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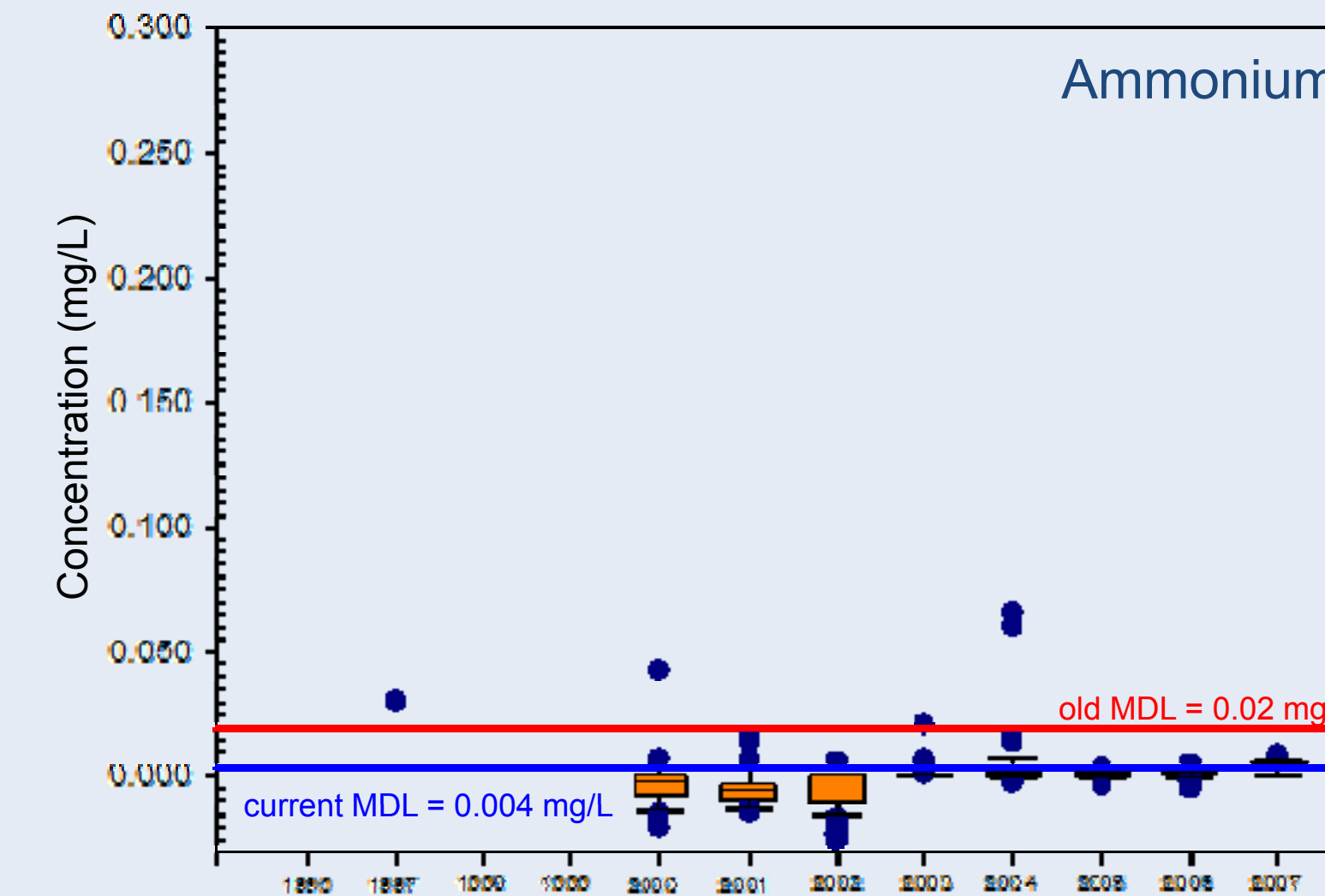
