Site Characteristics Conclusions

3.3 Conclusions

This Chapter has provided a comprehensive description of the site characteristics that have been used both in the specification of the design basis for the Reactor Facility and the analysis of consequences. This Chapter has also demonstrated that the assumptions presented in the EIS and the site licence continue to be applicable to the Reactor Facility as it has been built.

End of Section

3.4 REFERENCES

AAEC, 1972	HIFAR Safety Document
AGSO, 2000	Review, Seismic Hazard Analysis Lucas Heights
ANSTO, 1997	HIFAR Safety Document 1997, NTP/TN 193 rev 0
ANSTO, 1999	Application to ARPANSA for a Facility Licence, Site Authorisation, for the Replacement Research Reactor Facility. Document Number LBD-02. April 1999.
ANSTO, 2002	Submission to ARPANSA on the Site Geological Investigations for the Replacement Research Reactor at Lucas Heights, RRRP-7500-3BEAN-002-A, 12 September 2002.
ARPANSA, 1999	Criteria for Siting of Nuclear Facilities, RG4. ARPANSA, April 1999.
ARPANSA, 2001	Regulatory Assessment Principles for Controlled Facilities. RB-STD-42-00 Rev 1, ARPANSA, 2001.
AWT, 1997	AWT (Australian Water Technology Environmental Measurement Services) 1997, Woronora River at the Needles, North Engadine – Station No.21321 1 Mean Stream Discharge in Megalitres per day. HYMONTH V34 Data output 29 September 1997. File RD 0355.
Bembrick, 1980	Bembrick, C, Herbert, C, Scheibner, E, Stuntz, J., <i>Structural subdivision of the Sydney Basin</i> . In: Herbert, C. & Helby, R (editors), <i>A guide to the Sydney Basin</i> . Department of Mineral Resources, Geological Survey of New South Wales, Bulletin 26, 4-9. (1980).
Bowman, 1974	Bowman, H. N. <i>Geology of the Wollongong, Kiama and Robertson 1:</i> 50,000 sheets NSW Geological Survey, Sydney
Brodrick, 1997	Brodrick, J. Groundwater Bore Data, Department of Land and Water Conservation Letter dated 22 August 1997, File RD 0355.
Charash, 1968	Charash, E. & Bendun, E. 0. K. Selected Climatological Data from Lucas Heights 1958-1966, AAEC/TM453.
Clark, 1981	Clark, G. H. & Bendun, E. 0. K. Detailed Meteorological Interpretation of Acoustic Sounder Records, AAEC/E498
Clark, 1982	Clark, G. H. 'A climatology of air pollution meteorology parameters on the southern extremity of Sydney, <i>The Urban Atmosphere - Sydney, a Case Study,</i> proceedings of a conference organised by the CSIRO, Division of Fossil Fuels, Leura, 5-6 May, eds. Carras J. N. and Johnson, G. M.
Clark, 1990	Clark, G. H. A Report to the Environmental Planner Roads and Traffic Authority on a Brief Description of the Climatology of Lucas Heights and its relationship with the Meteorology of the Woronora Valley, ANSTO/C167
Clark, 1997	Clark, G. H. An updated analysis of the Lucas Heights climatology - 1975 to 1996, ANSTO/E731

Site	Characteristics
	References

	Reterences
Clark, 1998	Clark, G.H., Crawford, J., Pascoe, J.H., Stone, D.J.M., Jayaswal, Z. Studies to validate complex terrain atmospheric dispersion models using perfluorocarbon tracers. Proceedings of Clean Air and Environment'98. 14 th International Clean Air and Environment Conference, Melbourne, Oct. 18-22, pp.581-586.
Clark, 2003	Clark, G.H., Bowles, C.J., Bradd, J., Hoffmann, E <i>Radiological</i> characterisation of the ANSTO buffer zone and LHSTC. ANSTO EM/TN-03/2003.
Coffey, 1998a	Coffey Partners International P/L, report G459/1-AG Replacement Reactor Site, Lucas Heights, Hydrogeological and Hydrochemical Study, August 1998.
Coffey, 1998b	Coffey Partners International Pty Ltd, Replacement Research Reactor, Lucas Heights, Geophysical Study, April 1998, report no. GY617/1-AC
Coffey,1998c	Coffey Partners International Pty Ltd, Replacement Research Reactor, Lucas Heights, Geotechnical Investigation, June 1998, report no. Sl0948/1-AF
Coffey, 1999	Coffey Partners International Pty Ltd, Report On Near Site Investigations, October 1999.
Colwell, 1993	Colwell, J. B., Coffin, M. F., Spencer, R. A., Structure of the southern New South Wales continental margin, southeastern Australia. BMR Journal of Australian Geology and Geophysics, 13, 333-343. (1993).
Corran, 1995	The Seismic Safety of HIFAR, ANSTO Report E-723
Creasey, 1985	Creasey, J. W., Huntington, J. F., <i>Lineament patterns of the Sydney Basin – An overview. Advances in the study of the Sydney Basin</i> , Proceedings of the nineteenth symposium, Department of Geology, The University of Newcastle, 12-14. (1985).
Domel, 2003	Agricultural Production and Consumption and the 2001 Population Census Data in the Sydney Statistical Division. ANSTO EM/TN-04/2003.
DTC, 1982	Seismic Hazard Study of the Lucas Heights Research Laboratories. Commonwealth of Australia, Department of Transport and Construction and AAEC, December 1982
David, 1950	David, T. W. E. & Browne, W. R. (ed.) <i>The Geology of the Commonwealth of Australia, Edward Arnold & Co</i> , London
Denham, 1981	Denham, D., Weekes, J., Krayshek, C., Earthquake evidence for compressive stress in southeast Australian crust. Journal of Geological Society of Australia 28, 323-332. (1981).
Denham, 1991	Denham, D., Windsor, C. R., <i>The crustal stress pattern in the Australian continent</i> . Tyne, E. & Vozoff, K. (eds.), Exploration in a changing environment; Australian Society of Exploration Geophysicists 8th conference and exhibition and the Geological Society of Australia exploration symposium; conference papers. Exploration Geophysics, 22, 101–105. (1991).

