ANNUAL MONITORING REPORT – YGP

EPL230-01

(10/2/2022 – 9/2/2023)

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PR-OP	00	09/05/23	Issued for Information	MEA	JCO	GPA		
Validity Status / Revision index	Rev. Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approval	Company Approval

eni australia	Project name **BLACKTIP OPERATIONS**	Company identification DOCUMENT NUMBER Job N. ___
		Contractor identification Contract ___
(Vendor logo and business name)		Vendor identification …… Order N…….
Facility Name BLACKTIP	Location AUSTRALIA WA-33-L	Scale: 1:1 / Sheet of Sheets: 1 / 90
Document Title **Annual Monitoring Report – (2022-2023)**		Supersedes N…… Superseded by N……
		Plant Area / Plant Unit

REVISION HISTORY

Rev.	Date	Nr. of sheets	Description
00	09/05/23	90	Issued for Information

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1. EXECUTIVE SUMMARY

The Blacktip Annual Environmental Performance Report 2022 summarises the environmental performance of the Blacktip Yelcherr Gas Plant (YGP) for the reporting period 10 February 2022 to 9 February 2023. It makes this comparison against the Environmental Protection Licence (EPL) 230-01.

At times, this Report provides information required for licence anniversary reporting, with a 10 Feb 2022 to 9 Feb 2023 period. At other times, information is reported in Financial Year terms, based on NGER reporting (July to June). Where anniversary or financial year reporting is used, it is clearly marked.

The Report accompanies the Annual Return, which provides a summary of the compliance against the EPL.

1.1 Production

- Gas production was 544 kSCM;
- Annual Gas production was 415 ktonnes; and
- Condensate production was 7.5 ktonnes.

1.2 Discharges to Water

- Annual shellfish and sediment monitoring, and offshore produced water monitoring (for model validation) were conducted in July 2022. The results were consistent across the sampling sites, with little variation between the control and monitoring sites, providing confidence that there are no adverse impacts from produced water discharge;
- Produced water limits for Oil in Water, Manganese, Zinc, Benzene, Toluene, Ethylbenzene, and Xylene (m+p) were exceeded on occasions;
- Non-compliances with trigger values are shown in the relevant Appendix;
- Eni proposes dilution in the 50m diameter mixing zone around PW-01 as justification of low risk to the environment of releasing Produced Water above PW-02 specifications. The company had submitted a request for licence Amendment in 2021 and received request for further information (RFFI). This RFFI was closed in April 2023.

1.3 Discharges to Air

- Total greenhouse gas emissions from Yelcherr Gas Plant calculated in the latest NGER reporting period (July to June) were 43,277 tCO2-e; and
- Total volume of gas flared was 2,140 KSCM, with an average daily rate of 5.86 KSCM/d, compared with 6.98 KSCM/d in the previous licence period.

1.4 Discharges to Land

Liquid waste discharges – treated wastewater

- A total of 1.4ML of treated wastewater effluent was reused for irrigation; and
- Non-compliances with limits and trigger values are shown in Table 10.1. It included trigger values for Oil in Water, pH, and TSS.

Liquid waste discharges – stormwater

- Non-compliances with the trigger value for oil in water, occurred on various occasions;
- Oil in water typically ranged between 0 – 5.1mg/l; and
- Annual chemical characterisation was undertaken in January 2022.

1.5 Groundwater

- A total of 11ML was abstracted for potable water use; and
- All quarterly monitoring results were within the Australian Drinking Water Guidelines and ANZECC guidelines.

1.6 Waste Management

- Blacktip operations generated an approximate total of 23 tonnes of hazardous waste, and 63 tonnes of non-hazardous waste.

1.7 Non-Conformances

Non-Conformances recorded in 2022/2023 are reported in the Annual Return and recorded below. Exceedance of limits and three consecutive exceedances of trigger values are shown in Table 1.1.

Table 1.1: 2022/2023 Non Conformances

11-Feb-22	22-Mar-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 produced water and wastewater discharge	160755	PW above EPL Limit for TSS, Mn, Zn, Toluene, and Xylene (m+p). WW below EPL Limit for pH.
14-Mar-22	5-May-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 produced water discharge	160756	PW above EPL Limit for TSS, Mn, Zn, Benzene, Toluene, Ethylbenzene, and Xylene (m+p)
16-Mar-22	5-May-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01	160757	WW above EPL Limit for TPH, and Naphtalene
20-Apr-22	4-Apr-23	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge		PW above EPL Limit for Manganese, Zinc, Toluene, and Xylene. WW below EPL limit for pH. PW exceeded EPL trigger values for 3 consecutive samples for TSS and OiW
10-May-22	29-Jun-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge	160758	WW above EPL limit for pH, TSS, and TPH
12-May-22	29-Jun-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge	160759	PW above EPL Limit for Toluene, Ethylbenzene, and m+p-xylene, Manganese, and Zinc
23-Jun-22	26-Jul-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge	162814	PW above EPL Limit for pH, Zn, Toluene, Ethylbenzene, and m+p-xylene. PW above EPL Trigger Values for TSS, OiW, and Benzene.
20-Jul-22	25-Aug-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge	174145	PW above EPL Limit for Benzene, Toluene, Ethyl-Benzene, Xylene, and Manganese
24-Aug-22	3-Oct-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge	174147	PW above EPL Limit for Benzene, Toluene, Ethyl-Benzene, Xylene, and Zinc. WW below EPL limit for pH. WW above EPL limit for Copper and Zinc
20-Sep-22	4-Nov-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge	174148	PW above EPL Limit for Toluene, Ethyl-Benzene, Xylene, and Zinc. WW below EPL limit for pH.
26-Oct-22	16-Dec-22	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge	174149	PW above EPL Limit for Toluene, Ethyl-Benzene, Xylene, and Zinc. WW below EPL limit for pH. PW above trigger values, but below limits for OiW and Copper
23-Nov-22	21-Jan-23	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge		PW above EPL Limit for Toluene, Ethyl-Benzene, Xylene (M+P), Manganese (total), Zinc (total), and Copper (total). PW above trigger values over three consecutive samples for TSS and OiW.
17-Dec-22	2-Feb-23	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge		PW above EPL Limit for Toluene, Ethyl-Benzene, Xylene, Manganese (dissolved and filtered) and Zinc (dissolved and filtered). Phenol not taken. WW below EPL limit for pH. PW above trigger values for Benzene, Copper (dissolved and filtered)
21-Jan-23	9-Mar-23	EPL230-01	Condition 28	NTEPA	Blacktip - YGP - Env Incident - Non-compliance with EPL230-01 wastewater discharge		PW above EPL Limit for Toluene, Ethyl-Benzene, Xylene, Manganese, Zinc, Copper (dissolved and filtered), TSS PW above trigger values for OiW

1.8 Community initiatives

Eni continues to maintain a positive and engaging relationship with the Thamarrurr Rangers, who deliver local environmental monitoring services including:

- Containers for Change (plastic bottle recycling);
- offshore monitoring of the Single Point Mooring (SPM);
- marine monitoring (Shellfish and Sediment monitoring);
- controlled burning; and
- PW01 Sampling.

1.9 Continuous improvement

- A Comprehensive Fugitive emissions survey to monitor for gas leaks across YGP was conducted in May 2022; and
- Carbon Neutrality Plan developed to support a plant wide Energy Efficiency Assessment.

2. INTRODUCTION

This report summarises the environmental performance of the Blacktip YGP for the reporting period 10th February 2022 to 9th February 2023, as required by condition 63 of the EPL.

Eni Australia Limited (Eni) is Operator of the Blacktip Gas Project in the Northern Territory. The development consists of a small unmanned offshore wellhead platform, a subsea pipeline bringing whole well stream fluid, (i.e., gas, condensate and produced water) to Yelcherr Beach and the Yelcherr Gas Plant (YGP) near Wadeye The processed gas is exported via an onshore export pipeline, by Australian Pipeline Trust, to the customer, Power and Water Corporation.

Blacktip YGP commenced production on 26 August 2009. The operation of the YGP is licensed under the Environmental Protection Licence (EPL), EPL230-01, issued by the former Department of Natural Resources, Environment, The Arts and Sport (NRETAS) (now Northern Territory Environment Protection Authority (NT EPA)) on 11th August 2009.

EPL230-01 (the current license) was issued to Eni as the most recent amendment to the EPL.

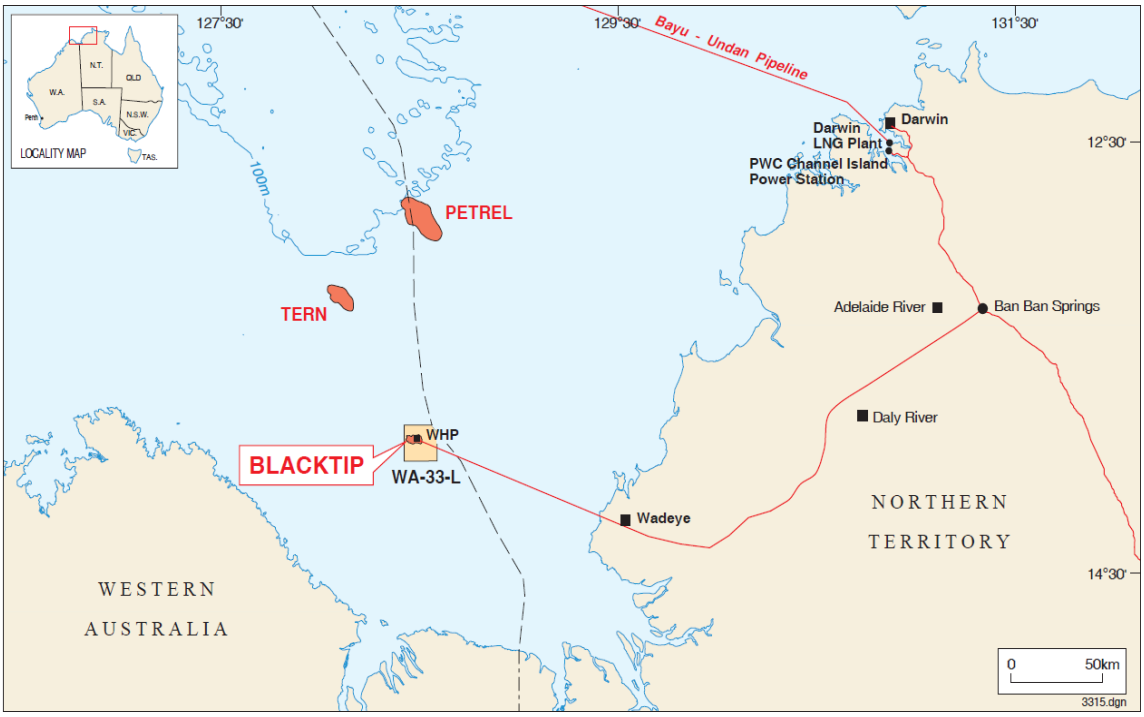


Figure 2.1: Blacktip Project locality map

2.1 Condition 64 requirements

This report has been prepared in accordance with NT EPA 'Guideline for Reporting on Environmental Monitoring' and the requirements under condition 64 of the EPL, outlined below.

Table 2.1: EPL Condition Clause 64

Clause	EPL condition
64.1	include an updated description of gas plant infrastructure and processes
64.2	reports on total condensate produced and total gas processed by the gas plant;
64.3	reports on the quality of gas received by the plant;
64.4	includes a tabulation of all monitoring data required as a condition of this licence;
64.5	includes a trend analysis and interpretation of all monitoring data required as a condition of this licence;
64.6	includes a long-term trend analysis of monitoring data to demonstrate any environmental impact associated with the activity over a minimum period of three years;
64.7	reports the total annual emissions for each emission point, as well as for condensate tanks and fugitive emissions.
64.8	reports the frequency and volume of wastewater discharges for the reporting period;
64.9	identifies the number of exceedances of trigger values and limits that have occurred during the reporting period, which includes a record of trigger value exceedances in accordance with condition 61;
64.10	is prepared in accordance with the requirements of the NT EPA *Guideline for Reporting on Environmental Monitoring;*
64.11	demonstrates continuous improvement in air emissions from the authorised air emissions points identified in Attachment 4;
64.12	demonstrates continuous improvement in wastewater quality from the authorised discharge points identified in Attachment 2.

2.2 Program objectives

Wastewater streams emanating from the YGP include:

- Produced water;
- Sewage wastewater;
- Stormwater runoff from the utilities area, and
- Stormwater runoff from the Open Drains System (ODS).

The above streams may contain pollutants, which, if not properly managed, can enter the groundwater or surface waterways and result in soil and groundwater contamination. Therefore, wastewater must be managed appropriate in accordance with the Onshore Gas Plant Environmental Management Plan 000036_DV_EX.HSE.0684.000, and discharges are to be monitored for pollutants.

2.3 Site information

2.3.1 Site layout

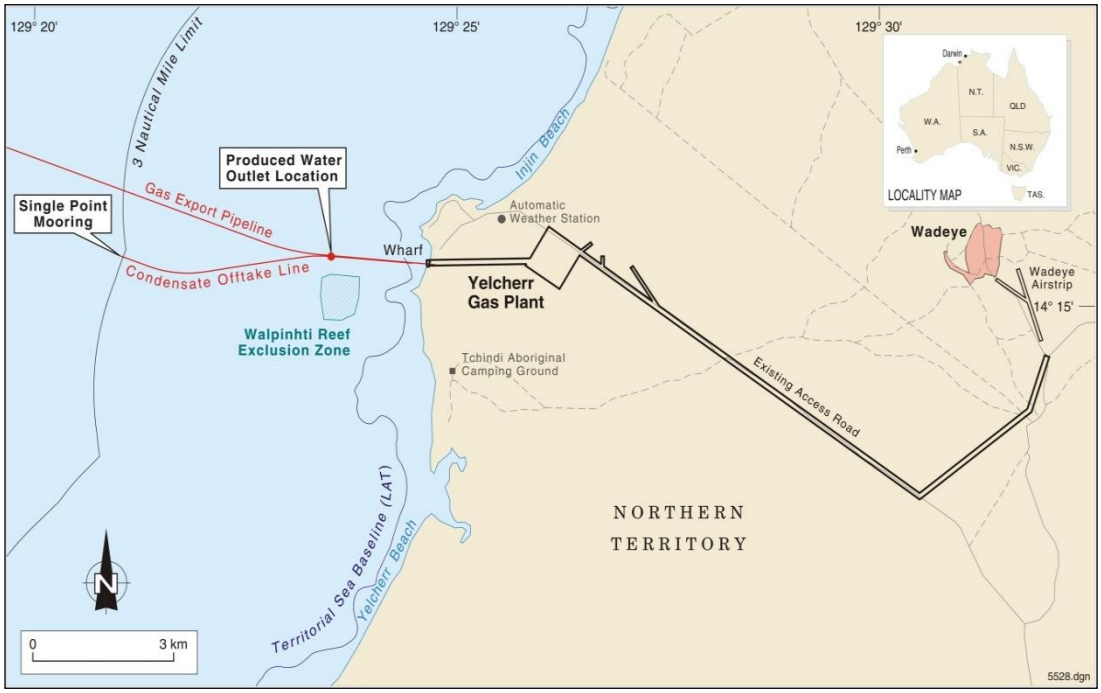


Figure 2.2: Blacktip Project layout

2.3.2 Environmental Context

Wadeye is located in the eastern (onshore) part of the Bonaparte Gulf Basin. The key geological/aquifer unit in the region is the Hyland Bay Formation, of Upper Permian age, which dips to the west (Laws & Brown, 1976). The unit is about 400m thick and was deposited in a deltaic environment during a period of marine transgression. Overlying the Hyland Bay Formation are undifferentiated sediments that have been heavily leached/altered to form a blanket cover of laterite and laterised clays and sandstones (Jamieson, 1991).

The uppermost sediments (in the Hyland Bay Formation) comprise weathered, fine to coarse, clean to clayey sandstone and rounded quartz gravels with interbeds of clay and siltstone. Fracturing within the Hyland Bay Formation sediments has resulted in the development of secondary permeability and highly permeable dual-porosity aquifers in this unit, which have been exploited by bores utilised for water supply by the Wadeye community (Jamieson, 1991). The aquifers are semi-confined to semi-unconfined, with pumping typically resulting in a delayed yield from surrounding sediments (Jamieson, 1991).

The lowermost sediments comprise pink to dark grey clays which are at least 50m thick. This clay unit sub-crops immediately to the east of Wadeye.

Geotechnical investigations undertaken by Advanced Geomechanics (AG, 2005) have confirmed that the general lithological sequence of sandstones, clayey/silty sands and gravels at the plant site is fairly consistent with the sequence found at Wadeye, although no gravels have been encountered at Wadeye.

Interpretation of a 10-day pumping test undertaken by AG (2005) (Figure 5) indicates that the aquifer in the area of the plant site has a transmissivity of around 1,300 m2/day, although the lack of measurement precision with which the test was undertaken causes some uncertainty in the estimated transmissivity. The groundwater level (elevation) at the time of the test in October 2004 was not provided but is estimated to be around +4 mAHD (based on section drawings showing bore elevations). Pumping at around 190 kL/day resulted in a final drawdown of 0.2 m. Jamieson (1991) reports a typical transmissivity of around 4,000 m2/day in the Wadeye area and a specific yield of 10%.

Groundwater flows to the west and discharges as small springs in coastal creek/swamp areas. The hydraulic gradient is low and estimated to be about 0.1% (Jamieson, 1991). Based on the results of bore test data, Jamieson (1991) estimates that groundwater throughflows, (and hence coastal discharges to the sea and creek/wetland systems) are of the order of 1.5 Mm3/yr/km.

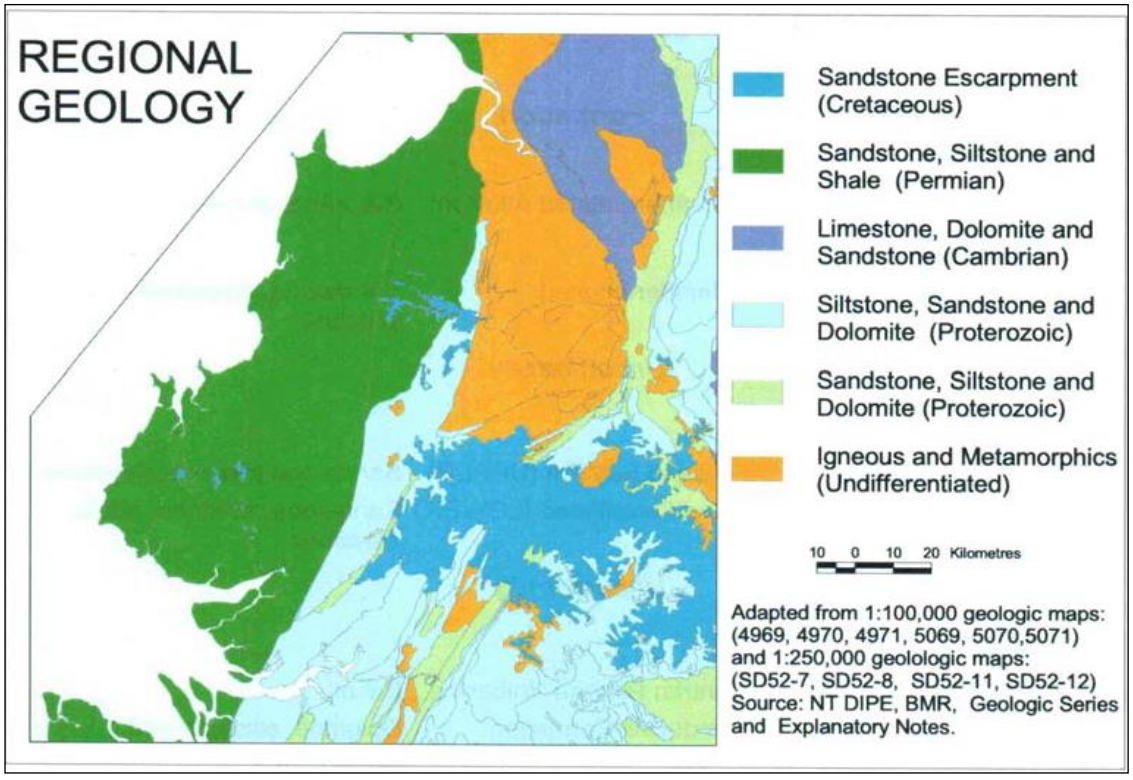


Figure 2.3: Regional Geology layout

Source of above information is Groundwater Management Plan - Blacktip Gas Project (Phase 1 Civil Works), EcOZ Environmental Services Pty Ltd, Sept 2006

3. OVERVIEW OF YELCHERR GAS PLANT

3.1 General overview

In accordance with condition 64.1 of EPL230-01, this section provides a description of the gas plant infrastructure and processes.

Infrastructure at the YGP includes:

- A gas processing plant consisting of separation, gas dehydration, compression, condensate storage and produced water treatment facilities;
- The onshore portion of an 18" carbon steel, multi-phase pipeline bringing produced fluids from the offshore gas field to the YGP, starting from the shore crossing;
- The onshore portion of a condensate export pipeline from the condensate storage facilities at the YGP to the shore crossing; and
- A portion of the onshore gas export pipeline that runs from the gas processing plant to a custody transfer meter at the boundary of the YGP site.

3.2 Plant configuration

After processing, un-odorised natural gas at agreed specifications is delivered to the customer via an onshore export pipeline to a custody transfer meter at the boundary of the YGP, at a maximum delivery rate of 120 TJ/day.

Stabilised condensate is stored on site at the YGP before being exported to the SPM for offload via tankers.

The production life of the field is planned to be 25 years based on initial gas sales contract. The design life of the Blacktip YGP is 30 years.

The entire YGP site occupies an area of 750m by 750m, with the main process facility located to the south of the site (occupying an area of approximately 250m by 380m) and the accommodation, warehouse, offices, and control room to the north (see Figure 3.1). The coordinates of the YGP are shown in Table 3.1.

