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LIQUID SODIUM HYDROXIDE SPILL - MONITORED NATURAL ATTENUATION

ADDENDUM REPORT

April 2025

Commissioned by:

Issue: V1

Project Reference: NS_0118_21/MNA/ADDENDUM

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APPENDICES

1.0 INTRODUCTION

1.1 Project Background and Aims

ECL, on behalf of Veolia, has commissioned NSugg Ltd. to prepare an Addendum to the 2024 Monitored Natural Attenuation (MNA) Report[1] relating to a liquid sodium hydroxide (NaOH) spill at PB Leiner UK, Severn Road, Pontypridd, CF37 5SQ.

This addendum should be read in conjunction with the 2024 MNA report and presents the results of additional water quality analysis, undertaken in April 2025, to address Natural Resources Wales's requirements.

Groundwater sampling and analysis for Environmental Quality Standard metals has been undertaken in response to the following comments received from Natural Resources Wales (NRW):

1. A comment received in response to the initial Hydrogeological Conceptual Site Model report prepared in October 2023[2]:

   Analyse the groundwater from the borehole with the highest concentrations of manganese and ammonium (WS202) for dissolved metals, especially those with low EQS, such as copper, and compare against the current EQS for surface waters, then redo the river-groundwater dilution calculations based on conservative (worst-case) approach. This is to help confirm that there is no risk to the receptor (receiving river) and support a request for cessation of the current investigation.

2. A comment received in response to the 2024 MNA report:

   If the upgradient BH01 is still available, then this can be used to make a simple comparison between upgradient and down-gradient concentrations of metals. We did not request a trend analysis and are aware of the likely other anthropogenic influences on shallow groundwater in this area, however, we require the requested information, including the revised groundwater-river water dilution calculations to enable us to 'close' the incident.

   If BH01 is no longer available, then 1 or 2 temporary up-gradient boreholes could be installed to obtain up-gradient groundwater samples for Environmental Quality Standards (EQS) metals. The effect (or not) of the NaOH spill on EQS metal concentrations should be apparent from these samples when compared with data from immediately upgradient of the NaOH spill. As an alternative, NSugg may wish to first sample the down-gradient BHs for EQS metals and use this information without upgradient data to estimate the (diluted) concentrations of EQS metals at the river; if these data support no significant risk from 'flushed' EQS metals, then obtaining up-gradient samples, which may include installing additional borehole(s), would not be needed.

Up-gradient BH01 was decommissioned in 2020 and no longer available for sampling; therefore, the down-gradient boreholes have been sampled for EQS metals, and the data

[1] NSugg Ltd., March 2024, PB Leiner UK, Severn Road, Pontypridd, Liquid Sodium Hydroxide Spill – Monitored Natural Attenuation.

[2] NSugg Ltd., October 2023, PB Leiner UK, Severn Road, Pontypridd, Hydrogeological Conceptual Site Model to support Monitored Natural Attenuation. Ref: NS_0118_21.

reviewed to assess the resultant (diluted) concentrations in the River Taff. As stated by NRW, if the data confirm no significant risk to the River Taff from EQS metals, the incident and investigation can be closed.

1.2 Scope of Work

Groundwater samples were obtained on 1st April 2025 from borehole WS201, located within the spill area, and from down-gradient boreholes BH0, BH3 and WS202. Borehole locations and the inferred direction of groundwater flow beneath the site are confirmed in Figure 1.