Site	Characteristics
	References

	References
Douglas, 1992	Douglas, D. J. & Partners Pty Ltd & Coffey Partners International Pty Ltd 1992 Report on Hydrogeological Investigation Proposed Extension Regional Waste Depot Lucas Heights, Volumes 1-3, CPI E156/1-CJ, DP14780. 1992
Gaull, 1990	Gaull, Michael-Leiba and Rynn. Probabilistic Earthquake Risk Maps of Australia. Australian Journal of Earth Sciences 37(2), 169-188, June 1990.
Giles, 1966	Results of the Lucas Heights Biological Survey December 1959 – December 1964, August 1966. Reprinted May 1979. Ed: Giles and Stockdale.
Hassell, 1998	Waste Service NSW and Sutherland Shire Council Lucas Heights 1 and Waste Management Centre Development Application Report, HASSELL consultants, December 1998.
Herbert, 1980	Herbert, C., <i>Depositional development of the Sydney Basin</i> . In: Herbert, C. & Helby, R (editors), A guide to the Sydney basin. Department of Mineral Resources, Geological Survey of New South Wales, Bulletin 26, 11-52. (1980).
Herbert, 1988	Herbert, C., The Lapstone Monocline-Nepean Fault – A high angle reverse fault system. TMOC Resources report. (1988).
Herbert, 1999	The Lapstone Monocline-Nepean Fault – A High Angle Reverse Fault System.
Higson, 1990	Nuclear Safety Bureau Visit Report: Discussions with the Bureau of Mineral Resources. 1990
Hoffmann, 1997	E.L. Hoffmann, T. Loosz, Y. Farrar; <i>Environmental end Effluent Monitoring at LHSTC, 1996,</i> ANSTO/E-730 June 1997
Hoffmann, 1998	E.L. Hoffmann, T. Loosz, Y. Farrar; <i>Environmental end Effluent Monitoring at LHSTC, 1997,</i> ANSTO/E-732 November 1998
Hoffmann, 1999	E.L. Hoffmann, T. Loosz, Y. Farrar, L. Mokhber-Shahin; Environmental end Effluent Monitoring at LHSTC, 1998, ANSTO/E- 737 June 1999
Hoffmann, 2000	E.L. Hoffmann, T. Loosz, L. Mokhber-Shahin; <i>Environmental end Effluent Monitoring at ANSTO Sites, 1999,</i> ANSTO/E-740 June 2000
Hoffman, 2001	Hoffmann EL, Loosz T. <i>Environmental and Effluent Monitoring at ANSTO Sites</i> , 2001. ANSTO/E-747.
Hoffman, 2003	Hoffmann EL, Ferris JM, Markick SJ. <i>Environmental and Effluent Monitoring at ANSTO Sites, 2002-2003</i> . ANSTO/E-752.
IAEA, 1981	External Man-Induced Events in Relation to Nuclear Power Plant Siting, IAEA Safety Series No. 50-SG-S5
IAEA, 1987	Siting of Research Reactors, IAEA-TECDOC-403,1987
IAEA, 1991	Earthquakes and Associated Topics in Relation to Nuclear Power Plant Siting, IAEA Safety Series No. 50-SG-S1 (Rev. 1)
IAEA, 1992	Code on the Safety of Nuclear Research Reactors: Design, IAEA Safety Series No.35-SI, June 1992.