Table 3.1: YGP Coordinates

Corner	GDA 1994		GDA 1994 MGA Zone 52	
	East	North	mE	mN
W	129°25'52.09"	14°14'33.60"	546 510	8 425 393
N	129°26'05.87"	14°14'13.22"	546 924	8 426 018
E	129°26'26.77"	14°14'26.66"	547 549	8 425 604
S	129°26'12.99"	14°14'47.04"	547 135	8 424 979

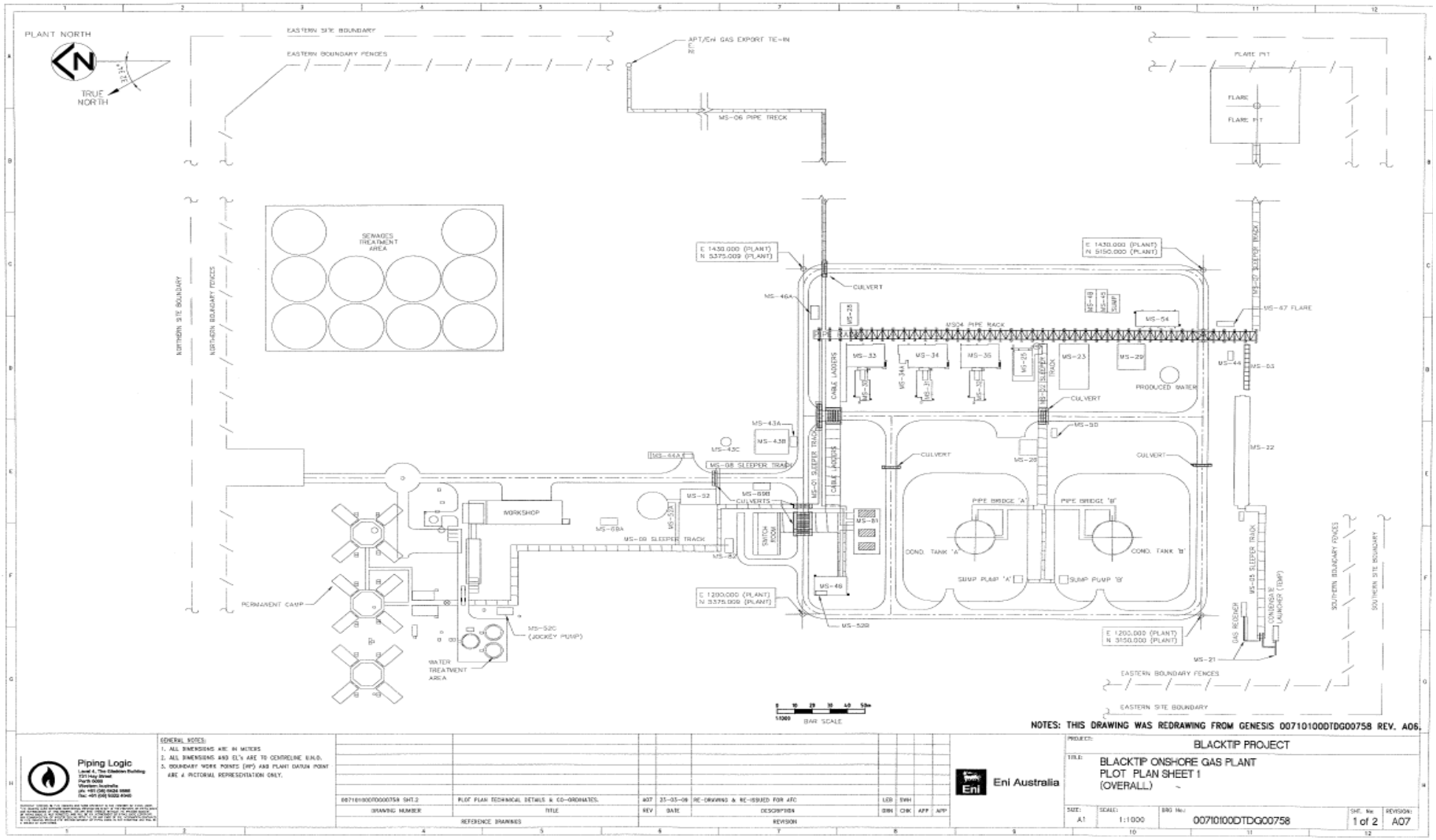


Figure 3.1: Blacktip YGP layout

3.3 Other facilities

Other key facilities on site include:

- Utilities system – including:
  - Power generation;
  - Compressed air system;
  - Potable water system;
  - Chemical injection;
  - Stormwater drainage;
  - Sewage treatment plant and effluent reuse; and
  - Firewater.
- Ancillary buildings – including:
  - Accommodation; and
  - Laboratory, workshop and stores;
- Hazardous chemicals storage; and
- Lighting and security.

4. PRODUCTION

4.1 Overview

The annual production is provided in Table 4.1.

Blacktip is licensed for a maximum scale of 1,055,300 tonnes of gas and 50,900 tonnes of condensate per annum.

Table 4.1: Overview of production

	2020	2021	2022
Annual gas production (KSCM)	946,762	881,400	543,814
Annual gas production (t)	723,326	673,000	415,240
Condensate production (t)	10,615	10,521	7,476
Total production (t)	733,941	683,521	422,716

Notes: Reporting period is from 1 January – 31 December

4.2 Condensate

Two condensate offtakes occurred on 15th February 2022 and 26th November 2022. Volumes were 31,564bbl and 29,433bbl respectively.

4.3 Gas production

Total gas production in 2022 was 543MSCM, a decrease from 2021.

4.4 Gas composition

The reservoir fluid properties and contaminants are shown in Table 4.3 and Table 4.3.

Table 4.2: Blacktip reservoir fluid properties

Component	Percentage
CO_2	0.62 mol%
N2	5.88 mol%
Methane	89.06 mol%
Ethane	2.82 mol%
Propane	1.00 mol%
Ibutane	0.12 mol%
Butane	0.23 mol%
Ipentane	0.06 mol%
Pentane	0.05 mol%
Hexanes	0.02 mol%
Heptanes	0.01 mol%
Octanes	0.02 mol%
Nonanes	0.03 mol%
Decanes	0.04 mol%
Undecanes	0.02 mol%
C_{12+}	0.01 mol%

Source: Ref. [3], [5]

Table 4.3: Contaminants in Blacktip Gas

Component	Maximum measured
H_2S	3.0 ppmv
Mercaptan	<0.5 ppmv
Mercury	0.2 µg/m³
Radon	222 Bq/m³
Argon	0.01 mol%
Oxygen	<0.01 mol%
Helium	0.06 mol%
Hydrogen	0.01 mol%
Benzene	0.002 mol%
Toluene	0.002 mol%
Ethyl Benzene	<0.001 mol%
Xylenes	0.001 mol%

Source: Ref. [3], [5]

5. MONITORING DISCHARGES TO WATER

5.1 Produced Water

Produced Formation Water (PFW) or Produced Water (PW) separated from the liquid stream is further processed in the PFW system to remove free oil prior to disposal at sea.

The key design functions of the PFW Treatment System are to:

- Handle a maximum flow rate of 9,400 bwpd (1,500 m3/day); and
- Reduce the oil in water concentration to below 30 ppm.

The main components include:

- Produced Water Degasser;
- Induced Gas Flotation (IGF) Units;
- Produced Water Break Tank; and
- CETCO unit.

The licence limit for OiW is 25mg/l, so a sodium hydroxide solution is added to remove the final hydrocarbon components to ensure specification. pH balance is returned by adding Citric Acid once the OiW readings have steadied below the limit. This information is gathered from site testing using the Horriba method to confirm suitability to discharge.

Produced water discharge in this reporting period was 31ML.

Annual shellfish and sediment monitoring, and offshore produced water monitoring (for model validation) were conducted in July 2022. The results were consistent across the sampling sites, with little variation between the control and monitoring sites, providing confidence that there are no adverse impacts from produced water discharge.

Table 5.1 presents the annual produced water discharges for the past three years.

Table 5.1: Produced water discharge annually

	2020	2021	2022
Volume of PW discharged (m^3)	5,787	10,503	31,440
Number of discharge days	22	57	237

Notes: Reporting period is from 1 January – 31 December
Produced water volumes increased in 2021, hence a significant increase in the number of discharge days is expected.

5.1.1 Monitoring Objective

The objective of the Produced Water discharge monitoring program is to:

- Characterise the quality of the discharge stream; and
- Assess compliance with the limits and trigger values in the licence.

5.1.2 Monitoring Methods

Produced water is sampled and tested on site prior to discharge to ensure parameters are within the limits stipulated in the EPL.

Samples are taken during discharge to ensure water quality remains within the licence limits. These samples are tested in the site laboratory.

EPL230-01 requires quarterly characterisation of PW. Sampling has been undertaken as per the sampling plan.

Samples are taken from PW-02. These samples are analysed for the parameters as specified in EPL230-01. The samples are taken on the Tuesday, are stored appropriately, prior to transfer to the company's laboratory services provider Caleb Brett, a subsidiary of Intertek. The samples travel by charter flight from Wadeye to Darwin on a Wednesday morning. On arrival in Darwin, company logistics team moves the samples to Caleb Brett. Chemists at Caleb Brett distribute the samples to laboratories within their network. NATA accredited laboratories are used.

Routine and periodic produced water samples are collected by the process operators.

The monitoring regime is further detailed in the document Environmental Monitoring Requirements [000036_DV_PR.HSE.1020.000_03].

5.1.3 Monitoring Results

The table outlining the results is available in the relevant Appendix.

Laboratory analysis indicates a sustained increase in Barium, Boron, Copper, Mercury, and Lead. These increases started in late November 2020.

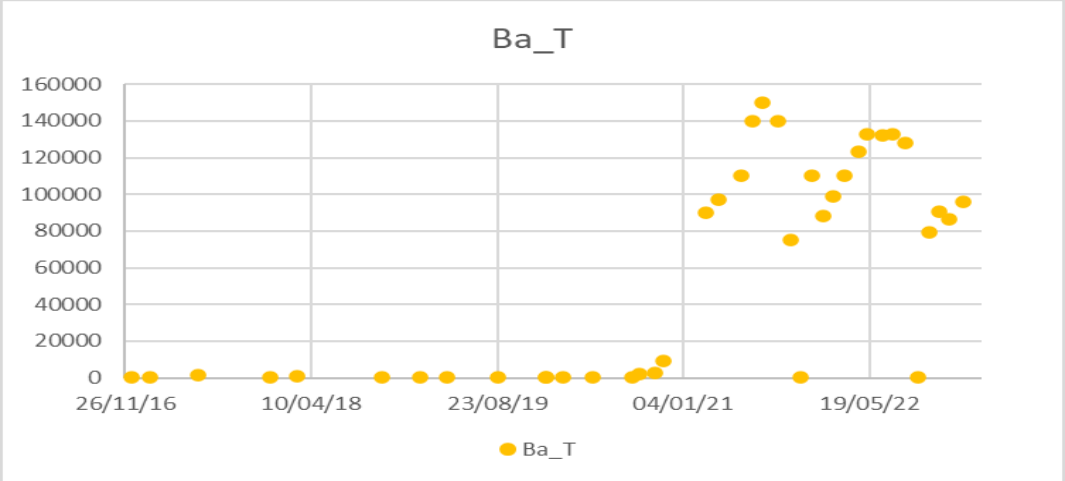
These are not parameters that trigger a breach in compliance. They are parameters that Eni has committed to monitor as per EPL230-01.

November 2020 correlates to higher PW discharge frequencies, indicating higher produced water flowrates.

A hypothesis is that due to the wells watering out, greater concentrations of metals are being brought to the surface. YGP does not have any metals removal process in the PWT system, so these metals are discharged to sea.

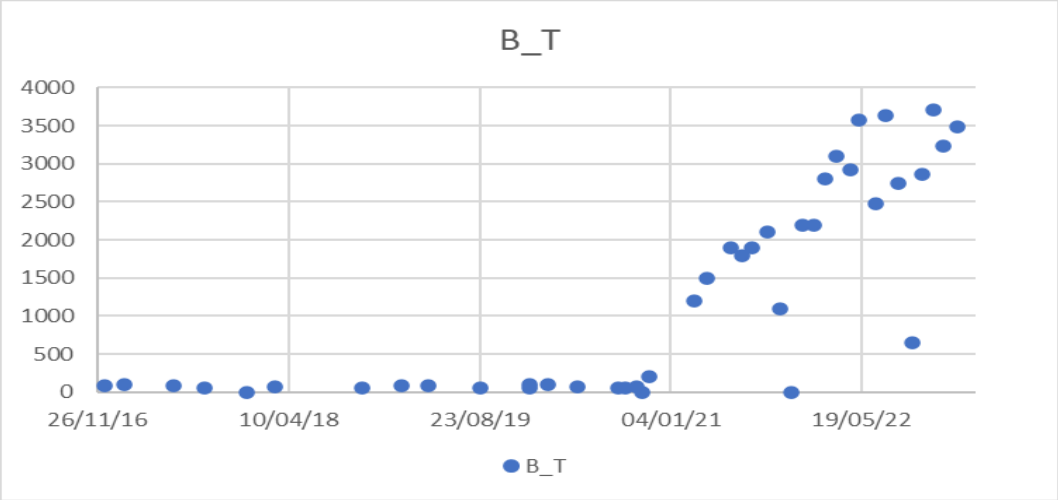
Key trends identified during the reporting period are shown below.

Table 5.2: YGP Ba_T Trending Data



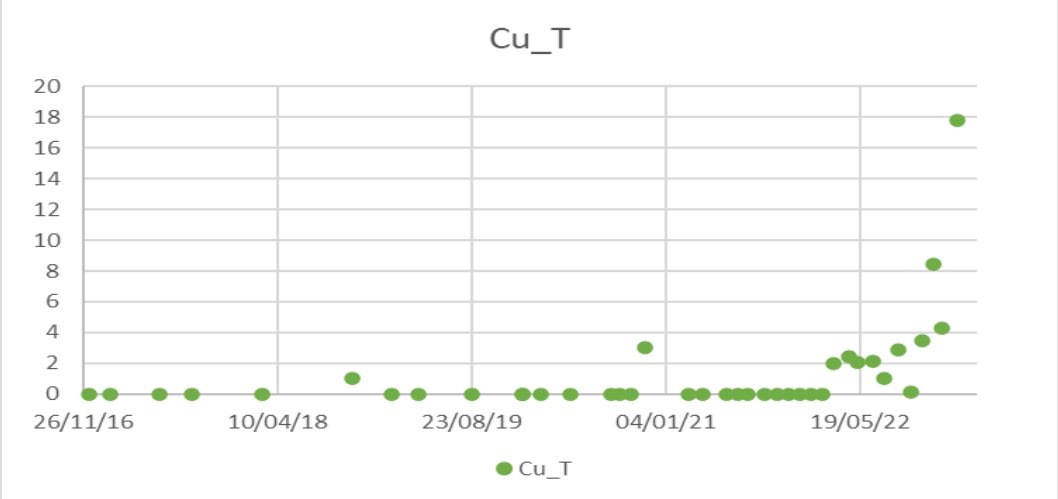
[µg/l]

Table 5.3: YGP B_T Trending Data



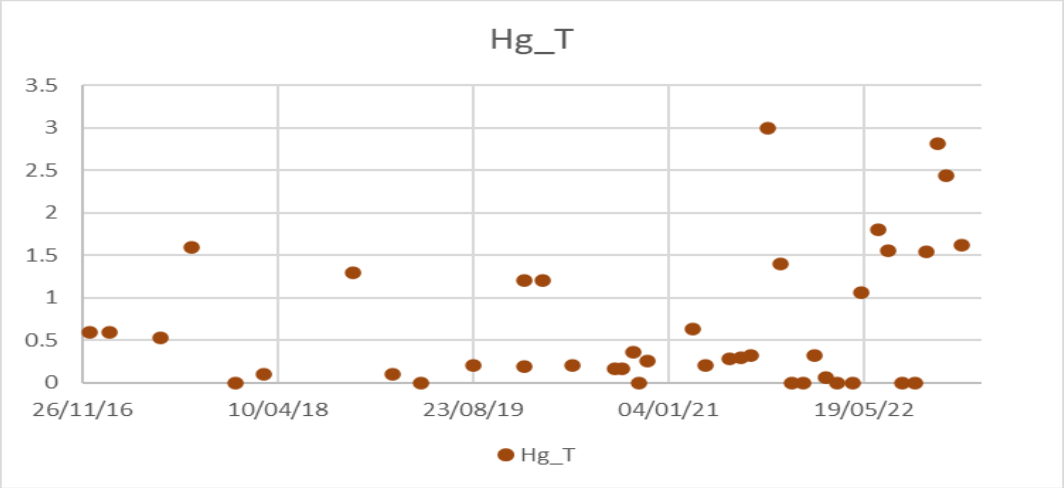
[µg/l]

Table 5.4: YGP Cu_T Trending Data



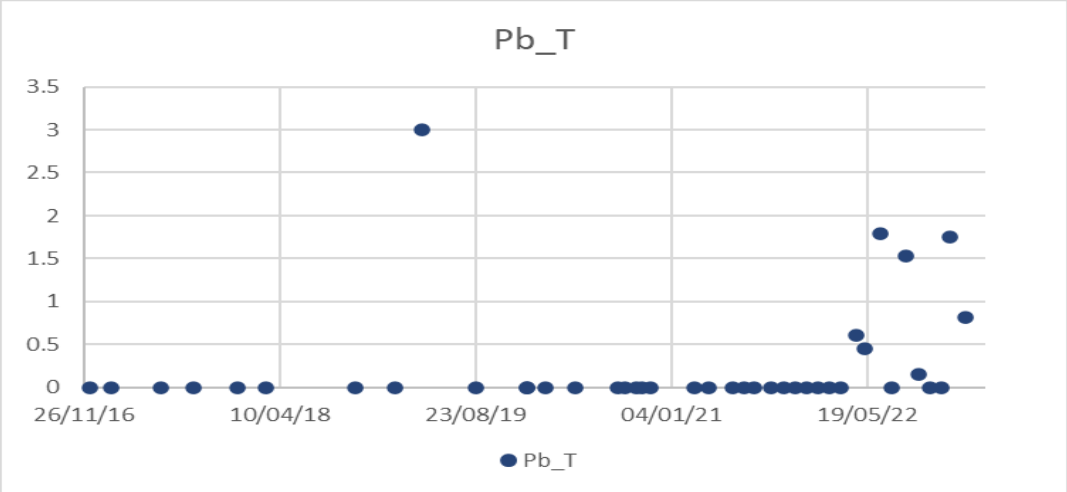
[µg/l]

Table 5.5: YGP Hg_T Trending Data



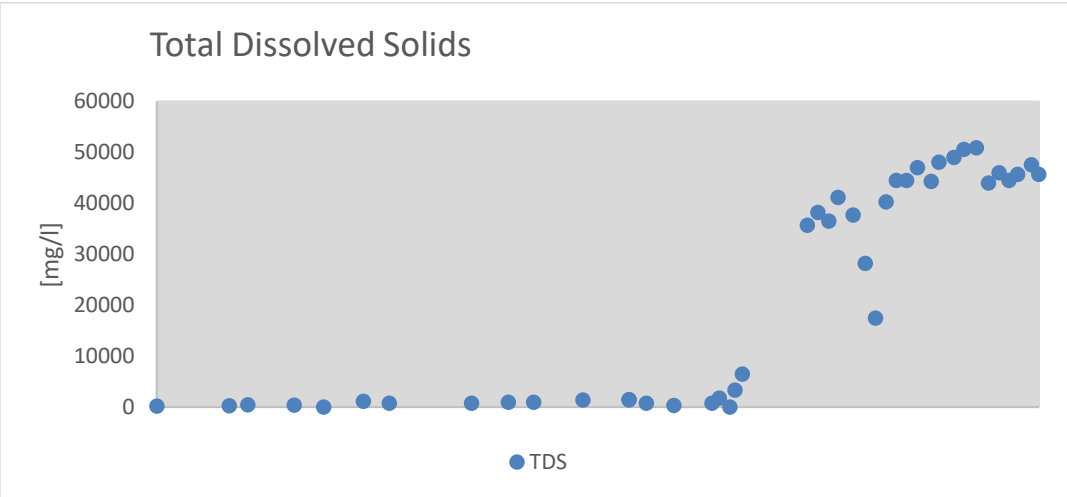
[µg/l]

Table 5.6: YGP Pb_T Trending Data



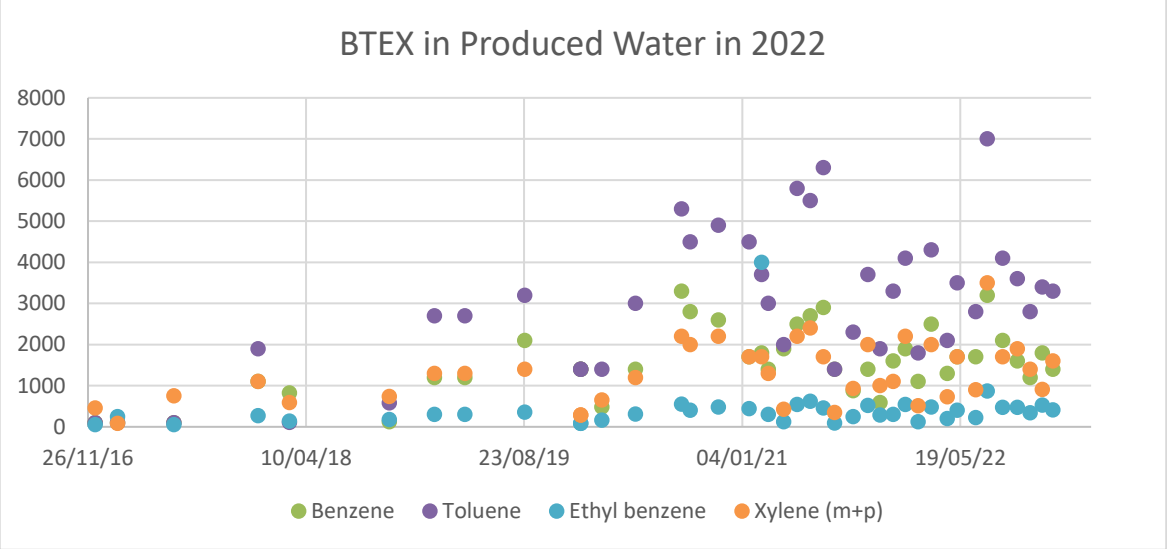
[µg/l]

Table 5.7: YGP Hg_T Trending Data



For hydrocarbon samples there has been a gradual increase in Benzene, Toluene, Ethyl benzene and Xylene (BTEX), since 2016. This is likely due to entrained hydrocarbon passing through the system. The facility is investigating Nitrogen sparging and activated carbon filters to extract the entrained hydrocarbon. The BTEX units are [µg/l].

Table 5.8: BTEX in Produced Water Trending Data



5.1.4 Data Management and Quality Control

The quality assurance/quality control (QA/QC) procedures specific to the collection and analysis of samples from sample location included:

- NATA accredited analytical laboratories were used for all analysis or a test method managed under a NATA accredited quality management system;
- Laboratory designated sample holding times met;
- Chain of custody forms was completed and accompanied the samples; and
- Calibration of all field-testing equipment using standard method(s) was undertaken.

5.1.5 Annual Marine Monitoring

Eni has an annual commitment, set out in *Produced Water Management Plan* 000036_DV_EX.HSE.0381.000_A02, to undertake sediment and shellfish sampling in the vicinity of the produced water pipeline to monitor any impacts on sediment and biota.

