**

Engine

✔ The Cat® C13 engine combines power management with ACERT™ Technology to deliver maximum power and efficiency in every gear while reducing the environmental impact. **pg. 12**

Hydraulics

✔ The electro-hydraulic load-sensing system provides the foundation for advanced machine controls, enabling superior controllability and precise and predictable hydraulic movements, with the reliability customers expect from Caterpillar. **pg. 13**

Safety

✔ Caterpillar has been and continues to be proactive in developing machines that meet or exceed safety standards. **pg. 16**

Serviceability and Customer Support

✔ Fast component replacement and minimum downtime are possible with Caterpillar's exceptional parts availability and dealers' advanced rebuild and repair capabilities. **pg. 18**

✔ *New Feature*

Operator Station

The 16M features a revolutionary cab design that provides unmatched comfort, visibility and ease of use, making the operator more confident and productive.

Advanced Joystick Controls. Two electro-hydraulic joysticks reduce hand and wrist movement as much as 78% compared to conventional lever controls for greatly enhanced operator efficiency. The intuitive pattern is easy to learn and provides the precise implement control you expect from Caterpillar.

Auxiliary Pod and Ripper Control. The optional ripper control and auxiliary control pod are ergonomically positioned to allow simple, comfortable operation for the multiple hydraulic options.

Visibility. The 16M boasts excellent visibility to the work area, made possible with angled cab doors, a tapered engine enclosure and a patented sloped rear window.

In-Dash Instrument Cluster. The instrument panel, with easy-to-read, high-visibility gauges and warning lamps, keeps the operator aware of critical system information.

Cat Messenger. Cat Messenger provides real-time machine performance and diagnostic data. You can quickly view critical performance and operating information, in multiple languages, helping to maximize the life and productivity of the machine.

Controls and Switches. Reliable, long-life rocker switches are located on the right side cab post and front instrument cluster, within easy reach for the operator.

Low Interior Sound and Vibration Levels. Isolation mounts for the cab, engine and transmission, in addition to the relocation of the hydraulic pump and valves, provide significant sound and vibration reductions. The low vibration levels and quiet interior (72 dB(A)) provide a comfortable work environment.

Cat Comfort Series Seat. The Cat® Comfort Series suspension seat has an ergonomic high-back design, with extra thick contoured cushions and infinitely adjustable lumbar support that evenly distributes the operator's weight. Multiple seat controls and armrests are easy to adjust for optimal support and comfort all day. The optional air suspension seat enhances ride quality for additional comfort.

Comfort and Convenience. Caterpillar has built the most comfortable cab in the industry by replacing the control levers and steering wheel with two joystick controls, and lengthening the cab to give more leg room.

Multiple adjustment capabilities for the arm rest, wrist rests and joystick pods help keep the operator comfortable throughout a long shift.

Modular HVAC System. The standard modular heating, ventilation and air conditioning system is fully integrated into the design of the cab. The modular design allows for easy replacement or repair with minimum downtime. Intelligent placement of vents provides consistent climate control and clear windows for every condition. The high-capacity system dehumidifies air and pressurizes the cab, circulating fresh air and sealing out dust. An easily accessible fresh air filter is located outside the cab at ground level for quick replacement or cleaning.

Additional Cab Features. Additional cab features include cup holder, lighter and ashtray, coat hook, storage area, night time light, and power port. An optional rearview camera, 25 amp power converter and radio are also available.

Steering and Implement Controls

The 16M sets the new standard for motor grader operational efficiency.

Ease of Operation. The revolutionary joystick controls and exceptional visibility make the 16M easier to operate without sacrificing control.

The intuitive joystick control pattern allows both new and experienced operators to become productive quickly.

Logical grouping of hydraulic functions in the joysticks allow any operator to easily control several functions at the same time. This allows the operator to be more productive and remain comfortable throughout the work shift.

Intuitive Steering Control. The 16M introduces a breakthrough in joystick steering control. This technology creates a direct relationship between the lean angle of the joystick and the turning angle of the steer tires.

A brake tensioning system holds the joystick in position until the operator moves it. In addition, the steering control automatically reduces steering sensitivity at higher ground speeds for comfortable and predictable control.

Electronic Throttle Control. Electronic Throttle Control (ETC) provides the operator with easy, precise, and consistent throttle operation. An automatic and manual mode on a single switch offers flexibility for different applications and operator preferences.

Left Joystick Functions. The left joystick primarily controls the machine direction and speed.

1 – Steering: Lean joystick left and right

2 – Articulation: Twist joystick left and right

3 – Articulation Return to Center: Yellow thumb button

4 – Wheel Lean: Two black thumb buttons

5 – Direction: Index trigger shifts transmission to forward, neutral or reverse

6 – Gear Selection: Two yellow thumb buttons upshift and downshift

7 – Left moldboard lift cylinder: Push joystick to lower, pull joystick to raise

– Left moldboard lift cylinder float: Pushing joystick through detent engages float

Articulation Return-to-Center. This feature automatically returns the machine to a straight frame position from any articulation angle with the touch of a single button. Return-to-Center helps improve productivity and safety by allowing the operator to focus on controlling the moldboard.

Right Joystick Functions. The right joystick primarily controls the Drawbar, Circle and Moldboard functions.

1 – Right moldboard lift cylinder: Push joystick to lower, pull joystick to raise

– Right moldboard lift cylinder float: Pushing joystick through detent engages float

2 – Moldboard slide: Lean joystick left and right

3 – Circle turn: Twist joystick left and right

4 – Moldboard tip: Thumb switch fore and aft

5 – Drawbar center shift: Thumb switch left and right

6 – Electronic Throttle Control: Trigger switch is resume and decrement

7 – Differential Lock/Unlock: Bottom Trigger button

1 – Ripper Control Pod. Infinitely variable roller switches control the rear ripper and/or front lift group (when equipped), for easy and comfortable control.

2 – Programmable Auxiliary Hydraulic Pod. Four fingertip controls and a mini joystick maximize hydraulic control flexibility, accommodating up to six hydraulic circuits. Individual functions are easily programmable through Cat ET to meet the configuration you need.

The optional auxiliary hydraulic pod is provided in addition to the ripper control pod when the machine is configured with three or more auxiliary functions.

Structures, Drawbar, Circle, Moldboard

Durable structures with fast and simple DCM adjustments deliver precise material control while lowering operating costs.

Front Frame Structure. Continuous top and bottom plate construction provides consistency and strength. The flanged box section design removes welds from high stress areas, improving reliability and durability, and increasing resale values for the customer.

Rear Frame Structure. The box-sectioned hitch design and cast axle mounting helps resist torsion loads and ensure structural durability. The integrated bumper ties the rear frame together as a single, solid unit, so the frame can withstand heavy-duty applications such as ripping.

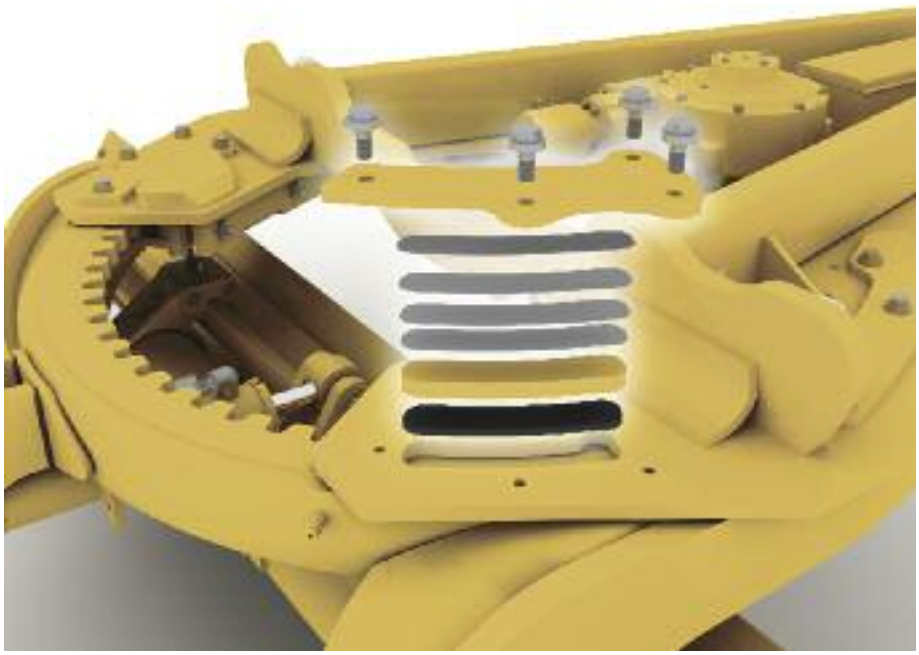
Articulation Hitch. A large tapered roller bearing at the lower pivot carries loads evenly and smoothly. This joint is sealed to prevent contamination in this critical area.

A mechanical locking pin prevents frame articulation to help ensure safety when servicing or transporting the machine.

Circle Construction. Our one-piece forged steel circle is built to stand up to high stress loads and provide structural durability. The front 240° of circle teeth are hardened to reduce wear and ensure component reliability.

Drawbar Construction. The A-frame drawbar features a tubular design for high strength and optimum durability.

Aggressive Blade Angle. With a long wheelbase the operator can obtain aggressive moldboard angles so material rolls more freely along the length of the blade. This is particularly helpful when handling very dry materials or cohesive soils. Better material control gets the job done faster, requires less power and saves fuel.



Top-adjust drawbar wear strips

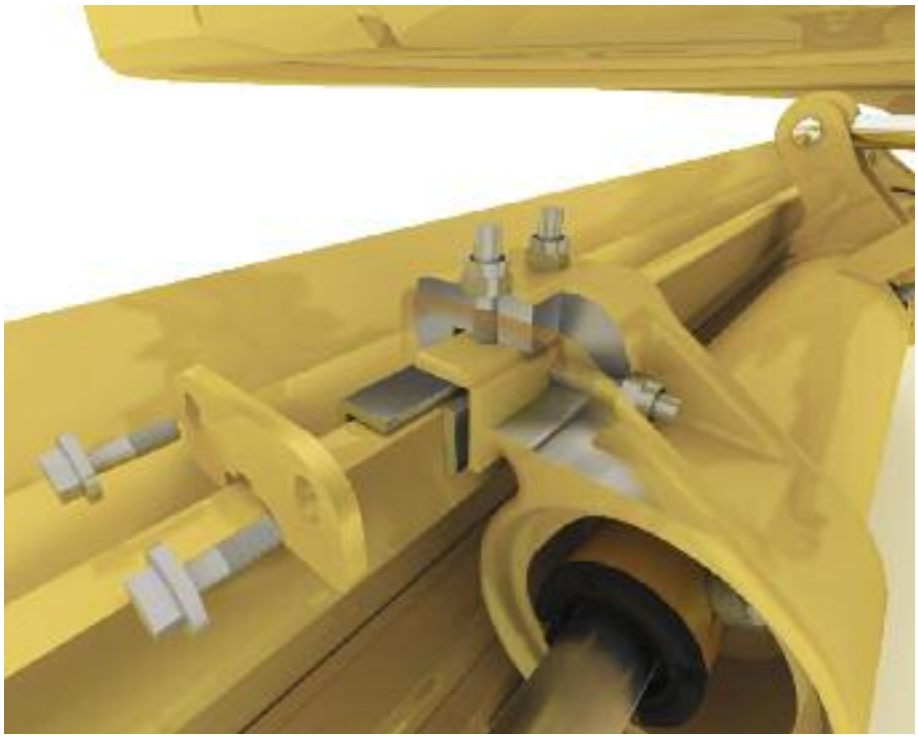
Moldboard. The optimal curvature and large throat clearance help move material quickly and efficiently. Heat-treated moldboard rails, hardened cutting edges and end bits, and large diameter bolts assure reliability and longer service life. The moldboard side shift cylinder is positioned on the left side to eliminate snow wing interference.

Moldboard Positioning. The blade link bar design extends the possibilities for moldboard positioning, most beneficial in mid-range bank sloping and in ditch cutting and cleaning.

Shimless Moldboard Retention System. The unique shimless moldboard retention system reduces the potential for blade chatter. Vertical and horizontal adjusting screws keep the moldboard's wear strips aligned for precise blade control and dramatic reductions in service time.

Top-Adjust Drawbar Wear Strips. The patented top-adjust wear strips dramatically reduce drawbar/circle adjustment time. By removing the access plates on top of the drawbar, shims and wear strips can easily be added or replaced. This feature reduces service downtime and lowers overall machine operating costs.

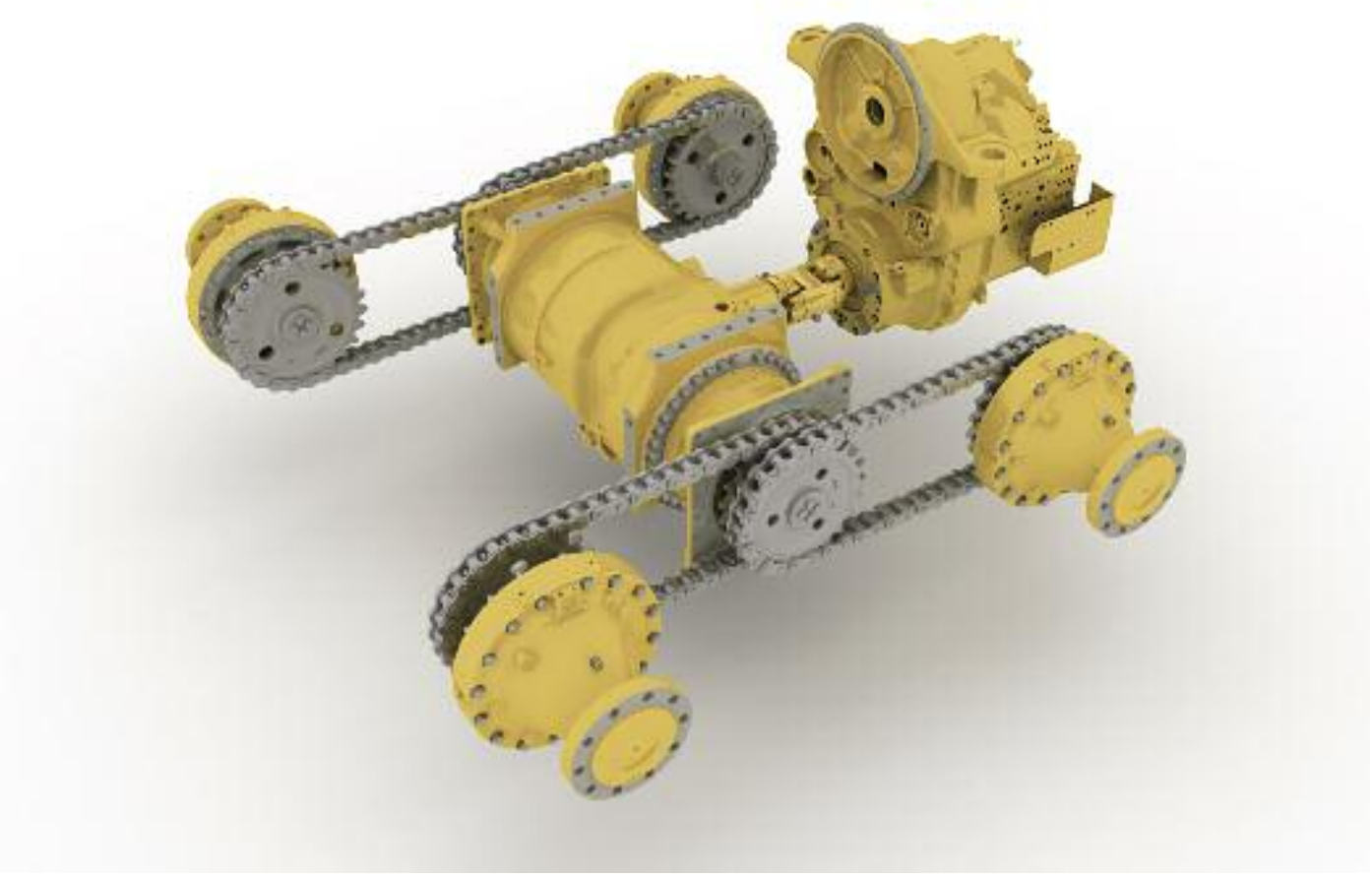
Replaceable Wear Inserts. Tough, durable nylon composite wear inserts reduce rotational friction for maximum circle torque and longer component life. They are located between the drawbar and circle, and between the support shoes and circle. High load-resistant brass wearstrips are placed between the blade mounting group and moldboard. This sacrificial wear system can be replaced easily and helps keep components tight for fine grading.



Shimless moldboard retention system with adjusting screws

Power Train

Integrated, electronically controlled systems, deliver smooth reliable performance with reduced operating costs.



Smooth Shifting Transmission. The 16M combines several key innovations to ensure smooth, powerful shifts throughout the gear range.

