Southwark Platform

Chemical Permit Risk Assessment

Contents

1. CHEMICAL RISK ASSESSMENT

1.1 Chemicals Use and Discharge During Production Operations at Southwark

This chemical risk assessment supports the chemical treatments which are applied at Southwark during production operations. Chemicals which were used or discharged during the platform installation and commissioning are the subject of a separate risk assessment document.

1.2 CHARM Calculations

Discharged CHARMable chemicals have undergone a chemical risk assessment, using the CHARM Calculator, in order to determine their fate in the marine environment.

The risk assessment has taken into account the site specific information provided in Table 1.

Table 1: Southwark site-specific information

Information	Values
Water depth (metres)	29.0
Mean residual current (metres per second / ms^{-1})	0.049
Dilution at distance X (distance to be specified)*	0.001
Platform density (platforms per km^2)	0.00551
Volume of ambient water per platform (cubic metres / m^3)	5,260,000,000
Organic fraction in sediment (number between 0 and 1)*	0.04

*Note * = CHARM default value*

1.3 Chemical Assumptions Made During Risk Assessment

1.3.1 Production/Process Chemicals

No production chemicals are discharged from Southwark therefore risk assessment is not required.

1.3.2 Utility Chemicals

For detergents and cleaning fluids the CWS algorithm has been used to model these discharges, with a fraction released of 100%.

1.3.3 Batch Dilution Factors (BDFs)

Batch dilution factors are calculated from:

- The density of the discharged fluid, normally equivalent to seawater, not the density of the product.
- The discharge rate of the discharged fluid.
- The total volume of fluid discharged.

If the discharge parameters exceed the permitted range in EOSCA, the worst case BDF of 9.95×10^{-04} will be used for CHARM modelling.

If the discharge parameters are below the permitted range in CHARM, the minimum values will be used.

1.3.4 Subsea Discharges

If applicable, the Osborne–Adams risk assessment will be used for subsea discharges. This risk assessment uses the following formulae;

Total quantity of chemical to be discharged (mg) Total expected discharge time in seconds	= Quantity of chemical released per second (QS)
Quantity in a litre to reach PNEC (mg) x volume water column (litres) QS x 3600	= Time taken to reach PNEC in hours (T1)
Residual current speed x 3,600 2 x 500	= Refreshment rate (hour $^{-1}$) (R)
Refreshment rate (R)-1	= Time taken to refresh column (hours) (T2)

An acceptable discharge is one where the time taken to discharge sufficient chemical to exceed PEC/PNEC = 1 in the 500 m column water is greater than the time taken to completely refresh that column of water (i.e. if T1>T2), unless there are other local environmental sensitivities.

1.3.5 Annual Usage Figures

For batch treatment operations environmental modelling has been performed on the maximum batch size used in an operation to represent a worst-case scenario. However, a unique batch size is calculated for every treatment, therefore the total use recorded for batch use products will not always correspond to the frequency of treatment multiplied by the maximum batch use. The total use may be lower as not all applications will use the maximum batch size.

1.3.6 Annual Discharge Figures

There are no produced water discharges so zero discharge for chemicals entering produced water.

100% discharge has been assumed for utility chemicals as a worst-case.

1.4 Chemical Use on Southwark

A detailed description of treatment philosophy and the results of the risk assessment for each of those chemicals proposed for use at Southwark is given below. Further justification has been included where:

- Where RQs >1;
- If the Osbourne-Adams risk assessment indicates that T1<T2;
- If RQs are calculated to be <1, but specific chemical has an HQ>1 (Silver, White, Orange, Blue and Purple); or
- Non-CHARMable chemicals with OCNS groups that indicate a significant toxic potential (i.e. OCNS category A, B or C).

For chemicals that are OSPAR Candidates for Substitution a full technical justification and replacement schedule have been provided.

The chemicals used on Southwark are summarised in Table 2.

Table 2: Summary of Chemicals Used

Chemical Name	Chemical Function Group	Supplier	Template Version	HQ	Chemical Label	Expiry Date
CRW85689	Corrosion Inhibitor	Baker Hughes Limited	10	Gold	SUB	31/03/2024
Methanol (all dilutions)	Gas Hydrate Inhibitor	ChampionX (Champion Technologies Ltd)	3	E	PLO	26/11/2025
Mono Ethylene Glycol	Gas Hydrate Inhibitor	Solventis Ltd	11	E	PLO	10/05/2025
RX-5208	Biocide	Roemex Ltd	7	Gold	None	16/07/2024
RX-9034A	Dye	Roemex Ltd	8	Gold	None	29/04/2023
SOBO S GOLD 08	Detergent / Cleaning Fluid	Oil Technics Ltd	13	Gold	None	03/07/2023

1.4.1 Process Chemicals

Chemical name	**CRW85689**	**Supplier**	Baker Hughes Limited
Function	Corrosion Inhibitor	**Discharge stream**	Zero discharge

Treatment philosophy and application

CRW85689 is a corrosion inhibitor applied subsea to Southwark to maintain integrity.

