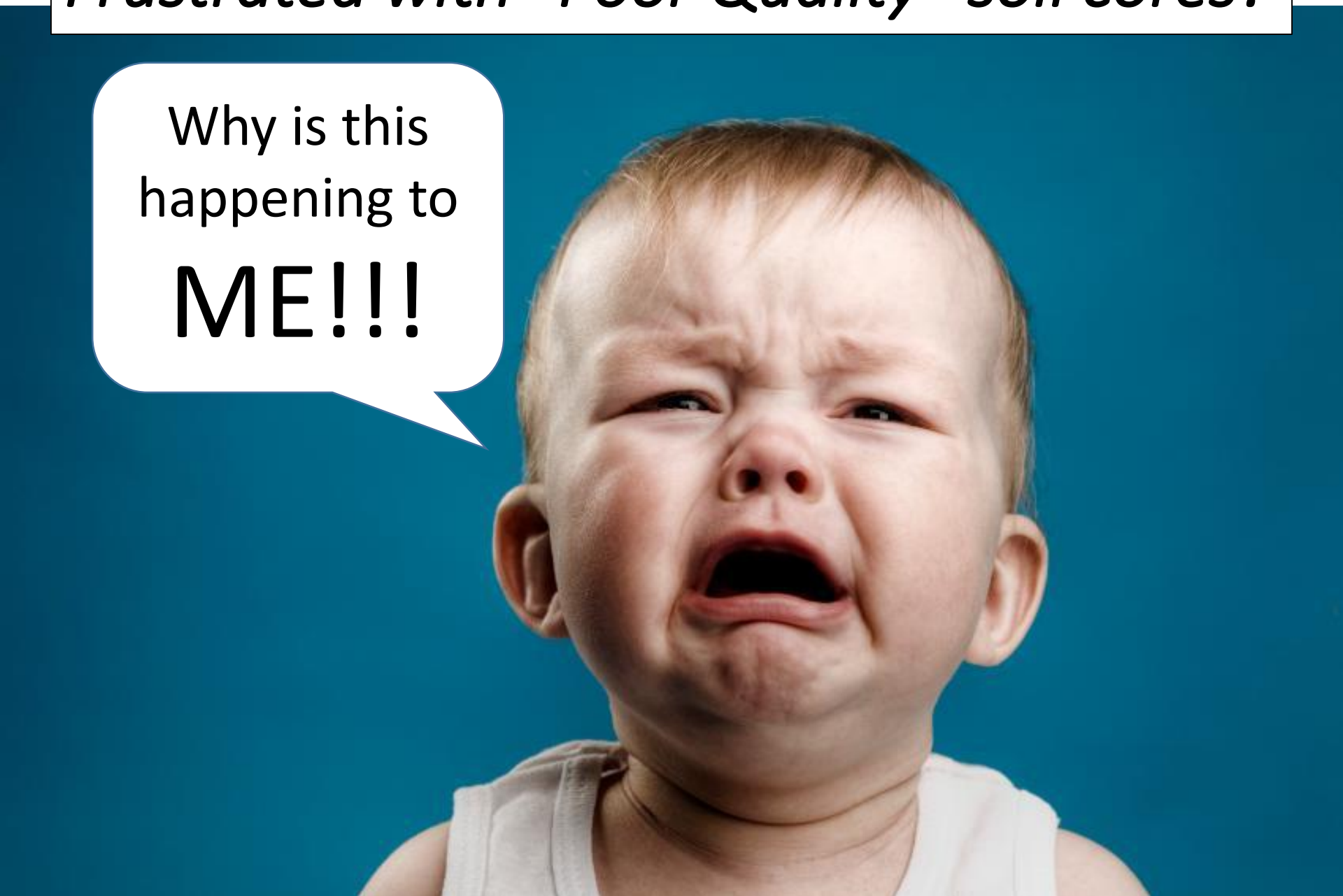
24” Soil Sampling Equipment & Sample Quality

Soil Probes, Tips and Tricks (Cheats)

Frustrated with "Poor Quality" soil cores?