Electronically Controlled Shifting. The full Electronic Clutch Pressure Control (ECPC) system optimizes inching modulation and smooths shifting between all gears and directional changes. This provides outstanding control and also extends the life of the transmission by reducing stress on the gears.

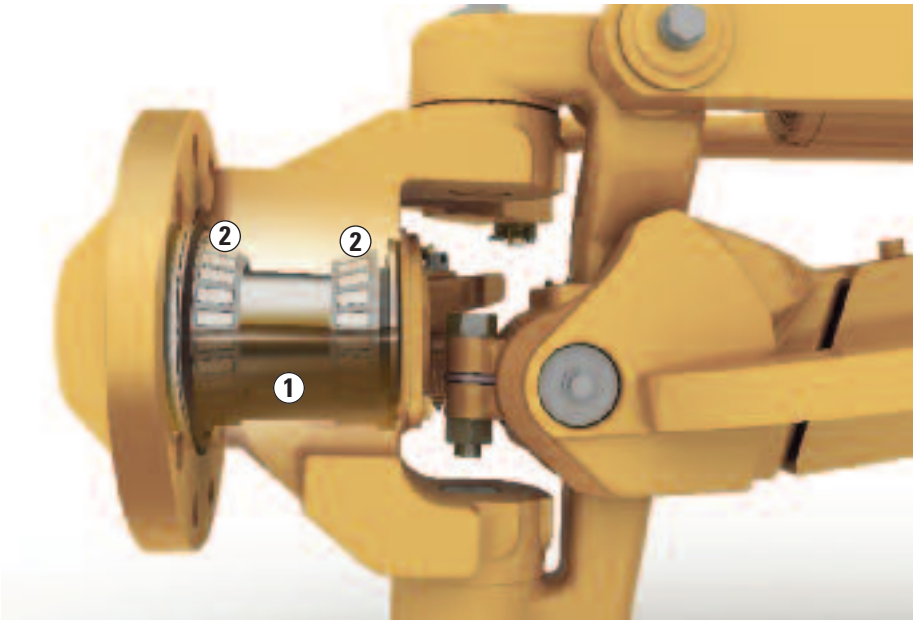
Load Compensation. This standard feature ensures consistent shift quality regardless of blade or machine load.

Controlled Throttle Shifting. This standard feature helps to smooth directional and gear changes without use of the inching pedal.

Engine Over-Speed Protection. Helps protect the transmission and extend component life by preventing downshifting until a safe travel speed has been established.

Power Shift Countershaft Transmission. Designed and manufactured specifically for the 16M motor grader, the direct drive countershaft transmission is matched with the powerful Cat C13 engine to maximize power to the ground.

Modular Rear Axle. The 16M incorporates a bolt-on modular rear axle design, which offers easy access to differential components, improves serviceability and contamination control, and lowers maintenance time and operating costs. The result is a rugged machine you can rely on for years to come.



Front axle

Front Axle. The Caterpillar® sealed spindle keeps the bearings free from contaminants and lubricated in a light-weight oil (1). This durable, low-maintenance design reduces your owning and operating costs. Two tapered roller bearings (2) support the wheel spindle. The Cat "Live Spindle" design places the larger tapered roller bearing outboard where the load is greater, extending bearing life.

Gear Selection. Eight forward and six reverse gears give the operator a wide operating range. The specifically designed range of gears ensures maximum productivity in all earthmoving applications.

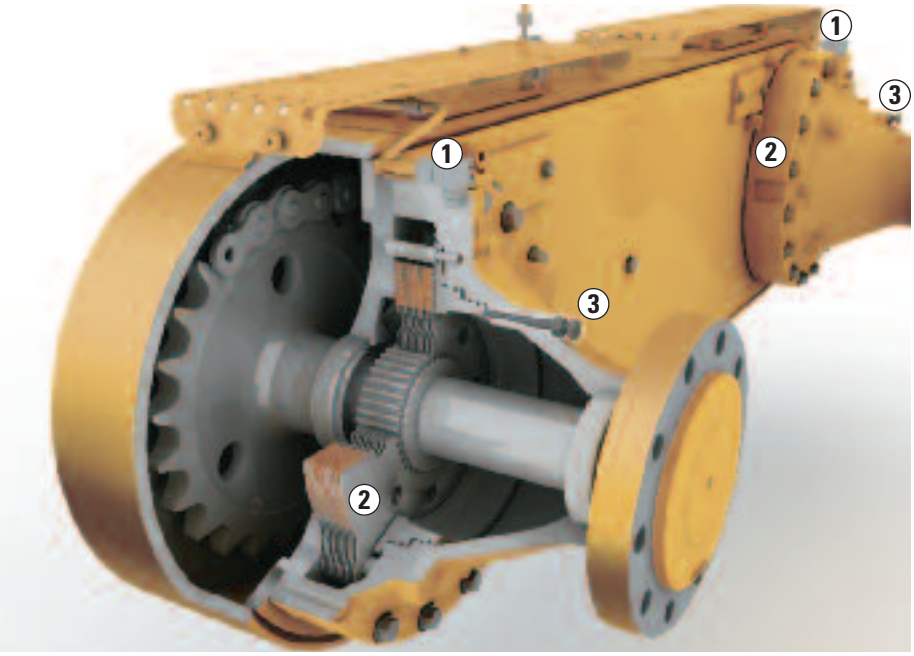
Programmable Autoshift. The operator can easily customize various shift parameters through Cat Messenger to match the specific application requirement. This optional feature automatically shifts the transmission at optimal points so the operator can focus on the work, improving safety, productivity and ease of operation.

Inching Pedal. Allows precise control of machine movements in any gear with low pedal effort and excellent modulation, critical in close-quarter work or finish grading.

Hydraulic Brakes. The oil bathed, multi-disc service brakes are hydraulically actuated (1), providing smooth predictable braking and lower operating costs. With brakes located at each tandem wheel, the 16M offers the largest total brake surface area in the industry (2), delivering dependable stopping power and longer brake life.

Brake Serviceability and Reliability. An easily accessible brake wear indicator/compensator system (3) maintains consistent brake performance and indicates brake wear without disassembly. This system cuts service time and extends brake service life.

Parking Brake. The spring-applied, hydraulically released multi-disc parking brake can be easily serviced without transmission removal to reduce operating cost. A sealed, oil-cooled design extends component life and reduces the need for service.



Brake design

Engine

The 16M combines power management with ACERT™ Technology to deliver maximum power and efficiency while reducing the environmental impact.

ACERT™ Technology. ACERT Technology allows Cat engines to supply more power per unit of displacement without causing premature wear. This breakthrough technology reduces emissions during the combustion process by using advanced technology in the air and fuel systems, in conjunction with integrated electronics. ACERT Technology enhances overall engine performance while dramatically reducing exhaust emissions.

Fuel Delivery. The C13 engine with ACERT Technology uses multiple injection fuel delivery to precisely shape the combustion cycle. Several small ignitions lower combustion chamber temperatures, generates fewer emissions and optimizes fuel combustion. Bottom line: more work output for your fuel cost.

Compression Brake. The three-phase compression brake enables higher travel speeds downhill, while reducing wear on brake components. This improves overall productivity and lowers maintenance costs.

Power Management. The 16M Power Management System automatically delivers an additional five horsepower in each forward gear 1st through 4th, and each reverse gear 1st through 3rd. This standard feature optimizes rimpull for all gears by balancing traction, speed and horsepower while conserving fuel. The system limits horsepower in lower gears, which helps reduce wheel slip where traction is limited. With the Variable Horsepower Plus (VHP Plus) option, an additional five-horsepower is delivered in each forward gear 5th through 8th for more power at higher speeds.

CAT Power | ACERT Technology

Performance. The Cat C13 engine meets specific performance requirements for 16M applications. Its superior torque and lugging capability can pull through sudden, short-term increases in loads, maintaining consistent, desirable grading speeds to get the work done faster without downshifting.

Hydraulic Demand Fan. The hydraulic demand fan automatically adjusts cooling fan speed according to engine cooling requirements. This system reduces demands on the engine, putting more horsepower to the ground and improving fuel efficiency.

Exhaust Emissions Compliant. The Cat C13 with ACERT™ Technology meets or exceeds all U.S. EPA Tier 3 and European Union Stage IIIa emissions control standards.

Hydraulics

The 16M electro-hydraulics enable advanced machine controls with precise and predictable movements.

Advanced Electro-Hydraulic System. The 16M incorporates a state-of-the-art electro-hydraulic system. This technology is the foundation for revolutionary changes of the machine and implement controls. Advanced joystick controls provide unmatched controllability with precise, predictable hydraulic movements and the reliability you expect from Caterpillar.

Blade Float. Blade float is built into the blade lift control valves and is optional for some auxiliary hydraulic functions. The blade float feature allows the blade to move freely under its own weight. By floating both cylinders, the blade can follow the contours of the road when removing snow. Floating only one cylinder permits the toe of the blade to follow a hard surface while the operator controls the slope with the other lift cylinder.

Cat® XT™ Hose. Caterpillar hose technology allows high pressures for maximum power and reduced downtime. Intelligent routing minimizes exposure to damage. Hose clips prevent hose rubbing and excessive vibration for lower owning and operating costs.

Independent Oil Supply. Large, separate hydraulic oil supply prevents cross-contamination and provides proper oil cooling, which reduces heat build-up and extends component life.

Load Sensing Hydraulics (PPPC). The time proven load-sensing system and the advanced Proportional Priority Pressure-Compensating (PPPC, or "triple-PC") electro-hydraulic valves on the 16M are designed to provide superior implement control and enhanced machine performance in all applications. Continuous matching of hydraulic flow and pressure to power demands creates less heat and reduces power consumption.

Balanced Flow. Hydraulic flow is proportioned to ensure all implements operate simultaneously with little effect on the engine or implement speeds. If demand exceeds pump capacity, all cylinder velocities are reduced by the same ratio. The result is improved productivity in all applications.

Consistent and Predictable Movement. PPPC valves have different flow rates for the head (red) and rod (blue) ends of the cylinder. This ensures consistent extension and retraction speeds for each cylinder, and gives the operator a consistent and predictable response every time an implement control is moved.

Predictable movements

Integrated Electronic Solutions

Full systems integration optimizes machine performance and availability.

"Smart Machine". The 16M fully integrates all core systems creating a "Smart Machine." The Cat data link shares key data among systems, optimizing machine performance while preventing potential machine damage.

Electronic Technician (Cat ET). Cat ET is a two-way communication tool that gives service technicians easy access to stored diagnostic data and lets them configure the machine parameters through the Cat Data Link. This integrated feature reduces machine downtime and lowers operating costs.

Diagnostics. Cat Messenger, combined with full systems integration, enhances the diagnostic capability of the 16M. Machine system errors are displayed in text as well as with fault codes, allowing service technicians and operators to quickly analyze critical data, increasing machine availability.

Machine Security System (MSS). The optional MSS uses electronically coded keys to limit usage by specific individuals or times of the day. MSS deters theft, vandalism and unauthorized use.

Product Link. The optional Product Link system streamlines diagnostic efforts, and reduces downtime, maintenance scheduling and costs by providing a communication flow of vital machine data and location. Product Link gives automatic updates on machine parameters such as machine hours, machine condition, location, fault codes and alarms directly to your office computer.

Cat Messenger. Standard on the 16M, Cat Messenger provides real-time machine performance and diagnostic data with an easy-to-use interface. Messenger monitors all system data and alerts the operator of any faults through a digital text display that can be shown in multiple languages.

Low Battery Elevated Idle. After the 16M is at low idle for an extended period and low system voltage is detected, idle speed is raised. This ensures adequate system voltage and improves battery reliability.

Automatic Engine Deration. Protects the C13 engine by automatically lowering engine torque output and alerting the operator if critical conditions are detected.

Optional Automatic Blade Control. The Caterpillar AccuGrade System automatically controls the blade, improving operator efficiency and productivity. AccuGrade™ technology reduces the need for traditional survey stakes or grade checkers, so you can reach grade faster and in fewer passes than ever before.

AccuGrade Attachment Ready Option. The AccuGrade System is fully integrated into the machine design, making installation quick and easy. Integral hydraulic and electrical components are standard on the 16M (Grade Control Ready). The AccuGrade Attachment Ready Option provides additional mounting brackets, cab controls and electrical harnesses for easy installation of the Cross Slope, Sonic, Laser, GPS or ATS electronics kits.

Work Tools and Attachments

The Work Tools and optional attachments for the 16M expand machine versatility, utilization and performance.

Moldboard Options. A 4.9 m (16 ft) moldboard is standard on the 16M from the factory.

Ground Engaging Tools (GET). A wide variety of Caterpillar GET is available on the 16M, including cutting edges, graderbits and end bits, all designed for maximum service life and productivity.

Variable Float. The optional variable float feature gives the operator the ability to select the amount of down force the blade has when it is in float. This allows the operator to easily follow the contour of the haul road when removing only the loose material, increasing productivity and cutting edge life.

Front Mounted Groups. A front mounted push plate/counterweight can be ordered on the 16M. A Caterpillar Work Tools front lift group can be combined with a front dozer blade for added versatility.

Ripper. The 16M optional ripper is made to penetrate tough material fast and rip thoroughly for easier material movement with the moldboard. The ripper includes three shanks with the ability to add four more if needed.

Automatic Lubrication System. The optional Lincoln Centro-Matic® AutoLube System maintains the proper grease lubrication on working surfaces, significantly extending component life. Contaminants are purged from open pins and bushings to help prevent dirt from damaging critical components.

Fast-Fill Fuel. The 16M offers a standard Fast-Fill that allows customers to refuel in less than two minutes for fast, accurate filling and reduced downtime.

Safety

Safety is an integral part of all machine and system designs.

Steel Tandem Walkways. Perforated raised steel walkways cover the tandems. This provides a sturdy platform for standing and walking, and additional protection for the brake lines.

ROPS/FOPS Cab. Isolation mounted to the frame to reduce vibration and sound, the integral ROPS/FOPS structure meets ISO and SAE criteria for operator protection.

Operator Presence System. The Operator Presence System keeps the parking brake engaged and hydraulic implements disabled until the operator is seated and the machine is ready for safe operation.

Secondary Steering System. The standard secondary steering system automatically engages an electric hydraulic pump in case of a drop in steering pressure, allowing the operator to steer the machine to a stop.

Speed Sensitive Steering. The steering software automatically provides an infinitely variable ratio between the joystick and the steer tires, resulting in less sensitive steering as the ground speed increases.

Low Sound and Vibration Levels. Isolation mounts for the cab, engine and transmission maximize operator comfort and help to minimize sound and vibration. These modifications provide a quieter and more comfortable working environment, optimizing operator focus.

Hydraulic Lockout. A simple switch located in the cab disables all implement functions while still providing machine steering control. This safety feature is especially useful while the machine is roading.

Brake Systems. Brakes are located at each tandem wheel to eliminate braking loads on the power train. In addition, the brake systems are redundant and utilize accumulators to enable stopping in case of machine failure, further increasing operational safety.

Drop-Down Rear Lights. Optional drop-down lights fold out from the rear of the machine. This creates a wider, lower profile to be better aligned with passenger cars.

Window-Cleaning Platform. The optional window-cleaning platform provides easy access to all windows.

Rearview Camera. Visibility is further enhanced with an optional Work Area Vision System (WAVS) through a 178 mm (7 in) LCD color monitor in the cab. Developed specifically for rugged applications, this durable camera improves productivity and increases operator awareness of surroundings.

High Intensity Discharge (HID) Lighting. Optional HID lights can replace the standard halogen lamps. The powerful HID lights are four times brighter, improving night time visibility and safety.

Circle Drive Slip Clutch. This standard feature protects the drawbar, circle and moldboard from shock loads when the blade encounters an immovable object. It also reduces the possibility of abrupt directional changes in poor traction conditions, protecting the machine, operator and surroundings.

Blade Lift Accumulators. This standard feature uses accumulators to help absorb impact loads to the moldboard by allowing vertical blade travel. Blade lift accumulators reduce unnecessary wear and help to avoid unintended machine movement for increased operator safety.

Engine Shutoff Switch. An engine shutoff switch is located at ground level on the left rear of the machine, allowing anyone nearby to shut it down in case of an emergency.

Electrical Disconnect Switch. A battery disconnect switch, located inside the left rear enclosure, provides ground-level lockout of the electrical system to prevent inadvertent starting of the machine.

Rear Fenders. To help reduce objects flying from the tires, as well as build-up of mud, snow or debris, optional rear fenders can be added.

Additional Safety Features. The 16M has many additional standard safety features, including laminated glass on the front windows and doors, back-uplights and sounding alarm, black glare-reducing paint on the front frame and engine enclosure, lockable doors, and conveniently located grab rails for added safety.

Serviceability and Customer Support

Simplified service, world-class product support and Cat® dealer-trained experts keep your fleet up and running, maximizing your equipment investment.

Grouped Service Points. The 16M groups daily service points in the left side service center to help ensure proper maintenance and inspection routines.

