OEG Offshore

OEG Offshore

Hamaura Road Facility Water Monitoring Plan

12 August 2019

CDM Smith

Table of Contents

Figures

Tables

Appendices

Document history & status

Revision	Date issued	Reviewed by	Approved by	Date approved	Revision type
A	06/06/19	P. Davey	P. Davey	06/06/19	Draft
0	17/06/19	P. Davey	P. Davey	17/06/19	Draft
0	12/08/19	P. Davey	P. Davey	12/08/19	Final

Distribution of copies

Version	Date issued	Quantity	Electronic	Issued to
A	07/06/19	1	pdf	OEG Offshore
0	17/06/19	1	Pdf	OEG Offshore
0	12/08/19	1	Pdf	OEG Offshore

Last Saved:	12 August 2019
File Name:	1000250 OEG WMP Rev_0.docx
Author:	E. Aliotti
Project Manager:	P. Davey
Client:	OEG Offshore
Document Title:	**Hamaura Road Facility Water Monitoring Plan**
Document Version:	Rev 0
Project Number:	1000250

Section 1 Introduction

1.1 Purpose

This Surface Water Monitoring Plan outlines the method, location and frequency for assessment of surface water and sediment contamination associated with operation of the OEG Offshore operated East Arm Facility at Hamaura Road, Hudson Creek Industrial Estate, Berrimah (OEG East Arm Facility) approximately 8 km south east of the Darwin CBD.

1.2 Objectives

The objective of this plan is to provide guidance on sampling, analytical requirements and assessment criteria for surface water monitored on site.

1.3 Background

OEG are a long-term tenant of the facility and currently manage bulk fuel transfer and storage operations. This site is part of an industrial estate and was originally developed from a greenfield area in stages to its current land use of commercial/industrial. The OEG East Arm Facility was designed for the storage, handling, transfer and use of a range of chemicals. The facility consists of two yards; Yard 1 (Lot 5106 and Lot 5107) and Yard 2 (Lot 7405), refer Figure 1.

Table 1-1 presents the key storage infrastructure and activities for each yard. Tank washing is conducted in Yard 1 shed 2 undercover within a substantial bund capacity. All waste is captured in IBC's and disposed of appropriately offsite by ToxFree/Cleanaway. All chemical storage occurs in the fully bunded and undercover area in Yard 1 shed 1. Yard 2 is used for container/basket storage with fabrication works conducted undercover in Yard 2 Shed.

Table 1-1 OEG Offshore Facility Storage Infrastructure

Yard	Infrastructure	Activities
Yard 1	Shed 1 – Semi-enclosed shed, bunded on all sides with concrete floor	Chemical storage
	Shed 2 – Semi-enclosed shed, bunded on all sides with concrete floor	Tank washing
	Laydown area - unbunded concrete lined yard	Non-hazardous bulk storage
	Gantry – concrete lined fuel depot	Vehicle refuelling
	4 x 110KL self-bunded tanks	Bulk fuel storage
	4 x 150KL bunded tank	Bulk fuel storage
Yard 2	Yard 2 Shed - roofed but open shed with concrete floor. Bunding installed along the northern side.	Fabrication works
	Laydown areas – unbunded bitumen lined open yard	Non-hazardous bulk storage

The drainage systems has a number of internal drains and sumps in which water from select catchments is captured for treated disposal (Figure 2). Humiceptors are located at three drainage points and are connected to isolation valves to allow management response in the event of a spill. Stormwater from clean areas flows off site through stormwater drains. The stormwater drain network for the industrial area ultimately discharges to the Darwin Harbour south of the facility.

Figure 1 OEG Offshore Hamaura Road Facilities, East Arm Northern Territory

Figure 2 OEG Offshore facility surface water drainage network

Since 26th February 2019 the site has operated under an Environmental Protection Licence (EPL257) administered by the Northern Territory Environmental Protection Authority (NT EPA). A Surface Water Management Plan (SWMP) is required for the facility as part of the EPL. This SWMP has been developed to address this requirement and has been informed by a review of chemicals stored on site, operation activities, discharge pathways and water quality assessments from site water storages and drains. This information has been used to collate a list of contaminants of potential concern (CoPC). These include TRH, PAH, BTEXN, SVV, SVOC, VOC, CrVI and herbicides.

