Environmental Measurement Program COSLProspector

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1 Introduction

The COSLProspector is a semi-submersible drilling rig of GG 5000 type designed to operate in water depth from 70 meters up to 1500 meters and drilling depths to 7500 meters.

The unit is designed for North Sea/Norwegian Sea and world-wide use in harsh environments. Station keeping is maintained by an 8-line mooring system or in dynamic position mode maintained by 6, fixed pitch, variable speed thrusters. The DP system meets Class 3 operational requirements. The station keeping can also be maintained in a combination of mooring assisted by the thrusters (Posmoor ATA).

This measurement program has been established in accordance with Activities regulation § 70. The purpose of the measurement program is to document how the environmental data reported from the rig to the operator is measured, calculated or estimated. The data is used by the operator for reporting of discharges to sea and emissions to air to the NEA.

1.1 References

L3-MAR-229328 Contained Rig Manual
DM#8002394 COSLProspector Rig Specific Map for Hydraulic Valves and all overboard valves
YCRO332-L-701-XB-001 P&ID Fuel Oil Transfer System
YCRO332-L-701-XB-002 P&ID-Fuel Oil Supply System Boiler
YCRO332-L-703-XB-001 P&ID-Fuel Oil Supply System
YCRO332-L-701-FD-001 Functional Description - Fuel Oil Transfer System
YCRO332-L-722-XB-004 P&ID- Main Engine Cooling Water System
YCRO332-L-722-XB-005 P&ID-Thruster Cooling Water System
YCRO332-L-720-XB-001 P&ID- Sea and Fresh Water Cooling – General Cooling System
V1201-NOV-P-4700-01 Column 2. Secondary mud storage and transfer
V1201-NOV-P-4700-02 Column 3. Secondary mud storage and transfer
V1201-NOV-P-4500-01 Lower deck. Primary mud tanks - Active
V1201-NOV-P-4500-02 Lower deck. Primary mud tanks Slug/Pill
V1201-NOV-P-4500-03 Lower deck. Primary mud tanks. Storage
V1201-NOV-P-4500-04 Lower deck. Primary mud tanks. Storage
V1201-NOV-P-4500-05 Lower deck. Primary mud tanks. Storage

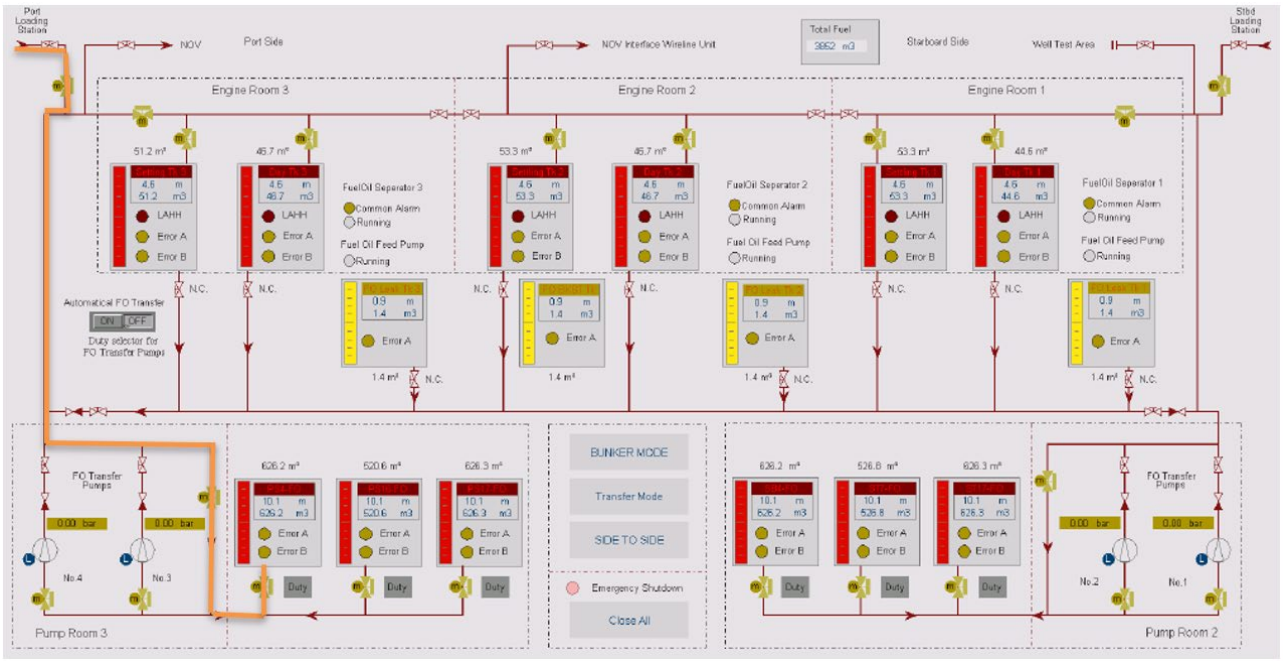
2 Diesel - Consumption & Emissions to Air

The COSLProspector has an Air Pollution Prevention Certificate (IAPP Certificate) issued by the class society (DNV), valid until 12.05.29 (DM#8008760). This is in compliance with requirements set forth in MARPOL 73/78 Annex VI Regulations for the prevention of Air Pollution from ships Regulation 13 – Nitrogen Oxides (NOx).

In accordance with the same regulation, all diesel engines with a power output of more than 130 kW installed on-board the vessel have an Engine International Air Pollution Prevention (EIAPP) Certificate (permanent validity). The regulation does not apply to emergency diesel engines, engines installed in lifeboats or for any equipment intended to be used solely in case of emergency.

2.1 Flow chart

Fuel oil Transfer (Diesel). (ref. FDS-Fuel Oil Transfer System DM-5081453)



The flow chart above shows the diesel route during bunkering on Port side from boat to tank PS4-FO. When the hose is mounted the manual valve is opened at the loading station, and the automatic valves are remotely operated to route the fuel oil to the dedicated tank situated in the pontoons. The transfer hose is a 4” Todo-Matic, female connection. A weak link coupling with shut-off valve is installed.

There are loading stations on both port- and starboard side of the rig. And it is possible to route the fuel to any of the 6 fuel oil tanks (PS4-FO, PS16-FO, PS17-FO, SB4-FO, SB7-FO and SB17-FO) independently. The fuel oil lines are equipped with check valves at the house loading stations to avoid unintended discharge from the fuel oil system on-board.

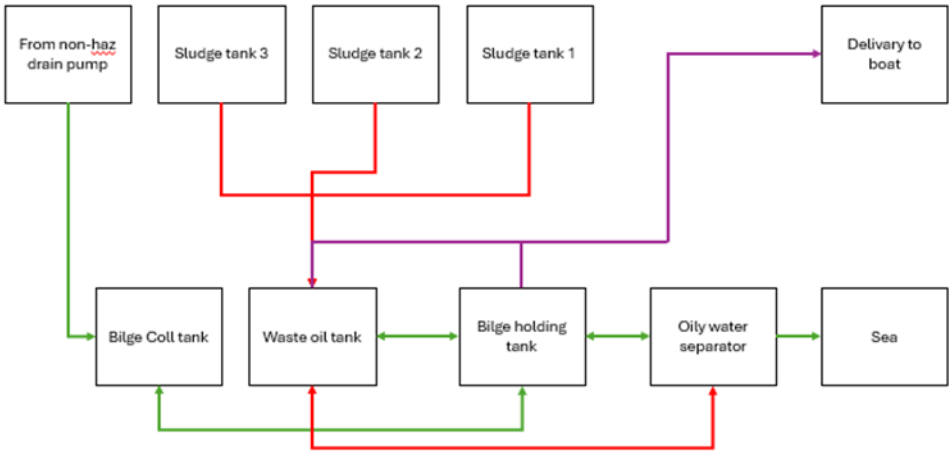
The fuel oil (diesel) is further transferred through filters and the transfer pump into the settling tanks.