Sediment and Shellfish Sampling was undertaken in July 2022 in accordance with the *Australian Government National Assessment Guidelines*. Sampling is typically undertaken at the end of the wet season in May when shellfish are still relatively abundant.

The results were consistent across the sampling sites, with little variation between the control and monitoring sites, providing confidence that there are no adverse impacts from produced water discharge.

5.1.6 Produced water model validation

Eni has a commitment in the Produced Formation Water Plan (000036_DV_PR.HSE.1056.000_04) to validate the near field and far field produced water dispersion model.

Offshore monitoring at the produced water outfall was undertaken in November 2020, for the purposes of validating the produced water dispersion model in accordance with the Produced Formation Water Plan. The study report was delivered on the 25th of March 2021. The assessment concluded that within the proposed 50m mixing zone, no laboratory parameters exceeded the ANZG (2018) Marine water 99% toxicant DGVs.

This report was submitted to the NT EPA on 30th April 2021 to support the licence amendment of Eni to increase the allowable discharge concentration of BTEX, Zn, and Mn parameters in the Produced Water Discharge stream. This assessment remained open at time of writing. This request for amendment was followed up on in March 2023, through completion of the outstanding RFFWI.

5.1.7 Discussion and Interpretation of Results

It is suspected that a new water layer was broken in to in late 2020 and this has bought additional metals to the surface. Company is drilling a new well, and working over an existing well and this is expected to reduce the water flow rates when it starts up again.

BTEX is light entrained hydrocarbon. These levels have exceeded parameters for TEX for several years, so appear unlinked to the new water source in the formation.

5.1.8 Conclusions and Proposed Actions

Company is trialling a nitrogen sparging in the Produced Water Treatment tank to strip the light hydrocarbons. Company is sourcing activated carbon filters for use at the discharge to remove the entrained hydrocarbon.

This will likely trigger greater pressure to install metals removal capacity. Or close in the well.

Due to dilution in the mixing zone to contaminant concentrations below ANZG Defaul Guideline Values (DVG), the risk of negative environmental receptor impact is deemed low.

6. MONITORING DISCHARGES TO LAND

6.1 Wastewater disposal

Domestic wastewater, including wastewater originating from showers, wash basins, toilet facilities, laundries, and kitchens, is treated by the Wastewater Treatment Plant (WWTP). The WWTP is an ABACO Jacana Sequencing Batch Reactor (SBR). The SBR includes primary treatment by settlement and secondary treatment by activated sludge. Treated effluent is discharged through an irrigation system to the designated area shown. The irrigation system has a flow rate capacity of 3.5m3 /hr and consists of 10 sprinklers, each with a 40m radius.

Wastewater generated at Blacktip YGP is treated in an ABCO Water System 150 EP. Effluent is reused through an irrigation system to land, and a total of 1.4ML was discharged over the reporting period.

Table 6.1: Treated wastewater effluent reuse

	2020	2021	2022
Effluent reuse (ML)	2.2	1.7	1.4

Notes:
Reporting period is from 1 February to 31 January.

In accordance with the EPL, treated discharged wastewater is sampled and analysed for constituents monthly by an external laboratory to verify compliance against the contaminant limits. The results are presented in the relevant Appendix.

Volumetric flowrates are down significantly on 2020 discharge. The reason is not apparent. There have been no meter reading issues.

6.1.1 Monitoring Objective

Wastewater monitoring includes:

- Routine testing on site prior to discharge; and
- Periodic (monthly, quarterly, or annually) monitoring of discharge water for detailed chemical analysis.

Routine sampling and testing prior to discharge allow water quality to be assessed to determine whether it meets the EPL limits for discharge. The tests are typically carried out on site in the site laboratory using portable bench top instruments such as the Horiba and PC700 and are described in the Blacktip Operations Water Sampling Procedure 000036_DV_PR.HSE.1013.000.

Periodic monitoring of discharge water is undertaken to monitor the chemical composition of the wastewater stream and assess water quality across a full suite of parameters. Samples are sent to an external laboratory for analysis of chemical composition.

Sewage wastewater samples are collected by the Process Operators. Sewage wastewater is treated by the Wastewater Treatment Plan (WWTP) and discharge to a nearby irrigation spray field (authorised discharge point WW-01).

6.1.2 Monitoring Methods

Samples are taken from sample point WW-02. These samples are analysed for the parameters as specified in EPL230-01. The samples are taken on the Tuesday and are stored appropriately. Samples are transferred to Darwin and Chain of Custody transferred to company's laboratory services provider Caleb Brett, a subsidiary of Intertek. The samples travel by charter flight from Wadeye to Darwin on a Wednesday morning. On arrival in Darwin, company logistics team moves the samples to Caleb Brett. Chemists at Caleb Brett distribute the samples to laboratories within their network. NATA accredited laboratories are used where required.

Routine and periodic water samples are collected by the process operators.

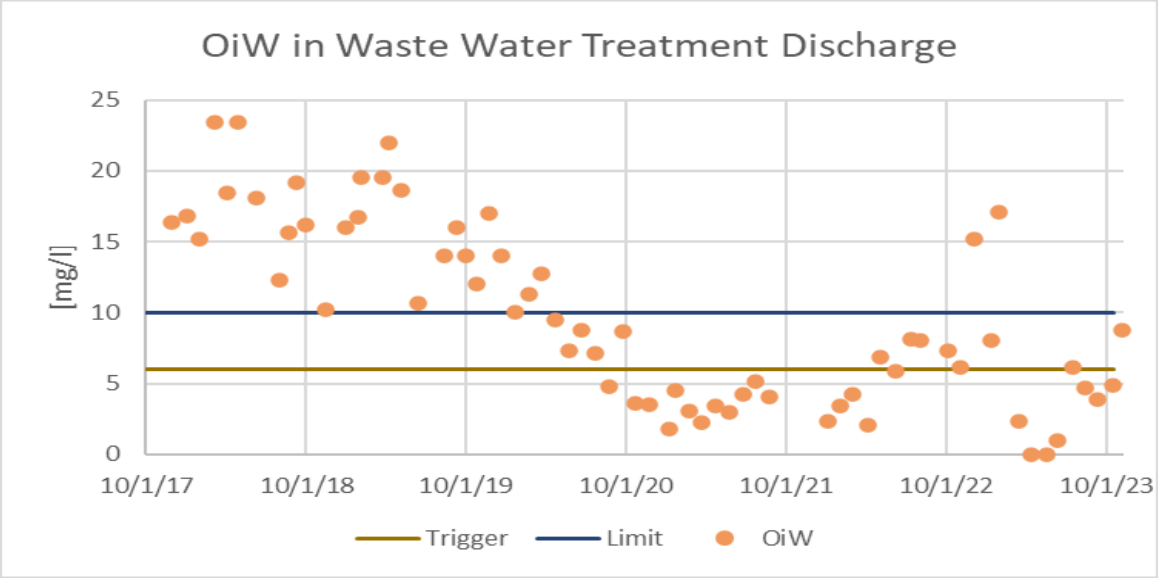
The monitoring regime is further detailed in the document Environmental Monitoring Requirements [000036_DV_PR.HSE.1020.000_03].

6.1.3 Monitoring Results

The table outlining the results is available in the relevant Appendix.

Graphs indicating trending according to parameters with EPL limitations and parameters to be monitored, are presented below.

Table 6.2: YGP Treated wastewater effluent reuse Trending Data



For OiW, Eni suspects the high values up to 2019 likely are due to inappropriate use of the grease trap in the kitchen. Discipline has been built to ensure kitchen hands and chefs pour the waste oil in to the grease trap, which is then transported to Darwin for disposal. It is suspected that the higher values in 2022 were the result of temporary chefs disposing of used oil down the sink. These behaviours are constantly addressed in communications when inappropriate disposal is noted.

Table 6.3: YGP pH and Range Trending Data

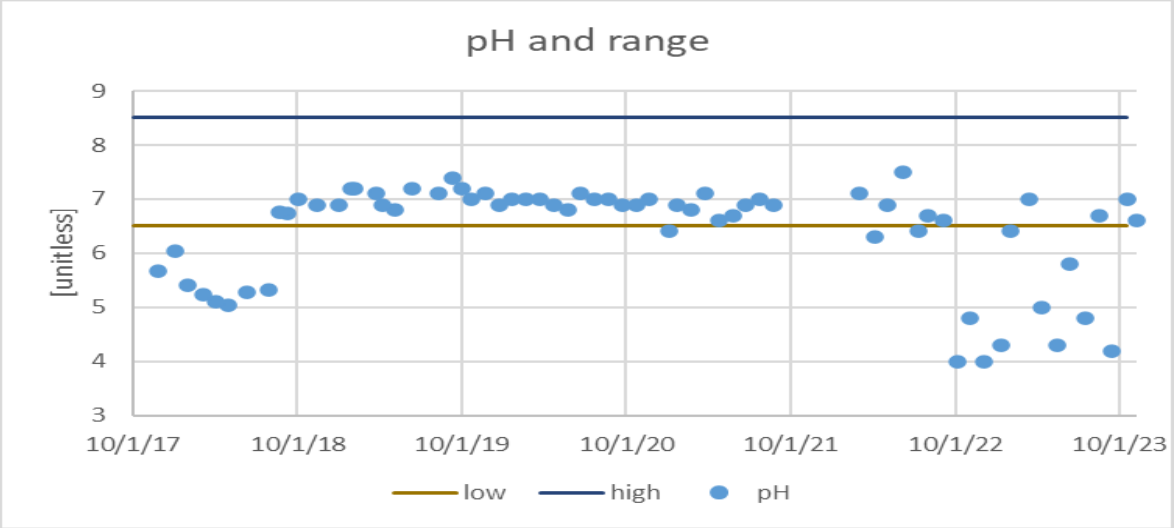


Table 6.4: YGP E.coli and licence limits Trending Data

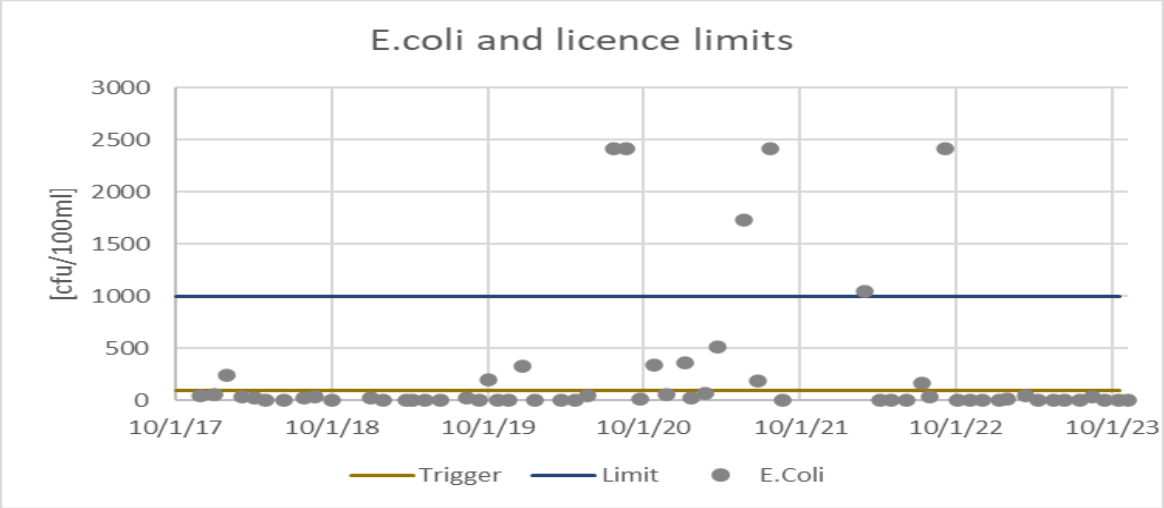


Table 6.5: YGP BOD and licence limits Trending Data

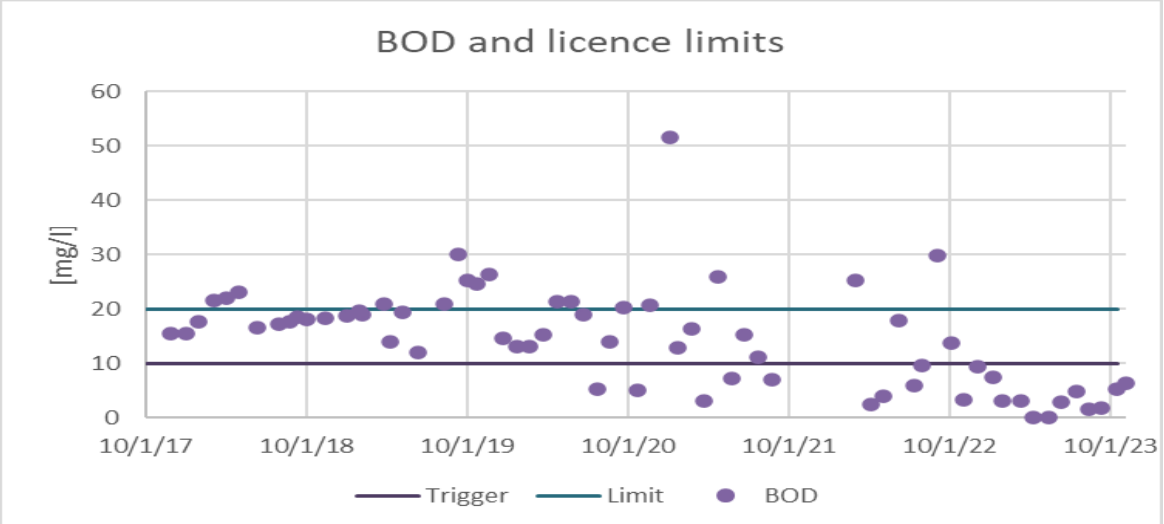


Table 6.6: YGP TSS and licence ranges Trending Data

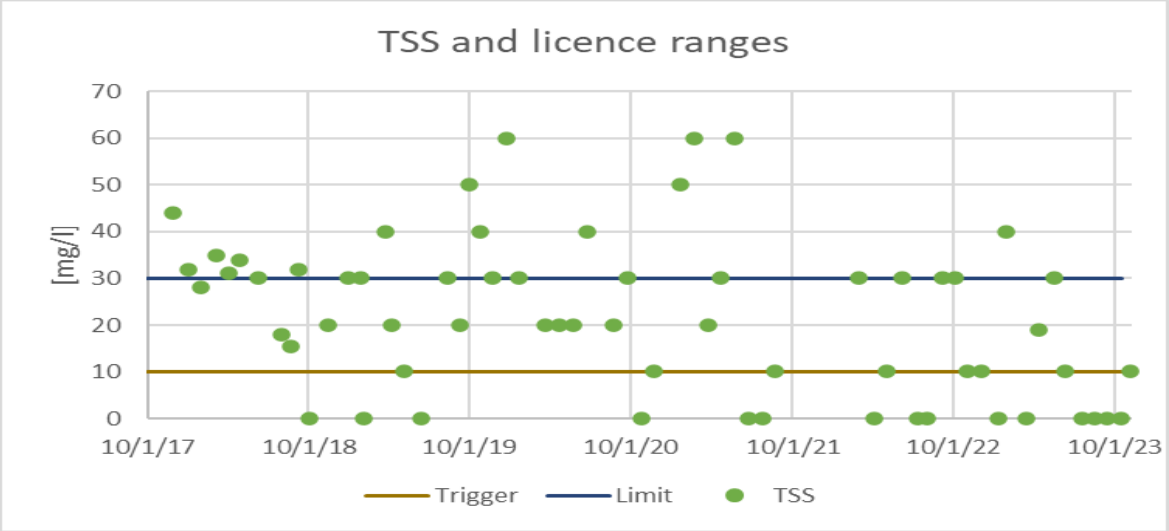


Table 6.7: YGP TSS and licence ranges Trending Data

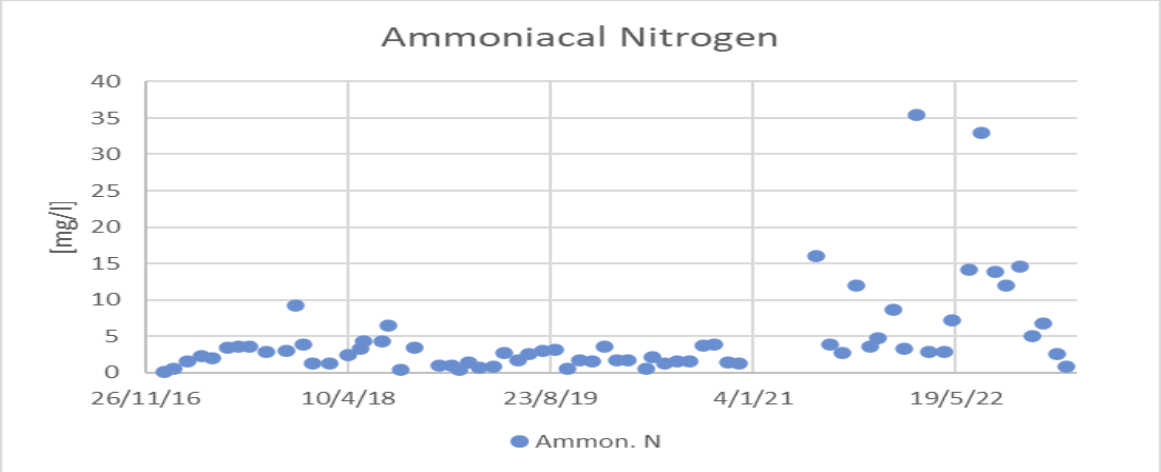


Table 6.8: YGP Electricity Conductivity Trending Data

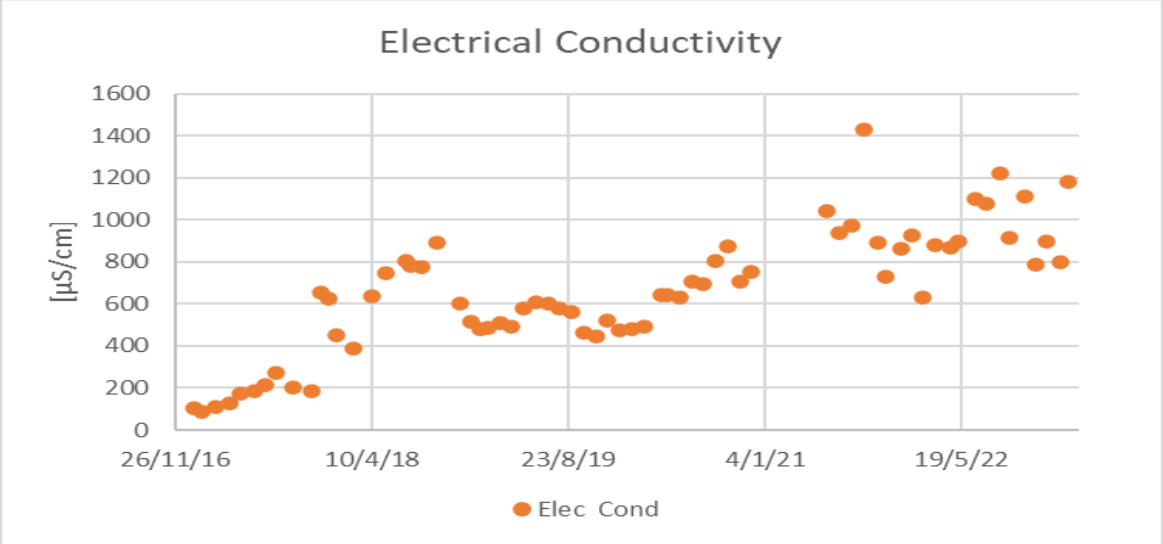
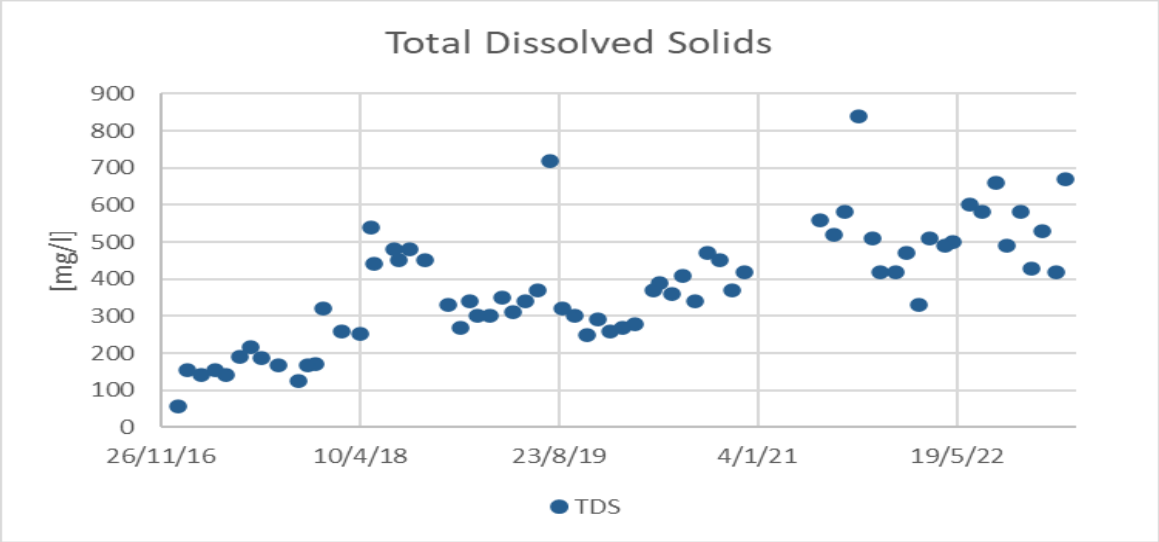


Table 6.9: YGP Total Dissolved Solids Trending Data



6.1.4 Data Management and Quality Control

Samples are obtained as per the Sampling Plan.

Single samples are taken and distributed to participating laboratories.

Duplicates, Triplicates, Blanks and Controls are not used as the number of bottles required to achieve this level of QA/QC is unrealistic knowing the logistics challenges at YGP.

6.1.5 Discussion and Interpretation of Results

It is not known why pH fell so low in 2017 and 2022. During these periods, due to the low pH of the receiving groundwater, this was not seen as a risk to the environment.

TDS and electrical conductivity are rising. The reasons for this are being investigated.

E.coli has been managed in 2022 and has not exceeded the licence condition.

6.1.6 Conclusions and Proposed Actions

The Original Engineering Manufacturer has been contacted and investigations are ongoing to identify improvements to the wastewater system. It is considered over-sized for its throughput. It is designed for a 120-person camp, and generally is only processing the waste of 20 persons. This brings with it operational challenges, however these seem to have been managed appropriately in this annual monitoring period.