The SWMP includes four key water sampling points with different risk profile due to different upstream operations and infrastructure (Table 1-2 and Figure 1-3). Sampling will be conducted on an at-least annual basis. Where CoPC are detected additional sampling will be scheduled to confirm water quality and further management requirements.

Table 1-2 Samples Locations

Sample ID	Location	GPS Coordinates UTM 52 L	
		Easting	Northing
SWH1	Humeceptor	0708684	8619703
SW2	ISO tank: FISU 260005	0708685	8619704
SW3	Bulk tank bund	0708587	8619713
SW4	Yard 2 Humeceptor	0708538	8619708

Figure 1-3 Site sampling points

Section 2 Legislation and guidance

The SWMP has been prepared in general accordance with and reference to the following relevant state and federal guidelines and with reference to the site environmental authority (EA):

- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/guidelines/anz-fresh-marine;
- Australian/New Zealand Standard 5667.1:1998 Water quality—Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples;
- HEPA (2018) PFAS National Environmental Management Plan;
- NEPC (as amended April 2013) National Environment Protection (Assessment of Site Contamination) Measure 1999;
- Northern Territory Government Waste Management and Pollution Control Act;
- Northern Territory Government Waste Management and Pollution Control (Administration) Regulations;
- NT EPA (2016) Northern Territory Guideline for Reporting on Environmental Monitoring. Northern Territory Government, Darwin NT, Australia. Available at: https://ntepa.nt.gov.au/__data/assets/pdf_file/0006/284856/guideline_reporting_env_monitoring.pdf; and
- NT EPA (2017) Northern Territory Contaminated Land Guideline. Northern Territory Government, Darwin NT, Australia. Available at: https://ntepa.nt.gov.au/__data/assets/pdf_file/0020/434540/guideline_contaminated_land.pdf

Section 3 Sample Points and Monitoring Parameters

The location of the site sampling points is presented in Figure 1-3.

These sites have been identified based on the site layout, chemical storage, drainage infrastructure and potential for contamination. A list of chemicals stored on site is included in Appendix 1.

A summary of the sample sites, transport mechanisms and chemical parameters of interest are summarised in Table 3-1 below. The analytical parameters are currently extensive and are to be reviewed on an annual basis with the intent to amend based on risk.

Table 3-1 Sampling points and analytical parameters

AEC	Site ID and description	Sampling Zone	Contaminant distribution and transport	Analytical Parameters
1	SWH1 Yard 1 HumeCeptor	Within Humeceptor treatment chamber	Surface runoff and/or particulate movement from laydown area into drainage lines.	**In-Situ:** ▪ pH; ▪ Electrical conductivity (EC), µs/cm; ▪ Temperature, degrees Celsius (c); ▪ Dissolved Oxygen (DO), %sat and mg/L; ▪ Turbidity, NTU; and ▪ Redox, mV. **Laboratory:** ▪ SVOCs and VOCs ▪ BTEXN ▪ TPH and PAH ▪ Dissolved metals; As, Be, B, Cd, Co, Cu, CrVI, Hg, Pb, Ni, Mn, Se, Zn
2	SW2 Yard 1 ISO tank	Treated water from HumeCeptor (prior to discharge)	Surface runoff and/or particulate movement from laydown area into drainage lines.	
3	SW3 Yard 1 Bulk tank bund	Within bund	Residual contamination from spills or leaks from tanks within bunded area.	
4	SW4 Yard 2 HumeCeptor	Within Humeceptor treatment chamber	Surface runoff and/or particulate movement into drainage lines.	

Section 4 Field program

4.1 Health and safety

Field work will be undertaken in accordance with OEG's site specific health, safety and environment requirements and the job safety and environment analysis (JSEA) for the proposed works.

Table 4 1 indicates the minimum requirement for personal protective equipment (PPE) to be used when conducting sampling works.

Table 4-1 Summary of minimum PPE requirements

Protection area	Required PPE	Notes
Head	Hardhat	Must be worn at all times
Face	Safety glasses	
Hands	Disposable nitrile gloves	
Body	Long sleeved shirt and trousers with high visibility vest	
Feet	Steel capped boots	

It is noted that any PPE used/worn my affect physical mobility, manual dexterity, hearing, visibility and body temperature and moisture loss, thereby having adverse impacts on work efficiency. Regular breaks should be taken to reduce these impacts.

