

HEALTH CONSULTATION

Private Residence

Wickenburg, AZ
Maricopa County

August 25, 1999

Arizona Department of Health Services
Office of Environmental Health
under cooperative agreement with the
Agency for Toxic Substances and Disease Registry

BACKGROUND

A resident of Wickenburg, Arizona and her husband reported experiencing some adverse health effects that she felt may be attributed to a recent pesticide application to her home. The family requested the Arizona Department of Health Services (ADHS) to evaluate whether the remaining levels of pesticides present in her home would cause any health effects.

The resident reported that on June 9, 1999, a termaticide was applied to the concrete slab of her house. The applicator reported that the chemical used was an organophosphate called chlorpyrifos, trade named Dunspan or Dragnet [ATSDR Tox Profile, 1997]. Subsequent to returning to the home on June 16th after being away, the resident noted a strong chemical odor pervading the house, and a puddle of chemical near the baseboards by the bedroom window of the home. The applicator company was notified of the pooling chemical and advised the resident to neutralize the chemical with a chlorox bleach solution.

Shortly thereafter, both the resident and her husband, who has chronic obstructive pulmonary disease and receives supplemental oxygen reported to the Boswell Hospital emergency room with symptoms including: shortness of breath, thick feeling tongue, tingling skin, headache, numbness in the lips, paresthesias, and burning chest pains. After being examined, the husband received oxygen treatment, and the wife received a tranquilizer, Lorazepam. The attending physician diagnosed that they were suffering from symptoms related to irritation from the bleach solution.

The resident reported to ADHS that their symptoms continued to worsen over time, and that the chemical continued to pool in their house even after being wiped up several times, so that she and her husband vacated the house. They were referred to Dr. Stuart Lanson, an occupational physician at the Mayo Clinic in Scottsdale for treatment by their internist. The couple underwent extensive testing , and are receiving oxygen treatment to alleviate their symptoms. No medical records have been submitted to ADHS for review, and it is difficult to conclusively analyze health outcome information as it has been self reported [Curry, August 1999].

The Structural Pest Control Commission and the State Department of Agriculture were also contacted by the resident for assistance, but were unable to conduct an investigation. A copy of their preliminary complaint form was obtained by the ADHS Pesticide Surveillance officer and the ADHS database was searched for any other related complaints, but none were filed. [Arvisu, August 1999]. Meanwhile, the resident contacted an environmental testing company to pull volatile organic compound (VOC) air samples from their Wickenburg home to determine whether there were any dangerous levels of chemicals present in their home.

The contracted company sent the samples to a laboratory, GD Air Testing Incorporated, for analysis by EPA test method TO-14. The samples were analyzed on 8/13/99 and proper QA/QC methods were employed in the collection, storage, and analysis of the samples.

Air samples for VOC's were taken at the resident's home and the results are listed below for the contaminants detected. Concentrations of the chemicals were then compared with Arizona Air Quality Guidelines (AQGs).

AQGs are residential screening values that are protective of human health, including children. Chemical concentrations in air that exceed AQGs may not necessarily represent a health risk. Rather, when contaminant concentrations exceed these guidelines, further evaluation may be necessary to determine whether there is a true threat to human health. AQGs are not intended to be used as standards. Rather, they are intended to provide health-based guidelines that may be useful in making environmental risk management decisions. AQGs consider human health risk from inhalation of contaminants in ambient air. They do not take into account odor thresholds or threats to wildlife.

Table 1: Air sampling results for volatile organic compounds (VOCs)

Contaminant	Level detected ppbv	Molecular weight	Level $\mu\text{g}/\text{m}^3$	AQG level $\mu\text{g}/\text{m}^3$	Excedence?
dichlorodiflouromethane	1.61	120.9	7.96	3.9E4	no
dichloromethane	0.270	84.9	0.938	2.2	no
toluene	1.28	92	4.74	3.0E ³	no
1,1,1-trichloroethane (TCA)	0.250	133.4	1.38	1.5E4	no
1,3,5-trimethylbenzene	3.91	120.2	18.2	9.9E2	no
1,2,4-trimethylbenzene	2.03	120.2	9.98	9.9E2	no
trichloroethene (TCE)	0.420	131.3	2.28	5.8E-1	no
trichlorofluoromethane	1.680	137.4	5.95	4.4E4	no
trichlorotrifluoroethane	1.82	167.4	11.7		
m-xylene	0.680	106	2.35	3.5E3	no
o-xylene	0.50	106	2.17	3.5E3	no
acetone	5.00	54	11.9	1.4E4	no
ethanol	2.4	46	4.52	1.5E4	no

^a concentrations in $\mu\text{g}/\text{cu M}$ reported at 760 mm Hg pressure and 298 degrees Kelvin

^b surrogate recovery report was acceptable and ranged from 87-100%

^c ppbv indicates parts per billion volume

DISCUSSION

The VOCs that were sampled for all fall below Arizona's AQG health based guidelines. Most of the chemicals detected are commonly found in the synthetic materials used in home construction.

