Environmental economics

Risk assessment can be defined as the procedure of collecting all obtainable information regarding the possible toxic effects of any chemical substance and examining it to decide the potential risks related to exposure to the substance. The process involves four steps: Hazard Identification, Dose-response estimation, Exposure Assessment and finally, Risk Characterization.

Hazard identification constitutes determining the qualitative characters of the possible adverse effects of the substance as well as the estimating the true implication by evaluating the potency of evidence. While for chemical contaminants this is done by assessing toxicological and epidemiological results, engineering or other disciplines are involved for other types.

The second step is Dose-Response Estimation which in essence is the process of determining the magnitude of impact of a unit dose of the contaminant substance. The relation between dosage and possibility or incidence of the potentially adverse consequence is estimated. This is possibly one of the most complex steps of the entire risk assessment process particularly due to the fact that often the potential impacts on humans have to be extrapolated from the observed results on mice, rats etc thereby engendering the possibility of estimation errors. Also, the genetic or other differences between individuals imply that the hazard may be a stronger threat to a certain part of the human population thereby reducing the possibility of effective generalization of the results.

Exposure Assessment attempts to identify the extent of human exposure to the substance given particular locations, lifestyles etc to quantify the likely doses of the substance that humans will be exposed to.

The final step is Risk Characterization where all the information gathered is

installed together to identify the possibility or risk of exposure to a specific toxic contaminant.

Phthalates are identified as a particular class of multiple-function chemicals that are used in varieties of consumer as well as personal care goodsi. Due to the limited scope of this paper we shall discuss a very recently concluded assessment of phthalates in regard to possibility of contamination and risk particularly to children exposed to toys that used the substance as softeners.

The research in late 1980s that showed that phthalates DEHP caused cancer in rodents exposed to very high doses and later another variant of phthalates known as DINP that was adopted as substitute for DEHP as softeners in toys though initially showed that it had not similar carcinogenic effects, did however cause liver damage to rodents, constitutes the first step of hazard identification in this case. It raised widespread concerns since children were exposed to these substances from toys or pacifiers and often were observed to chew these. DINP was subsequently removed from toys and research began on how risky for children possibility of damage from oral exposure to DINP present in toys was.

The hazard identification also included experiments with volunteers having to chew DINP containing PVC and then spitting out saliva as well as observing how regularly children put toys into their mouths. As part of the dose response estimation it was found that children would have to chew on toys for more than 75 minutes to incur even the slightest of damage. It was also found that children rarely put toys in their mouths for more than two minutes a day. Therefore from the perspective of exposure assessment it was found that children were not exposed enough to be contaminated. The

final step of characterization therefore identified exposure to toys including DINP to be associated with no risk for children.

However, it should be noted that different phthalate types have been observed to generate other adverse effects such as reduced sperm counts in males as well as genital abnormalities in male children borne by females exposed to certain types of phthalates. Therefore it cannot be concluded that phthalates are not harmful to humans. However, it may be safe to conclude that using DINP to soften toys is not risky for children from the perspective of oral exposure.

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