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**Rose Energy Biomass Fuelled Power Plant Health
Impact Assessment with Human Health Risk
Assessment (HIA-HRA)**

HIA-HRA ADDENDUM 1

**Health Risk Assessment of the Additional
Dioxin Exposure in Breast Milk related to the
Proposed Rose Energy Biomass Fuelled
Power Plant**

FINAL

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Rose Energy Biomass Fuelled Power Plant Health Impact Assessment with Human Health Risk Assessment

HIA-HRA ADDENDUM 1:

Health Risk Assessment of the Additional Dioxin Exposure in Breast Milk related to the Proposed Rose Energy Biomass Fuelled Power Plant

Introduction

A1.1 The Health Impact Assessment (HIA) within the Environmental Statement (ES) included a quantitative health risk assessment (HRA) for human health based on the predicted emissions from the process. The values within the HRA were obtained using a well established methodology developed by the United States Environmental Protection Agency (USEPA), known as the Human Health Risk Assessment Protocol¹ (HHRAP). The QRA data was generated using IRAP-h, a validated software tool which implements HHRAP, supplied by Lakes Environmental.

A1.2 HHRAP considers a range of potential exposure pathways for human exposure to process emissions released to the atmosphere e.g. direct inhalation and ingestion of fish, water, milk, beef and locally grown produce. HHRAP has three standard exposure categories: farmers, fishers and residential, which consider both adults and children separately. The ES included a detailed listing of the risk assessment data for these six exposure categories. These six HHRAP exposure categories do not include ingestion of breast milk. The assessment of dioxins in breast milk was not included within the main assessment report for a number of reasons:

A1.3 Research studies identified in the wide-ranging literature review found that there is no elevation in dioxins in breast milk for mothers living near waste incinerators. There are also no reported cases of acute or chronic health problems to breast-feeding infants from background exposure to dioxins from waste or non-waste combustion sources.

A1.4 Though there was community concern about health impacts on children there was no specific concerns about breast feeding mentioned in the community consultations.

¹ USEPA 2006. Human Health Risk Assessment Protocol. Multimedia Planning and Permitting Division Office of Solid Waste Center for Combustion Science and Engineering

A1.5 The dioxin risks are wholly due to long term background exposures during childhood and across the whole lifetime as a child and adult. This is because of the relatively much higher background levels in air, water and soil in the area compared with the lower level of additional exposure generated by the proposed power plant. Therefore, though the breast feeding infant would be slightly more vulnerable than a young child the health risks of exposure over one year is generally less than that for the child receptor/exposure scenario which was estimated over six years. The child receptor was therefore considered to provide the more accurate assessment of the potential risks to infants and young children.

A1.6 Over 95% of the dioxins in breast milk is from background exposure of the mother through ingesting food and the body burden of dioxins associated with her body fat. The additional exposure from the facility via breast milk is therefore very small compared to this and hence the additional health risk over less than one year of breast feeding is also very small.

A1.7 Following the publication of the ES, members of the local community have expressed concern that the HRA does not report the levels of predicted dioxins in breast milk. The assessment team has therefore generated the additional data to ensure the transparency of the assessment. These data are presented in Table A1.1 attached. The Receptor Numbers in the first column are the same as the Receptor Numbers identified within the Air Quality Assessment and the Health Impact Assessment with Health Risk Assessment Main Reports.

Health risk assessment of dioxin exposure through breast milk

A1.8 Due to the short duration of breast feeding, compared to eating throughout a lifetime, the USEPA recommends using the Average Daily Dose (ADD) rather than the Lifetime Average Daily Dose (LADD), which is the ADD average over a lifetime. The USEPA also focuses solely on the potential non-cancer adverse health effects.

A1.9 There is currently no UK or USEPA target level for tolerable infant exposure similar to the adult Tolerable Daily Intake (TDI). However, the USEPA HHRAP manual suggests evaluating the health effects by comparing the additional infant exposure to US national average background levels of **60pg TEQ/kg/day** for nursing infants.² This is very near

² Chapter 2: Facility characterization. Page 2-70. Human Health Risk Assessment Protocol. USEPA. USA. 2005.

to the most recent figure for the UK where an average level of approximately **50 pg TEQ/kg/day** is identified for breast feeding infants (low=27 mean=48.9 and high=73.8pg).³

A1.10 The results of this additional assessment predict that a farmer's wife eating a proportion of local produce at Receptor 14 (Glenville) could potentially pass on to her baby the highest predicted average daily dose of **2.94 pg TEQ/kg/day** through breast milk.⁴

A1.11 Compared to the average background levels of dioxin intake in breast feeding infants (average 50 pg TEQ/kg/day) the predicted levels are small (a factor of 15 less) and therefore very unlikely to have any negative health impact on a breast-feeding baby.