6.2 Stormwater disposal

The open drains on the YGP are designed to collect stormwater, washdown water, fire test water and any accidental spills from equipment. During the wet season, a large volume of water will enter the drains. The main contaminant of concern in the equipment bund will be residual hydrocarbons related to equipment leaks or maintenance. The flow is highly variable and minimal in the dry season and up to the design capacity of 130 m3 /hr during the wet season.

The plant drains are split into two separate systems:

- Hazardous; and
- Non-hazardous.

Stormwater discharge to the environment includes cooling water from the fire pump testing and stormwater collected from the process skids. Fire pump cooling water is potable water used in a tubular design heat exchanger, where the other medium is coolant. The cooling water does not come into direct contact with the coolant or any other contamination sources and is discharged to grade at SW-02. The licenced sample point is SW-01, however the equipment that this sample point would run off is not commissioned. As the firewater pump discharge is closer to SW-02, this point has been captured as more appropriate.

Process skid stormwater is collected in the Open Drain Sump (ODS) for treatment and sampling prior to manual discharge to grade at SW-03. The ODS typically remains closed for much of the dry season and is only opened to grade when rainfall increases during the wet season.

6.2.1 Monitoring Objective

To determine the contaminants in the storm-water run-off stream before being discharged to grade.

There is no flow meter on this discharge, the fluids flow to grade after a sample is taken and analysed.

6.2.2 Monitoring Methods

Treated storm water samples are collected by the process operators.

Treated storm water includes runoff from the utilities area (authorised discharge point SW-01) and stormwater runoff from the Open Drains System (authorised discharge point SW-03).

6.2.3 Monitoring Results

Results are provided in relevant Appendices.

The following trends are available.

Table 6.10: YGP SW-03 pH and licence limits Trending Data (2016 – 2022)

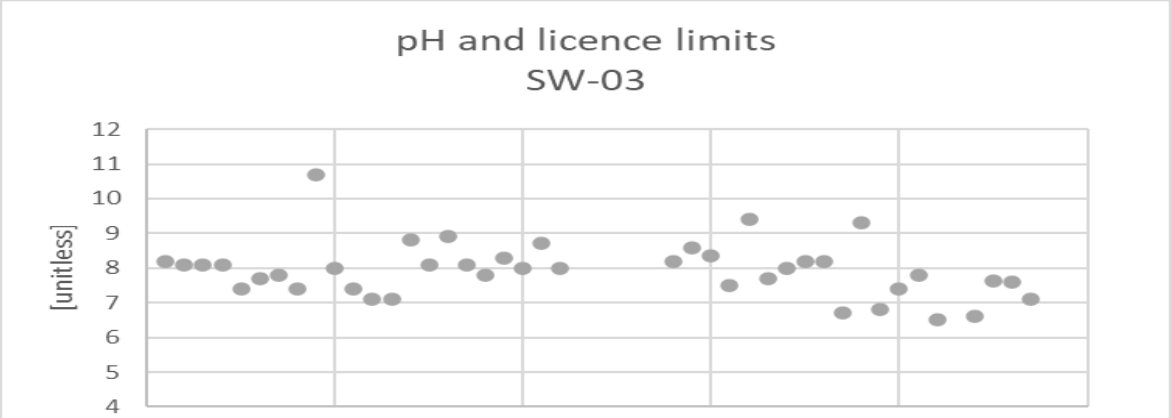


Table 6.11: YGP SW-03 Electrical Conductivity Trending Data

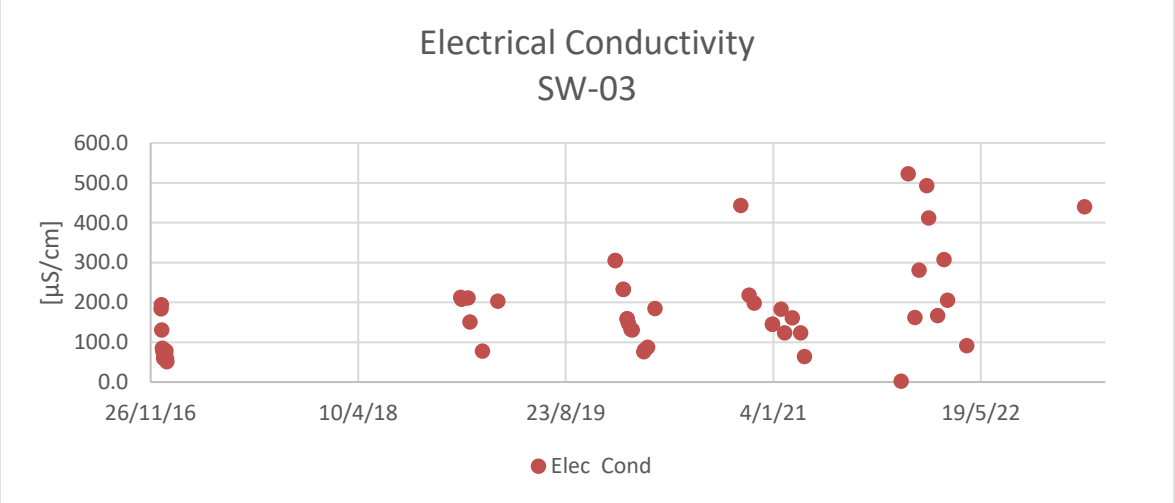
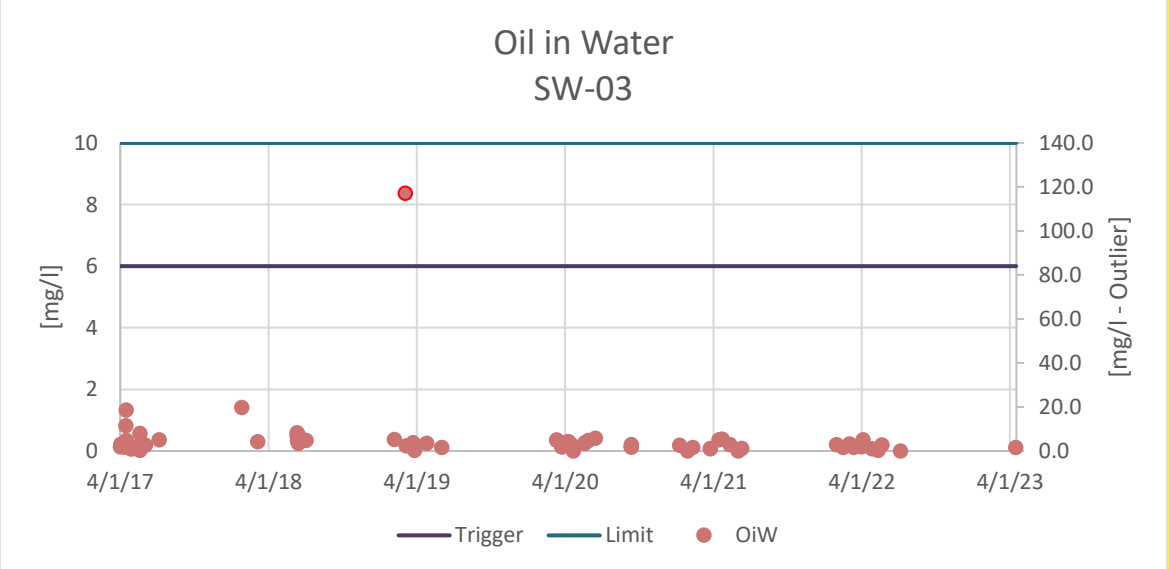


Table 6.12: YGP SW-03 Oil in Water Trending Data



6.2.4 Data Management and Quality Control

As explained in earlier sections, there are logistical challenges with meeting required QA/QC expectations in sampling methods due to the remoteness of the site.

6.2.5 Discussion and Interpretation of Results

The conversion of data from the reporting structure used until request by NT EPA to communicate information in the latest structure (April 2022) is taking time. For storm water the historical data has not been brought up to present requirements, due to the significant extra work required to complete the transformation. This effort was focussed on the Produced Water and wastewater System.

Eni Environmental Advisor intends to spend 2023 upgrading the Stormwater data to present requirements. As a result, there is limited trends or conclusions to draw for this waste stream.

6.2.6 Conclusions and Proposed Actions

Focus will be given to ensuring the storm water discharge sampling is returned in 2023.

7. MONITORING DISCHARGES TO AIR

Air emission monitoring is performed by the external laboratory services provider.

Most air emissions emanating from the YGP are from the following key sources:

- Flares;
- Gas turbine compressors;
- Gas engine generators; and
- Emergency diesel generator.

Fuel usage for the compressors and gas engines is monitored continuously, as are gas quantities flared. Table 7.1 lists the flow meters used for measuring the various gas streams.

Table 7.1: Gas flow meters

Emission Source	Gas Flow Meter	Reference Number
Turbine Compressor	Compressor A Compressor B Compressor C	420.1 FIT 161 420.1 FIT 261 420.1 FIT 361
Engine Generators	LP Fuel Gas	420.1 FIT 004
Flare	HP Flare	230.1 FIT 008
	LP Flare	230.1 FIT 002
	Fuel Gas Distribution	420.1 FIT 007

Total greenhouse gas emissions from Yelcherr Gas Plant calculated in the latest NGER reporting period were 43,277 tCO_2-e (Ref. [2]).

The GHG intensities for flaring and total emissions, calculated as the ratio of tCO_2-e emitted to tonnes hydrocarbon produced, are 0.010 and 0.084, respectively as reported via NGER. This compares with industry averages of 0.068 and 0.353, respectively (Ref. [6]).

7.1.1 Monitoring Objective

The objective of this monitoring objective is to determine the contaminants in the exhaust stream of the compression units.

There is a flow meter on this fuel gas input. Multiplication with flow rate and concentration from the Ektimo analysis provide the final contaminant flow.

Ektimo is brought to site twice annually. For the visits they obtain the following information:

Air Emissions Monitoring Programme

Atmospheric Emission Points		Monitoring location height	Parameter						
Emission point code	Description		CO	CO_2	CH_4	NOx	SO_2	Solid particles	VOC
A01	High Pressure Flare	-	NR	NR	NR	NR	NR	NR	NR
A02	Low Pressure Flare	-	NR	NR	NR	NR	NR	NR	NR
A03	Gas Turbine Compressor A	13 m	B	A	A	B	A	A	B
A04	Gas Turbine Compressor B	13 m							
A05	Gas Turbine Compressor C	13 m							
A06	Gas Engine Generator A	8 m	B	A	A	B	A	A	B
A07	Gas Engine Generator B	8 m							
A08	Gas Engine Generator C	8 m							
A09	Emergency Diesel Generator	-	NR	NR	NR	NR	NR	NR	NR

A = Annually; B = biannually (i.e. every 6 months); NR = Not Required;

Previously the atmospheric emissions were reported using the NGERS information, spread between July to June. Improvements to this approach were sought in the 2022-2023 period to bring the results in line with the licence durations. There were issues with obtaining total flowrates of the discharge streams.

This method will be further investigated in the next Annual Monitoring Report. For this report, the NGERs and NPI reports are available on request.

The NGERS reporting approach has been used in this report.

7.1.2 Monitoring Methods

NGERS and NPI reports form the basis of the analysis.

Ektimo investigations and reports ensure that the discharge concentration of contaminants is known.

In the next period, the team will investigate flowmeters and calculations using Ektimo results to determine contaminant discharges.

Fuel and gas flow must also be measured and recorded to determine the overall pollutant mass loading and ensure mass limits are not exceeded. Fuel and gas flow are measured by flow meters, shown below.

Pollutant loads are calculated and reported annually under the National Greenhouse and Energy Reporting Scheme (NGERS) and the National Pollutant Inventory (NPI) reporting scheme.

Frequency	Sample location	Monitoring methodology	Parameter	Analysis	Concentration limit
Ad hoc	A01, A02	Visual monitoring for visible smoke using a Ringelmann chart[1]	Smoke	Visual observation by site personnel[3]	No visible emission other than for a total period of no more than 5 minutes in any 2 hours[1]
Bi-annual	A03, A04,	A sample must be collected by a	CO*		100-1600 mg/m
			NOx*		350-2000 mg/m

Frequency	Sample location	Monitoring methodology	Parameter	Analysis	Concentration limit
	A05, A06, A07, A08,	qualified technician and sent to an external laboratory for analysis	VOC	External laboratory analysis	40 mg/m
Annual			CO_2	External laboratory analysis	-
			CH_4		-
			SO_2*		100 mg/m
			Solid particles		

*Dry, 273K, 101.3 kPa, 15% O_2 or at manufacturer's specified level
[1]A Ringlemann chart is provided in Appendix D
Source: EPL230-01, Attachment 4 Air Emission Monitoring Program.

Table above taken from Blacktip Operations Environmental Monitoring Requirements [000036_DV_PR.HSE.1020.000].

7.1.3 Monitoring Results

Atmospheric parameters in the licence have been on specification through 2022/2023.

7.1.4 Data Management and Quality Control

Intertek manages the Ektimo contract and QA/QC checks are available on request.

7.1.5 Discussion and Interpretation of Results

Low Pressure Flare meter (230.1 FIT.002) failed on 13th November 2022. An assumed LP flare flowrate has been estimated and used in the cumulative flaring figure. The meter was returned to service on the 24th April 2023.

Exhaust emissions from the above equipment contains contaminants, which at high levels can contribute to air pollution including greenhouse emissions and smog.

The YGP operates a high pressure (HP) and low pressure (LP) ground flare system. These are in a 'pit' at the southeast corner of the plant. The locations of the solar gas turbine compressors and the gas engine generator packages are also shown in Figure 3.8. The compressors operate on a 1 x 100% basis and generators on a 2 x 100% basis.

7.2 Fuel gas consumption

The two main consumers of high pressure (HP) and low pressure (LP) fuel gas are the gas turbine compressors and power generators. The volume of gas consumed as fuel during the reporting period is summarised in Table 7.2.

Table 7.2: Gas consumption at YGP

	2020	2021	2022
Daily fuel gas consumption (KSCM)	71.8	76.9	55.8
Total annual fuel gas consumption (MSCM)	26.3	28.1	20.3
Emissions (tCO_2-e)	53,200	56,800	46,618

Notes:
Reporting period is from 1 January – 31 December
Emissions number for 2022 taken from Eni's internal GHG recording program, SHERPA.

7.3 Flaring

The annual volume of gas flared from the past three years is summarised in Table 7.3.

Table 7.3: Gas flared at YGP

	2020	2021	2022
Daily volume of gas flared (KSCM/d)	11.6	6.98	6.2
Total volume of gas flared (KSCM)	4,261	2,549	2,262
Estimated emissions (t CO_2-e)[1]	9,200	5503[2]	4,775

Notes:
Estimate to nearest 100 tonnes.
[1] Reporting period is from 1 January – 31 December, recorded in SHERPA

For the 2022 period, the Total equivalent greenhouse gas (GHG) emissions for flaring were calculated using Eni's internal emissions reporting program Sherpa.

7.4 Diesel Usage

Diesel usage over the reporting period was 3,100m^3. This equates to GHG emissions of approximately 611 tonnes CO_2-e. This information is drawn from SHERPA 2022. SHERPA is Eni's GHG data entry program.

Table 7.4: Annual diesel consumption and GHG emissions

	2020[1]	2021[2]	2022[3]
Diesel – stationary energy (m^3)	27	125	64
Diesel – mobile plant and transport (m^3)	7	4	7
Emissions (t CO_2-e)	92	350	192

Notes:
[1] Reporting period is from 1 January – 31 December using SHERPA
[2] Reporting period as per NGER from 1 July to 30 June

[3] Reporting period is from February 2022 to January 2023. It assumes mobile plant and transport is 7m3. The fuel records show a total diesel usage of 71m^3, so the stationary energy is calculated by subtracting mobile usage from total (71-7m^3). The Emissions is calculated using interpolation with the 2020 and 2021 relationship.

The increase in diesel usage through 2022 is due to increased offshore activity, during drilling in November and December 2022.

7.5 Stack emission monitoring

Emissions from the export gas turbine compressors are shown in the relevant Appendix.

All pollutant emissions measured were within the EPL limits.

7.6 Fugitive emission monitoring

During October 2022, a fugitive emissions survey was undertaken at the Blacktip Yelcherr Gas Plant. The following conclusions were drawn:

Table 7.5: Fugitive Emissions Data

Classification	Gas Leak	Number of Leaks at Source	
	[Concentration/Volume]	Preliminary Reading	Validation Reading
< Minor	< 500 ppm	9	9
Minor	≥ 500 ppm to < 5000 ppm	4	4
Significant	≥ 5000 or LEL% > 10%	9	9
Total		**22**	**22**

All leaks were quantified and Tag numbers for the affected equipment was recorded. These leaks are listed in the report Bureau Veritas - ENI Australia - Fugitive Emissions Survey 2022 (October).

Work orders have been raised for inspection and repair of remaining fugitive emission sources.

7.7 Pollutant inventory reporting

Eni reports emissions to atmosphere and the environment via the National Pollutant Inventory (NPI) and the National Greenhouse and Energy Reporting Scheme (NGERS).

Eni submitted the annual NPI reporting figures via the NPI Online Reporting System on 31 October 2022. NPI details available on request.

The annual NGERS reporting figures were submitted to the Department of Climate Change on 31 October 2022. Total emissions from Yelcherr Gas Plant during the July 2021 to June 2022 NGER reporting period were 43,277 tCO_2-e.

7.8 Flaring

The HP flare header is designed for inventories above 1000 kPag. The system is sized to blowdown the Hydrocarbon inventory in the YGP to achieve the required 690 kPag or 50% of operating pressure (whichever is lower) within 15 minutes.

The LP flare is designed to safely dispose of regeneration offgas, and control pressure regulation during normal operation. The annual volume of gas flared from the past three years is summarised in the following table.

Table 7.6: Gas flared at YGP

	2020	2021	2022
Daily volume of gas flared (KSCM/d)	11.6	6.98	6.2
Total volume of gas flared (KSCM)	4,261	2,549	2,262
Estimated emissions (t CO_2-e)[1]	9,200	5503[2]	4,775

Notes:
Estimate to nearest 100 tonnes.
[1] Reporting period is from 1 January – 31 December, recorded in SHERPA

For the 2022 period, the Total equivalent greenhouse gas (GHG) emissions for flaring were calculated using Eni's internal emissions reporting program Sherpa.

8. UNPLANNED DISCHARGES TO LAND

8.1 Groundwater Quality

Groundwater is abstracted for potable water use and ancillary equipment at Yelcherr Gas Plant. The annual groundwater abstraction volumes are summarised in Table 8.1

There are also two monitoring bores, BH5 and BH7, located at YGP. The location of the abstraction and monitoring bores are shown in Figure 8.1

Table 8.1: Total annual volume of groundwater abstracted

	2020	2021	2022
Groundwater use (ML)	16.5	22	11

Notes: Reporting period is from 1 January to 31 December.

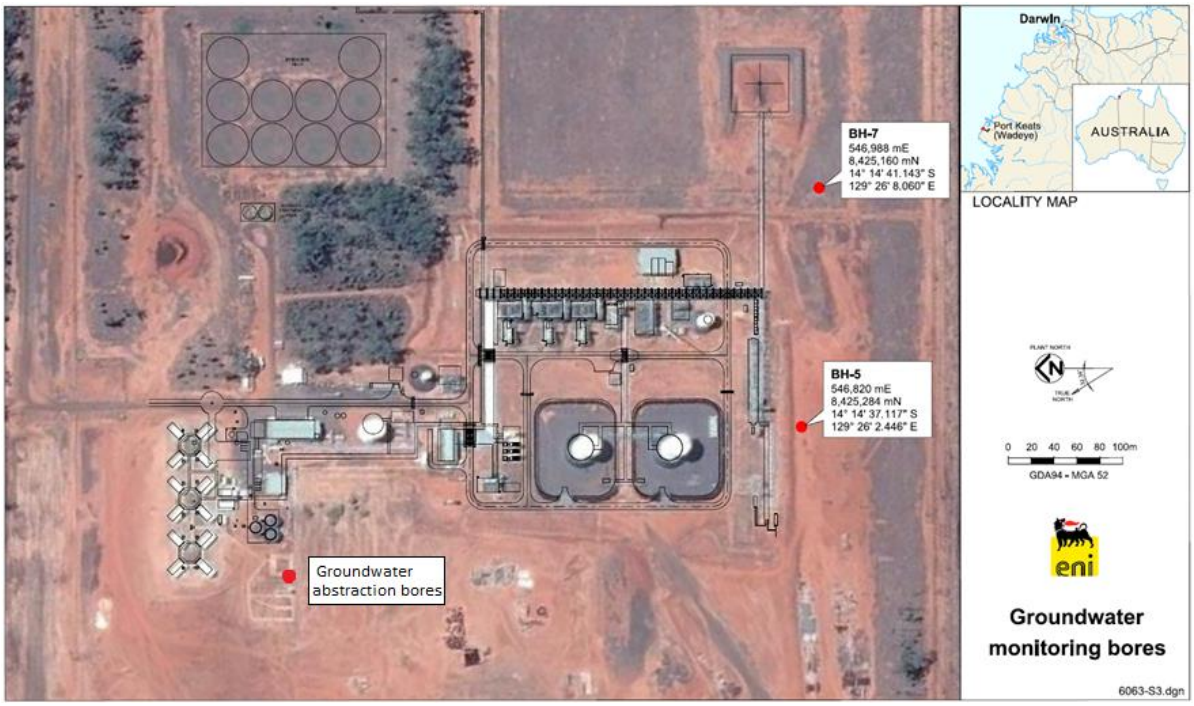


Figure 8.1: Groundwater abstraction and monitoring bores

Volumetric flowrates are down significantly on 2021 usage but are in line with 2020 figures. The reason for the 2021 spike is not clear. There have been no meter reading issues.

Two ground water extraction bores (BH-1 and BH-2) draw water from the aquifer for potable and plant use.

Groundwater monitoring (BH-5 and BH-7) was conducted on 20 February 2022, 10 May 2022, 23 August 2022 and 23 November 2022.

The results and trend analysis are presented in Attachment E.

All results were within the Australian Drinking Water Guidelines and ANZECC guidelines for 80% species protection. Quarterly monitoring at both bores measured pH between 4.9 and 7.8.

There were no weekly field measurements conducted this year by the Thamarrurr Rangers. In the past the Rangers measure the pH, water level, and electrical conductivity. This program was put on hold during the Covid periods of 2020 and 2021. This program will be reintroduced in 2023.

8.1.1 Monitoring Objective

A Groundwater Monitoring plan is being developed. The Environmental Management Plan requires samples to be drawn from the wells. Depths of water from surface are also required to be measured.

Sampling has been ongoing. Depth measurements are returning to practice.

8.1.2 Monitoring Methods

Groundwater monitoring is undertaken by the operators and coordinated by the Environmental Advisor through 2022.

