occurring weekly during this time (26 times per year). Personal protective equipment consisting of impervious gloves (90 percent protection), long sleeve shirt and long pants (50 percent) protection are worn.

15. Data for cattle cannot be extrapolated to poultry, because of the different application method and less frequent applications for poultry. As a result, exposure from applying dichlorvos to poultry is expected to be much lower than for cattle.

16. An average dairy barn has the dimensions 30 ft x 100 ft x 9 ft (total area covered is 4340 ft²). Dichlorvos is applied at two week intervals for 22 weeks, one barn per day. A 1.0 percent solution of dichlorvos is applied using a low pressure hand sprayer at a rate of 3.4 gallons per hour. Daily exposure time is 0.20 hours. A worker wears a long sleeve shirt, long trousers, shoes and impervious gloves at a minimum. Gloves offer 90 percent protection to the hands and the other garments 50 percent protection. Coveralls are assumed to offer 90 percent protection.

17. Feedlots include stockyards, corrals, holding pens and other areas where groups of animals are contained. This application method would probably be used for controlling insects on cattle. EPA assumes that some type of power sprayer capable of treating a large number of animals in a short time is probably used. A short application time period in an outdoor or partially enclosed area would minimize exposure to less than that of a greenhouse.

18. MOE is expected to be greater than 100 for manure use. Application equipment may be similar to those used in a greenhouse; however, the application time would probably be less and the treated area would be well ventilated - either outdoors or in a partially enclosed area.

19. Tobacco warehouse mixer/loader/ applicator exposure is expected occur twice a week for 27 weeks, totaling 54 days of exposure. Warehouse reentry workers are expected to be exposed six days a week for 27 weeks per year.

20. Use on ornamental lawns, turf and plants are expected to have an exposure pattern similar to a greenhouse sprayer.

Dichlorvos can be applied to warehouses manually using foggers or with wall-mounted automatic foggers. Exposure to mixer/loaders through automatic application is expected to be negligible; however, there would still be reentry exposure. In estimating reentry exposure, EPA assumed six hours elapsed before reentry is allowed, as required on labels; and that workers spend eight hours per day in the treated area for the next three days. In estimating exposure from manual application, EPA assumed that an average warehouse has a volume of two million ft3; dichlorvos is applied at the rate of 2.0 grams active ingredient per 1000 ft³ over a period of 125 minutes per application. On average, dichlorvos is applied 12 times per year. Protective clothing consisted of impervious gloves, an apron, coveralls, boots, hood, goggles and a respirator during application.

22. Exposure in a kennel is believed to be similar to a dairy barn.

23. Exposure is believed to be negligible since the pesticide is in the form of an

impregnated strip and the traps are placed in outdoor areas (such as forests) where there is no human exposure.

24. Exposure at a garbage dump is believed to be less than greenhouse exposure.

25. Exposure is believed to be similar to warehouse exposure.

26. Aircraft personnel are exposed to dichlorvos 30 minutes once per week, 52 times per year. No protective clothing is worn, representing a chronic exposure scenario. Passenger exposure is an acute scenario.

27. Passengers are exposed to airborne dichlorvos for four hours in buses following two hours aeration. Passenger respiratory volume is assumed to be 0.44 m³/hour which is less than for workers because passengers are at rest.

28. EPA is assuming that exposure from application should be less than that for warehouses because of the smaller area to treat - therefore less exposure time. However, because a short term exposure scenario is involved, EPA is concerned about the potential risks from any type of hand application, assuming no respiratory protection. For reentry, the MOE of 20 is based on 8 hours of exposure after a 12-hour reentry period. Even a 24 hour reentry peroiod results in an MOE of 60.

D. Risk Characterization

1. Chronic dietary. This section summarizes chronic risk estimates from dietary exposure to dichlorvos, including risks due to direct application of dichlorvos and dichlorvos which occurs as a metabolite from the use of naled. In initiating the Special Review in 1988, EPA estimated the upper bound dietary cancer risk from dichlorvos application alone to be 8.4 x 10⁻⁵ or in the range of 10⁻⁴, for the general U.S. population. EPA believed this to be an overestimate because it was based on a number of conservative assumptions. The Agency is now able to provide a more realistic dietary risk estimate based on field trial data, processing and cooking data, and refinements in percent of crop treated data (Refs. 52 and 53).

i. Noncancer. The Agency estimates chronic dietary risks for noncancer endpoints by comparing dietary exposure to the Reference Dose (RfD). The RfD is an estimate of the daily oral exposure to humans over a lifetime that is not expected to result in adverse health effects. The RfD is based on the determination of a critical effect from a review of all toxicity data and a judgment of uncertainty. In the case of dichlorvos, the RfD is 0.0005 mg/kg body weight/day, based on a NOEL of 0.05 mg/kg body weight/day and an uncertainty factor of 100 to account for extrapolation from animal data to humans and variability in the human population. The NOEL, was taken from a 1 year feeding study in dogs in which

plasma and red blood cell ChE inhibition (ChE) were the effects observed in males and females; in addition, brain ChE inhibition was observed in males (Ref. 54).

Using anticipated residues and percent of crop treated data, EPA estimated the exposure from registered uses of dichlorvos to be 0.000054 mg/kg body weight/day, which represents 11 percent of the RfD for the general U.S. population. EPA estimates that the ARC to the most highly exposed population subgroup, non-nursing infants under 1 year, is 0.000143 mg/kg body weight/ day, or 29 percent of the RfD. The ARC for the U.S. population from dichlorvos derived from registered uses of naled is 0.000016 mg/kg body weight/day or 3 percent of the RfD. EPA estimates that the ARC to the most highly exposed population subgroup, "non-nursing infants under 1 year," is 0.000057 mg/ kg body weight/day, or 11 percent of the RfD. EPA concludes that the risk from ChE inhibition due to chronic dietary exposure is minimal and not of concern.

The Agency does not have a concern for cholinesterase inhibition from DDVP use on foods at this time. This conclusion is based on the dietary risk assessment for DDVP alone. If exposure from other cholinesterase inhibitors, either on the same or different foods in addition to DDVP were considered, a cumulative exposure may trigger a risk concern. The Agency currently has no methodology for assessing cumulative exposure from cholinesterase inhibitors via ingestion of treated foods. However, the Agency plans to pursue options towards this end in the coming years and at that time will solicit public input on possible methodologies.

ii. Cancer. In estimating the upper bound cancer risk, chronic dietary exposure is multiplied by the cancer potency of the chemical. This analysis uses the upper bound cancer potency factor (or Q_1^*) for dichlorvos of 1.22 x 10⁻¹ (mg/kg/day)⁻¹ and assumes that an individual is exposed over a 70-year lifetime. Based on these assumptions, the estimated upper-bound excess individual lifetime cancer risk from direct application of dichlorvos is 4.4 x 10-6 and from naled-derived dichlorvos it is 7.2 x 10-7 for a total of 5.1 x 10-6 (see Table 2 of this paragraph). At a future date, EPA will issue a Reregistration Eligibility Document for naled which provides further analysis of naled-derived dichlorvos. The major source of estimated risk is dichlorvos residues from use on packaged, bagged or bulk nonperishable processed or raw food (3.4 x 10-6). The estimated risk from the three individual tolerances and FAR (bulk raw, packaged or bagged raw,