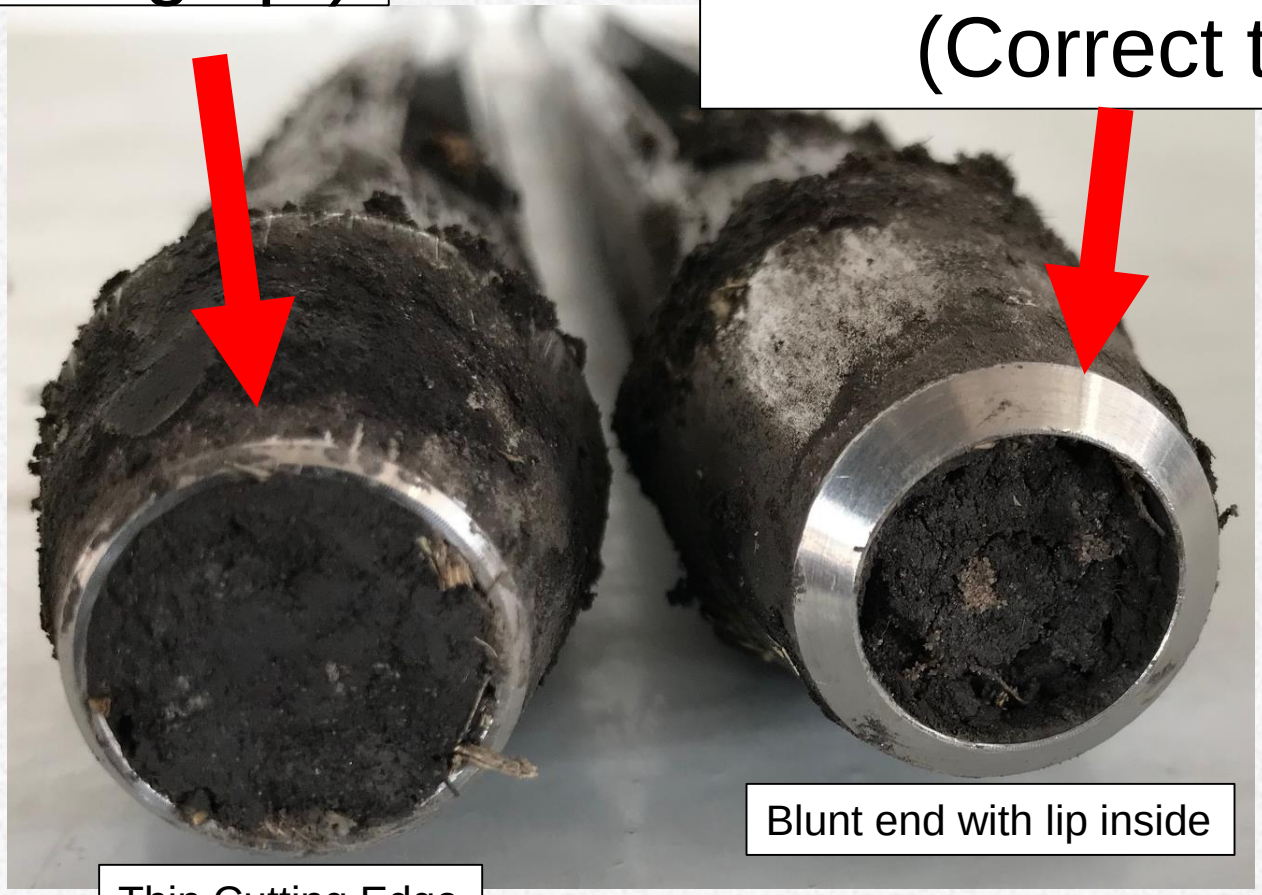
Sampling <u>Wet Soil</u> What Can Go Wrong?

- Tip plugged
- Plugged probe due to build up inside probe
- Core pulls out the bottom of probe (rat tail)
- Compression of soil core in probe (this is OK)

Wet Sticky Soil Conditions

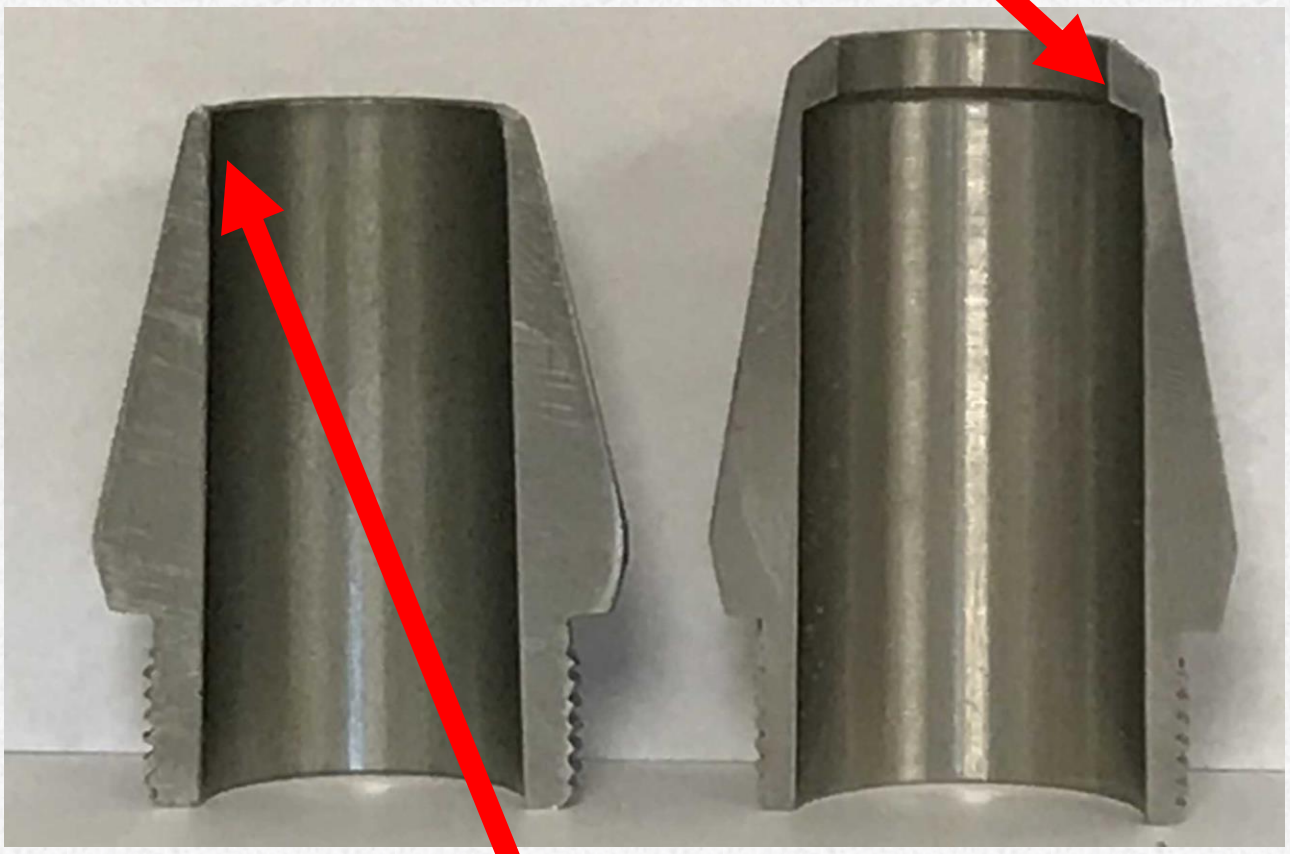
Plugged
Dry Tip
(wrong tip!)

