Government of Western Australia
Department of Water and Environmental Regulation

Amendment Notice #5

Licence Number	L7969/2004/3
Licence Holder	Northern Star Resources Ltd
ACN	092 832 892
File Number:	DER2013/000991-1
Premises	Paulsens Gold Project Nanutarra - Munjina Road M08/99, M08/196 PARABURDOO WA 6754
Date of Amendment	03/12/2018

Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act), as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

Alana Kidd
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Date: 2018.12.03 16:07:16 +08'00'

Alana Kidd

MANAGER, RESOURCE INDUSTRIES

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA).

Definitions and interpretation

Definitions

In this Amendment Notice, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Amendment Notice	Refers to this document
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the *Environmental Protection Act 1986* Locked Bag 33 Cloisters Square PERTH WA 6850 info@der.wa.gov.au
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Review
Licence Holder	Northern Star Resources Ltd
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
TSF	Tailings Storage Facility
WAD cyanide	Weak acid dissociable cyanide

Amendment Notice

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the Licence issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

This notice is for an amendment to modify monitoring requirements for two groundwater monitoring bores and to include two other groundwater monitoring bores.

This notice is limited only to these groundwater monitoring bores. No other changes to the aspects of the licence have been requested by the Licence Holder.

The following guidance statements have informed the decision made on this amendment:

- *Guidance Statement: Decision Making* (February 2017); and
- *Guidance Statement: Risk Assessment* (February 2017).

Amendment description

The Licence Holder submitted a licence amendment application on 23 August 2018 to remove groundwater monitoring bores PMB1 and PMB2. These two bores have been dry or have water levels too low to obtain water samples for an extended period of time. Consequently, they are sometimes unable to be monitored as per the licence requirements. Additional monitoring bores were installed around the Tailings Storage Facility (TSF) to increase the monitoring network.

Two groundwater monitoring bores, PMB9a and PMB11, will provide an additional monitoring bore to the east and south of PMB1 and PMB2, capturing water movement away from the TSF in both directions. PMB11 is removed from the existing monitoring bore network and will provide important information on water quality further downstream of the TSF.

The groundwater monitoring bores locations are shown in the new Attachment 3.

Water quality monitoring results for PMB1, PM2, PMB9a and PMB11 are shown in Table 2 and are fairly consistent between these bores, with the exception of PMB11 indicating less effects of mining, with generally lower contamination compared to the other bores.

Monitoring results indicate that parameters have remained relatively stable.

SWLs in these bores is approximately 23 metres below ground level (mbgl).

TDS levels in all bores were slightly erratic, but seem to exhibit a typically downward trend and are below the licence limit. Sulfate also shows a typically downward trend and is below the licence limit.

WAD cyanide and pH levels remained constant and below the licence limits of the monitoring bores. All other parameters measured also remained constant throughout the reporting period and beyond, with the exception of manganese in some bores.

The results are shown in table 2.

