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Use Case Study - Waste sorting

Identification of articles potentially containing SVHCs in mixed plastic recyclate

Primary Actor	Waste sorting operatives in sorting facilities
Secondary Actors	Material reprocessors responsible for producing new materials from sorted waste
Existing Practice	A waste sorting operative receives a load of mixed plastics recyclate from a site such as a Local Authority Household Waste and Recycling Centre (HWRC). Received loads will be sampled, visually and prior to shredding, to determine the average composition of a load. The waste sorting operative will then sort the plastics into individual material streams, identifying any contaminants within the load. Contaminants are objects or materials that are not accepted within the material stream including additives and fillers. Sorting and sampling may be done using a mix of technology (infra-red, vision colour sensors, etc.); however it is likely to be predominantly undertaken via manual sorting using a conveyor belt[1]. The aim will be to extract contaminants, such as specific articles known to contain SVHCs, which are not accepted by secondary actors (e.g. articles containing Bisphenol A).
Challenges related to substances of (very high) concern in waste	There are a number of challenges related to the presence of SVHC within waste including health, safety, environment, regulatory and financial risks as well as practical ones. For example: • Difficulty in identifying SVHCs in mixed material streams as technology is unable to target all SVHC substances and make a distinction between each. • Analytical challenges in identifying which SVHCs could be found in a waste stream. Literature analysis can be used to determine what substances can be expected in what types of products, but this cannot be exhaustive and does not ensure that all relevant substances present in the products have been covered. • Immediate risks to personnel. • Regulatory risks if materials are accepted containing hazardous content not covered by site permits and licenses. • Confirming if the waste stream is considered hazardous and identifying all precautions and permits are in place for transportation and treatment. • Loss of income due to contamination of sorted recycled materials downstream, and due to secondary actors refusing to buy loads found to contain specific SVHC. • Risks to public and the environment as a result of SVHCs entering new products within recycled content.
Future Practice with the new database	The database will be used to identify SVHCs in both common and unusual loads of waste or recyclate. For the majority of loads received routine approaches will be in place and articles containing unacceptable levels of SVHCs will be identifiable and removable. However, the key value for the database is to deal with loads that the waste sorting operative is less familiar with (e.g. new clients or new waste types). Waste sorting operatives can use the database on two levels: 1. They can **search the database for product types or material types that represent (part of) their loads** in order to get an overview of which SVHCs can be expected in that waste stream and in which products/materials. For example, a waste sorting facility receiving a load of plastic recyclate from a new source (e.g. a new construction/demolition site) consisting of specific product types (e.g. pipes and cables) can search the database for aggregated data of which SVHCs are contained within these product types, and within which specific polymers (e.g. cadmium and phthalates in PVC pipes). They will then know which SVHCs in which polymers of this load they

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[1] National Institute for Public Health and the Environment (2016) Waste Handling and REACH. Accessed online Nov 2019 at: https://pdfs.semanticscholar.org/3ff4/a9ea143c42b032819e1142adf97b0b5e68b6.pdf

may need to test for and report to material reprocessors that they pass the sorted waste on to.

2. Using any known attributes of specific articles or products that they have identified within their waste stream (article name, product category, material type, etc.), they can **search for detailed article/product specific SVHC-information and safe use instructions**. This could help if specific articles are responsible for the presence of certain substances in the wider stream. Photographs of articles/products might help the waste sorting operative confirm that the correct article has been chosen. For example, if within the new load of plastic recyclate, a waste sorting facility might visually identify a significant amount of plastic pipes of a certain brand made from a polymer that is not typically contained in the loads they usually handle. They could search the database for the brand name and product type and confirm that they have identified the correct product in the database by looking at the photographs provided (if available). The database provides them with the material type (i.e. the polymer) and information on safe use and SVHC content for the containers, so that they know how to handle them accordingly.