Wet tip with recessed
Lip - Not plugged
(Correct tip)



Dry Cutting Tip vs Wet Tips

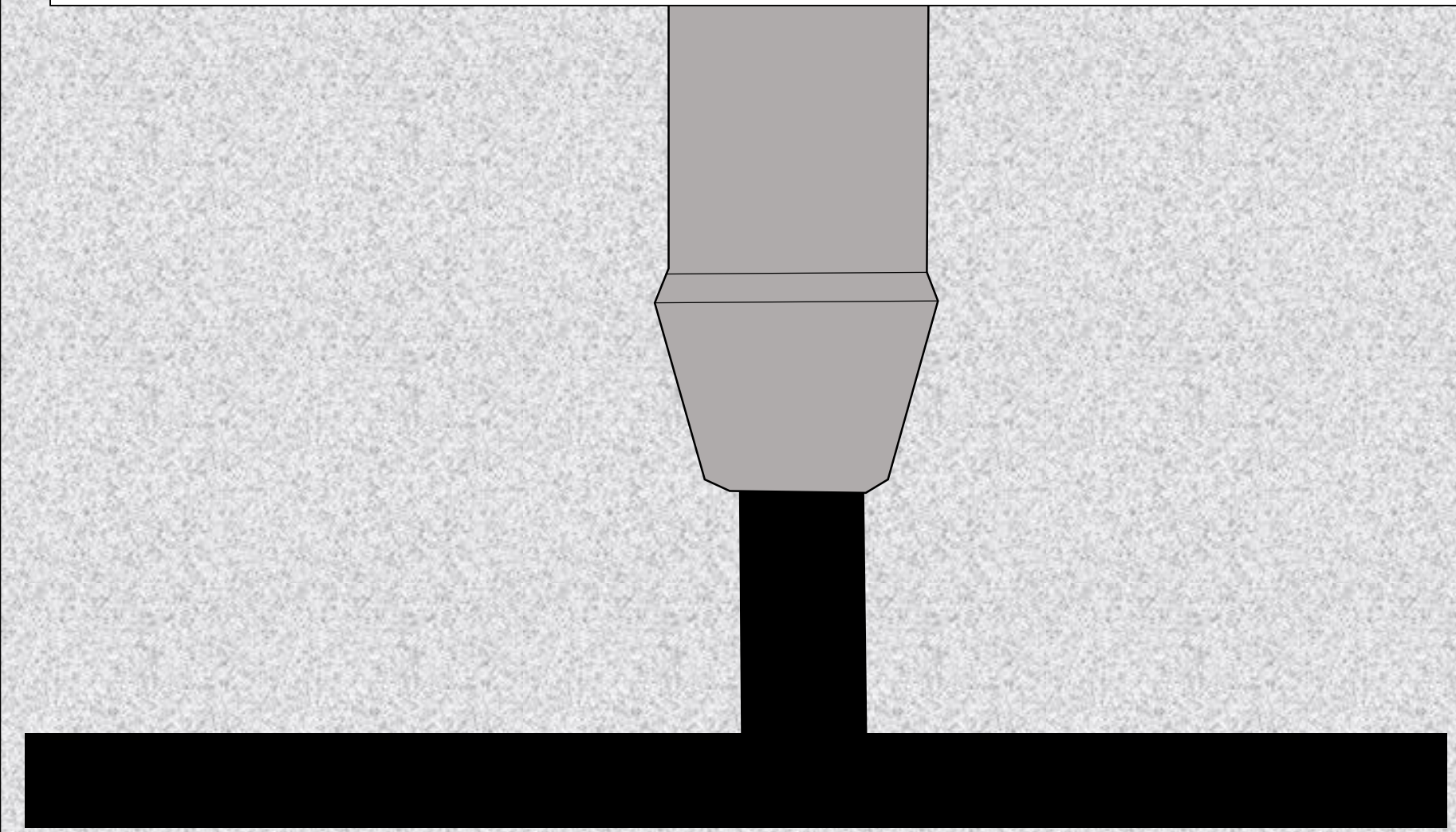
Wet tip - Lip inside tip prevents most plugging in wet stick soils