4.2 Methodology

sampling was undertaken in accordance with the AS/NZS 5667: Australian and New Zealand Standard: Water Quality – Sampling. Water quality parameters will be collected at each location using a pre-calibrated hand-held water quality meter. Calibration certificates will be filed and retained.

Where possible and safe, measurements will be collected by water quality probes being lowered directly into standing water for the measurement of the physiochemical parameters (pH, EC, dissolved oxygen, redox potential and temperature). Alternatively, a grab sample will be collected from the water body and water quality parameters measured directly from a clean, dedicated sample container.

Samples destined for laboratory analysis will be collected as grab samples from just below the surface of the water (it is not acceptable to decant water for laboratory analysis from the container used to measure water quality parameters). If water depth permits (and access can safely be gained) the mouth of bottles will be held >5 cm below the water surface. Samples may be collected using an extendable pole if required for safety reasons.

All samples will be collected in appropriately preserved sampling containers provided by OEG's nominated NATA accredited analytical laboratory. Where analysis for dissolved metals is required, samples will be field filtered directly into the laboratory supplied bottles.

Observations made during parameter measurement and/or sample collection will be documented including, but not necessarily limited to odour, sheen, colour, floating matter, algae and/or presence of fauna.

Any re-usable sampling equipment will be decontaminated between sites using a 10% decon-90 solution and deionised water rinse.

4.3 Photographic and location records

Where permitted and feasible, photographs of sampling locations and/or other features of interest relevant to the assessment will be taken.

Weather conditions, particularly in relation to contaminant migration pathways within and in the vicinity of the AECs will be recorded by field personnel.

Photographs will document significant areas of contamination (e.g. staining/free phase product) and/or foreign materials encountered at the surface or near surface (e.g. metal fragments, wood etc.)

The coordinates of each sample location and photograph will be recorded by GPS and/or relative to site features.

4.4 Sample identification, storage and transport

Samples will be identified using unique sample point identification codes based on sample media and location (e.g. SW2). All samples will be placed in laboratory-supplied containers which will then be placed directly into an insulated chest containing ice for transportation to the selected NATA accredited analytical laboratory under chain of custody (COC) control. The COC will contain (as a minimum):

- project code;
- sample date;
- sampler;
- unique sample identifier;
- sample matrix and container type;
- preservation method used;
- requested analysis for each sample;
- laboratory quote number and contact person, if required;
- turnaround times required for analysis (critical if less than standard turnaround times are required); and
- names and signatures of sender and receiving laboratory.

Samples will be transported to the selected laboratory with sufficient time to perform analysis within the applicable holding time.

Samples should be labelled with an appropriate unique sample location identifier followed by date in (YYMMDD) format as presented in Table 4-2.

Table 4-2 Sample naming convention

Sample location	Location description	Sample ID
SWH1	Yard 1 HumeCeptor	SWH1_YYMMDD
SW2	ISO tank	SW2_YYMMDD
SW3	Bulk tank bund	SW3_YYMMDD
SW4	Yard 2 HumeCeptor	SW4_YYMMDD

Section 5 Quality assurance and quality control

For field quality assurance and quality control (QA/QC) purposes, a duplicate will be undertaken every 10 primary samples and a triplicate every 20 primary samples. Primary and duplicate samples will be sent to the primary laboratory Eurofins and triplicate samples will be sent to the secondary laboratory ALS Laboratory Global (ALS).

Laboratory QA/QC provide an accurate estimate of the precision or accuracy of analytical results when sample results are derived within laboratory reporting of limits (LOR) required by the Data Quality Indicators (DQI). The LOR represents the concentration of a specific analyte the laboratory can detect to a high degree of confidence for a particular sample.

5.1 Fieldwork quality assurance/quality control

Field Duplicates and Triplicates

In addition to the primary samples, quality control field duplicate (intra-laboratory duplicates) and triplicate (inter-laboratory) samples will be collected to assess aspects of field protocols and laboratory performance and to classify the validity of the laboratory data. The duplicate and triplicates collection will be attained by dividing one sample into two or three subsamples.

Duplicates and triplicates allow to assess the aspects of field protocols and laboratory performance and to classify the validity of the laboratory data and analysed. The QA/QC samples must be labelled anonymous (e.g. DUPE1).

