Title: **Analytical Determination of Atrazine, Alachlor and their Selected Degradation Products in Contaminated Groundwater: Implications for Wisconsin Groundwater Standards (Study No. 42)**

Investigators:

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Objectives: To investigate the contribution of atrazine and alachlor degradation products to the total groundwater contamination by the parent compounds.

Background/Need: Extensive investigation nationwide has indicated an increasing occurrence of pesticides in groundwater. Environmental fate studies generally examine parent pesticide compounds but ignore degradation products. The health risks posed by pesticide use may be underestimated by this exclusion.

Methods: Methods were developed to identify and quantify the atrazine degradation products, deethylatrazine and deisopropylatrazine, and alachlor degradation products 2,6-diethylaniline (DEA) and 2-Cl-2',6'-diethylacetanilide in water. Groundwater samples were taken from wells at four sites known to have groundwater contamination from atrazine or alachlor. Samples were analyzed for atrazine, alachlor and their targeted breakdown products using methods developed for this study.

Results: Atrazine was detected more frequently than alachlor at each site. Degradation product deethylatrazine was detected at every atrazine occurrence, and deisopropylatrazine less frequently and in lower concentrations. Median atrazine values were similar between sites. Alachlor degradation products occurred less pervasively and in lower concentrations than products of atrazine. Alachlor was detected in similar concentrations at three of the four sites.

Conclusions: Investigators conclude the atrazine breakdown products can measurably contribute to the total atrazine groundwater contamination; neither of the metabolites of alachlor studied were common groundwater contaminants.

Recommendations/ Implications: Investigators determined that atrazine contamination may be underestimated by failing to account for deethylatrazine and deisopropylatrazine. Adjustment of the atrazine enforcement standard (ES) for the presence of breakdown products is suggested as a cost effective management approach to dealing with atrazine breakdown products. A reduced ES of 1.1 micrograms/liter (ug/l) as compared to the current ES of 3.5 ug/l, was calculated based on the typical ratios of concentrations of atrazine to breakdown products found in this study. Further study is recommended to

gather data from a wider variety of aquifer and soil types and to investigate temporal characteristics of the relationship between the breakdown product and parent concentrations. Didealkylatrazine and hydroxyalachor are additional metabolites that should be studied.

Availability of Report: This report can be obtained from:

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