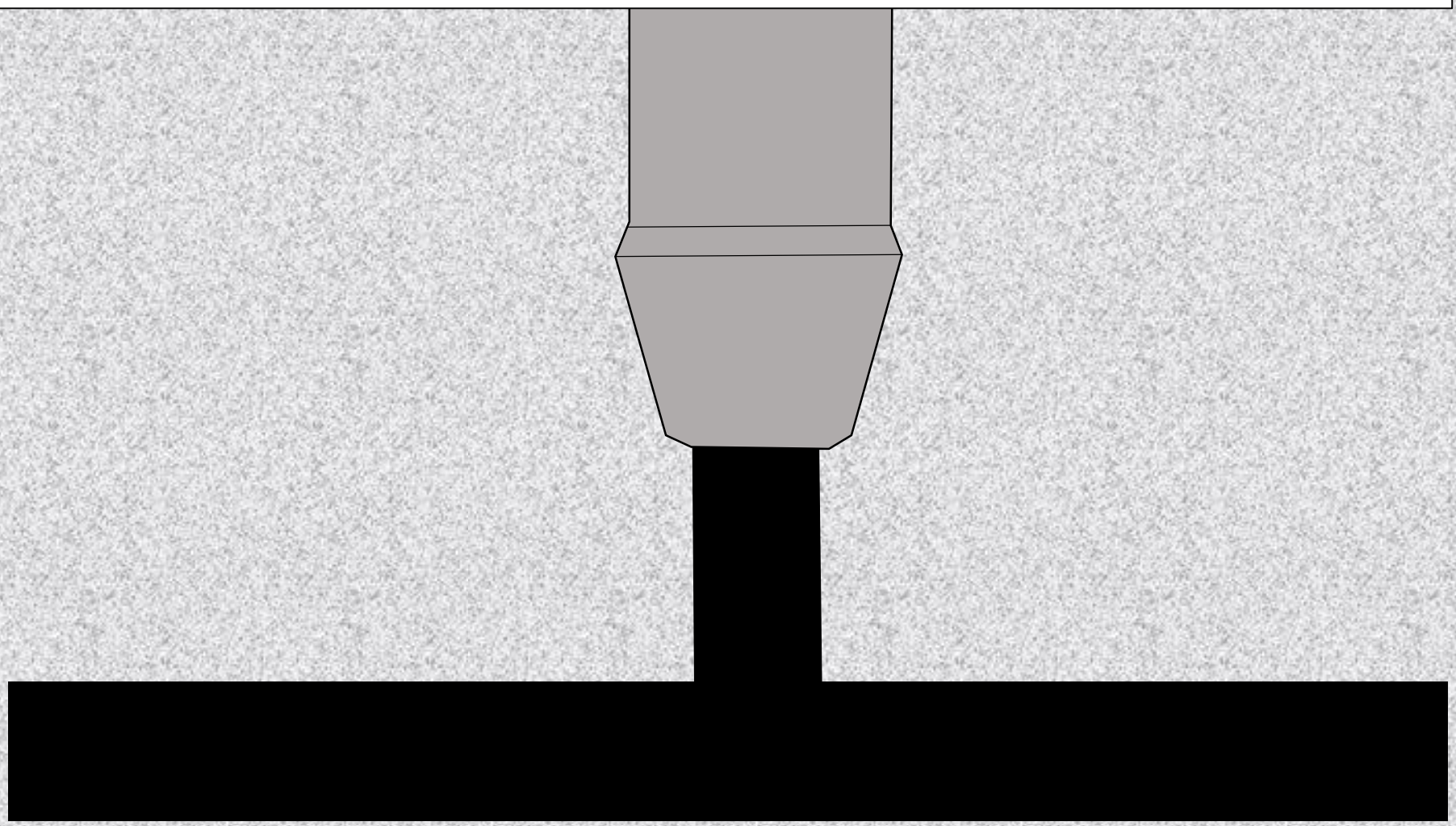
Dry Tip - Sharp cutting edge and slow taper prevent soil core from falling out in dry conditions

Rat Tail (core pulls out!)

