11. CONCLUSION

The Unit Three Expansion of the Wagerup Alumina Refinery will be undertaken in line with Alcoa's Sustainability Framework. The proposal offers the opportunity to:

- Significantly increase employment during construction and ongoing operation of the facility;
- Increase export earnings from Western Australia by around \$17 billion over the life of the project;
- Invest in a facility that Alcoa considers to be the most environmentally advanced alumina refinery in the world;
- Increase direct financial returns to Western Australia through ongoing royalty payments, and
- Facilitate significant social benefits for the locality and region.

These benefits can be realised whilst the proposal is implemented in an environmentally acceptable manner through emission controls and management practices that ensure:

- No increase in noise, dust or odour impacts on surrounding residents;
- World class health risk criteria are satisfied;
- Important land and water environmental values are protected;
- Improved greenhouse gas emission intensity; and
- Sustainable use of water resources.

These initiatives will be delivered within a framework that encourages ongoing involvement of the local community and other stakeholders.

Alcoa believes this proposal will deliver long-term sustainable outcomes for communities in the immediate vicinity of the refinery, Peel and South West regions and Western Australia.

12. REFERENCES

- Air Assessments, Pitts, Owen (2005). *Diffuse Source Air Quality Modelling*, Report to Alcoa World Alumina Australia, Air Assessments, Canning Vale, WA.
- Australian Greenhouse Office (AGO) (2004). National Greenhouse Gas Inventory.
- Alcoa (1978) Wagerup Alumina Project Environmental Review and Management Programme, May 1978.
- Alcoa (2004a). Environmental Management Manual, Wagerup Refinery, November 2004
- Alcoa (2004b). Wagerup Annual Environmental Report. Report provided to Department of Environment.
- Anderson, J. (1984). Between Plateau and Plain. Flexible Responses to varied Environments in Southwestern Australia. Occasional Papers in Prehistory, Research School of Pacific Studies, ANU, Canberra.
- archae aus (2000). The Report of an Aboriginal Archaeological Survey of the Proposed Wagerup Residue Retention Expansion Area, Wagerup Alumina Refinery, Western Australia. Report for Alcoa of Australia Ltd
- Australian Bureau of Statistics (2001). Census Data
- Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (1992). Water Quality and Monitoring Guidelines: *National Water Quality Management Strategy*.
- AWN Consultants, Fleer, Frank (2003). *Environmental Audit: Alcoa World Alumina Australia, Wagerup Refinery, April 2002 May 2003*, Report for the Department of Environment, Water and Catchment Protection, Perth, WA. Ferntree Gully, Vic, AWN Consultants Report D64
- Beard, J.S. (1979). *The Vegetation of the Pinjarra area, Western Australia and Explanatory Memoir.* 1:250 000. Vegmap Publications, Perth.
- Beard, J.S. (1980). A New Phytogeographic Map of Western Australia. Western Australian Herbarium Notes. Number 3: 37-58.
- Beard, J.S. (1981). *Vegetation Survey of Western Australia, Swan, Explanatory Notes* to Sheet 7. University of Western Australia Press, Perth.