Table 2: Groundwater Quality Monitoring Results																													
		PMB1 - dry							PMB2 - dry																PMB9a			PMB11			
Date	**Units**	19/01/2015	21/01/2015	27/04/2015	3/08/2015	12/10/2015	25/11/2015	10/07/2017	19/01/2015	21/01/2015	27/04/2015	3/08/2015	12/10/2015	25/11/2015	29/12/2015	18/01/2016	25/04/2016	10/10/2016	1/02/2017	12/04/2017	10/07/2017	16/10/2017	24/08/2017	16/10/2017	11/04/2018	24/08/2017	16/10/2017	11/04/2018	14/07/2018
Aluminium, Al	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	-	0.02	0.02	<0.01	0.03	-	-	<0.01
Antimony, Sb	mg/L	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	-	-	-	0.002	0.001	0.002	0.001	-	0.001	<0.001	<0.001	<0.001	-	-	<0.001
Arsenic, As	mg/L	0.005	0.005	0.005	0.009	0.006	-	0.002	0.039	0.039	0.02	0.017	0.007	-	-	0.005	0.02	0.005	0.003	0.002	0.003	-	0.015	0.004	0.014	0.003	-	-	0.004
HCO_3 as $CaCO_3$	mg/L	180	180	180	170	170	180	210	120	120	140	140	150	140	150	-	180	300	290	280	250	-	140	170	220	480	-	-	500
Cadmium, Cd	mg/L	0.0003	0.0003	<0.0001	<0.0001	<0.0001	-	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0001	<0.0001	0.0003	0.0003	0.0002	<0.0001	-	0.0004	<0.0001	<0.0001	<0.0001	-	-	<0.0001
Calcium, Ca	mg/L	500	500	540	540	550	580	590	450	450	490	500	500	540	580	480	470	210	250	260	300	-	470	580	520	56	-	-	68
CO^{2-}_3 as $CaCO_3$	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	<5	<5	<5	<5	-	-	<5
Chloride, Cl	mg/L	970	970	970	970	870	850	800	760	760	820	870	860	850	830	870	840	550	590	570	610	-	830	840	840	210	-	-	200
Chromium, Cr	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	0.006	0.006	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Cobalt, Co	mg/L	-	-	-	-	-	-	0.15	-	-	-	-	-	-	-	-	-	0.044	0.043	0.041	0.041	-	0.26	0.18	0.26	0.001	-	-	0.002
Copper, Cu	mg/L	0.002	0.002	0.002	0.006	<0.001	-	0.004	<0.001	<0.001	0.001	0.002	<0.001	-	-	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	-	0.001	<0.001	<0.001	0.001	-	-	<0.001
CN-Total	mg/L	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.011	-	0.14	0.17	-	<0.004	-	<0.004
CN-WAD	mg/L **LIMIT <0.5**	<0.004	<0.004	0.01	0.011	0.55	<0.008	0.033	0.021	0.021	0.026	0.013	2.4	-	<0.2	<0.16	0.008	0.004	<0.004	<0.004	0.005	0.005	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004
Electrical Conductivity, EC	µS/cm	-	-	-	-	-	-	7970	-	-	-	-	-	-	-	-	-	4240	4.74	4120	5490	-	-	8390	9510	-	1860	2100	-
Fluoride, F	mg/L	-	-	-	-	-	-	0.013	-	-	-	-	-	-	-	-	-	-	<0.00005	<0.00005	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	-	-	<0.00005
Hardness	mg/L	3,500	3500	3900	3800	3900	4100	3800	2900	2900	3300	3300	3400	3600	-	3200	3100	1300	1500	1600	1900	-	3100	3700	3500	340	-	-	380
OH^- as $CaCO_3$	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	140	<5	<5	<5	<5	<5	-	<5	<5	<5	<5	-	-	<5
Iron, Fe	mg/L	0.07	0.07	1.5	0.22	1.9	-	<0.01	0.3	0.3	0.45	0.84	2.4	-	-	1.6	0.02	<0.01	<0.01	<0.01	0.06	-	<0.01	0.93	2.6	<0.01	-	-	0.01
Lead, Pb-D	mg/L	0.001	0.001	<0.001	0.002	0.014	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	-	<0.001
Lead, Pb-T	mg/L	-	-	-	-	-	-	0.004	-	-	-	-	-	-	-	0.02	0.7	0.009	0.004	0.015	0.056	-	0.006	0.001	<0.001	0.02	-	-	0.003
Magnesium, Mg	mg/L	550	550	610	610	610	640	570	430	430	500	500	520	560	600	490	470	200	210	230	280	-	460	560	520	50	-	-	51
Manganese, Mn	mg/L	2.7	2.7	14	6.3	21	-	2.9	24	24	27	26	24	-	-	20	15	0.84	2.9	2.9	3.4	-	19	11	22	0.043	-	-	0.27
Mercury, Hg	mg/L	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0.9	-	3.4	<0.5	2.3	0.6	-	-	0.3
Nickel, Ni	mg/L	0.051	0.051	0.031	0.062	0.027	-	0.037	0.041	0.041	0.06	0.044	0.042	-	-	0.013	0.012	0.017	0.023	0.025	0.027	-	0.041	0.015	0.021	<0.001	-	-	<0.001
Total Nitrogen, TN	mg/L	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-	-	34	27	26	20	-	64	38	18	0.5	-	-	<0.1
pH	pH units **LIMIT 6.5-8.5**	7.5	7.5	7.3	7.2	7.3	7.8	7.1	7.6	7.6	7.5	7.4	7.3	7.8	7.6	7.5	7.8	7.5	7.3	7.4	7.4	-	8.1	7.2	6.8	8	-	-	7.4
pH (field)	pH units **LIMIT 6.5-8.5**	7.13	-	7.25	7.04	7.26	-	6.72	7.19	-	7.17	7.02	7.29	-	-	7.43	-	7.98	7.62	7.43	6.98	-	-	6.91	7.18	-	7.33	7.4	7
Total Phosphorus, TP	mg/L	-	-	-	-	-	-	0.09	-	-	-	-	-	-	-	-	-	0.07	0.05	0.1	0.24	-	0.26	0.07	<0.05	1	-	-	0.02
Potassium, K	mg/L	2.4	2.4	2.4	3.8	3.3	3.7	3.2	7.2	7.2	5.3	7.6	6	6.6	7.3	6.3	4.9	5.4	3	3.4	3.5	-	5.4	8.4	5	4	-	-	1
Selenium, Se	mg/L	0.001	0.001	<0.001	0.002	<0.001	-	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	0.002	0.007	0.003	0.002	0.001	-	<0.001	<0.001	<0.001	<0.001	0.002	-	<0.001
Sodium, Na	mg/L	720	720	860	850	970	1000	990	1400	1400	1300	1400	1300	1300	1500	1300	1200	450	480	550	640	-	1200	980	1100	220	-	-	230
Sulfate, SO^{2-}_4	mg/L **LIMIT 5,000**	4100	4100	4000	3900	4100	4200	3400	4700	4700	4400	4400	4300	4300	4300	4500	4000	1100	1500	1400	1600	-	4200	4200	3900	130	-	-	130
Standing Water Level, SWL	mbgl	21.55	-	22.09	21.44	22.89	-	23.38	19.56	-	21.75	21.12	22.5	-	-	23.34	24.76	22.98	23.36	-	24.03	24.52	-	24.4	24.9	-	23.9	25.1	22.63