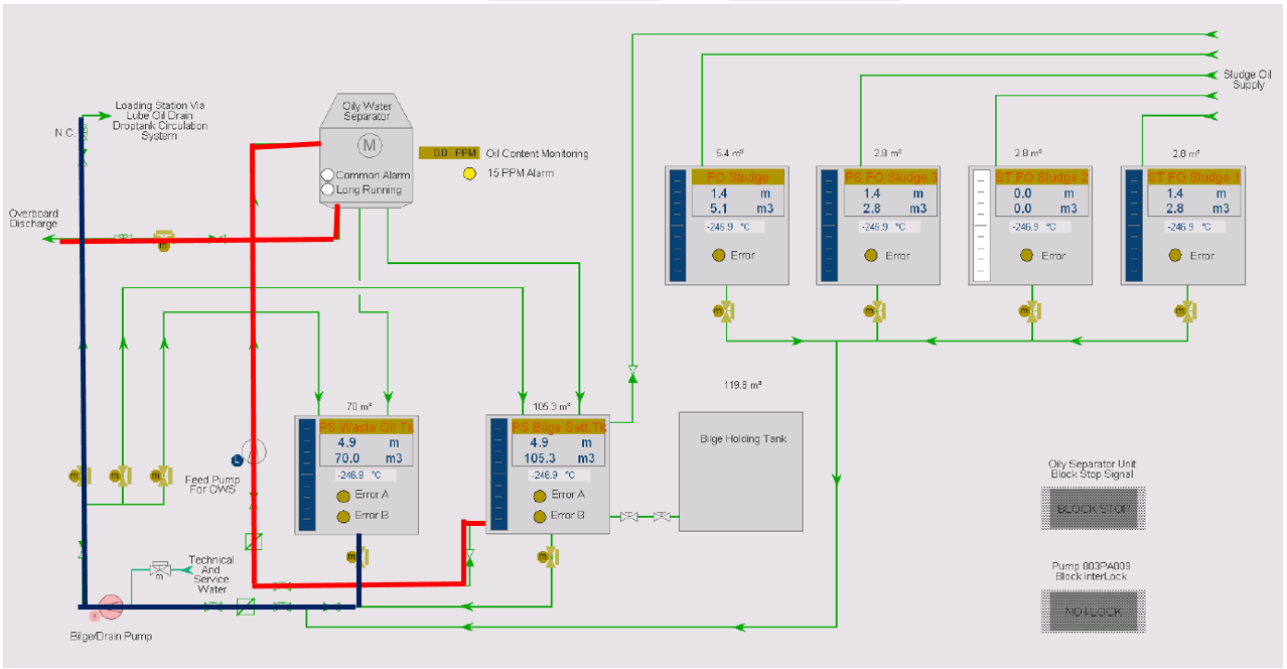
The system is controlled by quadruple set of remote operated valves from the integrated vessel control system between pumps on board the vessel and the hose loading stations. To have redundancy towards human error, the check valves at hose loading stations are leak tested frequently.

A diesel separator system transfers diesel from the settling tank to the day tank. This process removes water and debris from the diesel before it enters in the day tanks (ref. YCRO332-L-701-XB-001 P&ID Fuel Oil Transfer System).

The settling- and day tanks are drained 2 times per day. There is a dedicated settling- and day tank for each engine room.

Flow chart, contaminated diesel:





A charge pump delivers diesel from the day tank via 2 filters to the diesel engine.

Diesel consumption is logged in the ROB (Remaining On Board) machine logbook each midnight. Input is based on readings made from the tank sensors where the diesel fuel is stored. Daily recording in the machine logbook is required in accordance with IMO regulations for vessels. Fuel received by supply vessel and daily consumption is registered in Rig Manager. Monthly consumption is calculated by adding the received fuel to stock level at the start of the month and then subtract stock level at end the month. The monthly diesel consumption is registered in the monthly environmental report (DM#405864 COPS - Monthly Environmental Report)

Diesel consumption for boilers (Saacke with SKVJ-M burners) is calculated from 2 flowmeters on flow and return line. Average consumption is 3m3/24 hours, but this is depending on temperature outside and demand of fresh water. Boilers use approximately 8m^3/24 hours of diesel on full load. When considering variable production, load, engine running time etc. it has been estimated an average consumption of 3m^3/ 24 hours. The exact measurements daily / monthly from flowmeter are available through Kogni.fai, and these results are used in the monthly environmental report (DM#405864 COPS - Monthly Environmental Report).

Discharges

Storage tanks for diesel fuel: Possible source of emissions of VOC/NMVOC, methane and hydrocarbons.

From all consumers of fuel oil (diesel engines, boilers, cement unit, etc.) there will be discharges to air in the form of exhaust fumes. Emissions to air are calculated by the operator based on the monthly diesel consumption from the rig and emission factors for the engines and boilers.

Offshore Norway standard factors and Regulation on Excise Duties are currently used for both engines and boiler:

CO2:	3,17 ton CO2/ton diesel
NOX engine:	0,053 ton NOx/ton diesel
NOX boiler:	0,0036 ton NOx/ton diesel

2.2 Measuring instruments

2.2.1 Tank level gauges

NO.	Tank Description	Level Sound	Level Transmitter			
			Tag	Alarms	Output	Signal
1	Fuel Oil Storage Tank PT4	0-100% in 10.05m and 613.7m3	701LT001	L/H/HH	4-20mA	AI
			701LT002	L/H/HH	4-20mA	AI
2	Fuel Oil Storage Tank PT16	0-100% in 10.05m and 510.8m3	701LT003	L/H/HH	4-20mA	AI
			701LT004	L/H/HH	4-20mA	AI
3	Fuel Oil Storage Tank PT17	0-100% in 10.05m and 614.0m3	701LT005	L/H/HH	4-20mA	AI
			701LT006	L/H/HH	4-20mA	AI
4	Fuel Oil Storage Tank ST4	0-100% in 10.05m and 613.7m3	701LT007	L/H/HH	4-20mA	AI
			701LT008	L/H/HH	4-20mA	AI
5	Fuel Oil Storage Tank ST7	0-100% in 10.05m and 516.2m3	701LT009	L/H/HH	4-20mA	AI
			701LT010	L/H/HH	4-20mA	AI
6	Fuel Oil Storage Tank ST17	0-100% in 10.05m and 614.0m3	701LT011	L/H/HH	4-20mA	AI
			701LT012	L/H/HH	4-20mA	AI
7	Fuel Settling Tank 3 701TB010	0-100% in 4.610m and 50.2m3	701LT017	L/H/HH	4-20mA	AI
			701LT018	L/H/HH	4-20mA	AI
			701LS001	HH		DI
8	Fuel Day Tank 3 701TB009	0-100% in 4.610m and 52.2m3	701LT019	L/H/HH	4-20mA	AI
			701LT020	L/H/HH	4-20mA	AI
9	Fuel Settling Tank 2 701TB008	0-100% in 4.610m and 52.2m3	701LT021	L/H/HH	4-20mA	AI
			701LT022	L/H/HH	4-20mA	AI
			701LS003	HH		DI
10	Fuel Day Tank 2 701TB007	0-100% in 4.610m and 52.2m3	701LT023	L/H/HH	4-20mA	AI
			701LT024	L/H/HH	4-20mA	AI
11	Fuel Settling Tank 1 701TB006	0-100% in 4.610m and 52.2m3	701LT025	L/H/HH	4-20mA	AI
			701LT026	L/H/HH	4-20mA	AI
			701LS005	HH		DI
12	Fuel Day Tank 1 701TB005	0-100% in 4.610m and 50.2m3	701LT027	L/H/HH	4-20mA	AI
			701LT028	L/H/HH	4-20mA	AI
13	Fuel Oil Leak Tank 3 701TB014	0-100% in 0.9m and 1.4m3	701LT029	H	4-20mA	AI
14	Fuel Oil Leak Tank 2 701TB013	0-100% in 0.9m and 1.4m3	701LT030	H	4-20mA	AI
15	Fuel Oil Leak Tank 1 701TB012	0-100% in 0.9m and 1.4m3	701LT031	H	4-20mA	AI

2.2.2 FO transfer system instrumentation (other than tank gauges)

Pressure Transmitter Set Point for Transfer Pump

NO.	Tag NO. (PT)	Location	Low Pressure Alarm Point
1	701PT001	Outside of Transfer Pump 1 in Pump Room 2	L SP: 3bar

			H SP: 6.5bar
2	701PT002	Outside of Transfer Pump 2 in Pump Room 2	L SP: 3bar H SP: 6.5bar
3	701PT003	Outside of Transfer Pump 3 in Pump Room 3	L SP: 3bar H SP: 6.5bar
4	701PT004	Outside of Transfer Pump 4 in Pump Room 3	L SP: 3bar H SP: 6.5bar

Fuel Oil System Instrumentation

No.	Instrument Tag No.	Description (Location)/Action	Output	Signal
1	701XV002	HIV on Fuel Oil Storage Tank (PT4)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Fuel Oil Storage Tank (PT4)-COMMAND	OPEN /CLOSE COMMAND	DO
2	701XV003	HIV on Fuel Oil Storage Tank (PT16)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Fuel Oil Storage Tank (PT16)-COMMAND	OPEN /CLOSE COMMAND	DO
3	701XV004	HIV on Fuel Oil Storage Tank (PT17)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Fuel Oil Storage Tank (PT17)-COMMAND	OPEN /CLOSE COMMAND	DO
4	701XV005	HIV on Fuel Oil Storage Tank (ST4)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Fuel Oil Storage Tank (ST4)-COMMAND	OPEN /CLOSE COMMAND	DO
5	701XV006	HIV on Fuel Oil Storage Tank (ST7)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Fuel Oil Storage Tank (ST7)-COMMAND	OPEN /CLOSE COMMAND	DO
6	701XV007	HIV on Fuel Oil Storage Tank (ST17)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Fuel Oil Storage Tank (ST17)-COMMAND	OPEN /CLOSE COMMAND	DO
7	701XV001	HIV for Drop valve PORT-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Drop valve PORT-COMMAND	OPEN /CLOSE COMMAND	DO
8	701XV008	HIV for Drop valve STBD-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Drop valve STBD-COMMAND	OPEN /CLOSE COMMAND	DO
9	701XV046	HIV for Transfer Pump 4-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Transfer Pump 4-COMMAND	OPEN /CLOSE COMMAND	DO
10	701XV047	HIV for Transfer Pump 3-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Transfer Pump 3-COMMAND	OPEN /CLOSE COMMAND	DO
11	701XV048	HIV for Transfer Pump 2-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Transfer Pump 2-COMMAND	OPEN /CLOSE COMMAND	DO
12	701XV049	HIV for Transfer Pump 1-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Transfer Pump 1-COMMAND	OPEN /CLOSE COMMAND	DO
13	701XV013	HIV on Settling Tank (701TB010)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Settling Tank (701TB010)-COMMAND	OPEN /CLOSE COMMAND	DO
14	701XV014	HIV on Day Tank (701TB009)-STATUS	OPEN/CLOSE	Switch (DI)