The overall precision of field duplicates is generally assessed by their Relative Percent Difference (RPD), given by:

$$\mathrm{RPD} = \frac{|X1 - X2|}{\frac{|X1+X2|}{2}} * 100$$

where X1 is the primary sample measurement

X2 is the duplicate sample measurement

5.2 Laboratory quality assurance/quality control

Laboratory Duplicates

The quality control term Laboratory Duplicate refers to a randomly selected intra-laboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The results of the sub-samples are then compared by calculating the Relative Percentage Difference (RPD). If there are still non-conformances, the analytical run must be re-analysed. It is acceptable for replicate values close to the LOR to have increased RPD's:

- Result < 10 times LOR: No Limit;
- Result between 10 and 20 times LOR: 0% - 50%;
- Result > 20 times LOR: 0% - 20%.

Matrix Spikes

Matrix spikes are samples prepared within the laboratory by dividing a field sample into two aliquots, then spiking each with identical concentrations of the analytes. The matrix spike and matrix spike duplicate are then analysed separately, and the results compared to determine the effects of the sample matrix on the accuracy and precision of the analytes. Accuracy is assessed by the calculation of the percent recovery.

Surrogates

Surrogate spikes involve the addition of a known concentration of a non-target analyte prior to sample preparation and analysis. The surrogate is chemically similar to the target analytes and behaves similarly during extraction and analysis. The surrogate spike recovery must meet the established acceptance criteria, and measures the efficiency of the steps of the analytical method in recovering the non-target analytes.

Laboratory Control Samples

The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Laboratory Blanks

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination.

5.3 Data quality indicators

DQI	Field	Laboratory	Limit
Precision	Sampling methodologies appropriate and complied with. Collection of intra-laboratory duplicate and inter-laboratory duplicate samples	Analysis of: Field intra-laboratory duplicate samples (1 in 20 samples) Laboratory duplicate samples	 RPD of < 50% RPD of < 50%
Accuracy	Sampling methodologies appropriate and complied with.	Analysis of: Method blanks Matrix spikes Matrix spike duplicates Laboratory control samples Surrogate spikes Reference Materials	 Non-detect for CoC 70 to 130% RPD of <50% 70 to 130 % 70 to 130% Varies
Representativeness	Appropriate media sampled according to the SWMP methodology	All samples analysed according to the CoC methodology	All samples analysed according to the CoC methodology
Comparability	Same sampling methodologies used on each day of sampling Experienced sampler Climatic conditions Same types of samples collected	Same analytical methods used (including clean-up) Sample laboratory detection limits (justify/quantify if different) Same laboratories (NATA accredited) Same units	As per AS_NZS_5667.1-1998 < nominated criteria where applicable: DHWQO
Completeness	All critical locations and media sampled All samples collected Sampling methodologies appropriate and complied with Experienced sampler Documentation correct	All critical samples analysed and all analytes analysed according to the CoC methodology Appropriate methods Appropriate laboratory detection limits Sample documentation complete Sample holding times complied with	 As per AS_NZS_5667.1-1998 < nominated criteria where applicable: DHWQO

Section 6 Adopted assessment criteria

Condition 22 of the EPL requires that no migration or overflow of a contaminant or waste, which causes or may cause environmental harm, beyond the boundary of the land on which the premises are located.

Where CoPC (excluding CrVI) are reported above the limit of detection, the tested water will not be allowed to leave site unless demonstrated to pose no environmental risk.

Appendix A Site Storage Chemical List

Product Name	TYPE
Product 857	N/A
Jet-A1 Fuel	Fuel
Ethanol	RAW MATERIAL
Asphaltene/Parrafin Inhib 02585 (replaces Product 857)	PARAFFIN INHIBITOR
CLEARTRON IZB-245	WATER CLARIFIER
PS-2500	CORROSION INHIBITOR
Solvent 150	SOLVENT
THPS 75%	BIOCIDE
Gyptron IT240	SCALE INHIBITOR
Gyptron IT-109 (ST-4560)	SCALE INHIBITOR
Product 10210	CORROSION INHIBITOR
PS 2577	N/A
BACTRON IK88	BIOCIDE
Aluminium chloro-hydrate	RAW MATERIAL
Triethylene Glycol	RAW MATERIAL
Bactron IK34	BIOCIDE
Methanol	RAW MATERIAL
Avesta 401	TANK WASH
Solvent B1	-
Phosbright Marine	-
Citra Force	TANK WASH
All King	-
All Bright	-
All Shine	-