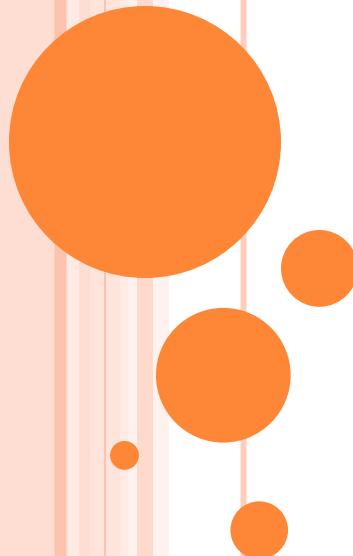


FRM PM_{2.5} MASS PTFE FILTERS

TEFLON FILTER HANDLING



Ali Adams

Nial Maloney

Air Pollution Specialists, Inorganic Laboratory Section

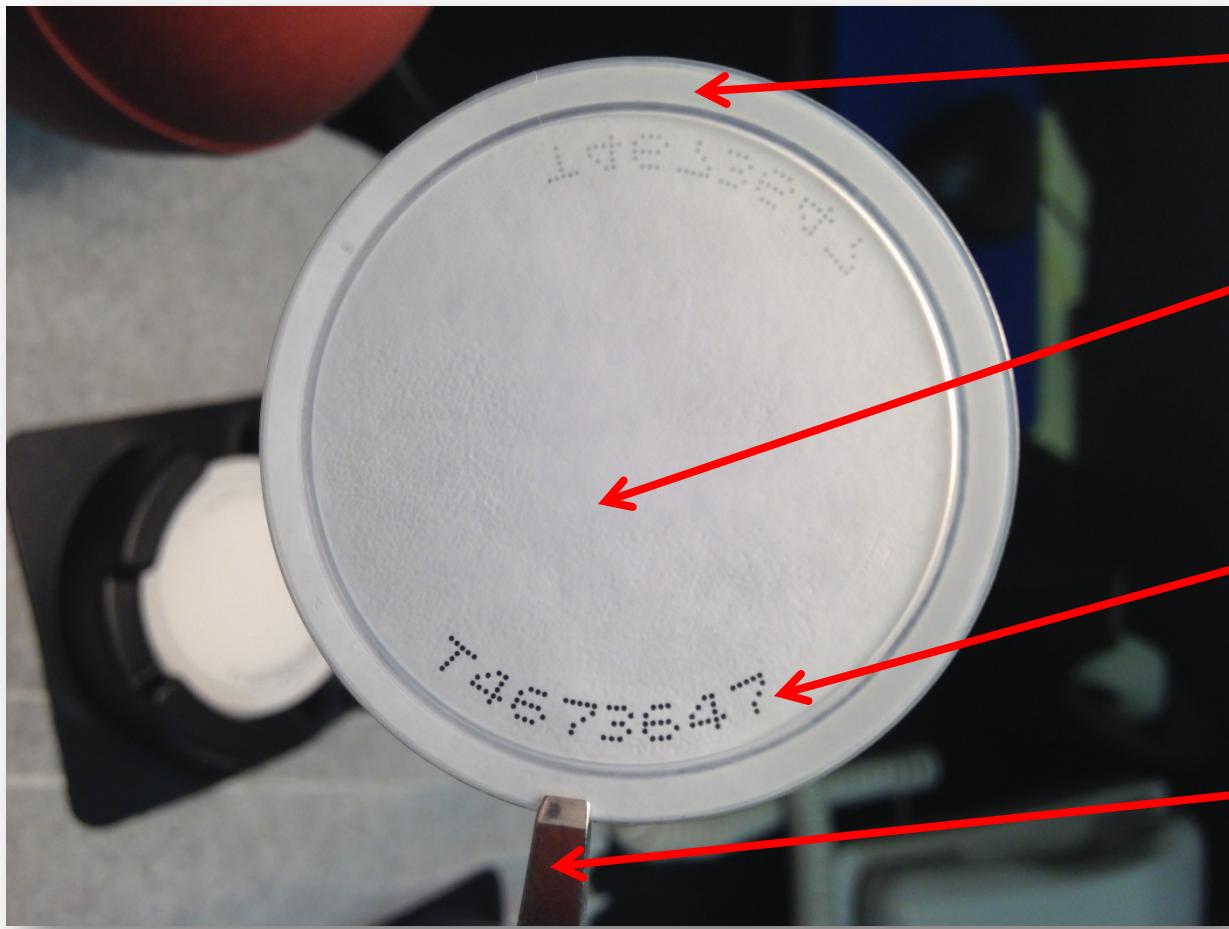
Monitoring and Laboratory Division

California Air Resources Board

GENERAL OVERVIEW

- Filter Anatomy
- Filter Inspections: Defect vs. Reject
- Preparing for the Field
- Filter Handling in the Field
- Sample Recovery: What's Important?
- Back to the Lab
- Final Inspections and Analysis
- Questions and Answers

MTL PTFE FILTER ANATOMY



46.2 mm Diameter
Expected weight 395 mg – 425 mg

Support Ring
Polyfluoro Alkoxy
(PFA)

