

Objection No. 2.

**Noeleen Keavey**

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**From:** Licensing Staff  
**Sent:** 11 January 2017 13:42  
**To:** Noeleen Keavey  
**Subject:** FW: New Third Party objection entered for Reg no: W0184-02. (Reference Number: W0184-02-170111013939)  
**Attachments:** ENVA\_Objection.pdf  
**Importance:** High

**From:** [Redacted] Phelan [Redacted]  
**Sent:** 11 January 2017 13:41  
**To:** Licensing Staff  
**Subject:** New Third Party objection entered for Reg no: W0184-02. (Reference Number: W0184-02-170111013939)  
**Importance:** High

**Objection submitted on:** 11/01/2017 13:39

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**Objector Type:** Third Party

**Oral Hearing:** No

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# OBJECTION TO GRANTING OF LICENCE W0184-2 TO ENVA

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## 1 INTRODUCTION

Recycling waste oil is a good thing. One litre of waste oil can contaminate one million litres of water. *You dump it, you drink it* was the slogan from the US EPA in the 1980s. But what about tasting oil in your mouth, wiping it off your windows, headaches, nausea, sore throats, having to leave your home? This is what residents and workers describe living beside ENVA.

The background and rationale for an objection to the licence being granted is set out in the following pages. All the information that is presented is available in the public domain, or to members of the public through access to information on the environment.

## 2 BACKGROUND TO OBJECTION

The origins of ENVA, from Sunnyfresh Farms in Sligo to Atlas Oil are described in an archived website *The Curious Trinkets of Nelius Flynn*.<sup>1</sup>

*"The farm grew by another acre during my time there but when the oil crisis hit in the 1970s it nearly marked the end of the business. It was getting too expensive to heat the glasshouses. There were three managers, an Irish man called Fred Duffy, an English man, Bill Dray and a Dutch man, Jan Moret. I think it was Duffy who got the brainwave to buy up all the waste oil in garages. Mostly they got it free. It was collected in a truck and taken to the farm where it was passed through a long pipe that had a series of sieves or filters built into it. When the oil came out the end it could be used to heat the glasshouses, for practically nothing. As time passed the managers discovered that they had a surplus so they began to sell it to other businesses. Soon they then realised there was more profit in selling this oil, than burning it, to grow tomatoes. Sunnyfresh was wound up and a national company, Atlas Oil was formed."*

Atlas Oil was established in Portlaoise in 1978, where filtering, de-watering and blending of waste oil was undertaken. The company was acquired by DCC plc in 1987. An IPPC licence was granted to Atlas Oil in 2000 by the EPA. The company was renamed ENVA and a further review of the licence was undertaken and granted by the EPA in 2003. An industrial emission licence was later granted to the company by the EPA. Following concerns raised in the Seanad, the Minister of the Environment requested a report on the facility from the EPA. In 2015, the Interim report was published and concluded that "There is currently no requirements to place any further mandatory controls or monitoring requirements on the emissions from ENVA". Seven months later ENVA were criminally convicted in court for causing odour nuisances. The EPA initiated a further review in 2016. The board of directors of the EPA granted a new licence in November, 2016.

However there is a problem. There have been a litany of complaints from residents and workers spanning over 18 years, describing distressing odours and harm on human health. The complaints precede the granting of the 2000 licence by the EPA, and continued after the licence was granted. The complaints continued before and after the 2003 review. They have continued

<sup>1</sup> <https://goo.gl/zm2Etr>

after the criminal conviction of ENVA. And yet again after the board of the EPA granted the latest licence in November 2016.

It is important to examine these complaints in the context of an objection, and not to discount the experience of workers and residents living beside the facility.

## 2.1 Formal Complaints to EPA of Harm on Human Health

According to ENVA's annual environmental report there were 47 complaints relating to the facility 2015. Complaints from the facility on file with the EPA date back over 18 years and pre-date the original licensing of the plant in 2000. A sample of complaints include:

*"...this is a seriously heavy odour and I wish to point out that I was advised by Portlaoise Hospital that this type of atmosphere may be contributing to my sons asthma and other ailments such as headaches to which myself and my wife are regularly subject"*

Resident A, 24th December, 1999

*"Staff here complain that it is affecting their throats"*

9th March 2007

*"Our staff at the Portlaoise Depot are complaining of a smell coming from the premises and have advised that they suffer headaches as a result of the emissions from ENVA"*

13th August, 2009

*"the complaint concerns an odour experienced on the 14th and 15th November which caused the complainant to feel ill after a few minutes outside"*

Resident B, 24th February, 2012

*"It can be like gas is leaking. Sometimes it can be a dirty, oily smells like diesel." Either way, she said, it was "overpowering". Both she and her 15-yearold daughter have suffered headaches. Her daughter's headaches are particularly bad, but doctors at Crumlin children's hospital have been unable to diagnose the cause."*

Resident C, Sunday Independent, 13th April, 2014

*"Most interviewees in the video spoke about odours, their experience of odours when they are on their property and in their homes, and their concerns about the impact of these odours on their health. People in the interviews described their experiences of these odours as a nauseating gas/oil smell, burning oily smell, garage smell, disgusting smell, noticeable, so strong that they can taste it in their mouths, having to keep their windows closed, masked smell - like laundrette, smell permeates into their houses even with the windows shut, can almost taste the smell, experiencing headaches, feeling ill. Grievances include very bad headaches that are severe, sharp, debilitating"*

Meeting record with EPA inspectors, 25th July, 2014

*"The smell from ENVA this evening is horrendous and I've a headache all evening. If we open the back door it floods into our living room and does not leave, it feels like they're burning oil inside our house."*

Resident D, 28th August, 2015

These complaints contain acute ill-health effects of headaches and sore throats that were submitted by residents and workers *independently*. An innocuous odorous compound would not cause these acute effects, and it warrants investigation as to whether there are further chronic health effects. Concerns regarding the health effects have been addressed by leading health professionals.

## 2.2 Health Investigation

In the Seanad on the 9th July, 2014, the oncologist Professor John Crown called for a full health-only based investigation

*'As a result of appropriate environmental regulation, we now limit the use of materials such as asbestos, benzene and other hydrocarbons. These regulations are based on good science, not on some kind of fluffy bunny-hugging, Luddite, anti-industrial policy. There is sound science, medicine and epidemiology behind them all. The concerns about specific chemicals associated with hydrocarbon disposal are very real. It may well be that there are adequate processes in place for the supervision of the safe disposal of these products but the contention as advanced that it is not adequate is plausible and requires full evaluation and I urge an appropriate, health-only focused investigation, taking into account the data presented.'*

- Prof. John Crown

Up to the date of this objection, no health-only focused investigation has been undertaken.

