

Mitigating Emissions and Odor from Land Application

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Most Complaints Arise from Land Application



Wastewater Irrigation Sprinklers

- Impact Sprinklers
- Drop Nozzles
 - Sprays
 - Rotating Heads



Nelson R3000 Rotator



Nelson S3000 Spinner



Senninger I-Wob

Drop Tubes to Control Odor and Drift

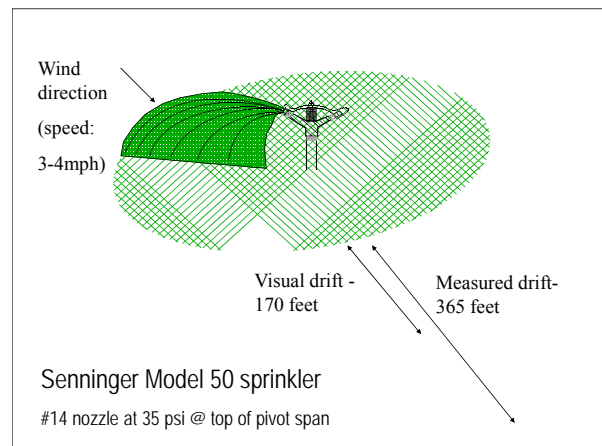
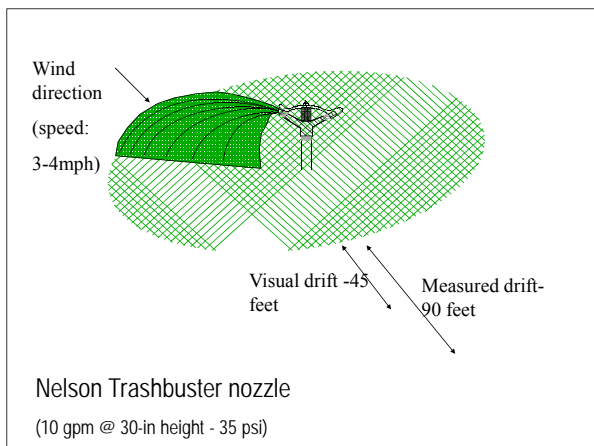
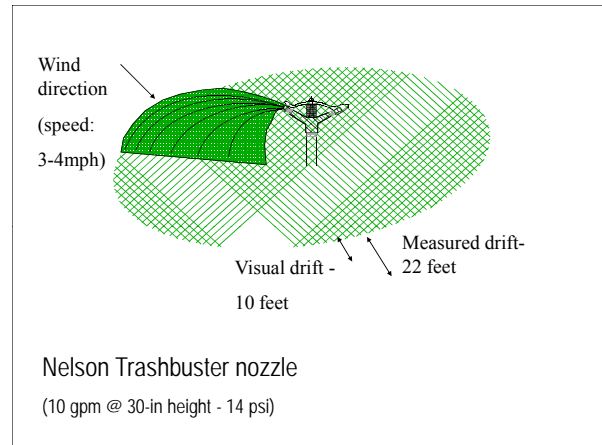
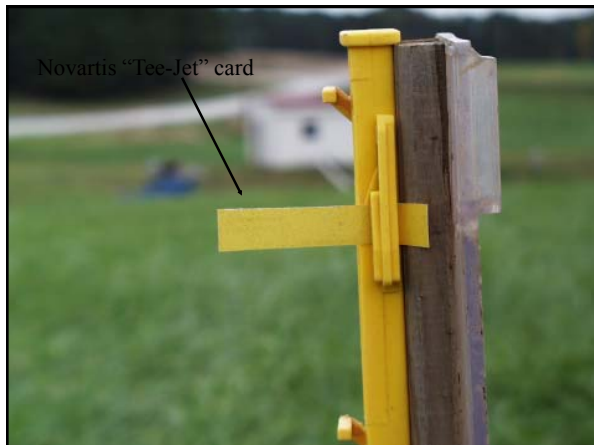
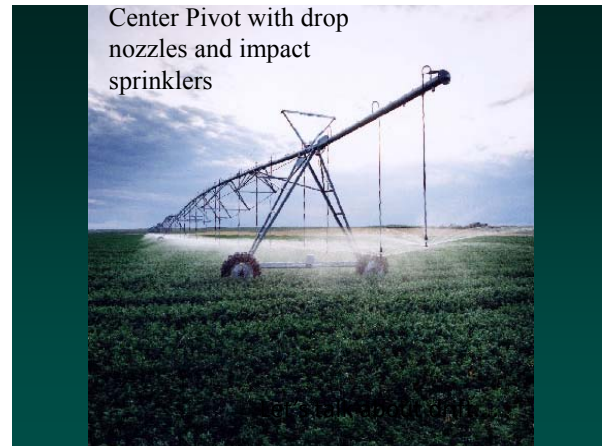