PTFE
(polytetrafluoroethylene)
membrane with $2 \mu\text{m}$
pore size

Printed serial
numbers on both
sides

PTFE coated, non-
magnetic, non-
serrated, stainless
steel forceps

FILTER INSPECTIONS AND PRE-CONDITIONING

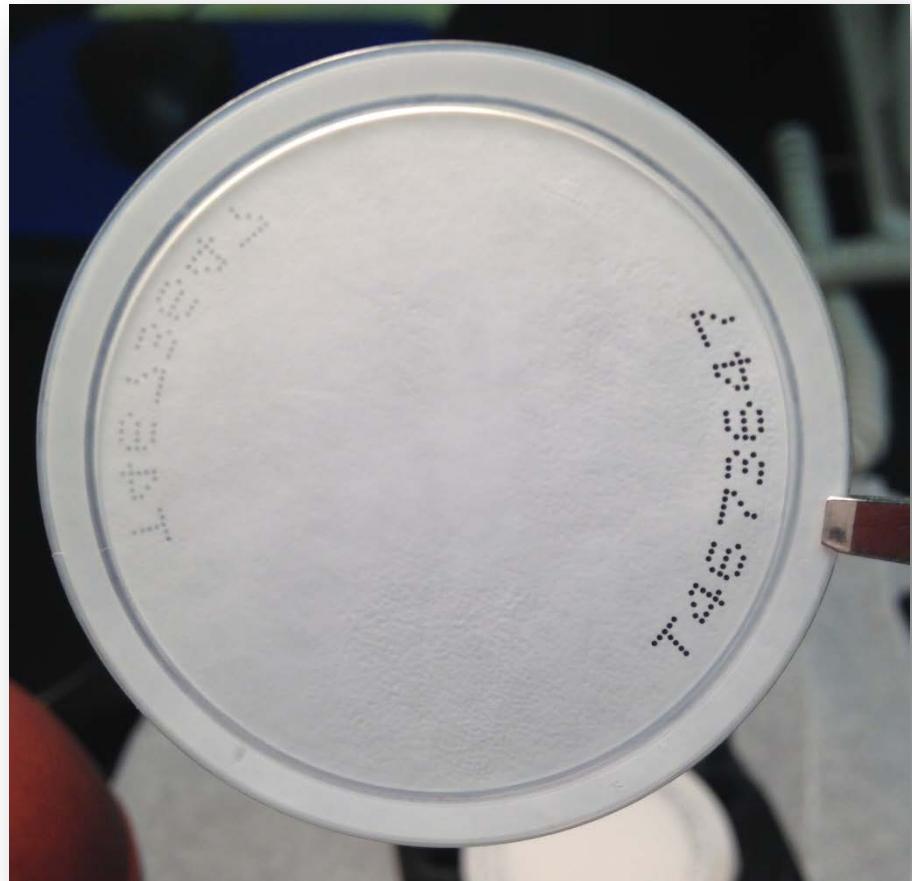
- ~ 500 filters pre-weighed each month = 6,000/year.
- ~ 2 filters inspected for every 1 to the field.
 - 50% Rejection
- ~ 12,000 filter PRE-inspections each year.



PRE-INSPECTIONS

DEFECT VS. REJECT

- Loose Material (Defect)
- Filter “Features” (Defect)
- Non-Uniformity (Defect)



PRE-INSPECTIONS

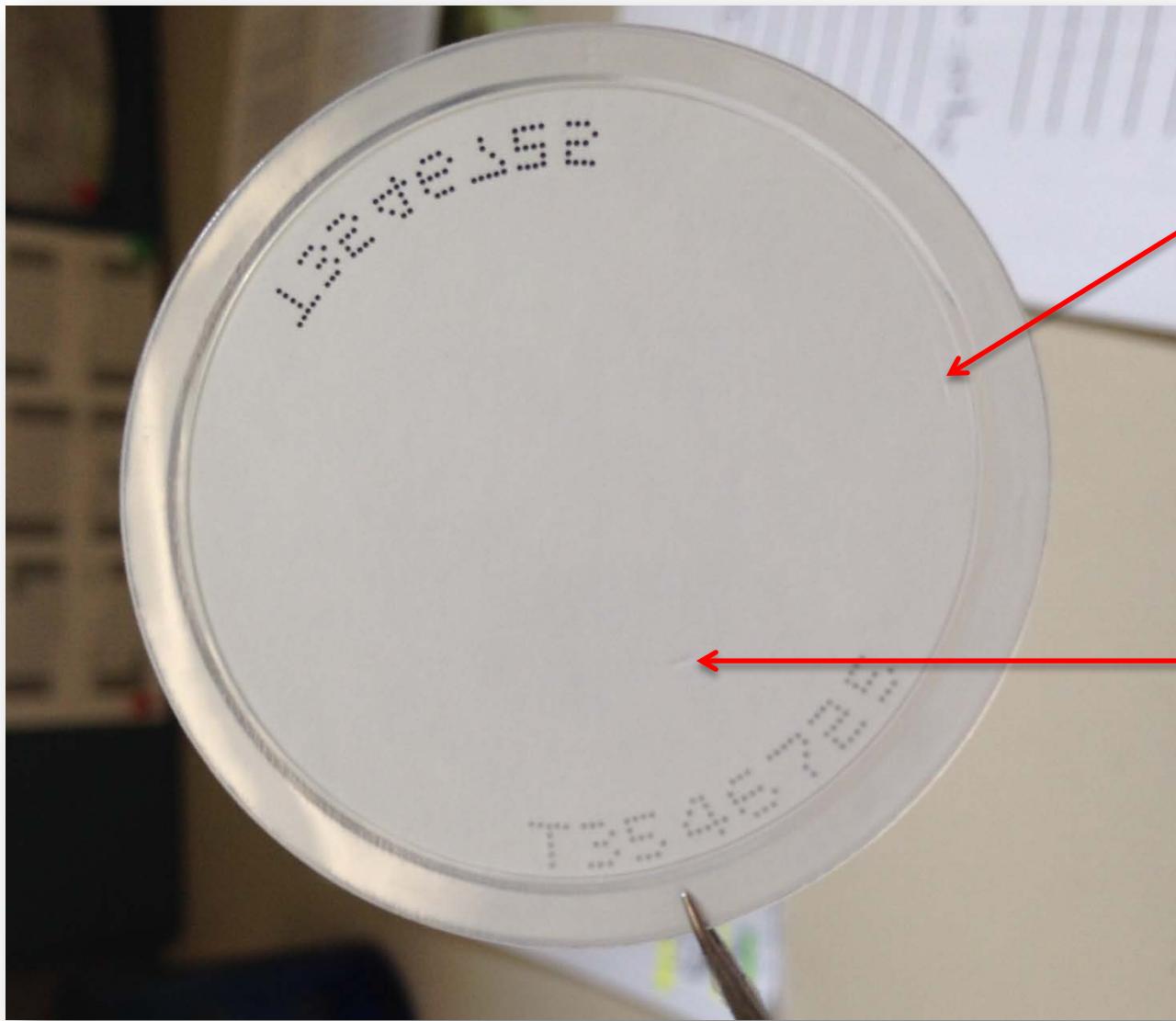
DEFECT VS. REJECT



- Pinholes (Reject)
- Ring Separation (Reject)
- Discoloration (Reject)
- Contamination (Reject)
 - Pre and Post Field
- Imperfections (Reject)
 - Scratches
 - Cuts
 - Dents
 - Inconsistent thickness



