14.0 INDUSTRIAL ODOUR CONTROL

A.W.N. has been instrumental in raising the standards of odour measurement in Australia, through the preparation of relevant Australian/New Zealand Standards, organisation, co-ordination and facilitation of the 2nd and 3rd CASANZ National Odour Workshops and chairing of the CASANZ Odour Special Interest Group.

A.W.N. (Air Water Noise) Consultants has extensive experience in odour monitoring and in the assessment of industrial odour control options. A number of case studies in the odour control field are outlined below:-

1. Dynamic Fertilisers, Victoria

The storage, composting, pelletising and subsequent drying of poultry manure resulted in odour complaints at distances up to 2 km from the processing plant. A.W.N. Consultants was employed by Dynamic Fertilisers to act as environmental engineering consultants, and to liaise with Municipal Council and EPA representatives.

LEFT
Poultry manure dryer afterburner, Dynamic Fertilisers, Victoria

RIGHT
Poultry manure composting, Pakenham

Following an initial evaluation, A.W.N. recommendations for process equipment modifications were implemented, resulting in a substantial decrease in odorous emissions.

Further project stages conducted by A.W.N. Consultants involved:-

- Review of suitable poultry manure dryer control equipment options. The review included an assessment of available services (gas, town water and wastewater treatment facilities) and land disposal of treatment plant waste, in addition to environmental engineering matters;
- Pilot scale wet chemical scrubbing equipment trials;
- Poultry manure dryer afterburner process design, specification, tender assessment and commissioning;
- Design of process and raw material building ventilation systems;
- Process design of a biofilter for the control of building ventilation system odorous emissions.

2. Devonport City Abattoirs, Tasmania

A.W.N. Consultants was employed to conduct an Odour Audit of the rendering plant operated by Devonport City Abattoirs. The audit established the principal odorous emission sources, and quantified emission rates from these areas during the rendering of both fish and meat wastes.

The design parameters for the previously installed biofilter were also reviewed and recommendations for improvements made.

Mathematical modelling was then used to estimate maximum ground level odour concentrations resulting from the odorous sources, under both existing and proposed operating conditions.

The process building ventilation system and biofilter were subsequently upgraded to incorporate the changes recommended by A.W.N.

3. Aspen By-Products, Victoria

Odorous emissions from the Aspen By-Products animal by-products plant, producing sausage casings from sheep, cattle and hog intestines, and bile concentrate from cattle and sheep gall bladder bile, resulted in widespread public complaint.

A.W.N. (Air Water Noise) Consultants was commissioned by the company to:-

- Identify and quantify major odour sources;
- Conduct mathematical modelling to assess maximum ground level odour concentrations;
- Recommend appropriate odour control methods and conduct pilot scale control equipment trials;
- Prepare engineering specification covering equipment process design;
- Conduct equipment commissioning trials.

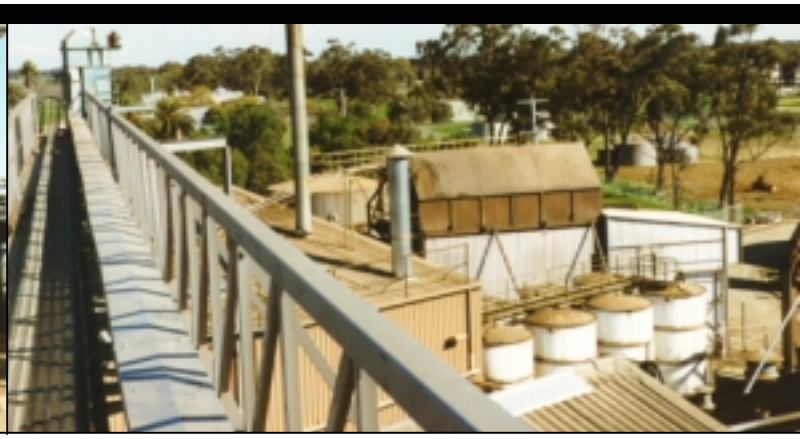
The total site odour emission rate was quantified and found to be approximately 2,500,000 O.U. vol/min, resulting in a maximum ground level concentration at a distance of approximately fifty metres from the site boundary of 160 O.U., as determined by AUSPLUME gaussian plume dispersion modelling.

