



Benbow
ENVIRONMENTAL

Benbow Environmental News Update

Engineering a Sustainable Future for Our Environment

April 2010

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Services offered by Benbow

- Noise and Acoustics
- Air Quality
- Environmental Management & Planning
- Auditing
- Greenhouse Gas Management & Carbon Engineering
- Occupational Hygiene
- Risk
- Dangerous Goods & Chemicals
- Asbestos & Hazardous Substance
- Cleaner Production
- Training and Seminars

Working at Benbow

- Fieldwork Personal Experience as a Graduate

Environmental Technical Officer Ilco Naumoski has an Environmental Science background and joined Benbow Environmental over a year ago as a graduate.

One of the best aspects of working at Benbow is being able to conduct field work. I have warmed to life at Benbow as I have regularly been given the opportunity to explore and discover new places, ask questions, and look for observations relevant to answering a question about various jobs. This has provided me with an opportunity to apply what I have learnt in my studies to the world outside the classroom walls.

Most jobs are a bit of a push towards indoors and office work. I get to experience that, but the field work has long been an essential part of hands-on personal experience at Benbow Environmental. You spend a lot of time out on sites investigating and taking samples, and then coming back to the office and analysing and reporting. Trips have ranged from active problem-solving in occupational, environmental and hygiene assessments to less active activities such as liaising with councils and industries involving environmental management.

My position allows me to have control over the way each project is run. I am involved in all stages of a project and this has enabled me to have a good grounding in a wide range of manufacturing processes that take place at the various sites that I am assessing. Subsequently, I meet with our clients in person, which include local councils, private individuals, landowners and commercial organisations.

I am currently working with one of the Senior Environmental Scientists on an occupational and hygiene assessment. The study is a very important aspect of occupational health and safety within the workplace. We go out and look at a site and its history, assess it for potential harmful activities, and then we plan and design a program to ensure that the site is suitable against limits set in criteria. There is a lot of moving around in completing a study, with plenty of public roles in the levels of government and private roles such as consulting in chemical and analytical science.

Ilco Naumoski





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Air Impact Assessments for Gas Compressor Stations

Benbow Environmental have prepared air impact assessments for some of the gas compressor stations in QLD and NSW and were able to advise stack heights to readily comply with the Australian air quality regulation limits and guidelines in NSW.

In NSW, impacts from the site were assessed based on the limits stipulated by the Protection of Environment and Operations (Clean Air) Regulation, as well assessing air impacts against the nearest residences and other locations which could be considered health sensitive. Queensland gas compressor stations were also assessed against these regulations as they are based on the National Environmental Protection Measure (NEPM) targets, which are air quality objectives for Australia and New Zealand.

Recently, Benbow Environmental has prepared an air impact assessment for similar, though larger, gas compressor stations in Oman in the Middle East. Unlike the previous work that had been done for Australian gas compressor stations, the initial screening assessment has found that air emission impacts from the site were showing potential exceedances to the limits applied in Oman, which are based on World Health Organization (WHO) limits. Discussions were made with the project managers to consider "end of pipe" solutions but these were not viable.

Benbow Environmental was then asked to prepare a much more detailed air impact assessment to help determine not only the results during various worst-case meteorological and site operation conditions but also determine ways to achieve compliance without resorting to "end of pipe" solutions.

The air impact assessment provided outcomes that implementation of catalytic converters on their compressor and gas-powered generator engines were not necessary to achieve compliance but were helpful in reducing the overall emissions from the site. The detailed assessment also found that the major potential source of air emissions from the site was the flare used for burning excess fuel. This is due to the nature of flares and its potential to release significant quantities of air emissions. Numerous scenarios for the flares were developed and had showed exceedances to the applicable limits.

A risk based approach was developed to determine the likelihood of the operating conditions occurring, the frequency of these occurrences, the consequences to receivers and the frequency the receivers could expect to be exposed.

As a result during the final stages of the assessment, the frequency and operational parameters of the flaring operations were then designed to be limited and controlled. The site was enabled to achieve compliance with the Oman and WHO limits.

