

exposure pathways for chemicals released from either the wastewater or the resulting treatment sludge. This Phase II analysis used a  $10^{-5}$  risk threshold that the Agency considers sufficiently protective of human health and the environment, and therefore uses

for a variety of regulatory determinations.

#### Comparison to Existing Waste Concentration Limits

The screening analysis compared waste concentration estimates taken

from previous modeling efforts for each of the four chemicals with applicable headworks exemption levels.

TABLE 1.—PRELIMINARY COMPARATIVE SOLVENT RISK DATA

Chemical name	Groundwater ingestion (mg/L) <sup>1</sup>	Direct inhalation <sup>2</sup> (mg/L)
benzene (c) .....	0.0027	3
2-ethoxyethanol (nc) .....	13	100,000
2-nitropropane (c) .....	N/A	0.04
1,1,2-trichloroethane (c) .....	0.0028	2

#### Footnotes:

(c) is a carcinogen, (nc) is a non-carcinogen

<sup>1</sup> Adult risk, surface impoundment,  $10^{-6}$  risk, HQ = 1 (ground water modeling screening levels from IWEM)

<sup>2</sup> Adult risk, Aerated tanks, 90% sites, 90% receptors protected, 150 m,  $10^{-6}$  risk, HQ = 0.25 (1999 Air Characteristic Study)

The Agency identified waste concentration screening estimates that would be protective of groundwater ingestion for three of the solvents (benzene, 2-ethoxyethanol, and 1,1,2-trichloroethane) from previous groundwater modeling efforts.<sup>1</sup> This comparison was conservative because it did not take into account any reductions in concentration due to treatment. For all three chemicals, the protective screening levels are lower than the existing standards for wastewaters entering treatment (*i.e.*, 1 ppm for benzene and 1,1,2-trichloroethane; and 25 ppm for 2-ethoxyethanol), indicating a need for further analysis. The Agency currently does not have sufficient information to generate an estimate of the toxicity of 2-nitropropane through ingestion, so no comparison could be made.

The Agency also has identified waste concentration estimates that would be protective of inhalation exposures to each of the four chemicals during volatilization from aerated tanks, also based on previous modeling efforts.<sup>2</sup> The numbers shown in Table 1 represent the maximum constituent concentration meeting the noted adult risk thresholds at specified receptor distances. The table shows that for three of the solvents (benzene, 2-ethoxyethanol, and 1,1,2-trichloroethane), the maximum modeled constituent level is above the exemption level proposed for these chemicals (*i.e.*, the existing standard of 1 ppm or 25 ppm was protective of this risk scenario)

and thus, is considered protective. One of the constituents, 2-NP, is still of concern for the inhalation pathway (*i.e.*, the potential standard of 1 ppm would not meet the Agency inhalation risk thresholds). Additional discussion of 2-nitropropane follows below.

#### Analysis of Treatability Data

The NRMRL treatability database provides valuable information on effluent concentrations for specific chemicals at set input levels. For the purposes of today's proposal, Agency staff searched the database for aqueous treatment technology data on full-scale industrial facilities in the chemical or petroleum refining industries that have measured levels of any one of the four solvents entering the wastewater treatment system. Data generally are summarized from government references, such as effluent guidelines development documents. Aqueous treatment technology data are available for benzene and 1,1,2-trichloroethane. Only one non-industrial aqueous treatment technology data point exists for 2-ethoxyethanol, and no data are available for 2-nitropropane. The data show that for two of the solvents (benzene and 2-ethoxyethanol), wastewater treatment generally is effective in reducing concentrations below the levels of concern. Information on how to obtain the NRMRL data can be found at <http://www.epa.gov/ORD/NRMRL/treat.htm>. Further analysis of NRMRL data as applied to industrial users of the chemicals under consideration is available in *Proposed Rule to Expand the RCRA Wastewater Treatment Exemptions for Hazardous Waste Mixtures (Headworks Exemption) in 40 CFR 261.3(a)(2)(iv) Technical Background Document* located in the public docket to today's rule.

#### Additional Human Health Risk Assessment

In the second phase, the Agency used the Chem 9/Water 9 model as an emissions source model (*i.e.*, to estimate the wastewater and sludge concentrations after each step in the wastewater treatment system) and the Industrial Waste Management Evaluation Model (IWEM) to perform a groundwater pathway risk assessment, using data from the 1997 Biennial Reporting System as input parameters.<sup>3</sup> EPA modeled wastewaters managed in both a non-aerated tank and unlined surface impoundment, and an aerated biological treatment system (which included both primary and secondary clarifier wastewater units). EPA also modeled sludges generated by wastewater treatment as managed in monofills and land farms. EPA modeled direct and indirect pathways, using chemical specific dilution and attenuation factors (DAFs) from EPA's Composite Model for Leachate Migration with Transformation Products (EPACMTP), to predict the constituent concentration at the point of human contact. Direct routes included exposure via ingestion of contaminated ground water and inhalation of vapors from showering with contaminated ground water. Indirect routes of exposure

<sup>3</sup> The 1997 BRS data were used because that was the last year to include wastewater data. EPA queried the BRS for data on F002 (for 1, 1,2-trichloroethane) and F005 (for benzene, 2-ethoxyethanol, and 2-nitropropane) at facilities which generated wastewaters or managed treatment sludges. The data from the BRS do not state which solvent is linked to a specific waste code. To screen for a "high end" exposure analysis, EPA based the input parameters on the facility that is the 90th percentile in size for the given waste code (*i.e.*, that only ten percent of the facilities are larger).

<sup>1</sup> U.S. EPA. 2002. Industrial Waste Management Evaluation Model (IWEM) Technical Background Document. Office of Solid Waste, Washington, DC. EPA530-R-02-012.

<sup>2</sup> Volume III: Revised Risk Analysis for the Air Characteristic Study: Results, EPA 530-R-99-019c, U.S. EPA, November 1999. (on CD-ROM)