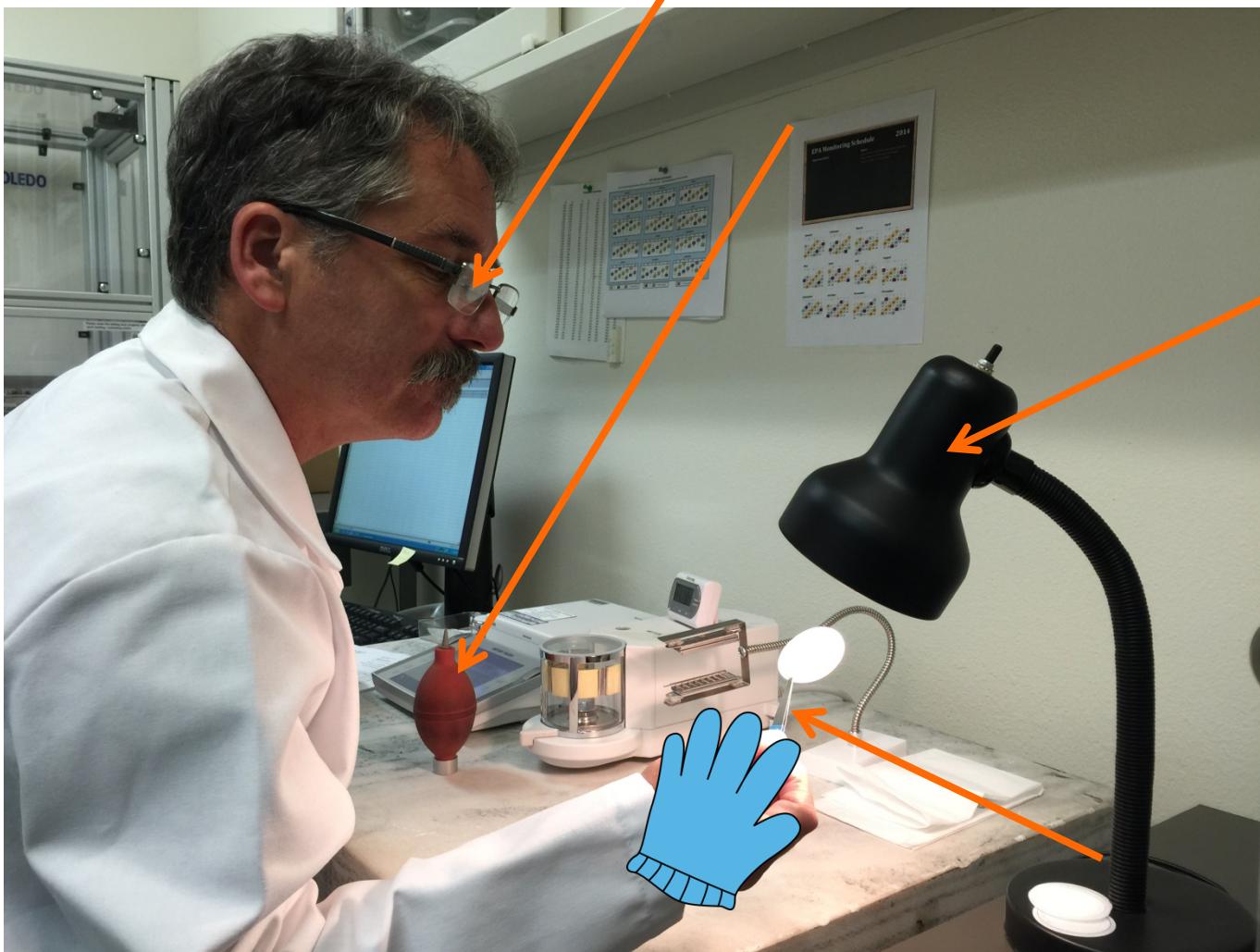
REJECT EXAMPLES



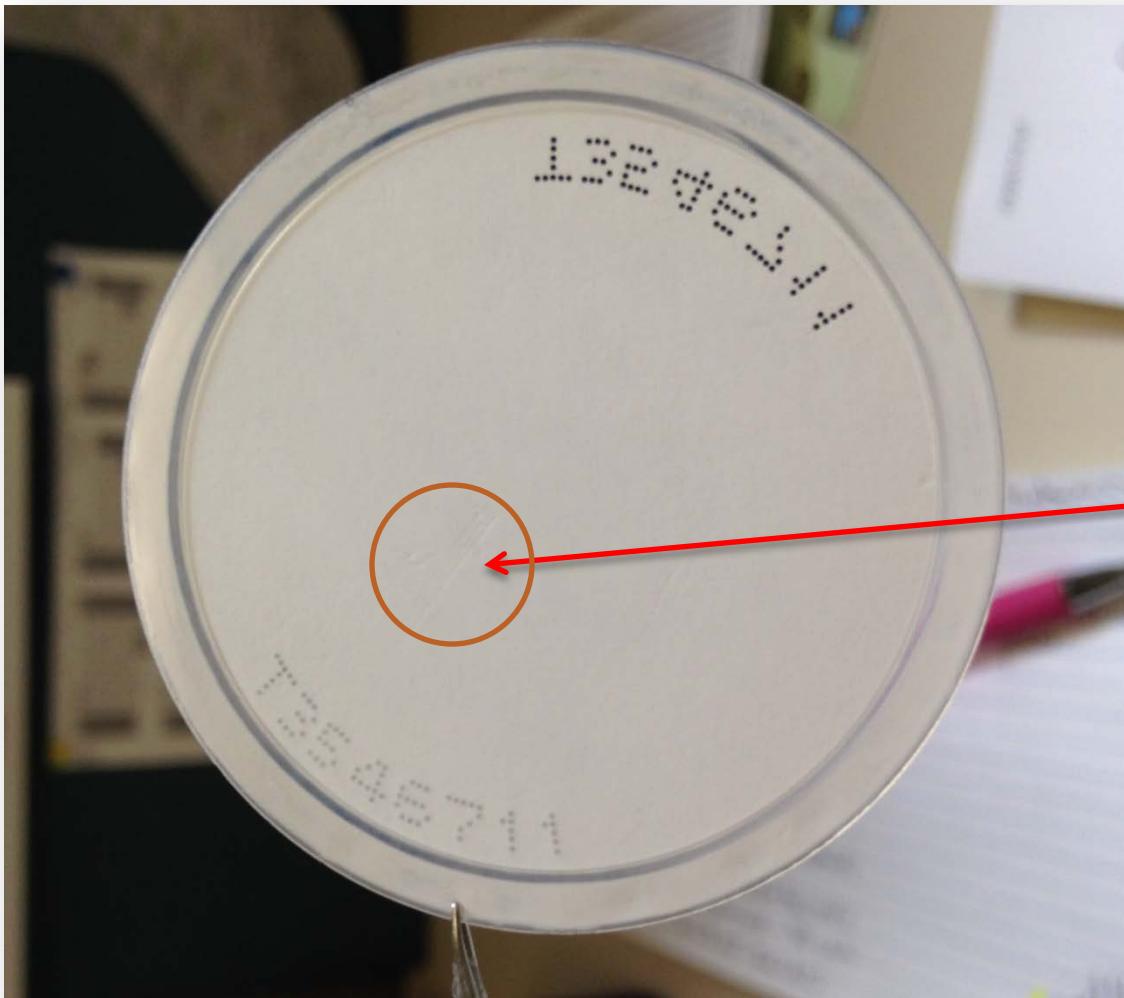
CUT

DENT

HARD TO SEE???