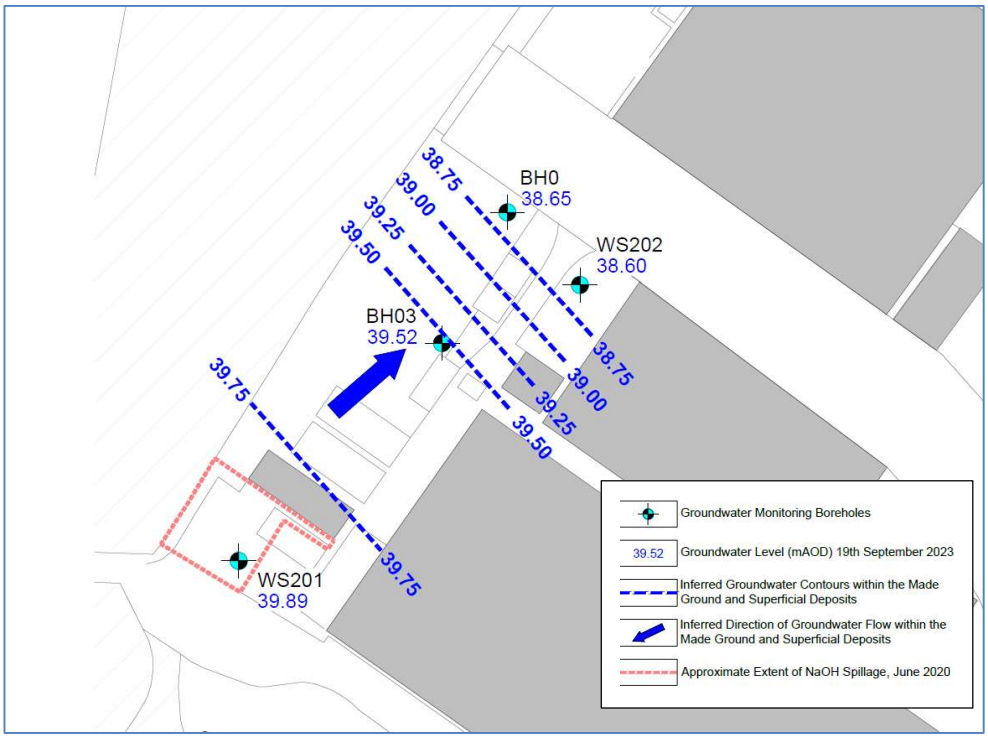

Figure 1. Site Monitoring Plan (extracted from 2024 MNA Report, Drawing 1)

Groundwater samples were analysed for general chemistry and EQS metals. Laboratory certificates are included as Appendix 1 and the key data are presented and reviewed in Section 2. The data have been assessed using the Environment Agency and NRW Risk Screening approach for surface water pollution risk assessments[3].

[3] Environment Agency, February 2016 (last updated: April 2025), Guidance – Surface water pollution risk assessment for your environmental permit.

2.0 DATA REVIEW & FRESHWATER SCREENING TESTS

2.1 Groundwater Quality Data – EQS Metals

Table 1 presents a summary of the April 2025 groundwater quality data for EQS dissolved metals (raw laboratory certificates are included as Appendix 1). Average concentrations in groundwater are calculated assuming values less than the laboratory reporting limit (LRL) are equal to the LRL.

Freshwater EQS limits are included in Table 1, reported as annual average concentrations (AA) and maximum allowable concentrations (MAC).

Table 1: April 2025 Groundwater Quality Data

Parameter	Concentration (dissolved, µg/l)					Freshwater EQS	
	WS201 (spill area)	BH03	BH0	WS202	Average	AA	MAC
Arsenic	16	7.9	0.51	4.8	7.3	50	N/A
Boron	96	50.3	48.2	64	64.6	2000	N/A
Cadmium	<0.03	<0.03	<0.03	<0.03	0.03	0.15	0.9
Chromium	<1.0	<1.0	<1.0	<1.0	1.0	4.7	32
Hexavalent Chromium	<7.0	<7.0	<7.0	<7.0	7.0	3.4	N/A
Cobalt	1.2	11	1.1	2.8	4.0	3	100
Copper	1.1	<0.4	<0.4	<0.4	0.6	1*	N/A
Iron	1400	36000	300	550	9563	1000	N/A
Lead	5.2	8	10	7	7.6	1.2*	14
Manganese	1200	2400	720	1900	1555	123*	N/A
Mercury	<0.01	<0.01	<0.01	<0.01	0.01	N/A	0.07
Nickel	9.9	4.4	6.3	8.3	7.2	4*	34
Tin	<0.4	<0.4	<0.4	<0.4	0.4	25	N/A
Zinc	49	110	220	82	115	10.9*	N/A
Cyanide (total)	<40	<40	<40	<40	40	1	5

Table Notes: * represents bioavailable content. Cadmium EQS based on a receiving water hardness of between 100mg/l and 200mg/l (based on groundwater quality analysis).