Wastewater Irrigation - Drag Hose

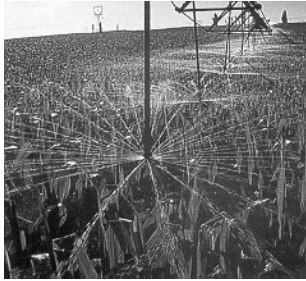


Liquid Effluent Land Application

Practice	Distance	Detection Threshold	Odor Intensity	H ₂ S/TRS	NH ₃
Range - units	meters	(1.4 - 60)	(0 - 6)	ppm	ppm
Drag Tube	100	15.2	3.5	0.058	0.00
maximum		42.4	5.0	0.005	0.000
*Rotator Nozzles	100	26.5	4.6	----	0.13
maximum		60.0	5.0	----	0.25
*Spray Nozzles	150	12.5	4.8	0.222	0.28
maximum		60.0	6.0	0.295	0.30
*Wobbler Nozzles	100	24.1	4.9	0.079	0.30
maximum		42.4	6.0	0.085	0.35



Wastewater Irrigation



- Dilute 1:5 –10 H₂O
- Maximize droplet size
 - Large nozzles
 - Low pressures
- Minimize distance droplets move through the air
 - Downward projecting nozzles
 - Drops to put nozzles in canopy or close to ground
- No wastewater irrigation if >10mph

Slurry Manure Application



Solid Manure Application



Slurry Application

Application Method	Odor Threshold
Broadcast	2818
Plow	200
Harrow	131
Inject	32
Unmanured	50

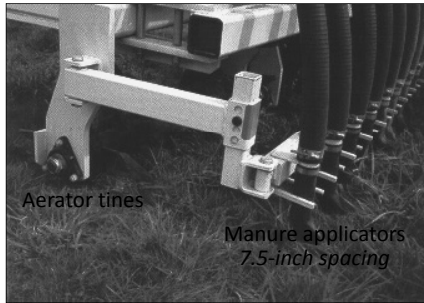
Solid & Slurry Manure Application

Practice	Distance	Detection Threshold	Odor Intensity	H ₂ S/TRS	NH ₃
Range - units	meters	(1.4 - 60)	(0 - 6)	ppm	ppm
Dry Corral Manure	75	10.4	3.4	0.087	4.00
maximum		21.2	6.0	0.087	4.00
Dry Corral Manure	100	23.4	4.2	0.009	0.05
maximum		42.4	6.0	0.010	0.10
Settled Dairy Solids	70	9.3	3.2	0.044	0.50
maximum		42.4	5.0	0.061	0.75
Vacuumed Manure Slurry	100	11.8	3.2	0.031	0.83
maximum		42.4	5.0	0.046	1.2

Drop Hose Toolbar



Aerator Incorporator



Injection

Running double disk injectors deeper covers manure better but also covers more crop residue.



Injection

Direct injection of manure is the most effective way to minimize gaseous emissions.



Soybean Stubble in SC Coastal Plain Applied at 60,000 gallons per hour



Average Ammonia Loss over 2 days
Leytem et al, Professional Animal Scientist. 25(1): 93-98