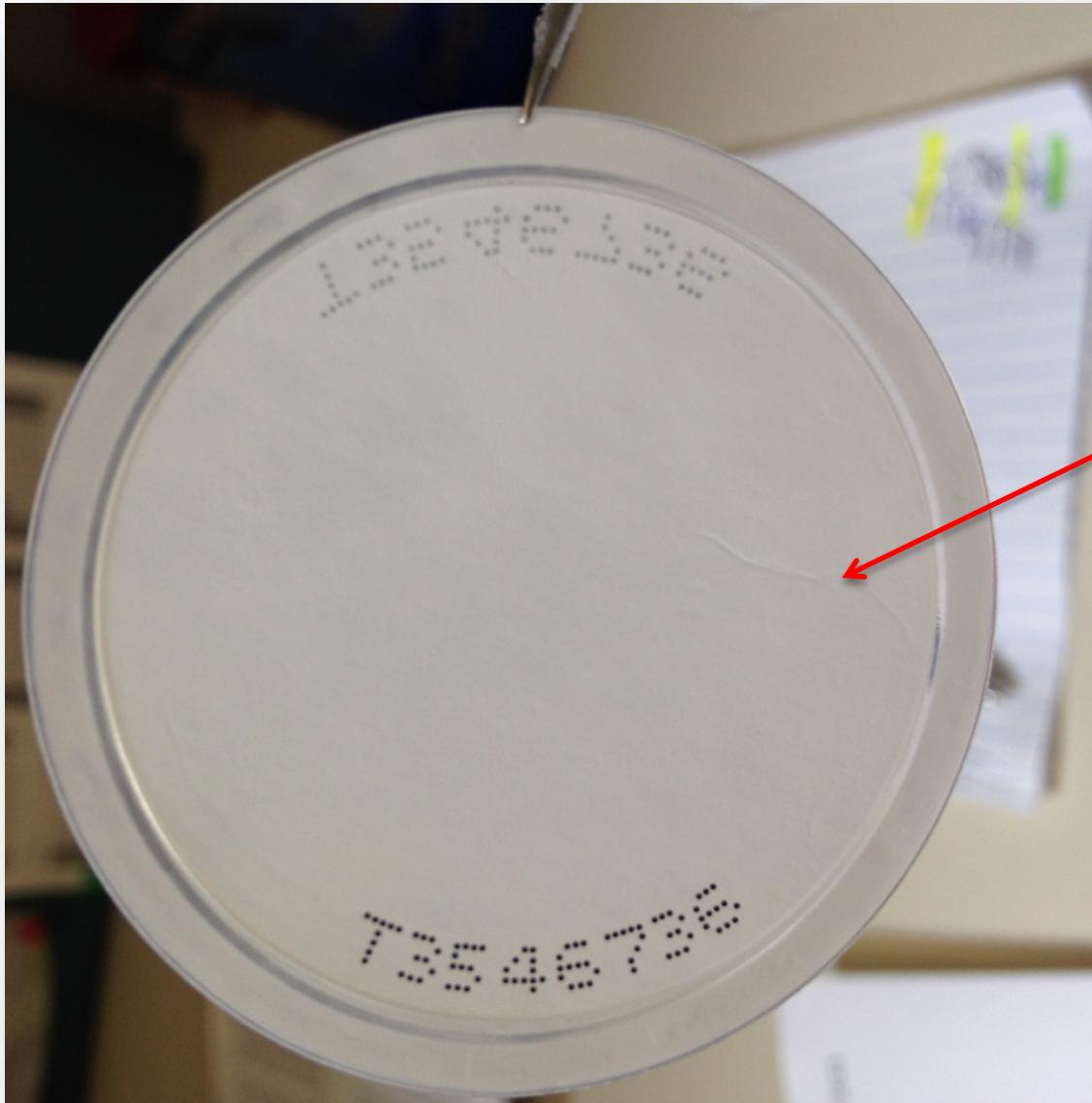


REJECT EXAMPLES



SCRATCH

REJECT EXAMPLES



INCONSISTENCY

THE BALANCE ROOM

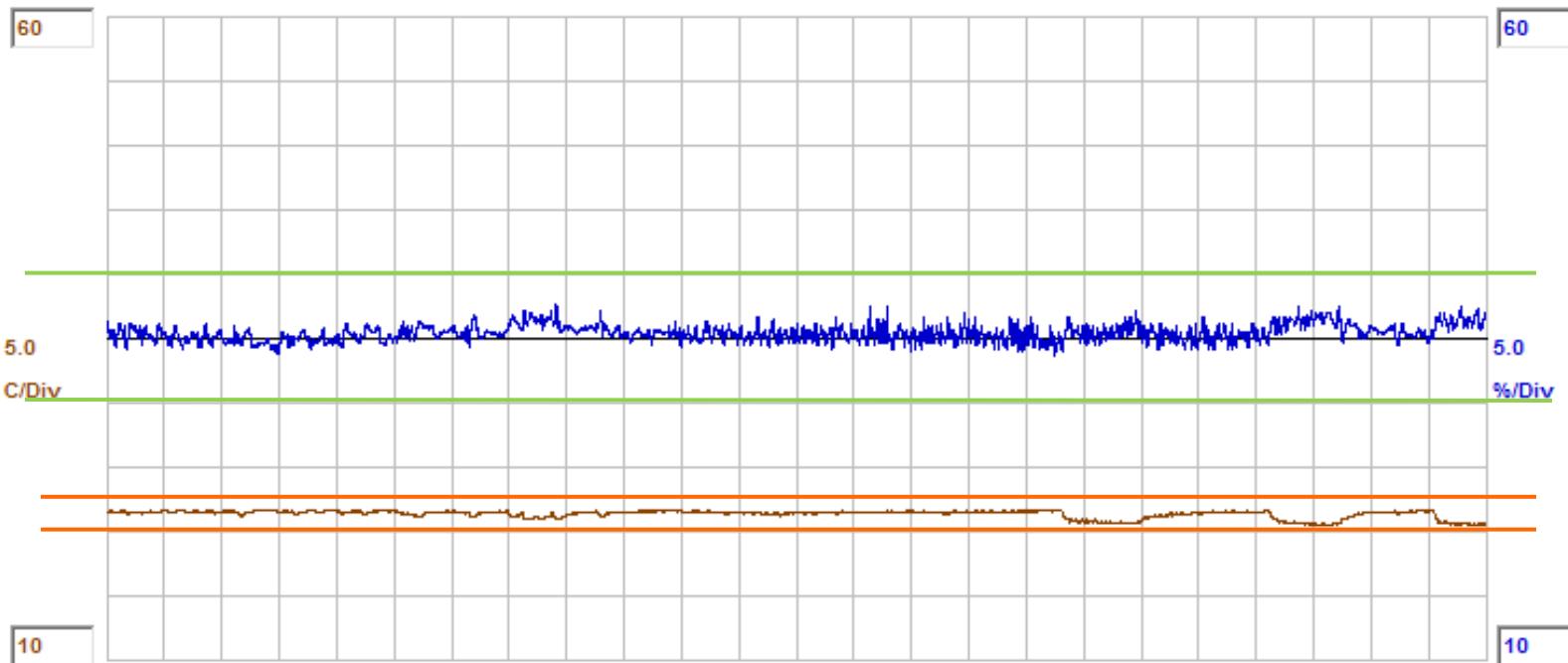
- Temperature has to be 20-23 degrees C for at least 24 hours prior to any weighing.
- Relative Humidity has to be within 30-40% for at least 24 hours prior to weighing.