## 2.3 Prosecution and Criminal Conviction of ENVA

On the 18th December 2015, ENVA pleaded guilty in court to 4 counts of odour nuisances during the summer of 2015. During the proceedings, Judge Catherine Staines attempted to shut down the facility, and questioned why the EPA had not taken the case to a higher court.

## 2.4 Formal Complaints to EPA following Conviction

There have been numerous complaints following the prosecution in court.

*"Smell from ENVA is very bad this afternoon - just back from town and it would take your breath away"*

Resident E, 7th January, 2016

*"Odour is described as like a gas, burning, oily (like a garage) smell, that is acute and very strong and hits you straight away in the back of the throat and makes you eyes water. It was similar to last year in the summer when complainant stated they could not go out in their back garden and had a splitting headache all summer"*

Resident F, 8th January, 2016

*"Stench from ENVA is absolutely disgusting. Complainant states they have a headache...they often cannot use the garden due to the smell"*

Resident G, 8th January, 2016

*"Nuisance odour complaint on the out-of hours phone...complainant stated they were getting an oily smell again this evening."*

Resident H, 8th January, 2016

*"There was an odour that left her with a headache and a sore throat (back of her throat). The longer she was in the house the more distinct the smell was, like a garage forecourt smell."*

Resident I, 14th January, 2016

*"Very Strong - 5 out of 5"*

- Irish Rail Log, 25th January, 2016

*"Complainant stated she noticed the odour in her residence...she checked outside and she considered the odour outdoors very strong...since moving into her house she has repeatedly suffered from sinus and throat problems."*

Resident J, 4th February, 2016

*"Very Strong - 5 out of 5"*

- Irish Rail Log, 8th March, 2016

*"A hydrocarbon odour of intermittent and moderate intensity was detected by the EPA Inspector close to the railway track between Galmbia and Telfords."*

- EPA Inspector, 11th March, 2016

*"I can't believe I am emailing you again. This morning at 7:30am I got hit with that smell again. I know from speaking to other people in the locality that this is 3 days in a row that they are doing this...it feels like we are being poisoned and that ENVA has a blatant disregard for the environment and the people who live close by"*

Resident K, 11th March, 2016

*"I was out with the dog there a few minutes ago and I can get the smell from ENVA again"*

11th March, 2016

*"Complainant described the odour as varying from faint to moderate to high level that gets on your nose and as typical of the ENVA smell "oily gas type odour"*

Resident L, 16th March, 2016

*"It was intermittent but easily detectable in a moderate breeze when present and could be described as possibly offensive"*

- EPA Authorised Odour Agent, 7th April, 2016

*"Complainant advised that today at lunch time, I get a distinct smell and it is a gassy/oil odour. On a very regular basis I get a gassy/ oil odour. The smell can be very strong and sickening"*

Resident M, 8th April, 2016

*"Complainant indicated that the odour was noticed at 9:30 and lasting more than an hour"*

Resident D, 20th May, 2016

*"Complainant passed by ENVA, and stated he was greeted by that old familiar smell"*

Resident K, 22th August, 2016

*"Went out my back garden. Smell present again"*

Resident K, 8th September, 2016

*"The person reports of experiencing the classic ENVA hydrocarbon odour that was incredibly strong....10 minutes after the odour the person started to feel unwell, and started vomiting"*

Resident N, 8th September, 2016

*"Strong Odour - 5 out of 5"*

- Irish Rail Log, 15th October, 2016

## 2.5 Complaints Following Granting of New Licence

*"Usual odour attributable to ENVA as bad as ever this afternoon in Rockview"*

Resident N, 7th December, 2016

*"I was in my kitchen a few minutes ago and got the smell of oil, went outside and very strong smell filling the air, back to the original smell"*

Resident D, 7th December, 2016

*"It was an extremely strong odour that was invasive and penetrated through windows. It was oily, gassy and made me nauseous....I am extremely concerned."*

Resident O, 9th December, 2016

## 2.6 Irish Rail Complaints

For over a decade, Irish Rail has formally complained to both the EPA and ENVA of the effect on their workers beside the facility. In January 2016, a non-compliance was issued to ENVA as they had withheld from the EPA a complaint from Irish Rail.

An odour nuisance log has been kept by the workers, which describe the intensity of the odours experienced from ENVA. There are over 80 entries.



These include descriptions of Very Strong Odours, Very Bad odours, Choking smell, 10 out of 10.

At the time of writing, the latest record kept in the log is the 15th October 2016, 6 weeks before the board of the EPA decided to grant a licence to ENVA. This stated the odour was very strong, 5 out of 5.

## 2.7 Gas Network Complaints

Gas networks have kept detailed records from calls to their emergency helpline of gas like odours and a sizeable quantity have been traced back by their engineers to ENVA. On some days there are up to 18 calls to the emergency helpline, where the engineers have not detected any trace of natural gas, but have found the source of the odour to be ENVA.

This is only a small sample of these records to illustrate the widespread areas of Portlaoise that are affected by ENVA.

*"Checked area in school where smell was reported-checked up stairs and downstairs - no trace. Same smell from ENVA factory in town"*

Portlaoise

*"Checked area in drains, ducts etc - no trace. Smell in area from factory in town [ENVA Factory]"*

Portlaoise

*"Checked around entrance to estate and both sides of entrance - checked drains, ESB ducts etc - no trace.. Smell in area from ENVA factory close by"*

Westlands, Portlaoise

*"Checked up along roadway both sides in drains ducts etc - no trace. Smell is area from ENVA factory in Clonminam Industrial Estate - non gas related."*

Mountrath Road, Portlaoise

*"Checked around the area in drains, ducts etc - no readings detected. Smell in area from ENVA factory in town - no trace."*

Greenmill Lane, Portlaoise

*"Checked around top of street in drains etc. - no trace. Smell in town is from ENVA factory in Industrial estate."*

Main Street, Portlaoise

*"Checked around no., checked both sides up along roadway, continued up along estate and got no readings. Smell in area from ENVA factory near by. - no trace"*

Coote Street, Portlaoise

*"Customer reporting smell at foot path, checked both sides of property in drains, ducts etc - no trace. Smell coming from ENVA factory in estate"*

Coote Street, Portlaoise

*"Checked car park, checked meter bank - no trace. Smell from ENVA factory in town"*

Stradbally Road, Portlaoise

*"Checked along street in drains, ducts etc. - no trace. Smell in area from ENVA factory"*

Grattan Street, Portlaoise

*"No Nat gas in area. No propane on site. Smell from ENVA factory"*

Clonminam Business Park, Portlaoise

*"Checked along footpath, checked drains, water blocks, ESB ducts etc - checked meter here and both sides also - no trace. Smell from ENVA factory in town"*

Maryborough Village, Portlaoise

*"Smell due to factory. Suspect ENVA"*

Knockmay, Portlaoise

*"Checked area where smell was reported, checked outside along building line in ducts, drains etc - no trace. Smell in area from ENVA factory across the road"*

IDA Business and Technical Park, Portlaoise

*"Checked along road in drains, manholes, telecom ducts, ESB ducts etc - no trace. Strong smell in area from ENVA factory which is just around the corner from this location"*

Portlaoise

A potentially very dangerous situation has now developed with reporting fatigue. Many resident and workers no longer report gas like smells due to the emissions from ENVA.