The subsequent installation of incineration and packed bed scrubbing equipment, in conjunction with modifications to housekeeping procedures and manufacturing processes, has reduced the maximum predicted ground level concentration to an acceptable level of 0.56 O.U.

4. Riverland Oilseed Processors, Victoria

A.W.N. (Air Water Noise) Consultants was commissioned by Riverland Oilseed Processors, Numurkah, Victoria, to:

- Identify and quantify major odour sources from the prepress and solvent plants;
- Conduct mathematical modelling to assess maximum atmospheric contaminant ground level concentrations;
- Conduct solvent plant hydrogen sulphide wet chemical scrubbing trials;
- Prepare an engineering specification for the wet scrubbing of solvent plant hydrogen sulphide emissions to air;
- Conduct the tender evaluation process;
- Prepare an Odour Management Plan for the prepress plant.



LEFT
Meal storage and dust control systems under construction, Numurkah

RIGHT
Oilseed crushing/solvent extraction plant and surrounding environs, Numurkah

5. Nuplex Industries (Australia), Victoria

A.W.N. Consultants was commissioned by Nuplex Industries (Australia), Hallam, Victoria, to:

- Conduct an odour audit of the alkyd resin manufacturing operations;
- Evaluate odour control options;
- Conduct pilot scale control equipment trials under a range of production conditions;
- Prepare an engineering specification for a wet chemical packed bed scrubbing system for the control of odorous emissions to air.

6. BTR Engineering, South Australia

BTR Engineering re-located an existing ferrous products foundry from Bowden, South Australia, to the Foundry Precinct established by the South Australian Government in Wingfield.

A.W.N. Consultants provided advise to BTR Engineering, and conducted negotiations with the Environment Protection Authority, in the early phases of the project to establish applicable environmental performance indicators and modelling parameters for the proposed site Licence.

An Odour Audit was conducted of the Bowden site. A mathematical modelling assessment, utilising the AUSPLUME gaussian plume dispersion computer model, was subsequently used to evaluate odour control options for the proposed Wingfield works. A preliminary design for a wet chemical packed bed odour control scrubbing system was completed.

On-going environmental advice was provided as a member of the Foundry Relocation Project Design Team.

A.W.N. consequently completed an Odour Audit of the completed Wingfield operations, and repeated the plume dispersion modelling assessment, confirming the assumptions made concerning the upgraded facility.

7. Department of Urban Affairs and Planning, New South Wales

A.W.N. (Air Water Noise) Consultants was commissioned by the Department of Urban Affairs and Planning to undertake an assessment of potential air quality impacts, resulting from the then proposed Sydney Water Northside Storage Tunnel (NST) vents at Lane Cove West and Scotts Creek.

The NST project involved the construction of a tunnel from Lane Cove to North Head, with a branch tunnel to Scotts Creek. The objective was to collect the majority of Northern Suburbs Ocean Outfall Sewer (NSOOS) overflows, which had previously occurred during wet weather events at Lane Cove, Tunks Park, Quakers Hat Bay and Scotts Creek.

The tunnel was constructed by the Northside Storage Tunnel Alliance (NSTA). Organisations represented within the Alliance were Sydney Water, Transfield, Connell Wagner and Montgomery Watson.

The Scotts Creek community, through the Community Liaison Committee (CLC) and Willoughby City Council, had expressed concerns regarding the vent, with particular emphasis on potential health and odour impacts due to vent emissions to air.

The EIS and the Review of Environmental Factors (REF) referred to activated carbon adsorption as the method for controlling the discharge of atmospheric contaminants from the vent.

The A.W.N. assessment reviewed:

- The adequacy of the air quality impact assessment carried out for the REF;
- The likely air quality impacts of the vents (health and odour) at the Scotts Creek and Lane Cove West sites;
- The most appropriate type of odour/air pollution control equipment to ensure acceptable performance.