Preventing “Rat Tail” in wet Soil Conditions. Soil core does not break off and pulls out



- Solution: Extend probe to 24” depth, raise it up a 2” and then extend the probe to 24” again.
- This action will break the core loose so it will stay in the probe and not pull out



Soil Sampling Lubricants

University of Wyoming 1995 (WD-40 Recommended)

Lubricant	Nitrate Lb/a	P ppm	K ppm	Fe ppm	Mn Ppm	Zn ppm	Cu ppm
Control	14	11	218	15.0	1.5	0.8	1.1
PAM	16	11	227	14.6	4.0	0.8	1.1
Silicone	12	10	219	14.2	1.5	0.8	1.1
WD-40	**14**	**10**	**221**	**13.9**	**1.6**	**0.8**	**1.0**
LSD .05	ns	ns	ns	ns	ns	ns	ns

AGVISE will be doing a research project on WD-40

AGVISE LABORATORIES

Why WD-40?

- Testing shows no contaminants
- Very good lubrication
- Evaporates away quickly (others linger and remain sticky on the probe)
- High carbon chain does not encourage microbial activity

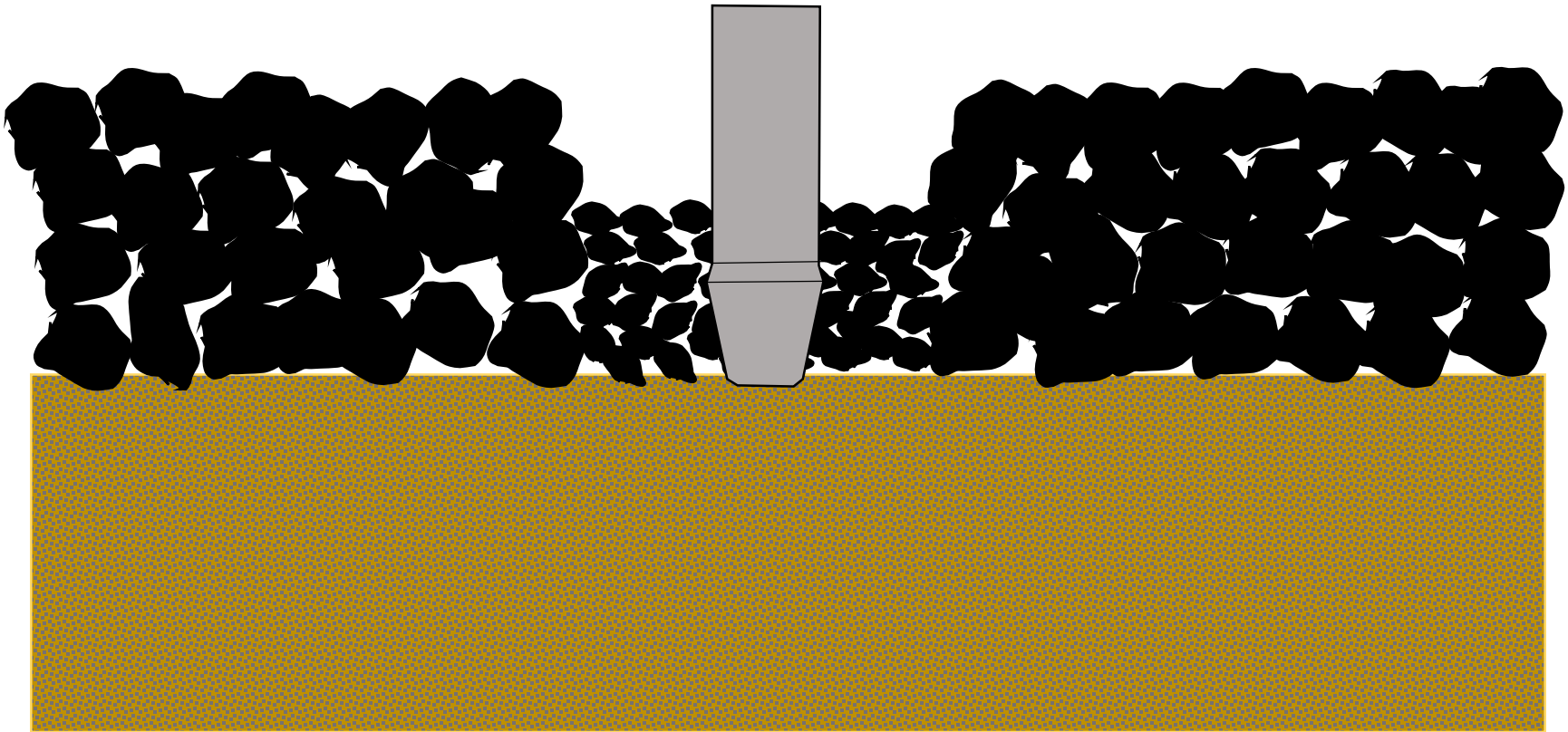

WD-40

Sampling <u>Dry Soil</u> What Can Go Wrong?