This information from the database can then also be used by the waste sorting operative to:

*   Identify the concentration range of SVHC in the material and, through discussion with reprocessors, learn if this will jeopardise the quality of their supplies to reprocessors if the material remained in the load passed on to reprocessors.
*   Gather sufficient information that enables the waste sorting operative to work to identify reprocessors or waste treatment facilities that are most suited to manage the materials.
*   Share the information with reprocessors of the materials to accompany waste movement records allowing for safe use of materials.
*   Allow the waste sorting operative to confirm whether the waste material can be transported as a non-hazardous waste or whether it needs to be notified – and managed – as hazardous waste.
*   Monitor the tonnages of SVHC across time, identifying if tonnages are increasing and whether changes are required in operations to best manage the materials and anticipate R&D developments.
*   Explore opportunities to improve the quality of material streams that include SVHC by segregating, separating and managing wastes which contain SVHC.
*   Identify any operational challenges to remove target substances if markets develop or change and regulations evolve.
*   Identify cases where it is possible to dismantle and remove affected components, to allow the remainder of the article to be recycled and enter the recycling material stream.
*   Inform business cases to ensure investment in any new process technologies.
*   Liaise with the customer who provided the loads to discuss opportunities to improve the quality of future loads by reducing contamination.

Potential benefits of this use

Correct management of the SVHCs will reduce loss of income to the waste sorting operative by:

*   **Reducing the need for and improving the efficiency and effectiveness of chemical analysis**,
*   **Reducing contamination** in the load sent to reprocessors, and
*   **Mitigating potential risk to personnel and the environment** both directly on site and downstream within secondary raw materials.

It will also allow the waste sorting operative to use the database to help comply with changing regulations across sampling, segregating, reporting, transporting and managing materials. If legislation changes e.g. to demand that new wastes be separated and recycled, or that waste sorting operatives are to change how materials are managed, then the waste sorting operative can use the database to improve their understanding on how to identify, separate and safely manage the material to ensure compliance with the new regulations.   This also applies when new SVHC are identified and new substances restrictions are introduced.

Incentives and barriers for this use

Incentives:

*   The waste sorting operative will maximise potential income for mixed materials by limiting the quantities of refused materials from reprocessors due to contamination

- Confirming to customers that the waste sorting operative uses the database. This will help instil confidence among customers regarding the quality of the waste sorting operatives materials
- The database will allow waste sorting operatives to increase the material streams that they can accept due to the ability to identify and manage unacceptable SVHCs in loads
- The database will help to identify if the substances present in a stream are evolving with time and whether a waste stream has to be classified as hazardous or declassified. If the material was identified as hazardous, the waste sorting operative would be required to manage, record and transport wastes differently

Barriers:

- Waste sorting operatives may be time constrained and be unable to invest the time needed to accurately identify *each* article containing SVHCs; instead focussing only on the most predominant from visually sampling for articles known to contain SVHCs.
- There may be a lack of information in the database for waste sorting operatives to adequately identify the right articles/products.
- Waste sorting operatives indicate they have very limited resources for dismantling articles or checking on an article-by-article basis. Where despite the database dismantling certain articles is still not economically viable, the use of the database could focus on a strategic level (adjusting their management practices for certain waste streams in the future) or as an educational tool (to enhance worker safety by teaching them about products/articles of particular concern).

Presentation of information in the database to support his use

- Step by step questions that guide the user through sampling, identification and reporting of the SVHC would be advantageous – with help sections on each question.
- Waste sorting operatives have highlighted a high degree of flexibility will be needed in how the data can be searched, which could be facilitated by a 'search wizard' to allow users to save their default preferences. Contextual data (e.g. year of manufacture) will also be highly important.
- Aggregation to product category level, potentially with breakdowns by different time periods would be useful.
- Photographs of generic / non-branded articles and complex articles containing them would be beneficial to waste sorting operatives.
- Aggregation of average volume (weight) of SVHCs in a waste stream (e.g. grams of a certain substance per tonne of washing machines)

This use case is an extract of a report that has been prepared under contract ECHA/2018/338. Further background is provided in the full report.

Issued by

pp ....
Julius Kreißig

Approved by

pp ....
Caspar Corden

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