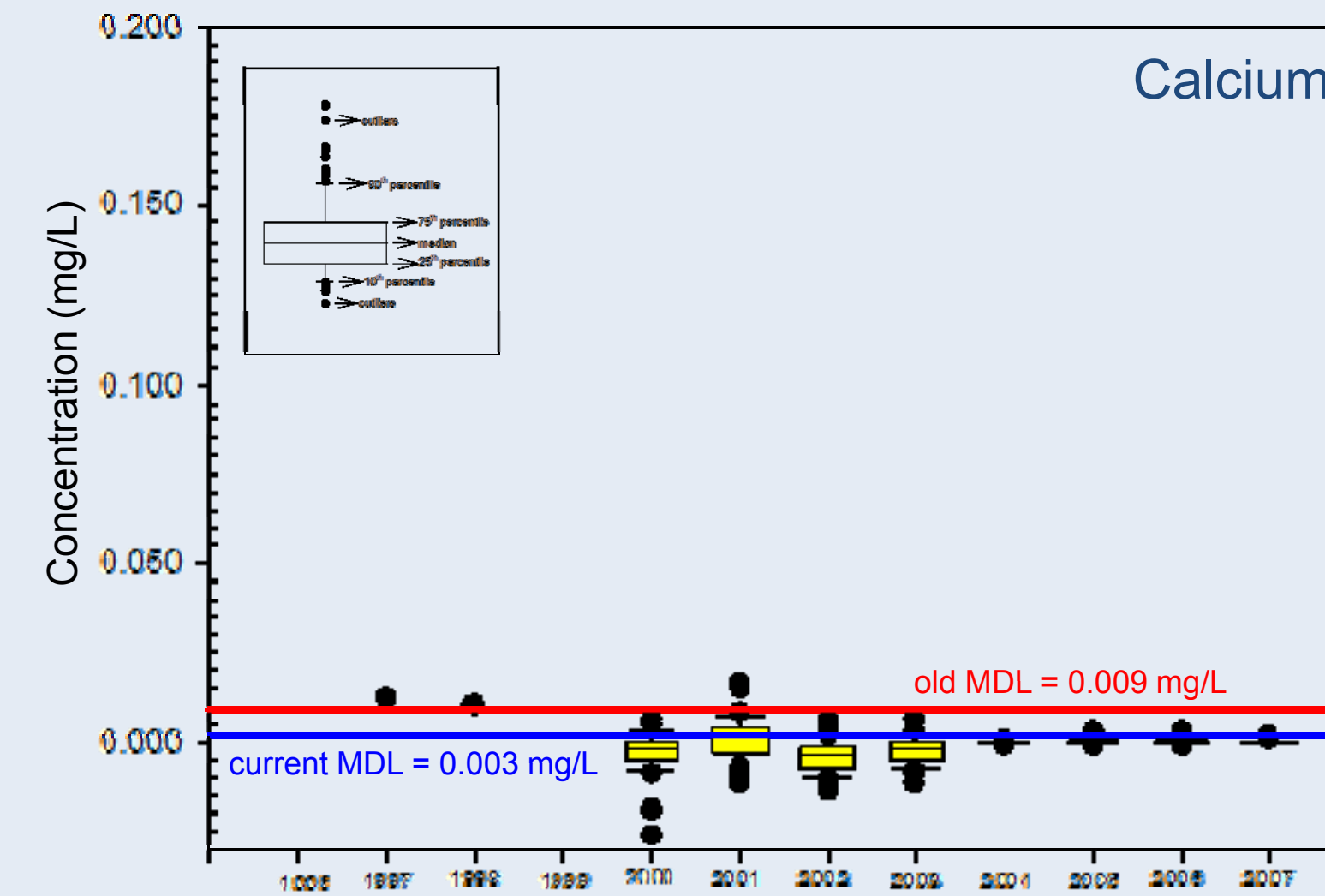
How Clean is Clean?