2.2 Screening Test 1

Freshwater Screening Test 1 assesses whether the concentration of the metal is more than 10% of the EQS. If the concentration is less than 10%, the metal is not a risk to the environment and is screened out. A metal is considered to pass Screening Test 1 if the average concentration is less than 10% of the AA EQS, and/or the maximum concentration is less than 10% of the MAC, as applicable.

Review of Table 1 confirms the following metals are screened out: boron and tin. All other metals are carried forward to Screening Test 2.

2.3 Screening Test 2

Freshwater Screening Test 2 introduces the dilution available in the receiving water (River Taff). It assesses if the process contribution (PC) of the metal is more than 4% of the EQS, where PC is the concentration of the metal in the receiving water after dilution. If the PC is 4% or less of the EQS, the metal is screened out and not a risk to the environment.

$$PC = \frac{EFR \times RC}{EFR + RFR}$$

Where: EFR = effluent flow rate (groundwater flow rate discharging to the River Taff)
RC = release concentration (concentration in groundwater)
RFR = river flow rate

Section 3.3 of the 2024 MNA Report confirms the following input parameters:

- Mean river flow for the River Taff at Pontypridd (approximately 3.5km upstream of the site) of 21.04m^3/s.
- A low flow for the River Taff (Q_{95} with 95% exceedance) of 3.63m^3/s.
- The approximate rate of groundwater flow through the spill area is calculated as between 2.5x$10^{-5}$$m^3$/s and 2.5x$10^{-3}$$m^3$/s (assumed mean: 2.5 x $10^{-4}$$m^3$/s).

Table 2 presents the results of Screening Test 2; calculations are included as Appendix 2. The average PC is calculated based on the average groundwater concentration, average river flow rate (21,040l/s) and average groundwater flow rate (0.25l/s), and is compared against the AA EQS limit. The maximum PC is calculated based on the maximum groundwater concentration, worst-case Q_{95} river flow rate (3,630l/s) and maximum groundwater flow rate (2.5l/s), and is compared against the MAC EQS limit.

Table 2: Screening Test 2

Parameter	Concentration in groundwater (dissolved, µg/l)		PC		PC as % of EQS	
	Average	Maximum	Average	Maximum	AA	MAC
Arsenic	7.3	16	8.68E-05	N/A	<1.0%	N/A
Cadmium	0.03	0.03	3.56E-07	2.06E-05	<1.0%	<1.0%
Chromium	1.0	1.0	1.19E-05	6.88E-04	<1.0%	<1.0%
Hexavalent Chromium	7.0	7.0	8.32E-05	N/A	<1.0%	N/A
Cobalt	4.0	11	4.78E-05	7.57E-03	<1.0%	<1.0%
Copper	0.6	1.1	6.83E-06	N/A	<1.0%	N/A
Iron	9563	36000	1.14E-01	N/A	<1.0%	N/A
Lead	7.6	10	8.97E-05	6.88E-03	<1.0%	<1.0%
Manganese	1555	2400	1.85E-02	N/A	<1.0%	N/A
Mercury	0.01	0.01	N/A	6.88E-06	N/A	<1.0%
Nickel	7.2	9.9	8.58E-05	6.81E-03	<1.0%	<1.0%
Zinc	115	220	1.37E-03	N/A	<1.0%	N/A
Cyanide (total)	40	40	4.75E-04	2.75E-02	<1.0%	<1.0%

The results of Screening Test 2 confirm that the Process Contribution (PC) of all remaining EQS metals is significantly less than 4% of the relevant EQS; therefore, all metals are screened out at this stage and not a risk to the receiving watercourse.