- Beard, J.S. (1990). Plant Life of Western Australia. Kangaroo Press, N.S.W.
- Benchmark Toxicology Services and ENVIRON Australia (2005). Health Risk Assessment of Atmospheric Emissions, Expansion of Wagerup Refinery to 4.7 Mtpa.
- Black, R.E. and Rosher, J.E. (1980). The Peel-Harvey Estuarine System Study (1976-1980). Technical Report. Hydrology and Meteorology. June 1980. *Department of Conservation and Environment Bulletin* No. 89. Perth.
- Bunn, S. E. & Davies, P. M. (1990). Why is the stream fauna of the south-west of Western Australia so impoverished? *Hydrobiologia* 194: 169-176.
- Burgess, M., (2005a), Review of Environmental Noise Management Proposal for Wagerup Unit 3 Expansion for Alcoa of Australia Wagerup Expansion Team, Acoustics & Vibration Unit School of Aerospace, Civil & Mechanical Engineering UNSW at ADFA, February 2005.
- Burgess, M., (2005b), Review of Environmental Noise Management Proposal for Wagerup Unit 3 Expansion Part 2 Ore Transport System and Bunbury Port for Alcoa of Australia Wagerup Expansion Team, Acoustics & Vibration Unit School of Aerospace, Civil & Mechanical Engineering UNSW at ADFA, March 2005.
- Carto-Cult Pty Ltd (1997). Ethnographic and Archaeological Survey: Waroona North WA. Unpublished report for Westralian Sands Ltd.
- Centre of Excellence in Natural Resource Management (CENRM) (2005). Ecological Water Requirements and water availability in the lower Harvey River catchment associated with the proposed Wagerup 3 Expansion. Report to Alcoa World Alumina Australia. Report No. St 12/04.
- Churchward, H.M. and McArthur, W.M. (1980). Landforms and Soils of the Darling System, Western Australia. In: *Atlas of Natural Resources Darling System, Western Australia*. Published by the Department of Conservation and Environment, Perth.
- Commonwealth of Australia (1992). National Strategy for Ecologically Sustainable Development.
- Cook M (2003). Yarloop Community Health Clinic Report. Department of Health, Western Australia, Perth.
- CSIRO (1996). Climate change scenarios for the Australian region. Climate Impact Group: CSIRO Division of Atmospheric Research.

- CSIRO (2000). Climate change scenarios for the Australian region. Climate Impact Group: CSIRO Division of Atmospheric Research.
- CSIRO Division of Atmospheric Research, Galbally, Ian, Luhar, Ashok and Gras, John (2004a). *Wagerup Air Quality Review*, Report for Alcoa World Alumina Australia, Wagerup Refinery. Aspendale, Vic, CSIRO DAR Report C/0936, May 2004.
- CSIRO Division of Atmospheric Research, Galbally, Ian, Luhar, Ashok, Hibberd, Mark, and Bentley, Simon (2004b). *Meteorological and Dispersion Modelling for Wagerup using TAPM for Wagerup, Phase 1: Meteorology*. Aspendale, Vic, CSIRO DAR Report C/0810, Nov 2004.
- CSIRO Division of Atmospheric Research, Galbally, Ian, Luhar, Ashok, Hibberd, Mark, and Bentley, Simon (2005a). *Meteorological and Dispersion Modelling for Wagerup using TAPM, Phase 2: Dispersion*. Aspendale, Vic, CSIRO DAR Report C/0986, Feb 2005.
- CSIRO Division of Atmospheric Research, Galbally, Ian, Luhar, Ashok, Hibberd, Mark, Hurley, Peter and Physick, Bill (2005b). *Meteorological and Dispersion Modelling for Wagerup using TAPM, Phase 3A: HRA Concentration Modelling, Current Refinery Scenario.* Aspendale, Vic, CSIRO DAR Report C/0986, Feb 2005.
- CSIRO Division of Atmospheric Research, Galbally, Ian, Luhar, Ashok, Hibberd, Mark, Hurley, Peter and Physick, Bill (2005c) *Meteorological and Dispersion Modelling for Wagerup using TAPM, Phase 3B: HRA Concentration Modelling, Expanded Refinery Scenario.* Aspendale, Vic, CSIRO DAR Report C/0986, Feb 2005.
- Cullen M (2002). Wagerup Alumina Refinery: Health Issues. Yale University, New Haven.
- Department of Aboriginal Sites, (1977). A survey for Aboriginal sites in the Wagerup Alumina project area, WA. Unpublished report held by the Aboriginal Affairs Department, Perth.
- Department of Aboriginal Sites, (1994). Draft Guidelines for Aboriginal heritage assessment in Western Australia. Western Australian Museum, Perth.
- Department of Industry and Resources (DoIR) (2004). Western Australian Mineral and Petroleum Statistics Digest 2003. DoIR.
- Emphron Informatics (2005) Oxides of Nitrogen and Particulate Monitoring at Wagerup refinery. An Analysis of Influences Detectable in Yarloop, April 2005.