Extended Service Intervals. The 16M extended service intervals, such as 500-hour engine oil changes and 4,000-hour hydraulic oil changes, reduce machine service time and increase availability.

Ecology Drains. Conveniently located ecology drains shorten service times and help keep the environment safe by preventing spills.

Diagnostics and Monitoring. The 16M integrates Cat Messenger, Cat Electronic Technician and S•O•S℠ Sampling ports for easy monitoring and fast troubleshooting, keeping your machine up and running.

Machine Selection. Make detailed comparisons of the machines under consideration before purchase. Cat dealers help you size the right machine for your operations and can estimate component life, preventative maintenance cost, and the true cost of production.

Purchase. Consider the financing options available, as well as day-to-day operating costs. Look at dealer services that can be included in the cost of the machine to yield lower equipment owning and operating costs over the long run.

Grouped Component Rebuilds. Rebuilds take your machine out of service. Caterpillar designs components in groups to be rebuilt at the same time, maximizing uptime.

Maintenance Services. Repair option programs guarantee the cost of repairs up front. Diagnostics programs such as Scheduled Oil Sampling, S•O•S℠ analysis, Coolant Sampling and Technical Analysis help avoid unscheduled repairs.

Product Support. You will find nearly all parts at our dealer parts counter. Cat dealers use a world-wide computer network to track in-stock parts to minimize machine down time. Save money with genuine Cat Reman parts. You receive the same warranty and reliability as new products at substantial cost savings.

Engine

Engine Model	Cat® C13 ACERT™ VHP	
Base Power (1st gear) – Net	221 kW	297 hp
VHP range – Net	221-233 kW	297-312 hp
VHP Plus range – Net	221-248 kW	297-332 hp
Displacement	12.5 L	763 in^3
Bore	130 mm	5.1 in
Stroke	157 mm	6.2 in
Torque rise	50%	
Max torque	1710 N•m	1,261 lb-ft
Speed @ rated power	2,000 rpm	
Number of cylinders	6	
Derating altitude	4572 m	15,000 ft

Std – Fan speed	– max	1,200 rpm	
	– min	550 rpm	
Std – Ambient Capability		43° C	109° F
Hi Ambient – Fan speed	– max	1,450 rpm	
	– min	550 rpm	
Hi Ambient Capability		50° C	122° F

- Net power is tested per ISO 9249, SAE J1349, and EEC80/1269 standards in effect at the time of manufacture.
- VHP Plus is an optional arrangement.
- Net power advertised is the power available at rated speed of 2,000 rpm, measured at the flywheel when engine is equipped with fan running at minimum speed, air cleaner, muffler and alternator.
- No engine derating required up to 4572 m (15,000 ft).

16M Net Power

Gear	VHP kW (hp) – Net	VHP Plus kW (hp) – Net
Fwd. 1st	221 (297)	221 (297)
2nd	225 (302)	225 (302)
3rd	229 (307)	229 (307)
4th	233 (312)	233 (312)
5th	233 (312)	236 (317)
6th	233 (312)	240 (322)
7th	233 (312)	244 (327)
8th	233 (312)	248 (332)
Rev. 1st	221 (297)	221 (297)
2nd	225 (302)	225 (302)
3rd - 6th	229 (307)	229 (307)

Power Train

Forward/Reverse Gears		8 Fwd/6 Rev	
Transmission		Direct drive, power shift, countershaft	
Brakes	– Service	Oil-actuated, oil-disc	
	– Service, surface area	49 830 cm^2	7,724 in^2
	– Parking	Spring applied, hydraulically released	
	– Secondary	Oil-actuated, oil-disc	

Hydraulic System

Circuit type	Electro-hydraulic load sensing, closed center	
Pump type	Variable piston	
Pump output	280 L/min	74 gal/min
Maximum system pressure	24 150 kPa	3,500 psi
Standby Pressure	3100 kPa	450 psi

- Pump output measured at 2,150 rpm.

Operating Specifications

Top Speed – Fwd.	53.9 km/h	33.5 mph
– Rev.	42.6 km/h	26.5 mph
Turning radius, outside front tires	8.9 m	29 ft 3 in
Steering range – left/right	47.5°	
Articulation angle – left/right	20°	
Fwd. 1st	4.5 km/h	2.8 mph
2nd	6.3 km/h	3.9 mph
3rd	9 km/h	5.6 mph
4th	12.4 km/h	7.7 mph
5th	19.3 km/h	12 mph
6th	26.8 km/h	16.7 mph
7th	37 km/h	23.0 mph
8th	53.9 km/h	33.5 mph
Rev. 1st	3.6 km/h	2.2 mph
2nd	6.8 km/h	4.2 mph
3rd	9.8 km/h	6.1 mph
4th	15.2 km/h	9.5 mph
5th	29.3 km/h	18.2 mph
6th	42.6 km/h	26.5 mph

Service Refill

Fuel Capacity	492 L	130 gal
Cooling system	46.5 L	12.3 gal
Hydraulic system – total	114 L	30.1 gal
– tank	65 L	17.2 gal
Engine Oil	30 L	7.9 gal
Trans./Diff./Final Drives	114 L	30.1 gal
Tandem housing (each)	121.5 L	32.1 gal
Front wheel spindle bearing housing	0.9 L	0.24 gal
Circle drive housing	8 L	2.1 gal

Frame

Circle – diameter	1822 mm	71.75 in
– blade beam thickness	50 mm	2 in
Drawbar – height	203 mm	8 in
– width	76 mm	3 in
Front frame structure		
– height	356 mm	14 in
– width	324 mm	12.8 in
– thickness	14 mm	0.06 in
Front axle – height to center	688 mm	27.1 in
– wheel lean, left/right	18.2°	
– total oscillation per side	32.0°	

Tandems

Height	648 mm	25.5 in
Width	236 mm	9.3 in
Sidewall thickness – inner	22 mm	0.9 in
– outer	22 mm	0.9 in
Drive chain pitch	63.5 mm	2.5 in
Wheel axle spacing	1841 mm	72.5 in
Tandem oscillation – front up	15°	
– front down	25°	

Moldboard

Moldboard – width	4.877 m	16 ft
– height	787 mm	31 in
– thickness	25 mm	1 in
Arc radius	413 mm	16.3 in
Throat clearance	126 mm	4.9 in
Cutting edge – width	203 mm	8 in
– thickness	25 mm	1 in
End Bit – width	152 mm	6 in
– thickness	19 mm	0.75 in
Blade Pull – base GVW	17 591 kg	38,781 lb
– max GVW	22 024 kg	48,554 lb
Down Pressure – base GVW	13 224 kg	29,154 lb
– max GVW	19 979 kg	44,047 lb

- Blade pull calculated at 0.9 traction coefficient, which is equal to ideal no-slip conditions, and Gross Machine Weight.

Blade Range

Circle centershift – right	597 mm	23.5 in
– left	647 mm	25.5 in
Moldboard sideshift – right	1094 mm	43.1 in
– left	740 mm	25.6 in
Maximum blade position angle	65°	
Blade tip range – forward	40°	
– backward	5°	
Maximum shoulder reach outside of tires		
– right	2587 mm	101.9 in
– left	2282 mm	90 in
Maximum lift above ground	395 mm	15.6 in
Maximum depth of cut	488 mm	19.2 in

Ripper

Ripping depth, maximum	452 mm	17.8 in
Ripper shank holders	7	
Shank holder spacing – min	445 mm	17.5 in
– max	500 mm	20 in
Penetration force	10 163 kg	22,140 lb
Pryout force	15 323 kg	33,788 lb
Machine length increase, beam raised	1610 mm	63.4 in

Weights

Gross Vehicle Weight – base		
– total	26 959 kg	59,435 lb
– front axle	7414 kg	16,345 lb
– rear axle	19 545 kg	43,090 lb
Gross Vehicle Weight – max		
– total	35 672 kg	78,643 lb
– front axle	11 201 kg	24,694 lb
– rear axle	24 471 kg	53,949 lb

- Base operating weight calculated on standard machine configuration with 18.00-25 12PR (G-2) tires, full fuel tank, coolant, lubricants and operator.

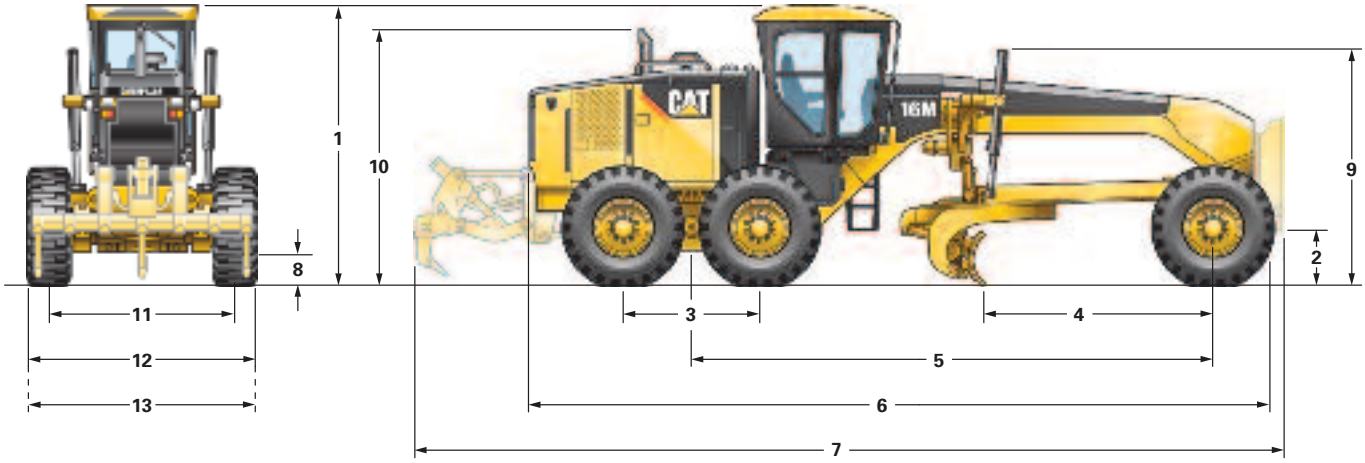
Standards

ROPS/FOPS	ISO 3471/ISO 3499
Steering	ISO 5010:1992
Brakes	SO 3450
Sound	ISO 6394/ISO 6395

- The static operator sound pressure level measured according to ISO 6394:1998 for a cab offered by Caterpillar, when properly installed, maintained and tested with doors and windows closed and hydraulic fan at maximum speed, is 72 dB(A).
- The dynamic spectator sound power level for the standard machine measured according to ISO 6395:1988 with no sound suppression package and hydraulic fan running at maximum speed is 111 dB(A). When machine is equipped with sound suppression package and hydraulic fan running at 70% of maximum speed, machine sound measured is less than 108 dB(A), complying with EU 2000/14/EC requirement.

Dimensions

All dimensions are approximate, based on standard machine configuration with 18.00-25 12PR (G-2) tires.



1	Height – top of cab	3703 mm	145.8 in
2	Height – front axle center	688 mm	27.1 in
3	Length – between tandem axles	1841 mm	72.5 in
4	Length – front axle to moldboard	3069 mm	120.8 in
5	Length – front axle to mid tandem	6985 mm	275 in
6	Length – front tire to rear of machine	9963 mm	392.2 in
7	Length – counterweight to ripper	11 672 mm	459.5 in

8	Ground clearance at rear axle	407 mm	16 in
9	Height to top of cylinders	3088 mm	121.6 in
10	Height to exhaust stack	3405 mm	134.1 in
11	Width – tire center lines	2509 mm	98.8 in
12	Width – outside rear tires	3096 mm	121.9 in
13	Width – outside front tires	3096 mm	121.9 in

Optional Tire Arrangements

Common tire options for the 16M.

Wheel Group	Tires
19.5 × 25 MP	23.5R25 Bridgestone VKT2 1 Star
19.5 × 25 MP	23.5R25 Bridgestone VMT 1 Star
19.5 × 25 MP	23.5R25 Bridgestone VKT 1 Star
19.5 × 25 MP	23.65R25 Michelin XMA 1 Star
19.5 × 25 MP	23.5-25 Goodyear MRL

Standard Equipment

Standard equipment may vary. Consult your Cat dealer for details.

OPERATOR ENVIRONMENT
- Accelerator
- Air conditioner with heat
- Arm and wrist rest, adjustable
- Articulation, automatic Return-to-Center
- Ashtray and lighter
- Cat Messenger, operator information system
- Centershift pin indicator
- Coat hook
- Cup holder
- Display, digital speed and gear
- Doors, left and right side with wiper
- Gauge cluster – articulation, engine coolant temp, engine rpm, fuel, system voltage
- Gauges, machine level
- Hour meter, digital
- Joystick hydraulic controls for implements, steering, transmission
- Ladders, cab, left and right side
- Lights, left and right side lights
- Lights, night time cab
- Meter, hour, digital
- Mirror, inside rearview, wide angle
- Power port, 12V
- Radio Ready, Entertainment
- ROPS cab, sound suppressed, less than 75 dB
- Seat belt, retractable 76 mm (3 in)
- Seat, cloth-covered, comfort air suspension
- Storage area for cooler/lunchbox
- Throttle control, electronic
- Windows, laminated glass:
  - fixed front with intermittent wiper
  - side and rear windows (3)

POWER TRAIN
- Air cleaner, dual stage, dry type, automatic dust ejector, service indicator through Cat Messenger
- Air-to-air after cooler (ATAAC)
- Belt, serpentine, automatic tensioner
- Brakes, four-wheel hydraulic
- Differential, lock/unlock
- Drain, engine oil, high speed
- Electronic over speed protection
- Engine, Cat® C13 with ACERT™ Technology
- Engine, Compression brake
- Ether starting aid
- Fuel tank, fast fill, ground level
- Fuel-water separator
- Hydraulic demand fan
- Muffler, under hood
- Parking brake – multi disc, sealed, oil-cooled
- Priming pump, fuel
- Rear axle, modular
- Sediment drain, fuel tank
- Transmission, 8F/6R, power shift, direct drive
- VHP (Variable Horsepower)

ELECTRICAL
- Alarm, back up
- Alternator, 150 ampere, sealed
- Batteries, maintenance free, heavy duty, 1400 CCA
- Breaker panel, ground accessible
- Electrical system, 24V
- Grade Control Ready – Cab harness, software, electrical hydraulic valves, bosses and brackets
- Lights: reversing, roof-mounted roading, stop and tail (LED), work front
- Product Link Ready
- Starter, electric, heavy duty

OTHER STANDARD EQUIPMENT
- Accumulators, blade lift
- Brake accumulators, dual certified
- Bumper, rear, integrated with hitch
- CD ROM Parts Book
- Clutch, circle drive slip
- Cutting edges
  - curved DH-2 steel
  - 203 mm × 25 mm (8 in × 1 in)
  - 19 mm (3/4 in) mounting bolts
- Doors (4), engine compartment, locking
- Drawbar – 6 shoe with replaceable wear strips
- Endbits, 19 mm (3/4 in) DH-2 steel
- Extended Life Coolant to –35° C (–30° F)
- Fluid check, ground level
- Frame, articulated, with safety lock
- Ground level engine shutdown
- Guards, service center debris
- Hammer (emergency exit)
- Horn, electric
- Hydraulics, base 8 implement controls
- Hydraulics, load-sensing
- Lockout, hydraulic implement for roading
- Moldboard
  - 4877 mm × 787 mm × 25 mm (16 ft × 31 in × 1 in)
  - hydraulic sideshift and tip
- Paint, glare reducing – top of front frame, rear enclosure
- Radiator, cleanout access
- Secondary steering
- Serviceability, LH side
- S•O•S℠ ports: engine, hydraulic, transmission, coolant, fuel
- Tandem walkway/guards
- Tool box
- Tow hitch

TIRES, RIMS, & WHEELS
- Partial allowance for tires and multi-piece rims

Optional Equipment

Optional equipment may vary. Consult your Cat dealer for details.

	kg	lb
ELECTRICAL		
Converter, communications (CB)	5	1
Lights:		
Lighting arrangements, HID options and rear roading, drop down		
Warning, LED strobe	1	2
GUARDS		
Covers, screen	5	10
Debris	11	24
Sound	11.3	25
Transmission	159	350
OPERATOR ENVIRONMENT		
Fan, defroster, rear window	2	4
Horn, air	7	15
Mirrors, outside:		
Heated 24V	15	33
Mounted	10	22
Shade, sun	2	5
POWER TRAIN		
Coolant:		
–40° C (–40° F)		
–45° C (–50° F)		
–50° C (–58° F)		
Engine, variable horsepower plus (VHP Plus)		
Transmission, autoshift	2	5

	kg	lb
OTHER ATTACHMENTS		
AccuGrade® ARO	18	40
AutoLube, Lincoln	39	85
Camera, rearview	9	20
Fenders, rear	514	1,150
Float, variable	9	20
Heater, engine coolant:		
120V	1	3
220V	1	3
Hydraulic arrangements with one or more additional hydraulic valves are available.		
Platform, access, windows	159	350
Security system	2	5
Sound suppression	5	11
WORK TOOLS/G.E.T.		
Cutting edges, curved	68	150
Push plate, counterweight		
Ripper, rear	1950	4,298
Ripper, mounting	39	85
Ripper tooth	60	132
MACHINE ARRANGEMENTS		
Canadian Arrangement		
European Arrangement		
Snow Arrangement		

Note: Not all attachments are available in all regions.

