

Review of: "Regulatory Compliance of PCDD/F Emissions by a Municipal Solid Waste Incinerator: A Case Study in Sant Adrià de Besòs, Catalonia, Spain"

Federico Sisani

Potential competing interests: No potential competing interests to declare.

Overview and general recommendation:

The paper revises the PCDD/Fs emissions in different environmental compartments from an MSWI in Catalonia at different temporal moments. A main issue is the lack of description of the scientific methodology(ies) used for assessing the impacts obtained in terms of the emissions and the related human health risks. In this perspective, the present paper lacks the description of the "scientific tools" (e.g., sampling apparatus and the analytical procedure) used for assessing the emissions and the health risks. What is reported above in general affects the repeatability of the results presented in the paper. Also, a proper discussion of the results obtained is something presently missing in the paper. Finally, the text doesn't flow well and should be revised, particularly in the third paragraph.

An aspect that could help understand the functioning of the plant deals with the description of the waste composition, flue gas treatment section, and flue gas emissions at the stack. Also, the dispersion modelling of the emissions could help in understanding the deposition areas of the gaseous emissions. For example, an image of the sampling points could be inserted in the paper.

With respect to the description of the sampling apparatus and the analytical procedure used for evaluating the emissions, it could be useful to take a look at the paper of Domingo José L. et al. (2015)

(<http://dx.doi.org/10.1016/j.scitotenv.2015.03.010>). Another example that describes the materials and methods used for their analysis is Zhang B. et al. (2023) (<https://doi.org/10.1016/j.envpol.2023.121840>).

With regard to the clarity and fluidity of the text (mainly in the third paragraph), it is advised to structure the third paragraph in subparagraphs, with each one describing an aspect (for example): materials and methods used for the analysis, sampling procedure, and data analysis and results obtained. It is also advised to separate the Discussion from the Conclusions paragraph.

For what is above reported, I suggest doing a major revision of the present paper.

Major comments

It is advised to insert line numbers in the paper that has to be revised to facilitate comments for the reviewers.

Aim of the study:

The goal of the study, which consists in establishing the temporal variation in the levels of PCDD/Fs in air and soil matrices, is partially accomplished. This is principally due to the lack of a proper scientific structure of the paper in which, after the Introduction, the materials and methods used and the results of the study are described and discussed. My advice is to do a major revision of the present paper because it is not properly scientifically structured and presented.

Title:

It is not clear what the title means in relation to what is reported in the study. In fact, only one reference to regulatory compliance with the emissions limit is mentioned (Pag. 4/11). The aspect of regulatory compliance is not the main focus of the paper, and it is not discussed in a proper manner, so I would advise revising the title to avoid the mention of this aspect. A valid substitution could be “A Review of PCDD/Fs Emissions by a Municipal Solid Waste Incinerator: A Case Study in Sant Adrià de Besòs, Catalonia, Spain.”

Abstract & Keywords: In the Abstract, the work done in terms of analyzing PCDD/Fs from the incinerator in different environmental compartments is generally presented. The abstract generically presents what is done but is not properly structured in terms of presenting the methods used. Also, the Conclusion of the Abstract is not structured in a scientific way because it offers assumptions (e.g., “MSWI of Sant Adrià de Besòs could have had a negative impact...”).

For what concerns the Keywords, I advise removing Regulatory Compliance and substituting it with a more specific one. This is also due to the fact that it is not properly explained in the paper how the MSWI complies with regulatory requirements for PCDD/Fs.

Introduction:

Please be more extensive in introducing what the article presents and define better what the lack is that the present paper aims to fill or what the aim of the present paper is.

There are some definitions or judgements reported that are not scientific (as, for example, "poor management"). It would be better to describe the apparatus present in the MSWI and to avoid introducing judgements that provide a personal point of view on the MSWI management.

Materials and methods:

The case study of the MSWI is presented but could be implemented with a more specific description of the flue gas treatment section during the years to make comparisons. Is the HCl-SO₂ acid gas emission limit equipment a kind of scrubber? Is the metal emission limit equipment integrated with the scrubber?

Also, it should be reported the waste composition, the flue gas emissions at the stack, and the bottom and fly ashes during the years to correlate the results presented with the input and output materials of the MSWI.

Some comments are reported below:

- Something that is not clear is how the NATO/CCMS coefficient factors were calculated; please explain better or insert a reference.
- The analyzed samples present increases or decreases in the (I-TEQ) levels of PCDD/Fs. In general, it would be interesting to get some explanations about that (if possible) in the Discussion of the Results paragraph.
- I advise to revise the present phrase “Furthermore, it was concluded that human health risks might not be underrated and, consequently, they had to be reduced.”
- In this section, the Principal Component Analysis is used, but it is not explained how it was conducted. Please provide a description of the Materials and the methods used in general in the paper.
- Define the acronym PUF.
- The limits of the industrial and control areas are not defined. Please provide a definition.
- What's the meaning of possible “poor operations” in MSWI?
- The part related to the cancer risk is inserted without any previous explanation of the methods used for defining it; please provide the related explanations for its evaluation.
- For Figure 2, reported at Pag.6, insert the Unit of Measurement.

Results and Discussion:

I suggest splitting in two separate paragraphs the part related to the Discussion from the part related to the Conclusion.

In this paragraph, there is not a proper discussion of the results obtained in the previous sections. I advise to discuss the results by confronting the results obtained with other papers that analyze PCDD/Fs emissions in other areas next to MSWIs. Also, due to the fact that other studies were conducted on the same incinerator, these could be added in the paragraph to discuss the results obtained.

Conclusions: This section needs some adjustments because it is too vague. In fact, the phrases reported don't sum up in a proper way what is studied in the paper; e.g., “the incineration of MSW - in itself - is not a good or bad process of waste management, and it is neither safe nor unsafe,” and “However, others, such as the one analyzed here, have been experiencing too many problems, probably because of the deficient or inappropriate management of the plant.” Another main problem here is the fact that assumptions are made but these are not supported by evaluations presented in the paper, e.g., “However, others, such as the one analyzed here, have been experiencing too many problems, probably because of the deficient or inappropriate management of the plant.”

Author Contributions: It is not included but is generally suggested.