Stewardship of Metam Sodium

Environmental Stewardship: Minimize Off-gassing

Paper sponsored by Tessenderlo-Kerley, Inc.

Conversion Process

- Metam sodium breaks down in moist soil to methyl isothiocyanate (MITC)
- MITC is the biocidal agent
- To suppress pests need to deliver lethal dose (concentration x time)
- Goal: keep MITC in treatment zone and minimize odors

Goal: Keep MITC in the Soil

- Enhance efficacy
- Reduce worker exposures
- Reduce bystander exposures
- Promote primary removal from treatment zone by biodegradation: preferred pathway for efficacy and environment

Stewardship Steps to Maximize MITC Contact in Treatment Zone

- Achieve good seed bed soil preparation, consistent with cultural practice (regional differences)
- Manage soil moisture pre-application within label range of 50 to 80 percent FC – upper end of range has shown better off-gassing control
- As feasible apply during daylight hours as feasible to minimize the potential for odors

Stewardship Steps to Maximize MITC Contact in Treatment Zone

- Minimize surface drips / leaks - - inexpensive solution to promote environmental management
- Break up shank traces
- Achieve good “seal” / barrier
- Monitor for odors / mitigate if necessary

Achieve Good Seed Bed Soil Preparation

- Promote efficacy / penetration throughout treatment zone - - contact biocide - - needs contact
- Promote deeper penetration of MITC - - improves environmental management too
- Minimize debris, as feasible, to improve nematacidal properties
- Minimize as feasible field preparation that increases off-gassing surface area

Manage soil moisture pre-application within label range of 50 to 80 percent FC

- “ball up” soil test
- Soil moisture probes
- 70 percent field capacity found to produce good retention in field study trials
- Without adequate water reservoir to retain MITC in solution, volatilization increases - - **Important**

Apply During Daylight Hours as Feasible

- Atmospheric dilution from fumigants is generally ~ 10 x better in daytime
- Higher emissions usually occur during and shortly after application
- By applying in daytime, benefit of greater mixing of off-gassing in atmosphere, i.e. lower potential for odors
- Recent testing shank compaction, good moisture management - - special case to support nighttime

Apply During Daylight Hours as Feasible (Cont.)

- If surface spill / problem - - dilution daytime and sealed by nighttime
- Recommended exceptions:
  - 4:00 AM start for summertime chemigation (90F air temp. criterion)
  - If nighttime must be done - - well designed shank / compaction would be preferred choice

Minimize Surface Drips / Leaks Break Up Shank Traces / Voids

- Check valves, automatic shutoffs - - minimize surface flash off of MITC
- Shank injection needs effective shank void breakup after passage of shanks - - minimize flow of gases between the soil and the atmosphere