No.	Instrument Tag No.	Description (Location)/Action	Output	Signal
		HIV on Day Tank (701TB009)-COMMAND	OPEN /CLOSE COMMAND	DO
15	701XV015	HIV on Settling Tank (701TB008)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Settling Tank (701TB008)-COMMAND	OPEN /CLOSE COMMAND	DO
16	701XV016	HIV on Day Tank (701TB007)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Day Tank (701TB007)-COMMAND	OPEN /CLOSE COMMAND	DO
17	701XV017	HIV on Settling Tank (701TB006)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Settling Tank (701TB006)-COMMAND	OPEN /CLOSE COMMAND	DO
18	701XV018	HIV on Day Tank (701TB005)-STATUS	OPEN/CLOSE	Switch (DI)
		HIV on Day Tank (701TB005)-COMMAND	OPEN /CLOSE COMMAND	DO
19	701XV009	HIV for Isolating valve PORT-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Isolating valve PORT-COMMAND	OPEN /CLOSE COMMAND	DO
20	701XV020	HIV for Isolating valve STBD-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Isolating valve STBD-COMMAND	OPEN /CLOSE COMMAND	DO
21	701XV010	HIV for Isolating Loading valve PORT-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Isolating Loading valve PORT-COMMAND	OPEN /CLOSE COMMAND	DO
22	701XV019	HIV for Isolating Loading valve STBD-STATUS	OPEN/CLOSE	Switch (DI)
		HIV for Isolating Loading valve STBD-COMMAND	OPEN /CLOSE COMMAND	DO
23	701PT001	Fuel Oil transfer Pump (701PG001) Discharge Pressure - STATUS	Pressure Build-up 4-20mA	AI
24	701PT002	Fuel Oil transfer Pump (701PG002) Discharge Pressure - STATUS	Pressure Build-up 4-20mA	AI
25	701PT003	Fuel Oil transfer Pump (701PG003) Discharge Pressure - STATUS	Pressure Build-up 4-20mA	AI
26	701PT004	Fuel Oil transfer Pump (701PG004) Discharge Pressure - STATUS	Pressure Build-up 4-20mA	AI

2.3 Uncertainty Assessment

There are not any measurement instruments / sensors installed for exhaust emission on board. The monthly fuel consumption is used to calculate emissions.

There are installed two level sensors (duplicate) in the fuel oil tanks measuring the fluid level (static pressure). The level sensors are registered and followed-up through the planned maintenance system. Check and test of sensors is done annually, ref. STAR job IX011 Instrument loop, electronic calibration.

There are installed flowmeters on all main diesel generator and boilers onboard. ROB of fuel oil onboard are calculated from level sensors on fuel tanks, and flowmeters are used to check consumption against total use of fuel.

The level sensors give input to a software program which, based on the specific tank's design, calculates diesel volume. Vessel movement may result in marginal variations. Other factors that may influence the calculations are whether the rig is on "even keel" in relation with the location of the sensors. If the rig is tilted this may result in marginal variations.

3 Utility Chemicals - Consumption & Discharge

This section will only contain those chemicals which CDE is responsible for. It does not include chemicals which are part of the well service and client third party company's deliveries.

All chemicals are registered through the EcoOnline chemical database.

3.1 Flow charts

3.1.1 Dope

Jet-Lube NCS-30 ECF
Jet-Lube Seal-Guard ECF
Jet-Lube Kopr Kote
Jet-Lube Alco EP 73

Compensator Fluid:
Houghto-Safe NL-1

Grease is shipped on board in 20 kg buckets. All goods received are registered through the main store, and then brought to their final storage location.
Jet-Lube products are kept in the following locations:

- S1703 – Oil store

Grease is used in drilling operations. Most will be lost in the well fluid during the drilling operations, and in the closed drain system during washing / cleaning on surface. 10% is reported as discharge in line with industry practise.
EcoOnline chemical database is used for registration of storage location and to maintain updated SDS.

3.1.2 Detergent Chemicals

MICROSIT POLAR

MICROSIT POLAR is stored in the following locations:

- S3405 Chemical store – Main deck in front of derrick

MICROSIT POLAR is shipped on board in cubic plastic tanks. All goods received are registered through the main store. Marine department are responsible for MICROSIT POLAR. The chemical is used for cleaning all deck spaces. When used on areas connected to the open drain, the chemical will be discharged to sea together with the wash water. In areas with closed drain, the chemical will follow the wash water and be discharged to sea through the Slop treatment Unit. The chemical may also be transported to shore if the Slop treatment unit is not able to clean the slop.

3.1.3 Fi-Fi Foam

RE-Healing RF-MB, 3% Low Viscosity Foam

Re-Healing RF3, 3% Low Viscosity Foam is stored in the following locations:

- Foam Room L4210
- Boiler Room 1 S1802
- Boiler Room 2 S1804
- Engine room 1 S1805
- Engine room 2 S1806
- Engine room 3 S1807
- Tank placed by helicopter deck

Fire Foam RE-Healing RF3 concentrate is shipped on board in plastic tanks. The chemical is used for firefighting processes.

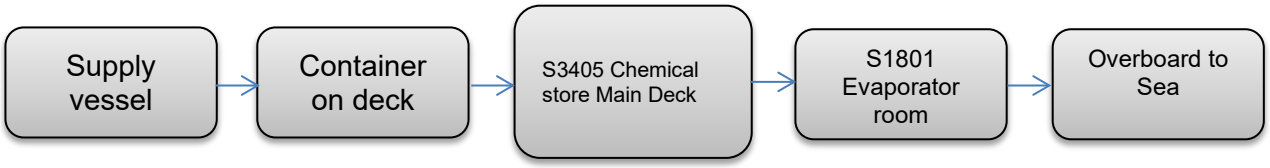
The fi-fi system is regularly tested with sea water. RE-Healing RF-MB is not included when testing, however foam samples are sent in annually for analysis. The foam canons on helicopter deck is also tested with foam once each year. During this test a maximum of 100 liters of RE-Healing RF3 is used.

3.1.4 Pot Water treatment chemicals

Evaporator treatment - water treatment. Certified by NSF/ANSI in accordance with Standard 60 - Drinking water treatment chemicals.

Vaptreat is stored in the following locations:

- S1801 Evaporator room
- S3405 Chemical store Main Deck



Vaptreat is shipped on board in plastic containers. It arrives in 20litre cans. The chemical is used for pot water production only. Cans are stored in chemical store, and in evaporator room where they are mixed and put to use through designated chemical dosing tanks.

All chemicals are registered through the EcoOnline chemical database.

3.1.5 BOP Chemicals

Erifon HD 603 HP
Erifon CLS 40

Erifon is brought on board in plastic cubic tanks inside containers. The Erifon is transferred to main deck starboard side, and transferred through hard piping over to the mixing system tank in the BOP Control Room. The Erifon is mixed with water and glycol depending on the sea temperature. The mix contains an average of 1% Erifon. The mix is then transferred into the BOP control system and is used in the well operations. Upon depletion the mix is discharged to sea from the BOP.

All chemicals are registered through the EcoOnline chemical database.

Pilot HPU:
Erifon CLS 40 Closed loop Pilot Fluid.

Erifon CLS 40 is a water/glycol/lubricant premix, brought onboard in plastic cubic tanks inside containers.
This is filled on to the pilot tank and is a part of a closed loop hydraulic system, return to tank in BOP ctrl room. Minor amounts of CLS 40 will be discharged to sea during opening / closing of particularly critical valves of the BOP (annular <0.06 l, ram <0,02 l).
During annual maintenance or when performing corrective/need-based maintenance the Pilot HPU system will be flushed with Erifon CLS 40. The total consumption during flushing procedure will be

approximately 3500 litres of fluid. Consumed fluid will be transferred to hazardous drain tank and pumped to boat or treated by the Bara H2O unit.