THE BALANCE ROOM BEHAVING...

Max. 21.8 / Min. 20.6

Temp-14th

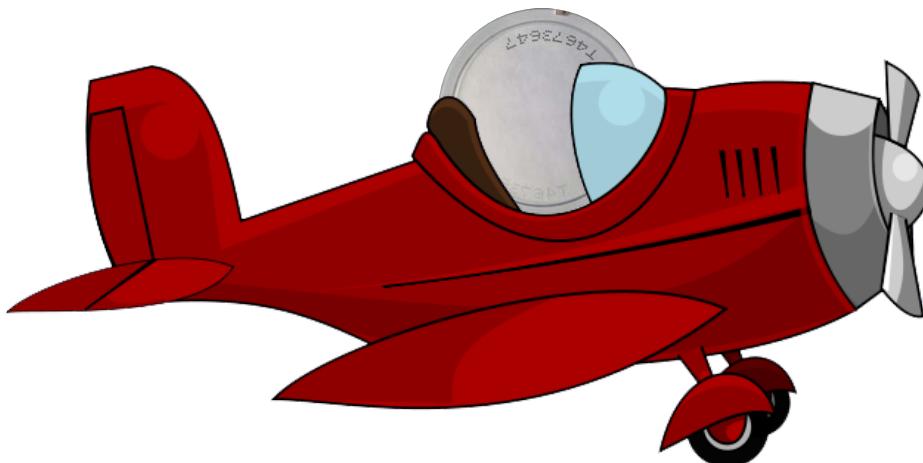


Max. 37.7 / Min. 33.8

Humidity-14th

PREPARING FOR THE FIELD

- Balance Room Pre-conditioning.
 - 20-23 degrees Celsius AND 30-40% Relative Humidity
- Weighed after at least 24 hours of proper conditioning.
- Pre-weigh sessions determined by site frequency.
- Field and Trip Blanks = 10% the site's frequency year.
 - Example: 1/6 Site = 6 Field Blanks and 6 Trip Blanks
- Packaged and shipped within one day.



PRE-WEIGHT SCHEDULE 2015

Pre-weight Date	6/22	7/1	7/6	7/8	7/13	7/16	7/22
1	7/6/2015	7/17/2015	7/17/2015	7/20/2015	7/30/2015	8/1/2015	8/4/2015
2	7/7/2015	7/23/2015	7/18/2015	7/23/2015	7/31/2015	8/4/2015	8/10/2015
3	7/8/2015	7/29/2015	7/19/2015	7/26/2015	8/1/2015	8/7/2015	8/16/2015
4	7/9/2015		7/20/2015	7/29/2015	8/2/2015	8/10/2015	Field
5	7/10/2015			7/21/2015	8/3/2015	Field	Trip
6	7/11/2015			7/22/2015	8/4/2015	Trip	
7	Field			Field	Field		
8	Trip			Trip	Trip		
9	7/12/2015		7/23/2015		8/5/2015		
10	7/13/2015		7/24/2015		8/6/2015		
11	7/14/2015		7/25/2015		8/7/2015		
12	7/15/2015		7/26/2015		8/8/2015		
13	7/16/2015		7/27/2015		8/9/2015		
14	Field		7/28/2015				
15	Trip		7/29/2015				
Total Dates	15	3	15	4	13	6	5
# of Filters	90	18	104	56	78	84	30
Pre-Wt & last SD (days)	24	28	23	21	27	25	25
Pre-Wt & first SD (days)	14	16	11	12	17	16	13

Highlighted Sample Dates (SD) signify same Pre-Weight date for 1/1 and 1/12.

1 in 1 Sites: 6
Bakersfield (P)
Calexico (P)
Chico
Fresno (P)
Sacramento DP
Yuba City

1 in 3 Sites: 14
Sac DP-PM10_C
Bakersfield-SE
Bkfd-Golden
Clovis
Corcoran
Fresno-Pacific
Madera
Merced
Portola
Quincy
Sacramento-T
Sac-Stkn
Truckee (P)
Visalia

1 in 6 Sites: 6
Colusa
Grass Valley
Redding
Roseville
Woodland
Yreka

1 in 12 Sites: 7
Bakersfield (C)
Calexico (C)
Fresno (C)
Modesto
Roseville (C) Eff. 7/1
Sac DP (C)
Truckee (C)

TEMPORARY STORAGE AT THE SITE

- Keep filters cool & dry.
- Visual inspections prior to loading.
- Verify cassette ID with Chain-of-Custody (COC) ID and barcode.
- Use filters before 30 day “expiration.”
- Send back “expired” filters with “Not Used” notation on (COC) sheet.



TEMPORARY STORAGE AT THE SITE CONTINUED...

- Store temperature tabs < 5 degrees C.
- Prevent preliminary reactivity.
- Email SampleHandling@arb.ca.gov for additional supplies.