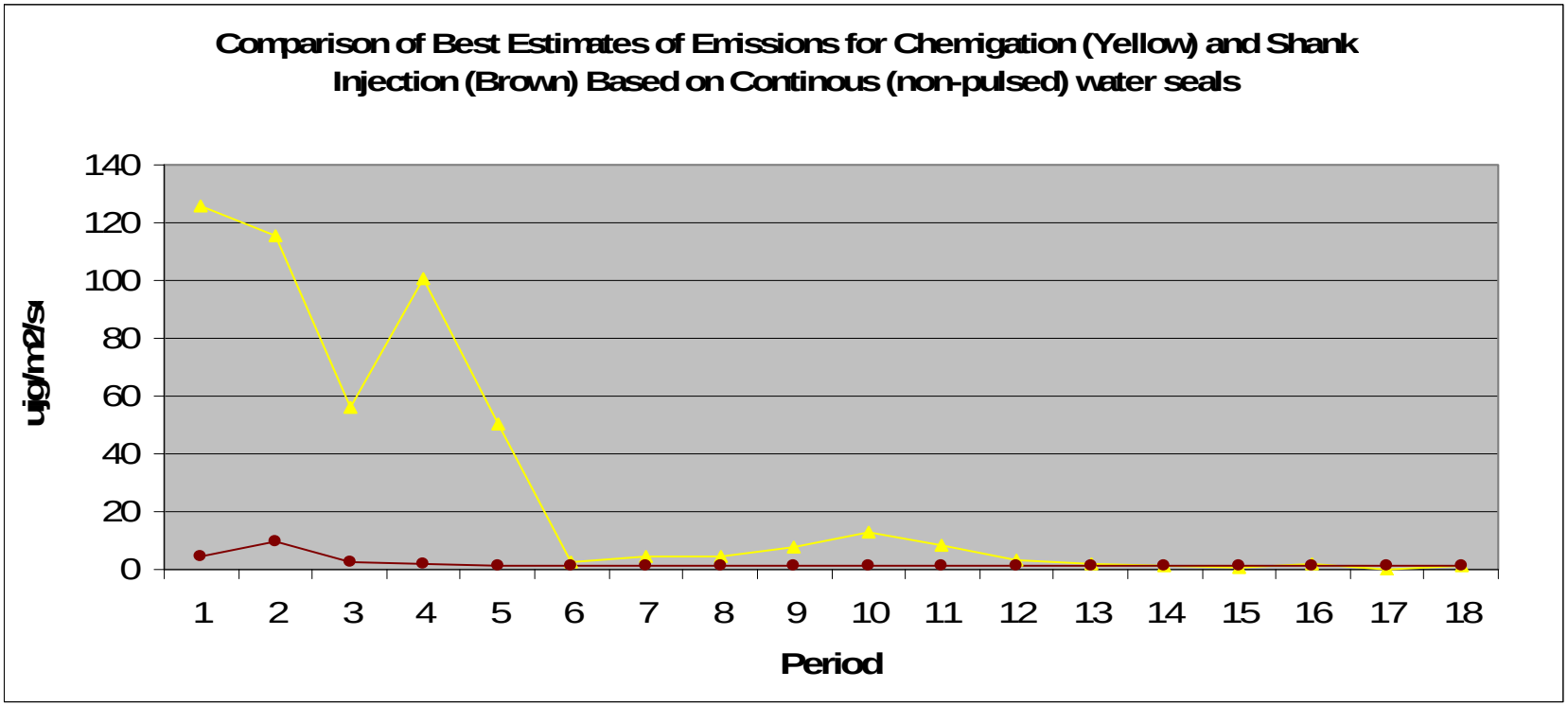
Achieve Good "Seal" / Create a Barrier

- Top layer should be established in manner to minimize volatilization loss
- Effective soil compaction can be effective in some soils if soil sufficiently moist and adequately compacted
- Water seals very effective - - when strategically timed and when available as option - - accepted by EPA

Monitor for Odors / Mitigate if Necessary

- Effective and consistent management of off-gassing is two-step process:
- First, follow all of preceding steps to minimize the potential for odors
- Second, monitor to provide rapid mitigation as needed (water seals are good option when feasible)

