RECENT PROGRESS MADE BY APPLICATORS IN REDUCING AIRBORNE FLUX OF METAM SODIUM

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This paper provides a summary of the work that was undertaken in the Mid-West and the Pacific Northwest in the Fall of 2009 and Spring of 2010 to demonstrate shank injection flux rates that are applicable to the current state-of-the-art and for conditions representative of the cooler weather shank injection / compaction methods that are currently employed in these regions.

There were good reasons to anticipate substantially lower flux rates in these studies compared to the basis that was being used in the U.S. EPA buffer zone distributions that were released in 2009:

- First, the basis for the EPA buffer zones for shank injection was a USDA-sponsored research study conducted in Bakersfield California in early September 2002 (Nelson et. al, 2003)[1]. Although this application included enhanced water sealing (intermittent water sealing), the application rig produced substantial voids.

- Second, soil temperatures in the 2002 field trial ranged from 14.8-27.1 C during the time of the application. This is much hotter than would be expected for the typical cool weather periods when metam sodium applications are applied in the Mid-west and Pacific Northwest.

[1] Nelson, S., Ajwa, H., Sullivan, D.A., Holdsworth, M.T., 2003, Bakersfield,California Shank Injection and Chemigation Trials for Metam-Sodium, U.S. Department of Agriculture, CSREES Project # 74.

Summary & Conclusions

The recent studies demonstrate several important developments. First, the regulatory initiatives at the State and Federal levels have lead to pronounced reductions in flux. Farmers and applicators have responded to the challenge of reducing flux through changes in field preparation and application methods. The impetus for these changes can be traced back to the U.S. Environmental Protection Agency and the California Department of Pesticide Registration. This is as much of a success for commercial agriculture as it is a testament to the initiatives undertaken by regulators.

The results also show that direct data that are representative of actual cultural practice provide a basis to refine buffer zones beyond the use of worst-case field trials, without the need to rely on soil model-based extrapolation that generally results in greater conservatism because of the greater uncertainty inherent with this approach. These results show that a more effective approach to buffer zone management would be to rely on directly measured field study results in cool weather and hot weather conditions. Rather than base buffer zone requirements on regional factors, a more efficient approach would be to base buffer zones on conditions, such as:

- Soil temperatures < 50 F or >= 50 F
- Injection depth <10 inches or >= 10 inches
- With a water seal or without a water seal

Such an approach would be consistent with the evolving field study data sets and would make best use of the evolving field study data.

Table 1 summarizes the conditions and specification of the recent metam sodium field studies on shank compaction. The matrix covers a broad range of soil temperature, depth of injection, percent field capacity, and applications with and without water seals. Figure 1 provides a normalized presentation of the flux data from these recent studies, which for comparison purposes also shows the 2003 field trial that is the basis for the 2009 EPA risk assessment for Metam Sodium (released May 2009). As shown, when Table 1 and Figure 1 are reviewed, the flux data are consistently ordered as a function of conditions. When viewed as a mutually supportive set of studies, rather than as individual results, the influence of conditions on flux results can be displayed. Similar ordering of results could be anticipated for matched field trials for other fumigants.

Table 1: Summary of Conditions and Specifications for Recent Metam Sodium Field Studies on Shank Compaction

Study	Field #	Soil Temperature < 10C	Soil Temperature >15C	Injection Depth >25 cm	Soil Moisture 70-80 % Field Capacity?	Water Seal
CA, 2008	1		*		yes	dual
CA, 2008	2		*		no	dual
MI, 2010	1	*		*	yes	no
MI, 2010	2	*		*	yes	single
WI, 2009	1				yes	no
WI, 2009	3				yes	no
WA, 2010	1	*			yes	no
WA, 2010	2	*			yes	single

CA, 2008 = Shank compaction field trial, California (Kern County) July 2008 Field 1

CA, 2008 = Shank compaction field trial, California (Kern County) July 2008 Field 2

MI, 2010 = Shank compaction field trial, Michigan, October 2009 Field 1

MI, 2010 = Shank compaction field trial, Michigan, October 2009 Field 2

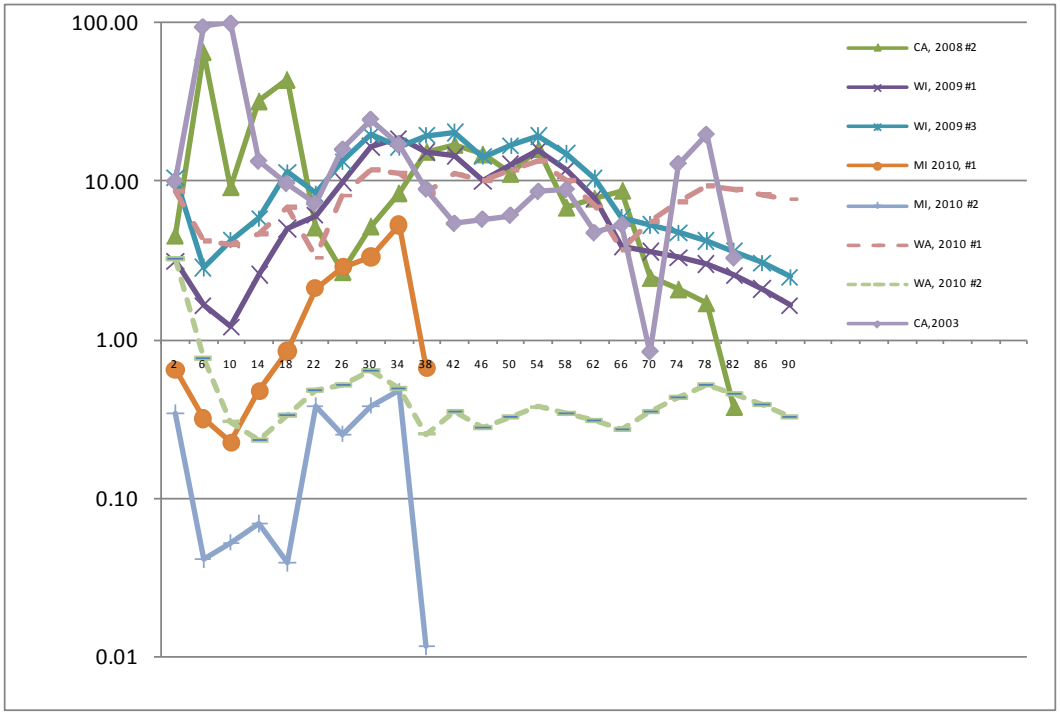
WI, 2009 = Shank compaction field trial, Wisconsin, September 2009 Field 1

WI, 2009 = Shank compaction field trial, Wisconsin, September 2009 Field 2

WA, 2010 = Shank compaction field trial, Washington State, March 2010 Field 1

WA, 2010 = Shank compaction field trial, Washington State, March 2010 Field 2

Figure 1: Normalized Flux Results for Recent Field Trials Conducted for Metam Sodium Via Shank Compaction as a Function of Hour After Application



Note: CA, 2003 – USDA CSREES shank injection field trial (no compaction), California (Kern County), September 2003; the Michigan flux rates had negligible values after the peak flux occurred hour 34, which was associated with a rain event.