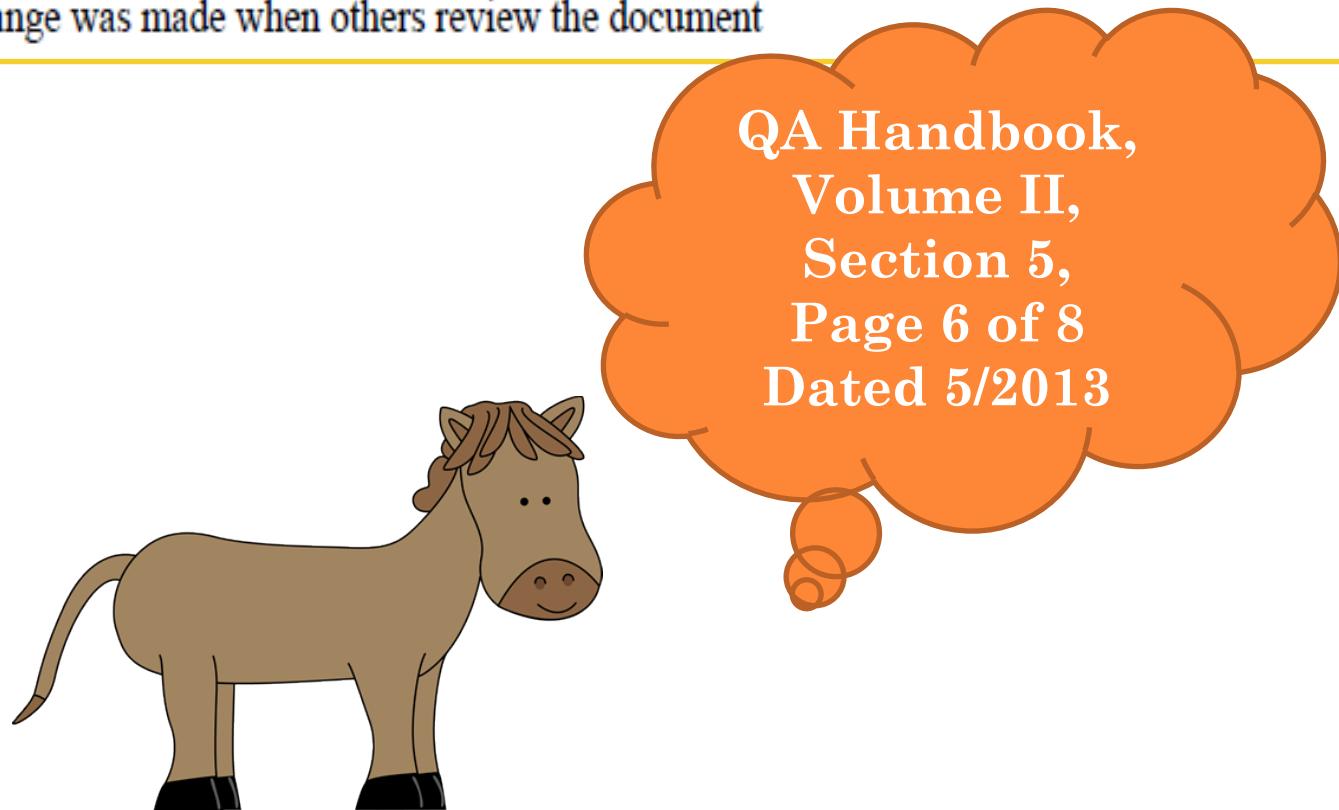
PROPER HANDLING IN THE FIELD

- A fingerprint can weigh as much as 0.1 – 1.0 mg.
- Removal <7.4 days from sampling end date.
- Post-sampling visual inspections.
- Keeping filters cold and dry.
- Chain-of-custody in blue or black ink only.
- Simple line and initials for changes.
- No white out.



STRAIGHT FROM THE HORSES MOUTH...

If a manual record is kept, any error should be crossed out with a single line, and the correct value recorded above the crossed-out entry. It is recommended that manual documentation always use indelible black or blue ink when recording or correcting data entries, that corrections be made as specified above, and that all forms be completed with the signatures and dates required on the forms. Since these records may be subpoenaed, it is important that all field notes be legible. Corrections should be initialed and dated as to who made the change and when. Comments at the bottom of the form can provide clarification as to why a change was made when others review the document



SAMPLE RECOVERY: WHAT'S IMPORTANT?

- Sample integrity and avoid contamination.
- Use gloves when handling filters.
- Complete chain-of-custody sheets.
- Post-sampling visual inspections and noting observations on COC.
- Keep samples cool and in the freezer.
- Send filters back to the lab ASAP.

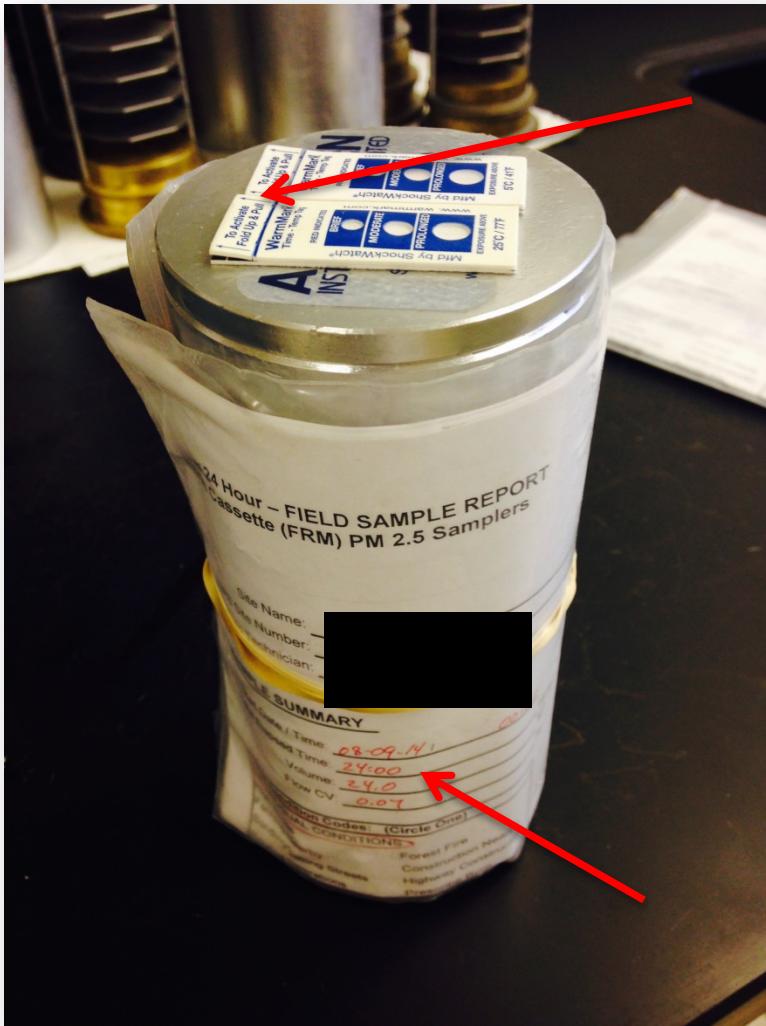


CHAIN-OF-CUSTODY: WHAT'S IMPORTANT?

