November 22, 2000

MEMORANDUM FOR: RCRA Docket F-2001-WHWF-FFFFF

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Economics, Methods, and Risk Analysis Division

SUBJECT: Analysis of Chemicals in Wastes Listed for Ignitability, Corrosivity, or Reactivity

Summary

In an effort to evaluate the potential impacts from expanding the current exemption for decharactized ignitable, corrosive, or reactive (ICR) wastes to include wastes derived from wastes listed solely for ICR and subsequently decharacterized, we conducted a screening analysis to evaluate the risks from direct inhalation or direct ingestion of the waste at the Universal Treatment Standard (UTS) level.

We calculated screening-level health-based levels (HBL) for 14 chemicals and compared them to the relevant Universal Treatment Standards (UTS), when possible (eight comparisons). In all cases except one, the relevant UTS standards are much lower than the conservative health-based numbers. The HBL for the remaining chemical, n-butyl alcohol, is very close to the UTS (3.3 mg/L 90th percentile water ingestion HBL vs 5.6 mg/L wastewater UTS).

Methodology

The screening analysis consisted of generating health-based numbers for direct ingestion of waste waters and direct ingestion of contaminated soil and comparing these health-based numbers with UTS levels when available and appropriate. For this analysis, 27 constituents were identified as listed for ICR, eight of these had numerical UTS values, and seven of the eight had toxicity values in EPA's Integrated Risk Information System (IRIS). Only one constituent (acetaldehyde) had a cancer slope factor, but this chemical did not have a numerical UTS. Thus, only the potential to exceed non-cancer effects levels was evaluated. For comparison purposes, we evaluated both median and high-end intake rates from EPA's Exposure Factors Handbook.

Direct Ingestion of Waste Waters

For the direct ingestion of leachate, we used the following equation to generate the health-based number:

$$HBL = \frac{RfD * BW * AT}{IR * EF * ED}$$

where:

HBL	=	Health-based level (mg/L)
RfD	=	Oral reference dose (mg/kg-d)
BW	=	Body weight (kg)
AT	=	Averaging time, based on the exposure duration x 365 days (days)

IR	=	Ingestion rate (L/day)
EF	=	Exposure frequency (days/yr)
ED	=	Exposure duration (yrs)

This equation applied only to constituents that had both an oral reference dose and an Land Disposal Restriction (LDR) standard for waste waters in mg/L.

Direct Ingestion of Soil

For the direct ingestion of contaminated soil, we used the following equation to generate the health-based number:

$$HBL = \frac{RfD * BW * AT}{IR * 10^{-6} * EF * ED}$$

where:

HBL	=	Health-based level (mg/kg)
RfD	=	Oral reference dose (mg/kg-d)
BW	=	Body weight (kg)
AT	=	Averaging time, based on the exposure duration x 365 days (days)
IR	=	Ingestion rate (mg/day)
10^{-6}	=	Conversion factor (kg/mg)
EF	=	Exposure frequency (days/yr)
ED	=	Exposure duration (yrs)

This equation applied only to constituents that had both an oral reference dose and an Land Disposal Restriction (LDR) standard for non-waste waters in mg/kg.

Data

The principal data source for the cancer slope factors and non-cancer reference doses and reference concentrations is EPA's *Integrated Risk Information System*. For the exposure factors, we used EPA's *Exposure Factors Handbook* (EPA 1997), except for the exposure frequency, which is based on guidance in OSWER Directive: 9285.6-03 (OSWER, 1991). Table 1 presents the exposure factors used in this analysis.

Results

Table 2 presents the chemical-specific slope factors, reference doses, reference concentrations, health-based levels, and comparisons of health-based levels with UTS standards. As shown in Table 2, most of the UTS-levels are 2 or more orders of magnitude less than the resulting health-based number for the soil ingestion and drinking water ingestion pathways. Only the HBL for n-butyl alcohol exceeds the UTS level (by a factor of 1.7 at the 90th percentile and by a factor of 1.06 at the 50th percentile).

TABLE 1: SUMMARY OF EXPOSURE FACTORS

Exposure Factor	Value	Source
Reference Dose (mg/kg-d)	Chemical-specific	IRIS
Body weight - water (kg)	71.8	Exposure Factors Handbook (EFH) Table 7-11
Body weight - soil (kg)	16.6	EFH, Table 7-3
Averaging time (days)	365	Risk Assessment Guidance for Superfund Vol. 1, Exhibit 6-11
Ingestion Rate (water, L/day)	Median = 1.4 High-end = 2.3	EFH, Table 3-30
Ingestion Rate (soil, mg/day)	Median = 100 High-end = 400	EFH, Table 4-23
Exposure Frequency (d/yr)	350	OSWER Directive: 9285.6-03
Exposure Duration (yr)	1	Assumption (related to averaging time)

Assumptions/Limitations

There are several assumptions or limitations to this screening level analysis. These include, but are not limited to:

- Use of IRIS. Only IRIS was consulted for toxicity information. A more detailed study of the literature may have resulted in toxicity data for additional chemicals or additional toxicity data on the constituents with toxicity values in IRIS.

- Fate and Transport. The screening analysis did not account for the potential fate and transport of constituents through media and the potential dilution that may occur as a result of this transport. The analysis also did not account for the bioaccumulation or bioconcentration tha may occur in biological systems and may result in higher exposures.

- Mass partitioning. The analysis did not account for the partitioning of the constituent among various environmental media, which may result in higher estimates of constituents in the soil or in the ground water.