dosimeters to determine the amount of leaf residue transferable to the participant. All volunteers rogued for a 4-hour period after which the inner/outer dosimeters were divided into lower and upper leg, lower and upper arm, and front and back torso sections and submitted for pesticide analysis. The majority of the pesticide residues were distributed on the upper leg, lower leg, and lower arm. Residue penetration from the outer to the inner dosimeter was 5.3% and 7.2% for Warrior® and Tilt®, respectively. Day 2 foliar residues were used to calculate transfer coefficients (TC) for each section of the dosimeter. The average overall TC for Tilt® and Warrior® were 7800 and 6800, respectively. A preliminary estimate indicates that the margin of exposure for this crop and activity far exceeds EPA's target of 100 for occupational risk.

414 PESTICIDE EXPOSURE ASSESSMENT: MOISTURE ENHANCES MALATHION TRANSFER TO HARVESTER GLOVES AND CLOTHING, BUT DOES NOT INCREASE ABSORBED DOSE.

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When strawberries are protected from pests with insecticides, fungicides, miticides, or molluscicides, field entry intervals are an important means to minimize harvester exposures. Establishment of safe entry intervals requires knowledge of dosages that produce experimental adverse effects and field measurements of harvester exposure. The influence of morning dew on harvester exposure was studied using latex glove and cotton forearm dosimeters (ug per harvester), and urine biomonitoring. Using a crossover design groups of 12 workers harvested malathion-treated in either the morning or in the afternoon during a 10-day period. Worker production during the day did not differ. The dislodgeable foliar residues ranged from 0.22 to 0.014 ug/cm^2. This abstract reports the first 3 d of 10 that are included in this report. Latex gloves in the morning retained 5.3 ± 1.1 mg malathion and 1.2 ± 0.66 mg malathion in the afternoon. A similar pattern of residue retention was found on the forearm dosimeters: morning residues were 1.2 ± 0.61 and 0.28 ± 0.81 during the afternoon harvest. Urine specimens normalized for daily creatinine excretion were obtained for measurement of malathion mono- and diacids. Even though the gloves and shirtsleeves represented morning: afternoon ratios of about 4 (day 3-5 post malathion application), the excreted malathion acids following morning exposures (0.95 ug/kg-3d) and afternoon exposures (1.26 ug/kg-3d) did not differ (>0.05). Based upon these observations, morning dew enhanced pesticide transfer from treated foliage, but it did not increase malathion absorption of harvesters. Pesticide exposure estimates based upon external dosimeters may be excessive in the presence of moisture e.g., dew, rain, and perhaps perspiration. Supported in part by the California Strawberry Commission and DB Specialty Farms, Santa Maria, CA.

415 CHEMICAL EXPOSURE ASSESSMENT: SURFACE DEPOSITION OF ENVIRONMENTAL TOBACCO SMOKE (ETS).

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ETS is commonly regarded as a source of bystander exposure to mainstream and sidestream smoke. Dermal exposures may be more important than inhalation to semivolatile (< 10^{-3} mm Hg) chemicals in ETS. Nicotine was used as an exposure marker due to its concentration in ETS, stability, suitability for sensitive biological and environmental analysis, and toxicity. Nicotine is readily absorbed from inhaled air, ingestion, and skin contact. Dermal contact may be an important route of exposure for non-smokers, and this exposure may begin early in life. Carpet swatches were placed for 1, 2, and 4 weeks in 9 homes of cigarette smokers. Transferable carpet residue (TCR; µg nicotine/cm^2) was sampled with a cotton cloth pressed beneath a 30-lb. roller. Nicotine was measured via GC/MS following Soxhlet extraction of carpet swatches with ethyl acetate. Nicotine concentrations in carpet swatches contained as much as 4.3 µg/cm^2 with a mean deposition of 1.29 µg/cm^2. Carpet deposition increased about 0.3 µg/cm^2/week. Mean nicotine concentrations after a four-week exposure were 1.7 µg/cm^2. Potential daily dose (µg/person) is the product of TCR x TC x exposure hours. TCRs (TC; cm^2/h) are used by the USEPA to evaluate and re-register pesticides for residential use. Assuming 10% nicotine transferability and the USEPA TC of 8700 cm^2/hr, a potential daily dermal dose of 1, 500 µg/person-h. Assignment of dose is tentative since the transferable carpet residue is more tightly bound than organophosphate and pyrethroid pesticides that have been studied in this laboratory. Transferable surface residue to a cotton cloth utilizing a 30 lb roller was unsuccessful (LOQ 5 µg/ml). Dermal absorption could contribute significantly to ETS exposure measured using biomarkers such as cotinine and attributed to inhalation exposure (e.g. Jurado et al. 2004 and Kim et al., 2004). Many persons object to the irritancy of ETS in indoor settings, but primary exposure to tobacco smoke constituents, may result from dermal contact rather than inhalation.

