**North Wiltshire Friends of the Earth.**

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**Northacre Renewable Energy Limited, BA13 4WE : Environmental Permit Consultation.**

 These are the comments of North Wiltshire Friends of the Earth with respect to the Environmental Permit application by Northacre Renewable Energy Limited, Westbury.

 These comments concern the atmospheric emissions, particularly particulate matter (PM) along with the calibre of filter to be installed into the incinerator’s main chimney(s) for these particulate emissions; the adequacy of the applicant’s plume ground model of these atmospheric emissions; and the location of human receptor monitoring points for these atmospheric emissions.

**Atmospheric Emissions**.

 The Environment Agency (EA) has acknowledged that it is not possible to monitor the size (diameter) of particulate emissions in sizes below 10 microns diameter (PM10) and therefore calculations of the quantity of PM emissions have to assume that these PM emissions are all of the lowest size. In other words, if total particulate emissions are estimated to be of a certainty quantity (tonnes) then all these particulate emissions must be assumed to be of the smallest size e.g. measuring 0.1 microns in diameter (PM0.1). [Source: Environment Agency internal briefing note on UKWIN article July 2018, copy attached].

 The matter to be established therefore is: what is the volume of ultrafine particles (PM0.1) that will be emitted by the NREL incinerator?  The answer to this question lies in Environment Agency advice [Ref: Pollution Inventory reporting – incineration activities guidance note (Environment Agency 2012) [https://www.gov.uk/government/publications/pollution-inventory-reporting-guidance-notes](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.gov.uk%2Fgovernment%2Fpublications%2Fpollution-inventory-reporting-guidance-notes&data=04%7C01%7CBrian.Mathew%40wiltshire.gov.uk%7Cdb2618eda7994a3f841f08d88c701042%7C5546e75e3be14813b0ff26651ea2fe19%7C0%7C0%7C637413760232192642%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=maezxzI3Iz%2Bu4xeEzD1glixo%2F2rGrE20zeN%2Fb1vLt%2FM%3D&reserved=0) ] which states that dust emissions can be assumed to be 0.022kg per tonne of incinerated waste – this is known as the ‘emissions factor’ for calculating the volume of PM emissions from new incinerators. Therefore for a plant incinerating 243,000 tonnes per annum (20/06775/WCM) the dust emissions are 0.022 kg x 243,000 = 5346 kg = 5.346 tonnes per annum.  As this is the emission volume for total particulate matter this means that, based on the assumption that all emissions must be of the smallest size (diameter), the emission to atmosphere from the NREL incinerator will be **5.346 tonnes p.a. of dust particles sized 0.1 microns and smaller**.  Also, there is the certainty that these PM0.1 micron emissions will be **toxically contaminated** due to the presence of toxic chemicals and elements both in the fuel and arising out of the combustion process [Ref: The range of toxins present in the atmospheric emissions is recorded in the NREL Environmental Statement (ES), e.g. ES Volume 1, Main Report, Summary of Dispersion Modelling Results, Table 8.16].

 Flue Gas Cleaning Systems requirements under NPPF 183 (National Planning Policy Framework) and Best Available Techniques (BAT) Reference Document for Waste Incineration, 2019 [Ref: <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/best-available-techniques-bat-reference-document-waste-incineration-industrial-emissions> ] mean the installation of ‘bag filters’, and under the BAT regulations for new incinerators (Ref: cited above) it is stated that the efficiency for bag filters is : “*Filtration efficiencies are very high across a wide range of particle sizes. At particle size below 0.1 microns efficiencies are reduced, but the fraction of these that exist in the flue-gas flow from waste incineration plants is relatively low. Low dust emissions are achieved with this technology.*”

However, although it will be observed from this BAT advice (under which NPPF 183 operates) that the requirement is for the installation of bag filters, this is counterbalanced by the assumption that all PM emissions must be of the lowest diameter because the exact volume (tonnes) for PM of different sizes cannot be measured (Ref: cited above). Thus it has to be assumed that the emissions from the NREL incinerator to atmosphere will in fact be only particles sized 0.1 microns and smaller (ultrafine particles), e.g.5.346 tonnes p.a. of dust particles sized 0.1 microns and smaller.

The only way therefore for these particulate emissions, which will be toxically contaminated, to be removed from the continuous atmospheric emissions is for **electrostatic precipitators** to be the calibre of filter to be installed at the NREL incinerator, either as a stand-alone system or in combination with bag filters. BAT regulations admit the use of this procedure (Ref: BAT Regulations cited above).

