

Final Plan Attachment 8.6 V13 Supporting Information 1

Business Cases

APA Occupational Noise Assessment

December 2016

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08 AUG 2009

Ms. Ada Cinaglia
Manager Network Services
APA Group
1 Wood Street
Thomastown VIC 3074

Dear Ada,

Occupational Noise Assessment

Integrated Risk Management is pleased to submit our report on the Occupational Noise Survey conducted at various sites on the 23rd of July, 2009.

Noise was found to exceed the Noise Exposure Standard at the sites and we have provided recommendations regarding control measures that you may implement to reduce noise exposure.

Please contact me to discuss the report further if you wish.

Yours faithfully,

Marc Saunders GradCertOHS MSIA
Occupational Hygienist



Occupational Health and Safety Auditor
Environment Auditor

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OCCUPATIONAL NOISE ASSESSMENT

Gas Regulating Installations

**Clyde Road, Berwick
Hallam Road, Hampton Park
Cranbourne Road, Narre Warren
Anderson Road, Warragul
Victoria**

JUL 2009

APA GROUP

09 114.1.01



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PREPARED

A handwritten signature in black ink, appearing to be 'Marc SAUNDERS', with a large loop at the start and a horizontal stroke at the end.

Marc SAUNDERS GradCertOHS, MSIA
08 AUG 2009

APPROVED

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Karen WITCHELL BAppSc, MOccEnvHygMgt, MBA
12 AUG 2009

EXECUTIVE SUMMARY

The following report details the results of the occupational noise assessment conducted at APA managed gas installation plants located in Berwick, Narre Warren, Hampton Park and Warragal.

Monitoring conducted during normal operations at the sites indicated that the Noise Exposure Standard of 85dB(A) LAeq8hr would be exceeded by personnel working under both normal conditions and during fail-sure mode within both the Berwick installation enclosure and the Kiosks located at the other sites. The peak noise Noise Exposure Standard of 140 dB(C) was not exceeded at any site.

The main source of the excessive noise at each of the sites was found to be the gas regulators. It was noted that the Welka Set is significantly more noisy than the Axial Flow type regulator; however, it was found that both types exceed the Noise Exposure Standard of 85dB(A) LAeq8hr.

APA Group representatives have indicated that it is not practicable to replace the gas regulating equipment with quieter plant. It is also reported that owing to the layout of installations, it would be impracticable to attenuate the noise generated by the regulator by enclosure or some other means.

Owing to the diverse nature of the maintenance work being performed at these locations, IRM has based its conclusions and recommendations on the most credible worst case.

IRM have therefore recommended a combination of both administrative controls and the mandatory use of personal hearing protection devices within certain areas of each site. The basis of the administrative controls is to reduce the duration of worker exposure to excessive noise. This can be achieved by limiting work time within noisy areas and restricting access to essential personnel.

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1 Introduction

1.1 Background

Integrated Risk Management [IRM] was engaged by APA Group (APA) to conduct an *Occupational Noise Assessment* of gas plant installations. The assessment was conducted on the 23rd of July, 2009.

1.2 Scope

The assessment measured noise at APA managed facilities located at Berwick, Narre Warren, Hampton Park and Warragul.

2 Aim

The objective of the *Occupational Noise Assessment* was to:

- identify any employee likely to be exposed to noise above the Noise Exposure Standard;
- obtain information on noise sources and work practices to assist in the selection of risk control measures;
- verify the effectiveness of existing risk control measures;
- assist in the selection of personal hearing protectors where appropriate.

3 Systems of Work

3.1 Site Construction

Gas plant at the Berwick site is housed in an open topped enclosure formed by upright pre-cast concrete slabs and earth works. The surrounding compound is secured by chain link fence.

Gas plant at each of the remaining sites is housed within a free standing kiosk. The kiosk is of masonry construction with a concrete slab floor and roof. Each compound is secured by chain link fence.

3.2 Operations

Work at the sites involves both programmed maintenance and corrective maintenance. It was reported that maintenance works vary considerably in terms of frequency and duration, ranging from major shut down and overhaul to brief inspections.