8. Environmental Protection Agency, Queensland

A.W.N. (Air Water Noise) Consultants was commissioned by the Queensland Environmental Protection Agency to prepare Best Practice Environmental Management Guidelines for the Brisbane municipal solid waste landfill, aimed at minimising odorous emissions and their impact on adjacent residential premises. The site is operated and managed by Pacific Waste Management Ltd. under contract to Brisbane City Council.

Specific project tasks were to:-

- Undertake site investigations to identify the source and causes of nuisance landfill odour;
- Produce a report containing recommended actions to reduce odour emanating from the landfill site, setting out measures, and advising on related technical and practical considerations.

A.W.N. was subsequently commissioned by the Department to review proposed odour monitoring and management protocols developed by Brisbane City Council, based on the A.W.N. Best Practice Environmental Management Guidelines.

LEFT
Landfill working face, Queensland

RIGHT
Stormwater management, Queensland

9. Department of Environment, Western Australia

A.W.N. (Air Water Noise) Consultants was appointed by the Western Australian Department of Industry and Technology to conduct an independent Environmental Audit of the Alcoa World Alumina Australia Wagerup Refinery, on behalf of the Department of Environment.

The Audit consisted of an independent technical review of:

- The methods and resulting data used to establish baseline odour emission levels, representative of production equivalent to 2.2 million tonnes per annum (mtpa), and the current odour emission levels (at 2.35 mtpa);
- Six monthly and annual monitoring reports submitted by Alcoa;
- The ambient air quality monitoring programme conducted by Alcoa;
- The Liquor Burning Facility metals emission monitoring programme;
- The emissions inventory; including the monitoring plan, parameters to be measured, sampling methods, analytical methods, reporting and interpretation.

The Auditor also met with community representatives periodically at key milestones during the Audit process.

Summarised industrial odour control case studies

Carter Holt Harvey Tissue

Complete site assessment and odour emission monitoring programme. Mathematical modelling to determine compliance with environmental authority criteria.

Cargill Australia

Monitoring of odorous emissions and dispersion modelling to confirm non-compliance with ground level concentration criteria. Expert witness at Victorian Civil and Administrative Tribunal hearing. Pilot scale control equipment trials. Evaluation of options resulted in the use of incineration for control.

BTR Nylex

Evaluation of odour sources to determine cause of community complaint. Recommendations for process changes and factory water segregation to achieve the required reduction in odour rate of emission.

Boral Insulwool

Workplace exhaust ventilation system odour monitoring and evaluation of BOC de-odour gas control option.

Philip Morris

Odour monitoring, dispersion modelling, assessment of relevant odour control technologies (activated carbon absorption, incineration and wet chemical scrubbing), pilot scale equipment trials and specification of control equipment.

Eureka Valves

Assessment of site. Monitoring of major odour sources. Mathematical modelling to enable review of control options. Recommendations for improved exhaust ventilation systems and source dispersion to enable compliance with EPAV criteria.

Carnation Pet Food

Complete site assessment and odour emission monitoring programme. Plume dispersion modelling to assess proposed control method. Commission testing of packed bed scrubbing systems.

South Pacific Tyres

Review of odour sources at Thomastown, Somerton and Footscray tyre manufacturing sites. Assessment of control options by plume dispersion modelling.

Sydney Water Board

Malabar sewage treatment plant hydrogen sulphide removal efficiency tests on packed bed scrubbing equipment.

Auckland Regional Council

Peer review of the odour assessment/control requirements of the proposed Auckland Regional Air Plan.

Pig Research and Development Corporation, ACT

Peer review of the development of the PRDC odour emissions and control strategies database.

LEFT
Point source odour sampling, Queensland

CENTRE
USEPA flux chamber – odour, cattle feed lot

RIGHT
Area source odour sampling, Gladstone

14.1 Odour Test Methods

Available odour sampling methods include:

- Point/line source sampling equipment (flues, exhausts, building vents);
- USEPA and UCF flux chambers for area sources (liquid and solid surfaces).

The flux chambers utilised by A.W.N. (Air Water Noise) Consultants are some of the few in Australia to have undergone extensive international validation studies. A.W.N. maintains contact with the principal researchers to enable further flux chamber developments to be included in studies it undertakes.