- Powdery dry topsoil falls to bottom of probe (lower P soil test results)
- Dry soil falls out the bottom of the probe (empty probe Grrrrrrrrr”)
- Hard dry clods prevent soil from coming into probe tip (can miss some topsoil)
- Not enough weight to push probe 24” into soil Lifts truck! (receiver mounted)

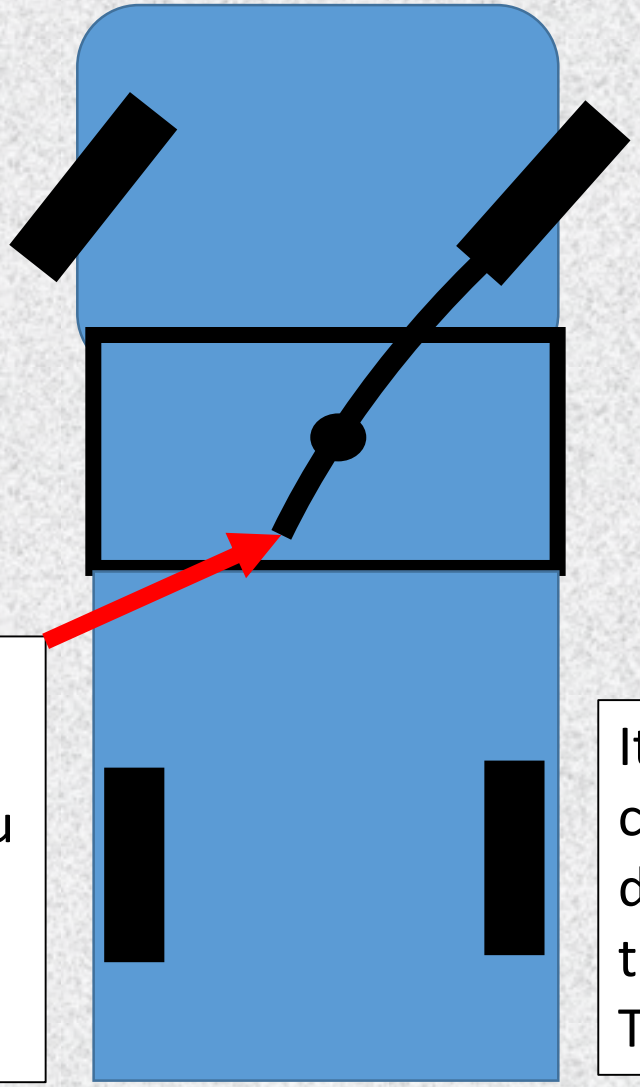
Tilled Soil - Sample in Wheel Track!

- Clods of soil tend to plug tip or be pushed away
- Compressed/dense soil cuts better – less plugging
- Get a better more consistent slice of soil profile
- Tend to get better P soil data from wheel track



Sampling from Wheel Track

Cab mounted Cylinder



Wheel track will be visible through the hole in the floor as you turn to the right. Take core from center of wheel track.

It is important to mount cylinder close enough to driver so he can see down the hole and see wheel Track.

What is a "Good" soil core?

- Compression happens to soil core inside the tube
  - Soil core can be compressed when air is squeezed out and core ends up shorter than 24".(moisture dependent)
  - More compression when soil has moderate moisture
  - No compression when frozen, saturated or very dry
  - Soil cores longer than 18" are good quality and should be submitted as 24" cores **(slotted probe so you see core)**
  - Compression of core by 15-20% is OK as long as probe tip is not plugged and the core is not pulling out (rat tail)
  - Tip is plugged and core is short! ***Throw the core away*** and try other tips and add lubricant if wet soil.
  - Automated systems do not allow "bad" cores to be thrown away!

Wet Loam/Clay

- Wet soil conditions
  - Need “wet” tip with recessed lip
  - larger tip opening is better
  - WD-40 lubricant is required
- Recommended probe and tip
  - HD Probe with “wet” tip (best)
  - Stainless probe with “wet” tip (OK)

“Wet” Clay Loam Tube and Tip Performance

HD Probe and “Wet” tip

Most consistent

Easier to get core out!!