## 2.8 ENVA responds to Complaints

Over the past 18 years, ENVA management have consistently refuted, dismissed, or have been unable to detect an odour, or odour nuisance for nearly ever complaint. This includes refuting odours detected by independent odour inspectors commissioned by the EPA that resulted in a non compliance. A small sample to illustrate this approach and strategy to complaints include:

*"...pointed out that he could not get any odour at the time of the visit...employees live on either side...and have not detected this odour on any occasion thus far."*

2nd February, 2000

*"...visited the complainants house at 7:00pm...no odour was detectable"*

31st July, 2011

*"As a result ENVA must dispute the non-conformance issued and feel strongly that the odour detected by the inspector on the day was not being generated by ENVA. As outlined ENVA are not satisfied with*

*the conclusions of the report and in particular strongly dispute the basis on which a formal non-compliance has now being issued by the agency...ENVA have made continued and sincere efforts to objectively assess reported odours in the area and are very concerned at what we believe to be a very tenuous observation"*

8th, November 2011

*"At no point was an odour detected"*

7th October, 2011

*"...no odour was detected on investigation at any of these locations"*

17th February, 2012

*"No odours attributed to ENVA activities were detected in these locations"*

18th February, 2012

*"No odours were noted at any of the inspection locations"*

11th May, 2012

*"Intermittent hydrocarbon odours were detected but were not considered a nuisance."*

31st, July, 2015

*"There were faint hydrocarbon odours detected however they were not deemed by the assessors as being a nuisance "*

8th, August, 2015

*"No hydrocarbon odours were detected "*

9th, August, 2015

*"a faint to moderate hydrocarbon odour was detected but was not considered to be a nuisance "*

18th, August, 2015

*"There was no nuisance odour detected."*

21st, August, 2015

*"The odour survey detected findings similar to the previous assessments carried out earlier in the day and not considered to be a nuisance"*

21st, August, 2015

*"While the odour surveys carried out by ENVA that day detected low level odours downwind, these were determined not to constitute a nuisance odour."*

7th, January, 2016

*"There were no odours detected which were attributable to site activities"*

4th, February, 2016

*"There were no significant odours detected"*

16th, February, 2016

*"Faint sporadic odours were detected however these were not noted to be significant or constitute a nuisance"*

8th, March, 2016

*"There were no odours detected during the surveys which were attributable to ENVAs activities"*

9th, March, 2016

These responses continue *ad nauseam*. However, ENVA have been very successful in identifying odours in their odour assessments reports from other sources beside the facility. These sources include the Glanbia Gain factory, Irish Rail, local farmers, road paving, chimney smoke etc.

## 2.9 Hydrocarbon Odours

In 2000, following odour complaints, consultants were commissioned by ENVA. An extreme worst case scenario was modeled. It assumed all the tanks were emitting at maximum capacity together, and that all the emissions were made up of the most odorous component, Xylene. This compound is still the most odorous component yet measured from the plant, including recent data. The predictions indicated that it was not even theoretically possible to detect an odour outside the plant boundaries.

The accepted odour threshold of xylene is approximately 2 mg/m<sup>3</sup>. This was used by the consultants commissioned by ENVA at the time. At the residence where odour were detected, the model indicated it would be only 2 percent of the odour threshold...i.e the concentrations would have to be 50 times the levels at that residence to be even barely detectable. Yet at that residence, complaints of strong odours were reported.

In an internal EPA email on the 10th April, 2014, a question was answered by the EPA from a journalist "Has the odour been found to contain chemicals?"

The reply was "Odours are odorous because they contain compounds which have a low odour threshold. Some compounds have a lower odour threshold than others. Hydrocarbons in the emissions from ENVA will contain potentially odorous compounds but at low levels and will not result in an odour impact"

Yet independent odour inspectors, and EPA Inspectors describe the odour in odour surveys as a "hydrocarbon" odour, in some cases at a very high level of intensity.

This brings into question whether this is simply an odour issue caused by innocuous odorous compounds or are the levels of hydrocarbons being emitted into the air so high that they are causing an odour impact? This is of concern, due to the numerous health effects associated with hydrocarbons. The question must be asked in the context of an objection as to what exactly is being emitted from the tanks at ENVA?

## 2.10 Emissions from Tanks 32, 24 and 25

Waste oil is designated as Hazardous Waste as it contains a cocktail of dangerous and regulated chemicals. In order to remove water from the waste oil, ENVA heated it to 102 °C in tanks 32, 24 and 25 in their tank farm. They refer to these tanks as "drying tanks". During the process they pump additional compressed air through the tank. The tanks had direct open vents

into the atmosphere, with the nearest residential house approximately 150 meters away. Footage of the emissions can be viewed in the Primetime documentary on youtube called "Whats in the air in Portlaoise? A Primetime Investigation" A number of measurement have been made from these tanks.

#### 2.10.1 1996 Measurements

Two years before the company applied for a licence from the EPA, the state agency Forbairt was commissioned by the company to carry out measurements of the emissions from the drying tanks. These measurements were undertaken at the full operating temperature. Atmospheric Dispersion modeling was carried out from the data and the impact at ground level was calculated. In the licence application to the EPA in 1999, this data is referred to:

*"An air dispersion modeling study undertaken in 1996 is being reviewed at present with a view to making recommendations for further monitoring and modeling"*

- Atlas Oil, 18th June 1999

After receiving the application, the EPA requested the 1996 data.

*"Question 12 Emissions to the atmosphere: Provide a copy of the Air Dispersion modelling referred to in the Attachment 12C of the application."*

- EPA

The data was never submitted to the EPA. ENVA have since claimed to have "lost" the data.

#### 2.10.2 1999 Measurements

Instead of submitting the 1996 data, the company repeated the measurements of the tanks. It is important to understand that the maximum emissions will occur when the tanks reach the maximum temperature. In a similar analogy to a kettle with water, little or no steam will be emitted when the water is at 25 °C, but quite a lot when it reaches 100 °C.

