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Pesticide Sprayer Cleanout

A review of good practices for a clean sprayer

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Credits

- Thia Walker, CSU Extension
- Ples Spradley, Univ. of Arkansas Extension
- Dr. Ed Peachy, OSU
- Extension publications on sprayer cleanout (NE, IA, AR, MO)

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Basic Cleanout Practices

- Why is it so important?
- Cleaning methods and strategies
- Cleaning agents
- Pesticide specific cleaning directions

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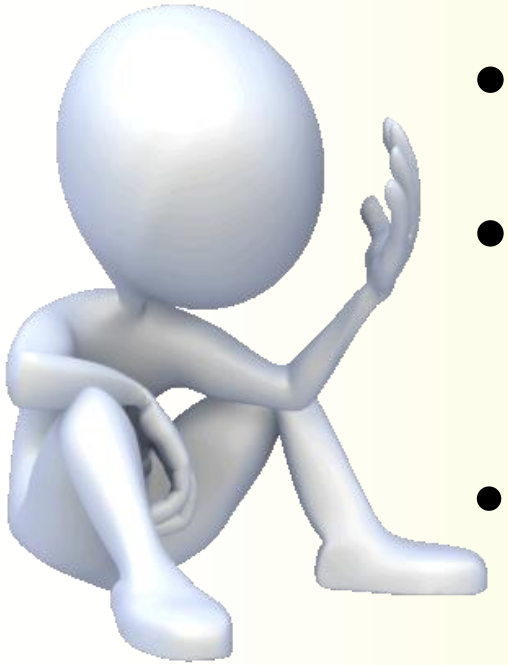
SO many issues!



- Where to do it?
- How much water to use?
- What to do with the rinsates?
- Do you need to use tank cleaners?

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Importance of Sprayer Cleanout

Sprayer contamination can cause crop injury

- May be using burndown treatments
- Wide variety and crops and pesticide usage
- Some products are active at very low rates

Importance of Sprayer Cleanout

Sprayer contamination can cause crop injury

- GMO and conventional crops grown
- Postemergence applications sprayed directly on the crop foliage has greater potential for crop injury than soil applied

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Importance of Sprayer Cleanout

Clean sprayers will help manage herbicide resistance

Importance of Sprayer Cleanout

- Must know pesticide product's mode of action and adjuvants for best cleaning
- ALWAYS read the pesticide label for specific instructions on sprayer cleanout

Herbicide Mode of Action (MOA)

- Growth regulators: 2,4-D; dicamba (Banvel)
- ALS inhibitors: sulfonureas (Accent, Harmony) and Imi's (Pursuit, Raptor)
- Photosynthesis inhibitors: Atrazine, Sencor, Sinbar

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Herbicide Mode of Action (MOA)

- ACCase inhibitors: Fusilade, Poast, Assure II
- Aromatic Amino Acid Synthesis inhibitors: Roundup
- Glutamine Synthesis inhibitors: phosphoric acid (Liberty)
- PPO inhibitors: Aim, Blazer, Valor

Photo from Dr. Ed Peachy, OSU

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Problems

1. Susceptible crops
2. Very active herbicides in small amounts
3. If the entire plumbing system of the sprayer is not cleaned after application
4. Tank additives: especially following 2,4-D, dicamba and ALS herbicides (Iml's, SU's)

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Tank Additives

- Adjuvants
- Fertilizers
- Oil
- pH blend adjuvants
- These products may remove herbicide residues in spray tanks, hoses and strainers—may be a problem when switching herbicides!

Growth regulator herbicides

- 2,4-D and dicamba
- Tank additives may be helpful for solubilizing herbicides and cleaning out the tank after these herbicides are used

Growth regulator herbicides

- Recommended that a small amount of fertilizer or crop oil be flushed through system after growth regulator herbicides

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- Growth regulator:

ALS inhibitor:

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CLEANING GUIDELINES FOR THE TANK

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When do you clean your spray equipment?

- At the end of the day?
- At the end of the week?
- When changing pesticides?
- When changing sites?