Conclusion

A1.12 The above result should be seen in the context of the model predictions based on pessimistic release, dispersion and ingestion assumptions recommended by the USEPA (e.g. it assumes the worst case release will occur at all times, assumes the worst case dispersion model results and assumes a significant amount of the food consumed is from local farm raised animals and crops. In that sense the findings are very much a worst case scenario for exposure. Hence, the likely level of additional dioxin exposure from the proposed Rose Energy Power Plant will be less and hence even less likely to cause any adverse health impact on breast feeding infants.

A1.13 In relation to dioxins in breast milk the USEPA states in the HHRAP manual that: "If exposure due to the facility's emissions during the exposure duration of concern are low compared to background exposures, then the emissions aren't expected to cause an increase in noncancer effects."⁵

A1.14 This conclusion is further strengthened by the Committee on Toxicity in its statement on the SUREMilk pilot study where it concluded that: "...although intakes of dioxins and

³ Dioxins and dioxin-like-PCBs section. Page 7. Table 1. COT statement on a toxicological evaluation of chemical analyses carried out as part of a pilot study for a breast milk archive. Committee on Toxicity. England. 2004.

⁴ This is different from the main report where the model predicted Receptor 16 as the most exposed in terms of child and adult scenarios.

⁵ It is important to note that because of the short duration of breast feeding there cannot be an assessment of the cancer risks for this time period. Cancer risks have been calculated in the main report for the child scenario for each of the receptors identified. These show that the additional cancer risks to children (and adults) are so extremely small as to be effectively zero.

PCBs by breast-fed babies were higher than desirable, breast-feeding should continue to be encouraged on the basis of convincing evidence of the benefits of human milk to the overall health and development of the infant.”⁶ This was in the context of identified daily intakes of dioxins of between **46 and 125 pg TEQ/kg/day**.

⁶ Page 8. Point 34. COT statement on a toxicological evaluation of chemical analyses carried out as part of a pilot study for a breast milk archive. Committee on Toxicity. England. 2004.

Table A1.1: Summary results for the additional average daily dose due to the proposed Rose Energy Power Plant in picograms per kilogram per day (1 picogram = 0.0000000000000001 grams).

RECEPTOR NAME	SCENARIO	pg COPC/kg BW-day
No 01	farmer_adult	1.33
No 01	fisher_adult	1.29
No 01	resident_adult	0.06
No 02	farmer_adult	2.75
No 02	fisher_adult	1.34
No 02	resident_adult	0.12
No 03	farmer_adult	2.62
No 03	fisher_adult	1.33
No 03	resident_adult	0.11
No 04	farmer_adult	2.19
No 04	fisher_adult	1.32
No 04	resident_adult	0.10
No 05	farmer_adult	1.34
No 05	fisher_adult	1.29
No 05	resident_adult	0.06
No 06	farmer_adult	0.86
No 06	fisher_adult	1.27
No 06	resident_adult	0.04
No 07	farmer_adult	0.83
No 07	fisher_adult	1.27
No 07	resident_adult	0.04
No 08	farmer_adult	0.49
No 08	fisher_adult	1.25
No 08	resident_adult	0.02
No 09	farmer_adult	0.46
No 09	fisher_adult	1.25
No 09	resident_adult	0.02
No 10	farmer_adult	0.49
No 10	fisher_adult	1.25
No 10	resident_adult	0.03
No 11	farmer_adult	0.52
No 11	fisher_adult	1.25
No 11	resident_adult	0.03
No 12	farmer_adult	0.70
No 12	fisher_adult	1.26
No 12	resident_adult	0.03
No 13	farmer_adult	1.42
No 13	fisher_adult	1.30
No 13	resident_adult	0.07
No 14	farmer_adult	2.94
No 14	resident_adult	0.15
No 15	farmer_adult	0.73
No 15	fisher_adult	1.26
No 15	resident_adult	0.03
No 16	farmer_adult	2.56
No 16	fisher_adult	1.33
No 16	resident_adult	0.10
No 17	farmer_adult	2.38
No 17	fisher_adult	1.32
No 17	resident_adult	0.09
No 18	farmer_adult	1.39
No 18	fisher_adult	1.28
No 18	resident_adult	0.06
No 19	farmer_adult	0.55