The necessity in the requirement for the installation of electrostatic precipitators is further strengthened if it is known that a/. PM0.1 emissions are seriously injurious to human health, and b/. the local population will be exposed to these ultrafine (PM0.1) emissions. We now present evidence on both of these two counts.

In the matter of whether PM0.1 emissions are seriously injurious to human health, particularly if they are toxically contaminated, the key evidence rests with the Briefing Report of Public Health England (PHE), Defra and the Local Government Association, March 2017 to Directors of Public Health where it is stated, firstly (ref. page 13) “*In 2013, the World Health Organization (WHO) published a review of 2,200 studies concluding that:*

*• Annual PM2.5 concentrations are associated with all-cause mortality to a high level of confidence, and with much greater certainty than in 2005*

*• There is no evidence of a safe level of exposure to PM or a threshold below which no adverse health effects occur. Negative health impacts have been found well below current EU & UK limits*” [Ref: Review of evidence on Health Aspects of Air Pollution – REVIHAAP: final Technical Report, World Health Organization Office for Europe, 2013 http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2013/ review-of-evidence-on-health-aspects-of-air-pollution-revihaap-project-final-technical-report].

And secondly (page 16), “*PM has the highest epidemiological link to health outcomes and is used for the Public Health Outcomes Framework indicator. At this size* ***the particles can be inhaled deep into the lungs****.* [Please note: bold emphasis in the original].

 “***The very smallest particles, ultrafine PM (the smallest fraction of PM ) 0.1*** *are nano-particles smaller than 0.1 microns and are thought, once inhaled, to be able to* ***pass directly into the bloodstream****.* [Please note: bold emphasis in the original].

[Source: Air Quality: A Briefing for Directors of Public Health, March 2017, published by PHE, Defra and LGA, see: https://www.local.gov.uk/air-quality-briefing-directors-public-health].

 Thus it is clear that PHE advice to senior health professionals that PM exposure at the 2.5 micron level is a serious health risk, and an extremely serious health risk at the 0.1 micron level. This risk is greatly enhanced if these small and ultrafine particles are toxically contaminated, as they will be in the case of an incinerator.

 Advice from Environment Agency authors in the document cited above [Environment Agency internal briefing note on UKWIN article July 2018, copy attached] states, page 2, that “PHE has also published the following position statement on the health impact of waste incineration: “*Modern, well managed incinerators make only a small contribution to local concentrations of air pollutants. It is possible that such small additions could have an impact on health but such effects, if they exist, are likely to be very small and not detectable*.” and further, page 3, that “PHE’s position is that well run and regulated modern Municipal Waste Incinerators are not a significant risk to public health. This view is based on detailed assessments of the effects of air pollutants on health and on the fact that modern and well managed Municipal Waste Incinerators make only a very small contribution to local concentrations of air pollutants.” and “For more information on PHE’s position, see: <https://www.gov.uk/government/publications/municipal-waste-incinerator-emissions-to-air-impact-on-health>”.

If one goes to this cited PHE link it is recorded that the Health Protection Agency (HPA) document of 2009 in which the PHE position is stated has been withdrawn, but reproduced in a new HPA document of the same title dated February 2010 (Ref:https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_data/file/335090/RCE-13\_for\_web\_with\_security.pdf].

 This PHE statement cited by the EA (July 2018, op. cited above) is somewhat misleading in the present context because, upon inspection, it is based on the belief that the surrounding population (i.e. in close and relatively close proximity) are not exposed to the atmospheric emissions due to their upward dispersion into the atmosphere and then wide dilution into the vast atmospheric air space, with fallout not occurring locally and when it does at very dilute levels. Yet this is not the reality at all times at Westbury. This is so for two reasons.

 The first reason is that the chimney is 75 metres high [Ref: NREL ES Dispersion Modelling Assessment, section 7.1] and that there is a residential housing at Westbury based around ‘Studland Park’ estate which is no more than 1 mile distant from the chimney and is located on the side of the ‘White Horse’ escarpment at an elevation that is the same as the top of the chimney [Ref: Ordnance Survey map, Sheet 183]. Thus when both the wind blows from the north-west to north-east quadrant (i.e. in a direction from the incinerator towards the Studland Park estate) and also the plume, due to local meteorological and topographical conditions remains horizontal rather than rising vertically, then the emissions from the chimney will enter directly at ground level into the air space of the housing estate. Thus the residents will be breathing in the very poorly diluted raw emissions from the chimney for however long this weather pattern prevails. These emissions will contain not just toxically contaminated particulates but also the full range of other gases and substances emitted.