Air Quality Guidelines (AQGs) are calculated for possible, probable and known human carcinogens. They protect against toxic doses of systemic toxicants, and limit excess lifetime cancer risk to one-in-one million (10^{-6}) for known human carcinogens. The guidelines use standard USEPA residential exposure assumptions. They assume that constant exposure occurs over a lifetime (70 years). The default exposure factors were obtained primarily from *Risk Assessment Guidance for Superfund (RAGS), Supplemental Guidance Standard Default Exposure Factors* (OSWER Directive, 9285.6-03) dated March 25, 1991. Annual AQGs assume an exposure frequency of 365 days/year for 70 years. Exposure doses are averaged over a lifetime (70 years) for carcinogens. They use USEPA carcinogenic slope factors from the USEPA Integrated Risk Information System (IRIS) through January 1999, USEPA Health Effects Assessment Summary Tables (HEAST) through 1998, and the USEPA National Center for Environmental Assessment (NCEA). [ADHS, May 1999].

To develop the AQG's, the priority among sources of toxicological values used is as follows: (1) IRIS, (2) HEAST, (3) NCEA, and (4) withdrawn values from IRIS or HEAST and values under review. Oral cancer slope reference doses and cancer slope were used when no toxicity values were available for inhalation exposure.

Sampling for VOCs, as requested by the resident, was conducted according to proper EPA methodology. However, the samples were not analyzed for pesticides, which the resident felt may be the underlying cause of her family's health problems. Many symptoms noted by the resident are nervous system related, and are consistent with low level, short term pesticide exposure. [US EPA, Sept. 1999]. However, without specific data about the concentrations of organophosphates in the home, a dose related toxicological analysis cannot be conducted.

Results of any medical tests were not submitted to ADHS for review. There is also a dietary contribution of produce treated pesticides consumed by most humans that may be reflected in medical testing. In order to separate out dietary exposure from potential environmental exposure, both the concentrations of the pesticides present in the home and in the blood of those affected are

required. [TOMES database,1999]. Without this information, it is impossible to determine whether the health effects being experienced may be attributable to termiticide exposure.

CHILD HEALTH INITIATIVE

Children are also protected by the AQGs. None of the constituents that were analyzed by EPA test methods exceeded health based guidelines.

CONCLUSION

At this time, none of the environmental test results indicate that there is any risk of experiencing any health effects from the indoor air in the home. None of the current concentrations of VOCs in the home exceed the federal or state health based guidelines. However, specific data on the pesticide levels present, and medical records for the affected residents were not submitted to ADHS to substantiate the health symptoms reported by the residents. Therefore, the site poses an indeterminate public health hazard.

RECOMMENDATIONS

Air and wipe samples from affected areas in the resident's home should be collected and analyzed for organophosphate pesticides if health concerns continue.

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REFERENCES

ADHS, *Arizona Ambient Air Quality Guidelines: Draft*, Office of Environmental Health, May 11 1999.

NIOSH, *Pocket Guide to Chemical Hazards*, US Department of Health and Human Services, Publication No. 97-140, June 1997.

Phone Consultation with Dr. S. Curry of the Good Samaritan Poison Control / Toxicology Branch, Good Samaritan Hospital, Phoenix, AZ, 8/13/99.

TOMES Database, Chlorpyrifos : IRIS and Meditext, [http:// www. micromedex.com](http://www.micromedex.com).

U.S. EPA, *Exposure Factors Handbooks, Volume I-III*, EPA/600/8-91/011B, Office of Health and Environmental Assessment, Washington, DC, August 1996.

U.S. EPA, *Risk Assessment Guidance for Superfund (RAGS), Volume 1: Parts A,B,C: Human Health Evaluation Manual*, Publication 9285.7-01B, Office of Emergency and Remedial Response, Washington, DC, January 1992.

US EPA, *Recognition and Management of Pesticide Poisonings*, EPA Document No. 735-R-98-003, September 1999.

US Department of Health and Human Services, *ATSDR Toxicological Profile for Chlorpyrifos*, September 1997.

Verbal Consultation with E. Arvisu, Pesticide Surveillance Program, AZ Department of Health Services, Phoenix, AZ, 8/13/99.