The NADP Central Analytical Laboratory (CAL) has been providing clean sampling supplies for the NTN and AIRMoN for almost 30 years. As method detection limits (MDLs) have decreased, supplies once thought to be clean now have detectable contamination. Our supplies preparation staff want to know... *When is clean, clean enough?*

Deionized Water Blanks

Description

One deionized water (18 MΩ-cm or better) sample is taken weekly from the CAL's sample preparation laboratory
Samples are collected in triple-rinsed 60 mL virgin high density polyethylene (HDPE) bottles
Samples are not filtered before analysis



Observations

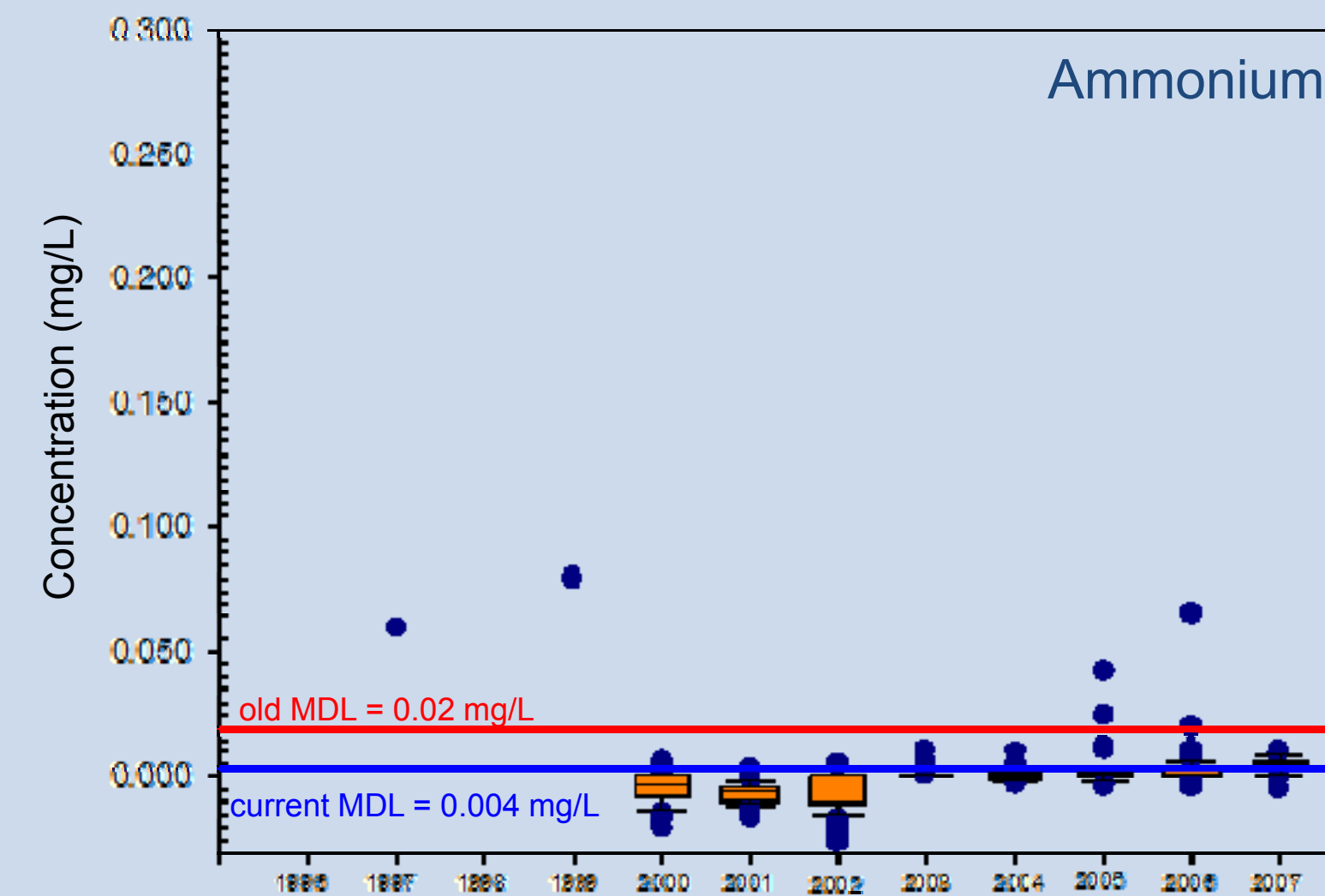
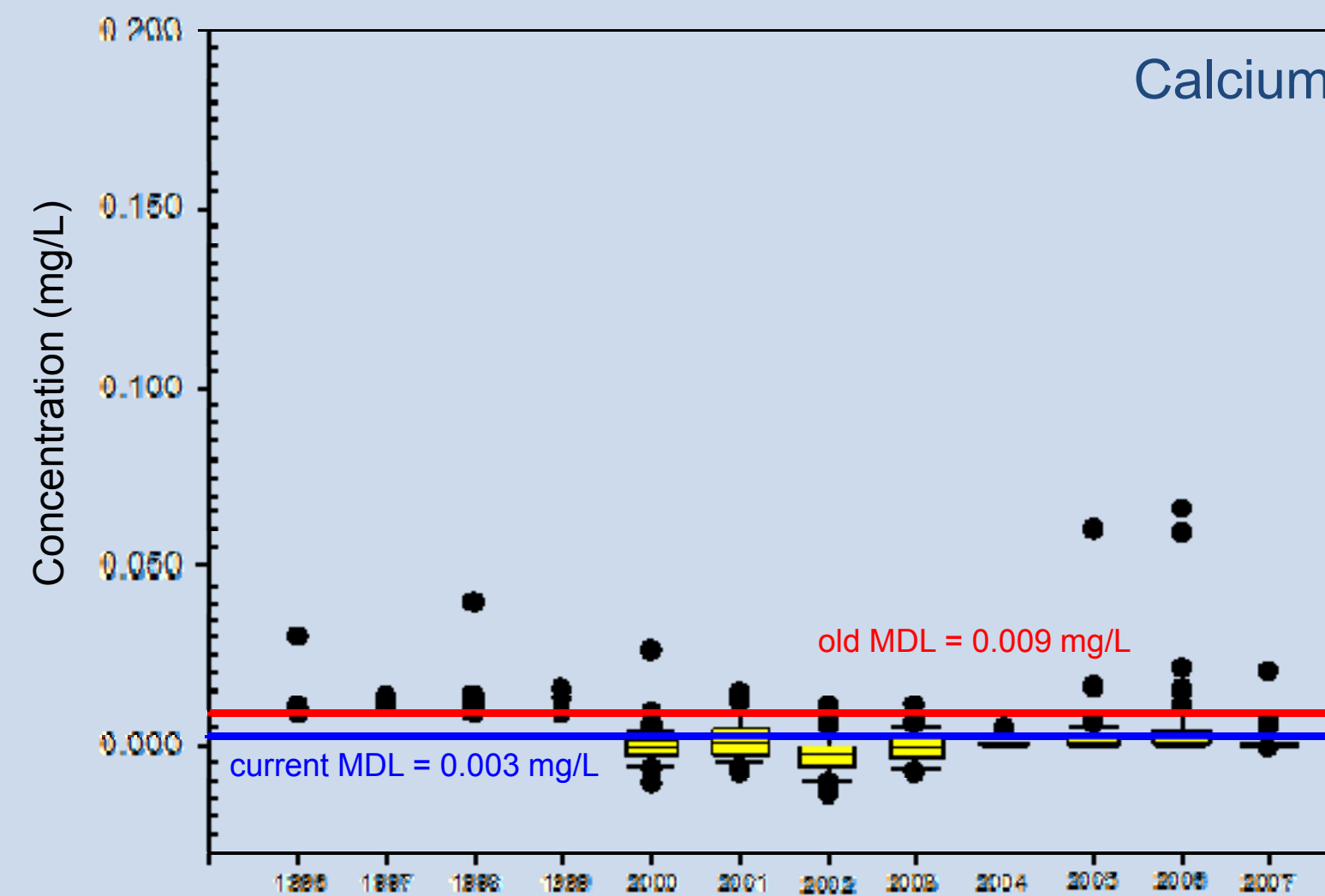
Deionized water blanks are consistently below both old and current MDLs.
The CAL's deionized water is not a source of supply contamination.

