West Musgrave Mine Camp Wastewater Treatment and Recycling System

As with most Mineral Resource Companies, OZ Minerals/BHP has an emphasis on environmental responsibility and minimal harm. The Fluid Environmental team was engaged to deliver a low carbon footprint, passive, fit for purpose wastewater treatment system suitable for West Musgrave mine site.

Peak design capacity was for a Peak Design Flow of 275kL/d. The system consists of multi-stage ABR anaerobic treatment followed by advanced secondary treatment using Hydroscape's ABSORBS™ technology. As the product water is recycled for on-site reuse, disinfection consisting of chlorination and UV was applied. The system control and disinfection equipment was mounted in a custom insulated shipping container so it could be pre-fabricated off site and be protected from the environmental conditions experienced on-site.

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Key features of the treatment plant are: passive treatment; minimal operator requirement; quarterly servicing; production of medium risk recycled water for beneficial reuse on site. Only operator input is daily visual inspection and maintenance when required. The system was approved by WA Health.

Project notes

It is a robust system that can operate over the highly variable flows and water qualities that can be experienced on mine sites

Passive Treatment
Unlike traditional sewage treatment, no active mechanical aeration is used. Yet despite this, the system is fully aerobic and achieves close to 100% conversion of ammonia to nitrate (i.e. complete nitrification efficiency). The only electricity required is for transfer pumping and UV disinfection.

Primary treatment is achieved through a series of 8 x 95 kL settling and digestion tanks configured as an Anaerobic Baffled Reactor producing high quality primary effluent. The absence of a high rate aerobic treatment process like activated sludge minimises site sludge production by some 90%, further reducing system operating costs from sludge management and off-site disposal.

Advanced Secondary Treatment
Secondary treatment is via the Hydroscape ABSORBS™ intermittently dosed single pass sand filter producing high quality advanced secondary effluent for disinfection.

Tertiary Treatment (Disinfection)
Multi-barrier disinfection comprises sodium hypochlorite followed by UV.

Recycled Water
The treatment train meets WA Health requirements for Medium Risk Reuse and can be used for:

- Urban space irrigation with some restricted access and application
- Fountains and water features
- Stock watering, dairy cattle, grazing
- Industrial use with potential human exposure
- Dust suppression
- Wash down water
- Cooling towers
- Commercial food crops

Pathogen reductions achieved are: 5-$\log_{10}$ for virus, 4.4-$\log_{10}$ for protozoa and 5-$\log_{10}$ for bacteria.

Snapshot

Client	OZ minerals/BHP
Location	West Musgrave Ranges WA
Job category	Wastewater Treatment and recycling
Technology	ABR ⇒ ABSORBS ⇒ disinfection
Peak Design Flow	275,000L/day

Prepared by Fluid Environmental Pty Ltd. While we have taken every precaution to ensure the accuracy of the information in this bulletin, we cannot accept liability for any errors or omissions. The recipient should verify the information before acting upon it.

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Water Source	TSS mg/L	Turbidity NTU	NH4-N mg/L	TN mg/L	TP mg/L	BOD mg/L	FOG mg/L
ABR influent	560	500	68	92	14	630	110
ABR effluent	76	50	77	89	14	250	<10
Post ABSORBS	10	0.66	0.031	75	2.5	10	
Final Water Qua.	10	0.41	0.051	75	2.7	5	
ABR effluent Red.	**-86%**	**-90%**	**13%**	**-3%**	**0%**	**-60%**	**-91%**
ABSORBS Red.	**-87%**	**-99%**	**-100%**	**-16%**	**-82%**	**-96%**	
Total System Red.	**-98%**	**-100%**	**-100%**	**-18%**	**-81%**	**-99%**	

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