The product is continuously applied in MEG (all dilutions) at a dosage of 1,000 ppm. This dosage is greater than that on the Cefas template. The treatment is to provide prevent corrosion to pipework from the subsea application point to the Bacton terminal, therefore, a higher dosage is required to ensure adequate protection.

Treated fluids are exported to the Bacton terminal. Zero discharge to sea will occur from this application of CRW85689.

PLONOR	×	**HQ category**	Gold	**Identified for substitution**	✓ (Level 3)	**RQ**	N/a

CHARM data		**Assumptions**	
Dosage	N/a	N/a	
Fraction discharged	0%	Treated fluids are routed directly to the export line	
CHARM algorithm code	CNA	**Discharge code**	ZEX

Justification

CRW85689 is a Gold category product which carries a level 3 UK National Plan substitution warning due to a surfactant which is assumed to bioaccumulate due to low molecular weight and is considered toxic.

CRW85689 was specified for use at Southwark by Perenco UK (PUK). Export from Southwark ties into PL370 between Perenco's Thames field and the Bacton Terminal. CRW85689 is used across all PUK assets and is therefore also required to be used on Southwark for compatibility.

There is no discharge to the marine environment associated with this application of CRW85689.

The chemical vendor continues to perform research and development into greener chemistries for this type of application. ODE will liaise with PUK as to their efforts to change out CRW85689 across all their UK assets with any relevant change being applied to Southwark if applicable.

1.4.2 Utility Chemicals

Chemical name	SOBO S GOLD 08	Supplier	Oil Technics Ltd
Function	Detergent / Cleaning Fluid	Discharge stream	Washing fluid direct to sea

Treatment philosophy and application

SOBO S GOLD 08 is a cleaning product for deck, bulkhead, drill-floor and equipment washing on the platform. In practice, SOBO S GOLD 08 will be used at a concentration of up to 5% (52,500 mg/l @ product density 1.05 g/cm^3). Batches of up to 25 litres (26.3 kg) will be used.

The chemical will be further diluted prior to discharge, as the platform decks will be rinsed with water after application (normally through a pressurised hose). However, the worst-case application dosage of 52,500 mg/l has been considered in the CHARM calculation, as the dilution cannot be accurately quantified.

100% discharge is recorded as a worst case.

PLONOR	×	HQ category	Gold	Identified for substitution	×	RQ	Year	RQ
							2022	<1
							2023	<1
							2024	

CHARM data		Assumptions	
Dosage	52,500.0 mg/l	The worst-case application dosage of 52,500 mg/l has been considered in the CHARM calculation.	
Fraction discharged	100%	A default value of 100% discharge is assumed for all products modelled using the CWS CHARM algorithm.	
Batch dilution factor	4.26e-04	Density: 1.03 g/cm^3 Volume Discharged: 3 m^3 (default minimum) Discharge Rate: 60 m^3/hour (default minimum)	
Batch use	26.3 kg	Batch sizes of up to 26.3 kg are used as required	
CHARM algorithm code	CWS	Discharge code	BAT

Justification

The RQ generated was <1, indicating that the discharge would not be expected to pose a significant risk to the receiving environment.

1.4.3 Riser protection

It will be necessary to remove blind flanges from the subsea ends of the 3", 8" and two 10" risers. The flanges are currently fitted with isolation valves that are not pressure rated to meet the pressures encountered during leak testing. As such, the risers will be removed by divers recovered to vessel and fitted with new appropriately rated valves before being re-installed to the riser subsea ends. When re-instating these flanges divers will insert 2 biocide sticks (RX-5208) to prevent corrosion following seawater ingress and 2 dye sticks (RX-9034A) for the purposes of leak detection.

During insertion of sticks by divers the industry standard assumption of 10% discharge is assumed. The remainder of the sticks will remain in the risers until eventual tie into future pipeline systems at which point, they will be discharged to sea when the new pipelines are dewatered.

A supplementary calculation has also been provided for the discharge of the riser content in the future. For the purposes of the risk assessment discharge of the remaining 90% of the stick has been assessed in the riser water volume of 3" (0.206 m^3), 8" (1.4 m^3) and 10" (2.3 m^3). The highest concentration results from the 3" riser. However, as the Osbourne Adams risk assessment is influenced by the discharge mass and rate, concentration had no influence on the result. Although it is anticipated that the chemical constituents will have degraded over time without an exact determination the reduction in activity cannot be accurately estimated and a worst-case discharge has been assumed.