Smoke Emissions and Escape during Emergency Events

In the event of fire at any site or building, one of the most important things to be achieved is the escape or evacuation of all occupants of that building to a safe location.

One of the factors that affect the escape of occupants in the building is the hindrance caused by smoke emissions from the fire to exiting occupants. Smoke emissions can carry various toxic pollutants, which some are labeled to have an IDLH (Immediately Dangerous to Life and Health) limit to help identify their toxicity in the event of an emergency. Examples of toxic pollutants released during combustion are carbon dioxide and carbon monoxide, which have IDLH limits of 40,000 ppm and 1,200 ppm respectively.

In some rare fire event cases, phosgene can be released, which has an IDLH limit of 2 ppm. In comparison to carbon dioxide and carbon monoxide, 2 ppm of phosgene can easily be generated in an enclosed environment and can be fatal to occupants of the building in an event of fire, especially when no planning or preparation have been prepared for the building.

The Building Code of Australia helps building designers provide access and egress for occupants in the event of fire or emergency. Most of the issues on escape are covered by the BCA's deemed to satisfy solutions and are usually sufficient.

However, there are unique cases where hazardous events and risks are not accounted for by the BCA (especially for industrial buildings or mixed use buildings). In these instances, further quantitative analyses are required to assess and provide additional controls for the building and prepare essential documents such as an emergency response plan.

Benbow Environmental has an extensive amount of experience in dealing with cases where compliance is either difficult to achieve or economically unfeasible. Specialised models from the Netherlands and USA are used. Such experiences combined with the technical knowledge of the processes have led us to solve numerous problems and be an industry leader in providing these services to fire engineers throughout Australia.

Recently, Benbow Environmental has conducted an assessment where smoke emissions released during the event of fire were required to be quantified in order to justify the need of smoke alarms in addition to the heat sensors already installed.

Smoke emissions were modeled using a modelling program called the Fire Dynamics Simulator (FDS), which is a computational fluid dynamics modelling program for simulating the flow of fire and smoke. Findings of this assessment showed that there was no need to implement any smoke alarms due to the temperature gradient displayed by the simulation, sufficiently triggering the heat sensors of the installed sprinklers in the event of fire.

A risk based assessment then showed that time of warning for building occupants due to the generation of heat to activate the fire sprinklers was far less than the build up of smoke would cause evacuation to have unacceptable risks. Triggering the sprinklers to activate the warning alarm would be sufficient to warn occupants to evacuate the building. Significant cost savings were much without compromising life safety, the analysis was approved by the regulatory authorities.



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Air Quality Assessment

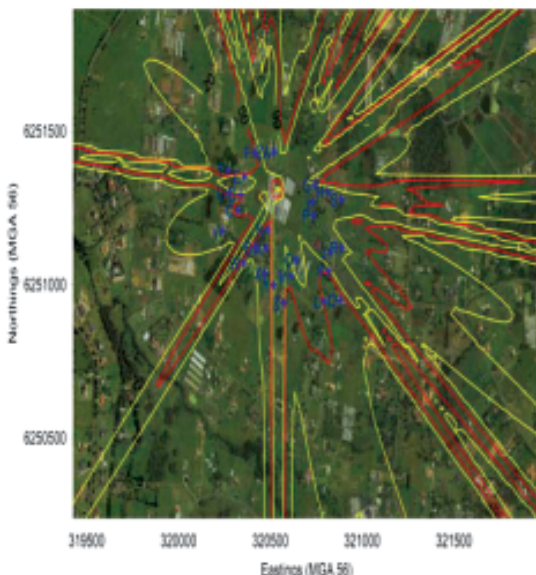
As the industries began to expand and increase, so does the air pollutants emitted into the atmosphere. To maintain Environmental Sustainability, the government dictates a decree to maintain a clean environment for the future, and thus, before any development of industry is approved, they would need to satisfy the environmental requirement in regards to pollution emissions. One aspect of these environmental requirements is the Air Quality Assessment.

Several fundamental factors, such as the location of the site, the type of industry, and the impact of the air pollutants emitted from the site, have a significant influence on the approval of the development. The best way to assess these is to perform air quality modelling.