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Cleaning Strategy

- ✓Dilute
- ✓Solubilize or Deactivate
- ✓Extract

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Cleaning Strategy: Dilute

- Add one-half tank of fresh water and flush tanks, lines, booms and nozzles for at least 5 minutes
- Use a combination of agitation and spraying
- Best to spray onto cropland to avoid accumulation of rinsate

Cleaning Strategy--Solubilize

- CLEANING SOLUTIONS: Fill the tank with clean water and one of the following cleaning solutions per 100 gallons of water:
  - 1 gallon household ammonia, or
  - 8 lbs trisodium phosphate cleaner detergent, or
  - Chlorine bleach (ONLY for a few), or
  - Commercial tank cleaner (follow label instructions)

Cleaning Solutions

- <u>For growth regulator herbicides and ALS inhibitors:</u>

❑Let solution stand overnight. Add more water to fill tank and agitate solution for at least 15 minutes and flush through nozzles. Drain the tank.

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Cleaning Agents

- Agents dilute, solubilize and deactivate
- Select based on the pesticide and formulation to be cleaned
- Agents should penetrate and dissolve pesticide residues so they are removed when rinsate removed from sprayer
- Some commercial tank cleaners perform better than household detergents and deactivate and solubilize

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Tank & Equipment Cleaner

AGRICULTURAL • COMMERCIAL • INDUSTRIAL

KEEP OUT OF REACH OF CHILDREN

CAUTION

NET CONTENTS: 1 POUND (454 g)

Loveland PRODUCTS

Loveland Products, Inc. • PO Box 1286 • Greeley, CO 80632

CAUTION: Harmful if swallowed, absorbed through skin, or inhaled. Avoid contact with skin, eyes or clothing. Wear chemical resistant gloves. **Personal Protective Equipment:** Wear chemical-resistant gloves, Long-sleeved shirt, long pants and socks.

FIRST AID: If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice. **If on skin or clothing:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. **If swallowed:** Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person. **If inhaled:** Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

FOR A MEDICAL EMERGENCY INVOLVING THIS PRODUCT CALL: 1-866-944-8565.
Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

GENERAL: *TANK & EQUIPMENT CLEANER* is an all purpose cleaner for flushing spray tanks, hoses, booms, filters, screens and nozzles when changing chemicals and prior to equipment storage. *TANK & EQUIPMENT CLEANER* will remove chemical deposits including rust, neutralize acid-based herbicides including 2,4-D, and leave a protective film if not rinsed before extended storage. *TANK & EQUIPMENT CLEANER* has been shown effective to solubilize and remove sulfonylurea herbicides.

DIRECTIONS FOR USE: *TANK & EQUIPMENT CLEANER* should be used at the concentration equivalent of 1 pound per 100 US gallons (120 grams per 100 litres) of water for general cleaning and most pesticides. For pesticides demonstrating difficulty to clean (i.e. sulfonylurea herbicides),

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Cleaning solutions:

- Ammonia increases pH, makes Su's more water soluble—easier to remove
- Chlorine bleach accelerates decomposition of SU's
- Chlorine less effective at dissolving and removing SU's
- Never mix chlorine with ammonia or liquid fertilizers

More on Cleaning Solutions

- Fuel oil or kerosene is effective for removing oil-soluble herbicides
- Esters and emulsifiable concentrates
- Should be followed by a detergent rinse to remove oily residue

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Cleaning Strategy—Extract

Clean all parts:

- Remove nozzles, screens, and strainers
- Clean separately in bucket of cleaning solution
- Rinse entire system with clean water
- Apply rinsate to field, if possible
- NOTE: rinsate with chlorine bleach cannot be applied to fields

Cleaning Strategy When Switching Crops

- Follow a more detailed cleaning procedure……..

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Cleaning Strategy

- Step 1: Drain tank and thoroughly rinse with clean water. Spray rinse water through boom at least 5 minutes. *(Rinse 1)*
- Step 2: Fill spray tank with clean water and add cleaning solution. Fill boom, hoses, nozzles and agitate for 15 minutes. *(Rinse 2)*

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Cleaning Strategy

- Step 3: Allow 8 hours for the cleaning solution to fully desorb the pesticide residues inside the sprayer, hoses and nozzles.
- Step 4: Spray the cleaning solution through the booms.
- Step 5: Rinse final time *(Rinse 3)* with clean water and spray rinsate through booms.