A.W.N. chairs Standards Australia/Standards New Zealand Committee EV7/1, "Stationary Source Emissions", and prepared the draft of AS 4323.4, "Area Source Sampling".

A.W.N. also has an exclusive technology transfer arrangement with Dr. Charles Schmidt. Charles was Field Task Co-ordinator on the USEPA Office of Solid Waste programme for the testing and evaluation of area source emission assessment techniques, including: emission isolation flux chamber technology, vent sampling, in-situ soil gas testing, transect testing, concentration profile testing, upwind/downwind testing and mass balance. This research led to the development of the current USEPA guidelines on the emission isolation flux chamber assessment technology.

Since 1989, Charles has specialised in the measurement of air emissions from area and fugitive emission sources, including lagoons, landfills, sewage treatment plants, composting operations and contaminated sites.

A.W.N. chaired Standards Australia/Standards New Zealand Committee EV/7/3/1, *"Odour Measurement"* , prepared the as-published draft of AS/NZS 4323.3, *"Determination of Odour Concentration by Dynamic Olfactometry"*, and was one of the first two laboratories in Australia to gain NATA accreditation for sampling and analysis of odour in accordance with AS/NZS 4323.3, both in September 2002.

The A.W.N. Consultants forced choice dynamic olfactometer and olfactometric procedures comply with all requirements of AS/NZ 4323.3.

14.2 Mathematical Modelling

A.W.N. Consultants routinely models the dispersal of industrial odour source emissions to predict maximum odour ground level concentrations for comparison with regulatory requirements. Models available include AUSPLUME (plume model), ISC-AERMOD (USEPA plume models) and CALPUFF (USEPA non-steady state puff model).

Modelling can include any or all of the following to enable a site-specific assessment:-

- Building design review to enable inclusion of wind direction dependent building dimensions in the building wake algorithm;
- Establishment of a meteorological file based on local meteorological data;
- Establishment of a terrain file based on local topography

The mathematical model typically calculates the ground level concentrations at each of the receptors selected for each hour of the year's meteorological data.

Experience has indicated that a thorough review of all odorous sources located on an industrial site is required in order to obtain accurate model predictions.

14.3 Odour Control Technologies

A.W.N. Consultants has conducted assessments of the following odour control technologies for our clients:-

- Activated carbon adsorption;
- Biofiltration;
- Chlorine dioxide injection;
- Electrostatic precipitation;
- Encapsulation and tall stack dispersal;
- Housekeeping/process modifications;
- Incineration;
- Neutralising/masking agents;
- Packed bed scrubbing;
- Spray towers;
- UV/ozone treatment.

These assessments have required all or some of the following:-

- Pilot scale control equipment trials;
- Process design and engineering specification;
- Tender review and selection

A.W.N. has prepared engineering specifications for equipment to control odorous emissions to air from tobacco processing, poultry manure processing, pesticide blending, animal by-products, oilseed processing, resin manufacture and hazardous waste treatment.

14.4 Training and Education

A large number of technical papers have been presented by A.W.N. Consultants staff relating to odour measurement techniques and odour control technologies (refer Section 19).

Short term training programmes have been conducted for clients to enable production staff and management to understand the principles involved in odour assessment and control, the impact of the specific industrial site, and the implications of good housekeeping procedures and specific process control requirements.

A.W.N. staff have been the principal lecturers at Clean Air Society of Australia and New Zealand Odour Control, Air Pollution Control and Air Pollution Measurement Courses.

The Managing Director of A.W.N. Consultants, Mr. Frank Fleer, was convenor of the 2nd. National Odour Workshop, Cape Schanck, Victoria, and the 3rd National Odour Workshop, Melbourne, Victoria. The workshops established future directions in odour measurement, management and regulatory approach.

Mr. Fleer prepared the pre-publication draft of Australian/New Zealand Standard AS/NZS 4323.3, "Methods for Sampling and Analysis of Stationary Source Emissions: Dynamic Dilution Olfactometry". He has also prepared the committee draft of AS 4323.4, "Area Source Sampling", which has particular implications for odour sampling.