	References
IAEA, 1994	Safety Assessment of Research Reactors and Preparation of the Safety Analysis Report IAEA Safety Series No.35-GI, 1994
IAEA, 1996	External Man-Induced Events in Relation to Nuclear Power Plant Design, IAEA Safety Series No. 50-SG-DS (Rev I), 1996.
IAEA, 2001	Safety Requirements for Research Reactors, draft ds 272, 2001.
IGNS, 1999	Seismic Hazard Analysis Lucas Heights Site of the High Flux Australian Reactor, December 1999.
ISO, 1989	International Organisation for Standardisation. Water Quality – Determination of tritium activity concentration – Liquid scintillation counting method. ISO 9698:1989 (E). Geneva, Switzerland
ISO, 1992a	International Organisation for Standardisation. Water Quality – Measurement of gross alpha activity in non-saline water – Thick source method. ISO 9696:1992 (E). Geneva, Switzerland
ISO, 1992b	International Organisation for Standardisation. Water Quality – Measurement of gross beta activity in non-saline water – Thick source method. ISO 9697:1992 (E). Geneva, Switzerland
JGSA, 1969	Journal of the Geological Society of Australia (Edited by Packham, G. H.) Volume 16, Part 1.
Lohe, 1992	Lohe, E. M., McLennan, T. P. T., Sullivan, T. D., Soole, K. P., Mallett, C. W., <i>Sydney Basin – Geological Structure and Mining Conditions, assessment for Mine Planning</i> . CSIRO Division of Geomechanics, External Report 20. (1992).
Mauger, 1984	Mauger, J., Creasey, J.W., Huntington, J.F., Extracts and notes on the Katoomba 1:100,000 Sheet, Sydney basin fracture analysis. CSIRO Division of Mineral Physics. (1984).
Mayne, 1974	Mayne, S. J., Nicholas, E., Bigg-Wither, A. L., Rasidi, J. S., Raine, M. J., <i>Geology of the Sydney Basin; a review</i> . Bulletin Australia Bureau of Mineral Resources, Geology and Geophysics 149, 229. (1974).
McCue, 1993	Earthquake Hazard Map of Australia – 1991. McCue, K (compiler), Gibson, G., Michael-Leiba, M., Love, D., Cuthbertson, R., and Horoschun, G. 1993.
McCue, 1995	McCue, Dent, and Jones. The Characteristics of Australian Strong Ground Motion. In Proceedings of the Pacific Conference on Earthquake Engineering, Melbourne, Australia, 20-22 November 1995, 71-81.
McGuire 2000	Review of "Seismic Hazard Analysis at Lucas Heights Site of the High Flux Australian Reactor" (dated December 1999), January 2000
Memarian, 1994	Mermarian, H., Fergusson C. L., <i>Fracture pattern of the Illawarra Coal Measures. Southeastern Sydney Basin</i> . Proceedings in the 28th Newcastle Symposium, 151-158. (1994).
Michael-Leiba 1990	Lucas Heights Preliminary Earthquake Risk Assessment. Bureau of Mineral Resources, Canberra.
Mumme, I.A. 1966	The Stability of the Lucas Heights Area Against Possible Seismic Events, AAEC/TM316.

Site	Characteristics
	References

	References
Mumme, 1972	Mumme, I.A. Daily Estimates of Freshwater Flows in the Woronora River April 1958 to December 1964 (Unpublished).
Mumme, 1976	Mumme, I.A. Seismic Risk Analysis of the Lucas Heights Area. AAEC Internal Report ER/UN 134.
Murray- Wallace, 1991	Murray-Wallace, C.V., Belpario, A.P., <i>The latest Interglacial shoreline in Australia – A review</i> . Quaternary Science Reviews, 10, 441-461. (1991).
NHMRC, 1987	National Health and Medical Research Council & Australian Water Resources Council, 1987. <i>Guidelines for Drinking Water Quality in Australia</i> . Australian Government Publishing Service, Canberra
NSWCWA 1972	NSW Clean Waters Act1972. Regulations as amended. Government Gazette, NSW Government Printery, Australia.
NSW Gazette 1997	The Sutherland Shire Local Environment Plan No. 50, NSW Government Gazette No.123, 14 November 1997.
Nicol, 2002	Nicol, A., Berryman, K., Langridge, R., Cox, S., Simpson, K., Volk, P., Hill, N., ANSTO — Replacement Research Reactor Project Tasks 1 & 2 — Site Fault Assessment. GNS Client Report 2002/103. (2002).
Norman, 1985	Norman, A. R., Creasey, J. W., Structural analysis of the Ku-ring-gai- Berowra area. Advances in the study of the Sydney Basin, Proceedings of the nineteenth symposium, Department of Geology, The University of Newcastle, 19-24. (1985).
Ollier, 1982	Ollier, C.D., <i>The great escarpment of eastern Australia: tectonic and geomorphic significance</i> . Journal of Geological Society Australia, 29, 13-23. (1982).
PB, 2004	Parsons Brinkerhoff (formerly PPK Environment and Infrastructure) Consolidated Volume of Reports on Groundwater Investigations at LHSTC to June 30, 2003, July 2004, prepared for Australian Nuclear Science and Technology Organisation, Sydney.
Pegler, 1998	Report on Chemical Hazards at LHSTC, ANSTO Safety Division memo from Joy Pegler to Allan Murray LH96/0477, 20 November 1998.
Pells, 1978	Pells, Douglas, Rodway, Thorne, and McMahon <i>Design Loadings for Foundations on Shale and Sandstone in the Sydney Region</i> , Australian Geomechanics Jounal, 1978
Petrozzi, 1994	Petrozzi, M. Fluvial Controls on Water Quality: Potential Leachate Migration in a Steep Discontinuous Bedrock Stream. BA Honours Thesis, Sydney University, Dept. of Geography.
PLG, 1998	A Level 1+ Probabilistic Safety Assessment of the High Flux Australian Reactor, PLG 1200, PLG, January 1998
PPK, 1998a	Replacement Nuclear Research Reactor Draft Environment Impact Statement, PPK Environment and Infrastructure, July 1998, prepared for Australian Nuclear Science and Technology Organisation, Sydney

