10 Years of NSZD Application in Australia – The Evolution from LNAPL Active Removal to Natural Attenuation

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In 2015, the concept of Natural Source Zone Depletion (NSZD) was virtually unknown in the Australian remediation landscape. At that time, the prevailing approach to managing Light Non-Aqueous Phase Liquid (LNAPL) contamination was focused on active removal technologies, often with limited long-term effectiveness and high operational costs.

This presentation charts the evolution of NSZD application in Australia over the past decade, beginning with early deployments of LI-COR flux chambers on LNAPL-impacted sites across the country. These initial efforts were made possible through collaboration with GHD's North American subject matter experts, whose experience helped translate emerging international practices into the Australian context.

A significant milestone in this journey was the development and release of national NSZD guidance in 2020. GHD played a key role in this initiative, adapting North American frameworks to reflect Australian regulatory expectations, site conditions, and climate considerations. The guidance provided a foundation for broader industry acceptance and regulatory confidence in NSZD as a viable line of evidence for site closure.

Drawing on a range of Australian case studies, this presentation will explore the practical application of NSZD from both a consultant's and an independent EPA site auditor's perspective. It will include comparative data on observed NSZD rates across different geologies and hydrocarbon types, and discuss how these findings have been used to support risk-based closure strategies. The presentation will also reflect on the challenges and successes of engaging with regulators to build confidence in NSZD as a sustainable and scientifically robust remediation approach.

Finally, the talk will consider how far the industry has progressed in embracing NSZD over the past decade. What began as a novel concept is now an increasingly mainstream component of LNAPL management strategies in Australia. This evolution aligns with a broader shift toward sustainability in remediation, where minimising emissions, reducing energy use, and supporting net zero aspirations are becoming central to decision-making.

Andre Smit

Andre is a Technical Director in GHD's Sydney, AU office. He has over two decades of international experience as an environmental scientist working in all aspects of contaminated land, from initial desktop assessment through to intrusive site investigations, remediation and final validation and environmental due diligence assessments of a wide-ranging variety of brownfield sites, from informal hazardous waste sites in South Africa to gasworks in the United Kingdom and refinery and terminal sites in Australia. His background in ecology and environmental chemistry gives a holistic perspective on contaminated land issues. He has been with GHD Sydney for the last 15 years, working on contaminated site projects and audits across the country, and was accredited as an NSWEPA Site Auditor in 2015. He has particular specialist experience with hydrocarbon and LNAPL impacted sites, both as consultant and in an auditing capacity, in respect of human health quantitative risk assessments for (for soil, groundwater and soil vapour impact) and fate and transport modelling of groundwater impacts. Since 2015 he has been an active advocate for NSZD, and was involved in the preparation of national guidance in the form of CRC CARE Technical Report 46 - *The role of natural source zone depletion in the management of light non-aqueous phase liquid contaminated sites.*