100-Fold Difference in Emission Rates During Application



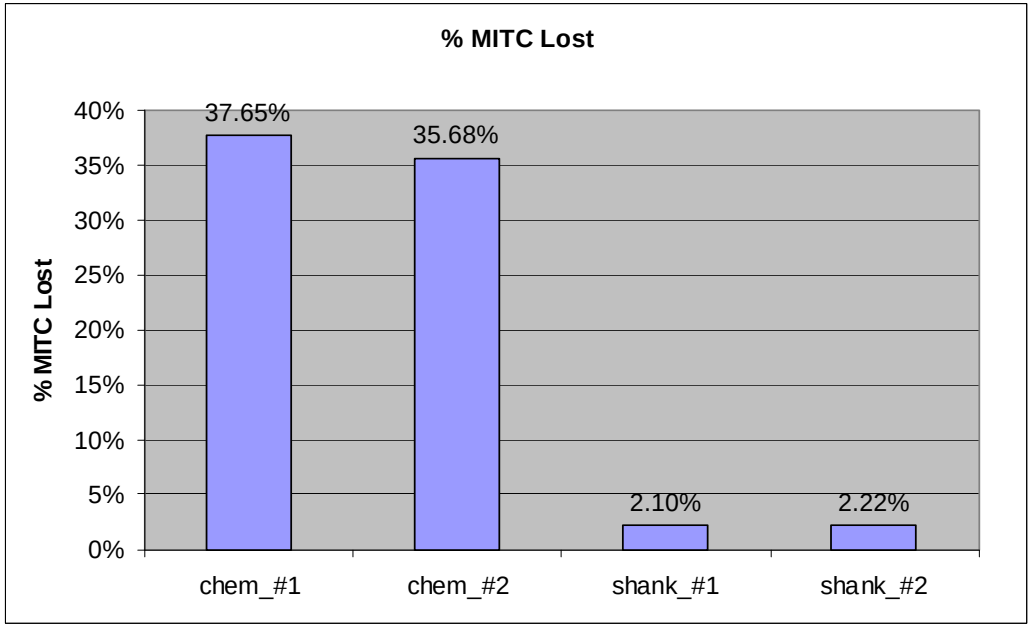
Preferred nighttime applications: shank compaction or 4:00 AM start

Example: Shank Compaction Rig

Shank Injection / Compaction

VOC Benefits as Well as Buffer Zone Benefits (Carrot Study 2007)

Important for Buffers & VOC Issues

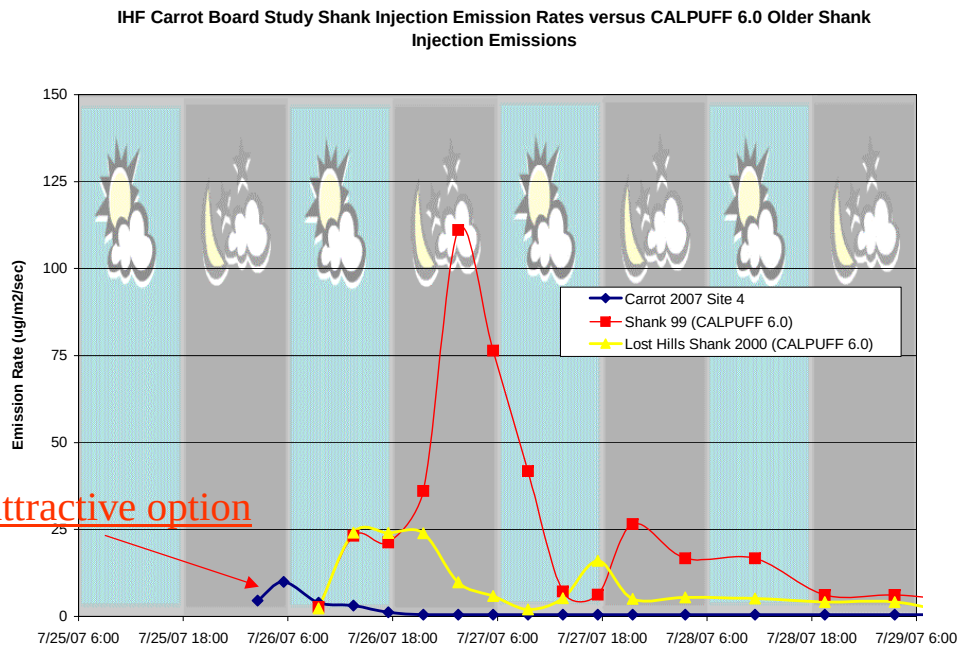


Chemigation standard: ~59 % and Chem
Early start lost ~ 44%; Chem Interm ~ 24 %

Example of Emissions Management: Shank Injection

(Emission) x (model) < endpoint

Comparison of New Data With Comparable Previous Studies: Shank Injection



Very attractive option

End

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