In July and August of that year, leading consultants were commissioned by the company to undertake measurements from the tanks, and to model the effects at ground level. The results of the measurements found the emissions from the tanks were massively breaching the allowed limits, and modeling at ground level showed breaches of the maximum permitted levels. The chemicals included Benzene, and Volatile Organic Compounds.

This data would have had serious consequences for the granting of a licence, and the future of the company.

The company decided to repeat the measurements again, and again. The final report deemed the emissions from the tanks to be within the guidelines, and the modeling of ground levels concentrations of chemicals to be within acceptable limits.

The problem with the measurements is that the majority were done at low temperatures of less than 25 °C. The only measurement done at the highest temperature, along with the only time that air was being pumped into the tank was deemed an error.

The final report calculated the amount being emitted from the tanks, referred to as the "mass emission". The figure was calculated based on the

average concentration, along with one of the lowest flow rates, and deemed to be the "worse case scenario". The EPA granted the licence based on this data.

#### 2.10.3 2003 Review

The company's licence was reviewed in 2003, in a similar fashion to the current review that is being undertaken. ENVA submitted only the worst data from the August 1999 report, showing massive breaches of permitted standards. The ground level calculations from this data showed residential areas being subjected to greater than  $10 \text{ mg/m}^3$  concentrations of volatile organic compounds. This would have a significant odour impact on residential areas, and based on the scientific literature these levels would have the potential to result in harm on human health. This was the only data submitted in the application and the EPA granted the licence.

To further put the breaches in perspective, the maximum concentration of permitted Volatile Organic Compounds (VOCs) allowed in waste gas is  $50 \text{ mg/m}^3$  from the chimneys at the top of the tanks. ENVA has measured concentrations in excess of  $7000 \text{ mg/m}^3$  from the chimneys on the drying tanks. The maximum levels of Benzene allowed is  $1 \text{ mg/m}^3$ . ENVA has measured concentrations of Benzene at  $120 \text{ mg/m}^3$ .

#### 2.10.4 2012 Measurements

Following numerous complaints from residents, the tanks were measured again by consultants in 2012. The temperature at which the tanks were operating at was not measured. The flow rate at the time was so low they were unable to measure it with their instruments. They did however measure the concentration of VOCs again with levels massively breaching permitted standards. The levels recorded were at  $3456 \text{ mg/m}^3$  and  $3928 \text{ mg/m}^3$ , up to 80 times the maximum permitted levels of  $50 \text{ mg/m}^3$ . The levels in fact were so high the carbon measurement tubes became clogged with volatile organic compounds within 30 minutes.

#### 2.10.5 2015 Interim Report

At the request of the Minister of the Environment, review of the measurements and data by the EPA in 2015 found

*"There is currently no requirements to place any further mandatory controls or monitoring requirements on the emissions from ENVA Ireland Ltd., Portlaoise."*

- EPA Interim Report

Yet 7 months later, ENVA were convicted in court of causing odour nuisances during the summer of 2015.

#### 2.10.6 2016 Licence Review

Less than 6 weeks after the criminal conviction of ENVA, and three weeks after the broadcast of the Primetime Program, the EPA initiated a licence review and requested ENVA to measure the emissions from the drying tanks. ENVA have declined to do so, have removed numerous chimneys and sealed the vents of the tanks. This data is critical as it would have shown the full

extent that residential areas were exposed to, and would be invaluable going forward is assessing the load on the proposed thermal oxidiser and the constituents from the tanks and flow rates.

#### 2.11 Modeling of tanks 32, 24 and 25

The EPA undertook modeling of the tanks in 2012 to estimate the emissions. They employed two methods; the US-EPA tanks model and the Envirolex Methodology

##### 2.11.1 US-EPA Tanks model

The US-EPA tanks model is a passive model of estimating emissions from oil storage tanks. Employing this model to the ENVA drying tanks is utterly invalid, as ENVA pump compressed air through the tanks.

Even leaving aside that critical argument, what transpired was questionable. Again the temperature of the tanks is critical, with the amount of volatile organic compounds emitted dependent on the temperature. When ENVA undertook the modeling, they employed a temperature of 48°C, which showed the emissions from one tank to be 0.366 kg/hr, just below the maximum limit of 0.50 kg/hr. However this is not the maximum temperature of the tanks, which are heated to 102°C. Re-modeling with only a small increase in temperature breaches the maximum limits. The EPA were aware of these calculations.

Either way the US-EPA tanks model should never have been employed as it is a passive model, and crude oil does not contain the same constituents as waste oil.

##### 2.11.2 Envirolex Method

The Envirolex report was compiled in association with the Oil Recycling Association and is not a peer reviewed report. The report contains measurements of the emissions from waste oil recycling plants in 2006, and the recorded temperature at which the measurements were taken. The emissions from these plants were passive, with no air being pumped through the tank, and it is therefore invalid to be used to calculate the emissions from ENVA's drying tanks.

The application of whole Envirolex methodology is deeply flawed. First, the model is passive and should never have been used. Secondly, the report considers only 16 measured compounds. This would be a small fraction of the total VOCs emitted from the plant. Thirdly, the method used a bizarre assumption that the emissions from the tanks are directly proportional to the volume of oil. This is not correct. Emissions would be proportional to the surface area in the tanks, not the volume.

However, the Envirolex model does contain useful data on the concentration of key regulated chemicals being emitted from heating oil at 70°C, and 90°C.

Comparing these levels of emissions to International standards TA LUFT 5.2.7.1 – Carcinogenic, Mutagenic or Reproduction Toxic Substances: Benzene, a Class III listed carcinogen, is recorded in the report at a concentration of 145 mg/m<sup>3</sup> at 70°C from the waste oil tanks, 145 times the 1 mg/m<sup>3</sup> TA Luft limits. At 90 Celsius abated, it is reported at 269 mg/m<sup>3</sup>, 269 times the TA Luft limits.