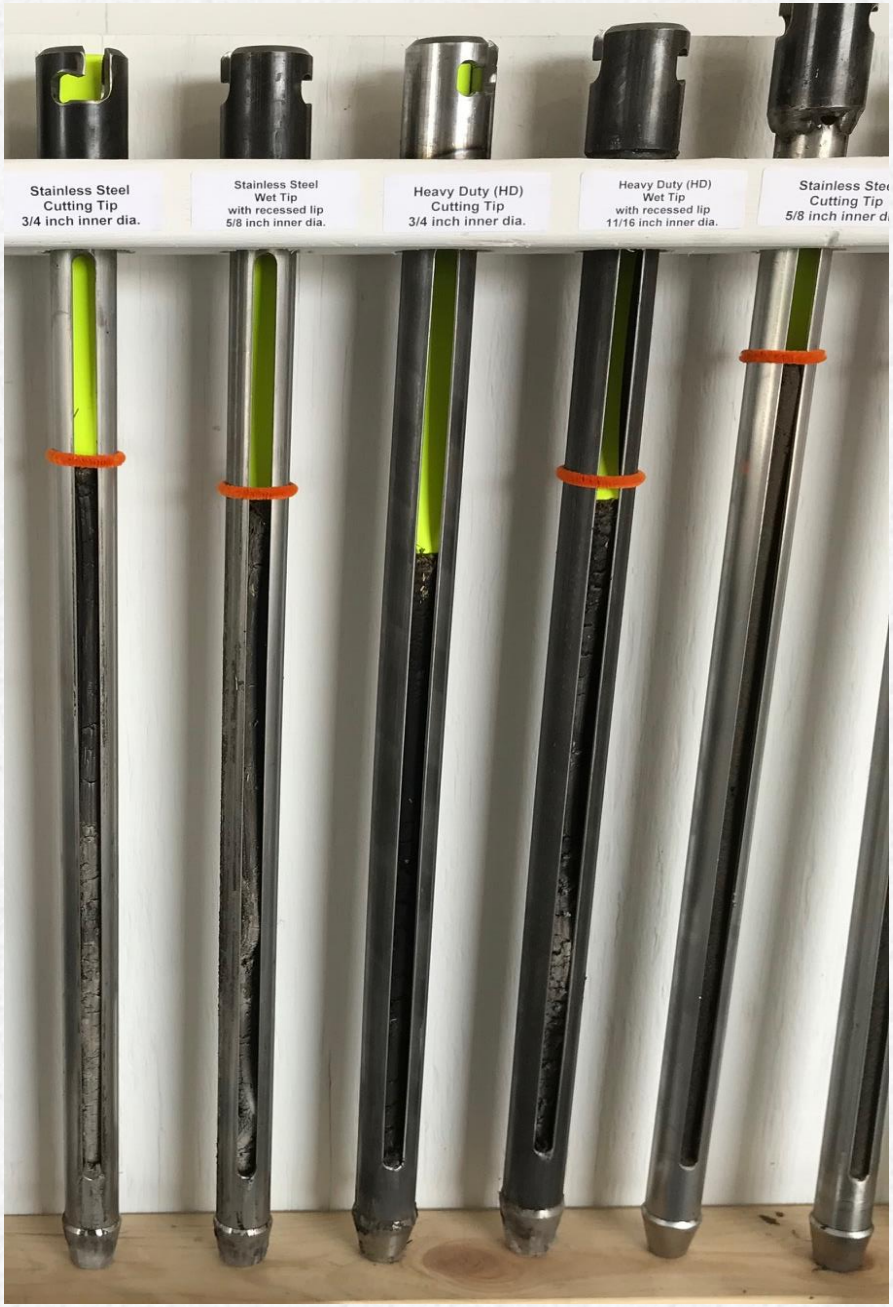
WD-40 is required on wet sticky soils

Dry Loam/Clay

- DRY soil conditions (loam or clay)
  - larger cutting tips are best (>5/8”)
  - Sometimes recessed lip works OK
- Recommended probe and tip
  - HD Probe with “dry/wet” tip
  - Stainless probe with “dry/wet” tip

Even in dry conditions, HD wet tip may work OK on heavy clay soils!

“DRY” Clay Loam
Tube and Tip Performance



Combinations that did OK

HD Probe “Dry” tip

HD Probe “Wet” tip

Stainless 5/8” cutting tip

Stainless 3/4” cutting tip

Dry Sandy Soil

- Dry soil conditions (sandy soils)
  - Cutting tip (sharp edge)
  - Larger tip opening is better (>5/8”)
- Recommended probe and tip
  - HD Probe with new “Dry” tip
  - Stainless probe with 3/4” tip

No WD-40 Needed

“Dry ” Sandy Loam
Tube and Tip Performance

HD Probe with “DRY” tip
Most consistent

Stainless Steel probe with 3/4” cutting tip worked pretty well too!

Stainless Steel Probes and Tips What you need!

- **Stainless Steel Probe Body (slotted and solid)**
  - Stainless Steel – 7/8” inside diameter (smaller than HD)
- Probe tips
  - **Cutting tips**
    - Stainless Steel ½” (not recommended), 5/8” and 3/4”
  - **Wet tip**
    - Recessed lip with 5/8” opening

HD Probes and Tips
What you need!

- HD Chromoly Body (slotted and solid)
  - HD Chromoly Steel – 1 1/16” inside (very hard)
  - Frozen ground sampling and very dry soil
- HD Probe tips
  - **Cutting tip** (New for dry sandy soils) 3/4” opening
  - **Wet tip** (for sticky wet soil or frozen soil) need lip

HD "Dry" Tip New in 2018

Many good comments from customers in dry areas. highly recommend

HD "Dry" tip Included in all sampling Systems now!