Groundwater is monitored to determine whether wastewater discharges are impacting groundwater quality. The groundwater monitoring boreholes are BH5 and BH7.

Sampling and monitoring will be carried out in accordance with procedures defined in BTP Operations Environmental Monitoring Requirements [000036_DV_PR.HSE.1020.000].

8.1.3 Monitoring Results

The following key trends have been captured:

Table 8.2: YGP pH Trending Data

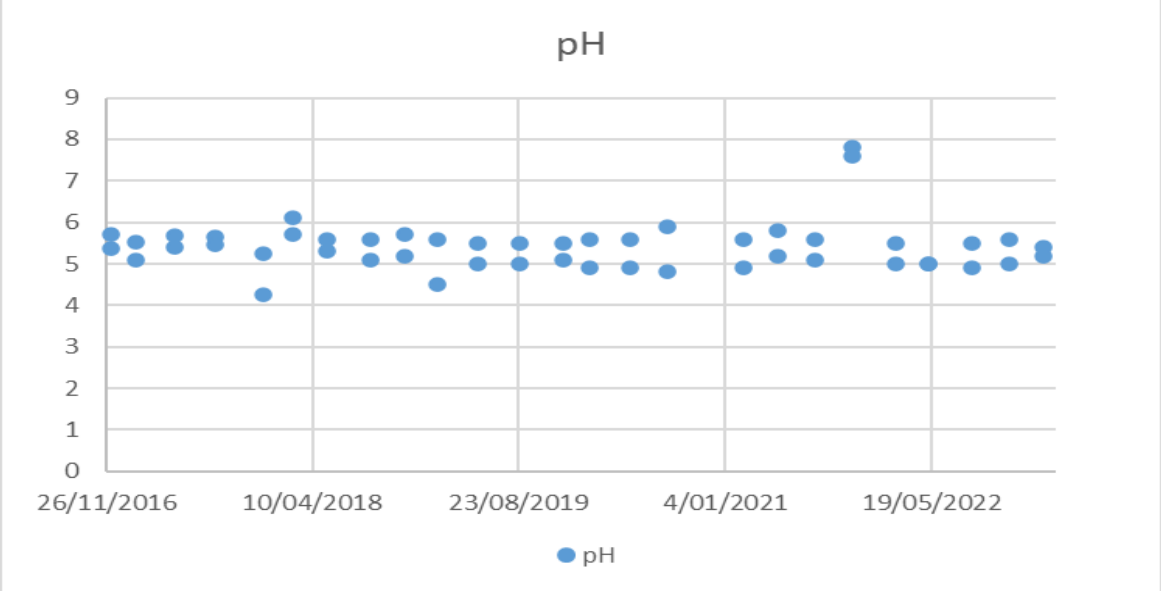


Table 8.3: YGP Electricity Conductivity (BH5/BH7) Trending Data

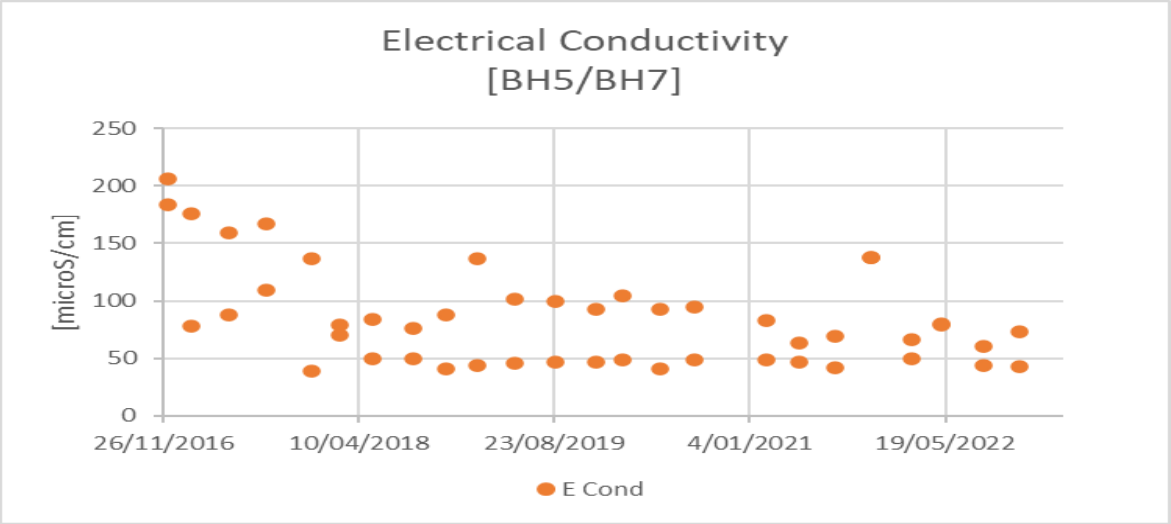


Table 8.4: YGP Dissolved Oxygen (BH5/BH7) Trending Data

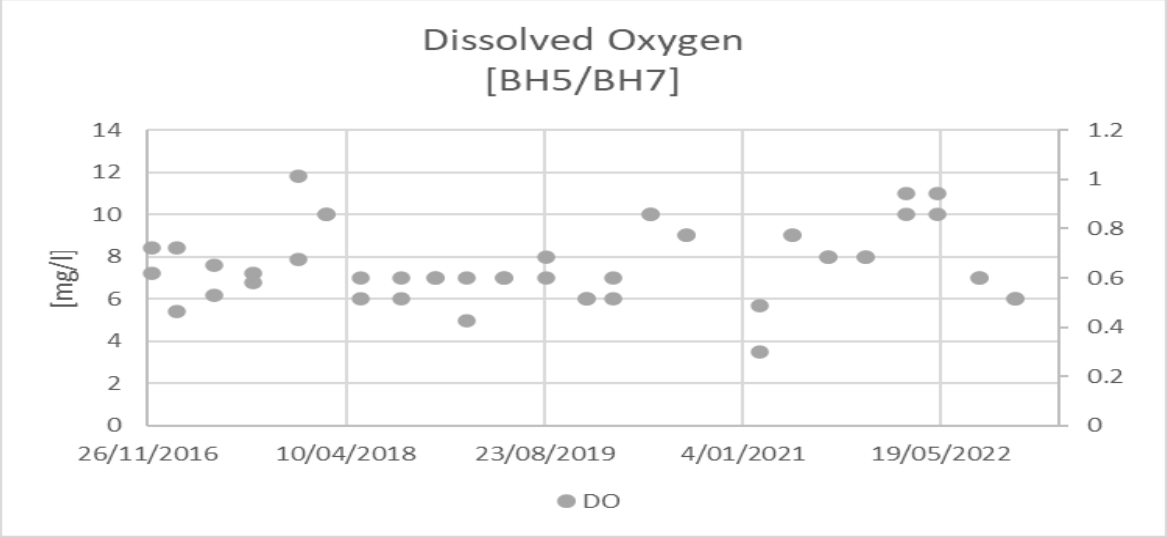


Table 8.5: YGP OiW and TPH (BH5/BH7) Trending Data

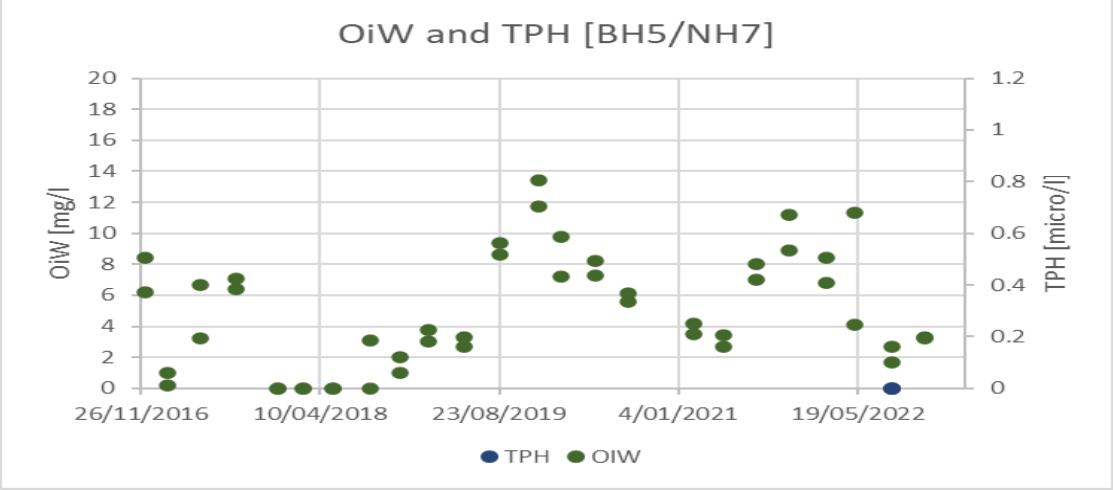
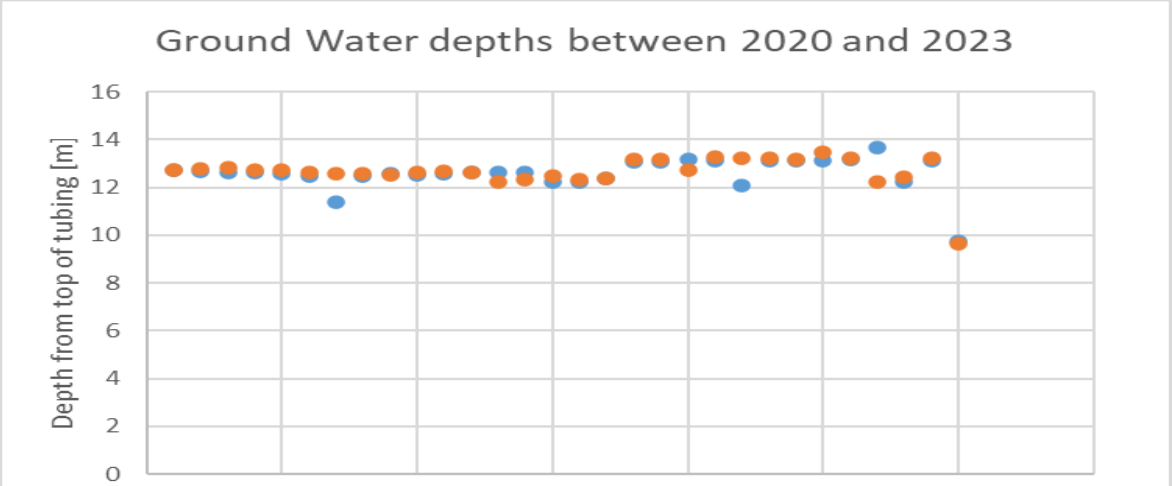


Table 8.6: Ground Water depths (BH5/BH7) Trending Data



No concerning trends or notable behaviours were identified in the other parameters.

More groundwater depths are available, which indicate a depth ranging between 13 meters and 9 meters. Depth data stretching back longer is available on request.

8.1.4 Data Management and Quality Control

The quality assurance/quality control (QA/QC) procedures specific to the collection and analysis of samples from sample location included:

- NATA accredited analytical laboratories were used for all analysis or a test method managed under a NATA accredited quality management system;
- Laboratory designated sample holding times met;
- Chain of custody forms was completed and accompanied the samples; and
- Calibration of all field-testing equipment using standard method(s) was undertaken.

8.1.5 Discussion and Interpretation of Results

Oil in Water (OiW) readings, although minimal, had been noticed in the bore water samples.

Total Petroleum Hydrocarbon (TPH) testing was started at the end of the reporting period. No TPH has been found in the borewells, indicating that the OiW reading is not hydrocarbon based.

8.1.6 Conclusions and Proposed Actions

There is no indication that negative environmental impacts are being experienced in the monitoring bores.

9. WASTE MANAGEMENT

Solid waste is managed onsite according to the Blacktip Waste Management Plan (000036_DV_PR.HSE.0832.000).

Domestic waste from the accommodation village and crib room is taken to the local West Daly Regional Shire Council Landfill. General industrial waste and hazardous waste from the plant is transported by a licensed contractor to Darwin for disposal, treatment, recycling, or destruction.

Table 9.1: Waste disposal

	2020	2021	2022
Domestic waste to local landfill (t) • Kitchen waste • Accommodation waste • Office waste	4	1	1
Darwin recycling (t) E.g. Scrap metal	3	3	4
Darwin disposal – non-hazardous (t) E.g. spent chemicals, cooking oil	21	22.7	58
Darwin disposal – hazardous (t) E.g. waste oil, oily rags, chemical drums and filters	54	85.6	63

Notes: Reporting period is from 1 January to 31 December.

10. INCIDENTS AND NON-COMPLIANCES

The Waste Management and Pollution Control Act (NT) and EPL require all non-compliances with the EPL and any potential or actual environmental harm or pollution event to be recorded and reported to NT EPA.

Pollution is defined in the Waste Management and Pollution Control Act (NT) as:

- A contaminant or waste that is emitted, discharged, deposited or disturbed or that escapes; or
- A contaminant or waste, effect, or phenomenon, that is present in the environment because of an emission, discharge, deposition or escape or disturbance of a contaminant or waste.

Incidents and Non-Compliances are submitted to NT EPA within 24 hours of the site being made aware of the issue.

10.1 Incidents and non-compliances

The Annual Return outlines the compliance assessment against the Environment Licence EPL230 and EPL230-01 as per the Environmental Management Compliance Report 2020 (000036_DV_PR.HSE.1139.000).

Table 10.1 lists the environmental non-compliances recorded between 10 February 2022 and 9 February 2023. These have been raised in the non-compliance register and will be tracked to closure.

Table 10.1: Environmental non-compliances

Date of NC	Date detected	Clause breached	Description / remarks
11-Feb-22	22-Mar-22	Condition 28	PW above EPL Limit for TSS, Mn, Zn, Toluene, and Xylene (m+p). WW below EPL Limit for pH.
14-Mar-22	5-May-22	Condition 28	PW above EPL Limit for TSS, Mn, Zn, Benzene, Toluene, Ethylbenzene, and Xylene (m+p)
16-Mar-22	5-May-22	Condition 28	WW above EPL Limit for TPH, and Naphtalene
10-May-22	29-Jun-22	Condition 28	WW above EPL limit for pH, TSS, and TPH
12-May-22	29-Jun-22	Condition 28	PW above EPL Limit for Toluene, Ethylbenzene, and m+p-xylene, Manganese, and Zinc
23-Jun-22	26-Jul-22	Condition 28	PW above EPL Limit for pH, Zn, Toluene, Ethylbenzene, and m+p-xylene. PW above EPL Trigger Values for TSS, OiW, and Benzene.
20-Jul-22	25-Aug-22	Condition 28	PW above EPL Limit for Benzene, Toluene, Ethyl-Benzene, Xylene, and Manganese

Date of NC	Date detected	Clause breached	Description / remarks
24-Aug-22	3-Oct-22	Condition 28	PW above EPL Limit for Benzene, Toluene, Ethyl-Benzene, Xylene, and Zinc. WW below EPL limit for pH. WW above EPL limit for Copper and Zinc
20-Sep-22	4-Nov-22	Condition 28	PW above EPL Limit for Toluene, Ethyl-Benzene, Xylene, and Zinc. WW below EPL limit for pH.
26-Oct-22	16-Dec-22	Condition 28	PW above EPL Limit for Toluene, Ethyl-Benzene, Xylene, and Zinc. WW below EPL limit for pH. PW above trigger values, but below limits for OiW and Copper
17-Dec-22	2-Feb-23	Condition 28	PW above EPL Limit for Toluene, Ethyl-Benzene, Xylene, Manganese (dissolved and filtered) and Zinc (dissolved and filtered), Phenol. WW below EPL limit for pH. PW above trigger values for Benzene, Copper (dissolved and filtered)

10.2 Complaints

No complaints were received during the reporting period.

10.3 Audits and inspections

The site was inspected by NT EPA staff on 22nd June 2022.

11. CONTINUOUS IMPROVEMENT AND OTHER ACTIVITIES

During the reporting period, Eni engaged in several continuous improvement activities including:

- Fugitive emissions survey– a fugitive emissions survey was undertaken to monitor for leaks across the YGP. The survey identified six minor leaks, four of which were repaired immediately; and
- Opportunities are being investigated to train the Thamarrurr Rangers to support with monitoring samples.

12. COMMUNITY INITIATIVES

Eni and the Thamarrurr Rangers continue to work closely to identify opportunities for local engagement and achieve positive environmental outcomes.

Eni continues to maintain a positive and engaging relationship with the Thamarrurr Rangers, who deliver local environmental monitoring services including:

- Offshore monitoring of the Single Point Mooring (SPM);
- Marine monitoring;
- Controlled burning; and
- PW-01 (Produced Water discharge point) monitoring.

The SPM monitoring conducted by the Rangers includes inspection of the SPM equipment as well as inspection of the surrounding waters for surface sheen and possible spills. This provides a valuable contribution to the safe offtake of condensate and is an important part of Eni's scheduled maintenance. The Rangers also support the YGP groundwater monitoring, marine monitoring and weed management programs.

The regular monitoring by the rangers allows our site-based personnel to engage with local indigenous community members, providing a greater appreciation of the region and the importance of caring for country.

13. ABBREVIATIONS

Abbreviation	Description
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
BOD	Biological Oxygen Demand
EPL 230-01	Environmental Protections Licence (EPL230-01)
Kscm	Thousands of standard cubic meters
ML	Mega-litres
Mn	Manganese
NGER	National Greenhouse and Energy Regulator
NPI	National Pollutant Inventory
NT EPA	Northern Territory Environment Protection Authority
OiW	Oil in Water
tCO2-e	Tonnes of Carbon Dioxide equivalent
TSS	Total Suspended Solids
YGP	Yelcherr Gas Plant
Zn	Zinc

14. REFERENCES

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[4] WEATHERFORD LABORATORIES (AUSTRALIA) PTY LTD (2009A). PVT ANALYSIS - FINAL REPORT 1288-06 FOR BLACKTIP-P2. DOCUMENT NUMBER BT-P2_A2. UNPUBLISHED REPORT PREPARED FOR ENI AUSTRALIA LTD.

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APPENDICES

ATTACHMENT A:

AIR EMISSIONS MONITORING PROGRAMME

Attachment A.1: Summary of stack emission monitoring results from the compressors

	CO	NOx[1]	SOx	Solid particles	VOCs
EPL limit	**100 mg/m³**	**350 mg/m³**	**100 mg/m³**	**-**	**40 mg/m³**
5 November 2020					
Compressor A	<3	230	*NT*	*NT*	<0.2
Compressor B	<3	210	*NT*	*NT*	<0.2
Compressor C	<3	240	*NT*	*NT*	0.56
October 2021					
Compressor A	<8	210	*<8*	*27*	0.55
Compressor B	<9	230	*<8*	*4.1*	0.18
Compressor C	<8	240	*<8*	*20*	1.8
April 2022					
Compressor A	<7	320	*NT*	*NT*	<0.2
Compressor B	<8	250	*NT*	*NT*	0.18
Compressor C	<7	320	*NT*	*NT*	<0.2
November 2022					
Compressor A	<9	210	*21*	*<2*	0.17
Compressor B	NT	NT	NT	NT	NT
Compressor C	NT	NT	NT	NT	NT

Notes:
[1] NOx presented as NO_2 equivalent.
[2] SOx presented as the cumulative concentration of SO_2 and SO_3.
[3] All measurements reported on a dry basis at NTP and corrected to 15% O_2 in accordance with the EPL.
[4] Measurements above the EPL limit are indicated in red, and measurements above the trigger value are indicated in orange.
[5] NT = Not tested.
[6] June 2020 emissions testing was deferred due to COVID travel restrictions.

Compressor B & C were not operational at time of testing due to unplanned maintenance.

Sox and solid particles are only required once per year, hence NT for April.

Attachment A.2: Summary of stack emission monitoring results from the generators

	CO	NOx[1]	SOx	PM	VOCs
EPL limit	**1600 mg/m^3**	**2000 mg/m^3**	**100 mg/m^3**	**-**	**40 mg/m^3**
5 November 2020					
Generator A	690	1500	*NT*	*NT*	0.56
Generator B	680	1500	*NT*	*NT*	1.8
Generator C	740	1500	*NT*	*NT*	1
October 2021					
Generator A	770	1500	*<20*	*8.9*	11
Generator B	750	1500	*<20*	*3.4*	36
Generator C[8]	NT[8]	NT[8]	*NT[8]*	*NT[8]*	NT[8]
April 2022					
Generator A	1100	2000	NT	NT	0.38
Generator B	1100	2000	NT	NT	0.58
Generator C	NT	NT	NT	NT	NT
November 2022					
Generator A	730	1400	<2	NT	4.8
Generator B	610	1400	<4	NT	0.42
Generator C	520	1200	<2	NT	9.2

Notes:
[1] NOx presented as NO_2 equivalent.
[2] SOx presented as the cumulative concentration of SO_2 and SO_3.
[3] All measurements reported on a dry basis at NTP and corrected to 15% O_2 in accordance with the EPL.
[4] Measurements above the EPL limit are indicated in red, and measurements above the trigger value are indicated in orange.
[5] Emissions sampling provider advised that levels of methane (160-200mg/m^3) can cause an interference with the SO_2 cell of the analyser
[6] NT = Not tested.
[7] June 2020 emissions testing was deferred due to COVID travel restrictions.
[8] Gas Engine Generator No.3 (C) was not operational due to unplanned maintenance

Generator C was not available at the time of testing.

Attachment A.3: Air emissions annual pollutant mass inventory (Source – NPI (Appendix C) and 2021 NGER report – Info only)

Atmospheric Emission Points			Annual Pollutant Mass (t)								
Point ID	Description		SO_2	NOx	CO	VOC	PM_{10}	CO_2	CH_4	N_2O	CO_2-e
A01 A02	High Pressure Flare Low Pressure Flare Flare Fuel Gas	2018-2019	0.06	4.4	26	44	0	7,917	11.7	0.3	8,298
		2019-2020	0.08	5.4	32	54	0	9,712	14.4	0.4	10,180
		2020-2021	0.05	3.1	18	31	0	5,664	279	54.5	5,998
A03 A04 A05	Gas Compressor A Gas Compressor B Gas Compressor C	2018-2019	0.2	125	40	1	0.9	35,165	3	0.07	35,254
		2019-2020	0.3	160	48	1	1.1	42,388	3	0.08	42,496
		2020-2021	0.3	172	48	1.2	1.1	40,691	79	23	40,794
A06 A07 A08	Engine Generator A Engine Generator B Engine Generator C	2018-2019	0.03	347	19	4	<0.003	3,653	0.28	0.007	3,663
		2019-2020	0.02	191	19	4	<0.003	3,661	0.28	0.007	3,670
		2020-2021	0.02	130	19.7	4.2	2.7	3,682	7	2	3,691
A09	Emergency Diesel Generator limits	2018-2019	<0.001	3.1	0.8	0.08	0.01	159	0.009	0.002	160
		2019-2020	<0.001	1.9	0.5	0.05	0.06	97	0.006	0.001	97
		2020-2021	0.002	5.9	1.6	0.15	0.1	303	0.43	0.87	305
-	Condensate Tank vents limits	2018-2019	-[2]	-[2]	-[2]	-[2]	0	-	-	-	-
		2019-2020	-[2]	-[2]	-[2]	-[2]	0	-	-	-	-
		2020-2021	-[2]	-[2]	-[2]	-[2]	0	-	-	-	-

[1] SOx, NOx and CO figures are as per the NPI reports and associated estimation techniques, and CH_4, N_2O and CO_2 are as per NGER reports and associated estimation techniques.