- ENVIRON Australia (2005a). Air Quality Summary Report, Wagerup 3 ERMP. Report for Alcoa World Alumina, May 2005.
- ENVIRON Australia (2005b). Water Supply Study Wagerup Refinery Unit 3. Report for Alcoa World Alumina, April 2005.
- Environmental Alliances (2003) Field Odour Surveys Around Alcoa Wagerup Refinery, November 2003
- Environmental Management and Research Consultants (EMRC) (2003). *A Fauna Survey of Alcoa and adjacent land near the Wagerup Alumina Refinery results of the 2002 survey*. EMRC, November 2003.
- Environmental Protection Authority (2002). EPA Guidance Statement No. 47: Guidance Statement for Assessment of Odour Impacts from new proposals. April 2002.
- ERM (2005) Wagerup Unit 3 Environmental Review and Management Programme, Social and Economic Component. Report for Alcoa World Alumina, February 2005.
- Fermo Pty Ltd (1982). Baseline Survey of Lichens and Higher Plants, Wagerup, WA An unpublished report prepared for Alcoa of Australia Limited in June 1982.
- Gerritse, R. and Thomas, G. (2001). *Groundwater Chemistry near Run-off Collection Pond 1 at the Wagerup Alumina Refinery*. Internal report to Alcoa, April 2001.
- Gerritse, R. and Thomas, G. (2003a). *Impacts on Water Quality from Run-off Collection Pond 1 and Residue Disposal Area 4 at the Wagerup Alumina Refinery*. Internal report to Alcoa, November 2003.
- Gerritse, R. and Thomas, G. (2003b). Quality of Surface Water in Drains near the Western Boundaries of Run-off Collection Pond 1 and Residue Disposal Area 4 at the Wagerup Alumina Refinery. Internal report to Alcoa, November 2003.
- Gibson, N., Keighery, B.J., Keighery, G.J., Burbridge, A.H. and Lyons, M.N. (1994). *Floristic Survey of the Swan Coastal Plain*. Unpublished Report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia.
- Government of Western Australia (2003). Regional Western Australia A Better Place to Live.

- Havel, J.J. (1975a). Site-vegetation mapping in the northern jarrah forest (Darling Range). I. Definition of site-vegetation types. *Bull. For. Dep. W. Aust.* 86.
- Havel, J.J. (1975b). Site-vegetation mapping in the northern jarrah forest (Darling Range). II. Location and mapping of site-vegetation types. *Bull. For. Dep. W. Aust.* 87.
- Heddle, E.M., Loneragan, O.W. and Havel, J.J. (1980). Vegetation Complexes of the Darling System, Western Australia. In: *Atlas of Natural Resources Darling System Western Australia*. Department of Conservation and Land Management, Western Australia.
- Herring Storer Acoustics (1999a). Noise Emission Investigation June 1999 (Report No. 7628-99029-4.1). Report to Alcoa (Wagerup Refinery).
- Herring Storer Acoustics (1999b). Noise Reduction Project August 1999 (Report No. 7830-99029-4.2). Report to Alcoa (Wagerup Refinery).
- Herring Storer Acoustics (2002a). Noise Emission Compliance Assessment, Ref 9578-4-00029-4.2, February 2002.
- Herring Storer Acoustics (2002b). Noise Emission Modelling and Source Ranking, Ref 9654-4-00029-4.2, February 2002.
- Herring Storer Acoustics (2002c). Report Providing Technical Supporting Data for Alcoa's Wagerup Refinery Regulation 17 Variation Application, Ref 9572-7-00029-4.2, February 2002.
- International Aluminium Institute (IAI) (2004). Statistics Report (www.world-aluminium.org/iai/stats)
- Intergovernmental Panel on Climate Change (IPCC) (2001). Climate Change 2001: Synthesis Report.
- Kinhill Engineers (1988). Techniques for Determining Environmental Water Requirements A Review. Report No. 40, Dept. Water Resources, Victoria.
- Layton Groundwater Consultants (1980). Wagerup Groundwater Supply.
- Mattiske, E.M. and Havel, J.J. (1998). Vegetation Complexes of the South-west Forest Region of Western Australia. Maps and report prepared as part of the Regional Forest Agreement, Western Australia for the Department of Conservation and Land Management and Environment Australia.
- Mattiske Consulting Pty Ltd. (2003). Flora and Vegetation Assessment Wagerup Farms. Report prepared for Alcoa World Alumina. May 2003.