 This situation is **not** analysed in the documents submitted to the EA by NREL in the Environmental Permit application.

 Additionally, this situation is further compounded by the fact that the Studland Park housing estate at Westbury will, as proposed in the Environmental Permit application, **not** have any routine monitoring of its air quality [Ref: NREL Dispersion Modelling Assessment, Human Sensitive Receptors, Section 4.1 Table 6 and Figure 1].

 Thus the risk to this section of the Westbury population (Studland Park estate and surrounding dwellings and their inhabitants) has been **not** been evaluated in the Environmental Permit application and will remain entirely unmonitored during the incinerator’s long-term operation.

 An additional risk of the population of Westbury being exposed to the atmospheric emissions across the full spectrum of its emissions also exists on another count. This is if the plume from the chimney, instead of rising vertically and dispersing, comes to ground – a ‘plume grounding’ event.

 Plume grounding events occur when an emission is made during a temperature inversion in the atmosphere due to local meteorological and topographical conditions, i.e. cold air trapped below warm air in a valley or alongside an escarpment – and Westbury is situated at the foot of a significantly sized escarpment. Plume grounding events used to occur from the emissions of the Blue Circle/Lafarge cement works which was situated near to the escarpment (as is the proposed NREL incinerator) from a chimney of almost identical height to that of the proposed NREL incinerator. Although not catalogued, except anecdotally, the plume grounding events from the cement works (now closed) used to occur with some regularity. There was no mistaking these events when experienced, and they occurred whether the plume was visible or invisible.

 The company behind this present Environmental Permit application (Hills Waste Solutions Limited) recorded the likelihood of plume grounding events in connection with its earlier 2018 planning application – 18/03816/WCM - to Wiltshire Council for an Advanced Thermal Treatment) incinerator at the same site (planning consent was granted but remains unimplemented ). This particular Air Quality Assessment, copy attached, stated (Section 4.4.5):

Plume grounding

Plume grounding is usually the description given when a plume can be observed to impact on the ground or elevated terrain. Plumes are usually only visible if they contain smoke, which is not the case here, or if water vapour in the plume has condensed to form a visible vapour plume.

Whether visible or not, all plumes will ground; the dispersion model used for this assessment calculates the frequency and intensity of plume grounding events to predict the resulting ground level concentrations.

The assessment of the frequency of visibility vapour plumes presented above shows that visible vapour plumes longer than 100 m will only occur for 0.5% of the year and therefore the frequency of visible plume grounding events will be significantly less than 0.5% for locations more than 100 m from the proposed facility. It should be noted that for the majority of the time when a plume is visible (e.g. 0.5% for plumes more than 100 m) the visible part of the plume will not be coming to ground and therefore there will not be a visible plume grounding event.

 The deficiency in this earlier 2018 Environmental Statement was that the analysis of the likelihood of plume grounding events was afforded no proper analysis e.g. the likelihood of the frequency, location or duration of these grounding events. Also the meteorological model used was based on weather data from RAF Lyneham, Wiltshire, which is situated over 20 miles away and experiences totally different topographical circumstances. Nevertheless the likelihood of plume grounding events was admitted by the planning applicant – although wholly unassessed in any model in the Environmental Statement which clearly should have considered local meteorological data and topographical features, and made predictions as to the likelihood of these events in terms of location, duration and frequency.

 This same range and degree of deficiencies exists in this present incinerator planning application and its Environmental Permit application. Neither the planning application nor the Environmental Permit application make any assessment of the likelihood of plume grounding of the incinerator’s atmospheric emissions e.g. no predictive model featuring location, duration and frequency of these events based on local meteorological and topographical data. Indeed, all meteorological data for this present Environmental Permit application is once again based on RAF Lyneham:

4.3.2 Meteorological data and surface characteristics

The impact of meteorological data was taken into account by using weather data from the RAF Lyneham meteorological station for the years 2015 – 2019. Lyneham is approximately 30 km to the west of the Proposed Development and is the closest and most representative meteorological station available.