Process tank 70°C unabated		Process tank 80°C unabated		Process tank 80°C abated	
Compound	Concentration (mg/m <sup>3</sup> )	Compound	Concentration (mg/m <sup>3</sup> )	Compound	Concentration (mg/m <sup>3</sup> )
toluene	1050	toluene	506	toluene	999
pentane	414	hexane	305	pentane	569
pentene	352	pentane	192	hexene	528
m & p xylene	238	heptane	164	dichloromethane	434
methylbutane	197	pentene	157	benzene *	269
dichloromethane	164	dichloromethane	128	m & p xylene	233
benzene *	145	methylpentane	122	heptane	198
heptane	140	hexane	127	methylpentane	163
hexane	124	benzene *	102	hexane	153
o xylene	114	methylbutane	81.5	cycloheptane	130
hexane	103	cycloheptane	83.2	pentene	110
butane	99	butane	58.7	o xylene	107
methylhexane	84.7	heptane	67.7	heptane	68.5
methylpentane	78.2	butane	55	methylhexane	68.5
butene	50.6	methylhexane	48.9	cyclooctane	20.8
release rate for top 15 VOCs (g/h)		release rate for top 15 VOCs (g/h)		release rate for top 15 VOCs (g/h)	
water	9000	water	352000	water	18000
Ammonia	0.2	Ammonia	446.5	Ammonia	0.3
H2S	0.01	H2S	0.12	H2S	0.18
PAH	<0.17	PAH total	3.72	PAH	<0.17

(a) Concentration Data

Figure 1: Envirolex Report

Dichloromethane (i.e Methylene Chloride), a Class 1 listed organic, is reported at a concentration of 164 mg/m<sup>3</sup> at 70 °C, 8 times the 20 mg/m<sup>3</sup> TA Luft limits. At 90 °C abated, it is reported at 434 mg/m<sup>3</sup>, 20 times the TA Luft limits.

Ammonia, a Class III listed inorganic substance, is reported at a concentration of 446.5 mg/m<sup>3</sup> at 90 Celsius, 15 times the 30 mg/m<sup>3</sup> TA Luft limits.

Polycyclic Aromatic Hydrocarbon concentrations are reported at 3.72 mg/m<sup>3</sup>. The breakdown is not given, yet the mass concentration limit of benzo(a)pyrene, a component of PAHs in waste oil and a Class I carcinogen, is set by TA Luft at 0.05 mg/m<sup>3</sup>.

All of the above levels are the concentrations from one tank. ENVA heated tanks 24, 25 and 32 to temperatures far higher than the data collected above. ENVA heated tanks 13, 14, 15, 16, 22 and 26 to temperatures between 70 and 80 °C and tanks 18, 19, 7 and 8 to temperatures of 80 °C. All of these tanks had either vents or chimneys. The nearest residential area is 150 meters away.

## 2.12 Mass Balance

Mass balance is a method often used in environmental engineering to calculate where a certain pollutant goes. What goes in, must come out. For example in the Envirolex report in 2006, Benzene was measured across all oil samples at 70 part per million or lower. Another dangerous carcinogen Benzo-a-pyrene was measured at 25 parts per million. ENVA processes approximately 20,000 tonnes of waste oil, and this equates to 1.4 tonnes of Benzene, and 0.5 tonnes of Benzo-a-pyrene. For Benzene, that works out at approximately 30 kg per week being boiled in ENVA's processing tanks which had open vents. The boiling point of Benzene is 80 Celsius and most of the processing tanks are heated to or well above this temperature. This will result in a significant amount of Benzene being released into the atmosphere in a relatively short period of time at the beginning of the process when the tanks reach their maximum temperature.

## 2.13 Inverse Atmospheric Dispersion Modeling

Given the known ground level measurements that were monitored downwind of ENVA, it is possible to work out the source emission from the



facility using a method called Inverse Atmospheric Dispersion Modeling. For example an approximate  $10 \mu\text{g}/\text{m}^3$  level concentration of benzene at ground level 150 meters from the tanks requires a source emission from the facility in excess of 0.2 Kg of Benzene per hour emitted from the tank farm. It is noted that the August 1999 modeling data commissioned by the company predicted a maximum concentration, approximately 150 meters meters away of  $12.1 \mu\text{g}/\text{m}^3$  from a source emission from the facility of 0.234 kg/hr of Benzene. This is a significant emission of Benzene and is worth considering when reviewing the ground level emissions.

#### 2.14 Ground level Measurements

Most licensing of facilities are based on what is measured being emitted at source, rather than downwind at ground levels. This has to do with the fact of the inherent difficulty of ground level measurements, including the wind direction has to be exactly downwind to the measuring device at the same time as processing. This is difficult as most health reference levels are one hour and wind can be quite variable over that hour, and only briefly pass through the measuring device, if at all. This is complicated with ENVA as they only process drying tanks 10 to 30 hours per week, so the wind has to be blowing the exact direction to the monitoring station at that time.

The EPA undertook measurements 2.3 km downwind from ENVA over a 4 month period in 2014. The results concluded that the levels were safe at that location. The problem with this method is that measuring at such a distance from the plant, 2.3 km, any potential concentrations of chemicals from the plant would be so dispersed as to be minuscule. Even if such a correlation of minuscule measurements to the plant was made, at such a distance other closer facilities in the path downwind of the monitoring station would throw any results into dispute.

In March 2015 the EPA have set up a monitoring station 150 meters from the processing tanks. It is important to note that the maximum ground levels will be reached before 150 meters under all Pasquill-Guilford dispersion parameters. The maximum levels at ground level will be reached between 50m to 90m from a tank height of 10 meters with a Pasquill stability class from A to C. It is therefore important when interpreting the measured ground level data that they are not the maximum ground level concentrations, but only a measure of the concentration at the point of the monitoring station. Areas closer to the tanks but outside the boundary of the facility will have higher ground level concentrations. This is important due to the close proximity of neighbouring businesses closer than 150m to ENVA.

They are measuring 4 chemicals referred to as BTEX, Benzene Toluene, Ethylbenzene and Xylene. The EPA sets out clear guidance in AG4 as to the reference standards to be used in comparing results. An extract from the EPA's guidance in AG4, which is considered best practice states:

*"The most stringent European guideline / limit value from the sources outlined below should be referenced when determining compliance in the absence of the applicable EU ambient air quality standard"*

The guidance then lists at the very top the Danish-C values from the Danish EPA's Environmental Guidelines, followed secondly by Instructions on Air Quality Control - TA Luft from the German Federal Ministry for the Environment. The Interim Report published by the EPA does not reference these levels when comparing BTEX measurements.

There are many other issues regarding the data that is published in the Interim Report by the EPA. For example, the highest recorded levels of Benzene by the EPA in analysis are dismissed as "interference peaks". An example from the 20th June, 2015, when the wind was blowing from Portlaoise past the monitoring station towards ENVA. The monitoring station was recording minimal background levels of Benzene at  $0.13 \mu\text{g}/\text{m}^3$ . At approximately 11am, the wind changed direction 180 degrees and started blowing from ENVA towards the monitoring station. At that moment and over the next few hours, the levels of Benzene were recorded at approximately  $33 \mu\text{g}/\text{m}^3$ . All these levels are deleted in the analysis by the EPA. During the preceding 24 hour period, 18 complaints were received by Gas Networks, and their engineers traced the odours back to ENVA.