Maintenance personnel were reported to typically work an 8 hour shift over a 5 day working week but can be called upon to perform necessary works out of hours when required.

The assessment also measured noise levels generated when the installation operates in *fail-safe* mode; and event described as being very infrequent yet extremely noisy. Activation of the *fail-safe* mode is automatic and may occur without warning, and it is possible that workers may be working within close proximity of the plant when the mode is activated. During this assessment, APA triggered the fail-safe under controlled conditions to approximate the actual event.

4 Background

4.1 dB(A) Measurements

During the assessment a precision instrument called a sound level meter (SLM) was used to take noise measurements at each site.

Noise is usually measured in units called decibels (dB). However, it is important to note that decibels are measured on a logarithmic rather than a linear scale. This means that each increase of 3 decibels represents a doubling in sound energy. Conversely, each 3 decibel reduction represents a halving of sound energy.

The instrument converts the sound pressure levels to an eight-hour equivalent continuous sound pressure level measured in dB(A) units for comparison against prescribed noise levels. These measurements represent the intensity of the sound weighted in such a way as to replicate the human ear's variable sensitivity to sound at different frequencies measured in A-weighted decibels (referenced to 20 micropascals).

4.2 Peak Noise Level Measurements

'Peak Noise' is a term used to describe noise that is instantaneous, impact or impulse noise. Examples of impact noise includes hammering steel and firing a rifle. High levels of peak noise are believed to immediately damage to our hearing. Exposure Standards have also been set to regulate this type of noise.

4.3 Noise Exposure Standard

The *Occupational Health and Safety Regulations 2007* state that the exposure for employees should not exceed 85dB(A) averaged over an 8-hour day, that is an $L_{Aeq,8h}$ of 85dB(A). This is based on the equal energy principle, and is related to the fact that noise damage is cumulative and assumes that the work duration is approximately 40 hours per week or 160 hours per month. It also assumes a 16 hour rest period between shifts during which time any temporary threshold shift in hearing that may have occurred will have resolved.

The Regulations also state that a C-weighted 'Peak Noise' sound pressure level ($L_{C,peak}$) of 140dB(C) should not be exceeded.

Therefore an employee's exposure to L_{Aeq} of 85dB(A) over an 8 hour day would be considered to be a noise dose of 100%. An equivalent noise dose can be reached by shorter exposures to louder sounds or, conversely longer exposures to quieter sounds (Table 1). This is based on the 3dB halving principle; that is, for every 3dB increase in noise levels there is a halving of the exposure duration.

Table 1 below indicates the length of time persons can be exposed to noise of varying intensity before exceeding prescribed standards.

Table 1: *Permissible Exposure*

| $L_{Aeq,8h}$ dB(A) | 79 | 82 | 85 | 88 | 91 | 94 | 97 | 100 | 103 | 106 | 120 |
|--------------------|------|------|-----|-----|-----|-----|------|------|-------|--------|-----|
| TIME | 24 h | 12 h | 8 h | 4 h | 2 h | 1 h | 30 m | 15 m | 7.5 m | 3.75 m | 8 s |

5 Method

5.1 Equipment

Brüel & Kjær 2250 Sound Level Meter

The Brüel & Kjær 2250 Sound Level Meter (SLM) is a Type 1 (Precision) sound level meter which complies with the specifications set in Australian Standards AS1259.1 and AS1259.2. It is equipped with an integrating/averaging function that enables the meter to process a continuous, variable, intermittent or impulsive signal to give a single integrated level or L_{eq} for the sampling period. A sound level meter equipped with this function is also known as an integrating/averaging sound level meter (ISLM). The instrument features a peak detector-indicating characteristic, which is necessary to measure the C-weighted peak noise level ($L_{C,peak}$). The instrument had been calibrated by a NATA approved technician.