For air quality modelling to be completed, there are several requirements, such as the complexity of the land elevations of the site, the meteorological data of the site, the proposed industry process, and the methodology of the modelling.

Depending on the complexity of the land elevations, the use of advanced modelling software such as CALPUFF is more appropriate. CALPUFF has the ability to assess the cross flow factor, account for fumigation factors, and the effects of different land elevation over a certain area. As a side effect, the pre-modelling process is prolonged for 2 to 3 weeks to prepare for the land elevation data and meteorological input into the CALPUFF software, as well as construct and incorporate the emissions inventory. This preparation involves tedious data manipulation with the help of mathematical computational tools such as spreadsheets and macros, not to mention validation process. The modelling process itself varies between 1 to 2 weeks per scenario, depending on the methodology used to create the model.

Once the modelling stage is completed, assessment of results as well as reporting would then have to be established.



There are cases when some developments cannot be passed and hence further modelling would have to be conducted, extending the completion timeframe up to several weeks. The methodology utilised and outcomes of the assessment would need to be explained, with a difficult assessment-based decision in a form of a conclusion included, to be laid out in the report.

Here are some examples of air assessment results, shown as a contour map.



Risk Management Principles *Applied to Chemical Exposures*

Benbow Environmental's Principal Consultant enjoys the technical challenge of developing safeguards to reduce the risk of exposure to hazardous chemicals and dangerous goods.

There have been many opportunities over the past year, several are summarised below:

- Facilitate a risk based analysis of the safeguards needed in using Hydrofluoric acid to clean the boiler pipes in two large boilers at Australia's most technologically advanced pulp and paper mill.
- Undertake a quantitative risk assessment resulting from the storage of shipping containers filled with low strength HCB's adjacent to a lunch room at a major facility.
- Quantitative risk assessment for water quality testing kits used by members of the community and school ground. A number of simulations of incidents that could occur were undertaken by members of the risk assessment team.

The quantitative risk assessment approach is a highly valued process if undertaken correctly. One of the keys to its success is involving all members of the risk assessment team and a working environment where all ideas and suggestions are considered – even the smallest detail can lend to an event that would otherwise be ignored.



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Benbow Environmental and Major Hazard Facilities.

Benbow Environmental's Principal Consultant Dick Benbow, supported by our Senior Environmental Engineer Gusni Melington are heavily involved in supporting two Major Hazard Facilities comply with regulatory requirements. The quantities of chemical stored on these sites amounts to large volumes of dangerous goods e.g. 6,000,000 L of flammable liquids, 500 tonnes of pool chlorine, 200 L of TDI, 1,000 tonnes of Class 8 and a vast range of chemicals belonging to Classes 3, 4.1, 4.2, 5.1, 6.1 and 8. Although the volumes and tonnages are large the risks are maintained at very low levels by the diligence of the management and their personnel in ensuring work practices are maintained to very high levels and by having in place safety management systems, emergency response plans and fire safety systems designed for the events that could arise.

The attention to detailed sets the management of these Major Hazard Facilities apart from other industries that may require notification to WorkCover and have manifest quantities of dangerous goods to notify and manage the risks.

The MHF audit team established to regulate and advise these facilities are very well experienced and between them have an incredible depth of knowledge.

For further information on our involvement with MHF's contact our Principal Consultant.



Noise Model Calibration

Just as all instrumentation needs to be calibrated to give realistic results, so does a noise model.

Digital computers are used almost exclusively to model noise emissions and propagation. As with all models, the quality is dependent on GIGO (Garbage In, Garbage Out).

Noise models use fundamental physics mimicked by mathematical algorithms to accurately simulate noise emission and propagation. There must be a translation between a noise source, be it a single source or an entire industrial complex, and a mathematical description of the noise emission, its propagation characteristics and any intervening objects and landforms between the source and any noise receivers.

Modern noise models assist in this, but a great deal of knowledge and experience goes into setting up a good noise model. Since you, the client, cannot wait an eternity for an answer, rules of thumb are often applied to simplify the model.

While the rules of thumb are well tried and tested, it is always wise to test the noise model, including the simplifying rules of thumb and assumptions, against a known reality. This testing of the noise model is called calibrating the model.