The Environment Agency recommends that 5 years of data are used to take into account inter annual fluctuations in weather conditions. Wind roses for each year are presented in Figure 3 of Annex C.

[Source: Wiltshire Council present NREL planning application – 20/06775/WCM – Environmental Statement , Appendix 8.3 Emissions Modelling, section 4 titled Process Emissions Dispersion Modelling methodology, paragraph 4.3.2)

In connection with this present Environmental Permit application, the Environment Agency should note that this information cited above about the origin of meteorological data has **not**, as far as we can determine, been supplied to the Environment Agency.

 The deficiency in the provision of information with regard to plume grounding by the applicant to the Environment Agency appears to go deeper still. The only information we can determine which has been provided to the Environment Agency by the Environmental Permit applicant occurs in the ‘Environmental Statement Main Report document, Volume 1, section 8.4.41. This states:

 Plume Grounding

* 8.4.41 The plume visibility modelling can be used to predict the number of visible plumes grounding. This has shown that a visible plume is not predicted to ground under any meteorological condition. This is due to the relatively high temperature of the release ensuring the plume remains buoyant and disperses effectively in the atmosphere.

This single paragraph cited above is the total extent of the information provided by the applicant in its Environmental Permit application to the Environment Agency. There is no additional information, and the assertion made in para. 8.4.41 is wholly unsubstantiated.

Therefore it is clear to us, and we assume to the Environment Agency as well, that this Environment Permit application is accompanied by **no Plume Grounding model**. We submit that this is a serious deficiency due the scale and nature of the atmospheric emissions that will occur and the reality that plume grounding events, particularly in this locality (Westbury) are known to have occurred in the past (Westbury cement works) and are likely to occur in the future in connection with any incinerator.

 Therefore a serious health risk to the local population due to the plume grounding of atmospheric emissions is unevaluated in the Environmental Permit application.

**Conclusions:**

 We believe that we have demonstrated in this submission that:

a/. There will be a significant particulate (PM) emission from this incinerator, measuring 5.346 tonnes per annum.

b/. The particles themselves in this PM emission will be toxically contaminated by a wide range of other chemicals and elements which are present in the fuel or have been created during the combustion process.

c/. Environment Agency rules of procedure stipulate that this PM emission load has, due methodological and monitoring reasons, to assume that all these particles are 0.1 microns in diameter (PM0.1).

d/. Public Health England’s most recent advice to Directors of Public Health, endorsed by DEFRA and the Local Government Association, states that PM0.1 exposure represents a serious risk to health because, once in the lung, they can enter direct into the blood stream. This hazard is intensified if the particles are toxically coated, as these incinerator particles will be.

e/. BAT advice on the installation of filters to new incinerators recommends the installation of bag filters. These are regarded as highly efficient for larger particles, but BAT advice recognises that they are largely ineffective in removal of PM0.1. In these circumstances, electrostatic precipitators are recommended.

f/. Central to the determination of any health risk to the local population from the atmospheric emissions is whether the local population is actually exposed (will breathe) the largely undiluted emissions from the chimney. This will likely occur at the Westbury Studland Park residential estate on the Westbury escarpment, firstly, whenever the plume trajectory remains horizontal due to local weather conditions and travels on a wind coming from the north-west to north-east quadrant and, secondly, because the residential estate is at the same elevation as the top of the chimney. This situation remains wholly unassessed in the Environmental Permit application.

g/. Also central to the determination of any health risk to the whole local population from the atmospheric emissions is whether the local population is actually exposed (will breathe) the largely undiluted emissions from the chimney due to plume ground events. The Environmental Permit application supplies the Environment Agency with no data at all on this matter, and no predictive model based on local meteorological features and topographical features. Thus this serious risk to public health is wholly unassessed by the applicant.

 In summary, we believe that this Environmental Permit is deficient in a number of serious respects and therefore does not warrant approval in its present form.

Even if these deficiencies in data and models were made good with a satisfactory outcome in terms of providing the necessary validatory science, the topographical and meteorological features of the locality will always mean that the local population is likely to be exposed to both toxic contaminated PM0.1 emissions (thus warranting the installation of electrostatic precipitators as a regulatory minimum) and also the full range of other atmospheric emissions, both in a specific locality (Studland Park residential estate) and more generally due to plume grounding.

 Therefore we can see no basis for issuing the applicant with an Environmental Permit.

North Wiltshire Friends of the Earth.

4th February 2021.