3.1.6 Hydraulic Oils

Hyspin AWH-M-15
Hyspin AWH-M-32
Hyspin AWH-M-46
Hyspin AWH-M-68
Hyspin AWH-M-100
Hyspin Biobar 22
Hyspin Biobar 32
Hydraulic Plus Bio

Hydraulic oil is shipped on board in containers. It arrives in 20 liters cans or 208 liters barrels. Sometimes we use 1000 liters (m^3) tanks. Cans are stored in chemical store, barrels are stored in dedicated room port / aft.

There are many users of hydraulic oils, such as drilling equipment, various cranes, HPU system, working baskets etc.

If leakage occurs, the spilled volume goes to either drain system or worst case to sea. Any leak to sea, or with the potential to go to sea, will be reported as an incident in the incident reporting system and reported to the operator. Wasted oil will be transported back to shore.

3.1.6.1 Consumers

Ballast Remote Valves	HPU Reservoir	Castrol	Hyspin AWH-M-32
BOP Overheads Crane	Hyd.system	Castrol	Hyspin AWH-M-32
Casing Stabbing Basket	Hyd.system	Castrol	Hyspin AWH-M-32
Catwalk Maskine Riser	Hyd.system	Castrol	Hyspin AWH-M-32
Const Tens Moonpool Winch	Hyd.system	Castrol	Hyspin AWH-M-32
Deck Crane	Hyd.system	Liebherr	Hydraulic Plus Bio
Drawwork	Brake HPU	Castrol	Hyspin AWH-M-15
Drillfloor Winches	Hyd.system	Castrol	Hyspin AWH-M-32
HP Mud Pumps	Crankcase	Castrol	Hyspin AWH-M 100
HPU for Rov luke	Hyd.system	Castrol	Hyspin Biobar 22
HPU for hose reels	Hyd. system	Castrol	Hyspin Biobar 22
HPU for burner booms	Hyd.system	Castrol	Hyspin AWH-M 32
Hydraulic Press	Hyd.system	Castrol	Hyspin AWH-M-46
Iron Roughneck	Hyd.system	Castrol	Hyspin AWH-M-32
Knuckle Boom Crane	Hyd.system	Castrol	Hyspin AWH-M-32
Lifeboats	Steering Hydraulics	Castrol	Hyspin AWH-M-15
Lifeboat davits	Hyd. system	Castrol	Hyspin Biobar 32
Main Hydraulic Power Unit	Hyd.system	Castrol	Hyspin AWH-M-32
Manrider Winches	Hyd.system	Castrol	Hyspin AWH-M-32

MOB Boat Davit	Hyd.system	Castrol	Hyspin Biobar-32
Moonpool Guideline Winches	Hyd.system	Castrol	Hyspin AWH-M-32
Moonpool Podline Winches	Hyd.system	Castrol	Hyspin AWH-M-32
Moonpool Winches	Hyd.system	Castrol	Hyspin AWH-M-32
Mud Mixing System	Lifting Table Hyd. System	Castrol	Hyspin AWH-M-15
HPU Storage tank 32 m^3 NAS 6	HPU	Castrol	Hyspin AWH-M-32
Pipebender	Hyd.system	Castrol	Hyspin AWH-M-46
Pontoon Mud Mixers	Hyd.system	Castrol	Hyspin AWH-M-32
Seawater Cooling Pumps	Mechanical Seal	Castrol	Hyspin AWH-M-15
Thrusters	Steering Syst HPU	Castrol	Hyspin AWH-M-46
Thrusters	Shaft Seal	Castrol	Alpha SP 100
Top Drive Dolly Track Assbly	Hyd.system	Castrol	Hyspin AWH-M-32
Taut Wire	Hyd.system	Castrol	Hyspin AWH-M-32
Watertight Doors	HPU Reservoir	Castrol	Hyspin AWH-M-15
Watertight doors moonpool/outside	Hyd. System	Castrol	Biobar-22
Watertight Hatches	HPU Reservoir	Castrol	Hyspin AWH-M-15
XY Hydraracker	Hyd.system	Castrol	Hyspin AWH-M-32

Return of used oil:

- Small amounts of waste oil are transferred to the waste oil tank or the lub. oil tank (closed system). Furthermore, the oil is pumped into a vessel and transported onshore.
- Large amounts of waste oil are pumped into barrels or refueled and sent onshore.

3.1.7 Engine oils

Main Engine	Bergen Engine	12V32	Turning Gear	Castrol	Alpha SP 320
Main Engine	Bergen Engine	12V32	Regulators	Castrol	Perfecto X68
Main Engine	Bergen Engine	12V32	Crankcase	Castrol	Engine Oil MHP 154

Engine oils are stored in the following locations:

- Tank in room above main HPU
- S1703 Oil store

Hydraulic oil is shipped on board in containers. It arrives in 20 liters cans or 208 liters barrels. Sometimes we use 1000 liters (m^3) tanks. Cans are stored in chemical store, barrels are stored in dedicated room port/ aft.

Waste oil is either transferred to boat from waste oil tank or sent ashore in barrels or 1000-liter tanks.

3.1.8 Thruster oils

Alpha SP 150 Castrol

Thrusters	Ulstein Aquamaster	Lube System	Castrol	Alpha SP 100 Alpha SP 150
Thrusters	Ulstein Aquamaster	Steering Gir	Castrol	Alpha SP 150
Thrusters	Ulstein Aquamaster	Drain Pump Lube System	Castrol	Alpha SP 150
Thrusters	Ulstein Aquamaster	Steering Syst HPU	Castrol	Hyspin AWH-M-46
Thrusters	Ulstein Aquamaster	Shaft Seal	Castrol	Alpha SP 100

Leakages during internal transferring of Thruster oils goes to the bilge system (no spill to sea). Waste oil is either transferred to boat from waste oil tank or sent ashore in barrels or 1000-liter tanks.

Thruster header-tanks have level glass installed on tank. This is checked daily by the machinist in accordance with the checklist. Any re-filling is logged (and subtracted from storage tank).

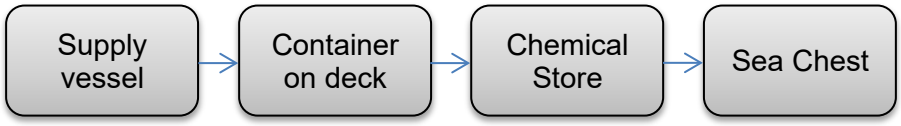
3.1.9 Slop treatment chemicals

DCA-14005
BDF-908

Chemicals are delivered and used by Operator's third party. Chemicals are transported in 1000 litres IBC, and filled directly into the pits containing slop. Slop is pumped from the slop tank to a supply vessel and sent onshore. There is no planned discharge of slop containing oil.

3.1.10 Cooling water chemicals

Bioguard-Plus.



Chemicals are delivered on request. Chemicals are transported in 25 litres plastic cans, and filled directly into the Sea Chest, pumped through the cooling system overboard. 2 litres are added to each sea chest on a weekly basis. There is a total of 8 sea chests on COSLProspector.

3.2 Reporting Procedures and discharges factors

Chemical consumption is registered in the environmental report (DM#441655 Monthly Environmental Report COSLProspector). The report is prepared by the Section Leaders offshore, and input is subsequently checked (QA) by the onshore QHSE department.

The consumption of chemicals is estimated by visual inspection of tanks and storage. First time registrations are made by counting the amount of chemicals and adding this into storage (start). Chemicals received on-board are added to storage (start). Chemicals consumed, returned onshore, or discharged are subtracted. Storage (end) is subject to control each month (inventory count) and transferred to storage (start) in next month's report. The report is sent to the operator monthly.

The environmental report specifies 11 different categories of chemicals which are consumed/ used on board.

The volume of chemicals is estimated by visual inspection of tanks and storage vessels.

Table 1: Overview and explanation of utility chemicals and their related discharge factors

Category of Chemicals	**Discharge Factor to Sea (0- 1)**		
	OBM	**WBM**	**Explanation of Discharge Factor**
Detergent: MICROSIT POLAR	1	1	Detergent will follow water to drain and as the chemical is soluble in water it will follow the cleaned water to sea. Reported as 100% discharge to sea.
BOP Fluids: Erifon HD603 HP and Glycol (MEG) Erifon CLS 40	1	1	No returns system so full discharge CLS 40 – no spill to sea in ordinary operation.
Hydraulic Fluids: Hyspin AWH-M-15 Hyspin-AWH-M-32 Hyspin AWH-M-46 Hyspin AWH-M-68 Hyspin Biobar 22 Hyspin Biobar 32	0	0	Closed system
DOPE: Jet-Lube NCS-30 ECF Jet-Lube Seal-Guard ECF Jet-Lube Kopr Kote Jet-Lube Alco EP 73	0	0.1	Industry standard of 10%
Thruster Oils: Alpha SP 150 Castrol	0	0	Closed system
Fire Foam: RE-Healing RF3, 3% Low Viscosity Foam	1	1	Helideck drains directly to sea
Cooling Water Chemicals: Bioguard Plus	1	1	No returns system so full discharge
Slop treatment unit: DCA-14005 BDF-908	1	1	Chemicals (acid/base) used in the slop cleaning process. Full discharge.