In the EPA's Interim Report it is still not even theoretically possible to detect an odour with the maximum levels of VOCs published. This conflicts with odour assessments that describe strong hydrocarbon odours. The data from the interim report would have to be multiplied by a least a factor of 20 to be even barely detectable as an odour.

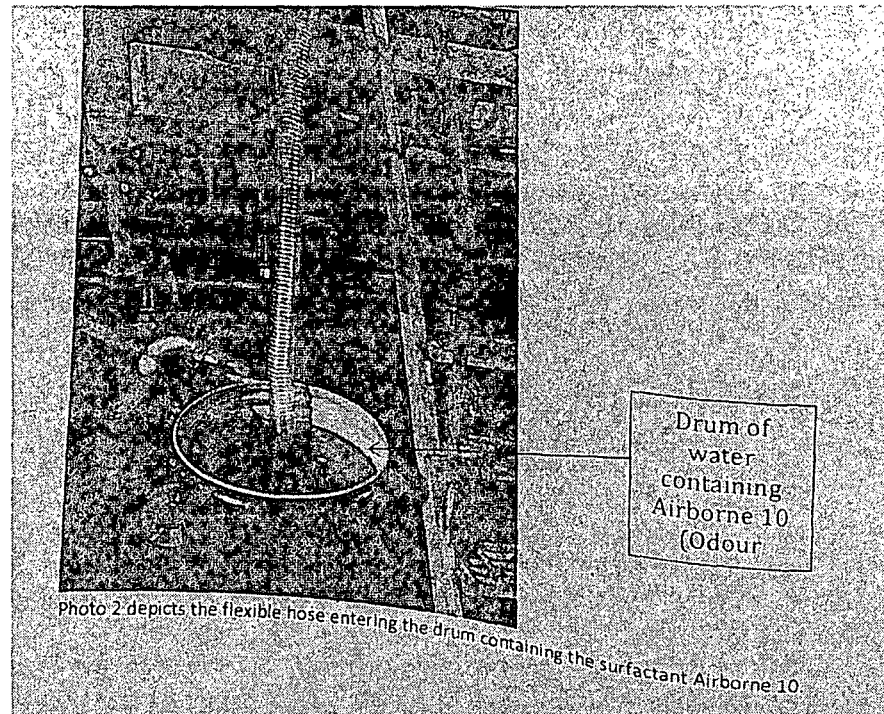
What the EPA are not measuring are the total levels of VOCs at ground level. Total VOCs are a complex mixture of specific compounds and over 300 have been identified in outdoor air. There is limited toxicological data available for many of these compounds. The measured levels of BTEX are only a tiny fraction of the VOCs that are being emitted from ENVA. The immission limit as set by TA Luft for total VOCs at ground level is  $1000 \mu\text{g}/\text{m}^3$ . Health effects to total VOCs have been noted in the scientific literature with effects starting at between  $3000 \mu\text{g}/\text{m}^3$  to  $5000 \mu\text{g}/\text{m}^3$ . These include irritation of the nose, throat, and headaches.

It is also stated that the levels of VOCs at ground level have dropped by 50 percent, inferred due to methods employed by ENVA to reduce emissions. But the monitoring station is now twice the distance from ENVA. According to atmospheric dispersion modeling, if you double the distance the concentrations will approximately be halved.

There are other issues in the ground level assessment of emissions from the plant as published in the EPA Interim Report that are questionable. For example "Minor mass flows" for Benzene of  $0.05 \text{ kg}/\text{hr}$ . This minor mass flow is pursuant to TA Luft section 5.5, which is based on 2 criteria; "Stacks shall have a minimum height of 10 m above ground level and project 3 m, as a minimum, above the ridge of the roof." ENVA do not meet the criteria, and therefore 10 percent of this value is to be used, and a detailed impact assessment of the emissions is required as part of the permit application.

#### 2.15 Thermal Oxidiser

The current review was triggered by the ENVA proposal to install a thermal oxidiser to deal with "odours", and what would be a new emission point. Point source emissions are defined in the EU BREF on Waste Treatment Industries on page 452 as "Point source emissions relate to those emissions that result from the collection of gas from a vessel or area and that are passed on, either via abatement or directly, to a stack or vent". Correspondence of the 7th May, 2013 from ENVA to the EPA lists 23 processing tanks with vents or chimneys from heated waste oil processing tanks. None of these 23 emission points were regulated. In 2016, without approval, they vented and ducted these emissions from the top of the tanks to ground level into what is described as an "abatement" system.



(a) Vents from tanks ducted into a dustbin

Figure 2: Abatement system

The vents were ducted into a dustbin containing chemicals to mask the odour. When evaluating this system, it is worth bearing in mind 1) the concentrations in the 1999 data measured from the tanks at low temperatures, with no compressed air 2) the data from the envirolex report and 3) the concentrations of VOCs measured in 2013. Even the abatement system in the envirolex report does not deliver anything close to the alleged performance of the dustbin abatement system employed by ENVA. This method and the data requires full investigation.

### 3 GROUNDS FOR OBJECTION

There are numerous points that together form an objection to this licence.

- The Minister of the Environment has ordered a report on this facility over 2 and a half years ago that has still not been completed. This was on foot of serious concerns raised by numerous elected members in the Seanad. It is premature for the board of the EPA to consider and grant a licence to this facility until a full and final report has been submitted to the Minister of the Environment for his consideration.
- There is an appeal currently before the Commissioner for Environmental Information regarding key documents relating to ENVA that were refused to be released by the EPA under Access to Environmental Information. The Environmental Information contained in these documents would have to be assessed in the context of submissions and objections to the granting of this licence. It is therefore prema-

ture to grant a licence before the decision of the Commissioner for Environmental Information:

- At the heart of the Primetime Investigation was the emissions from the drying tanks. There is an astonishing point in the submission from ENVA regarding the drying tanks. After the proposed submission to install an abatement system, the EPA requested measurements from the drying tanks. ENVA declined as they stated they would be no longer using this method, and would propose installing a new flash distillation system instead. Then later in September they contradict this and state they may employ the original drying tanks method. But they have not taken any measurements.

- The decision making process engaged by the EPA in the licence review has been flawed.

Firstly, the EPA informed members of the public orally that submissions would be accepted until the proposed determination date of the 6th January, 2017. This date was subsequently brought forward without notice.

Secondly, notice was given to members of the public who made submissions regarding the Appropriate Assessment issued on the 11th October. However the EPA omitted to give notice of this fact to other members of the public who made submissions.

Thirdly, after the publication of the Natura Impact statement on the EPA website on the 14th November 2016, the Inspector's report and the assessment of submissions was completed on the 24th November. This was insufficient time for members of the public to read, digest, formulate and make submissions on the key Natura Impact statement for consideration by the EPA. This was also done under the umbrella of an unknown time frame, which in this case turned out to be 7 working days.

