PPC Permit Condition

3.4 Fugitive VOC Emissions

3.4.1 The Operator shall prepare, implement and maintain a VOC fugitive release inventory for all plant (and tanks) included within the Permitted Installation. The said inventory shall list the main sources of fugitive releases on each plant along with the techniques in place to prevent or minimise VOC emissions from each source. Fugitive VOC emissions shall be quantified (based on composition and mass in kilograms) for each source including the total for each production plant based on monitoring estimates (in accordance with USEPA Method 21) on an annual basis. The fugitive release inventory shall be reported to SEPA on an annual basis, within 2 months of the end of the calendar year. The first assessment shall be completed by 28 February 2020.

3.4.2 The Operator shall implement and maintain an on-going annual Leak Detection and Repair Programme (LDAR) designed to reduce fugitive VOC emissions to air from the production plants and tanks identified in Condition 3.4.1. The repair programme shall use monitoring including optical gas imaging techniques and the annual VOC fugitive release inventory as the basis for targeting improvements.

3.4.3 The Operator shall record and report to SEPA the annual leak repair programme for the forthcoming calendar year along with a review of the previous year's repair programme identifying any improvements made, within 2 months of the end of the calendar year. The first assessment shall be completed by 28 February 2020.

Inventory Main Fugitive Sources

Equipment Description	Tag No	Leak Pathway	Quantification	Composition	Technique to prevent or reduce
Propane Boil off Compressor	K-3201-A	Elevated seal gas local vent	Not quantified as no access to vent point.	Propane	Wet synthetic seal oil system. To be upgraded to dry gas seal system
Propane Boil off Compressor	K-3201-B	Elevated seal gas local vent	Not quantified as no access to vent point.	Propane	Wet synthetic seal oil system. To be upgraded to dry gas seal system
Refrigeration Compressors	1K-1501	High level local vents from seal gas degassing tanks x 2	Not quantified as no access to vent point.	Propane	Wet seal system. Upgrade plan not defined.
Refrigeration Compressors	2K-1501	High level local vents from seal gas degassing tanks x 2	Not quantified as no access to vent point.	Propane	Wet seal system. Upgrade plan not defined.
Refrigeration Compressors	3K -1501	High level local vents from seal gas degassing tanks x 2	Not quantified as no access to vent point.	Propane	Wet seal system. Upgrade plan not defined.
Gasoline Storage Tank	T3401	Local vent	3.64 Tonnes	Pentane	Floating Roof to reduce evaporative loses
Gasoline Storage Tank	T3402	Local vent	3.75 Tonnes	Pentane	Floating Roof to reduce evaporative loses

Note: Other minor sources are captured under the LDAR programme

Fugitive Emissions Calculation

Enter weight % methane of product	0.0%	Based on average ETS composition
Enter total number of hours in operation or pressurized for the year	8,040	Full year (exc.Total Plant shutdown)

Upstream Production Total Hydrocarbon (THC) Leaker/No Leaker Emission Factors (gas service)

								Total if no leaks	
					Total	0.00	8.72	0.00	0.26
Emission Factor	**Component Type**	**Service** [a]	**Leak Emission Factor** (THC kg/hr/component) [a]	**No-Leak Emission Factor** (THC kg/hr/component) [a]	**Component Count**	**# of Leaks**	**Tonnes CH_4**	**Tonnes VOC**	**Tonnes CH_4**	**Tonnes VOC**
Valves	Valves only (Control Valve, Globe Valve, Block Valve, Gate Valve, etc.)	Gas	9.80E-02	2.50E-05	500	7	0.00	5.61	0.00	0.10
Pump seals	Pumps only	Gas	7.40E-02	3.50E-04	20	1	0.00	0.65	0.00	0.06
Flanges	Flanges only	Gas	8.20E-02	5.70E-06	2,000	0	0.00	0.09	0.00	0.09
Connectors	Threaded, Elbow, T, Y, Compression, etc.	Gas	2.60E-02	1.00E-05	0	1	0.00	0.21	0.00	0.00
Open-ended lines	Open-ended lines	Gas	5.50E-02	1.50E-05	20	0	0.00	0.00	0.00	0.00
Others [b]	compressors, diaphragms, drains, dump arms, hatches, instruments, meters, PRVs, polished rods, RVs, and vents	Gas	8.90E-02	1.20E-04	10	3	0.00	2.15	0.00	0.01
									Total if no leaks	