16M Motor Grader

For more complete information on Cat products, dealer services, and industry solutions, visit us on the web at **www.cat.com**

Materials and specifications are subject to change without notice.
Featured machines in photos may include additional equipment.
See your Cat Dealer for available options.

AEHQ5734-03 (06-10)

CATERPILLAR®

PACKAGE DATA

Feature Code:	C09DE02	**Rating Type:**	STANDBY	**Sales model Package:**	PGS250
Engine Sales Model:	C9	**Engine Arrangement Number:**	2575707	**Hertz:**	60
EKW W/F:	250.0	**Noise Reduction:**	0 dBA	**Back Pressure:**	0.0 inH2O

Package Sound Information

Open Sound Data

Distance: 3.3 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	100.7	98.5	91.9	98.3	93.9	97.3	93.8	88.7	82.3
187.5	75.0	100.4	97.5	90.9	98.4	93.2	97.3	93.3	88.0	81.0
125.0	50.0	100.2	96.0	89.7	98.3	92.7	97.3	93.0	87.4	79.8
62.5	25.0	100.2	95.1	89.0	98.1	92.8	97.3	93.0	87.5	79.5

Distance: 23.0 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	90.7	88.5	81.9	88.3	83.9	87.3	83.8	78.7	72.3
187.5	75.0	90.4	87.5	80.9	88.4	83.2	87.3	83.3	78.0	71.0
125.0	50.0	90.3	86.5	80.1	88.3	82.8	87.3	83.0	77.5	70.1
62.5	25.0	90.2	85.1	79.0	88.1	82.8	87.3	83.0	77.5	69.54

Distance: 49.2 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	84.7	82.5	75.9	82.3	77.9	81.3	77.8	72.7	66.3
187.5	75.0	84.4	81.5	74.9	82.4	77.2	81.3	77.3	72.0	65.0
125.0	50.0	84.2	80.0	73.7	82.3	76.7	81.3	77.0	71.4	63.8
62.5	25.0	84.2	79.1	73.0	82.1	76.8	81.3	77.0	71.5	63.5

PACKAGE DATA

Feature Code:	C09DE02	**Rating Type:**	STANDBY	**Sales model Package:**	PGS250
Engine Sales Model:	C9	**Engine Arrangement Number:**	2575707	**Hertz:**	60
EKW W/F:	250.0	**Noise Reduction:**	0 dBA	**Back Pressure:**	0.0 inH2O

Package Sound Information

WP Canopy Sound Data

Distance: 3.3 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	95.2	97.3	93.6	93.5	91.0	90.3	88.5	84.0	82.5
187.5	75.0	94.7	96.1	92.5	93.1	90.2	90.0	88.2	83.7	81.5
125.0	50.0	94.4	94.0	90.7	92.5	89.5	89.9	87.9	83.4	79.8
62.5	25.0	94.3	92.5	89.3	92.3	89.6	90.0	88.0	83.2	78.4

Distance: 23.0 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	83.6	87.6	84.7	84.5	80.1	77.9	76.1	71.5	71.7
187.5	75.0	83.3	86.4	83.9	84.2	78.9	78.0	76.2	71.3	70.7
125.0	50.0	83.2	84.7	82.6	83.9	77.9	78.5	76.7	71.2	68.7
62.5	25.0	83.5	83.5	81.6	83.7	77.7	79.1	77.1	71.4	67.3

Distance: 49.2 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	77.6	81.6	78.7	78.5	74.1	71.9	70.1	65.5	65.7
187.5	75.0	77.3	80.4	77.9	78.2	72.9	72.0	70.2	65.3	64.7
125.0	50.0	77.2	78.7	76.6	77.9	71.9	72.5	70.7	65.2	62.7
62.5	25.0	77.5	77.5	75.6	77.7	71.7	73.1	71.1	65.4	61.3

PACKAGE DATA

Feature Code:	C09DE02	**Rating Type:**	STANDBY	**Sales model Package:**	PGS250
Engine Sales Model:	C9	**Engine Arrangement Number:**	2575707	**Hertz:**	60
EKW W/F:	250.0	**Noise Reduction:**	0 dBA	**Back Pressure:**	0.0 inH2O

Package Sound Information

SA Canopy Sound Data

Distance: 3.3 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	82.7	91.1	87.9	85.1	79.9	75.3	72.6	70.4	67.6
187.5	75.0	82.1	90.0	86.7	84.8	79.8	74.7	72.2	68.7	65.9
125.0	50.0	81.4	88.2	84.8	84.2	79.5	74.2	71.7	66.8	63.5
62.5	25.0	81.0	86.9	83.5	83.7	79.1	74.1	71.6	66.0	62.0

Distance: 23.0 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	71.0	82.1	77.6	74.8	68.5	61.8	57.5	56.2	51.3
187.5	75.0	70.1	80.9	76.4	74.2	67.5	61.5	56.8	54.8	49.3
125.0	50.0	69.3	79.3	74.5	73.5	66.7	61.3	55.9	53.1	46.6
62.5	25.0	68.9	78.4	73.4	73.2	66.5	61.3	55.5	52.3	45.1

Distance: 49.2 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
250.0	100.0	65.0	76.1	71.6	68.8	62.5	55.8	51.5	50.2	45.3
187.5	75.0	64.1	74.9	70.4	68.2	61.5	55.5	50.8	48.8	43.3
125.0	50.0	63.3	73.3	68.5	67.5	60.7	55.3	49.9	47.1	40.6
62.5	25.0	62.9	72.4	67.4	67.2	60.5	55.3	49.5	46.3	39.1

GEN SET PACKAGE PERFORMANCE DATA [DM8266]

Performance Number: DM8266

Sales Model: 3516CDITA	**Combustion:** DI	**Aspr:** TA
Engine Power: 2500 W/F EKW 2593 W/O F EKW 3,622 HP	**Speed:** 1,800 RPM	**After Cooler:** ATAAC
Manifold Type: DRY	**Governor Type:** ADEM3	**After Cooler Temp(F):** 122
Turbo Quantity: 4	**Engine App:** GP	**Turbo Arrangement:** Parallel
Hertz: 60	**Engine Rating:** PGS	**Strategy:**
Rating Type: STANDBY	**Certification:** EPA TIER-2 2006 -	

General Performance Data

GEN W/F EKW	PERCENT LOAD	ENGINE POWER BHP	ENGINE BMEP PSI	FUEL RATE LB/BHP-HR	FUEL RATE GPH	INTAKE MFLD TEMP DEG F	INTAKE MFLD P IN-HG	INTAKE AIR FLOW CFM	EXH MFLD TEMP DEG F	EXH STACK TEMP DEG F	EXH GAS FLOW CFM
2,500.0	100	3604	333	0.337	173.3	122.0	78.2	6,992.3	1,236.7	921.9	19,048.8
2,250.0	90	3256	301	0.337	156.7	119.3	71.3	6,600.3	1,190.3	889.0	17,516.1
2,000.0	80	2911	269	0.341	141.9	117.0	64.3	6,183.6	1,159.0	871.0	16,167.1
1,875.0	75	2738	253	0.344	134.6	115.9	60.8	5,961.1	1,145.8	864.7	15,506.7
1,750.0	70	2566	237	0.347	127.3	114.6	57.1	5,731.6	1,133.6	859.6	14,846.3
1,500.0	60	2223	205	0.355	112.8	112.8	49.6	5,254.8	1,112.0	853.0	13,522.0
1,250.0	50	1880	174	0.366	98.4	111.0	41.5	4,739.2	1,091.7	848.5	12,144.7
1,000.0	40	1545	143	0.375	82.8	109.4	31.8	4,075.3	1,062.9	848.1	10,439.0
750.0	30	1203	111	0.387	66.5	108.0	22.0	3,404.3	1,012.8	837.9	8,627.4
625.0	25	1029	95	0.396	58.2	107.2	17.4	3,086.5	970.9	818.2	7,702.1
500.0	20	854	79	0.406	49.5	106.3	12.9	2,772.2	905.7	782.2	6,723.9
250.0	10	496	46	0.443	31.4	104.2	4.8	2,193.0	702.9	643.5	4,693.3

Heat Rejection Data

GEN W/F EKW	PERCENT LOAD	REJ TO JW BTU/MN	REJ TO ATMOS BTU/MN	REJ TO EXHAUST BTU/MN	EXH RCOV TO 350F BTU/MN	FROM OIL CLR BTU/MN	FROM AFT CLR BTU/MN	WORK ENERGY BTU/MN	LHV ENERGY BTU/MN	HHV ENERGY BTU/MN
2,500.0	100	47,202	9,156	140,924	75,921	18,596	43,392	152,866	371,872	396,156
2,250.0	90	44,245	8,587	127,047	67,163	16,833	38,046	138,080	336,328	358,280
2,000.0	80	41,458	8,303	115,901	60,566	15,241	33,155	123,408	304,481	324,386
1,875.0	75	40,093	8,189	110,555	57,609	14,445	30,767	116,128	288,899	307,780
1,750.0	70	38,672	8,076	105,266	54,766	13,649	28,321	108,792	273,260	291,117
1,500.0	60	35,885	7,791	94,916	49,420	12,113	23,601	94,233	242,152	257,962
1,250.0	50	32,871	7,564	84,566	44,074	10,578	18,824	79,732	211,101	224,864
1,000.0	40	29,515	7,336	72,566	37,762	8,872	13,478	65,514	177,718	189,320
750.0	30	25,648	6,881	59,258	30,823	7,109	8,474	51,012	142,743	152,070
625.0	25	23,544	6,597	52,150	26,729	6,256	6,426	43,676	124,886	133,019
500.0	20	21,156	6,142	44,245	22,009	5,289	4,550	36,169	106,119	113,057
250.0	10	15,867	5,118	27,525	11,601	3,355	1,763	21,042	67,277	71,656

EXHAUST Sound Data: 6.6 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,500.0	100	119	109	124	120	112	110	112	111	109
2,250.0	90	118	108	123	119	111	109	111	110	108
2,000.0	80	117	107	122	118	110	108	109	109	107
1,875.0	75	116	106	121	117	109	107	109	109	107
1,750.0	70	115	106	120	116	108	107	108	108	106
1,500.0	60	114	104	119	115	107	106	107	107	105
1,250.0	50	113	103	118	114	106	104	106	105	103
1,000.0	40	111	102	116	112	104	103	104	104	102
750.0	30	110	100	115	111	103	101	102	102	100
625.0	25	109	99	114	110	102	100	101	101	99
500.0	20	108	98	113	109	101	99	100	100	98
250.0	10	105	95	110	106	98	97	98	98	96

EXHAUST Sound Data: 23.0 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,500.0	100	105	97	113	108	99	97	98	98	95
2,250.0	90	104	96	112	107	98	96	97	97	94
2,000.0	80	103	95	111	105	97	95	96	96	93
1,875.0	75	103	94	111	105	96	95	95	95	92
1,750.0	70	102	93	110	104	96	94	95	95	92
1,500.0	60	101	92	109	103	94	93	93	93	91
1,250.0	50	99	91	107	102	93	91	92	92	89
1,000.0	40	98	89	106	100	92	90	91	90	88
750.0	30	96	88	104	98	90	88	89	89	86
625.0	25	95	87	103	97	89	87	88	88	85
500.0	20	94	86	102	96	88	86	87	87	84
250.0	10	92	83	100	94	85	84	84	84	82

EXHAUST Sound Data: 49.2 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,500.0	100	99	90	107	101	92	91	91	91	89
2,250.0	90	98	89	106	100	91	90	90	90	88
2,000.0	80	97	88	105	99	90	89	89	89	86
1,875.0	75	96	87	104	98	90	88	89	89	86
1,750.0	70	95	87	103	98	89	87	88	88	85
1,500.0	60	94	86	102	96	88	86	87	87	84
1,250.0	50	93	84	101	95	86	85	85	85	83
1,000.0	40	91	83	99	93	85	83	84	84	81
750.0	30	90	81	98	92	83	82	82	82	79
625.0	25	89	80	97	91	82	81	81	81	78
500.0	20	88	79	96	90	81	80	80	80	77
250.0	10	85	77	93	87	79	77	78	78	75

MECHANICAL Sound Data: 3.3 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,500.0	100	117	121	130	121	111	104	102	100	103
2,250.0	90	117	121	130	121	111	104	102	100	103
2,000.0	80	117	121	130	121	111	104	102	100	103
1,875.0	75	117	121	130	121	111	104	102	100	103
1,750.0	70	117	121	130	121	111	104	102	100	103
1,500.0	60	117	121	130	121	111	104	102	100	103
1,250.0	50	117	121	130	121	111	104	102	100	103
1,000.0	40	117	121	130	121	111	104	102	100	103
750.0	30	117	121	130	121	111	104	102	100	103
625.0	25	117	121	130	121	111	104	102	100	103
500.0	20	117	121	130	121	111	104	102	100	103
250.0	10	117	121	130	121	111	104	102	100	103

MECHANICAL Sound Data: 23.0 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCJ 8000HZ DB
2,500.0	100	103	107	116	107	98	91	90	88	92
2,250.0	90	103	107	116	107	98	91	90	88	92
2,000.0	80	103	107	116	107	98	91	90	88	92
1,875.0	75	103	107	116	107	98	91	90	88	92
1,750.0	70	103	107	116	107	98	91	90	88	92
1,500.0	60	103	107	116	107	98	91	90	88	92
1,250.0	50	103	107	116	107	98	91	90	88	92
1,000.0	40	103	107	116	107	98	91	90	88	92
750.0	30	103	107	116	107	98	91	90	88	92
625.0	25	103	107	116	107	98	91	90	88	92
500.0	20	103	107	116	107	98	91	90	88	92
250.0	10	103	107	116	107	98	91	90	88	92

MECHANICAL Sound Data: 49.2 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,500.0	100	97	100	110	100	91	85	85	82	86
2,250.0	90	97	100	110	100	91	85	85	82	86
2,000.0	80	97	100	110	100	91	85	85	82	86
1,875.0	75	97	100	110	100	91	85	85	82	86
1,750.0	70	97	100	110	100	91	85	85	82	86
1,500.0	60	97	100	110	100	91	85	85	82	86
1,250.0	50	97	100	110	100	91	85	85	82	86
1,000.0	40	97	100	110	100	91	85	85	82	86
750.0	30	97	100	110	100	91	85	85	82	86
625.0	25	97	100	110	100	91	85	85	82	86
500.0	20	97	100	110	100	91	85	85	82	86
250.0	10	97	100	110	100	91	85	85	82	86

EMISSIONS DATA

EPA TIER-2 2006 - ********** B5

Gaseous emissions data measurements are consistent with those described in EPA 40 CFR PART 89 SUBPART D and ISO 8178 for measuring HC, CO, PM, and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kw-hr		
U.S. (incl Calif)	EPA/TIER-2	CO:3.5	NOx + HC:6.4	PM:0.20

EXHAUST STACK DIAMETER	12 IN
WET EXHAUST MASS	32,253.6 LB/HR
WET EXHAUST FLOW (921.20 F STACK TEMP)	19,059.34 CFM
WET EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	6,611.00 STD CFM
DRY EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	6,056.47 STD CFM
FUEL FLOW RATE	172 GAL/HR

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,500.0	100	3604	40.09	3.25	0.80	3,715.1	0.280	9.30	1.5	1.28
1,875.0	75	2738	24.68	1.55	0.81	2,871.2	0.190	10.40	1.3	1.28
1,250.0	50	1880	12.36	1.31	0.88	2,088.2	0.200	11.30	1.7	1.28
625.0	25	1029	6.37	1.81	0.67	1,225.7	0.220	12.20	2.5	1.28
250.0	10	496	5.54	2.50	0.71	642.6	0.220	14.30	3.6	1.28

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BKW	TOTAL NOX (AS NO2) G/HP-HR	TOTAL CO G/HP-HR	TOTAL HC G/HP-HR	PART MATTER G/HP-HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,500.0	100	2,687.7	5.05	0.41	0.10	0.04	9.30	1.5	1.28
1,875.0	75	2,042.0	4.09	0.26	0.13	0.03	10.40	1.3	1.28
1,250.0	50	1,401.8	2.98	0.31	0.21	0.05	11.30	1.7	1.28
625.0	25	767.6	2.81	0.80	0.29	0.10	12.20	2.5	1.28
250.0	10	369.8	5.06	2.29	0.64	0.20	14.30	3.6	1.28

