

May 21, 2003 (68 FR 27805) (FRL-7501-8).

For dietary risk assessment (other than cancer) the Agency uses the UF to calculate an acute or chronic reference dose (acute RfD or chronic RfD) where the RfD is equal to the NOAEL divided by the appropriate UF ( $RfD = NOAEL / UF$ ). Where an additional safety factors (SF) is retained due to concerns unique to the FQPA, this additional factor is applied to the RfD by dividing the RfD by such additional factor. The acute or chronic Population Adjusted Dose (aPAD or cPAD) is a modification of the RfD to accommodate this type of FQPA SF.

For non-dietary risk assessments (other than cancer) the UF is used to

determine the LOC. For example, when 100 is the appropriate UF (10X to account for interspecies differences and 10X for intraspecies differences) the LOC is 100. To estimate risk, a ratio of the NOAEL to exposures (margin of exposure (MOE) =  $NOAEL / \text{exposure}$ ) is calculated and compared to the LOC.

The linear default risk methodology ( $Q^*$ ) is the primary method currently used by the Agency to quantify carcinogenic risk. The  $Q^*$  approach assumes that any amount of exposure will lead to some degree of cancer risk. A  $Q^*$  is calculated and used to estimate risk which represents a probability of occurrence of additional cancer cases (e.g., risk is expressed as  $1 \times 10^{-6}$  or one in a million). Under certain specific

circumstances, MOE calculations will be used for the carcinogenic risk assessment. In this non-linear approach, a "point of departure" is identified below which carcinogenic effects are not expected. The point of departure is typically a NOAEL based on an endpoint related to cancer effects though it may be a different value derived from the dose response curve. To estimate risk, a ratio of the point of departure to exposure ( $MOE_{\text{cancer}} = \text{point of departure} / \text{exposures}$ ) is calculated. A summary of the toxicological endpoints for glufosinate ammonium and its metabolite used for human risk assessment is shown in Table 4 of this unit:

TABLE 4.—SUMMARY OF TOXICOLOGICAL DOSE AND ENDPOINTS FOR GLUFOSINATE AMMONIUM AND ITS METABOLITES FOR USE IN HUMAN RISK ASSESSMENT

Exposure Scenario	Dose Used in Risk Assessment, UF	FQPA SF* and Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (Females 13–50 years of age)	NOAEL = 6.3 mg/kg/day UF = 1,000 Acute RfD = 0.0063 mg/kg/day.	FQPA SF = 1 aPAD = acute RfD ÷ FQPA SF = 0.0063 mg/kg/day.	Prenatal Developmental Toxicity Study in non-rodents - rabbit LOAEL = 20.0 mg/kg/day based on decreased body weights and fetal death
Chronic Dietary (All populations)	NOAEL = 6.0 mg/kg/day UF = 1,000 Chronic RfD = 0.006 mg/kg/day.	FQPA SF = 1 cPAD = chronic RfD ÷ FQPA SF = 0.006 mg/kg/day	"Weight-of-evidence" approach from several studies; NOAEL = 6.0 mg/kg/day; brain glutamine synthetase inhibition and alterations in the electrocardiogram.
Short-Term Dermal (1 to 30 days) (Residential)	Oral study NOAEL = 6.3 mg/kg/day (dermal absorption rate = 50%)	LOC for MOE = 1,000 (Residential)	Prenatal Developmental Toxicity Study in non-rodents - rabbits LOAEL = 20 mg/kg/day based on reduced fetal body weights, increased fetal mortality, reduced food consumption, body weight, and body weight gain
Short-Term Inhalation (1 to 30 days) (Residential)	Oral study NOAEL = 6.3 mg/kg/day (inhalation absorption rate = 100%)	LOC for MOE = 3,000 (Residential)	Prenatal Developmental Toxicity Study in non-rodents - rabbits LOAEL = 20 mg/kg/day based on reduced fetal body weights, increased fetal mortality, reduced food consumption, body weight, and body weight gain

\*The reference to the FQPA SF refers to any additional SF retained due to concerns unique to the FQPA.

### C. Exposure Assessment

1. *Dietary exposure from food and feed uses.* Tolerances have been established (40 CFR 180.473) for the combined residues of glufosinate ammonium and its metabolites, in or on almond hulls, apples, bananas, meat, milk, fat, meat byproducts, eggs, grapes, potatoes, tree nuts and food commodities derived from transgenic canola, transgenic field corn, transgenic soybean and transgenic sugar beets. Risk assessments were conducted by EPA to assess dietary exposures from combined residues of glufosinate ammonium and its metabolites as follows:

i. *Acute exposure.* Acute dietary risk assessments are performed for a food-

use pesticide if a toxicological study has indicated the possibility of an effect of concern occurring as a result of a one day or single exposure. The Dietary Exposure Evaluation Model-Food Consumption Intake Database (DEEM-FCID®) analysis evaluated the individual food consumption as reported by respondents in the USDA 1994–1996 and 1998 nationwide Continuing Surveys of Food Intake by Individuals (CSFII) and accumulated exposure to the chemical for each commodity. The following assumptions were made for the acute exposure assessments: 100% crop treated for all registered and proposed commodities (Tier 1 analysis) and, depending on the

level of blending of a commodity, tolerance level residues, highest field trial, or average field trial.

ii. *Chronic exposure.* In conducting this chronic dietary risk assessment the DEEM-FCID® analysis evaluated the individual food consumption as reported by respondents in the USDA 1994–1996 and 1998 nationwide CSFII and accumulated exposure to the chemical for each commodity. The following assumptions were made for the chronic exposure assessments: 100% crop treated for all registered and proposed commodities (Tier 1 analysis) excluding apple, canola, corn and grape, where 3 year weighted average percent crop treated was used, and, depending