1-Liter Shipping Bottle Blanks

The NTN uses 1-L HDPE bottles for precipitation sample shipping. These bottles are washed with deionized water and reused. Four supply blanks are prepared weekly from randomly-selected bottles. Solutions include:

- 50 mL deionized water (data shown at right)
- 150 mL deionized water
- 50 mL CAL internal standard (FR25)
- 150 mL CAL internal standard (FR25)

Solutions are left in the bottles for one week
Samples are not filtered before analysis



The majority of shipping bottle blanks are below old and current MDLs.
In 2006, five shipping bottle blanks (< 10%) had elevated concentrations of calcium.
There is more scatter in shipping bottle blanks as compared to deionized source water.
NTN shipping bottles are not an appreciable source of potential sample contamination.

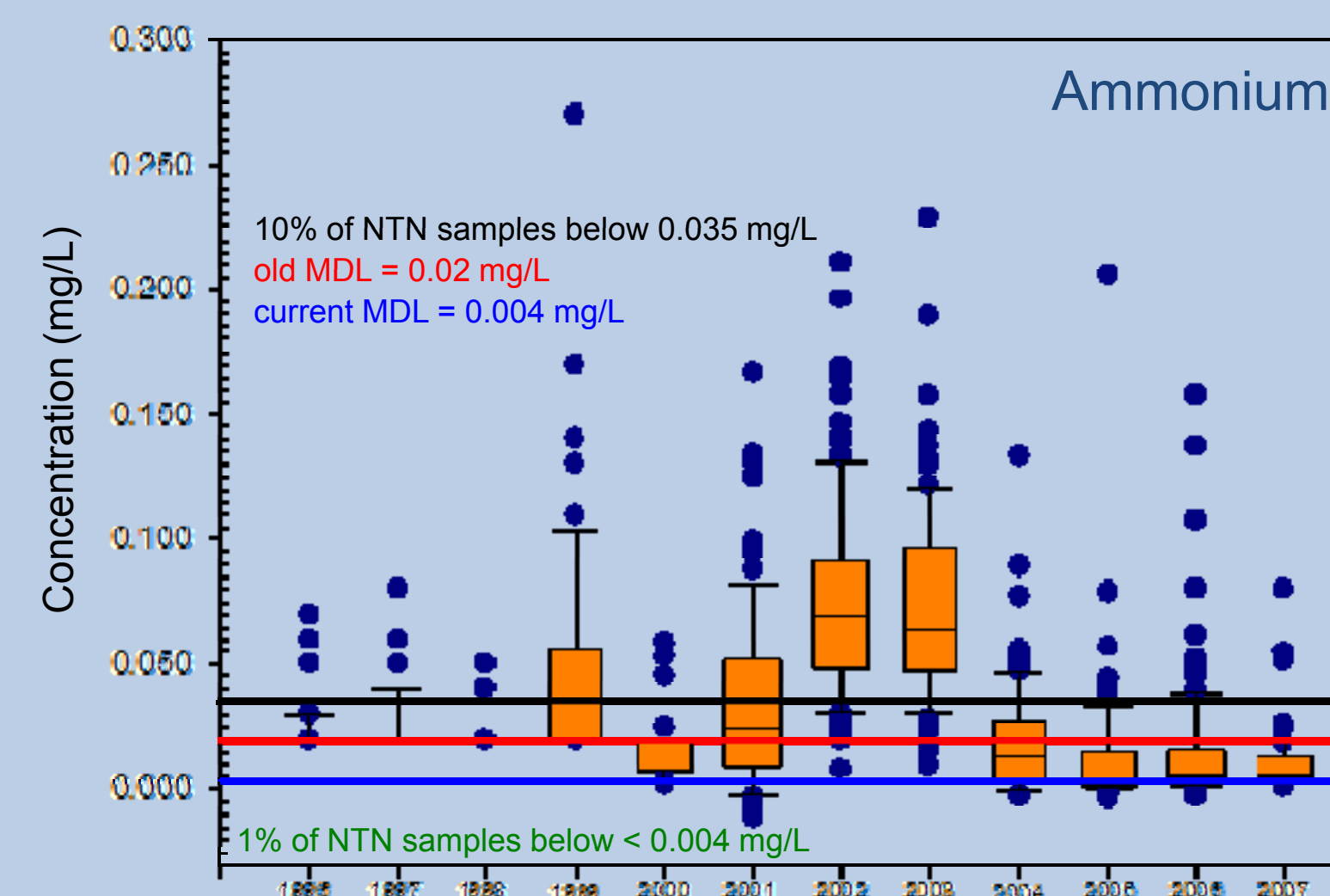
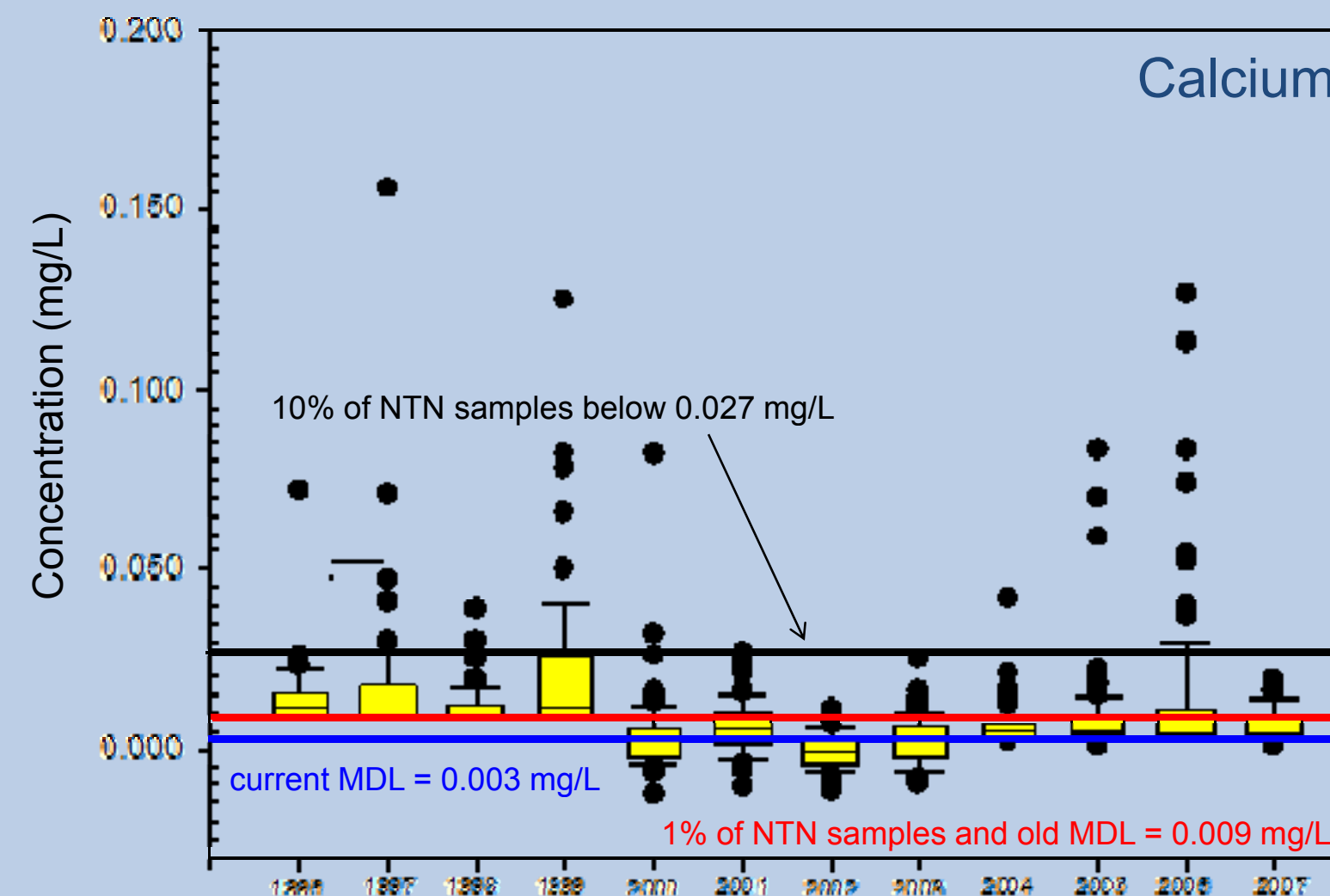
Collector Bucket Blanks