3.0 SUMMARY AND CONCLUSIONS

This report represents an addendum to the 2024 MNA Report relating to a liquid sodium hydroxide (NaOH) spill at PB Leiner UK, Pontypridd. It has been prepared to address comments raised by NRW regarding the potential impact of dissolved EQS metals in groundwater on the downstream River Taff.

Additional groundwater sampling was undertaken in April 2025, from boreholes within the spill area and down-gradient of the spill, with samples analysed for EQS metals. The laboratory results have been reviewed in accordance with standard freshwater screening tests, with boron and tin screened out by Test 1 and all remaining metals screened out by Test 2.

The data concludes that concentrations of EQS metals in groundwater beneath the site do not represent a significant risk to the receptor (River Taff); therefore, the NaOH spill investigation is concluded, with no further action required.

4.0 CLOSURE

This report has been prepared by Nicola Sugg (trading style of NSugg Limited) with all reasonable skill and care, and in accordance with the services agreed with ECL. Relevant information provided by ECL has been accepted in good faith as being accurate and valid. This report is based on the relevant guidance and legislation in force at the date of the report and should be reviewed if such guidance and legislation are amended or superseded.

This report is for the exclusive use of ECL and Veolia; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without prior written consent from Nicola Sugg.

APPENDIX 1

Certificate of Analysis

Certificate Number	25-07291	*Issued:*	14-Apr-25

Client Environmental Compliance
Unit G1
Main Avenue
Treforest Industrial Estate
Pontypridd
CF37 5YL

Our Reference	25-07291
Client Reference ~	VEOL.01.03
Order No ~	C0476
Contract Title ~	GWM
Description	4 Groundwater samples.
Date Received	03-Apr-25
Date Started	03-Apr-25
Date Completed	14-Apr-25
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Louise Cook
Contracts Manager

2139

Summary of Chemical Analysis
Water Samples

Our Ref 25-07291
Client Ref ~ VEOL.01.03
Contract Title ~ GWM

				Deviating	Deviating	Deviating	Deviating
			Lab No	2488716	2488717	2488718	2488719
			Sample ID ~	BH0	BH03	WS201	WS202
			Depth ~	2.40	2.40	2.90	2.50
			Other ID ~				
			Sample Type ~	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER
			Sampling Date ~	01/04/2025	01/04/2025	01/04/2025	01/04/2025
			Sampling Time ~	1223	1155	1133	1245
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.51	7.9	16	4.8
Arsenic, Total	DETSC 2306*	0.16	ug/l	1.80	24.78	21.23	28.83
Boron, Dissolved	DETSC 2306*	12	ug/l	48.2	50.3	96.0	64.0
Boron, Total	DETSC 2306*	12	ug/l	110	50	96	64
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	< 0.03	< 0.03
Cadmium, Total	DETSC 2306*	0.03	ug/l	0.27	0.66	0.28	2.0
Chromium III, Dissolved	DETSC 2306*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0	< 7.0	< 7.0
Cobalt, Dissolved	DETSC 2306	0.16	ug/l	1.1	11	1.2	2.8
Cobalt, Total	DETSC 2306*	0.16	ug/l	2.8	23	4.3	44
Copper, Dissolved	DETSC 2306	0.4	ug/l	< 0.4	< 0.4	1.1	< 0.4
Copper, Total	DETSC 2306*	0.4	ug/l	2.2	5.6	23	83
Iron, Dissolved	DETSC 2306	5.5	ug/l	300	36000	1400	550
Iron, Total	DETSC 2306*	5.5	ug/l	81000	36000	7800	84000
Lead, Dissolved	DETSC 2306	0.09	ug/l	10	8.0	5.2	7.0
Lead, Total	DETSC 2306*	0.09	ug/l	12	42	15	160
Manganese, Dissolved	DETSC 2306	0.22	ug/l	720	2400	1200	1900
Manganese, Total	DETSC 2306*	0.22	ug/l	1100	3100	1700	1900
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Mercury, Total	DETSC 2306*	0.01	ug/l	0.08	0.16	0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	6.3	4.4	9.9	8.3
Nickel, Total	DETSC 2306*	0.5	ug/l	15	35	15	58
Tin, Dissolved	DETSC 2306*	0.4	ug/l	< 0.4	< 0.4	< 0.4	< 0.4
Tin, Total	DETSC 2306*	0.4	ug/l	0.4	0.5	0.4	1.0
Zinc, Dissolved	DETSC 2306	1.3	ug/l	220	110	49	82
Zinc, Total	DETSC 2306*	1.3	ug/l	240	110	140	290
Inorganics							
Conductivity	DETSC 2009	1	uS/cm	430	2650	1270	2090
pH	DETSC 2008		pH	7.1	6.9	7.4	7.2
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	< 40	< 40
Dissolved, Oxygen	DETSC 2048*	0.1	mg/l	5.3	0.6	2.3	2.2
Total Hardness as CaCO3	DETSC 2303	0.1	mg/l	113	260	186	381
Redox Potential	DETSC 2016*	-500	mV	9.7	-120	-27	30
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	11	8.5	4.4	13
Nitrate as NO3	DETSC 2055	0.1	mg/l	0.52	1.0	< 0.10	< 0.10