Other Chemicals	Product Name	Application			
	N/A	N/A	N/A	N/A	N/A

3.3 Uncertainty Assessment

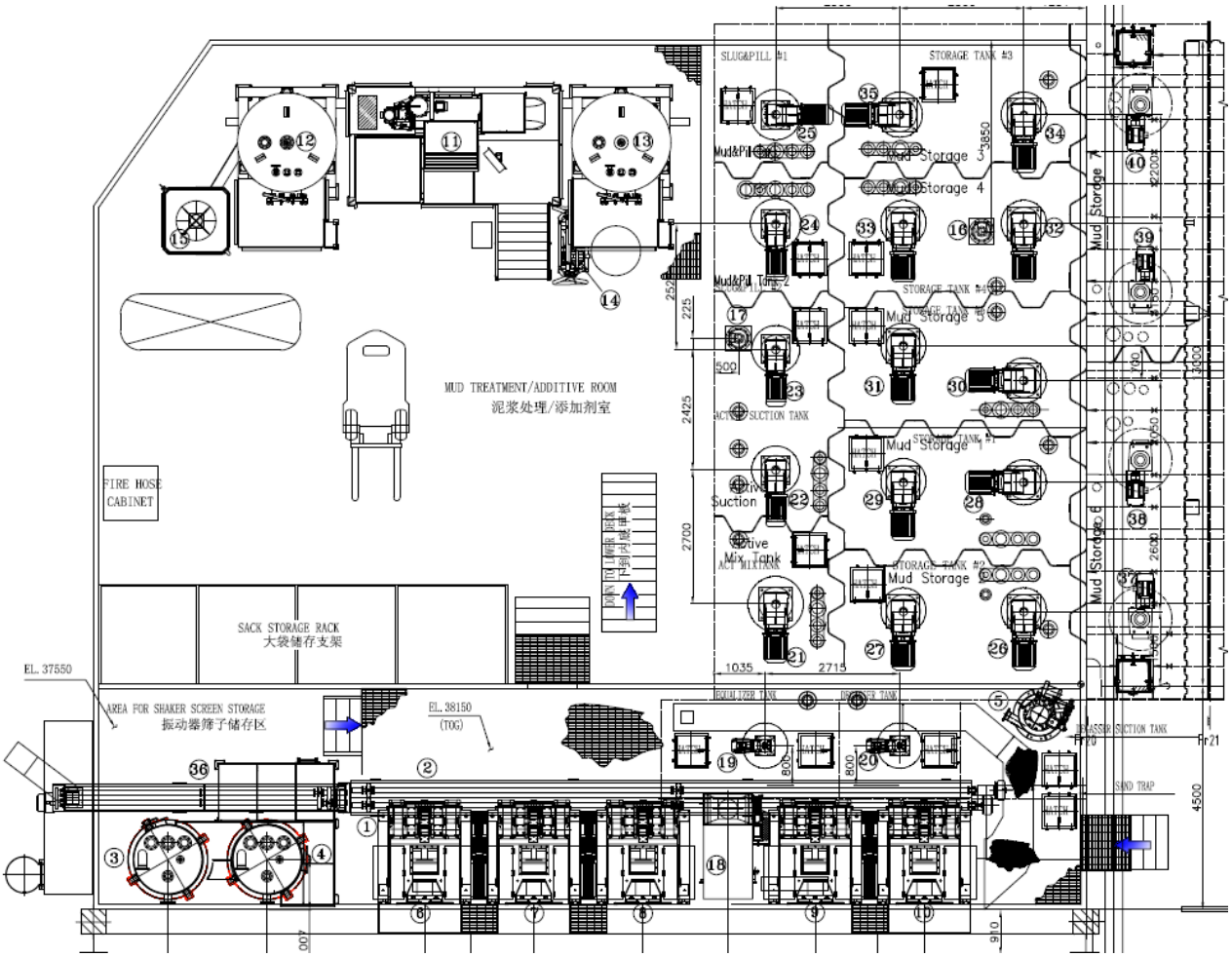
For chemicals which are used directly from tanks there will always be an uncertainty with regards to consumption. The uncertainty level may be in the range of +/- 5%. Chemicals which are used directly from cans is easier to measure and with higher reliability in regards of consumption and are considered with insignificant uncertainty.

4 Pits and tanks used for drilling fluids and cement

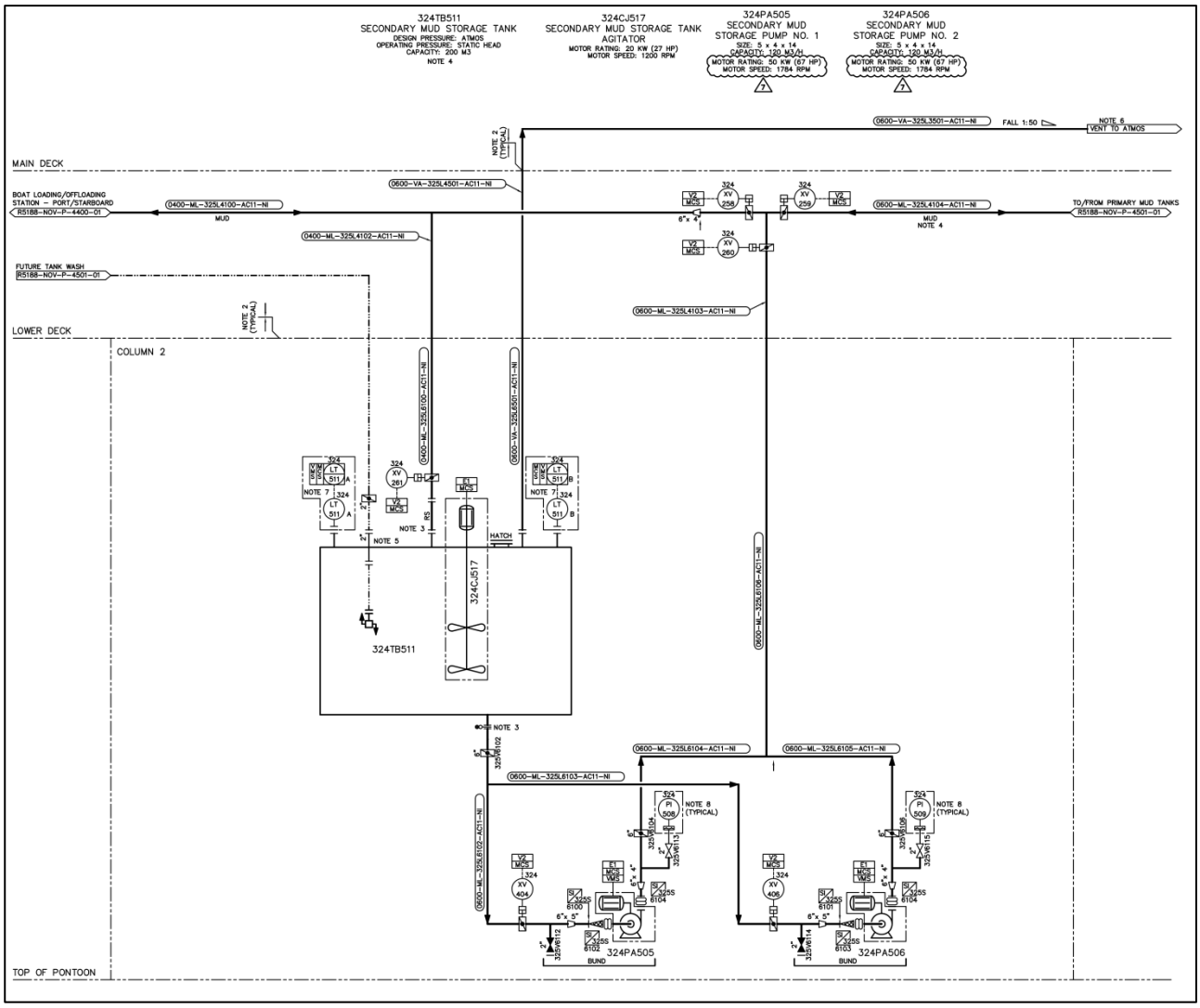
4.1 Flow charts

4.1.1 Drilling fluids

Reference to P&IDs related to mud and bulk systems (chapter 1.1 References).