Brüel & Kjær 4231 Calibrator

The instrument was field calibrated using the Brüel & Kjær 4231 Calibrator to manufacturer's specifications immediately before and after the assessment. This instrument had also been calibrated by a NATA approved technician.

5.2 Assessment Method

The assessment was conducted at a range of locations, activities and equipment at each site where potentially high levels of noise were identified. Measurements were taken using the SLM mounted on a tripod at the equivalent ear position of the receiver unless specified otherwise. Since workers were reported to move around potential noise sources, measurements were taken so as to represent the various work stations. The duration of each measurement was determined on the basis of the type of noise.

6 Results

6.1 Occupational Noise Measurements

| LOCATION | REMARKS | DUR (m) | L _{Aeq,8h} | L _{C,peak} |
|---------------------|--|---------|---------------------|---------------------|
| BERWICK | WELKA SET | | | |
| INSIDE ENCLOSURE | SOUTHERN SIDE | 10:00 | 96.8 | 110.2 |
| INSIDE ENCLOSURE | MID POINT | 07:00 | 96.0 | 109.0 |
| INSIDE ENCLOSURE | MID POINT: FAIL SAFE ACTIVATED | 00:30 | 100.9 | 114.5 |
| INSIDE ENCLOSURE | NORTH EAST: CONTROL PANELS | 05:00 | 80.5 | 95.7 |
| OUTSIDE ENCLOSURE | SOUTH: HARDSTAND | 02:00 | 86.3 | 99.3 |
| OUTSIDE ENCLOSURE | EAST: DRIVEWAY | 02:00 | 80.1 | 92.3 |
| HAMPTON PARK | AXIAL FLOW | | | |
| INSIDE KIOSK | DOOR OPEN | 10:00 | 87.5 | 100.2 |
| INSIDE KIOSK | DOOR OPEN: FAIL SAFE ACTIVATED | 00:30 | 93.3 | 110.9 |
| OUTSIDE KIOSK | DOOR OPEN: NORMAL OPERATION | 05:00 | 80.2 | 94.6 |
| NARRE WARREN | WELKA SET | | | |
| INSIDE KIOSK | DOOR OPEN | 10:00 | 102.9 | 116.1 |
| INSIDE KIOSK | DOOR OPEN: FAIL SAFE ACTIVATED | 00:30 | 104.7 | 121.6 |
| OUTSIDE KIOSK | DOOR OPEN: WORK AREA WITHIN COMPOUND | 05:00 | 82.6 | 100.5 |
| OUTSIDE KIOSK | DOOR CLOSED: WORK AREA WITHIN COMPOUND | 05:00 | 76.6 | 93.7 |
| WARRAGUL | AXIAL FLOW | | | |
| INSIDE KIOSK | DOOR OPEN | 10:00 | 88.8 | 102.0 |
| OUTSIDE KIOSK | DOOR CLOSED: WORK AREA WITHIN COMPOUND | 05:00 | 60.0 | 88.1 |

7 Interpretation

Owing to the potential variation in the exposure frequency and duration experienced during maintenance work, the methodology assumed the worst credible case of 8 hours maximum exposure to the noise levels measured. Actual exposure times may be significantly shorter. The protection afforded by hearing protection devices was also not taken into account when interpreting the results.

7.1 Berwick Enclosure

It was found that the noise generated by gas plant at this site exceeded the Noise Exposure Standard in areas within the plant enclosure. The plant generating the majority of the excessive noise was identified to be the Welka Set. The noise levels were constant and were reported to be representative of normal operations. Noise generated within the enclosure when demonstrating the fail safe mode was excessive, but was below the Peak noise limit. Noise levels at the control panel were not excessive, indicating attenuation by the precast concrete panels. The APA representative; however, advised that personnel move between the control panels and the enclosure while working. Noise levels on the hardstand were also excessive. Noise levels in the car parking area and driveway were not excessive.

7.2 Hampton Park Kiosk

It was found that the noise generated by gas plant within the Kiosk at this site exceeded the Noise Exposure Standard. The noise levels were constant and were reported to be representative of normal operations. Noise generated within the Kiosk during fail safe mode was excessive, but was below the Peak noise limit. Noise levels outside the Kiosk and at other work areas within the compound were not excessive.