Information in Support of the Analytical Results

Our Ref 25-07291
Client Ref ~ VEOL.01.03
Contract ~ GWM

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2488716	BH0 2.40 GROUND WATER	01/04/25	PB 1L	pH/Cond (1 days)	
2488717	BH03 2.40 GROUND WATER	01/04/25	PB 1L	pH/Cond (1 days)	
2488718	WS201 2.90 GROUND WATER	01/04/25	PB 1L	pH/Cond (1 days)	
2488719	WS202 2.50 GROUND WATER	01/04/25	PB 1L	pH/Cond (1 days)	

Key: P-Plastic B-Bottle

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:
~ Sample details are provided by the client and can affect the validity of the results
***** -not accredited.
# -MCERTS (accreditation only applies if report carries the MCERTS logo).
$ -subcontracted.
n/s -not supplied.
I/S -insufficient sample.
U/S -unsuitable sample.
t/f -to follow.
nd -not detected.

End of Report

APPENDIX 2

Screening Test 2:

	Concentration (ug/l		PC	AA	Avg PC as	PC	MAC	PC max as
	Average	Max	Average	EQS	% of AA EQS	Max	EQS	% of MAC EQS
Arsenic, Dissolved	7.3	16	8.68E-05	50	0.00%	1.10E-02	N/A	N/A
Cadmium, Dissolved	0.03	0.03	3.56E-07	0.15	0.00%	2.06E-05	0.9	0.00%
Chromium III, Dissolved	1.0	1.0	1.19E-05	4.7	0.00%	6.88E-04	32	0.00%
Chromium, Hexavalent	7.0	7.0	8.32E-05	3.4	0.00%	4.82E-03	N/A	N/A
Cobalt, Dissolved	4.0	11	4.78E-05	3	0.00%	7.57E-03	100	0.01%
Copper, Dissolved	0.6	1.1	6.83E-06	1	0.00%	7.57E-04	N/A	N/A
Iron, Dissolved	9563	36000	1.14E-01	1000	0.01%	2.48E+01	N/A	N/A
Lead, Dissolved	7.6	10	8.97E-05	1.2	0.01%	6.88E-03	14	0.05%
Manganese, Dissolved	1555	2400	1.85E-02	123	0.02%	1.65E+00	N/A	N/A
Mercury, Dissolved	0.01	0.01	1.19E-07	N/A	N/A	6.88E-06	0.07	0.01%
Nickel, Dissolved	7.2	9.9	8.58E-05	4	0.00%	6.81E-03	34	0.02%
Zinc, Dissolved	115	220	1.37E-03	10.9	0.01%	1.51E-01	N/A	N/A
Cyanide, Total	40	40	4.75E-04	1.0	0.05%	2.75E-02	5.00	0.55%

EFR (Avg)	2.50E-04	m3/s	0.25	l/s
EFR (Max)	2.50E-03	m3/s	2.50	l/s
RFR (Avg)	21.04	m3/s	21040	l/s
RFR (Q95- Max)	3.63	m3/s	3630	l/s

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