Mud module area

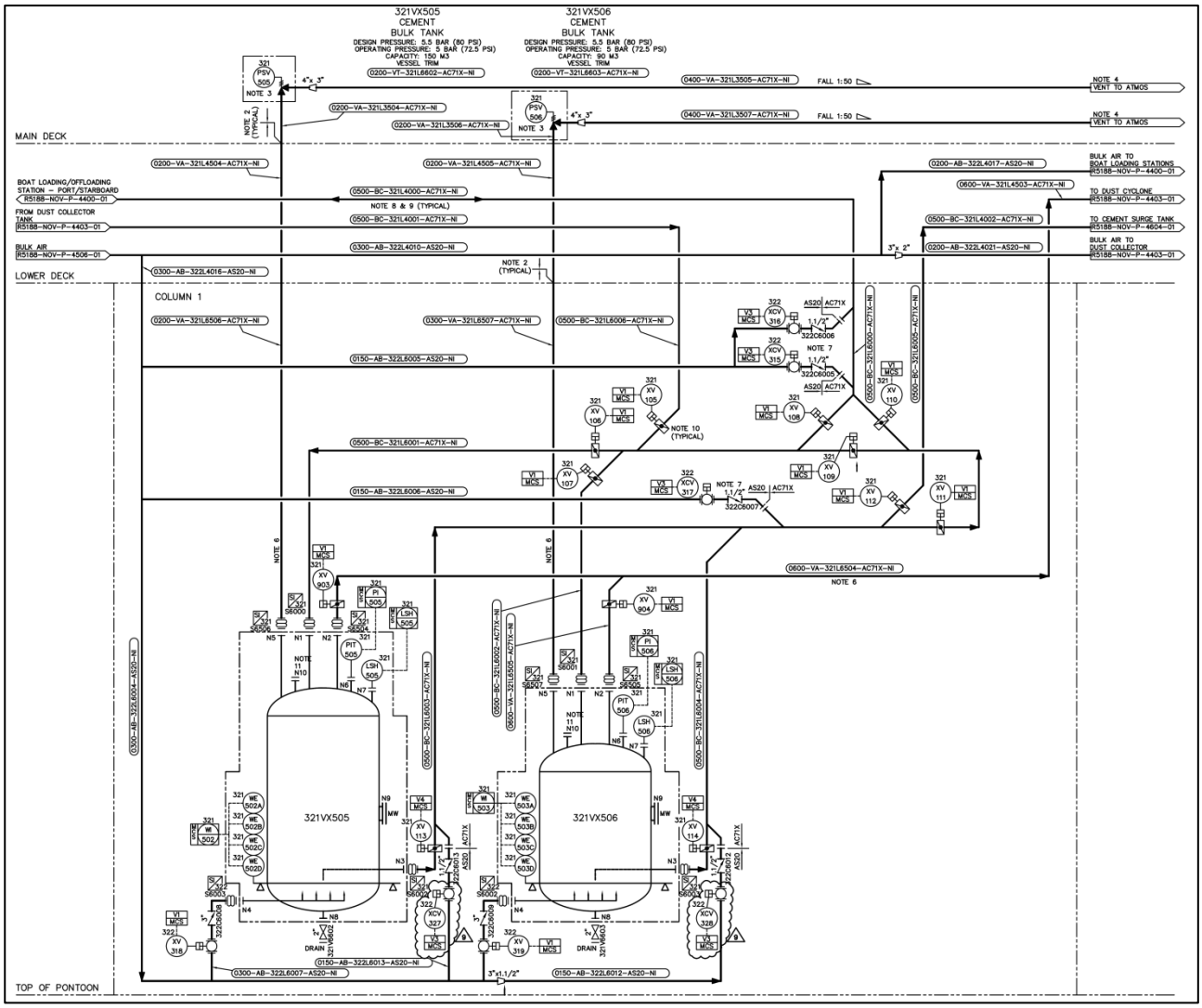


P&ID Secondary Mud Storage and Transfer COSLProspector

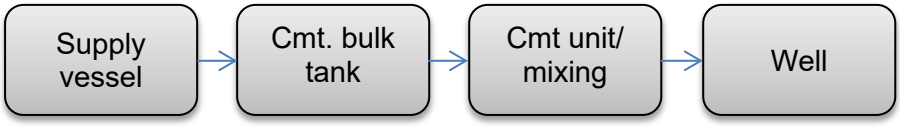
Drilling fluid is ordered in accordance with operational requirements/ plans by the mud engineer. Mud/ brine is transferred from supply vessel to the rig through liquid hoses. The transfer process is monitored by the Derrickman in accordance with instructions from the mud engineer. The mud engineer is responsible for specifying which fluid goes to each tank/pit. The mud engineer is also responsible for maintaining control/ log of all drilling fluids onboard the rig, and to update the daily report. Drilling fluids are not logged in Rig Manager (software), except bulk stock to keep control of weights and stability (logged by the marine department).

The load cells are calibrated in accordance with maintenance routines in STAR.

4.1.2 Cement



P&ID Cement Storage and Transfer COSLProspector



A specified amount of cement is ordered from supplier. The cement is loaded to boat and correct amount is verified by the supply vessel (volume/weight). When the boat arrives at the rig, the cement is blown from the boat to the cement tank through a hose. DPO/ Derrickman verifies that correct amount has been received by checking weight cell on tank and comparing this with the delivery report from the supply vessel. A direct reading is also available on the Lodic system (display for bulk tanks). Deviations will be detected on this system. The volume is checked and registered in Rig Manager (software) each midnight by the Derrickman. Consumption / supply of cement is also registered in Rig Manager.

The load cell in the tank is scheduled for yearly maintenance in STAR (IX011)

When cement is to be used, it's mixed and pumped into the well.

Bentonite and Barite come by boat as bulk and are loaded by the hose down to the Bentonite and Barite tank. When required it is transferred up to the surge tanks and mixed with mud in the mud mixing area and then pumped down into the well with the mud pump.

Mud may be (1) premixed and delivered by boat or (2) fully mixed onboard in the mud pit:

1. Premixed mud is taken onboard along with a certificate with volume / density / content etc approved by supplier. When taking premixed mud onboard tests are taken to verify the quality of mud.

2. Mud may also be mixed in the mud pit and kept there until required. When required, it is pumped into the well with one of the 3 available mud pumps.

4.2 Uncertainty Assessment

The average consumption of barite, bentonite, cement, mud and other well/ drilling fluids is totally dependent on the type and phase of operation. It is therefore hard to estimate the uncertainty. During calibration of load cells, a specified volume is transferred between tanks. Deviation in readings from each load cell will be registered by the Derrickman.

5 Bilge and drain water system

5.1 Bilge water system

Oily water is drain water collected in all oil contaminated areas. This includes areas where chemical or oils are stored, areas with machinery, vent lines from tanks containing oil or oil contaminated fluids, all drilling areas (also if only WBM is used), areas exposed to hoses containing oil of oil contaminated fluids, but not limited to the listed areas.

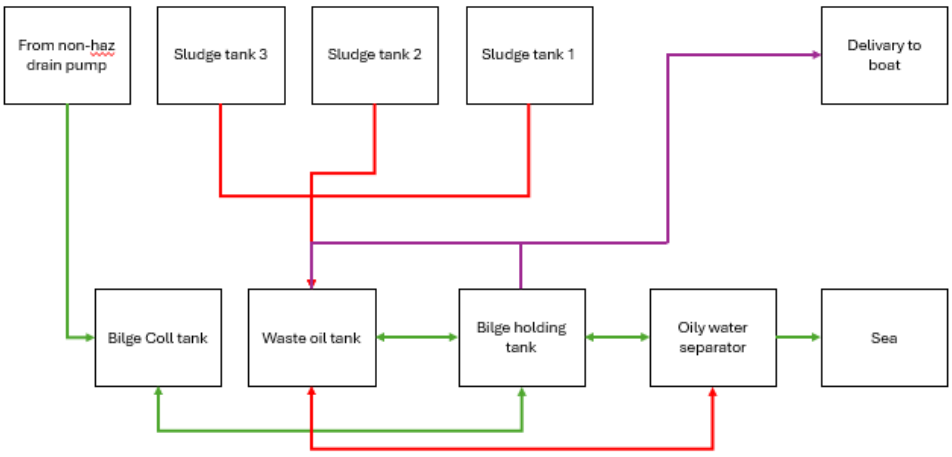
Technical rooms in all “non-hazardous areas” have bilge sumps collecting e.g. wash water or leaks. Each bilge well has a level guard that trigger an alarm on the K-chief (bridge). Upon alarm, the content will be pumped from the bilge sump to the bilge collecting tank. This tank collects all water from the non-hazardous area.