- Mercer A (2001). Report on Wagerup Health Survey. The Survey Research Centre, Department of Public Health, The University of Western Australia.
- Morawska, (2002) Alkalinity of airborne particulate matter, Technical report, Queensland University of Technology.
- Musk AW, deKlerk NH. Health effects from liquor burning unit emissions in an alumina refinery. School of Population Health, University of Western Australia.
- Novak, V. (1975). Report on Aboriginal Sites in the Lake Peel-Preston Lakelands. Unpublished report held by the AAD, Perth.
- NEPC, 1998. National Environment Protection Measure for Ambient Air Quality. National Environment Protection Council, 26 June 1998.
- NEPC, 2004. *National Environment Protection (Air Toxics) Measure*. National Environment Protection Council, April 2004.
- O'Connor, R. and Quartermaine, G. (1987). Aboriginal Site Survey for the proposed Spencer-Corfield Link Road. Unpublished report held by the Aboriginal Affairs Department, Perth.
- O'Connor, R. and Quartermaine, G. (1989). Report on a Survey for Aboriginal Sites on the proposed Byford-Collie and Onperup-Jerramungup sections of the Perth to Adelaide Optic Fibre Cable Route. Unpublished report held by the Aboriginal Affairs Department, Perth.
- Parsons Brinckerhoff/Nield Consulting (2004). *Alcoa Wagerup: Review of Impacts on Waters 2003*. Report prepared for Alcoa World Alumina Australia.
- Peck, A.J. and Thomas, G., (1997). *Wagerup Refinery: Contamination of Fill and Soil*. Report for Alcoa of Australia Limited, August 1997.
- Pickering, M. (1982). Archaeological Survey, Dampier-Perth National Pipeline, Section 6:Muchea to Wagerup. Unpublished report held by the Aboriginal Affairs Department, Perth.
- Playford, P.E., Cockbain, A.E. and Low, G.H. (1976). Geology of the Perth Basin. *Geological Survey of Western Australia Bulletin*, Perth.
- Qest Consulting (2005). Public Safety Risk Assessment -Wagerup Expansion Final Report. Report for Alcoa World Alumina. January 2005.