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Rinse efficacy

Rinse Number	Sample Location	% Concentration
1	Nozzle Tank Drain	5.5 4.8
2	Nozzle Tank Drain	1 1
3	Nozzle Tank Drain	0.2 0.2

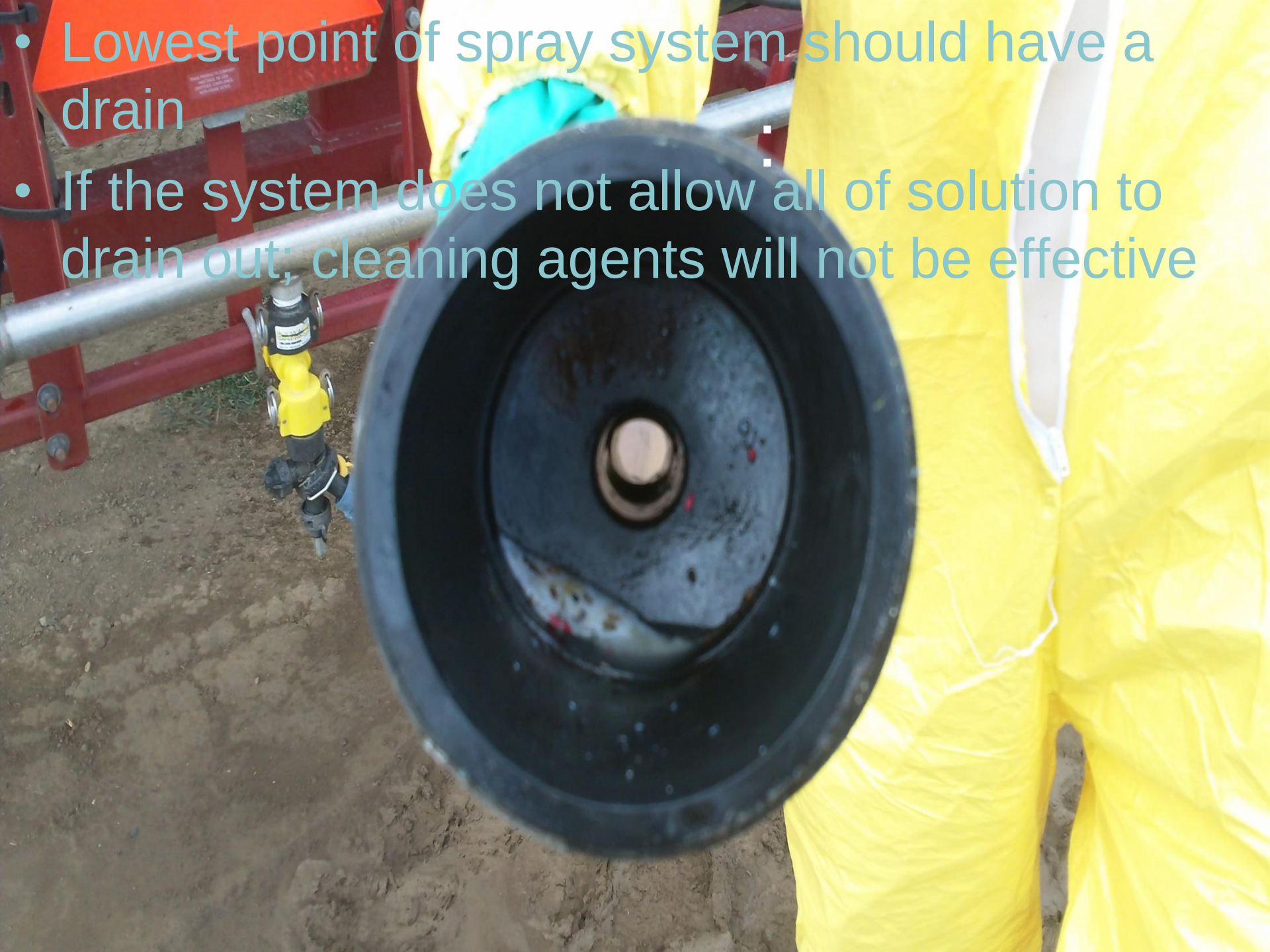
From Ed Peachy, OSU

Pay special attention to the following:

- Sprayer surfaces/components where buildup occurs due to spray followed by drying
- Sprayer sumps and pumps
- Inside the top of tank and around baffles
- Plumbing fixtures, agitation units

Pay special attention to the following:

- Cracked hoses
- Poly tanks tend to have more residue than stainless steel tanks and require more cleaning



- Lowest point of spray system should have a drain
- If the system does not allow all of solution to drain out; cleaning agents will not be effective