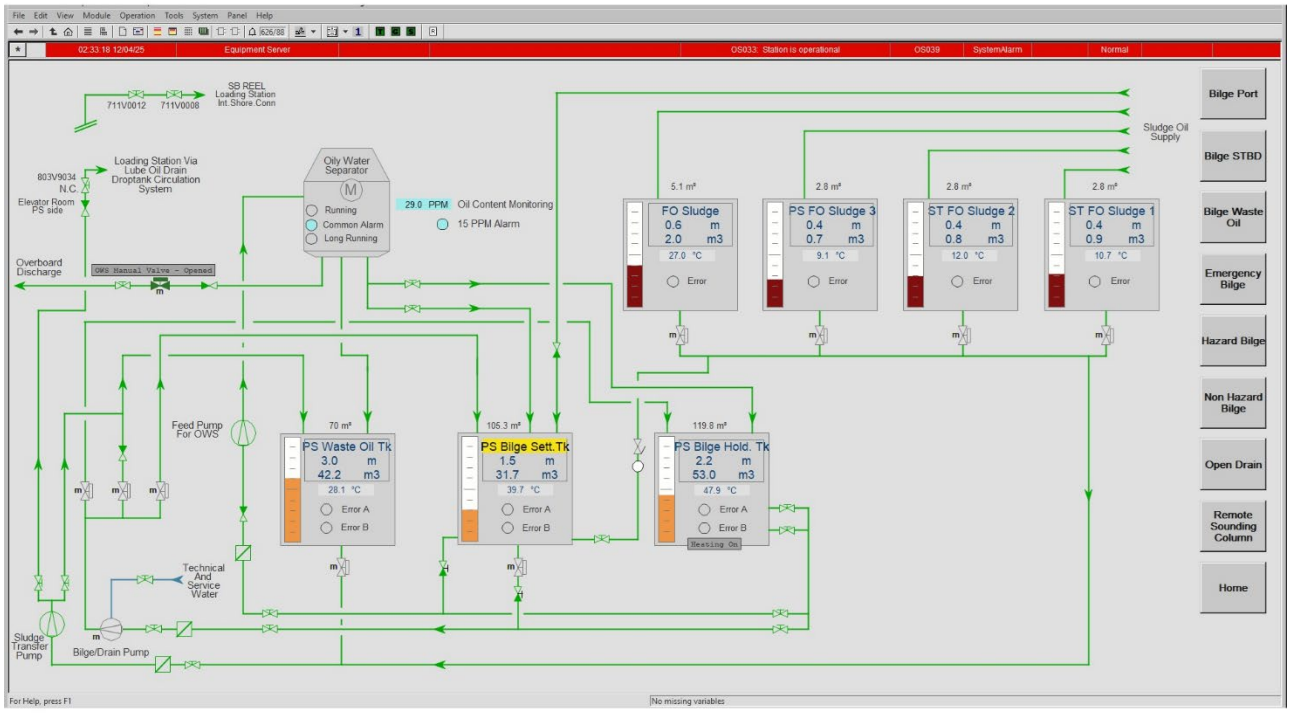
When the bilge collecting tank is full the content is pumped into the bilge holding tank. This is a settling tank used for settling oil at the surface, and particles at the bottom. The process is prepared by heating the content with an installed immersion heater. When the water has reached the desired temperature of 60 ° C, the content is ready for further processing by the bilge water separator.

The bilge drain pump may also transfer fluid from the waste oil tank to the oily water tank or to the bilge water separator.

A Westfalia bilge water separator is installed on the unit for treating non-hazardous bilge. The Slop treatment are treated with a unit operated by a subcontractor provided by the Contractor.The separator uses centrifugal force to separate oil and particles from the water. Water flowing from the separator passes through an optical measuring cell (in accordance with MEPC. 107(49) §4.2.11), which measures PPM content in the water. If the oil content is below 15 PPM the water will be discharged to sea. Flowmeters are installed to monitor the amount of water discharged to sea and the reject sent back to tank. A three-way valve is installed on the unit and will close the line-up to sea and return the fluid to waste oil tank or oily water tank if the water exceeds 15PPM. Residual (untreatable) fluids from the waste oil tank and the oily water tank will be pumped to boat.

5.2 Flow chart – Bilge system





5.3 Drain water system

Rainwater and wash water collected in all areas without oil contamination is routed to the non-hazardous drain system. The open drain tank is set- up with a central divider which has an opening in the bottom (chamber 1 and 2). The water enters chamber one where oil will float to the surface and the remaining water will be pushed under the central divider into chamber 2. A sensor detecting oil is installed in chamber 2. The sensor is calibrated to detect oil content in the water, and will automatically shut the overboard valve and transfer the water to the hazardous drain system if the water contains oil. Both chamber 1 and chamber 2 have oil sensors that will give alarm to the K-chief system if oil is detected.

If oil is detected in chamber 1 the surface water will be transferred to “HAZ Bilge Drain TK”. If oil is detected in chamber 2 the tank will be opened, and the oil film will be cleaned.

There is a total of 5 “open drain tanks” on board, strategically placed according to the surface they shall cover.

Water, wash water and drilling slop in areas with oil contamination is routed to the hazardous drain system. The hazardous drain water is then routed to a pit for flocculation and subsequent transfer to the Bara H_2O unit. The upper volumes are transferred from the pit via lines managed from the pit room. Volumes not treated to within applicable oil content is returned to the pit.

A **BaraH2O slop treatment unit** is installed on the rig to process oily water and slop generated during operations. The unit uses a combination of separation technologies to remove oil, solids, and other contaminants from the water. Unlike membrane-based systems, BaraH2O relies on advanced mechanical and chemical separation methods, allowing for high efficiency and solids tolerance directly at the source.
Discharge water is continuously monitored through the use of an on-line fluorescence instrument that measure oil content in parts per million (PPM), and the instrument provides both instant measurements as well as day average measurements. The analyzer is verified every shift by analyzing a fluid with known oil content, and additionally samples are collected and sent onshore to 3rd party accredited lab for analysis and verification of analyzer and offshore results once pr month as a minimum.

As per the Activities regulation §60a, the oil content of the discharge water shall not exceed 15 mg/l as a timeweighted average for a calendar year, and 30 mg/l for a calendar month. Compliance to regulation is monitored through daily calculations, but for COSL Prospector a stricter level has been set, and treated water may be discharged overboard when oil content is confirmed to be below 15 PPM (typically 3–6 PPM), in compliance with current environmental regulations.

Discharge to sea requires an approved work permit.

Rejected fluid is redirected to the slop tank for reprocessing. If the fluid becomes untreatable after repeated cycles, it is transferred to a supply vessel for further handling and disposal onshore at a certified treatment facility.

The BaraH2O system is designed to minimize the volume of waste sent to shore—often reducing it by over 90% and supports environmentally responsible operations by enabling onboard treatment and discharge.

5.3.1 Estimation of discharged water from non-hazardous drain system

To estimate the amount of rain and wash water discharged to sea, the area of the rig has been used. The total area of the unit is 81m*65m=5265m^2. A conservative assumption is that 3500m^2 of the unit’s area collect rain and wash water to the non-hazardous drain. Statistics from “Statistics Norway” have been used to estimate yearly rainfall. Normal rainfall for Sola is 1180mm. This is assumed to be conservative as the measuring stations is located onshore. In addition to rainfall, wash water is included in the amount of discharged water from the non-hazardous drain. A daily consumption of 1m^3 wash water have been used as input. Discharged water to sea from non-hazardous drain have been estimated on a monthly and yearly basis:

Monthly: (3500m^2*1,180m+365m^3)/12= 374,58m^3
Yearly: 3500m^2*1,180m+365m^3= 4495m^3

5.3.2 Measuring discharged water from the BaraH2O unit

A flowmeter is integrated into the BaraH_2O unit to measure volume of slop processed. The flowmeter displays both instant volume as well as cumulative volume, and volume discharged to sea is calculated based on cumulative volume processed minus the volume of contaminants separated out and discharged to dedicated sludge skip.
Operators of the unit register the volumes in a daily report (when operated) that calculates the time weighted average oil content over a calendar month as per the requirements of the Activities regulation §60a.

5.3.3 Uncertainties in measurements

Stated uncertainty level of OIW and flowmeter:
EX-1000: +/- 1% to OSPAR 2005-15
SITRANS F M MAGFLO MAG3100P + MAG 6000: +/- 0.2%

Uncertainties related to volume reported comprise of two main components; the flowmeter and the measurement of sludge volume.

SITRANS F M MAGFLO MAG3100P + MAG 6000: +/- 0.2%
Manual volume reading of skip +/- 5%
Relative uncertainty (at 20 m3 treated, assuming 5% sludge): 0.5%

Verification analysis:
Method of sampling in accordance with ISO 5667-3 /OSPAR 2006 is set to 30% total (sampling offshore, registration offshore of OIW readings and onshore lab analysis).
This factoring in 30 instant readings of OIW whilst sampling is being performed (one instant reading recorded, however 30 is performed), manual handling and filling of sample, and volume reading uncertainties.