Thallium, Tl	mg/L	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	0.001	<0.001	<0.001	<0.001	-	0.001	<0.001	<0.001	<0.001	-	-	<0.001
Total Dissolved Solids, TDS	mg/L **LIMIT< 10,000**	7600	7600	7400	7700	7500	7500	6400	8100	8100	8000	8300	8200	8200	8100	8100	7100	3100	3200	2500	3600	-	7800	-	7500	900	-	-	1100
TDS (field)	mg/L	3200	-	3390	3350	4180	-	4060	3770	-	3740	3860	4560	-	-	4570	3280	2160	2.41	2100	2790	-	-	4290	4850	-	940	1070	-
Zinc, Zn	mg/L	0.018	0.018	0.022	0.042	0.005	-	0.11	0.013	0.013	0.05	0.028	0.003	-	-	0.009	0.002	0.007	0.004	0.006	0.005	-	0.024	0.04	0.009	0.002	-	-	0.004

Note:

- No sample results provided

Amendment history

Table 3 provides the amendment history for L7969/2004/3.

Table 3: Licence amendments

Instrument	Issued	Amendment
L7969/2004/3	21/11/2013	Amendment issued to correct the company registered business address.
L7969/2004/3	15/09/2016	Amendment issued for the following: Removal of mine dewatering conditions and category 6; Reduction in the frequency of tailings monitoring;; Increase in the TDS limit of ambient groundwater monitoring from 3500mg/L up to 10,000mg/L; Addition of groundwater monitoring bores and Production bore; Addition of category 63 and 64 to the licence; Addition of category 52 to the licence as upgrades involved the installation of three additional skid mounted container style diesel generators; Addition of improvement conditions to address groundwater concerns; and Update to definitions and removal of targets as per CEO instructions.
L7969/2004/3	20/10/2016	Amendment Notice 1 Licence amendment to change Licensee's registered business address
L7969/2004/3	15/12/2016	Amendment Notice 2 Licence amendment to update the landfill location map in Attachment 5 of licence
L7969/2004/3	21/04/2017	Amendment Notice 3 Licence amendment to review and update the ambient groundwater monitoring requirements for the TSF
L7969/2004/3	24/11/2017	Amendment Notice 4 Licence amendment to alter Licence Condition 14 relating to applying and maintaining monthly cover on landfilled putrescible waste.
L7969/2004/3	03/12/2018	Amendment Notice 5 Licence amendment to modify conditions for groundwater monitoring bores PMB1 and PMB2 and to include PMB9a and PMB11.

Decision

The Delegated Officer has determined that this amendment is required in order for the Licence Holder to meet compliance with the Licence conditions.

Condition 5(a) and 5(b), Tables 2 and 2(a) have been amended to allow the Licence Holder to not provide groundwater quality data for groundwater monitoring bores PMB1 and PMB2 when they are dry and to include groundwater monitoring bores PMB9a and PMB11.

The maps showing the locations of the groundwater monitoring bores have been updated in Attachment 3.