The importance of calibrating the model is seen by looking at the common errors identified through calibration!

Calibrating the model is often done by measuring "reference" points on-site, free from other external noises. The model is run to predict the noise level at these reference points. The measured and predicted noise levels are compared and should agree. If the model calibrates well, it can then be used to predict noise levels at other locations with confidence.

If the model does not calibrate well, there are two courses of action based on personality. The budding young megalomaniac will try to alter reality to suit their noise model. The wiser amongst us will test the model's inputs for errors and then test for poorly applied rules of thumb and assumptions, only then will we try to suit reality to suit our noise model....

Traps for young players (Common errors found through calibrating the model):

- Incorrect data entry - elevation lines, source/receiver heights etc
- Heights being defined relative to ground when they should be absolute or vice versa.
- Sound power levels incorrectly chosen
- Heights of walls/noise barriers etc not uniform
- Poor assumptions made in calculations
- Poor monitoring techniques



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Noise Management in the Music Industry

Benbow Environmental has often been commissioned to help manage the noise from music events. Windows rattling, floors thumping, and being able to boogie in the kitchen is not the result any music event wishes for their residents. Our aim is to ensure noise compliance at the nearest residential receivers.

A noise management plan (NMP) is employed to deliver a sound (excuse the pun) experience for the local community.

The NMP is site specific and is used to determine the best placement of the speaker arrays to reduce noise for the local residents whilst maintaining quality for the events patronage.

Background noise monitoring is conducted prior to the event (to identify the noise criteria for the function), during and after the event to provide a comparison in noise levels.

As part of the NMP, Front-of-House sound checks are performed on and off-site prior to the event to determine the operating noise levels that will produce compliance at the nearest residents. The event's sound engineers are involved in this process and are made aware of what limits are required in order to minimize complaints.

A complaints procedure is also developed. This includes stating the number of BE employees required to monitor the noise at the residential receivers and allowing for the placement of a BE employee on-site to liaise between the residential noise monitors and the Front-of-House sound engineer(s). The noise monitors are equipped with communication devices (mobiles, walkie-talkies or both) to communicate with each other and to receive complaint information as per the complaints procedure.

Attended noise monitoring is conducted throughout the event. Detailed reporting includes noise levels, times of measurement, complainant details and a record of conversations. Any volume adjustments that are required are dealt with as promptly as possible.

The noise management of music concerts culminates in a final report that is produced to encompass all of the details mentioned above.

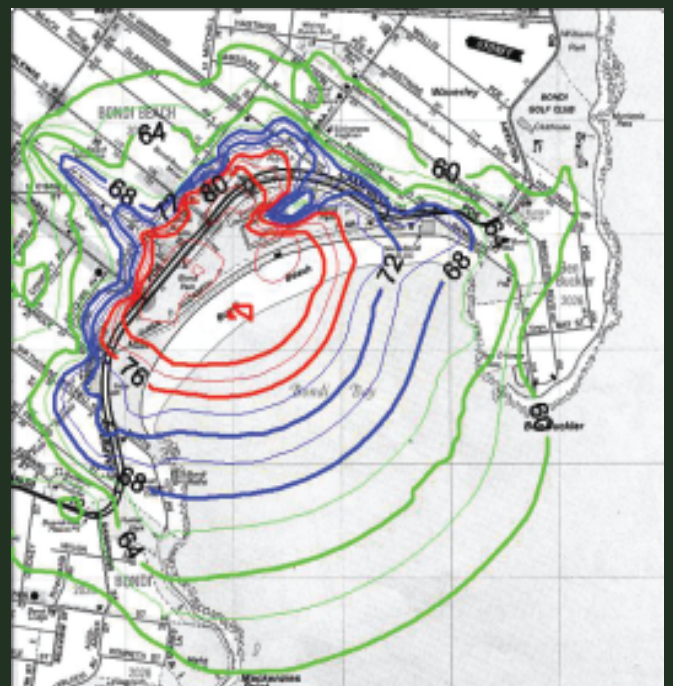


Benbow Environmental prides itself on fantastic community relations. We value each individual, their ideas and concerns, and do all possible to lend an empathetic ear whilst empowering them with avenues to pursue when they feel powerless. We have found that we will often be invited in for a beer and a chat – this has shown to provide some distraction from the cause of their angst whilst allowing them to ask many questions. With this extra information and personal public relations we have found that many are calmed and that we have been given extra information that allows us to provide a better service to both our client and the residents.

