

Fugitive emissions Sources and Losses Review 2017

Background:

An annual estimate is made of fugitive emissions from the Hexion, Barry site. The main element consists of losses when off-loading phenol and formalin into bulk storage. NRW has requested that fugitive emissions be looked at more closely and issued the site with the following action:

Action 2 Hexion 19th Jan 2017: *Conduct a full fugitive emissions sources and losses review. Any losses identified should have actions proposed to limit or eliminate them, based on their risk and estimations without direct measures must be based on a known and appropriate methodology.*

Hexion should propose review dates or agree to review every two years

Due: By the end of September 2017

This Review builds on the Fugitive Emissions Plan submitted in 2014 and concentrates on fugitive air emissions. The 2014 Fugitive Emissions Plan gave a good description of measures that prevent loss of containment. This report concentrates on where fugitive emissions to air arise and how these will be measured / calculated / estimated going forward.

Summary:

There are many gaps in the knowledge of free venting emissions. This report lists the sources and commits to measuring key concentrations over the next 12 months. These measurements will be applied to other free venting vessels as appropriate.

Additionally a review of pump emissions will be carried out using either direct measurement and/or published emission data.

The result will be more accurate fugitive emission reporting.

Overview of Relevant Site Operations:

The most significant fugitive emissions occur when free-venting vessels, tankers and packaging (drums and IBCs) are filled. Additionally pumps, flange joints and valves are sources of miniscule leaks.

This report concentrates on tank, tanker, drum and IBC filling activities with an overview of other sources of fugitive emissions and gives direction on improving future fugitive emissions reports.

List of Vessels:**Raw Material Tanks:**

All raw material tanks are free venting

Tank ID	Raw Material	Volume (m ³)	Annual Deliveries
1-V1531	Furfuryl alcohol	45	
1-V1532	Resole Dist	40	
1-V1533	50% NaOH	60	
1-V1534	KOH	60	
1-V1535	Caustic rewash	55	
1-V1543	Process Water	60	
1-V301	Phenol	100	
1-V302	Phenol	60	
1-V303	Formaldehyde	200	
1-V304	DiEthylene Glycol		
1-V305	Glycol 3		
1-V306	MonoEthylene Glycol		
1-V1001	Resole Dist	100	
2-V307	Industrial Methylated Sprits	30	
2-V309	Toluene	30	
2-V312	Raffinate	30	
2-V313	Methanol	30	
2-V603	Recovered Phenol	30	
2-V604	Recovered Phenol	30	
2-V605	Recovered Toluene	30	
2-V606	Recovered Toluene	30	
2-V607	Extract Toluene	30	
2-V608	Formaldehyde	30	
2-V1571	Heavy Layer Distillate	140	
2-V1572	Light Layer Distillate	140	
5-V1588	Libranone	40	
5-V1589	Breox	40	
6-V707	CNSL	70	
15-V1536	Triacetin		
15-V1537	EGDA storage	31	
15-V1538	Dibasic Ester		
15-V1539	Propylene Carbonate		
15-V1540	Gamma Butyrolactone		
15-V1541	UFC82	35	

Reactors:

All reactors (R1, R3, R6 and R10) are connected to the scrubber (point source emission) and therefore excluded from the fugitive emissions survey.

Product Storage Tanks:

All product tanks are free venting except for V-1514, V-1515 and V-1516 that are connected to the scrubber and therefore excluded from the list below. NB – many product tanks are double-stacked, i.e. one tank is directly on top of the other.

Tank ID	Main Product(s)	Volume (m³) – tonnes	Annual number of batches
V1508a	TPA / PBR 152	50	
V1508b	TPA / PBR 152	50	
V1509	TPA 75	70	
V1510	W132D	70	
V1511a	PBR 152	50	
V1511b	PBR 152	50	
V1512	TPA 70	70	
V1513	W132D	70	
V1514	PF1230V/0421/0225R/1764M40HC	50	
V1515	PF1230V/0421/0225R/1764M40HC	50	
V1516	PF1230V/0421/0225R/1764M40HC	50	
V1517	R 006.07.07	70	
V1518	R330UF-1	70	
V1519	R330UF-1	70	
V1520			
V1521	R330F/330UF-1	70	
V1581	TPA	2 x 64	
V1582	TPA	2 x 64	
V401/402	PR129/PRL384	2 x 28	
V403/404	R330F/J6014L/IDP240/J6070L	2 x 28	
V405/406	J6050L	2 x 28	
V407/408	PF1730	2 x 28	
V409/410			
V411/412	J2027L/2063L/2042L/2042X	2 x 28	
V413/414			
V415/416			
V1526	Aces	15	
V1527	Aces	15	
V1529	Furanes (TCS120 etc...)	15	
V1530	Furanes (TCS120 etc...)	15	

Tanker Loading Points (LPs):

There are 4 top-loading tanker points and bottom loading points for tanks V-401 to V-408 and V-411 to V-412. Loading points 2, 3 and 4 are connected to the scrubber. These will still be considered as the seal design is not 100% efficient.

Loading Point ID	Main Product(s) (tbc)	Annual number of batches
LP1 (V1508 -13)		
LP2 (V1514 -16)		
LP3 (V1517-21)		
LP4 (V1581-82)		
V-401/402		
V-403/404		
V-405/406		
V-407/408		
V-411/412		

IBC Filling Stations:

All free venting

Description	Main Product(s) (tbc)	Annual number of batches
Drumming Shed		
Wendy House		
R1		
Ace Furane		

Drum Filling Stations

Drumming Shed filling point is connected to the scrubber but will be considered as there is not a 100% seal.

Description	Main Product(s) (tbc)	Annual number of batches
Drumming Shed		
R1		
Ace Furane		

Additives:

Additives are small volume raw materials that are delivered via drum or IBC. Their contribution to the total fugitive emissions is limited as the drum or IBC they are in is emptied rather than filled. The main additives are included so measurements can be made.

Additive	Packaging	Annual Total
Ammonia	Drum	
Triethylamine	tbc	
IMS	IBC	
Methanol	IBC	
Acetic Anhydride	Drum	
Propanol	Drum	
Silane	Drum	
Sodium ethyl hexyl Sulphate	IBC	
Mono ethanolamine	IBC	
Lactic Acid	IBC	
PTSA	Drum	
Phencat 65	Drum	

Concentrations used for fugitive emissions analysis:

The concentration of emissions from phenol and formaldehyde tanks uses historic data. A more recent study showed a significantly lower reading. As this did not take into account the break in the vent pipe high up on the tanks it was decided to use the original figures, i.e. err on the side of caution.

There are no measurements available for any of the other fugitive emission points. These will be subject to an on-going programme of concentration measurement, using detector tubes, colorimetric badges or PIDs. Where possible readings from one fugitive emission point will be applied to others where it makes sense to do so. Where vent lines are not accessible, judgement will be used to decide on a value based on readings from similar materials.

Fugitive Emissions from Pumps, Valves and Joints:

As stated in the introduction the emissions from pumps, valves and joints is significantly less than for free venting operations. It is expected that pumps are the main source of fugitive emissions depending on their type, e.g. pump with double mechanical seal etc...

A review of site pumps and their seal arrangements will be included in a future review.

Work Plan Going Forward:

Obtain number of deliveries, IBCs/drums/tankers filled.

Carry out direct monitoring where there is reasonable access. See where measurements can be applied to other vessels.