- All the Atmospheric Dispersion modeling undertaken by ENVA in their submission is flawed. One of the nearest residential receptor is Oak Park, where a family continue to live. In the 1999 modeling, this was considered the nearest residential receptor, but is completely omitted in the current modeling. The family at this location describe highly offensive odours, headaches and having to leave their home at times from the emissions from ENVA.

- There are very serious issues with the monitoring of emissions from various heated tanks in the submission by ENVA, which are claimed to be than  $1 \text{ mg/m}^3$  of VOC concentration after ENVA's dustbin and barrel abatement system. Even the abatement systems employed in the Envirolex system does not achieve anything close to this level of abatement. AG2 guidance as published by the EPA sets out clear procedures for monitoring emissions, including 30 minute measuring intervals etc. Where in the process cycle, exact temperature of the tanks etc are not described, only vague numbers. Critically, the oil feedstock of whether this was ship oil, crankcase oil etc was not documented, which tanks were operating etc. Are these spot measurements with a Photo-Ionisation Detector in the vicinity of the dustbins and barrels, or have proper 30 minute measurements been undertaken in accordance

with EN:12619:2013 as per AG2? This hints strongly at the former given the results presented.

This point is reinforced by a letter of the 5th April, 2016<sup>2</sup> which described the emission monitoring undertaken by ENVA of heated tanks, oil storage tanks and oil filtration plant, all showing less than 1 ppm of total VOCs. These were all taken with a handheld device "supplemented by sensory assessment". The Oil filtration plant at an extraction rate of 2,300 m<sup>3</sup>/hr was measured at less than 1 ppm of VOC, yet this is contradicted in a later submission with measurements from the Oil extraction plant at an extraction rate of 2,220 m<sup>3</sup>/hr by Axis Environmental which show concentrations of 42.7 mg/m<sup>3</sup>. If this is the case, the data presented greatly underestimates the concentration of emissions from the tanks, compliance with BAT 41, and further assumptions that are made in later assessments.

All these measurements need to be repeated properly, and under supervision from the EPA.

- In the new licence, the decision of the EPA is flawed to permit ENVA to heat waste oil to 30 Celsius with air sparging. There are no measurements of the resulting emissions from this process in the submission made by ENVA, only assumptions
- ENVA during the licencing review installed without permission a dustbin and barrel type abatement system, bringing the emissions from a height of 10 meters to ground level. This was done without any approval by the EPA.
- The treatment of waste water from the facility with hydrogen peroxide etc has been demonstrated to be unsuccessful in stopping highly offensive mercaptan gas type odours from the plant. Leaving aside an odour nuisance issue from offensive mercaptans, as outlined previously this is a potentially dangerous situation as reporting fatigue is rampant from residents and workers. There is a real and significant danger that genuine gas leaks may not be reported.
- Other facilities that recycle waste oil have resulted in multiple fatalities from accidents. An example would be the Hub Oil facility that resulted in a massive explosion. The accident resulted from a simple blocked valve in the waste oil process, which resulted in a crack developing in the heated oil tank. It is questionable why this type of activity of heating waste oil to high temperatures should be permitted in such close proximity of neighbouring business and residential areas. There is no risk assessment of this scenario made in the submissions to the EPA.
- In the event of a bypass of the RTO, there is little or no backup systems employed in the proposal by ENVA except a carbon filter. This is not sufficient to enable protection of the environment in the event of a bypass.
- The EPA has allowed a 3 month testing period of the new proposed system. Given the history of odour nuisances from the facility, this experimental period has a high potential to yet again subject residents to further nuisance and affect ambient air quality.

<sup>2</sup> <https://goo.gl/5eyxRV>

- The precise make up of the odour masking chemicals emitted into the air from ENVA are unknown, as they are hidden by proprietary formulas. These chemicals are used to block and mask offensive odours emanating from the facility. These odour masking chemicals could have a potential adverse effect on sensitive members of the public with such conditions as asthma. No analysis or assessment is contained in the submissions by ENVA.
- This review was triggered by ENVA requesting to install a RTO. Earlier in 2015, an initial abatement system was drawn up, and abandoned. Another system was drawn up, and abandoned. A third abatement system is now proposed. After the EPA reviewed the initial proposal, the EPA requested ENVA to measure the tanks. ENVA yet again changed their in the proposal and stated that they would not be continuing with the existing system, but would install a new process of flash distillation. Given the indecisiveness and piecemeal approach to abatement so far, it is difficult to have confidence whether this proposal is genuine, or whether yet again ENVA will change their mind with a new proposal or process change. Either way the permitted 12 month period allowed by to install the new RTO is too long, and processing of waste oil should be suspended until proper abatement system is installed.
- Given the lack of measurements of the constituent from waste oil from either the drying tanks, or the new flash distillation unit, it is flawed to assume that the RTO will be capable to deal with the load. If measurements were undertaken of the drying tanks, it would have at least given a starting point to assess the impact and load on the proposed RTO. An example of this point is the Envirolex data where the concentrations of Trichloroethylene, a chlorinated solvent, was measured at a concentration of 372 mg/m<sup>3</sup> in the waste stream. There is a real potential to create dangerous Polychlorinated dibenzodioxins from chlorinated solvents entering into the RTO.
- The EPA have placed residents and members of the public on the horns of a dilemma. As outlined by the licencing department, if the new licence is refused, ENVA get to keep their original licence. Therefore any successful objection to refusing the licence will return the facility to the status-quo, which is very unsatisfactory. There are strong grounds that the current licence is invalid as it is based on inaccurate data, insufficient data, and withheld data. Furthermore complaints clearly demonstrate on-going nuisance, and harm on human health.
- There is a paradox between the board of the EPA granting a new licence, and yet the the EPA's compliance investigation in relation to the plant remains open. It is flawed to grant a licence while the current investigation is still open and has not concluded.
- Both residents and Irish rail have described significant dust coming from the facility, covering cars and equipment. Given the soil treatment facility contains hazardous waste in the form of contaminated soil, there is a serious threat to human health of inhaling the contaminated particulate matter. As described in the inspectors report, written information provided by ENVA stated that the building was fully enclosed, when it was not. Class of activity 11.2'(a), 11.2(b) and 11.4(a)(ii)

must be objected to as ENVA have misled the EPA in the licencing review and failed demonstrate the ability to eliminate the risk of dust from the contaminated soil.