[2] Not available or below threshold (i.e. for NPI substances, SO_2, NOx, CO).

ATTACHMENT B:

PRODUCED WATER MONITORING

Routine produced water discharge sampling and analysis

Date	Quantity m3/d	pH	Average OIW mg/L	pH	EC µs/cm	Dissolved oxygen % saturation	Temp °C	Turbidity NTU
limits		6.5-8.5	6 to 25					
11-Feb-22	107.2	7	2.09	6.7	67.7	0	29.9	19.7
13-Feb-22	64.9	7.1	3.3	7.1	68.69		32.3	16.1
14-Feb-22	107.7	8	3.6	8.07	66.77		29.2	7.14
16-Feb-22	67.5	6.91	4.6	6.9	66.1		32.5	10.1
18-Feb-22	177	7.59	12.8	7.59	67.9		28.6	25.5
20-Feb-22	124.6	8	6.2	8	65.54		30.1	27.4
22-Feb-22	118.8	8.3	18.7	8.37	70.93		33	14
26-Feb-22	134.2	7.23	18.7	7.21	68.1	0	28.6	32.1
27-Feb-22	72.5	7.93	15.9	7.9	67.99		29.4	51.8
28-Feb-22	63.1	8.47	4.8					
2-Mar-22	90.1	8.42	8.3					
3-Mar-22	100	7.36	7.1					
4-Mar-22	177	6.9	7.5					
5-Mar-22	112.4	7.1	15.4					
7-Mar-22	130.2	8.3	14.5					
8-Mar-22	69	6.79	10.9					
10-Mar-22	188.1	8.4	8.1					
12-Mar-22	118.5	8.2	20.4					
14-Mar-22	135.9	6.9	9					
16-Mar-22	135.7	8.3	9					
18-Mar-22	138.9	8.1	8.4					
20-Mar-22	221.6	8.15	13.8	7.88	70.14	NIL	28.7	19.3
22-Mar-22	113.9	8.1	2.4					
23-Mar-22	121.4	8.4	3.4	8.46	73.9	NIL	31.6	6.11
25-Mar-22	194.6	7.9	15.7	8.47	71.07	NIL	28.2	36.6
27-Mar-22	62.5	8.5	7.5					
28-Mar-22	132.2	8	11.1					
30-Mar-22	127.2	8.6	9.2					
31-Mar-22	125	8.46	9.7					
1-Apr-22	135.3	8.4	6.5					
2-Apr-22	136.2	8.4	18.6					
3-Apr-22	96.7	7.5	18.3					
4-Apr-22	105.4	6.51	19.8					
5-Apr-22	100.5	6.51	19.8					
7-Apr-22	147	7.25	12.9	7.25	69.71	3.1	33	37.3
8-Apr-22	109.1	7.69	11.4	7.695	27.34	1.8	33	11.9
9-Apr-22	97	8.4	18.3	8.43	7.08	4.5	30.1	37.5
10-Apr-22	115.8	7.8	12.5	7.85	236.7	0.17	28.3	19.7
12-Apr-22	145.5	8.42	5.1	8.42	917	4.1	33.7	19.6
13-Apr-22	97.5	8.06	6.3	8.06	71.48	4.4	29.6	15.1
14-Apr-22	98.5	8.25	6.2	8.25	73.58	3.4	35.8	35.5
16-Apr-22	133.7	7.6	21	7.6	73	3.5	27	29.3
17-Apr-22	115.3	8.2	9.9	8.2	72.33	2.8	31	21.9

Date	Quantity m3/d	pH	Average OIW mg/L	pH pH	EC µs/cm	Dissolved oxygen % saturation	Temp °C	Turbidity NTU
limits		6.5-8.5	6 to 25					
18-Apr-22	74.9	8.48	10.9	8.5	68.9	4	31.6	29.6
19-Apr-22	129.6	8.25	6.3	8.25	71	0.6	28.8	30
21-Apr-22	122.5	6.94	13.5	6.94	2.35	3.2	30.9	22.4
24-Apr-22	187	8.2	10.5					
26-Apr-22	132.7	8.3	12					
27-Apr-22	132.2	8.3	6.5					
28-Apr-22	111.2	8.3	3.2					
30-Apr-22	147.37	8.35	7					
1-May-22	144	8.25	2.5					
3-May-22	167.1	8.3	4.25					
4-May-22	111.9	6.79	16.7					
5-May-22	129.9	8.49	14.8					
7-May-22	176.8	7.5	9.5					
8-May-22	135.1	8.3	5.9					
10-May-22	80.7	8.5	16.5	8.5	72	14	29.3	35.1
12-May-22	161.3	8.1	16.1					
13-May-22	168.8	8.33	14.6					
14-May-22	128.7	8.34	15.4					
15-May-22	125.7	7.67	10.9					
16-May-22	76.4	7.61	13.2					
17-May-22	128.4	8.41	6.5					
18-May-22	74	7.8	3.8					
19-May-22	103.4	8.4	20.5					
20-May-22	101.7	8.1	5.1					
22-May-22	122.6	7.5	13.2					
3-Jun-22	134.7	8.1	15.3					
7-Jun-22	261.5	7.94	6.52					
8-Jun-22	115	8.18	6.52					
9-Jun-22	179.2	8.33	5.6					
10-Jun-22	147.5	7.56	8.5					
11-Jun-22	92.9	8.37	3.3					
12-Jun-22	148	8.4	18.6					
13-Jun-22	112.2	8.45	8.5					
14-Jun-22	112.8	8.45	8.5					
15-Jun-22	159.7	7.09	15.9					
17-Jun-22	169.3	7.4	11.6					
18-Jun-22	124.1	8.1	11.6	8.1	72.13	5.2	26.6	28.8
19-Jun-22	184.9	8.4	8.7	8.46	81	4.9	27.5	32.2
22-Jun-22	259.2	8.4	3	8.4	74.9	5	30.1	21.7
23-Jun-22	203	8.33	18.2	8.33	76.2	4.8	28.6	26.8
24-Jun-22	136.9	8.34	12.5					
25-Jun-22	108	8.3	16	8.433	73.36	3.2	25.5	27.2
27-Jun-22	150	8.34	12.3	8.4	70	5.7	23	13
28-Jun-22	133.1	8.2	11.8	8.3	75	n/a	29	26
29-Jun-22	126.4	8.35	11.7					

	Quantity		Average OIW	pH	EC	Dissolved oxygen	Temp	Turbidity
Date	m3/d	pH	mg/L	pH	µs/cm	% saturation	°C	NTU
limits		6.5-8.5	6 to 25					
30-Jun-22	146.3	8.35	11.7					
1-Jul-22	133	8	20.2	7.9	72.2	n/a	29	24
2-Jul-22	119.2	7.3	18.7					
4-Jul-22	180.6	7.4	11.3					
5-Jul-22	162.1	8.3	3.1					
7-Jul-22	181.5	8.2	13.5					
9-Jul-22	223.3	7.6	6.8					
10-Jul-22	100.5	8.4	20.2					
11-Jul-22	122.7	8.2	18.9					
12-Jul-22	18.2	7.4	6.2					
14-Jul-22	300.1	8.19	5					
15-Jul-22	176	8.3	22.4					
16-Jul-22	176	8.2	14.6					
17-Jul-22	167	8.4	3.1					
18-Jul-22	102.1	8.5	3.2					
19-Jul-22	180.5	6.9	3.6					
21-Jul-22	132	6.76	13.2					
23-Jul-22	174.4	8.2	2.2					
24-Jul-22	164.1	7.5	5.4					
26-Jul-22	133.6	7	10.1					
27-Jul-22	153.9	7.1	4.3					
29-Jul-22	163.2	8.5	6.8					
31-Jul-22	165.8	7.8	9.9					
1-Aug-22	135		0					
8-Aug-22	262.9	8.4	11.6					
10-Aug-22	211	8.3	9.5					
11-Aug-22	101.8	8.1	5.4					
12-Aug-22	139	6.6	13.1					
13-Aug-22	168.1	8.13	7.9	8.13	72.63	n/a	29.1	12.05
15-Aug-22	272.4	8	7.12					
16-Aug-22	110.6	6.8	12.3					
17-Aug-22	128.2	7.8	7.9					
18-Aug-22	100.5	8.4	19.35					
19-Aug-22	132.3	6.77	3.5					
20-Aug-22	154.1	8.19	14.25					
21-Aug-22	172.6	8.37	19					
22-Aug-22	160.4	6.85	19.5					
24-Aug-22	178.8	7.92	8.7					
25-Aug-22	179.7	8.43	18.6					
26-Aug-22	150.1	8.4	10.3					
27-Aug-22	158.2	7.99	8.1					
28-Aug-22	160.3	7.99	8.1					
1-Sep-22	120.2	8.04	26.5					
2-Sep-22	112	6.54	17.5					
4-Sep-22	132.1	8.3	9.2	8.3	75.7	n/a	26.6	13

	Quantity		Average OIW	pH	EC	Dissolved oxygen	Temp	Turbidity
Date	m3/d	pH	mg/L	pH	µs/cm	% saturation	°C	NTU
limits		6.5-8.5	6 to 25					
6-Sep-22	260.8	7.4	10.5					
8-Sep-22	130.6	8.2	8.7					
9-Sep-22	102.2	8.2	5.5					
10-Sep-22	81.2	8.2	24.7					
11-Sep-22	81.8	7.9	9.8					
12-Sep-22	106.2	7.7	13.8					
13-Sep-22	107	8.4	9.4					
14-Sep-22	123.4	8.2	24					
15-Sep-22	86.2	7.8	23					
16-Sep-22	77.2	8.1	16.6					
17-Sep-22	104.5	7.9	8.4					
18-Sep-22	121.2	8.2	12					
19-Sep-22	57.7	8	8.5					
20-Sep-22	90.9	7.9	12.6					
21-Sep-22	115	8.4	9	8.45	66.35	N/A	31.9	8.97
22-Sep-22	118	8.26	5.9					
23-Sep-22	118.9	8.3	9.2	8.31	68.17	N/A	33.3	16.1
24-Sep-22	139.2	7.73	11.2					
26-Sep-22	62.3	7.83	22.3	7.83	66.93	N/A	31.2	16.7
27-Sep-22	98	8.35	12.9					
28-Sep-22	80.4	7.4	8.1					
29-Sep-22	88.4	8.06	8					
30-Sep-22	93.1	7.8	8.7					
1-Oct-22	129.1	7.23	10.7					
3-Oct-22	105.7	7.95	8.7					
5-Oct-22	169.5	16.5	6.9					
8-Oct-22	203	8.1	7.5					
9-Oct-22	101	8	17					
10-Oct-22	161.8	8	10.7					
12-Oct-22	84.2	8.2	16.7					
14-Oct-22	146.4	7.1	11.8	7.15	67.43	N/A	31.3	27.9
16-Oct-22	160.8	7.3	13.4	7.5	2.6	N/A	21.4	23.7
17-Oct-22	107.6	8.1	5.2					
19-Oct-22	155.8	8.2	4.8					
20-Oct-22	78.8	8.3	6.8					
21-Oct-22	88.1	8.3	11.5					
22-Oct-22	82.3	7.9	10					
23-Oct-22	67	8	2.5					
25-Oct-22	117.6	7.5	19.7					
27-Oct-22	124.7	8.18	17					
28-Oct-22	115.8	8.18	17					
30-Oct-22	122.8	8.31	6.6					
31-Oct-22	131.7	8.4	18.6					
1-Nov-22	137.4	6.8	7.8					
2-Nov-22	156.2	8.3	8					

Date	Quantity m3/d	pH	Average OIW mg/L	pH pH	EC µs/cm	Dissolved oxygen % saturation	Temp °C	Turbidity NTU
limits		6.5-8.5	6 to 25					
3-Nov-22	129	8.4	9					
4-Nov-22	97.2	8.4	17.3					
5-Nov-22	75.4	7.6	9.8					
6-Nov-22	118	7	16.5					
8-Nov-22	115	8.1	12					
10-Nov-22	114.6	7.4	21.6					
11-Nov-22	92.5	6.5	6.3					
12-Nov-22	70.7	7.2	10.1					
14-Nov-22	199.2	8.3	6.9					
15-Nov-22	102.1	8.2	7.9					
16-Nov-22	105.5	7.8	4.6					
17-Nov-22	75.8	8.2	8.9					
18-Nov-22	148.2	7.5	12					
19-Nov-22	90.8	8.8	6.9					
20-Nov-22	107.7	7.9	16					
21-Nov-22	115.8	7.7	7.1					
22-Nov-22	113.7	7.2	13.6					
23-Nov-22	126.4	8.1	24					
26-Nov-22	126.7	7.38	10.4					
27-Nov-22	67.9	6.7	19.6					
29-Nov-22	141.9	8.2	12.6	8.47	69.5	19.2	29.3	16.7
1-Dec-22	69.9	7.9	3.7					
9-Dec-22	73.7	6.8	14.2					
12-Dec-22	301.7	7.79	15.7					
15-Dec-22	72.3	8.2	15					
17-Dec-22	63.7	7.2	7.1					
19-Dec-22	159.4	8.4	6.6					
23-Dec-22	148.2	8.4	15.8					
25-Dec-22	97.3	8.2	24.8					
27-Dec-22	79.3	8.3	5					
28-Dec-22	105.3	7.2	23					
29-Dec-22	127.7	6.76	15.7					
30-Dec-22	224.7	7.06	10	6.835	67.53	2.8	27.4	22.8
31-Dec-22	195.8	6.91	9.21	6.91	70.5	2.3	27.3	36.8
1-Jan-23	270.6	6.8	8.6					
3-Jan-23	233.3	6.71	7.9					
4-Jan-23	130.6	8.25	13.3					
5-Jan-23	212.9	7.4	12					
7-Jan-23	281.8	7	5.4					
8-Jan-23	150.8	6.6	15					
14-Jan-23	152	6.51	7.7					
15-Jan-23	173.2	8.1	21.5					
16-Jan-23	114.8	8.4	8.8					
17-Jan-23	224.2	7.9	10.55					
18-Jan-23	125.6	8.1	7.7					
19-Jan-23	125.4	8.2	12.6					

	Quantity		Average OIW	pH	EC	Dissolved oxygen	Temp	Turbidity
Date	m3/d	pH	mg/L	pH	µs/cm	% saturation	°C	NTU
limits		6.5-8.5	6 to 25					
20-Jan-23	125.66	6.9	12.5					
21-Jan-23	264.6	6.81	8					
22-Jan-23	170.9	6.63	12.1					
23-Jan-23	107.5	6.56	14.6					
24-Jan-23	134.2	7.84	24.5					
25-Jan-23	122	7.01	19.8					
26-Jan-23	137	8.4	17.3					
27-Jan-23	41.1	8.4	17.3					
28-Jan-23	52.1	7.7	14.5					
29-Jan-23	100	7.7	14.5					
30-Jan-23	119.1	7.6	13.1					
1-Feb-23	135.5	8.5	7.7					
2-Feb-23	79	6.6	14.7					

Total 31442.43

Produced water sampling and analysis

Sample Date	pH	Elec Cond	DO	Temp	Turbidity	BOD	COD	TSS	TDS	TOC	OiW
	unitless	µS/cm	%Sat	°C	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Trigger Value	6.5-8.5							10			6
Limit								50			25
24/01/2023	8.1	63300	10		76	5.2	3640	160	47600	616	20.4
17/12/2022	8.1	60000	5		12	7.2	4000	20	45700	623	16.7
23/11/2022	8.1	61700	4		19	7.6	2360	30	44500	531	17.3
26/10/2022	7.4	60100	10		8	19.2	3280	<10	46000	1300	12.1
27/09/2022	7.7	62000	2		5	9.2	1940	10	44000	312	22.5
24/08/2022	7.8	67500	6		1	72	2380	<10	50900	446	NT
20/07/2022	7.4	67300	10		31		3680	10	50600	359	<5
23/06/2022	10.7	69200	8		5	75	1920	30	49000	255	22.6
12/05/2022	8	66000	9		22	77	2580	20	48100	307	17.4
19/04/2022	7.4	65800	9		2	74	1560	30	44300	315	16.2
13/03/2022	7.1	65900	7		<1	87	1860	10	47000	328	28.5
11/02/2022	7.1	61,400	9		<1	87	2,500	120	44,500	604	17.4

Produced water sampling and analysis continued.....

Sample Date	Total Phos	Total Nitro	Oxid. Nitro (NOx)	Ammon. N (NH3-N)	Nitrate (NO3-)	Nitrite (NO2-)	Al_F	Al_T	As_F	As_T
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µg/L	µg/L	µg/L	µg/L
Trigger Value										
Limit										
24/01/2023	<0.025	42.8	0.045	42.4	0.045	<0.005	2	28.2	<2	2.6
17/12/2022	<0.025	59.8	<0.025	59.5	<0.025	<0.005	22	24.6	4.9	5.95
23/11/2022	<0.025	41.6	<0.025	40.7	<0.025	<0.005	<4		9.3	
26/10/2022	<0.025	39.9	<0.05	39.5	<0.05	<0.005	84		5.95	
27/09/2022	<0.025	44.5	<0.005	43.3	<0.005	<0.005	47.1		1	
24/08/2022	0.01	45.4	0.01	44.7	<0.005	<0.005	39.7		9.9	
20/07/2022	<0.05	40.1	<0.1	40.2	<0.1	<0.005			3.3	
23/06/2022	<0.005	40.6	0.01	39.4	0.01	<0.005	12		3.2	
12/05/2022							36.8		3.95	
19/04/2022	0.19	40.1	<0.005	38.6	<0.05	<0.005	46.7		<2	
13/03/2022	<0.1	37	<0.005	36	<0.005	0.006	70		<1	
11/02/2022							30		<1	

Produced water sampling and analysis continued.....

Sample Date	Ba_F	Ba_T	Be_F	Be_T	B_F	B_T	Cd_F	Cd_T	Co_F	Co_T
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Trigger Value										
Limit										
24/01/2023	87600	96000	<2	<2	3580	3480	<0.8	<0.8	<0.4	<0.4
17/12/2022	86000	86700	<2	<2	3270	3240	<0.8	<0.8	<0.4	<0.4
23/11/2022	90800		<2		3710		<0.8		<0.4	
26/10/2022	79600		<2		2860		<0.8		<0.4	
27/09/2022	92.2		<2		650		<0.8		<0.4	
24/08/2022	128000		<2		2750		<0.8		<0.4	
20/07/2022	133000		0.8		3640		<0.8		<0.4	
23/06/2022	132000		<2		2480		<0.8		<0.4	
12/05/2022	133,000		<2		3580		<0.8		<0.4	
19/04/2022	123000		<2		2920		<0.8		<0.4	
13/03/2022	110,000		<0.5		3,100		<0.1		2	
11/02/2022	99,000		<0.5		2,800		0.2		<1	

Sample Date	Cu_F	Cu_T	Cr_F	Cr_T	Cr III	Cr VI	Fe_F	Fe_T	Hg_F	Hg_T
	µg/L	µg/L	µg/L	µg/L	µg/L or mg/l	µg/L or mg/l	µg/L	µg/L	µg/L	µg/L
Trigger Value	3	3								
Limit	8	8								
24/01/2023	15.2	17.8	<4	<4	<50	<50	4740	5860	<0.8	1.62
17/12/2022	3.42	4.29	<4	<4	<0.05	<0.05	5720	6360	0.9	2.44
23/11/2022	8.41		<4		<50	<50	5580		2.82	
26/10/2022	3.5		5.8		<50	<50	946		1.54	
27/09/2022	0.09		<4		<0.05	<0.05	240		<0.8	
24/08/2022	2.88		<4		<50	<50	1200		<0.8	
20/07/2022	1.02		<4				NA		1.56	
23/06/2022	2.11		<4				<80		1.8	
12/05/2022	2.06		<0.4				2240		1.06	
19/04/2022	2.45		<4				3240		<0.8	
13/03/2022	2		15				3,300		<0.05	
11/02/2022	<1		3				9,600		0.06	

Produced water sampling and analysis continued.....

Sample Date	Mg_F	Mg_T	Mn_F	Mn_T	Mo_F	Mo_T	Pb_F	Pb_T	Ni_F	Ni_T
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Trigger Value										
Limit			80	80						
24/01/2023	99800	97500	145	163	<2	<2	0.69	0.82	1.66	3.23
17/12/2022	71500	71800	138	160	<2	<2	0.7	1.75	3.6	5.85
23/11/2022	103000		143		<2		<0.4		5.68	
26/10/2022	22700		23.1		<2		<0.4		6.17	
27/09/2022	1100		47.6		<2		0.16		0.99	
24/08/2022	55800		43.6		<2		1.53		0.99	
20/07/2022	99400		632		<2		<0.4		5.31	
23/06/2022	11200		9.96		<2		1.79		1.76	
12/05/2022	788000		166		<2		0.45		<0.4	
19/04/2022	64500		282		<2		0.61		3.2	
13/03/2022	400,000		230		2		<1		2	
11/02/2022	85		410		3		<1		11	

Produced water sampling and analysis continued.....

Sample Date	Se_F	Se_T	Sn_F	Sn_T	Zn_F	Zn_T	Radium Isotopes (Ra 226)	Radium Isotopes (Ra 228)	MBAS	Phenol
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mBq/L	mBq/L	µg/L	µg/L
Trigger Value					23	23				
Limit					43	43				1200
24/01/2023	<8	<8	<4	<4	70.8	78.1			<0.1	110
17/12/2022	<8	<8	<4	<4	87.7	83.1				Not Taken
23/11/2022	<8		<4		141				<0.1	130
26/10/2022	<8		<4		4170				<0.1	79
27/09/2022	4.6		<4		82		6,800	14,000	<0.1	130
24/08/2022	<8		<4		87.8				<0.1	190
20/07/2022	<8		<4						<0.1	110
23/06/2022	<8		<4		105				<0.1	270
12/05/2022	14.8		<4		55.9				<0.1	270
19/04/2022	<8		<4		56				<0.1	190
13/03/2022	2		<1		51				<0.1	220
11/02/2022	4		<1		75				<0.1	230
13/01/2022	1		<1		36					260

Produced water sampling and analysis continued…..