RATED SPEED "Not to exceed data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,500.0	100	3604	48.11	5.86	1.07	.400	9.30	1.5	1.28
1,875.0	75	2738	29.62	2.78	1.08	.260	10.40	1.3	1.28
1,250.0	50	1880	14.84	2.35	1.17	.280	11.30	1.7	1.28
625.0	25	1029	7.65	3.25	0.89	.310	12.20	2.5	1.28
250.0	10	496	6.64	4.50	0.94	.300	14.30	3.6	1.28

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,500.0	100	3604	40.09	3.25	0.80	3,715.1	0.280	9.30	1.5	1.28
1,875.0	75	2738	24.68	1.55	0.81	2,871.2	0.190	10.40	1.3	1.28
1,250.0	50	1880	12.36	1.31	0.88	2,088.2	0.200	11.30	1.7	1.28
625.0	25	1029	6.37	1.81	0.67	1,225.7	0.220	12.20	2.5	1.28
250.0	10	496	5.54	2.50	0.71	642.6	0.220	14.30	3.6	1.28

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BKW	TOTAL NOX (AS NO2) G/HP-HR	TOTAL CO G/HP-HR	TOTAL HC G/HP-HR	PART MATTER G/HP-HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,500.0	100	2,687.7	5.05	0.41	0.10	0.04	9.30	1.5	1.28
1,875.0	75	2,042.0	4.09	0.26	0.13	0.03	10.40	1.3	1.28
1,250.0	50	1,401.8	2.98	0.31	0.21	0.05	11.30	1.7	1.28
625.0	25	767.6	2.81	0.80	0.29	0.10	12.20	2.5	1.28
250.0	10	369.8	5.06	2.29	0.64	0.20	14.30	3.6	1.28

GEN SET PACKAGE PERFORMANCE DATA [DM8260]

DECEMBER 04, 2009

For Help Desk Phone Numbers Click here

Performance Number: DM8260 **Change Level:** 01

Sales Model: 3512CDITA **Combustion:** DI **Aspr:** TA

Engine Power:

1500 W/F EKW	1560 W/O F EKW	**Speed:** 1,800 RPM	**After Cooler:** ATAAC
2,206 HP			

Manifold Type: DRY **Governor Type:** ADEM3 **After Cooler Temp(F):** 122

Turbo Quantity: 4 **Engine App:** GP **Turbo Arrangement:** Parallel

Hertz: 60 **Application Type:** PACKAGE-DIE **Engine Rating:** PGS **Strategy:**

Rating Type: STANDBY **Certification:** EPA TIER-2 2006 -

General Performance Data 1

GEN W/F EKW	PERCENT LOAD	ENGINE POWER BHP	ENGINE BMEP PSI	FUEL BSFC LB/BHP-HR	FUEL RATE GPH	INTAKE MFLD TEMP DEG F	INTAKE MFLD P IN-HG	INTAKE AIR FLOW CFM	EXH MFLD TEMP DEG F	EXH STACK TEMP DEG F	EXH GAS FLOW CFM
1,500	100	2206	307.34	0.33	104.85	121.64	78	4,573.25	1,150.7	763.52	11,060.56
1,350	90	1983	276.3	0.34	95.31	116.42	72.64	4,382.55	1,105.7	728.6	10,294.24
1,200	80	1768	246.28	0.34	86.7	113.54	67.37	4,184.79	1,071.86	710.06	9,655.04
1,125	75	1662	231.48	0.35	82.13	111.92	63.96	4,050.6	1,054.94	701.78	9,277.17
1,050	70	1556	216.83	0.35	77.48	110.48	60.17	3,898.74	1,037.66	694.4	8,867.52
900	60	1349	187.97	0.35	67.95	107.42	51.56	3,542.06	1,002.38	683.06	7,970.53
750	50	1144	159.4	0.36	58.07	107.6	41.07	3,082.97	965.3	682.52	6,935.81
600	40	943	131.41	0.36	48.34	108.32	30.59	2,627.41	923.9	683.42	5,908.15
450	30	737	102.69	0.37	38.65	107.24	21.14	2,203.64	858.56	668.66	4,894.62
375	25	632	88.04	0.37	33.87	106.34	17.09	2,016.47	811.58	649.04	4,407.27
300	20	526	73.25	0.39	29.09	105.26	13.39	1,846.96	755.78	621.86	3,930.53
150	10	310	43.22	0.44	19.58	103.28	7.31	1,578.57	609.8	526.46	3,040.6

Engine Heat Rejection Data

GEN W/F EKW	PERCENT LOAD	REJ TO JW BTU/MN	REJ TO ATMOS BTU/MN	REJ TO EXHAUST BTU/MN	EXH RCOV TO 350F BTU/MN	FROM OIL CLR BTU/MN	FROM AFT CLR BTU/MN	WORK ENERGY BTU/MN	LHV ENERGY BTU/MN	HHV ENERGY BTU/MN
1,500	100	35,031.9	7,051.9	75,466.3	35,316.2	11,260.2	27,411.3	93,551.0	225,034.1	239,706.5
1,350	90	32,757.1	6,710.6	68,357.6	30,766.6	10,236.6	24,965.9	84,110.5	204,561.0	217,925.4
1,200	80	30,652.9	6,369.4	62,841.2	27,809.4	9,326.7	22,463.6	74,954.5	186,078.2	198,248.4
1,125	75	29,515.5	6,255.7	59,827.1	26,273.9	8,814.8	20,871.2	70,461.8	176,296.6	187,784.3
1,050	70	28,378.1	6,085.1	56,699.3	24,738.4	8,303.0	19,222.0	66,025.9	166,287.5	177,149.7
900	60	25,818.9	5,800.7	50,273.0	21,610.6	7,279.3	15,639.2	57,211.1	145,814.4	155,368.5
750	50	23,146.0	5,516.4	43,562.3	18,767.1	6,255.7	11,658.3	48,510.0	124,601.9	132,734.3
600	40	20,359.4	5,288.9	36,908.6	16,037.3	5,175.2	7,734.3	39,979.5	103,730.7	110,498.2
450	30	17,402.2	4,833.9	29,970.4	12,795.7	4,151.5	4,663.3	31,278.4	82,916.3	88,375.8
375	25	15,866.7	4,549.6	26,501.4	10,975.9	3,639.7	3,525.9	26,785.7	72,679.7	77,399.9
300	20	14,274.3	4,265.2	22,918.6	9,042.3	3,127.8	2,559.1	22,293.0	62,386.3	66,480.9

150	10	10,805.3	3,810.3	15,696.1	4,947.7	2,104.2	1,251.1	13,136.9	42,026.8	44,756.6

EXHAUST Sound Data: 4.92 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
1,500	100	117	107	122	118	110	108	109	109	107
1,350	90	116	106	121	117	109	107	108	108	106
1,200	80	115	105	120	116	108	106	107	107	105
1,125	75	114	104	119	115	107	106	107	107	105
1,050	70	114	104	119	115	107	105	106	106	104
900	60	112	103	117	113	105	104	105	105	103
750	50	111	101	116	112	104	103	104	104	102
600	40	110	100	115	111	103	101	103	103	101
450	30	108	99	113	109	101	100	101	101	99
375	25	108	98	113	109	101	99	100	100	98
300	20	107	97	112	108	100	98	99	99	97
150	10	104	95	109	105	97	96	97	97	95

EXHAUST Sound Data: 22.97 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
1,500	100	103	95	111	106	97	95	96	96	93
1,350	90	102	94	110	104	96	94	95	95	92
1,200	80	101	93	109	103	95	93	94	94	91
1,125	75	101	92	109	103	94	93	93	93	91
1,050	70	100	92	108	102	94	92	93	93	90
900	60	99	90	107	101	93	91	92	92	89
750	50	98	89	106	100	91	90	91	90	88
600	40	97	88	105	99	90	89	89	89	86
450	30	95	86	103	97	89	87	88	88	85
375	25	94	86	102	96	88	86	87	87	84
300	20	93	85	101	95	87	85	86	86	83
150	10	91	83	99	93	85	83	84	84	81

EXHAUST Sound Data: 49.21 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
1,500	100	97	88	105	99	90	89	89	89	86
1,350	90	96	87	104	98	89	88	88	88	85
1,200	80	95	86	103	97	88	87	87	87	84
1,125	75	94	85	102	96	88	86	87	87	84
1,050	70	94	85	102	96	87	86	86	86	83
900	60	92	84	100	95	86	84	85	85	82
750	50	91	83	99	93	85	83	84	84	81
600	40	90	81	98	92	83	82	83	82	80
450	30	88	80	96	91	82	80	81	81	78
375	25	88	79	96	90	81	80	80	80	77
300	20	87	78	95	89	80	79	79	79	76
150	10	84	76	92	87	78	76	77	77	74

MECHANICAL Sound Data: 3.28 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
1,500	100	115	118	127	118	109	102	101	98	102
1,350	90	115	118	127	118	109	102	101	98	102
1,200	80	115	118	127	118	109	102	101	98	102
1,125	75	115	118	127	118	109	102	101	98	102
1,050	70	115	118	127	118	109	102	101	98	102
900	60	115	118	127	118	109	102	101	98	102
750	50	115	118	127	118	109	102	101	98	102
600	40	115	118	127	118	109	102	101	98	102
450	30	115	118	127	118	109	102	101	98	102
375	25	115	118	127	118	109	102	101	98	102
300	20	115	118	127	118	109	102	101	98	102
150	10	115	118	127	118	109	102	101	98	102

MECHANICAL Sound Data: 22.97 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCJ 8000HZ DB
1,500	100	101	104	113	104	95	89	89	86	90
1,350	90	101	104	113	104	95	89	89	86	90
1,200	80	101	104	113	104	95	89	89	86	90
1,125	75	101	104	113	104	95	89	89	86	90
1,050	70	101	104	113	104	95	89	89	86	90
900	60	101	104	113	104	95	89	89	86	90
750	50	101	104	113	104	95	89	89	86	90
600	40	101	104	113	104	95	89	89	86	90
450	30	101	104	113	104	95	89	89	86	90
375	25	101	104	113	104	95	89	89	86	90
300	20	101	104	113	104	95	89	89	86	90
150	10	101	104	113	104	95	89	89	86	90

MECHANICAL Sound Data: 49.21 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
1,500	100	95	98	107	98	89	83	83	81	84
1,350	90	95	98	107	98	89	83	83	81	84
1,200	80	95	98	107	98	89	83	83	81	84
1,125	75	95	98	107	98	89	83	83	81	84
1,050	70	95	98	107	98	89	83	83	81	84
900	60	95	98	107	98	89	83	83	81	84
750	50	95	98	107	98	89	83	83	81	84
600	40	95	98	107	98	89	83	83	81	84
450	30	95	98	107	98	89	83	83	81	84
375	25	95	98	107	98	89	83	83	81	84
300	20	95	98	107	98	89	83	83	81	84
150	10	95	98	107	98	89	83	83	81	84

EMISSIONS DATA

EPA TIER-2 2006 - ********** B5

Gaseous emissions data measurements are consistent with those described in EPA 40 CFR PART 89 SUBPART D and ISO 8178 for measuring HC, CO, PM, and NOx

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kW-hr		
U.S. (incl Calif)	EPA/TIER-2	CO:3.5	NOx + HC:6.4	PM:0.2

REFERENCE EXHAUST STACK DIAMETER	8 IN
WET EXHAUST MASS	21,100.4 LB/HR
WET EXHAUST FLOW (762.80 F STACK TEMP)	11,071.16 CFM
WET EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	4,321.00 STD CFM
DRY EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	3,958.78 STD CFM
FUEL FLOW RATE	105 GAL/HR

RATED SPEED "Not to exceed data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
1,500	100	2206	28.9800	3.9500	.7100	.2000	10.2000	.8000	1.2800
1,125	75	1662	14.7100	2.4400	.7800	.2000	11.5000	.9000	1.2800
750	50	1144	9.6800	3.3200	.7400	.3000	12.2000	1.9000	1.2800
375	25	632	7.2600	4.0700	.5800	.3800	13.2000	3.3000	1.2800
150	10	310	5.6300	3.8300	.6700	.2300	15.2000	2.0000	1.2800

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
1,500	100	2206	24.1500	2.1900	.5300	2,262.3	.1400	10.2000	.8000	1.2800
1,125	75	1662	12.2600	1.3600	.5900	1,764.4	.1400	11.5000	.9000	1.2800
750	50	1144	8.0700	1.8400	.5500	1,242	.2100	12.2000	1.9000	1.2800
375	25	632	6.0500	2.2600	.4400	720	.2700	13.2000	3.3000	1.2800
150	10	310	4.6900	2.1300	.5000	410.8	.1600	15.2000	2.0000	1.2800

Altitude Capability Data(Corrected Power Altitude Capability)

Ambient Operating Temp. / Altitude	50 F	68 F	86 F	104 F	122 F	NORMAL
0 F	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,205.98 h
984.25 F	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,205.98 h
1,640.42 F	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,197.93 hp	2,205.98 h
3,280.84 F	2,205.98 hp	2,205.98 hp	2,205.98 hp	2,134.9 hp	2,069.19 hp	2,205.98 h
4,921.26 F	2,205.98 hp	2,145.63 hp	2,074.56 hp	2,008.85 hp	1,945.82 hp	2,141.61 h
6,561.68 F	2,087.97 hp	2,016.89 hp	1,951.18 hp	1,888.16 hp	1,830.49 hp	2,035.67 h
8,202.1 F	1,961.91 hp	1,894.86 hp	1,833.17 hp	1,774.17 hp	1,719.19 hp	1,933.75 h
9,842.52 F	1,842.56 hp	1,779.53 hp	1,720.53 hp	1,665.55 hp	1,614.59 hp	1,835.86 h
10,498.69 F	1,795.63 hp	1,735.28 hp	1,677.62 hp	1,623.98 hp	1,573.02 hp	1,798.31 h

The powers listed above and all the Powers displayed are Corrected Powers

Identification Reference and Notes

Engine Arrangement:	2673949	**Lube Oil Press @ Rated Spd(PSI):**	--
Effective Serial No:	EBG00100	**Piston Speed @ Rated Eng SPD (FT/Min):**	2,173.2
Primary Engine Test Spec:	0K7015	**Max Operating Altitude(FT):**	3,937.0
Performance Parm Ref:	TM5739	**PEEC Elect Control Module Ref**	
Performance Data Ref:	DM8260	**PEEC Personality Cont Mod Ref**	
Aux Coolant Pump Perf Ref:			
Cooling System Perf Ref:	DM1298	**Turbocharger Model**	GTB4708 52T/50EI-0.96
Certification Ref:	EPA TIER 2	**Fuel Injector**	2664387
Certification Year:	2006	**Timing-Static (DEG):**	--
Compression Ratio:	14.7	**Timing-Static Advance (DEG):**	--
Combustion System:	DI	**Timing-Static (MM):**	--
Aftercooler Temperature (F):	122	**Unit Injector Timing (MM):**	64.3
Crankcase Blowby Rate(CFH):	2,203.6	**Torque Rise (percent)**	--
Fuel Rate (Rated RPM) No Load (Gal/HR):	9.9	**Peak Torque Speed RPM**	--
Lube Oil Press @ Low Idle Spd(PSI):	--	**Peak Torque (LB/FT):**	--

Reference Number: DM8260 EPA TIER-2 2006 B5

Parameters Reference: TM5739

GEN SET - PACKAGED - DIESEL
TOLERANCES:
AMBIENT AIR CONDITIONS AND FUEL USED WILL AFFECT THESE VALUES. EACH OF THE VALUES MAY VARY IN ACCORDANCE WITH THE FOLLOWING TOLERANCES.

ENGINE POWER	+/-	3%
EXHAUST STACK TEMPERATURE	+/-	8%
GENERATOR POWER	+/-	5%
INLET AIR FLOW	+/-	5%
INTAKE MANIFOLD PRESSURE - GAGE	+/-	10%
EXHAUST FLOW	+/-	6%
SPECIFIC FUEL CONSUMPTION	+/-	3%
FUEL RATE	+/-	5%
HEAT REJECTION	+/-	5%
HEAT REJECTION EXHAUST ONLY	+/-	10%

CONDITIONS:
ENGINE PERFORMANCE IS CORRECTED TO INLET AIR STANDARD CONDITIONS OF 99 KPA (29.31 IN HG) AND 25 DEG C (77 DEG F).

THESE VALUES CORRESPOND TO THE STANDARD ATMOSPHERIC PRESSURE AND TEMPERATURE IN ACCORDANCE WITH SAE J1349. ALSO INCLUDED IS A CORRECTION TO STANDARD FUEL GRAVITY OF 35 DEGREES API HAVING A LOWER HEATING VALUE OF 42,780 KJ/KG (18,390 BTU/LB) WHEN USED AT 29 DEG C (84.2 DEG F) WHERE THE DENSITY IS 838.9 G/L (7.002 LB/GAL).

THE CORRECTED PERFORMANCE VALUES SHOWN FOR CATERPILLAR ENGINES WILL APPROXIMATE THE VALUES OBTAINED WHEN THE OBSERVED PERFORMANCE DATA IS CORRECTED TO SAE J1349, ISO 3046-2 & 8665 & 2288 & 9249 & 1585, EEC 80/1269 AND DIN70020 STANDARD REFERENCE CONDITIONS.