- Quartermaine, G. (1987). Proposed Harvey-Kwinana 330 kV Transmission Line. Public Environmental Report. Appendix C, Archaeological Survey, Report prepared by G. Quartermaine. Unpublished report held by the Aboriginal Affairs Department, Perth.
- Radiation Wise (2005). Baseline Radiation Parameters Prior to Wagerup 3 Expansion. Report for Alcoa World Alumina Australia. January 2005.
- Reyco Consultants (2005) Project Accomodation Review. Report prepared for Alcoa Alumina Australia, January 2005.
- Rivers, M. and M F Clarke (2003). Harvey Irrigation Area Collaborative Water Quality Monitoring Project Final Report Prepared for Harvey Water by the Department of Agriculture, Western Australia
- Shire of Waroona (2004). Shire of Waroona Community Strategic Plan (1999 2004) Status Report.
- Sim, M et al (2004) Healthwise Cancer and Mortality Study Second Report. Monash University and The University of Western Australia.
- Sinclair Knight Merz (2001). Wind Erosion over Future Wagerup Residue Areas. Report prepared for Alcoa Alumina Australia.
- Sinclair Knight Merz (SKM) (2002). Wagerup Refinery Odour Assessment, February 2002.
- Sinclair Knight Merz (2005a). RDA Dust Suppression Assessment: Phase 2 and Phase 3. Report prepared for Aloca Alumina Australia.
- Sound Vibration Technology (2003). Review of Environmental Noise Emissions from Alcoa Wagerup Refinery for Department of Environmental Protection, Ref AV/02/08/005, February 2003.
- Sound Vibration Technology (2005a). Noise Model Development Report for Wagerup 3 Expansion Project, Ref A/04/12/005, April 2005.
- Sound Vibration Technology (2005b). Environmental Noise Management Strategy for the Wagerup 3 Expansion Project, Ref A/05/01/010, April 2005.
- Sound Vibration Technology (2005c). Noise control Review for 4 dB Noise Reduction Scenario for Wagerup 3 Expansion Project, Ref A/05/02/002, April 2005.

- Threlfall TJ, Powers KA, Langley J (2004). Cancer in Western Australia, 1998-2002: incidence and mortality by Statistical Local Area (SLA). Department of Health, Western Australia, Perth. Statistical series number 72.
- Toxikos (2003) Health Risk and Toxicology Assessment of Emissions from the Upgraded Alcoa Pinjarra Alumina Refinery. R. Drew, Toxikos Pty Ltd. 14 November 2003.
- Van Emden, B and Power, G. (2005) Intensive Ambient Air Quality study, Phase 2. February 2005
- Veitch, B., Martin, C. and de Gand, D. (1997). The Report of an Aboriginal Heritage Survey of Twelve Proposed Drilling Traverses, near Boddington, Western Australia. Unpublished report, prepared for Hedges Gold Pty Ltd.
- Water and Rivers Commission (1998). Proposed Harvey Basin Surface water Allocation Plan. *Water Resource Allocation and Planning Series*. Water and Rivers Commission, Policy and Planning Division, Report WRAP 14.
- World Business Council for Sustainable Development (WBCSD) (2004). Methods for calculating GHG emissions from 2003 onwards.
- World Commission on Environment and Development (WCED) (1987). Our Common Future. Brundtland G. (ed.) Oxford University Press.

13. GLOSSARY

Abbreviations

Alcoa World Alumina Australia AGO Australian Greenhouse Office

CALM Conservation and Land Management

DoE Department of Environment (Western Australia)

DoH Department of Health (Western Australia)
DoIR Department of Industry and Resources

DMA Decision making authority

DoPI Department of Planning and Infrastructure

EPA Environmental Protection Authority (Western Australia)

EMS Environmental management system

NEPC National Environmental Protection Council
NEPM National Environmental Protection Measure

NO_x Nitrogen oxides

PM $_{10}$ Particulate matter less than 10 μ m in diameter PM $_{2.5}$ Particulate matter less than 2.5 μ m in diameter

SRG Stakeholder Reference Group

Units

ML

A\$ Australian dollars

dB decibels

dB (A) decibels (A-weighted) °C degrees Celsius

ha hectares
km kilometres
kL kilolitres
mm millimetres

m metres (length)
m² square metres (area)
m³ cubic metres (volume)
m/s metres per second
MJ mega joules
MW mega watts

ML/yr megalitres per year
MLpa megalitres per annum

megalitres

Mt megatonnes

Mtpa megatonnes per annum

ppm parts per million ppb parts per billion

μg micrograms (one-millionth of a gram)

μg/m³ micrograms per cubic metre

t tonnes

 $\begin{array}{ll} \text{tph} & \text{tonnes per hour} \\ \text{tpa} & \text{tonnes per annum} \\ \text{w/w} & \text{weight for weight} \end{array}$

% percent

% w/w percent by weight

Ref: ERMP Wagerup Unit 3 May 05 ENVIRON