Sample Date	Pentachlorophenol	2-Chlorophenol	2-Methylphenol (O-Cresol)	4-Methylphenol	2-Nitrophenol	Ethyl/Dimethyl phenols	Benzoic acid	2,4-Dichlorophenol	2,6-Dichlorophenol	4-Chloro-3-Methylphenol
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Trigger Value										
Limit	55									
24/01/2023	<5	<1	220	130	<1	330		<1	<1	<5
17/12/2022										
23/11/2022	<5	<1	280	150	<1	340		<1	<1	<5
26/10/2022	<50	<10	160	92	<10			<10	<10	<50
27/09/2022	<50	<10	250	180	<10			<10	<10	<50
24/08/2022	<50	<10	350		<10			<10	<10	<50
20/07/2022	<5	<1	280	140	<1			<1	<1	<5
23/06/2022	<5	<1	430	300	<1			<1	<1	<5
12/05/2022	<5	<1	570	490	<1			<1	<1	<5
19/04/2022	<50	<10	380		<10			<10	<10	<50
13/03/2022	<5	<1	350	280	<1			<1	<1	<5
11/02/2022	<5	<1	440	260	<1			<1	<1	<5

These samples are only required Quarterly as NTEPL230-01.

Produced water sampling and analysis continued.....

Sample Date	2,4,6-Trichlorophenol	2,4,5-Trichlorophenol	2,4-Dinitrophenol	4-Nitrophenol	2,3,4,5-Tetrachlorophenol	2,3,4,6-Tetrachlorophenol	4,6-Dinitro-o-cresol	TPH	PAH
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Trigger Value									
Limit									
24/01/2023	<1	<1	<20	<20	<10	<1	<10	3.35	20
17/12/2022								2.4	16
23/11/2022	<1	<1	<20	<20		<1		1.84	39
26/10/2022	<10	<10	<200	<200		<10			8.6
27/09/2022	<10	<10	<200	<200		<10			23
24/08/2022	<10	<10	<200			<10			11
20/07/2022	<1	<1	<20	<20		<1			40
23/06/2022	<1	<1	<20	<20		<1			
12/05/2022	<1	<1	<20	<20		<1			17
19/04/2022	<10	<10	<200	<200		<10			
13/03/2022	<1	<1	<20	<20		<1		28.5	
11/02/2022	<1	<1	<20	<20		<1		18	5.9

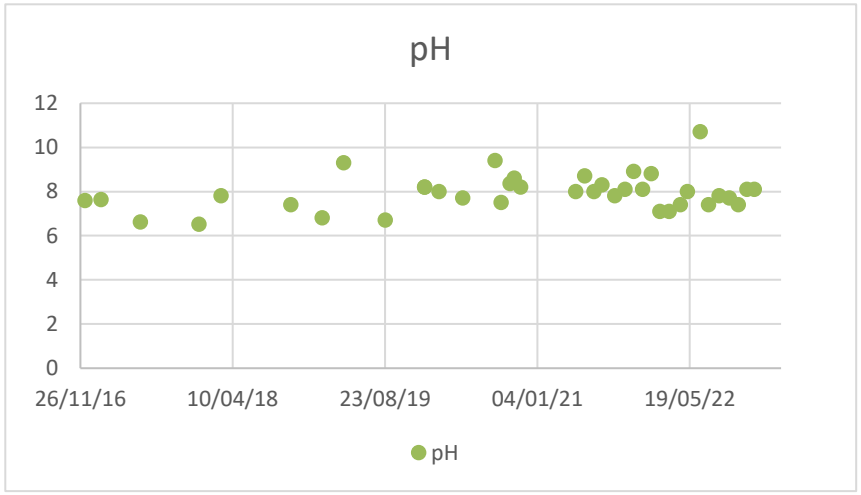
All samples, except TPH and PAH are required Quarterly.

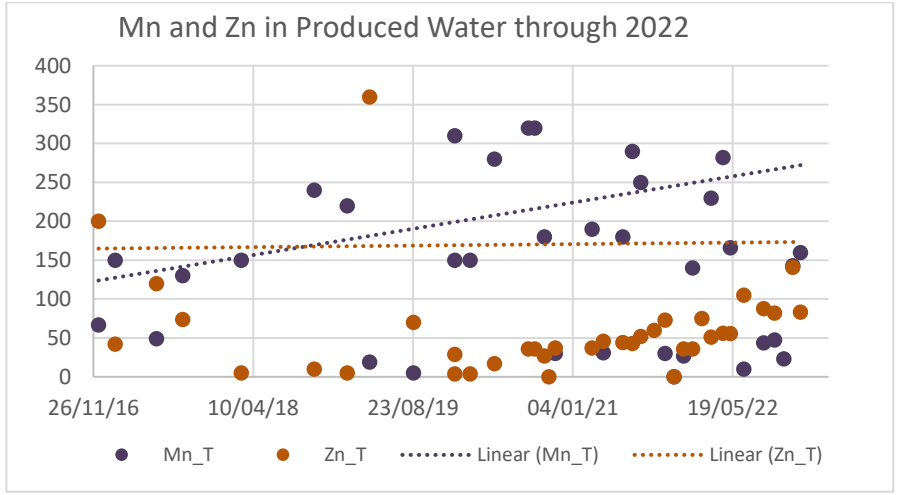
TPH and PAH are required Monthly. As has been previously discussed with the NT EPA, the TPH and OiW sampling definition has been misunderstood. Since November 2022 Eni has taken samples for TPH analysis.

Produced water sampling and analysis continued.....

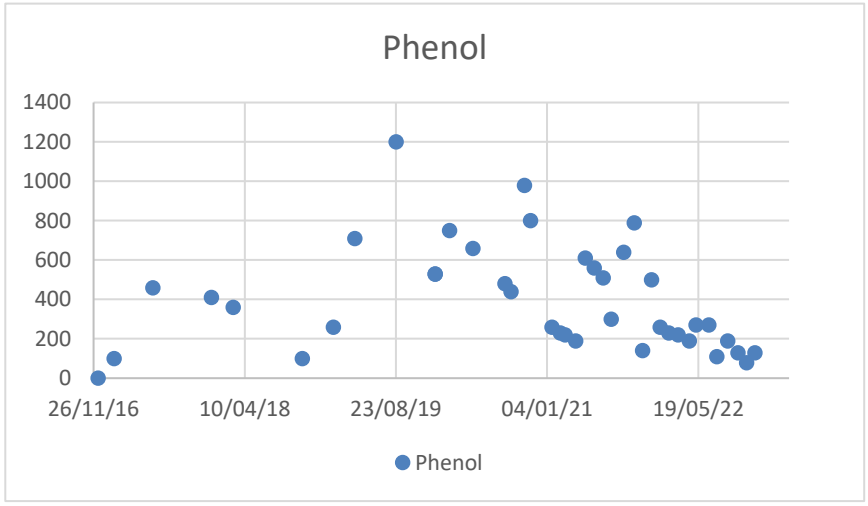
Sample Date	Benzene	Toluene	Ethyl benzene	Xylene (m+p)	Naphthalene	Anthracene	Fluoranthene	Benzo (a) pyrene	Xylene (O)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Trigger Value	1300								
Limit	2000	330	160	150	120	7	2	0.7	
24/01/2023	750	2000	230	980	34	<1	<1	<1	340
17/12/2022	1400	3300	410	1600	31				
23/11/2022	1800	3400	530	910	39	<1	<1	<1	600
26/10/2022	1200	2800	340	1400	41	<1	<1	<1	490
27/09/2022	1600	3600	470	1900	23	<1	<1	<1	640
24/08/2022	2100	4100	470	1700	11	<1	<1	<1	580
20/07/2022	3200	7000	870	3500	32	<1	<1	<1	
23/06/2022	1700	2800	220	900	17	<1	<1	<5	320
12/05/2022	1700	3500	400	1700	<100				
19/04/2022	1300	2100	<200	730	<200				250
13/03/2022	2,500	4,300	480	2,000	18	<1	<1	<1	750
11/02/2022	1,100	1,800	120	510	6	<1	<1	<1	180
13/01/2022	1,900	4,100	540	2,200	<100	<1	<1	<1	

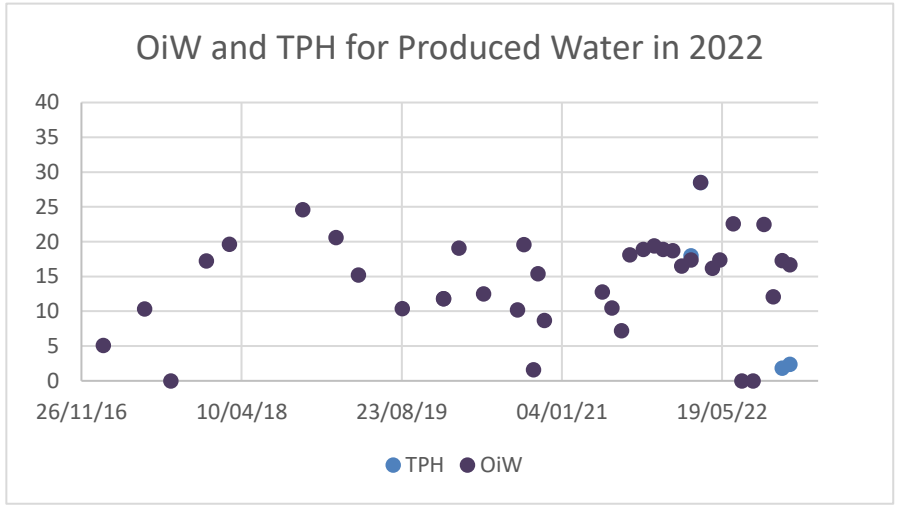
Produced water sampling and analysis continued.....

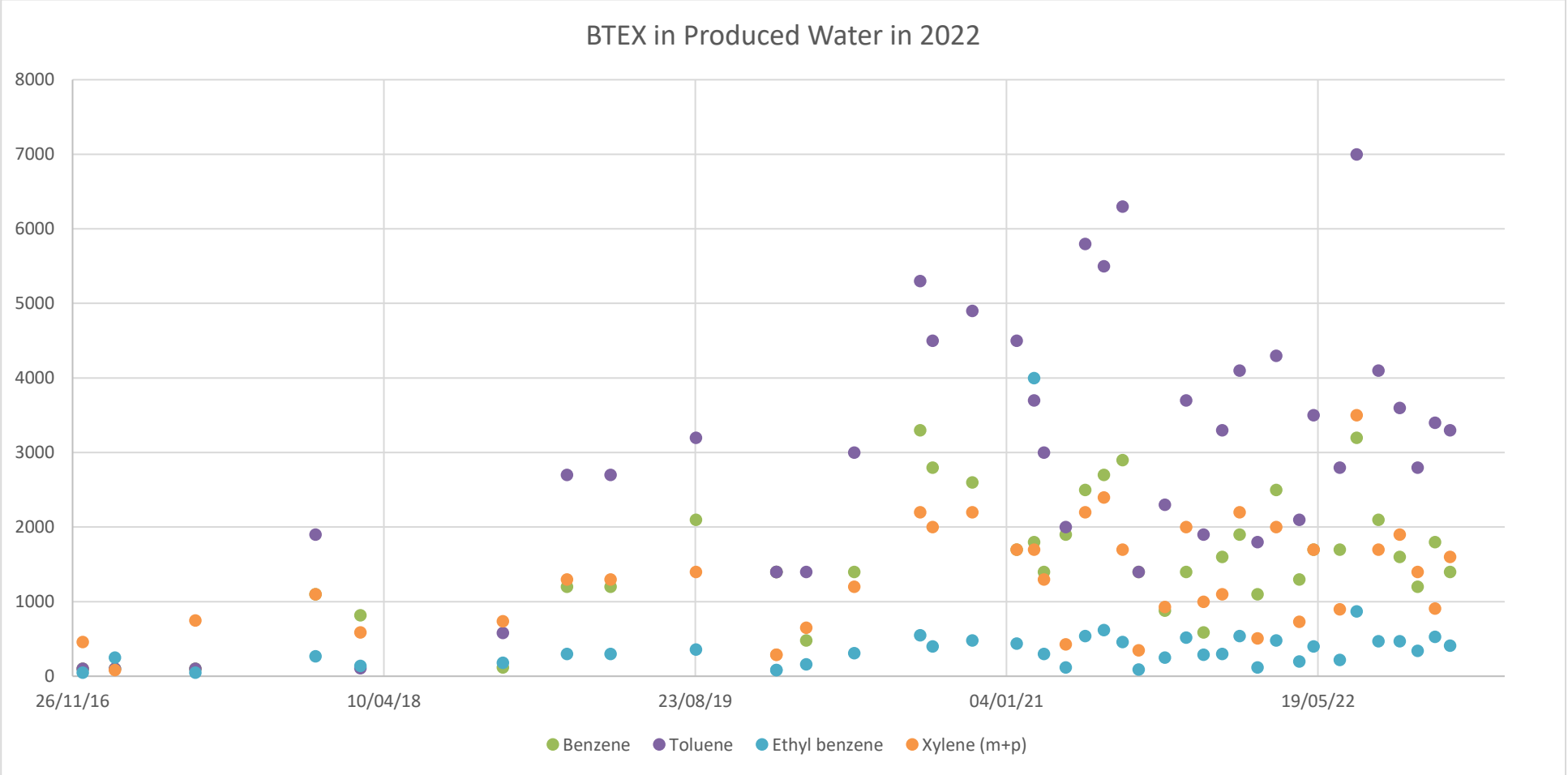




Units - pH : unitless, Manganese and Zinc : µg/L. Phenol : µg/L, OiW : mg/l, TPH : µg/L







Units - BTEX : µg/L

ATTACHMENT C:

WWTP SAMPLING

Treated wastewater effluent monitoring results

Sample Date	pH	Elec Cond	Turbidity	DO	BOD	COD	TSS	TDS	TOC	OiW
Units	unitless	µS/cm	NTU	% sat	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Threshold					10		10			
Limits	6.5-8.5				20		30			
25/01/2023	7	801	5	7	5.4	80	<10	420	25	4.9
21/12/2022	4.2	900	5	9	1.8	40	<10	530	14	3.9
23/11/2022	6.7	789	6	5	1.6	60	<10	430	19	4.7
26/10/2022	4.8	1110	3	7	4.9	40	<10	580	13	6.1
20/09/2022	5.8	913	3	10	3	20	10	490	8	
24/08/2022	4.3	1220	16	9	<5	60	30	660	19	
20/07/2022	5	1080	7	9	<5	40	19	580	11	<5
22/06/2022	7	1100	2	7	3.2	60	<10	600	18	
10/05/2022	6.4	899	22	10	3.2	40	40	500	15	
20/04/2022	4.3	866	4	9	7.4	20	<10	490	12	8
13/03/2022	4	883	10	9	9.4	40	10	510	9	
11/02/2022	4.8	629	4	8	3.4	20	10	330	8	

Treated wastewater effluent monitoring results continued...

Sample Date	Tot. Phos	Tot. Nitro	Ammon. N	Nox-N (Oxid. N)	NO3-N (nitrate)	NO2-N (nitrite)	E.Coli	Ent Cocci
Units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	cfu per100ml	cfu per 100ml
Threshold							100	
Limits							1000	
25/01/2023	2.29	6.83	2.49	4.01	3.96	0.055	<1	1300
21/12/2022	1.67	38	6.73	25.6	25.6	0.015	44	<1
23/11/2022	0.83	23	5.03	14.7	14.6	0.045	35	1730
26/10/2022	0.38	50.3	14.6	35.7	35.7	0.04	<1	59
20/09/2022	0.075	31.7	12	19.4	19.3	0.015	<1	131
24/08/2022	0.795	59.6	13.9	43.9	43.9	0.05	9	32
20/07/2022	0.255	69.4	33	36.4	36.2	0.22	<1	3
22/06/2022	0.97	15.2	14.2	0.585	0.525	0.06	43	866
10/05/2022	1.67	31.5	7.25	10.8	10.8	0.045	10	411
20/04/2022	2.11	35.4	2.78	26.4	26.4	<0.005	<1	7
13/03/2022	2.16	34.7	2.82	27.7	27.7	0.01	<1	4
11/02/2022	0.04	36.5	35.5	<0.005	<0.005	<0.005	<1	121

Treated wastewater effluent monitoring results continued...

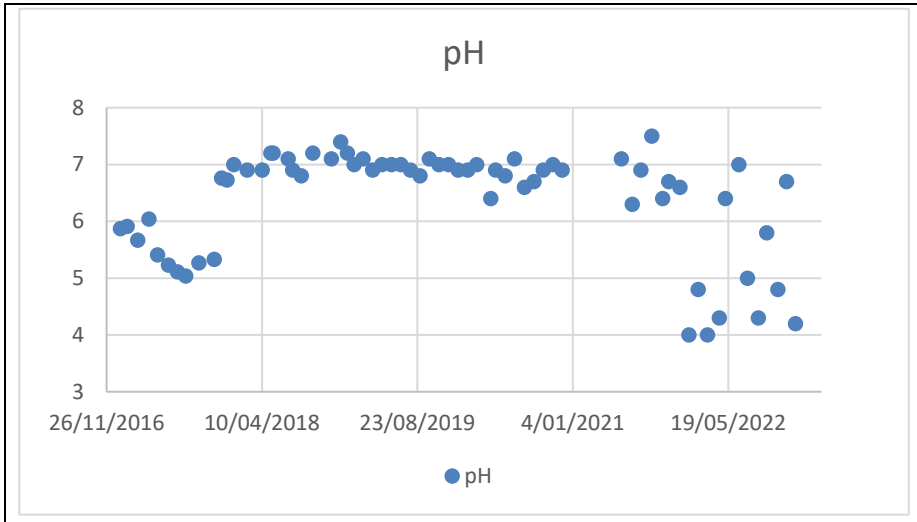
Sample Date	**Al**	**As**	**Ba**	**Be**	**B**	**Cd**	**Co**	**Cu**	**Cr**	**Cr III**	**Cr VI**
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Threshold											
Limits								8			
25/01/2023											
21/12/2022											
23/11/2022											
26/10/2022											
20/09/2022											
24/08/2022	9160	2.05	37.6	<0.05	97.5	1.54	0.42	53.5	0.8	<0.05	<0.05
20/07/2022											
22/06/2022											
10/05/2022											
20/04/2022											
13/03/2022											
11/02/2022											

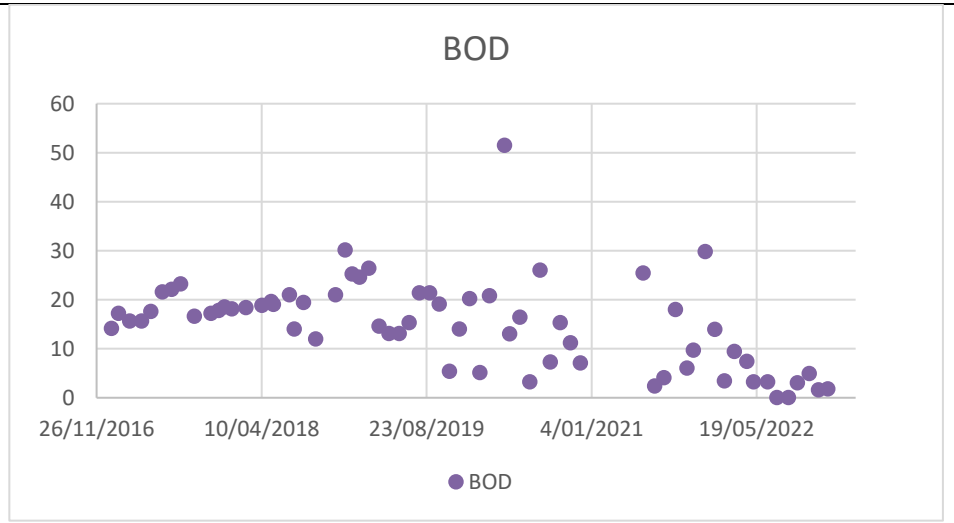
Treated wastewater effluent monitoring results continued...

Sample Date	**Fe**	**Hg**	**Mg**	**Mn**	**Mo**	**Pb**	**Ni**	**Se**	**Sn**	**Zn**
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Threshold										
Limits										43
25/01/2023										
21/12/2022										
23/11/2022										
26/10/2022										
20/09/2022										
24/08/2022	418	<0.02	3.7	74.8	0.3	0.7	26.4	0.6	0.7	529
20/07/2022										
22/06/2022										
10/05/2022										
20/04/2022										
13/03/2022										
11/02/2022										

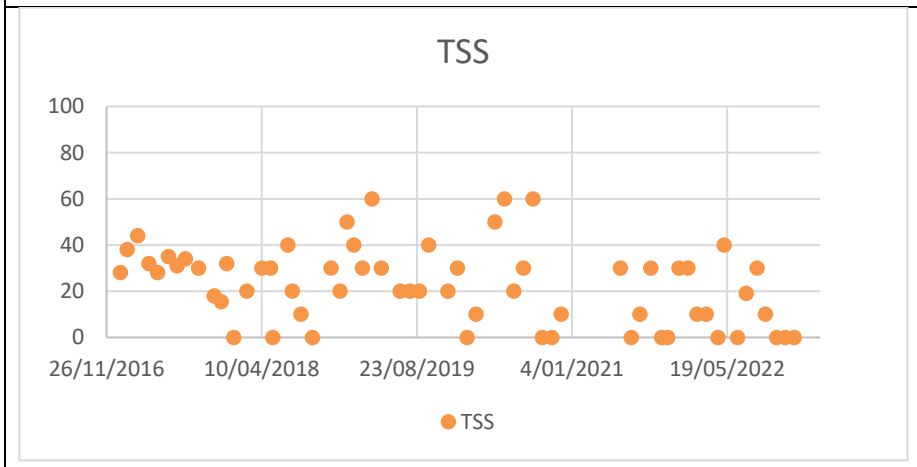
Treated wastewater effluent monitoring results continued...