The table below summarises the discharges at each stage:

Chemical	Mass used per riser (kg)	Loss during deployment (kg)	Mass remaining in riser (kg)
RX-5208	0.30	0.03	0.27
RX-9034A	0.1	0.01	0.09

Two Osbourne Adams risk assessments have been performed for the subsea discharges:

1. Discharge on deployment – 10% discharge in 200 litres over a period of 10 minutes for each deployment;
    a. It is standard practise to assume that 1 stick treats 1 m^3 of fluid.
2. Future discharge during tie in – remaining 90% in riser water volume treating over a 1-hour period for each rise in the future with the eventual tie in.
    a. Riser water volumes: 3" - 0.206 m^3, 8" - 1.4 m^3 and 10" - 2.3 m^3. The highest concentration results from the 3" riser.
    b. The Osbourne Adams risk assessment was performed on the smallest discharge volume/highest concentration as a worst case.

For both RX-5208 and RX-9034A each Osbourne Adams risk assessment scenario indicates that the time taken to refresh the water column (T2) is shorter than the time taken for the PNEC to be exceeded (T1). The subsea discharges therefore would not be expected to pose a significant risk to the receiving environment.

Chemical name	RX-5208	**Supplier**	Roemex Ltd
Function	Biocide	**Application point**	Subsea

Treatment philosophy and application

RX-5208 is a biocide stick which will be used to protect the integrity of the risers.

As described above divers will deploy 2 sticks (0.3 kg) of RX-5208 per riser with 10 % (0.03 kg per riser) loss at deployment. The remaining product (0.27 kg per riser) will be retained within the risers until eventual tie into future pipeline systems.

10% discharge of the product is recorded.

PLONOR	×	**HQ category**	Gold	**Identified for substitution**	× (O-VII)	**RQ**	N/a

CHARM data		**Assumptions**	
Discharge Dosage	N/a	N/a	
Fraction discharged	10%	Discharge of 10% during deployment	
Batch dilution factor	N/a	N/a	
Batch use	0.3 kg	Batch sizes of up to 0.3 kg	
CHARM algorithm code	CNA	**Discharge code**	BAT

Justification

RX-5208 is a bronopol based product and therefore, being an organo-halogen, has an O-VII product warning. Bronopol is known to be effective against Sulphate Reducing Bacteria (SRB) and algae. The Osborne-Adams risk assessment indicates that discharge probably presents acceptable risk to the marine environment.

A worst-case discharge of 10% has been assumed during deployment. It is anticipated the remaining product will be retained within the risers until eventual tie into future pipeline.

As described above, Osborne-Adams risk assessments were performed for both discharge on deployment and future discharge on tie in. Both assessments indicated that the time taken to refresh the water column (T2) is less than the time taken to reach the predicted no effect concentration (PNEC) (T1). Therefore the product is not expected to have significant impact on the marine environment.

Chemical name	RX-9034A	**Supplier**	Roemex Ltd
Function	Dye	**Application point**	Subsea

Treatment philosophy and application

RX-9034A is a dye which will be used during leak testing of the riser flanges.

As described above divers will deploy 2 sticks (0.1 kg) of RX-90343A per riser with 10 % (0.01 kg per riser) loss at deployment. The remaining product (0.09 kg per riser) will be retained within the risers until eventual tie into future pipeline systems.

10% discharge of the product is recorded.

PLONOR	×	**HQ category**	Gold	**Identified for substitution**	×	**RQ**	N/a

CHARM data		**Assumptions**	
Discharge Dosage	N/a	N/a	
Fraction discharged	10%	Discharge of 10% during deployment	
Batch dilution factor	N/a	N/a	
Batch use	0.09 kg	Batch sizes of up to 0.09 kg	
CHARM algorithm code	CNA	**Discharge code**	BAT

Justification

A worst-case discharge of 10% has been assumed during deployment. It is anticipated the remaining product will be retained within the risers until eventual tie into future pipeline.

As described above, Osborne-Adams risk assessments were performed for both discharge on deployment and future discharge on tie in. Both assessments indicated that the time taken to refresh the water column (T2) is less than the time taken to reach the predicted no effect concentration (PNEC) (T1). Therefore the product is not expected to have significant impact on the marine environment.

1.4.4 PLONOR Chemicals

The following PLONOR registered chemicals are in use on Southwark. The quantities used and discharged are not expected to have any significant impact on the surrounding marine environment.

Chemical name	**Methanol (all dilutions)**	**Supplier**	ChampionX (Champion Technologies Ltd)
Function	Gas Hydrate Inhibitor	**Discharge stream**	Zero discharge
Treatment philosophy and application			
Methanol (all dilutions) is applied subsea on a batch basis to prevent hydrate formation during well start-up. Treated fluids are exported to the Bacton terminal. Zero discharge to sea will occur from this application of Methanol (all dilutions).			

Chemical name	**Mono Ethylene Glycol**	**Supplier**	Solventis Ltd
Function	Gas Hydrate Inhibitor	**Discharge stream**	Zero discharge
Treatment philosophy and application			
Mono Ethylene Glycol dosed with corrosion inhibitor is continuously applied subsea to prevent hydrate formation. Treated fluids are exported to the Bacton terminal. Zero discharge to sea will occur from this application of Mono Ethylene Glycol.			