ENGINES ARE EQUIPPED WITH STANDARD ACCESSORIES; LUBE OIL, FUEL PUMP AND JACKET WATER PUMP. THE POWER REQUIRED TO DRIVE AUXILIARIES MUST BE DEDUCTED FROM THE GROSS OUTPUT TO ARRIVE AT THE NET POWER AVAILABLE FOR THE EXTERNAL (FLYWHEEL) LOAD. TYPICAL AUXILIARIES INCLUDE COOLING FANS, AIR COMPRESSORS, AND CHARGING ALTERNATORS.

RATINGS MUST BE REDUCED TO COMPENSATE FOR ALTITUDE AND/OR AMBIENT TEMPERATURE CONDITIONS ACCORDING TO THE APPLICABLE DATA SHOWN ON THE PERFORMANCE DATA SET.

GEN SET - PACKAGED - DIESEL
ALTITUDE:
ALTITUDE CAPABILITY - THE RECOMMENDED REDUCED POWER VALUES FOR SUSTAINED ENGINE OPERATION AT SPECIFIC ALTITUDE LEVELS AND AMBIENT TEMPERATURES.

COLUMN "N" DATA - THE FLYWHEEL POWER OUTPUT AT NORMAL AMBIENT TEMPERATURE.

AMBIENT TEMPERATURE - TO BE MEASURED AT THE AIR CLEANER AIR INLET DURING NORMAL ENGINE OPERATION.
NORMAL TEMPERATURE - THE NORMAL TEMPERATURE AT VARIOUS SPECIFIC ALTITUDE LEVELS IS FOUND ON TM2001.

THE GENERATOR POWER CURVE TABULAR DATA REPRESENTS THE NET ELECTRICAL POWER OUTPUT OF THE GENERATOR.

GENERATOR SET RATINGS
EMERGENCY STANDBY POWER (ESP)

OUTPUT AVAILABLE WITH VARYING LOAD FOR THE DURATION OF AN EMERGENCY OUTAGE. AVERAGE POWER OUTPUT IS 70% OF THE ESP RATING. TYPICAL OPERATION IS 50 HOURS PER YEAR, WITH MAXIMUM EXPECTED USAGE OF 200 HOURS PER YEAR.

STANDBY POWER RATING

OUTPUT AVAILABLE WITH VARYING LOAD FOR THE DURATION OF AN EMERGENCY OUTAGE. AVERAGE POWER OUTPUT IS 70% OF THE STANDBY POWER RATING. TYPICAL OPERATION IS 200 HOURS PER YEAR, WITH MAXIMUM EXPECTED USAGE OF 500 HOURS PER YEAR.

PRIME POWER RATING

OUTPUT AVAILABLE WITH VARYING LOAD FOR AN UNLIMITED TIME. AVERAGE POWER OUTPUT IS 70% OF THE PRIME POWER RATING. TYPICAL PEAK DEMAND IS 100% OF PRIME RATED EKW WITH 10% OVERLOAD CAPABILITY FOR EMERGENCY USE FOR A MAXIMUM OF 1 HOUR IN 12. OVERLOAD OPERATION CANNOT EXCEED 25 HOURS PER YEAR.

CONTINUOUS POWER RATING

OUTPUT AVAILABLE WITH NON-VARYING LOAD FOR AN UNLIMITED TIME. AVERAGE POWER OUTPUT IS 70-100% OF THE CONTINUOUS POWER RATING. TYPICAL PEAK DEMAND IS 100% OF CONTINUOUS RATED EKW FOR 100% OF OPERATING HOURS.

Qair

DATE: Dec. 08, 2006 **Doc #: 260214-L11-Rev 2**

DOCUMENT NAME: Fan Performance Curve

ISSUED BY: **Tony Quirk**
APPROVED BY: **Tony Quirk**

See attached performance curve for supplied fan. All values are constant for the supplied fan. The fan actually requires 73.6 BHP @ -38 degrees C and was supplied with a 75HP motor.

Attn: Richard,

Daltec Industries Ltd.

Version 2.0

Date: 8/1/2006

Customer: Kraemer Tool
Quotation No.: 06-11094
Model: IE-23-DAW
Fan Arrangment: 1BM
Flow: 15,000 acfm
Fan Speed: 1395 rpm
Wheel Dia.: 40 in.
Percent Width: 100 %
Static Efficiency: 61.8 %
Operating Temp.: 70 F
Baro. Pressure: 29.93 in. Hg

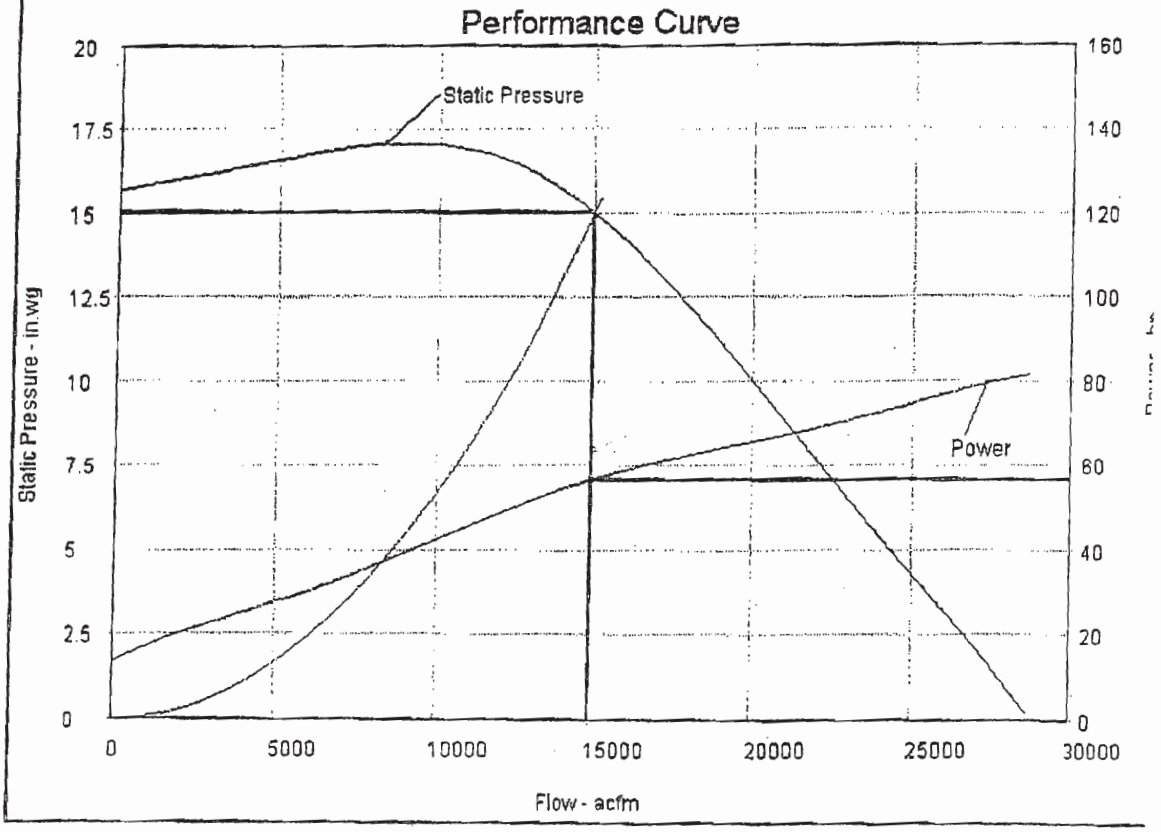
Project:
Customer Ref. No.:
Fan Tag No.:
Fan Class.: 15K
Static Pressure Rise: 15 in.wg
Power: 56.63 hp
Tip Speed: 14608 ft/min
Outlet Velocity: 5290 ft/min.
Elevation: 0 ft
Inlet Density: 0.075 lb/ft^3
Relative Humidity: 0%
Belt Loss: 2.41 hp

BHP @ -38°C
= 73.6 BHP

Total Sound Power Levels (ref 10^-12 Watts)

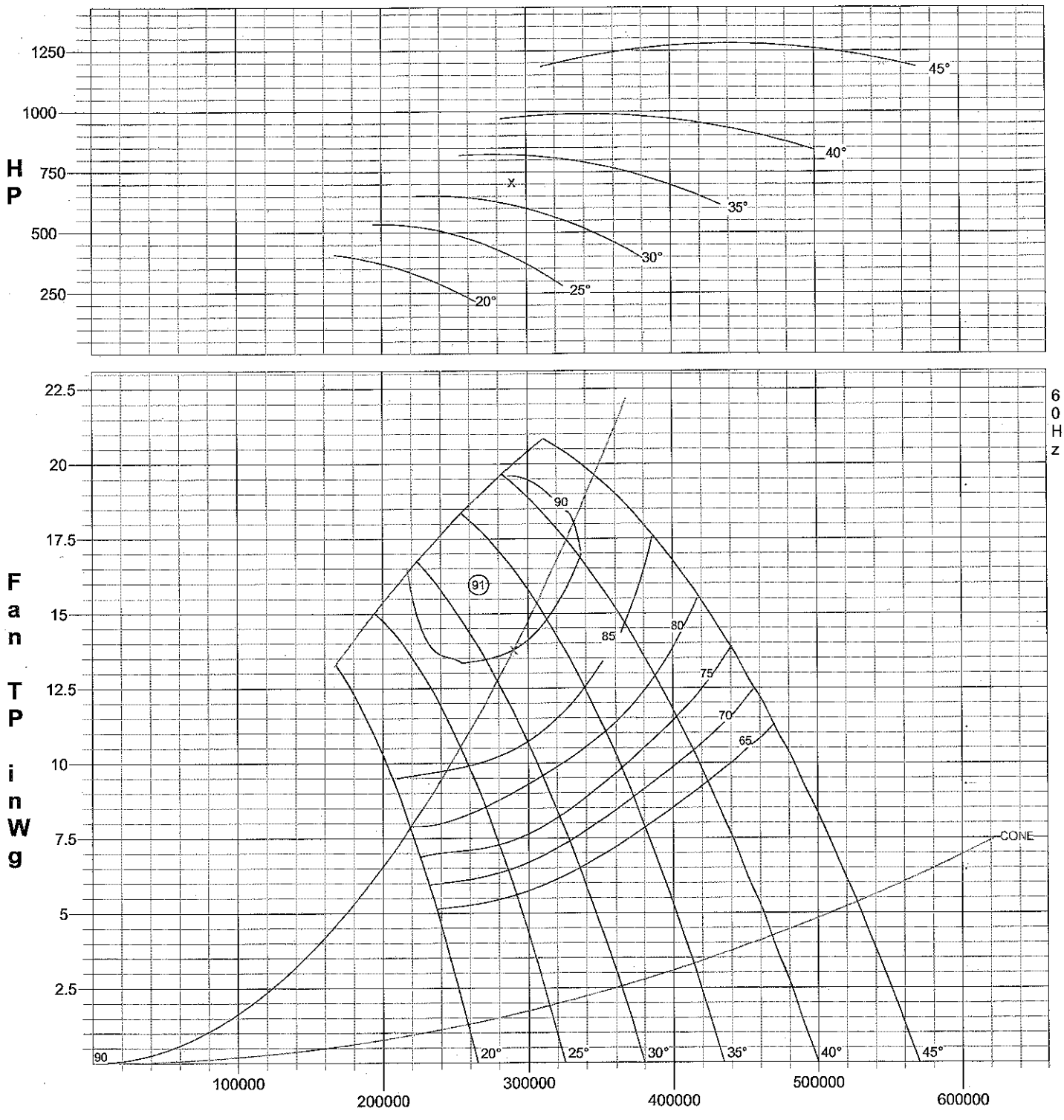
Octave Band	1	2	3	4	5	6	7	8
dB Level	107	108	101	97	95	92	87	85

Single Value LwA: 101 dBA *Estimated Sound Pressure Level: 91 dBA
Sound Pressure Level @ 3 ft. from the sound source in a free field (ref 2x10^-5 Pa, Q=1)
*Sound Pressure Level based on a non Ducted Inlet and Outlet



Alphair Ventilating Systems, Inc.
1221 Sherwin Road, Winnipeg, MB, R3H 0V1
Tel (204) 694-6666 Fax (204) 694-6204

Golder Associates - Rainy River Gold



Fan Performance Curve	**8400-AMF-5000 Full Blade**	Rev. 980127-01
Diameter: **84.00** in	Speed: **1180.0** Rpm	Diffuser Diameter: **112.00** in
Altitude: **0** ft asl	Temperature: **70.0** degF	Diffuser Length: **222.00** in
Density: **0.075** lb/ft³		Ref: **Portal Fan**

Alphair Ventilating Systems, Inc.
1221 Sherwin Road, Winnipeg, MB, R3H 0V1
Tel (204) 694-6666 Fax (204) 694-6204

Selection Data Sheet Golder Associates - Rainy River Gold (Portal Fan)

Model: 8400-AMF-5000 Full Blade*JetStream* Adjustable Pitch Vane Axial Fan

Fan Diameter: 84

Performance Information (Elevation 0 ft asl)

Volume cfm	FTP inWg	FSP inWg	Temp degF	Density lb/ft³	Power HP	Efft %	RPM	BlaAng Deg	Vfan fpm	Vcone fpm
290,000.0	**13.32**	**12.20**	**70.0**	**0.075**	**705.0**	**89.2**	**1180.0**	**32.1**	**7,535.50**	**4,238.70**

Selection Options Information

Speed and Pitch: ☐ Constant Speed ☐ Variable Speed ☐ Fixed Pitch ☒ **Adjustable Pitch**
Selection Basis: ☒ **Actual Volume** ☐ Standard Speed ☐ Mass Flow ☒ **Fan SP** ☐ Fan TP
Inlet Control: ☒ **Open** ☐ Ducted
Outlet Control: ☐ Open ☒ **Ducted** Discharge Cone: ☒ **Yes** ☐ No
Arrangement - (12A) - Direct Drive, Open In, Duct Out, Diffuser
Drive: ☐ Belt ☒ **Direct** Gas Type: ☒ **Clean Air** ☐ Special Freq: ☐ 50Hz ☒ **60Hz**

Diffuser Information

Round Inlet to Round Outlet: ☐ Fixed Angles ☐ Fixed Dimensions ☒ **Standard Geometry** ☐ Targeted Velocity
Round Inlet to Square Outlet: ☐ Fixed Angles ☐ Fixed Dimensions ☐ Standard Geometry ☐ Targeted Velocity

Target Velocity: **0.00** fpm BB Width: **0.00** in Diameter: **112.00** in
AA Height: **0.00** in CC Length: **222.00** in EOV: **4,238.71** fpm

Accessories and Losses Information

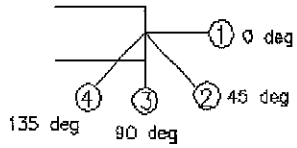
Accessory Description	Flow Area ft²	Volume cfm	Factor x VP	VP inWg	Loss inWg

Base Sound Data

Installation: AMCA B: Open/Ducted inlet / Ducted/Open Outlet

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lw	122	113	115	116	114	111	109	105
Lp	115	106	108	110	108	106	104	100
LpA	90	91	100	107	108	107	105	99

Position: 1



Over All Lp **108** dBA at 3 feet or 1 meter from fan dBA at 3.28 feet or 1.00 meter from fan

Motor Data

Motor Option 1: 3 Phase 60 Hz 0.0 HP 0.0 RPM Electric Motor Frame: **RTF**

Other Possible JetStream Selections

Model	Speed RPM	Power HP	Efft %	Vfan fpm	Vcone fpm
10150-AMF-6100 Full Blade	880.0	655.7	90.0	8,005.19	2,895.95
8400-AMF-5000 Full Blade	1180.0	705.0	89.2	11,670.43	4,238.71
9250-AMF-5000 Full Blade	1180.0	699.0	86.7	8,779.43	3,514.47
9250-AMF-6100 Full Blade	880.0	703.5	86.1	10,859.98	3,514.47
9250-AMF-5500 Full Blade	1180.0	706.0	85.8	9,612.74	3,514.47
10150-AMF-6600 Full Blade	880.0	691.3	85.4	9,069.29	2,895.95
9250-AMF-5500 Half Blade	1180.0	713.1	85.0	9,612.74	3,514.47
11200-AMF-7300 Full Blade	880.0	709.6	81.7	7,397.91	2,427.43
8400-AMF-5500 Half Blade	1180.0	769.9	81.6	13,190.39	4,238.71
9250-AMF-6100 Half Blade	1180.0	749.3	80.9	10,859.98	3,514.47