- Noting any details that could potentially affect the sample.
 - Short run
 - Power outage
 - Flow check
 - Audit
- Noting any unusual conditions.
 - Wind or rain
 - Local or nearby fires
 - Truck idling nearby



BACK TO THE LAB



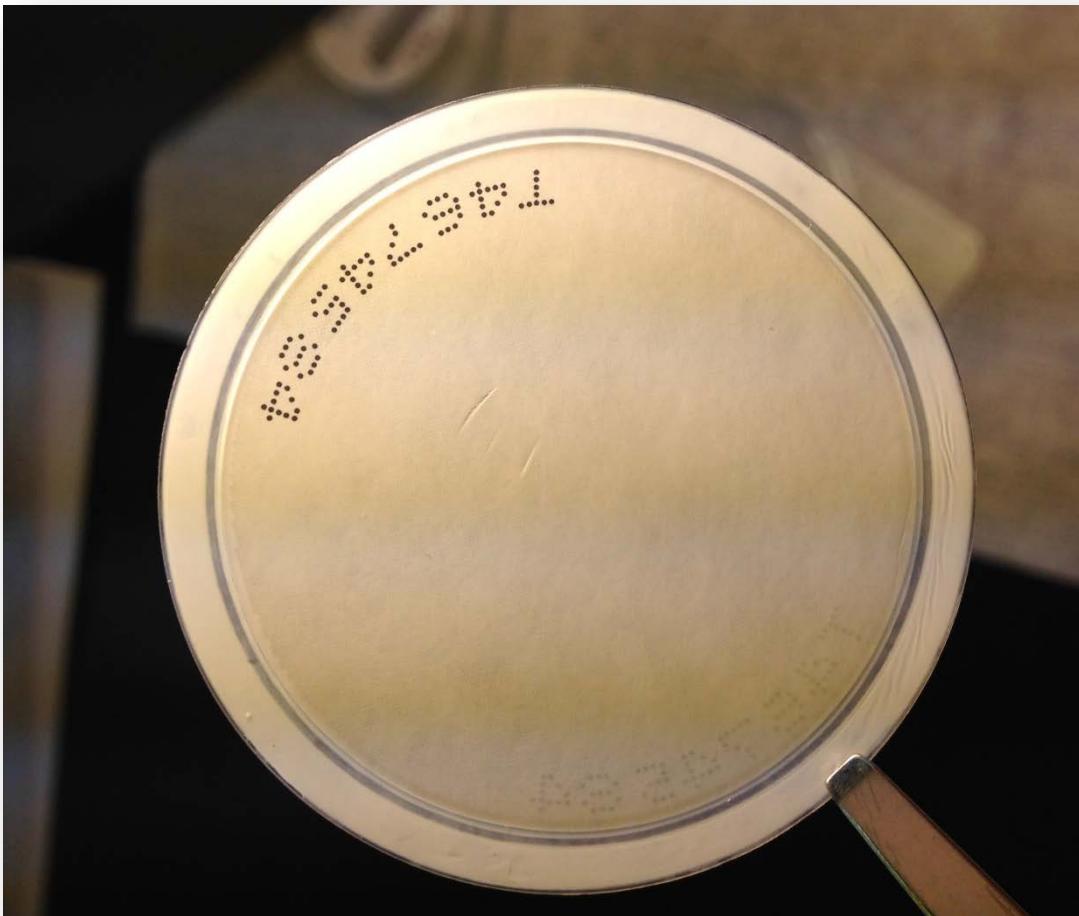
- Activating temperature indicators.
- Include complete COC with every cassette.
- Including frozen blue ice packs.
- Returning filters ASAP.
 - Balance room delays.
 - Holidays and weekends.
 - >30 day invalids.
 - Report completion and submitting data to AQS.

FINAL INSPECTIONS AND ANALYSIS

- Inspection again at post-weight:
 - Dents/scratches/cuts
 - Fingerprints
 - Liquid, oil, or dirt/debris
 - Pinholes
 - Ring separation
 - Contamination
- Verifying COC info to the sample.
- Verifying post-weight - abnormally high or low?
- Collocation comparisons <20% RPD.
- Complete and consistent data.
- Archiving for 5 years, plus one year.