416 VALIDATION OF A SURROGATE MIX TO DETERMINE CONCENTRATION OF INDIVIDUAL COMPONENTS OF JP-8 IN AEROSOL AND VAPOR SAMPLES BY GC/MS.

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JP-8 is a kerosene-based jet fuel containing several hundred hydrocarbons and is used in a variety of military vehicles, including aircraft. The chemical complexity of JP-8 makes analysis of individual components difficult. The objective of this study was to develop an analytical method, with an accuracy and precision of 20% or better, for JP-8 aerosol and vapor samples using gas chromatography/mass spectrometry (GC/MS). Preliminary analysis of the hydrocarbon composition of aerosol and vapor samples of JP-8 collected from a nose-only mouse exposure chamber at the University of Arizona was undertaken. Thirty-four of the primary components detected in the atmosphere were used to create a surrogate mixture for GC/MS analysis. Our surrogate mixture contained n-alkanes ranging from n-octane to n-heptadecane, toluene, n-ethylbenzene, xylenes, n-substituted cyclohexanes, 3-ethyltoluene, 2-methylnonane, trimethylbenzenes, indene, methyldecanes, 1, 2, 3, 4-tetrahydronaphthalene, naphthalene, methylnaphthalenes, and dimethylnaphthalenes. Three separate runs containing a standard curve, ranging from 1.25 µg/mL to 250 µg/mL, and six replicates each of the surrogate at concentrations of 1.25 µg/mL, 4.0 µg/mL, 75 µg/mL, and 200 µg/mL were analyzed. The average precision obtained for the thirty-four components was 8% or better, while the average accuracy was 13.5% or better. The precision of the standard curves was 18% or better at all concentrations of each of the components. Based on these results, we attained our desired precision and accuracy and have thus developed a suitable method for analyzing JP-8. This method will be used in the future to determine the concentration of major components in JP-8 samples acquired from the nose-only exposure chamber at the University of Arizona. Funded by AFOSR [grant no F49620-03-1-0157].

417 PHYSICOCHEMICAL CHARACTERISATION OF COMBUSTION PARTICLES FROM RESIDENTIAL WOOD SMOKE AND VEHICLE EXHAUST.

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Air pollution is associated with negative health effects. The particle characteristics responsible for these effects are still debated, but size, surface area and chemistry seem to influence the potency of the particles. This work is part of a VISTA* project investigating possible relationships between physicochemical characteristics of particles and their biological effects. Since residential wood smoke and vehicle exhaust are the primary sources of particulate air pollution in Norway, combustion particles collected from a traditional Norwegian wood stove and in a road tunnel were compared. In this study, the morphology of the particles was characterised by transmission electron microscopy (TEM) and the ratio of organic to total carbon content (OC/TC) was determined by thermal-optical transmission analysis. The only combustion particles observed in the samples were carbon aggregates of different sizes, consisting of spherical primary particles with diameters between 20 and 60 nm. The mean diameters of primary particles from wood smoke was 39 ± 11 nm, whereas the diameter for vehicle exhaust from the road tunnel sample was 26 ± 7 nm. The OC/TC ratios for wood smoke and vehicle exhaust were 0.43 ± 0.04 and 0.65 ± 0.03, respectively (4 measurements). For equal particle masses, a decrease in particle diameter results in an increase in surface area. In the comparison of combustion particles from the two sources, vehicle exhaust particles were found to have a larger surface area per unit mass and a higher content of organic material, as compared to wood smoke particles. Increases in surface area and organic carbon content have been associated with increases in certain biological effects. Based on these parameters, combustion particles from vehicle exhaust may be considered more harmful than particles from residential wood smoke. * *VISTA - The Norwegian Academy for Science and Letters and Statoil. www.vista.no*

418 COMPARISON OF TRACER METHODS USED TO MEASURE IN-VEHICLE CONCENTRATIONS.

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Two studies[1] used different tracer methods to estimate diesel particulate matter (DPM) inside school buses attributable to bus exhaust. One used continuous monitors for black carbon, PM2.5, PAH, and SF_6 (a tracer gas released into the school