Site	Characteristics
	References

	References
PPK, 1998b	Environmental Site Assessment, Proposed Replacement Nuclear Research Reactor Site, Lucas Heights Science & Technology Centre, New Illawarra Road, Lucas Heights NSW Final Report PPK Environment & Infrastructure Pty Ltd, September 1998, PR 1239.
PPK, 2000a	Groundwater Sampling Plan and Monitoring Protocols – Lucas Heights Science and Technology Centre, July 2000.
PPK, 2000b	PPK Environment & Infrastructure Pty Ltd, Groundwater Monitoring and Management Program – Lucas Heights Science and Technology Centre, August 2000.
Rickwood, 1985	Rickwood, P. C., <i>Igneous intrusives in the Greater Sydney region</i> . In: Pells P.J.N. (editor). Engineering Geology of the Sydney Region, 215-307. (1985).
SAA, 1993	Standards Association of Australia, <i>Minimum design loads on structures, Part 4: Earthquake loads</i> , AS 1170.4-1993
Sdrolias, 2001	Sdrolias, M., Muller, R.D., Gaina, C., <i>Plate tectonic evolution of Eastern Australian Marginal Ocean</i> . PESA Eastern Australasian Basins Symposium, 227-237. (2001).
Shepherd, 2002	Shepherd, J (2002) pers. comm.
Shepherd, 1981	Shepherd J., Huntington, J. F., <i>Geological fracture mapping in coalfields and the stress fields of the Sydney basin</i> . Journal of the Geological Society of Australia 28, 299-309. (1981).
Sherwin, 1986	Sherwin, L. & Holmes, G. G. <i>Geology of the Wollongong and Port Hacking 1:1000 000 Sheets 9029, 9129,</i> New South Wales Geological Survey, Sydney
Standard, 1969	Standard, J. C. <i>Hawkesbury Sandstone,</i> Journal of the Geological Society of Australia, vol. 16, part 1, pp 407-417. 1969
Stirling, 2001	Stirling, M. and Berryman, K.R., 'Extension to Lucas Heights Probabilistic Seismic Hazard Assessment', Geological and Nuclear Sciences, July 2001
SLEP 2000	Sutherland Local Environmental Plan, Sutherland Shire Council, 2000.
Taylor, 1923	Taylor, T. G. <i>The Warped Littoral around Sydney,</i> Proc. Linn. Soc. (NSW). 1923
UNSCEAR, 1993	United Nations Scientific Committee on the Effects of Atomic Radiation. Sources and Effects of Ionising Radiation. Report to the General Assembly, with scientific annexes. United Nations, New York. 1993
USEPA, 1987	On-site meteorological program guidance for regulatory applications. USEPA Report No. EPA-450/4-87-013. 1987
USNRC, 1973	Regulatory Guide 1.60, <i>Design Response Spectra for Seismic Design of Nuclear Power Plants</i> , US Atomic Energy Commission (now US Nuclear Regulatory Commission) Rev1, 1973.

Site Characteristics References

Wellman, 1974 Wellman and McDougal Cainozoic igneous activity in eastern Australia. Tectonophysics, 23, 49-65, 1974
 WHO, 1993 World Health Organisation. Guidelines for Drinking Water Quality. Volume 1 Recommendations, 2nd Edition, Geneva

End of Section