More thoughts on cleaning

- Do NOT leave empty sprayer overnight without cleaning it
- If using same pesticide—rinse with clean water
- Be sure the outside of the tank is cleaned off, too

Photo: www.ianrpubs.unl.edu

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Spray Rinsate

- Carry 50-100 gal drum of clean water with spray equipment
- Flush the system and rinse out, in the field
- Spray rinsate on the field consistent with the product's intended use


Remember to wear PPE

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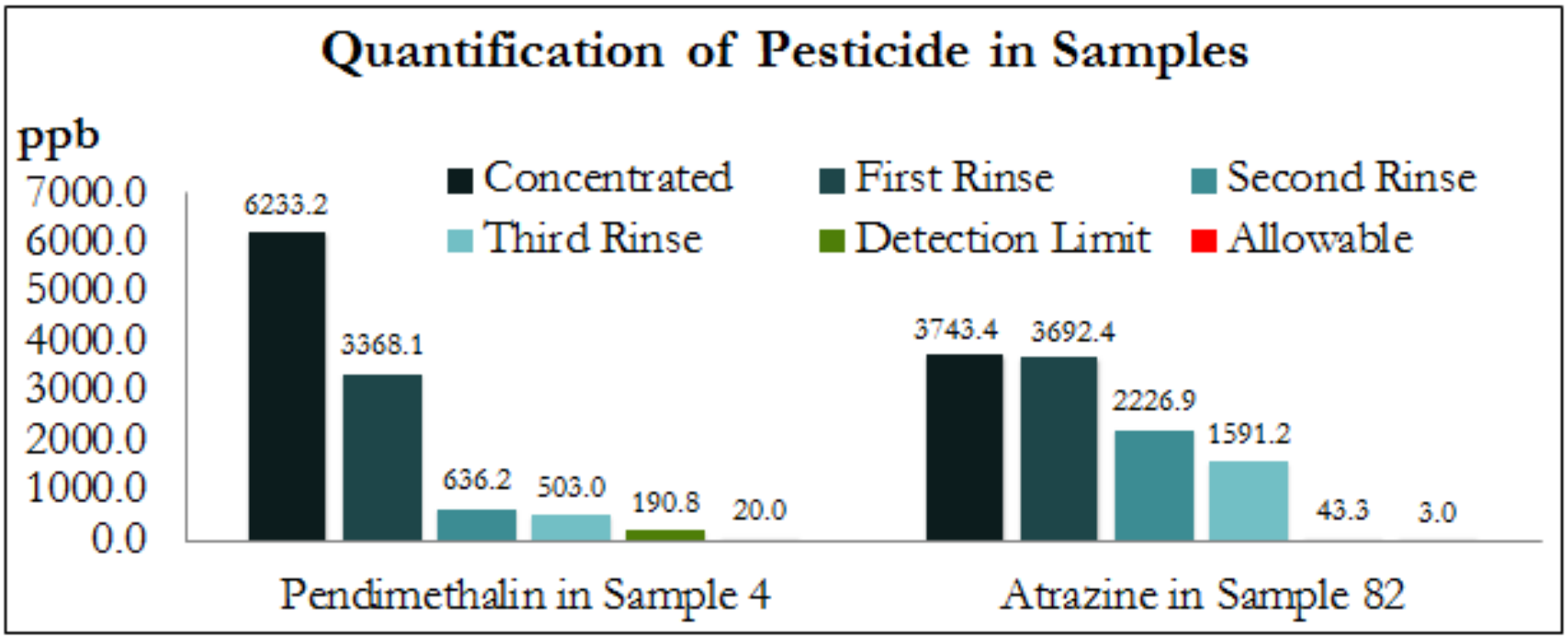
The Clean Machine… A glimpse at ‘real world’ sprayer clean out practices

Colorado State University Research Project:

Thia Walker, Extension Specialist

Dr. Delphine Farmer, Dept. of Chemistry

- 26 samples returned so far…
- Of the 8 analyzed, 2 indicate that the procedures were NOT



- Of 8 instances, only 2 contained pesticide above detection limits.
- Both of these samples registered well above allowable levels of pesticide in drinking water.
- Both tanks used a cleaner.

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Avoiding contamination

- Remove all liquid during the cleanout process
- Use pesticide resistant materials, such as stainless steel tanks
- Follow proper cleanout procedure
  - Pesticide label information

Avoiding contamination

- Rinse nozzles and clean screens
- Use recommended cleaners
- Use a dedicated sprayer