CHALLENGES OF CONDUCTING WEED SCIENCE RESEARCH IN AN ATRAZINE PROHIBITION AREA. Timothy L. Trower, Chris M. Boerboom, Dave E. Stoltenberg, Ken R. Bradbury, and Richard C. Graham, Senior Outreach Specialist, Professor and Professor University of Wisconsin, Madison 53706, Professor, Wisconsin Geological and Natural History Survey, Madison, WI 53705 and Hydrologist, Wisconsin Department of Agriculture, Trade and Consumer Protection, Madison, WI 53708.

Atrazine was detected in 12% of Wisconsin groundwater wells in a 1989 survey. Atrazine use has subsequently been regulated through Chapter ATCP 30 (the Atrazine Rule) by the Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) since 1991. The Atrazine Rule is based on an enforcement standard of 3 ppb of atrazine total chlorinated residues (TCR), which are the sum of atrazine, diamino atrazine, de-ethyl atrazine, and deisopropyl atrazine. When the enforcement standard is exceeded, atrazine prohibition areas can be created.

Currently Wisconsin has the nation's most restrictive atrazine management policy with 1.3 million acres in 101 separate atrazine prohibition areas. The Atrazine Rule limits use in the remaining areas of the state, including maximum application rates based on soil type and previous atrazine use and applications are limited from April 1 through July 31. The University of Wisconsin Arlington Research Station is located completely within the boundaries of an atrazine prohibition area. From 1994 to 2006, WDATCP granted the university a research exemption from atrazine prohibition if the atrazine rate restrictions were followed, use was only for research treatments, growers were educated on non-atrazine alternatives, use was limited to a defined maximum total acreage, and use was reported at the end of the growing season. In 2007, WDATCP became concerned that the research use of atrazine at the research station was contributing to elevated atrazine TCR in a neighboring private well. Weed management research using atrazine at the research station ceased in 2007 when conditions for a research exemption were not agreed upon. A WDATCP field investigation in 2007 also identified illegal atrazine use by a private grower within the atrazine prohibition area and near the research station and private well of concern.

In 2008, WDATCP conditions for a research exemption were agreed to by the University of Wisconsin that included groundwater monitoring in addition to previous requirements. WDATCP, the University of Wisconsin, and the Wisconsin Geological and Natural History Survey developed a plan to monitor potential movement of atrazine TCR in the groundwater. The plan was to install two monitoring wells up-gradient and two wells down-gradient around the perimeter of a 20-acre site where atrazine was used in research trials. One monitoring well would be placed in the center of the site. Preliminary hydrogeological analysis predicted southerly groundwater flow under the site and the underlying geology was relatively homogeneous. The two wells located up-gradient were to monitor for atrazine TCR contributions from sources other than from research trials and the well located in the middle of the site and the two wells located down-gradient were to detect contributions from research trials. Significant risks to the university were associated with this project. WDATCP placed benchmarks in the research exemption that, if triggered, would terminate future research use of atrazine at the research station.

The monitoring wells were installed in November 2008 through a till layer ranging from 4 to 6 feet over bedrock primarily consisting of weathered dolomite. Average groundwater depth is about 85 feet. Groundwater was located in weather dolomite in three wells and in sandstone in two wells. No fractures in the bedrock were detected in the monitoring wells. Water levels in the monitoring wells during the 2009 growing season indicate that a uniform gradient of water flow across the site may not exist and may complicate interpretation of sample results. A total of 1.13 lb and 1.33 lb of atrazine was applied to the research site in 2008 and 2009 respectively. TCR recovery from the quarterly sampling dates during the 2009 growing season varied among wells, but the results across sampling dates have

been relatively consistent. All current results have fallen within the parameters set by DATCP for continuation of atrazine use.

Another stipulation for continuing atrazine use at the Arlington Research Station is annual sampling of private wells within one mile down-gradient of research test plots. Two sets of samples have been analyzed and TCR levels have ranged from no detection to 1.79 ppb atrazine TCR, which is below the enforcement standard of 3 ppb.

The groundwater monitoring requirements of the atrazine research exemption at the Arlington Research Station have incurred significant time and expense, but the monitoring will be continued to determine if continued atrazine use at the research quantities is degrading water quality at the site. Unresolved questions remain about the potential rate of atrazine movement through the dolomite at this site and the age of the groundwater below the site, which may aid in understanding the age of the atrazine TCR that is being detected.