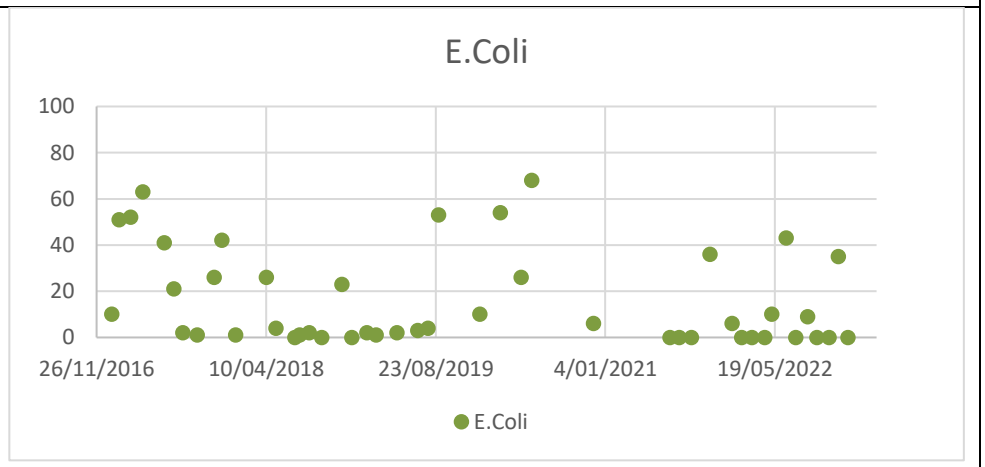
Sample Date	TPH	PAH	Benzene	Toluene	Ethyl benzene	Xylene (m+p)	Naphthalene	Anthracene	Fluoranthene	Benzo (a) pyrene	Xylene (o)
Units	mg/l		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Threshold											
Limits			2000	330	160	150	120	7	2		
25/01/2023	<0.1	0	<1	3	<1	6	<1	<1	<1	<1	<1
21/12/2022	<0.1	0	<1	<1	<1	<2	<1				
23/11/2022	<0.1	0	<10	<10	<10	<20	<10	<1	<1	<1	<10
26/10/2022	<0.1		<1	<1	<1	<2	<1	<1	<1	<5	<1
20/09/2022	1		<1	<1	<1	<2	<1	<1	<1	<1	<1
24/08/2022	NT	0	<1	<1	<1	<2	<1				
20/07/2022			<1	<1	<1	<2	<1				
22/06/2022	2.3	0	<1	<1	<1	<2	<1	<1	<1	<1	<1
10/05/2022	17.1										
20/04/2022			<1	<1	<1	<2	<1				
13/03/2022	15.2	420	<1	<1	<1	<2	420	<100	<100	<100	<1
11/02/2022	6.1		<1	1	<1	<2	<1	<1	<1	<1	

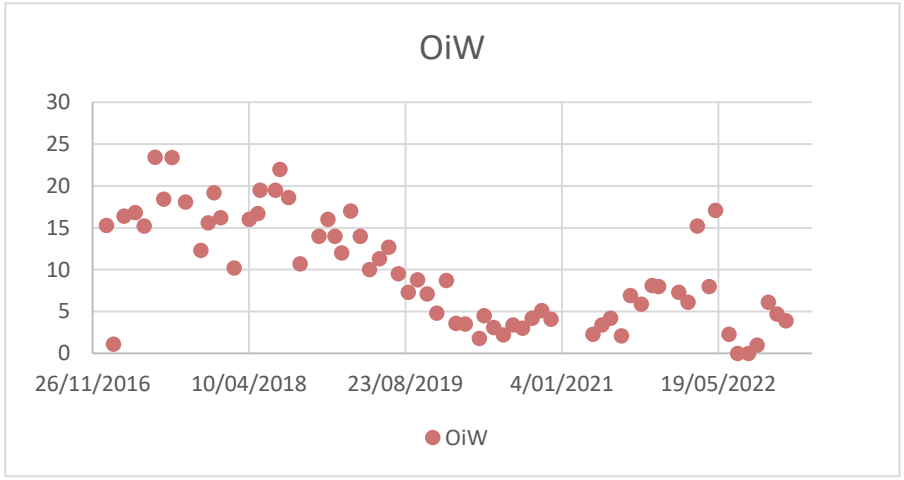


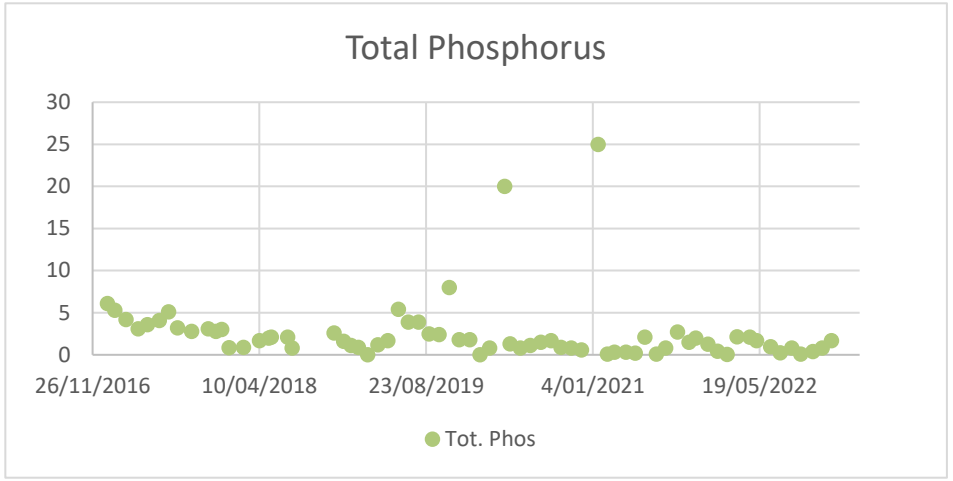


Units – pH : Unitless, BOD : mg/l, TSS : mg/l, E.Coli : cfu/100ml,

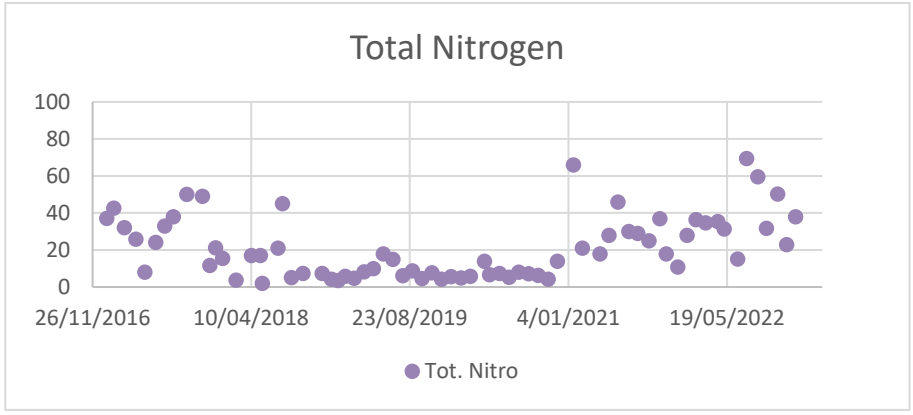


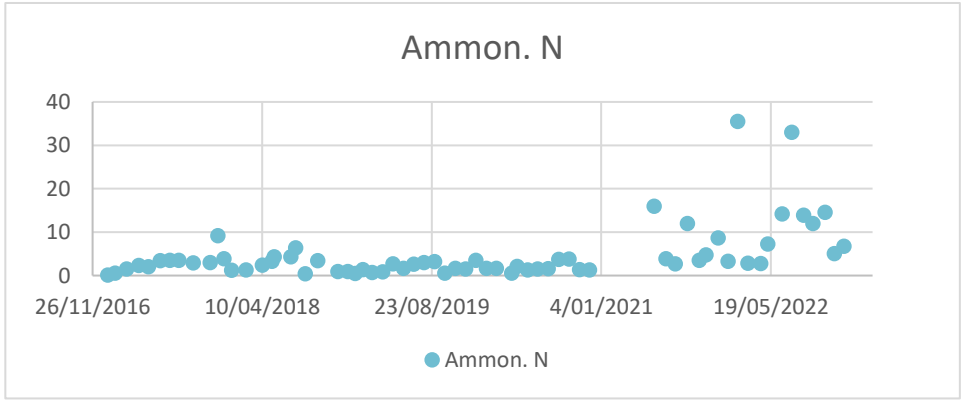






Units – OiW : mg/l, Total Phosphorus : mg/l, Total Nitrogen : mg/l, Total Ammonia : mg/l





ATTACHMENT D:

STORMWATER MONITORING

Utilities stormwater discharge monitoring (SW-01)

Date & time	pH	EC	Oil in Water (HORIBA)
	pH	µs/cm	mg/L
Trigger			1
Limit		-	6
2/01/2022	5.82	94	3.9
30/01/2022	5.79	82	0
14/03/2022	5.81	83	0
15/04/2022	5.93	83	0
28/05/2022	5.79	81	0
7/08/2022	5.9	88	0
14/08/2022	6	83	0
21/08/2022	5.8	86	0
29/08/2022	5.9	80	0
6/12/2022	6	81	0.2
31/12/2022	7.48	85	0.8

Table – Site measurements during discharge

Open drains sump stormwater discharge monitoring (SW-03)

Date & Time	pH	EC	Oil in Water (HORIBA)
	pH	µs/cm	mg/L
Trigger			1
Limit	-	-	6
9/01/2022 @ 01:30	7.57	492.6	1.9
04/02/2022 @ 08:00	7.12	166	1
19/02/2022 @ 21:00	6.33	307	0.3
28/02/2022 @ 08:00	6.86	205	2.8
15/04/2022 @ 08:00	6.94	90.73	0
28/1/2023@ 20:30	5.84		1.7

Notes:

[4] Values above the EPL limit are shown in red text. Values above the trigger value or outside ANZECC 80% species protection guideline value are shown in orange text.
[5] All routine analyses conducted in the site laboratory, using the PC700 bench meter for pH and EC, and the Horiba OCMA500 with Florisil solvent for oil in water, unless otherwise stated

Annual stormwater monitoring

Parameter	Unit	Value
pH	unitless	6.9
Elec Cond	µS/cm	411.0
OiW	mg/l	5.1
Al	µg/L	60
As	µg/L	<1
Ba	µg/L	660
Be	µg/L	<0.5
B	µg/L	30
Cd	µg/L	15
Co	µg/L	<1
Cu	µg/L	<1
Cr	µg/L	<1
Cr III	µg/L	nt
Cr VI	µg/L	nt
Fe	µg/L	680
Hg	µg/L	<0.05
Mg	µg/L	nt
Mn	µg/L	50
Mo	µg/L	6
Pb	µg/L	<1
Ni	µg/L	5
Se	µg/L	<1
Sn	µg/L	<1
Zn	µg/L	750

Notes:
[1] This table summarises the discharge monitoring between 10 February 2022 – 9 February 2022.
[2] NT = not tested.
[3] Trigger value for 80% species protection from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1. Updated values (2018) have been used where available.
[4] Values above the EPL limit are shown in red text. Values above the trigger value or outside ANZECC 80% species protection guideline value are shown in orange text.
[5] All routine analyses conducted in the site laboratory

Sample Date	pH	Elec Cond	OiW	Al	As	Ba	Be	B	Cd	Co	Cu	Cr	Cr III	Cr VI
	unitless	µS/cm	mg/l	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
24/01/2023	6.9	439.0	1.6	469	<2	320	<2	402	12.4	<0.4	10.1	4.6	<50	<50

Sample Date	Fe	Hg	Mg	Mn	Mo	Pb	Ni	Se	Sn	Zn
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
24/01/2023	698	<0.8		23.3	<2	<0.4	4.87	<8	<4	888

Annual Laboratory analysis results - Intertek

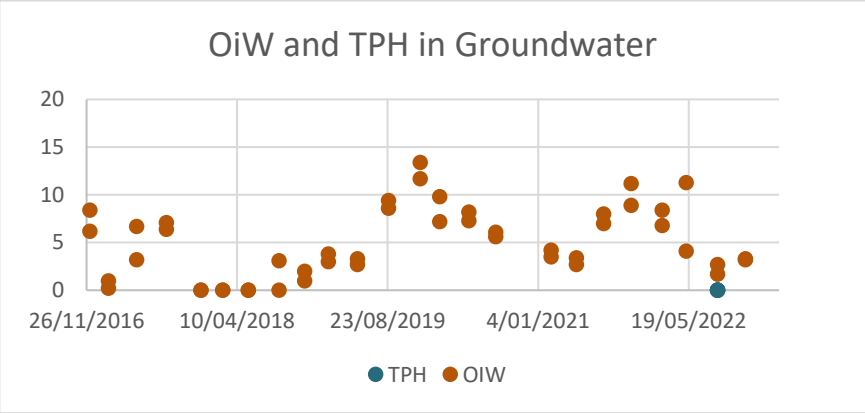
ATTACHMENT E:

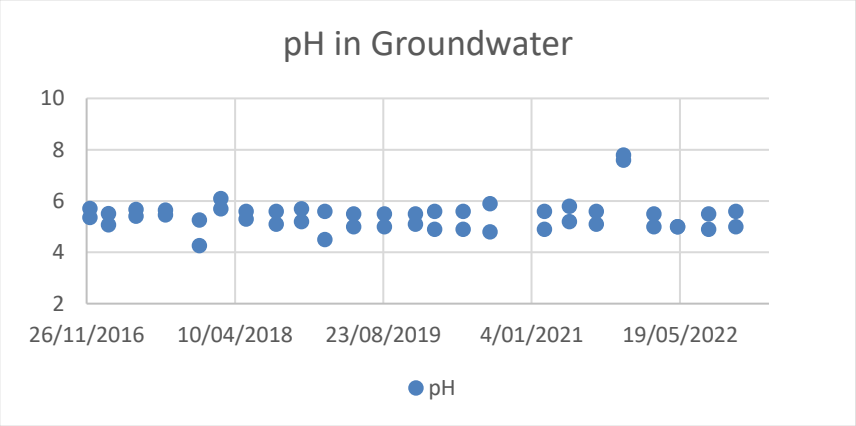
GROUNDWATER MONITORING

Quarterly groundwater monitoring data

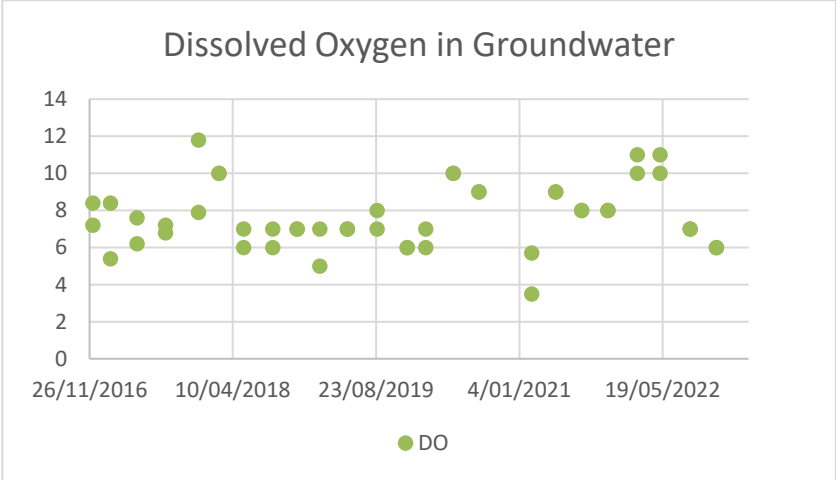
Sample Date		pH	E Cond	Turbidity	DO	BOD	Total Phos	Total Nitro	NOx (Oxid. N)	NH3 (Amm)	NO3 (Nitrate)	NO2 (Nitrite)
		-	microS/cm	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
23/11/2022	BH5	5	73	56	6	<5	0.03	3.26	3.04	0.025	3.04	<0.005
23/11/2022	BH7	5.6	43	100	6	<5	0.035	2.08	1.86	0.02	1.86	<0.005
23/08/2022	BH5	4.9	60	170	7	<5	0.005	2.82	2.8	0.015	2.8	<0.005
23/08/2022	BH7	5.5	44	260	7	<5	0.01	1.68	1.54	<0.03	1.54	<0.005
10/05/2022	BH5	5	80	11	11	2.1	<0.005	0.4	0.32	0.005	0.32	<0.005
10/05/2022	BH7	5	79	8	10	2.2	<0.005	0.42	0.315	<0.005	0.31	<0.005
20/02/2022	BH5	5.5	50	280	10	1.9	0.02	1.84	1.85	0.01	1.85	<0.005
20/02/2022	BH7	5	66	64	11	2.6	0.035	2.78	2.83	0.02	2.82	<0.005

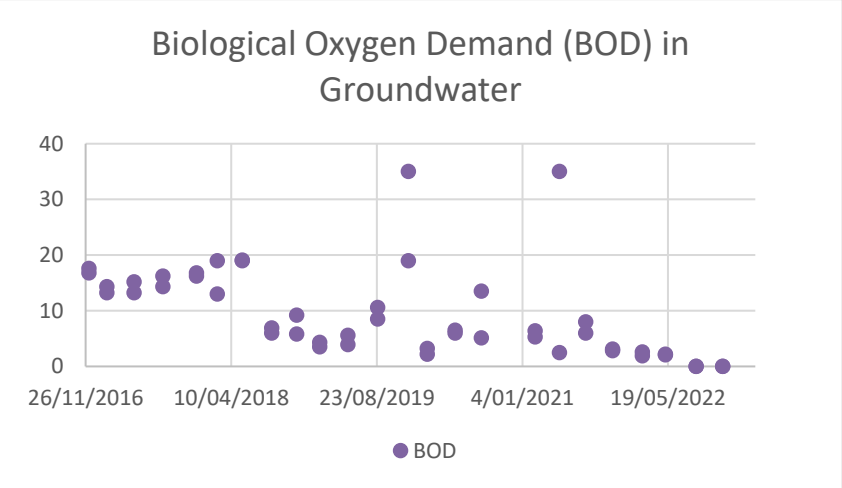
Sample Date		E. coli	Ent-Cocci	Total Coliforms	TPH	OIW	TSS	TDS	TOC	COD
		cfu per100ml	cfu per100ml	per 100ml MPN	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
23/11/2022	BH5					3.2				
23/11/2022	BH7					3.3				
23/08/2022	BH5	<1	15	<1	<0.1	2.7	220	50	1	20
23/08/2022	BH7	<1	1	<1	<0.1	1.7	260	30	1	<20
10/05/2022	BH5	<1	<1			11.3	<10	70	1	<20
10/05/2022	BH7	<1	<1			4.1	<10	60	1	<20
20/02/2022	BH5	<1	6			6.8	10	30	<1	<20
20/02/2022	BH7	<1	40			8.4	160	40	<1	<20

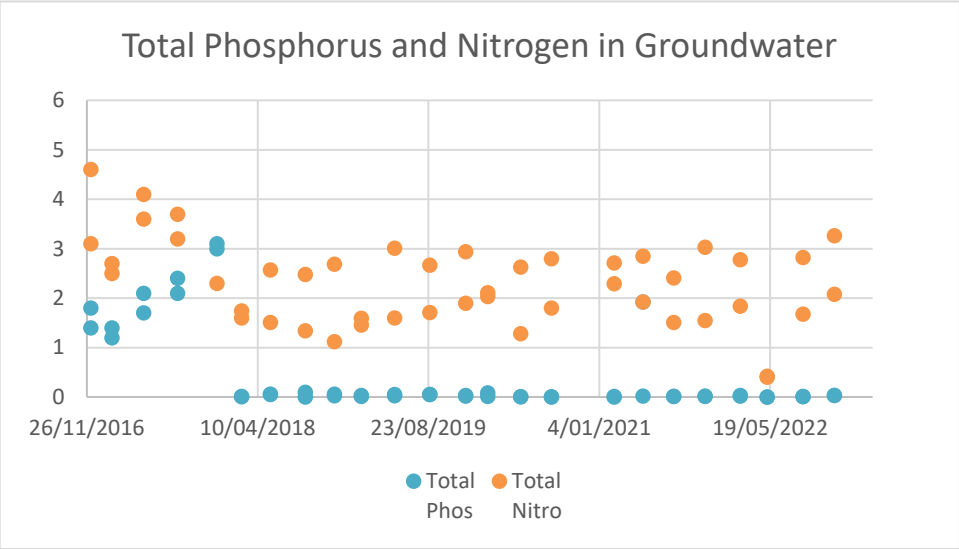


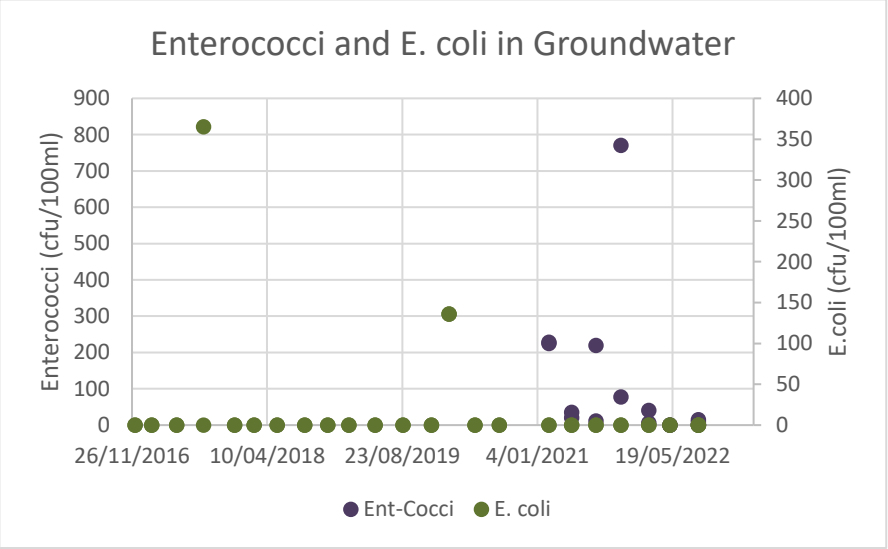


Units – OiW : mg/l, TPH : µg/L, pH : unitless, DO : mg/l, BOD : mg/l









ATTACHMENT F:

CALIBRATION CERTIFICATES

intertek
Total Quality. Assured.

VERIFICATION REPORT

Client: ENI Australia, Blacktip YGP
Instrument: HORIBA OCMA-500
Serial Number: T9EHWHDT
Date Calibrated: 01st February 2023
Next Calibration: 01st August 2023

Method

1. Zero Calibration
   a. Pure S-316 Solvent is measured in measurement mode, and result should be 0.0 mg/L if not replace internal filters and re measure.
   b. Change instrument into Zero Calibration and run S-316 Solvent.
2. Span Calibration
   a. Prepared known sock sample is measured to obtain steady reading. Concentration of standard is twice the value of measured sample.
3. Verify with Standard or Stock Samples.

Maintenance:

Were Internal Filter / O-ring replaced : Yes
Were repairs carried out : No

Calibration Results:
Following readings were obtained against Pure S-316 & Standard.

Mode	Expected Reading (mg/L)	Instrument Reading (mg/L)
Zero Calibration	0.0	0.0
Span Calibration	200.0	200.0
Stock Sample 1	5.0	5.3
Stock Sample 2	25.0	25.3

Remarks:
The Instrument is acceptable for use as per the standard operating test procedure (ASTM D 7066).

Verified by: Pasan Mihijaya
Title: Chemist
Date: 01st February 2023

intertek caleb brett

Page 1 of 1

Other calibration certificates of third party laboratories are assumes to be incorporated by NATA accreditation. Certificates may be requested.