The NTN & AIRMoN use 3.5 gallon HDPE buckets to collect precipitation samples. In the NTN, these buckets are exposed to field conditions for one week. Buckets are washed with deionized water at the CAL and reused.

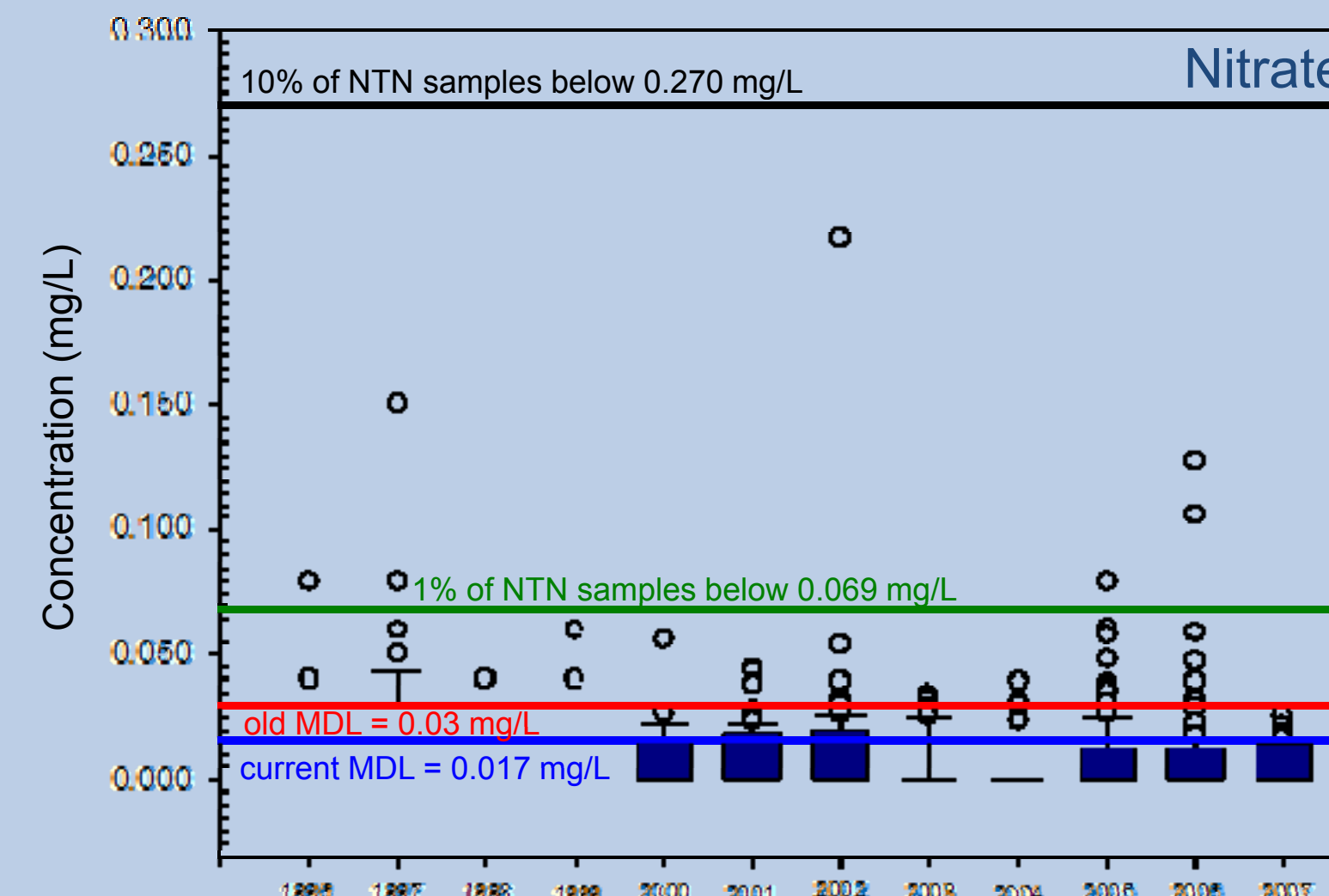
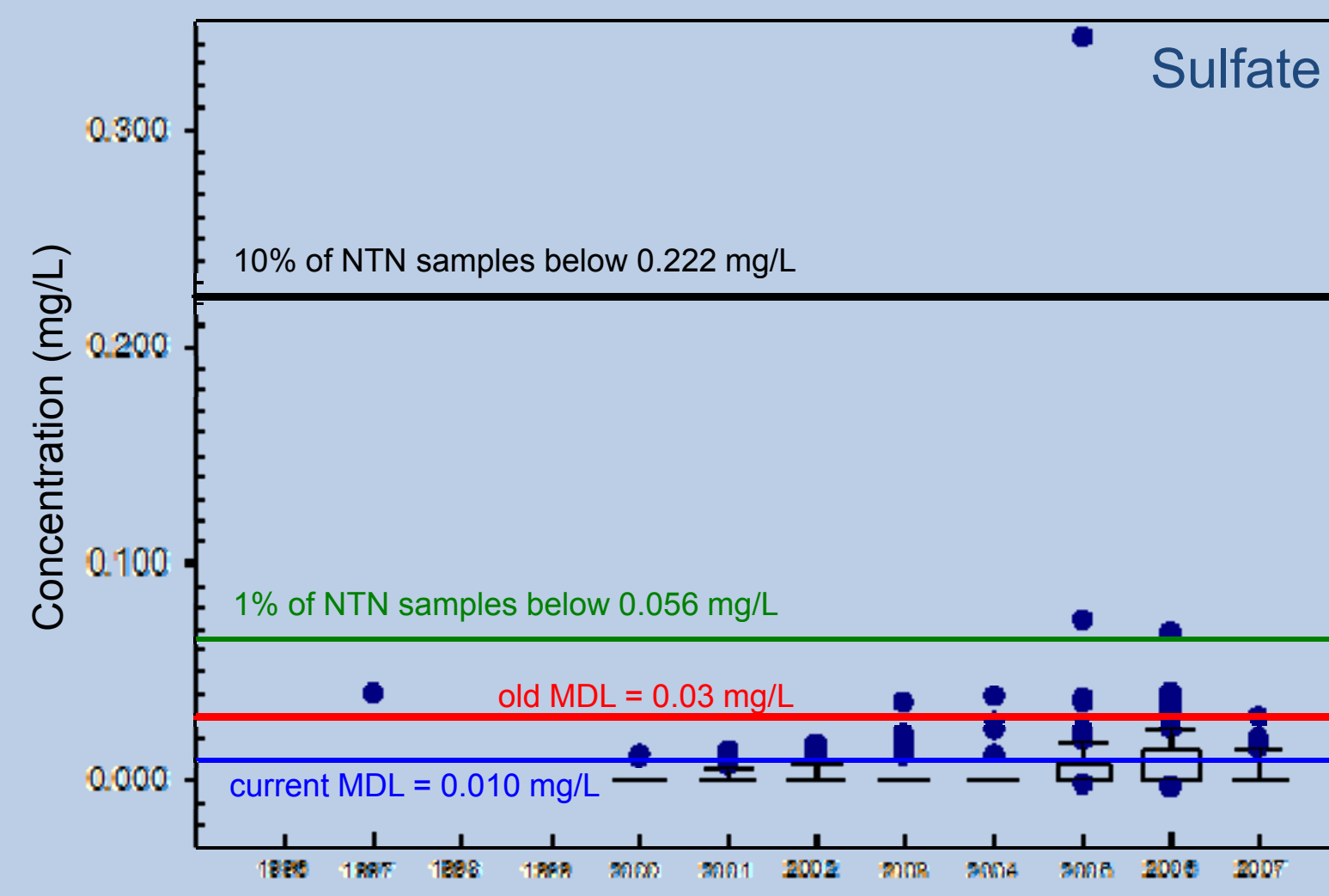
Four blanks are prepared weekly from randomly-selected buckets. Solutions include:

- 50 mL deionized water (data shown at right)
- 150 mL deionized water
- 50 mL CAL internal standard (FR25)
- 150 mL CAL internal standard (FR25)

Solutions are left in the buckets for one week
Samples are not filtered before analysis



The majority of collector bucket blanks are below old MDLs. Unfortunately, the majority of these blanks are above current MDLs for calcium and ammonium.
For nitrate and sulfate, the majority of blanks are below current MDLs.
The majority of blanks are below the 10th percentile of the 2002-2006 NTN data set for calcium, sulfate, and nitrate.
From 2001 through 2003, the majority of blanks were above the 10th percentile of the 2002-2006 NTN data set for ammonium. Since 2004, approximately 90% of blanks fell below the 10th percentile of the NTN data set.



Conclusions

The CAL's deionized water and 1-L shipping bottles are not an appreciable source of sample contamination.
Since buckets are exposed to the environment, contamination levels are higher than those observed in the 1-L shipping bottles.
Contamination levels in collector buckets are consistently at or below the 10th percentile of the NTN data set as required in the CAL's work plan.

Acknowledgements

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