- "Our drivers are trained to monitor the oils proposed for collection" is stated by ENVA in the submission process. ENVA also employ a standard operating procedure on waste oil acceptance. If the content is from an approved source it is accepted and pumped into a tank at the discretion of the operations personnel. Many substances appear to be accepted on face value or by visual inspection. These procedures are unsatisfactory. There is the potential for many contaminated and dangerous substances from waste oil collection, sludges and particularly tank cleaning operations. Previous internal emails in 2013 from the EPA regarding dangerous substances state "There is no correlation between what is been dispatched from Philips to been accepted in ENVA". In the original licence in 2000, waste was separated into segregation tanks and tested before acceptance. This is no longer done. All delivers of hazardous waste should be thoroughly tested rather than relying on the judgment of the truck drivers or other operations personnel.
- According to the answer to question 11 in the submission, ENVA state the emission point A2-1 may be relocated from its current position. This would affect the results of the air dispersion modeling and the ground level concentrations at nearby residential receptors. This variable location invalidates any proper assessment of the levels at residential receptors.
- It is stated in the original submission by ENVA "Thermal oxidation can routinely deliver in excess of 95 percent reduction in the concentrations of VOC's in the exhaust airstream". Given the very high concentrations in waste gas up to  $7000 \text{ mg/m}^3$ , a 95 percent reduction would still result in a massive breach of  $20 \text{ mg/m}^3$  under BAT 41. An efficiency of 99.7 percent would still breach BAT 41. Based on available data and statements, the proposed RTO will breach proposed licence limits.
- It is stated in the submission that "carbon filters will not operate in high temperatures (>50 C) or in high moisture streams ( > 25 percent)." It further goes on to say "Carbon filters are a suitable abatement technology for gas streams containing low concentrations of organic compounds. If used to abate high concentrations (but low flow) gas streams, saturation will occur very quickly"  
 ENVA's gas streams are high concentrations, but low flow, and potentially high temperatures and moisture streams. Therefore they are unsuitable to be used in numerous emission points as described by ENVA.
- According to the submission to question 12 on BAT 41 "status of technique at installation" it is described as "in place". This is contradicted later when emission point A3-52 an A3-53 are measured at  $47 \text{ mg/m}^3$  and  $141 \text{ mg/m}^3$ , respectively and breaching BAT 41.
- Under BAT 99 in the submission, it is described as "not applicable. No significant chlorinated species are present in the waste stream." However there is no data to back up this assertion from ENVA. The only

data available is from the Envirolex report in 2006, which measured levels of chlorinated solvents in the waste stream from waste oil plant at 372 mg/m<sup>3</sup>. This is a significant amount.

- Regarding BAT 103, uneconomic reasons are given. BATNEEC, Best available Technology Not Entailing Excessive Cost, has been redundant since been replaced by BAT and economic reasons are not an excuse.
- The potential of dioxin creation is significant given the data from the Envirolex report of chlorinated solvents. Continuous monitoring of dioxins should be a condition of any RTO.
- There is no data or measurements of persistent organic pollutants from the emissions of heated waste oil tanks.
- No evidence has been given by ENVA that the RTO can process the worst case scenario loading of hydrocarbons.
- Regarding 11LS Oil product it was requested by the EPA to show that processed fuel oil contains no more contaminants (of environmental concern); and will have no greater environmental impact than the fuel oils displaced by processed fuel oil. Results of the analysis show a significant adverse impact on the air quality in the vicinity of a combustion plant.

The highest levels of VOCs from burning 11LS were measured at 0.23 Kg/hr, compared to the highest level 0.15 Kg/hr from burning gas oil. This is an increase of more than 50 percent emissions of VOC's. This 50 percent increase could potentially throw an existing plant over the TA Luft emission limit and well beyond the permitted standard.

11LS breaches the Industrial emissions limit for sulfur dioxide and is at 162 per cent in the report.

- Regarding 19LS, the report and submission claims to demonstrate that the 19LS product contains no more contaminants and will have no greater environmental impact, than the virgin heavy fuel oil that has been replaced by the 19LS. No analysis is done similar to what was undertaken with 11LS, nor any quantitatively measuring of the environmental impact. Furthermore, the study starts by making 19LS analogous to Processed Fuel Oil (PFO). The quality control parameters for PFO are then compared to typical levels detected in class G Heavy Fuel Oil (HFO) from one dataset.

The typical levels of zinc in HFO is measured at 50 mg/kg, which compares with a quality control in PFO of 300 mg/kg. Typical levels of copper are 6 mg/kg in HFO, compared to PFO quality protocol of 40 mg/kg. Fluorine HFO levels are typically 33 mg/kg, while PFO quality protocol is 150 mg/kg. Typical PCBs, Arsenic, Antimony, Cobalt, Magnesium in HFO are one fifth of PFO quality protocol. This is like comparing apples with oranges. There is no data regarding sulphur dioxide and VOCs mass emission.

The report does not demonstrate that 19LS contains no more contaminants and will have no greater environmental impact than the virgin fuel oil.



- There is no data to support that emission point A3-56 (contingency carbon filter serving the main ring) will be adequate to deal with the load when the proposed RTO is not available. ENVA have previously stated that carbon filters are unsuitable for high concentration and high temperature abatement.
- Assumptions to the load into the RTO in the document of the 6th September submission are deeply flawed. These range from using the US EPA tanks model, to assumptions of mass emissions of 0.065kg/hr of VOCs. The US EPA tanks model is invalid due to pumping of compressed, and data from 1999 show measurements of mass emissions of VOCs at 0.37 kg/hr at a mere 22 degrees Celsius without air sparging.
- With regard to the carbon filters and given by their own admission they are unsuitable for high concentration levels of VOCs, ENVA refer to shoveling the carbon out of the dustbin or barrel when needed to be replaced. This appears to be some sort of home-made DIY filters, rather than a commercially proven carbon filter system. The efficacy of the carbon filters used by ENVA must be questioned. ENVA has used carbon filters before in an attempt to reduce odour nuisance. Given the complaints, the system failed. There is no confidence that things will be any different this time.
- Despite their qualifications, the management of the facility have shown and demonstrated to be technically incapable of stopping the odour nuisance from the facility, or even find the source of it. It is questionable whether they are technically fit to hold a licence.

#### 4 CONCLUSIONS

The current licence that ENVA operates under W0184-01 should never have been granted given the insufficient data from the drying tanks. The submissions from ENVA in the new licence contain woefully insufficient, insubstantial and implausible data regarding the emissions from dozens of heated tanks containing hazardous waste oil.

There are numerous grounds outlined in this document regarding an objection to the granting of this licence. ENVA has yet to demonstrate the ability to recycle oil in an environmentally sound manner, without creating nuisance and inflicting untold misery on numerous families in their homes.