NOTES:

a These factors are from Table 2-8 of the US EPA Protocol for Emission Leaks (1995). The original emission factors are for total organic compound which is the same as THC for calculating O&G fugitive emission rates and they include VOCs, plus methane and ethane. These emission factors apply to crude oil, gas plant, gas production, and offshore facilities.

b The "other" equipment type was derived from compressors, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

Note: Gasoline tank VOC calculated based on throughput, temperature, pressure & gasoline density)

Tank VOC	7.39
Total	**16.11**

Leak count

Connections	1
Valves	7
Open Ended Pipes	
Pumps	1
Other Components	3
Flange	0

FLIR Camera Leaks and Repair Programme

Leak Detection Programme

The FLIR camera is used to survey the plant to check for fugitive leaks. The surveys are completed weekly by trained camera operators. The plant is divided into areas and each area is surveyed twice per year. Any leaks are recorded and where appropriate a repair order is raised to rectify the leak. This is a rolling programme that continues every year to ensure the ongoing survey, identification and repair of fugitive leaks.

Depending on the size of the leak and cause, direct action will be taken to reduce or elimate the leak at the time of the survey.

Equipment/Leak Description	Area	Component Type	Repair Order Number in CMI	Date Identified	Date Repair Scheduled	Date Repair Completed
2-10-RV-1 st/by d/s	2-E-1001 RV Platform	Valve	16336174	19/03/2019	15/07/2020	12/06/2021
35-H-68 Gland Packing	T3301 Loading Platform	Valve	16818281	13/09/2020	01/04/2021	23/02/2021
1-55-FC-5 Orific Horn	Mod 1 E-1005	Valve	16860647	12/11//2020	19/04/2022	
2-V-1301-A Sight Glass	Mod 2 Treaters	Valve	17074899	08/09/2021	15/12/2021	19/01/2022
Repaired in 2021						
35-FT-17 Orifice plate carrier	Propane loading	Connection	61526680	30/09/2020	24/01/2021	30/01/2021
1-55-FC-5 Orific Horn	Mod 1 E-1005	Valve	16860647	12/11/2020	19/04/2022	24/04/2021
2-K-1501 Lube oil system	2-K-1501	Other Components	16044143	02/04/2018	03/07/2021	07/07/2021
2-K-1501 Plinth	2-K-1501	Pump	16044143	02/04/2018	03/07/2021	07/07/2021
2-K-1501 Gearbox	2-K-1501	Other Components	16044143	02/04/2018	03/07/2021	07/07/2021
1-10-PC-2 Stem Weep	Mod 1 C-1001 RV Platform	Valve	17085924	23/09/2021	15/11/2021	01/11/2021
P-7004 LG-11	A-7005-B Ogden Pump	Other Components	17108347	13/09/2021	15/10/2021	29/12/2021
2-15-FC-10	P-1501A/B M/FLO Control valve	Valve	17126856	22/11/2021	23/12/2021	23/12/2021

Leak count	
Connections	1
Valves	7
Open Ended Pipes	
Pumps	1
Other Components	3
Flange	0

Note: Central Maintenace Management System (CMMS): Corrective maintenance proritisatioin tool used to rank all corrective notifications (releases) and define schedule for repair

2021 Hydrocarbon Reduction Plan:

1) Appoint "Leak Champions" from front line or support teams – Champions identified for each shift, their roles & responsibilities include promotion of the HCR prevention plan, identify focus areas, taking part in the leak & seep inspections and undertaking training to become proficient in operating the FLIR camera.
2) Confirm use of Flange Break Register for Small Bore Tubing – completed, added to main flange break register and being used.
3) Weeps and Seeps and Minor Emissions awareness improvement and understanding of emission criteria - weeps and seeps ranked correctly and process well understood.

2022 Hydrocarbon Reduction Plan:

1) Gland Maintenance - improve gland packing deterioration. Consider development of a more comprehensive maintenance schedule.
2) Weeps and Seeps and Minor Emissions management - keep activity on plan for 2022 as a quarterly review of the SAP data.