Lab analysis - Uncertainties set for OSPAR 2005-15 measurements (3rd party accredited lab analysis: +/-15%)

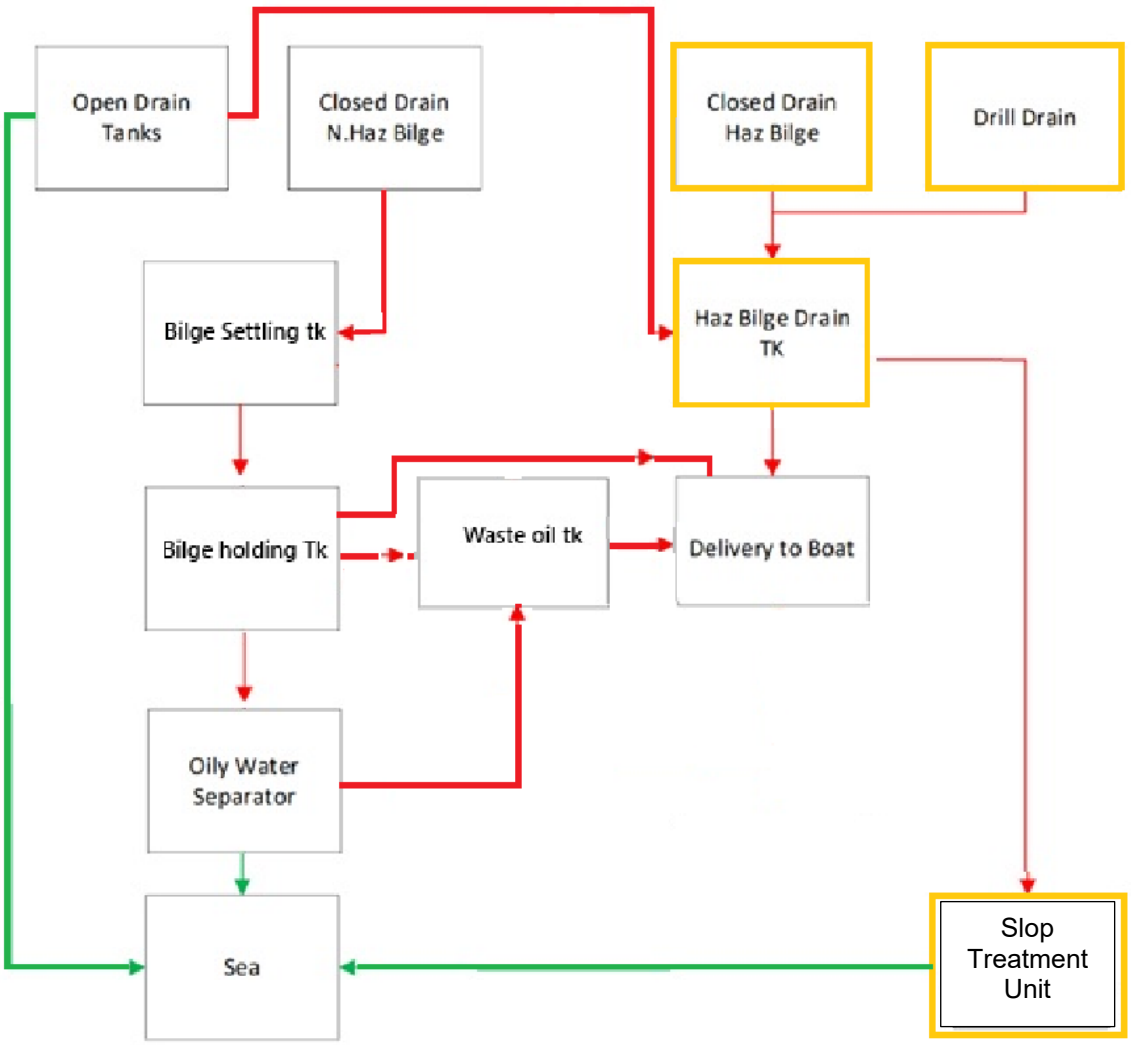
Acceptance criteria for OIW EX1000 readings offshore is set to +/- 30% to onshore lab analysis. Trend is analyzed continuously for each sample and if more than 30% discrepancy to onshore lab analysis, OIW is re-calibrated offshore using a fluid with known oil concentration.

Calibration OIW (EX1000):
Upon commencement of project, the analyser is calibrated offshore using a known concentration of hydrocarbon. The measurement of the analyser is verified by 3rd party accredited lab, and once the results correlate, the setup of the analyser is locked down.

In operation, the analyser is as a minimum zero levelled once per shift. Should the treatment be conducted in two or more batches in one 12 hour shift, the analyser is zeroed before each treatment period starts.

Verification of Flowmeter:
Flowmeter is installed inside the unit. Flowmeter is verified prior to process through pumping a known/constant volume from the inlet tank of the unit (known volume, pump controlled by Vega level sensors), through the flowmeter. Deviation >5% results in replacement and recalibration of flowmeter.

5.4 Flow Chart – Drain slop system



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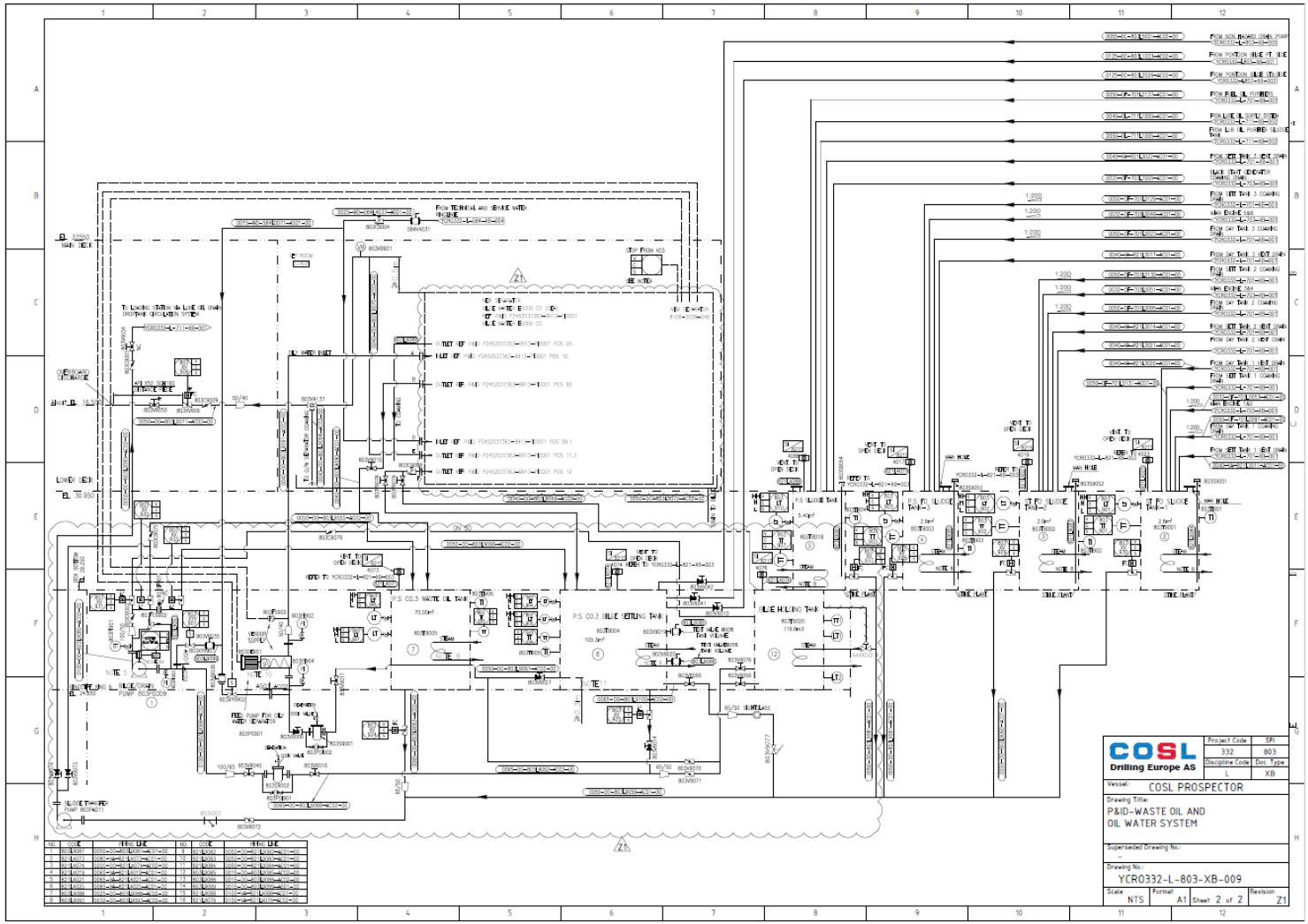
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Sheet 2 of 2
Revision Z1

5.5 Quantification and uncertainties

System	System description	Measuring method	Measuring routines and frequency	Measuring uncertainty
Hazardious Slop tank 803TB012	Column 2 322m^3	- 1 pcs Level Sensor in tank.	Continuously	High accuracy of measuring
Slop treatment system	*BaraH2O unit Halliburton*	- Optical UV fluorescence	Continuously as well as day average measurement	1% on OIW 0.5% on volume measurement
Bilge water separator	Westfalia bilge separator	- Optical measuring cell	Continuously	High accuracy of measuring
Bilge water tank	Bilge Setling Tank 105m^3	- 2 pcs level sensor in tank	Continuously	High accuracy of measuring
Closed drain	Hazardous areas - Hazadous slop tank 322m^3 - Drill drain tank 7,9m^3	- 1 pcs Level Sensor in each tank. - 2 pcs Leakwise oil sensor in each tank	Continuously	High accuracy of measuring
Open drain	Clean areas - Open drain tank Fwd stbd 10m^3 - Open drain tank Aft stbd 7,9m^3 - Open drain tank Fwd port 10m^3 - Open drain tank Aft port 7,90m^3 - WT PR Drain tank 7,7m^3	- 1 pcs Level Sensor in each tank. - 2 pcs Leakwise oil sensor in each tank	Continuously	High accuracy of measuring