7.3 Narre Warren Kiosk

It was found that the noise generated by gas plant within the Kiosk at this site exceeded the Exposure Standard. The noise levels were constant and were reported to be representative of normal operations. Noise generated within the Kiosk during fail safe mode was excessive, but was below the Peak noise limit. Noise was also excessive at the work area immediately to the south of the Kiosk while the door was open. Noise levels at plant situated to the west of the Kiosk were not excessive. Noise levels in the car parking area to the west of the compound were not measured as they were not considered excessive.

7.4 Warragul Kiosk

It was found that the noise generated by gas plant within the Kiosk at this site exceeded the Exposure Standard. The noise levels were constant and were reported to be representative of normal operations.

Operation of the plant in fail safe mode could not be demonstrated during this assessment. Noise levels outside the Kiosk were not excessive.

8 Recommendations

8.1 Berwick Site

Exposure levels were exceeded at this site.

The main noise source was found to be the Welka Set which is integral to the layout of the installation. After discussion with APA it is considered impractical that effective control of noise could be achieved by reducing the noise at the Welka Set, or by engineering treatment of the noise transmission path.

Based on the varying nature of maintenance tasks undertaken at the site it is recommended that personal hearing protection devices be worn at all times whilst within the enclosure, at the control panel area and on the hardstand. It is also recommended that only essential workers enter and remain within these areas for as long as necessary to conduct the work. This is particularly important as the duration of the exposure increases. Further advice regarding the selection, fit and use of hearing protection devices is provided below.

Noise levels at the driveway and car parking areas within the compound were not excessive and could be used to prepare for work and for work breaks.

8.2 Kiosks

Exposure levels were exceeded inside each of the Kiosks assessed.

The main noise source was found to be the gas regulator installed at each site. While both types of regulator generated excessive noise; the Welka Set measured significantly higher than the Axial Flow type.

After discussion with APA it is considered impractical that effective control of noise could be achieved by reducing the noise at the source, or by engineering treatment of the noise transmission path. Based on the nature of maintenance tasks undertaken at the site it is recommended that hearing protection be worn within Kiosks while the plant is operating. It is also recommended that only essential workers enter and remain within these areas for as long as necessary to conduct the work. This is particularly important as the duration of the exposure increases.

Noise levels outside the Kiosks were not excessive and these areas may be used to prepare for work and for work breaks.

8.3 Hearing Protection Devices

It is recommended that personnel working within the plant enclosures and kiosks be provided with personal hearing protection devices (HPD) of at least Class 4 rating. This class of HPD when fitted and worn correctly will provide adequate control of noise generated by both types of gas regulator when operating in normal and *fail-safe* modes.

HPD of this class are available in various types; including, ear muffs and ear plugs. Workers should receive appropriate training in the selection, use and fitting of the particular type of HPD provided. It is particularly important that ear muff type HPD be stored and maintained properly when not in use as they are prone to wear that may significantly reduce effectiveness.

It was reported that workers are currently provided with Class 5 HPD of both ear muff and plug types. This class of HPD provides adequate reduction capacity and may continue to be worn. In some circumstances; however, higher efficiency HPD may reduce workers ability to hear audible warnings, such as plant reversing or slewing sirens. Based on our discussions with APA this is unlikely to present additional hazards at these sites.

8.4 Audiometric Testing Program

IRM understands that the APA Group health surveillance program includes regular audiometric testing of its personnel. It is a requirement that all workers wearing hearing protection for the purposes of noise control be provided with hearing tests. Please contact us if you are unsure of your obligations.

8.5 Assessment Review

It is recommended that this assessment be reviewed if circumstances within the work place change, or if reasonably requested to do so by a Health and Safety Representative. Notwithstanding these events, it is recommended that you review noise assessments at least every 5 years.

8.6 Communication

It is recommended that this report be communicated to your workforce.