Alphair Ventilating Systems, Inc.
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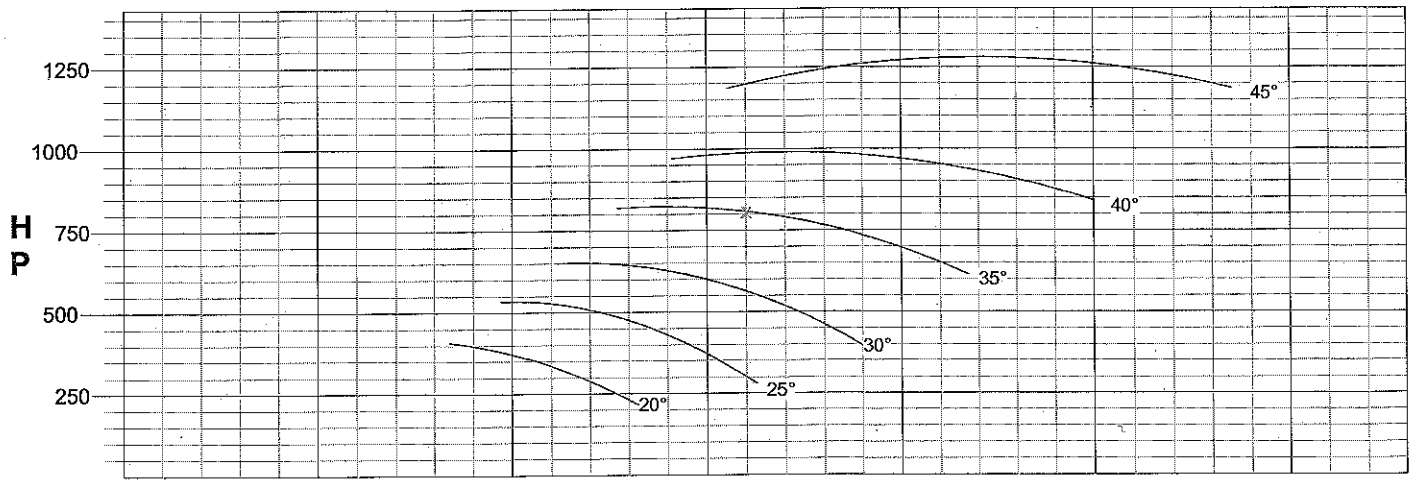
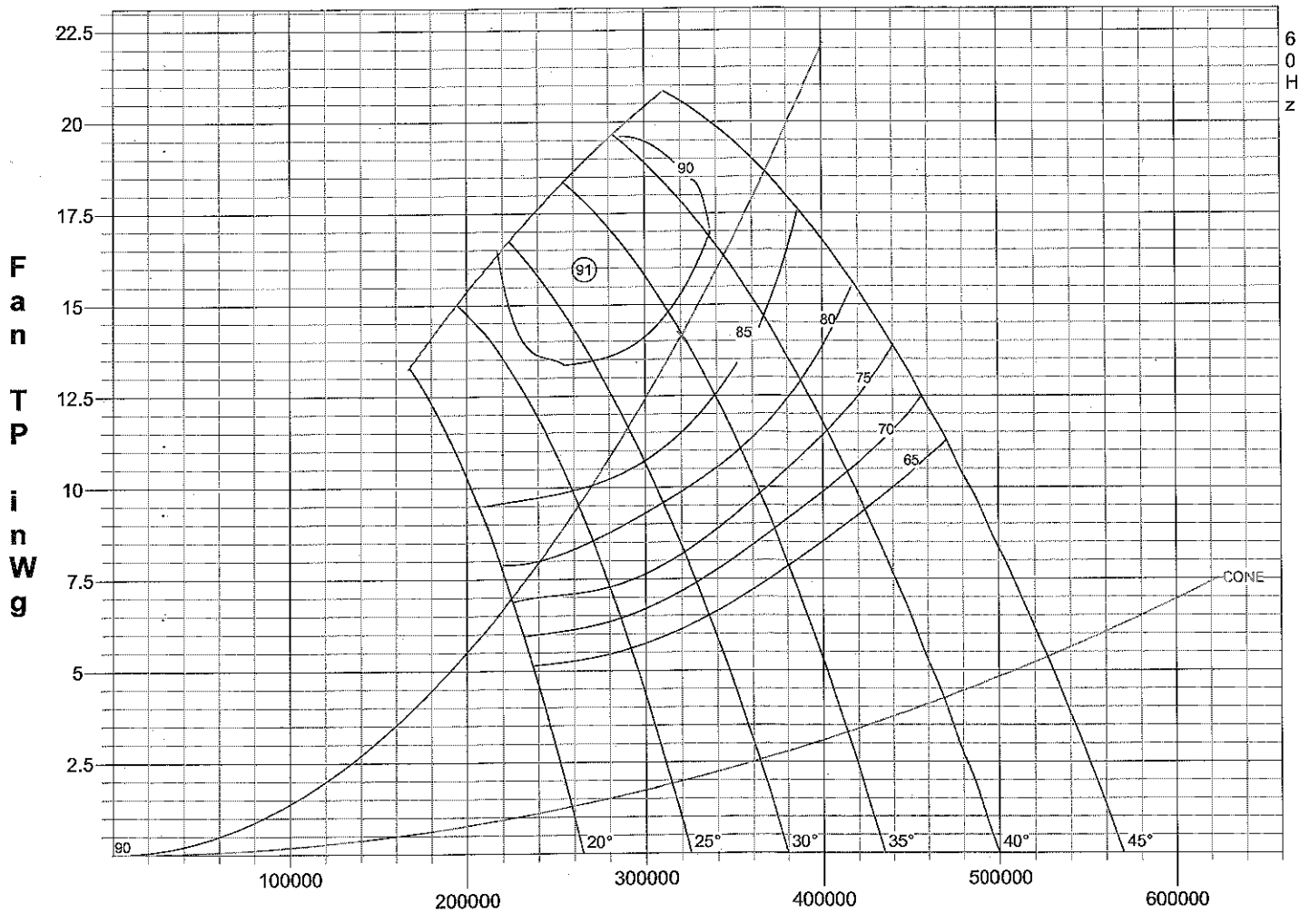
Tel (204) 694-6666 Fax (204) 694-6204

Golder Associates - Rainy River Gold





Fan Performance Curve	**8400-AMF-5000 Full Blade**	Rev. 980127-01
Diameter: **84.00** in	Speed: **1180.0** Rpm	Diffuser Diameter: **112.00** in
Altitude: **0** ft asl	Temperature: **70.0** degF	Diffuser Length: **222.00** in
Density: **0.075** lb/ft³		Ref: **ODM West Raise**

Alphair Ventilating Systems, Inc.
1221 Sherwin Road, Winnipeg, MB, R3H 0V1
Tel (204) 694-6666 Fax (204) 694-6204

Selection Data Sheet Golder Associates - Rainy River Gold (ODM West Raise)

Model: 8400-AMF-5000 Full Blade*JetStream* Adjustable Pitch Vane Axial Fan

Fan Diameter: 84

Performance Information (Elevation 0 ft asl)

Volume cfm	FTP inWg	FSP inWg	Temp degF	Density lb/ft³	Power HP	Efft %	RPM	BlaAng Deg	Vfan fpm	Vcone fpm
320,000.0	**13.56**	**12.20**	**70.0**	**0.075**	**803.0**	**88.5**	**1180.0**	**34.8**	**8,315.00**	**4,677.20**

Selection Options Information

Speed and Pitch: ☐ Constant Speed ☐ Variable Speed ☐ Fixed Pitch ☒ **Adjustable Pitch**
Selection Basis: ☒ **Actual Volume** ☐ Standard Speed ☐ Mass Flow ☒ **Fan SP** ☐ Fan TP
Inlet Control: ☒ **Open** ☐ Ducted
Outlet Control: ☐ Open ☒ **Ducted** Discharge Cone: ☒ **Yes** ☐ No
Arrangement - (12A) - Direct Drive, Open In, Duct Out, Diffuser
Drive: ☐ Belt ☒ **Direct** Gas Type: ☒ **Clean Air** ☐ Special Freq: ☐ 50Hz ☒ **60Hz**

Diffuser Information

Round Inlet to Round Outlet: ☐ Fixed Angles ☐ Fixed Dimensions ☒ **Standard Geometry** ☐ Targeted Velocity
Round Inlet to Square Outlet: ☐ Fixed Angles ☐ Fixed Dimensions ☐ Standard Geometry ☐ Targeted Velocity

Target Velocity: **0.00** fpm BB Width: **0.00** in Diameter: **112.00** in
AA Height: **0.00** in CC Length: **222.00** in EOV: **4,677.20** fpm

Accessories and Losses Information

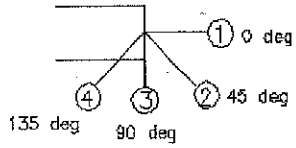
Accessory Description	Flow Area ft²	Volume cfm	Factor x VP	VP inWg	Loss inWg

Base Sound Data

Installation: AMCA B: Open/Ducted inlet / Ducted/Open Outlet

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lw	123	114	116	117	115	112	110	106
Lp	116	107	109	111	109	107	105	101
LpA	91	92	101	108	109	108	106	100

Position: 1



Over All Lp **109** dBA at 3 feet or 1 meter from fan dBA at 3.28 feet or 1.00 meter from fan

Motor Data

Motor Option 1: 3 Phase 60 Hz 0.0 HP 0.0 RPM Electric Motor Frame: **RTF**

Other Possible JetStream Selections

Model	Speed RPM	Power HP	Efft %	Vfan fpm	Vcone fpm
10150-AMF-6100 Full Blade	880.0	725.6	90.9	8,833.31	3,195.53
8400-AMF-5000 Full Blade	1180.0	803.0	88.6	12,877.71	4,677.20
9250-AMF-5000 Full Blade	1180.0	768.5	88.5	9,687.65	3,878.04
9250-AMF-5500 Full Blade	1180.0	784.3	86.8	10,607.16	3,878.04
11200-AMF-6600 Full Blade	880.0	745.3	86.6	7,239.34	2,678.54
9250-AMF-5500 Half Blade	1180.0	787.2	86.4	10,607.16	3,878.04
11200-AMF-7300 Full Blade	710.0	756.6	85.3	8,163.21	2,678.54
10150-AMF-6600 Full Blade	880.0	780.5	84.5	10,007.49	3,195.53
9250-AMF-6100 Full Blade	880.0	812.2	83.8	11,983.43	3,878.04
12300-AMF-8000 Full Blade	710.0	767.5	82.8	6,800.21	2,235.59

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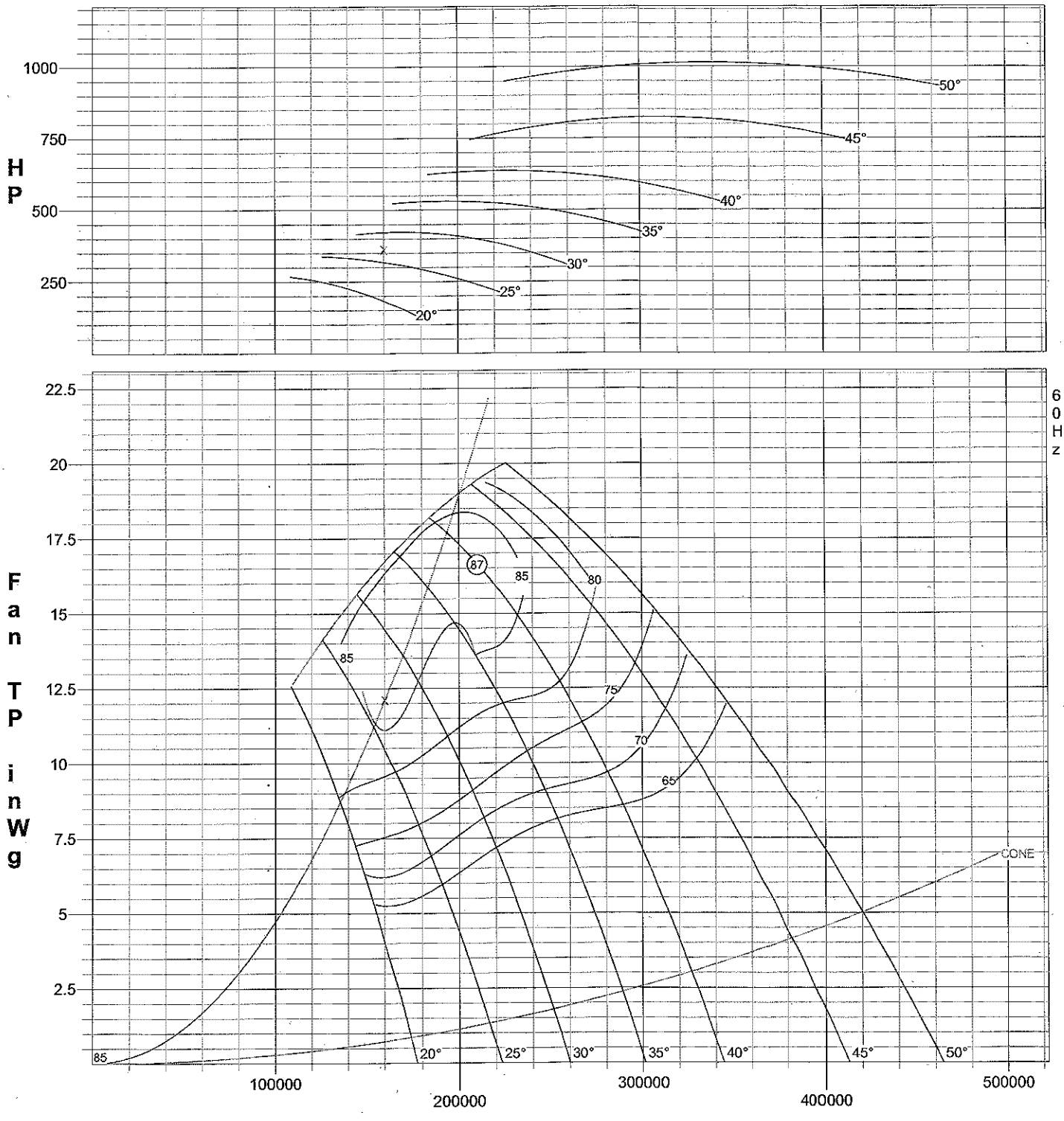
Golder Associates - Rainy River Gold



Fan Performance Curve	**7650-AMF-5000 Full Blade**	Rev. 980127-01
Diameter: **76.50** in	Speed: **1180.0** Rpm	Diffuser Diameter: **101.50** in
Altitude: **0** ft asl	Temperature: **70.0** degF	Diffuser Length: **204.00** in
Density: **0.075** lb/ft³		Ref: **17 East Raise**

Alphair Ventilating Systems, Inc.
1221 Sherwin Road, Winnipeg, MB, R3H 0V1
Tel (204) 694-6666 Fax (204) 694-6204

Selection Data Sheet Golder Associates - Rainy River Gold (17 East Raise)

Model: 7650-AMF-5000 Full Blade*JetStream* Adjustable Pitch Vane Axial Fan

Fan Diameter: 76

Performance Information (Elevation 0 ft asl)

Volume cfm	FTP inWg	FSP inWg	Temp degF	Density lb/ft³	Power HP	Efft %	RPM	BlaAng Deg	Vfan fpm	Vcone fpm
160,000.0	**11.90**	**11.40**	**70.0**	**0.075**	**360.5**	**84.5**	**1180.0**	**27.0**	**5,012.70**	**2,847.50**

Selection Options Information

Speed and Pitch: ☐ Constant Speed ☐ Variable Speed ☐ Fixed Pitch ☒ **Adjustable Pitch**
Selection Basis: ☒ **Actual Volume** ☐ Standard Speed ☐ Mass Flow ☒ **Fan SP** ☐ Fan TP
Inlet Control: ☒ **Open** ☐ Ducted
Outlet Control: ☐ Open ☒ **Ducted** Discharge Cone: ☒ **Yes** ☐ No
Arrangement - (12A) - Direct Drive, Open In, Duct Out, Diffuser
Drive: ☐ Belt ☒ **Direct** Gas Type: ☒ **Clean Air** ☐ Special Freq: ☐ 50Hz ☒ **60Hz**

Diffuser Information

Round Inlet to Round Outlet: ☐ Fixed Angles ☐ Fixed Dimensions ☒ **Standard Geometry** ☐ Targeted Velocity
Round Inlet to Square Outlet: ☐ Fixed Angles ☐ Fixed Dimensions ☐ Standard Geometry ☐ Targeted Velocity

Target Velocity: **0.00** fpm BB Width: **0.00** in Diameter: **101.50** in
AA Height: **0.00** in CC Length: **204.00** in EOV: **2,847.47** fpm

Accessories and Losses Information

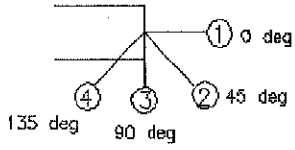
Accessory Description	Flow Area ft²	Volume cfm	Factor x VP	VP inWg	Loss inWg