MORE EXAMPLES...THINGS TO LOOK FOR

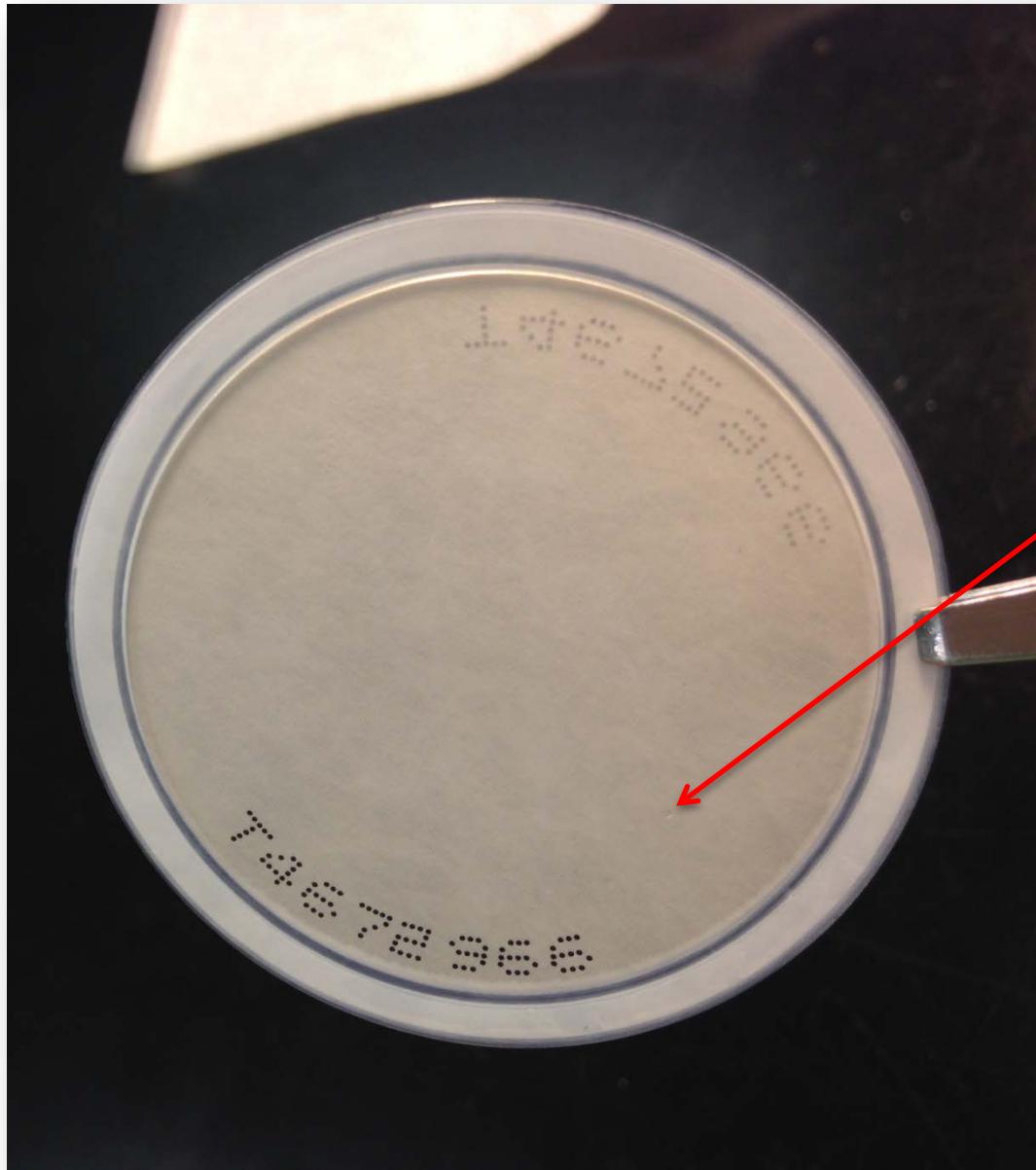


DENTS - MOST COMMON INVALIDATION

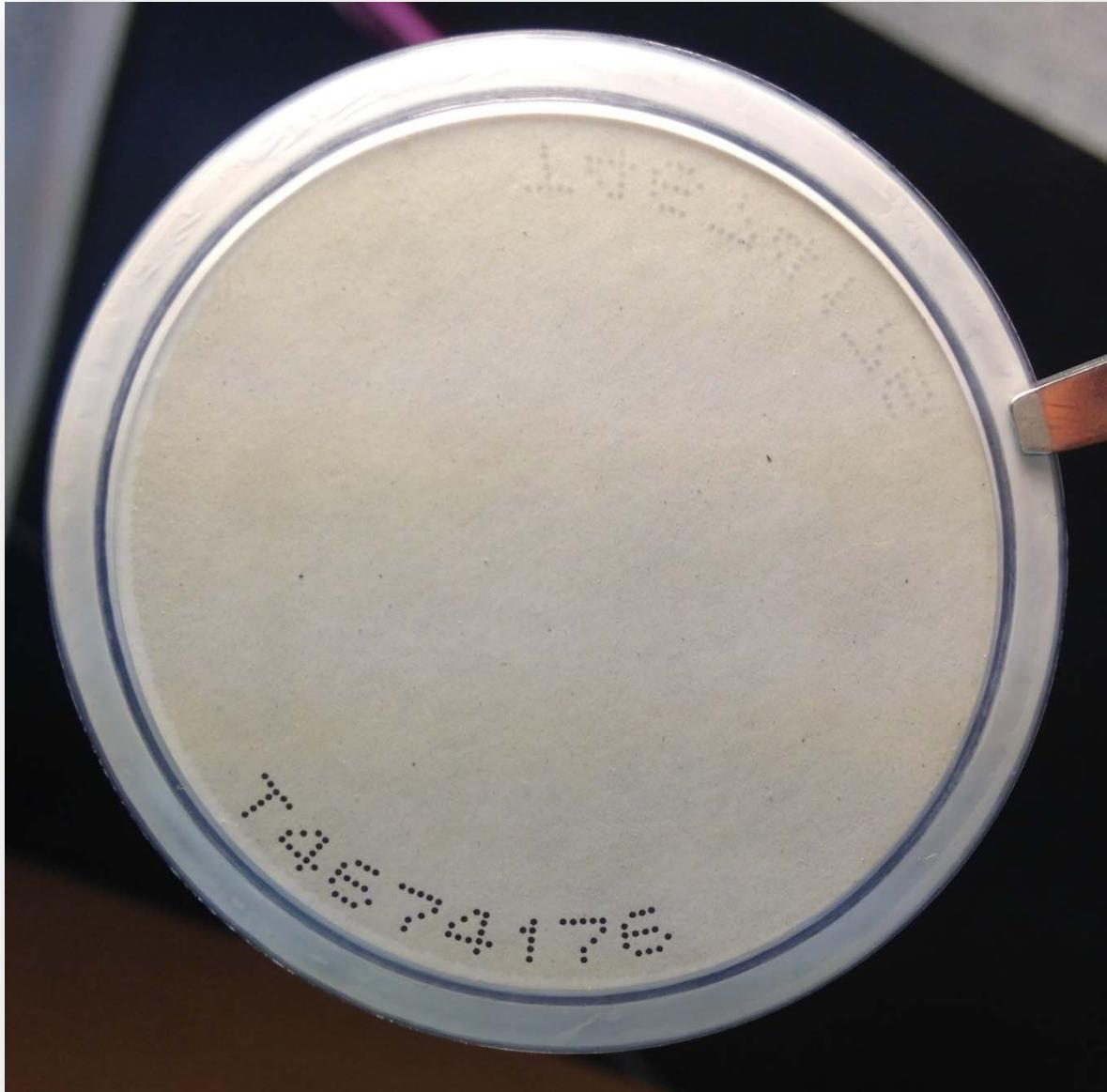
LIQUID CONTAMINATION



PINHOLE



DEBRIS



QUESTIONS?



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916-323-0668

Nial: nial.malone@arb.ca.gov
916-327-2729