RECEPTOR NAME	SCENARIO	pg COPC/kg BW-day
No 19	fisher_adult	1.25
No 19	resident_adult	0.03
No 20	farmer_adult	0.54
No 20	fisher_adult	1.25
No 20	resident_adult	0.03
No 21	farmer_adult	0.75
No 21	fisher_adult	1.26
No 21	resident_adult	0.03
No 22	farmer_adult	0.86
No 22	fisher_adult	1.26
No 22	resident_adult	0.04
No 23	farmer_adult	0.40
No 23	fisher_adult	1.25
No 23	resident_adult	0.02
No 24	farmer_adult	0.43
No 24	fisher_adult	1.25
No 24	resident_adult	0.02
No 25	farmer_adult	1.34
No 25	fisher_adult	1.28
No 25	resident_adult	0.05
No 26	farmer_adult	0.68
No 26	fisher_adult	1.26
No 26	resident_adult	0.03
No 27	farmer_adult	0.87
No 27	fisher_adult	1.26
No 27	resident_adult	0.04
No 28	farmer_adult	0.66
No 28	fisher_adult	1.25
No 28	resident_adult	0.03
No 29	farmer_adult	0.67
No 29	fisher_adult	1.25
No 29	resident_adult	0.03
No 30	farmer_adult	0.42
No 30	fisher_adult	1.24
No 30	resident_adult	0.02
No 31	farmer_adult	0.45
No 31	fisher_adult	1.24
No 31	resident_adult	0.02
No 32	farmer_adult	0.64
No 32	fisher_adult	1.26
No 32	resident_adult	0.03
No 33	farmer_adult	0.89
No 33	fisher_adult	1.27
No 33	resident_adult	0.04
No 34	farmer_adult	0.85
No 34	fisher_adult	0.04
No 34	resident_adult	0.04
No 35	farmer_adult	0.70
No 35	fisher_adult	0.03
No 35	resident_adult	0.03
No 36	farmer_adult	0.73
No 36	fisher_adult	1.26
No 36	resident_adult	0.04
No 37	farmer_adult	0.64
No 37	fisher_adult	1.26
No 37	resident_adult	0.03
No 38	farmer_adult	0.77
No 38	fisher_adult	1.26
No 38	resident_adult	0.04
No 39	farmer_adult	0.84

RECEPTOR NAME	SCENARIO	pg COPC/kg BW-day
No 39	fisher_adult	1.26
No 39	resident_adult	0.04
No 40	farmer_adult	0.77
No 40	fisher_adult	1.25
No 40	resident_adult	0.03
No 41	farmer_adult	0.73
No 41	fisher_adult	1.25
No 41	resident_adult	0.03
No 42	farmer_adult	0.76
No 42	fisher_adult	1.25
No 42	resident_adult	0.03
No 43	farmer_adult	0.54
No 43	fisher_adult	1.25
No 43	resident_adult	0.02
No 44	farmer_adult	0.60
No 44	fisher_adult	1.25
No 44	resident_adult	0.02
No 45	farmer_adult	0.26
No 45	fisher_adult	0.25
No 45	resident_adult	0.01
No 46	farmer_adult	0.56
No 46	fisher_adult	0.26
No 46	resident_adult	0.02
No 47	farmer_adult	0.44
No 47	fisher_adult	1.24
No 47	resident_adult	0.02
No 48	farmer_adult	0.50
No 48	fisher_adult	1.25
No 48	resident_adult	0.02
No 49	farmer_adult	0.83
No 49	fisher_adult	1.26
No 49	resident_adult	0.03
No 50	farmer_adult	0.86
No 50	fisher_adult	1.26
No 50	resident_adult	0.04
max		2.94