Base Sound Data

Installation: AMCA B: Open/Ducted inlet / Ducted/Open Outlet

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lw	119	110	112	113	111	108	106	102
Lp	112	103	105	107	105	103	101	97
LpA	87	88	97	104	105	104	102	96

Position: 1



Over All Lp **105** dBA at 3 feet or 1 meter from fan dBA at 3.28 feet or 1.00 meter from fan

Motor Data

Motor Option 1: 3 Phase 60 Hz 400.0 HP 1200.0 RPM Electric Motor Frame: **586/7**

Other Possible JetStream Selections

Model	Speed RPM	Power HP	Efft %	Vfan fpm	Vcone fpm
7650-AMF-5000 Full Blade	1180.0	360.5	84.5	8,750.96	2,847.47

Alphair Ventilating Systems, Inc.
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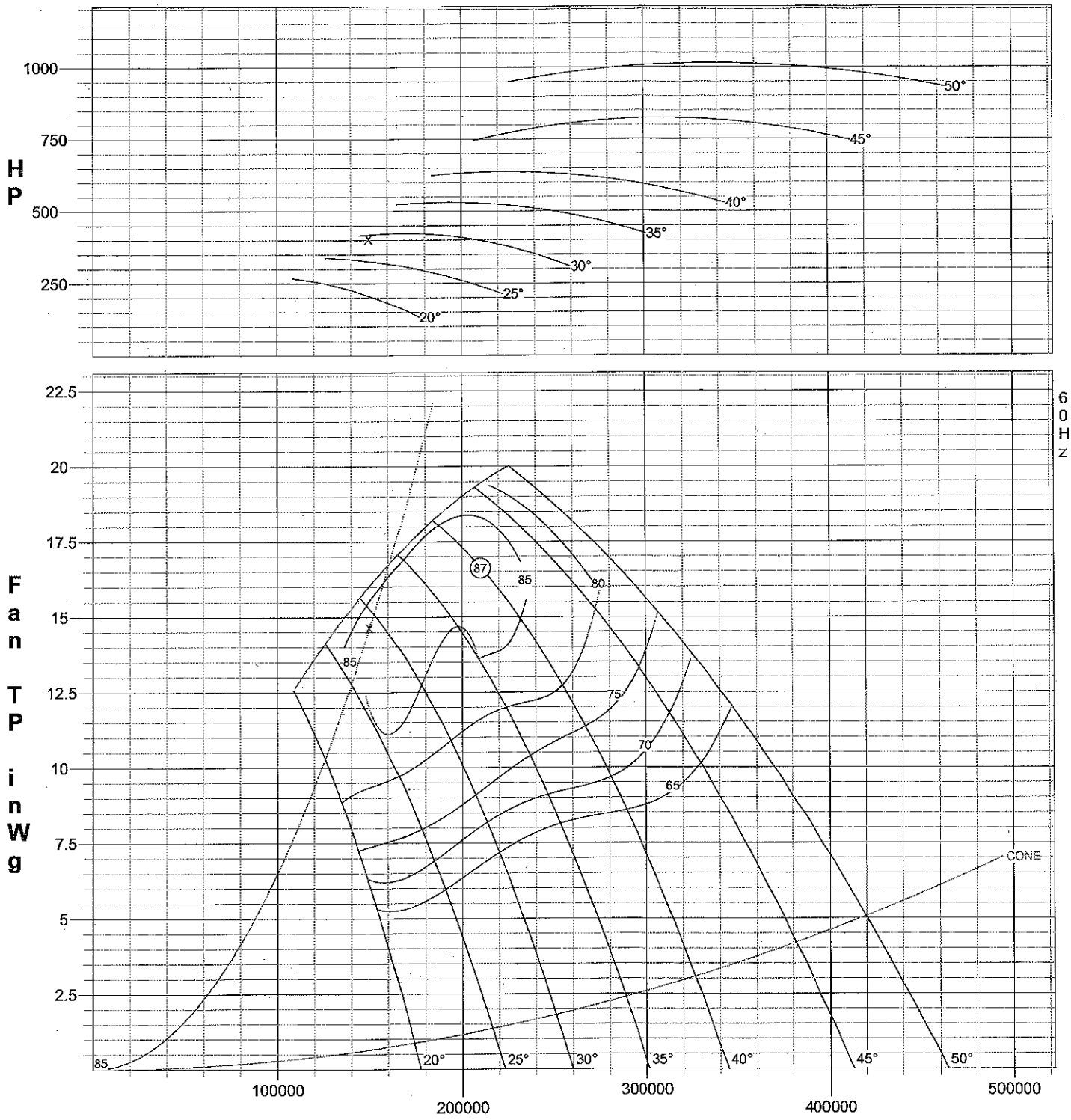
Golder Associates - Rainy River Gold



Fan Performance Curve	**7650-AMF-5000 Full Blade**	Rev. 980127-01
Diameter: **76.50** in	Speed: **1180.0** Rpm	Diffuser Diameter: **101.50** in
Altitude: **0** ft asl	Temperature: **70.0** degF	Diffuser Length: **204.00** in
Density: **0.075** lb/ft³		Ref: **Aux. Fan**

Alphair Ventilating Systems, Inc.
1221 Sherwin Road, Winnipeg, MB, R3H 0V1
Tel (204) 694-6666 Fax (204) 694-6204

Selection Data Sheet Golder Associates - Rainy River Gold (Aux. Fan)

Model: 7650-AMF-5000 Full Blade*JetStream* Adjustable Pitch Vane Axial Fan

Fan Diameter: 76

Performance Information (Elevation 0 ft asl)

Volume cfm	FTP inWg	FSP inWg	Temp degF	Density lb/ft³	Power HP	Efft %	RPM	BlaAng Deg	Vfan fpm	Vcone fpm
150,000.0	**14.44**	**14.00**	**70.0**	**0.075**	**401.5**	**85.9**	**1180.0**	**29.0**	**4,699.39**	**2,669.50**

Selection Options Information

Speed and Pitch: ☐ Constant Speed ☐ Variable Speed ☐ Fixed Pitch ☒ **Adjustable Pitch**
Selection Basis: ☒ **Actual Volume** ☐ Standard Speed ☐ Mass Flow ☒ **Fan SP** ☐ Fan TP
Inlet Control: ☒ **Open** ☐ Ducted
Outlet Control: ☐ Open ☒ **Ducted** Discharge Cone: ☒ **Yes** ☐ No
Arrangement - (12A) - Direct Drive, Open In, Duct Out, Diffuser
Drive: ☐ Belt ☒ **Direct** Gas Type: ☒ **Clean Air** ☐ Special Freq: ☐ 50Hz ☒ **60Hz**

Diffuser Information

Round Inlet to Round Outlet: ☐ Fixed Angles ☐ Fixed Dimensions ☒ **Standard Geometry** ☐ Targeted Velocity
Round Inlet to Square Outlet: ☐ Fixed Angles ☐ Fixed Dimensions ☐ Standard Geometry ☐ Targeted Velocity

Target Velocity: **0.00** fpm BB Width: **0.00** in Diameter: **101.50** in
AA Height: **0.00** in CC Length: **204.00** in EOV: **2,669.51** fpm

Accessories and Losses Information

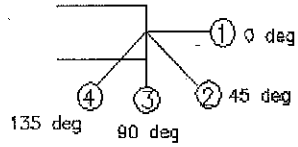
Accessory Description	Flow Area ft²	Volume cfm	Factor x VP	VP inWg	Loss inWg

Base Sound Data

Installation: AMCA B: Open/Ducted inlet / Ducted/Open Outlet

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lw	120	111	113	114	112	109	107	103
Lp	113	104	106	108	106	104	102	98
LpA	88	89	98	105	106	105	103	97

Position: 1



Over All Lp **106** dBA at 3 feet or 1 meter from fan dBA at 3.28 feet or 1.00 meter from fan

Motor Data

Motor Option 1: 3 Phase 60 Hz 450.0 HP 1200.0 RPM Electric Motor Frame: **586/7**

Other Possible JetStream Selections

Model	Speed RPM	Power HP	Efft %	Vfan fpm	Vcone fpm
7650-AMF-5000 Full Blade	1180.0	401.5	85.9	8,204.03	2,669.51

TR08-120 PV-235 Field Sound Pressure Audit								
	Run 1		Run 2		Run 3		Run 4	
	Impulsive	Slow	Impulsive	Slow	Impulsive	Slow	Impulsive	Slow
1	50.6	50.1	81.2	79.5	80.6	77.9	80.9	77.6
2	49.9	49.7	77.7	77.1	79.4	78.6	79.2	78.5
3	46.9	46.7	79.6	79.5	81.9	81.3	81.6	81.1
4	49.6	49.3	81.1	80.6	83.1	82.3	83.2	82.2
5	49.3	49.1	81.9	80.4	83.9	82.3	83.8	82.1
6	48.7	47.1	88.3	87.2	88.8	88.4	88.9	88.2
7	49.6	48.7	87.1	86.6	88.4	87.6	88.3	87.5
8	50.6	50.1	85.3	84.5	87.8	86.5	87.7	86.4
9	55.8	55.6	85.1	84.9	87.1	86.6	86.5	86.3
10	58.6	57.5	86.4	86.1	87.6	86.4	87.2	86.1
11	60.6	60.3	86.5	86.1	89.6	88.4	89.5	88.2
12	61.3	60.1	86.7	86.3	89.9	89.3	89.7	89.2
	Lpa =	54.83	Lpa =	84.35	Lpa =	85.98	Lpa =	85.80
	Lwa =	86.90	Lwa =	116.41	Lwa =	118.04	Lwa =	117.87

SANDVIK DR460

Drayton Unit: 406, Serial: 733105

Sound Power and Operator Noise

Prepared for
Sandvik

Global Acoustics

Noise and Vibration Specialists
PO Box 115 Thornton NSW 2322
ph: (02) 4966 4333 fax: (02) 4966 4330 email: global@globalacoustics.com.au
www.globalacoustics.com.au

Sandvik DR460
Drayton Unit: 406, Serial: 733105
Sound Power and Operator Noise

Reference: 09122_R01_DR460.doc

Report Date: 23 June 2009

Prepared for:
Sandvik Materials Handling Pty Ltd
230 Old Maitland Road
Hexham NSW 2322

Prepared by:
Global Acoustics Pty Ltd
PO Box 115
Thornton NSW 2322

Prepared: Joel Curran, Acoustics Engineer

QA review: Tony Welbourne, Director

Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

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TABLE OF APPENDICES

1 INTRODUCTION

Global Acoustics Pty Ltd was engaged by Sandvik to determine sound power (L_W) and cabin (operator) noise data for a DR460 drill operating at the Drayton Coal Mine.

Noise level measurements were made on 26 May 2009.

2 TESTING METHODOLOGY

Measurement and calculation was conducted generally in accordance with:

- AS 2012.2 'Acoustics - Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors - Stationary test condition – Operator's Position' and
- ISO 4872 'Acoustics – Measurement of airborne noise emitted by construction equipment intended for outdoor use- Method for determining compliance with noise limits'.

2.1 EQUIPMENT USED

The equipment used to measure and record noise levels are listed in Table 1. Calibration certificates are provided in Appendix A.

Table 1 SOUND LEVEL MEASURMENT EQUIPMENT

Model	Serial Number	Calibration Due Date
SVAN 948 noise and vibration analyser	6507	14/7/2010
Rion NC74 sound level calibrator	50941314	22/9/2009

3 RESULTS

3.1 TEST CONFIGURATIONS

During testing the machine configurations were as follows:

- Stationary L_W and operator noise exposure tests, engine at rated speed (1850 rpm), maximum fan speed (1050 rpm). All engine compartment doors and hatches were closed.

For the stationary operator noise exposure test, the engine was at rated speed, and the cabin air conditioner fan was operated at high speed. All cabin windows and doors were closed; all radios were off.

3.2 ATMOSPHERIC CONDITIONS

Weather conditions at the time of testing are presented in Table 2

Table 2 WEATHER CONDITIONS

Date	Temperature (^oC)	Wind Speed (m/s)	Barometric Pressure (hPa)	Relative Humidity (%)
26/5/2009	19	1 - 2	1020	59

3.3 OVERALL SOUND POWER

Sound powers determined from measured SPL are provided in Table 3. Figure 1 provides further detail.

Table 3 SOUND POWER RESULTS, dB(A)

Plant No	Test mode	L_W
406	Stationary	118

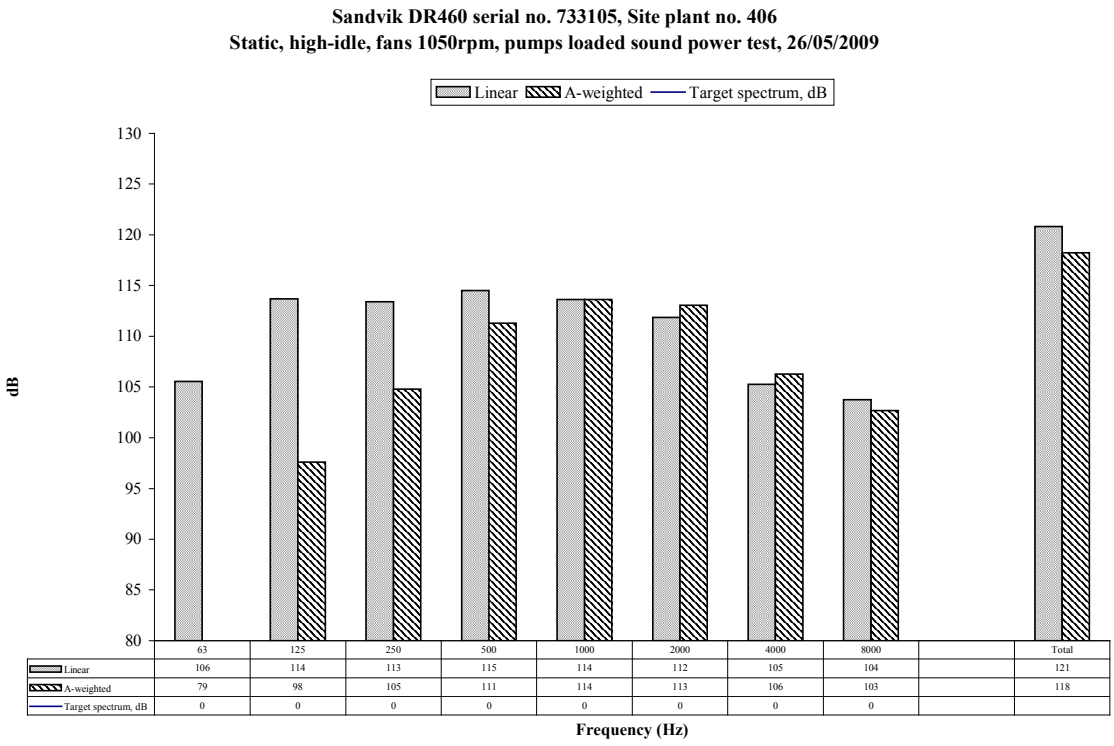

Figure 1 Stationary L_W

3.4 OPERATOR NOISE EXPOSURE

The result for an operator cabin noise test is shown in Table 4.

Table 4 CABIN NOISE LEVELS

Plant No	Test Condition	L_{Aeq} dB
406	Stationary	75

4 CLOSURE

We trust this information is per your requirements. Please contact us if you require further details or advice.

Global Acoustics Pty Ltd

Appendix

A: Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 32373 & FILT 1627

Equipment Description:	Sound Level Meter		
Manufacturer:	Svantek		
Model No:	Svan-948	**Serial No:**	6507
Microphone Type:	SV-22	**Serial No:**	4010442
Filter Type:	1/3 Octave	**Serial No:**	6507
Comments:	All tests passed for type 1. Uncertainty (at the 95% c.l.) = +/- 0.1 dB		
Owner:	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322		
Ambient Pressure:	1015 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	36 %RH ±5% RH
Date of Calibration:	14/07/2008	**Issue Date:**	15/07/2008

CHECKED BY: AM **AUTHORISED SIGNATORY:** Jack Kielt

The tests, calibrations or measurements covered by this document are traceable to Australian national standards of measurement. This document shall not be reproduced, except in full. The equipment listed above has been calibrated in this laboratory. The equipment performed satisfactorily in all the tests conducted.

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ACU-VIB ELECTRONICS
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Mobile: 0413 809806
web site: www.acu-vib.com.au

Acoustic Research Laboratories
Proprietary Limited A.B.N. 47 050 100 804
Noise and Vibration Monitoring Instrumentation for Industry and the Environment

Acoustic Calibrator Test Report

Report Number : 08357

Date of Test : 22/09/2008

Report Issue Date : 22/09/2008

Equipment Tested: **Rion Acoustic Calibrator**

Model Number: NC-74

Serial Number: 50941314

Client Name : Global Acoustics Pty Ltd

12/16 Huntingdale Drive

Thornton NSW 2322

Contact Name : Tony Welbourne

Tested by : Morgan Rae

Approved Signatory :

Ken Williams

Date : **22 September 2008**

NATA
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