AGVISE Demonstration Truck (come and see it all work!)

- 24” electric/hydraulic (receiver)
- 42” Electric/hydraulic (receiver)
- 42” Honda motor powered system

  Telescoping cylinder (in cab)

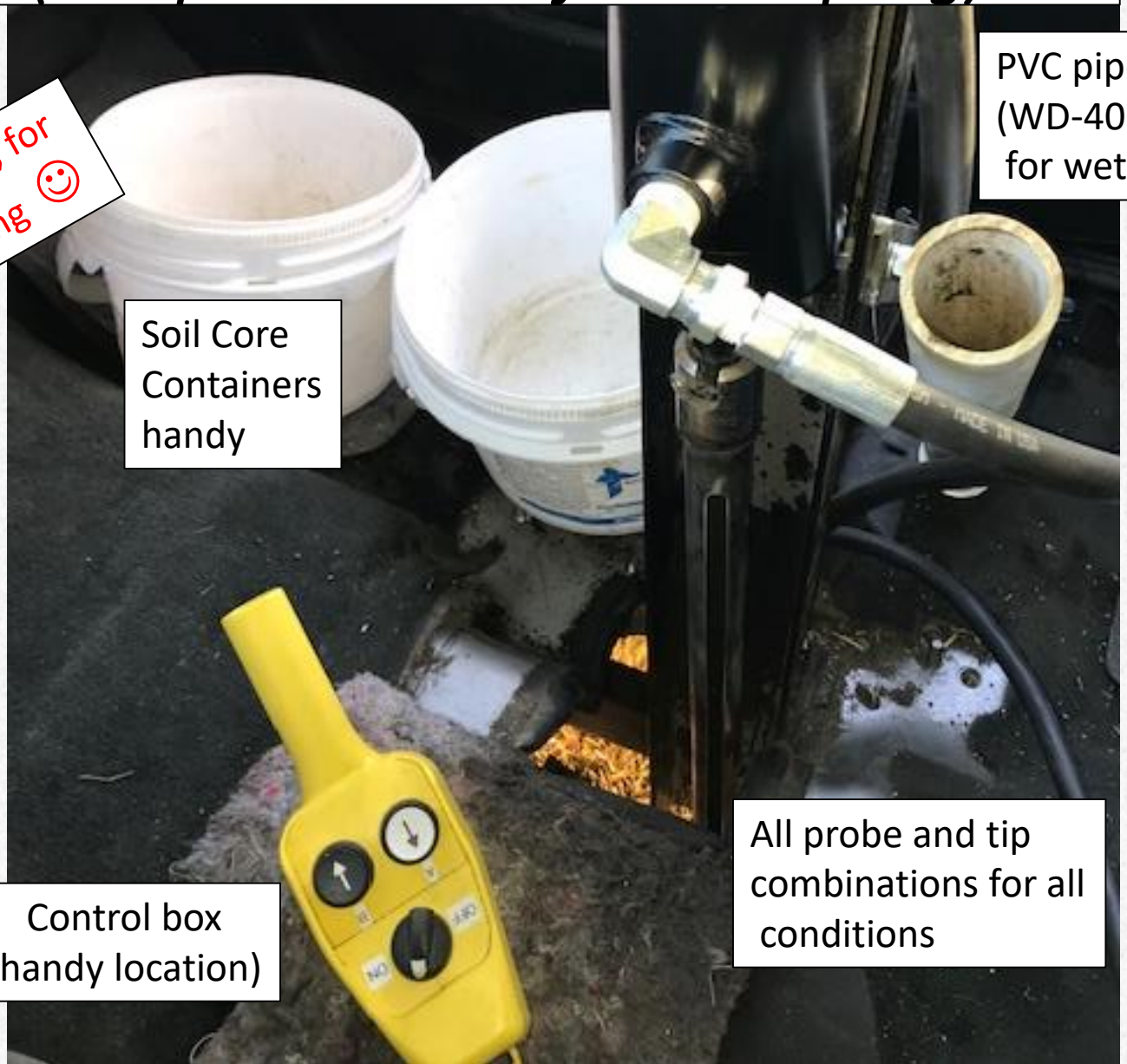
AGVISE Demonstration Truck

24” and 42” sampling systems installed in receiver hitch and telescoping cylinder in cab for viewing and testing

Best Probe and Tip Combinations? soil texture and moisture dictates!

You need both stainless and HD probes and dry and wet tips for all situations

Perfect in-Cab Sampling System
(composite whole field sampling)



Warm or cool cab, for efficient Sampling ☺

Soil Core Containers handy

PVC pipe for (WD-40) for wet soils

Control box (handy location)

All probe and tip combinations for all conditions

Perfect in-Cab Sampling System
(Zone Sampling)

Soil Core Containers handy

Computer with software and GPS showing where you are in field for collecting soil cores in each zone

Thank You
Questions?

CEU sign out!
Ideas for Topics and Speakers
Travel Safe!