Attachment 6 has been included, as in previous Amendment Notice 3, this map was added in as Attachment 5 in error, as Attachment 5 exists as the landfill location map. Therefore, this map showing the locations of the groundwater monitoring bores PB45 and PB70 has been re-included as Attachment 6.

Licence Holder's comments

The Licence Holder was provided with the draft Amendment Notice on 29 November 2018. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

Amendment

1. Conditions 5 (a) and 5(b) of the licence are amended by the deletion of the text shown in strikethrough below and the insertion of the bold underline text shown in underline below:

    5(a) The Licensee shall take representative samples from the locations identified in column 1 of Table 2, at the frequency stated in column 2 of Table 2 and have them analysed for the parameters listed in column 3 of Table 2.

    5(b) The Licensee shall ensure that the parameter limits listed in Column 4 of Table 2 are not exceeded at the monitoring sites listed in column 1 of Table 2. The Licensee shall take the specified management actions outlined in Table 2(a) in the case of a reportable event listed in column 5 of Table 2.

Table 2: TSF monitoring requirements.

Column 1	Column 2	Column 3	Column 4	Column 5
Monitoring site	Sampling Frequency	Parameters to be measured[3]	Limits	Reportable event
Tailings Dam Ground Water Monitoring (Attachment 3)				
PMB1, PMB2 **(when groundwater present)** PMB3, PMB4, PMB5, PMB6 PMB07, PMB08, PMB09**, PMB9a** PMB10**, PMB11**	Quarterly; (October, January, April, July)	pH[1], Total Dissolved Solids (TDS), Standing Water Level (SWL)[2], Major Anions and Cations; Copper(Cu), Arsenic(As), Chromium (Cr), Aluminium (Al), Cadmium (Cd), Iron (Fe), Manganese (Mn), Nickel (Ni), Selenium (Se), Zinc (Zn), Lead (Pb), Antimony (Sb), Cobalt (Co), Thallium (Tl), Weak Acid Dissociable Cyanide ($_{WAD}$CN), Total Nitrogen, Total Phosphorus, Sulfate (SO_4), Fluoride (F), Mercury (Hg) Total Cyanide (CN)[4]	TDS $\leq$ 10,000mg/l pH 6.5-8.5 $_{WAD}$CN $\leq$ 0.5mg/l	Sulfate > 5,000mg/l
Production Bore 45 (PB45) (Attachment 5)			TDS $\leq$ 5000mg/l pH 6.5-8.5 $_{WAD}$CN $\leq$ 0.5mg/l	Sulfate >2,000mg/l
Production Bore 70 (PB70) (Attachment 5)			N/A	N/A
Tailings dam pond water - Tailings hopper monitoring point (Attachment 3)			N/A	N/A