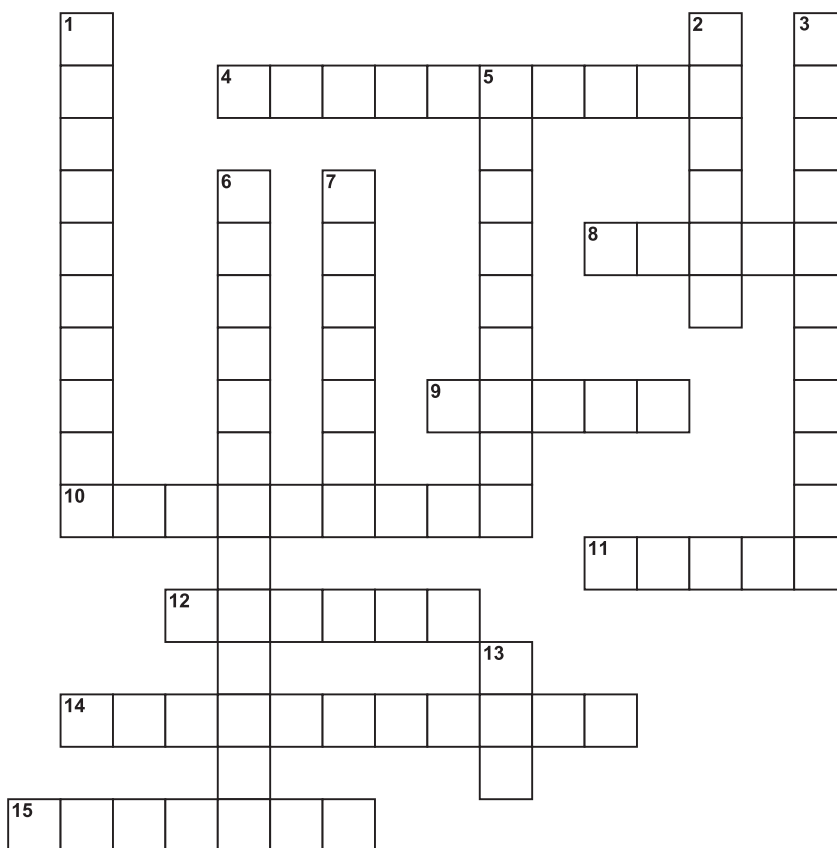
However difficulties arise when the front of house sound engineer is not co-operating, or when the site is not concerned about meeting their limits. When these issues arise we act professionally and assertively, following the noise management plan that has been developed. However the outcome of the complaints register will not reflect the hard work that was employed by Benbow Environmental to deliver compliance in the local community. This is terribly unfortunate as the local residents become more embittered and hostile to events in the area. It also prevents us from achieving the outcomes that we were commissioned to achieve.

At the end of the day, however, we are employed to monitor and inform but we are not given the authority to control.

The methods employed to develop Benbow Environmental's noise management plan for the management of noise in the music industry has produced some fantastic results. These include residents engaging in community discussions for the first time, a decrease in the number of complaints with respect to the last function held. Why not give us a go for your next event!



Benbow Crossword



ACROSS

- 4 This effect leads to global warming
- 8 Foul smell
- 9 Unwanted sound
- 10 People who develop solutions to practice problems
- 11 Review of condition, operations or situation
- 12 Occupational Health and
- 14 Law
- 15 To acquire knowledge through method

DOWN

- 1 Conforming to laws, regulations or criteria
- 2 Who we are
- 3 What do we help preserve
- 5 This type of substance has the potential to harm people and the environment
- 6 Remediation usually follows this
- 7 Not only about brushing your teeth
- 13 Its all around us

Submission by mail or e-mail to
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Winner will receive \$100 Myer Voucher



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