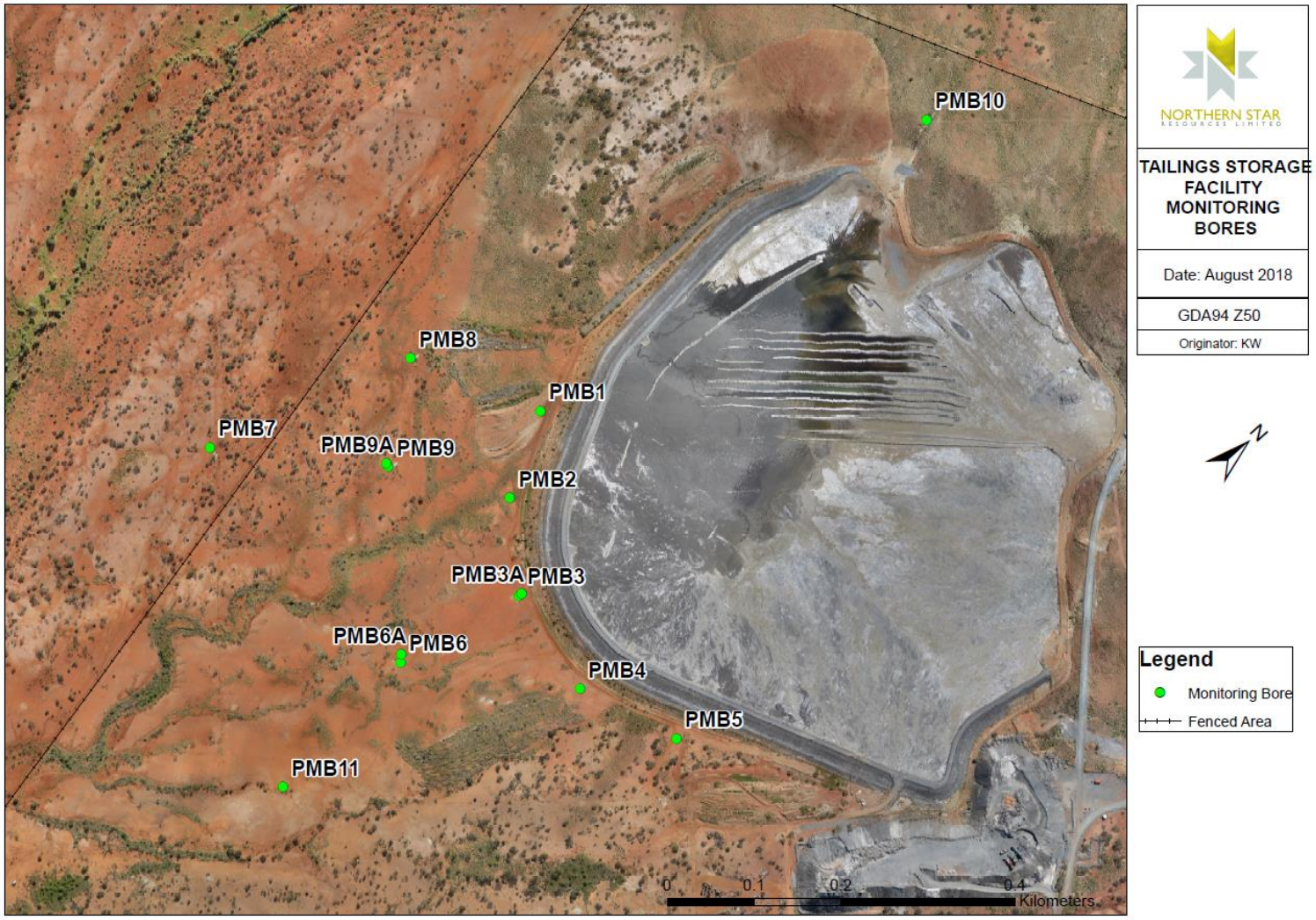
Note 1: In-field non-NATA accredited analysis permitted.
Note 2: SWL shall be determined prior to collection of other water samples.
Note 3: With the exception of pH and SWL all measurements are to be reported in mg/L.
Note 4: Only *applicable for tailings hopper monitoring*

Table 2(a): Trigger event management actions

Column 1	Column 2	Column 3	Column 4
Monitoring site	Event	Management action	Reporting requirements
PMB1, PMB2, PMB3, PMB4, PMB5, PMB6 PMB07, PMB08, PMB09***, PMB9a*** PMB10***, PMB11***	Reportable event listed in column 5 of Table 2	Install seepage recovery bore at PMB09 within one month of a reportable event	Notify the CEO ~~of DER~~ within one month of a reportable event, providing a report containing: • the reportable event date; • the raw monitoring data for the reportable event in tabulated form; and • evidence of management action implementation.
Production Bore 45 (PB45)		Cease abstraction at production bore PB45 within 24 hours of a reportable event	Notify the CEO ~~of DER~~ within seven days of a reportable event, providing a report containing: • the reportable event date; • the raw monitoring data for the reportable event in tabulated form; and • evidence of management action implementation.

2. The licence is amended by the replacement of the following groundwater monitoring maps into Attachment 3:

ATTACHMENT 3: LOCATIONS OF TAILINGS DAM GROUNDWATER MONITORING AND TAILINGS HOPPER MONITORING POINT



NORTHERN STAR RESOURCES LIMITED

TAILINGS STORAGE FACILITY MONITORING BORES

Date: August 2018

GDA94 Z50

Originator: KW

N

Legend

- Monitoring Bore
- Fenced Area


Tailings Hopper
Monitoring Point

3. The licence is amended by the replacement of the following groundwater monitoring map in as Attachment 6:

ATTACHMENT 6: LOCATIONS OF TAILINGS GROUNDWATER MONITORING POINTS PB45 AND PB70 (PRODUCTION BORES)

Appendix 1: Key documents

	Document title	In text ref	Availability
1	Licence L7969/2004/3 – Paulsens Gold Project	L7969/2004/3	accessed at www.dwer.wa.gov.au
2	DER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	N/A	accessed at www.dwer.wa.gov.au
3	DER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	N/A	

Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Notice on 29 November 2018 for review and comment. The Licence Holder responded on 3 December 2018 requesting that the Attachment 6 be updated with a more up to date figure. This has been included.