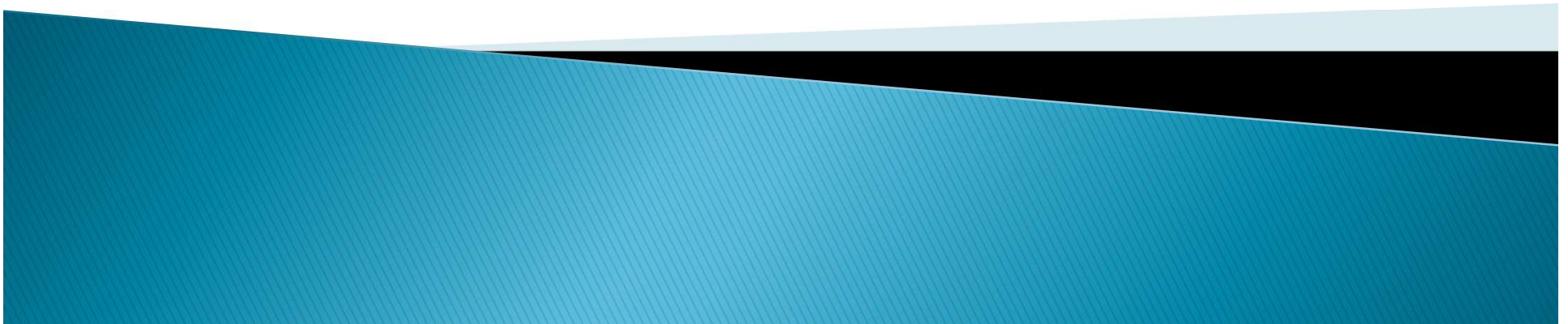# Meeting the Requirements of 40 CFR Part 136.7 for Online Instrumentation

Part 2

40 CFR 136.7

>> Required for the Use of Online Data for Regulatory Reporting

1. Demonstration of Capability (DOC),

2. **Method Detection Limit (MDL),**

3. Reagent blank (also referred to as method blank),

4. Laboratory fortified blank (LFB, also referred to as a spiked blank, or laboratory control sample (LCS)),

5. Matrix spike (MS), matrix spike duplicate (MSD), or laboratory fortified blank duplicate (LFBD) for suspected difficult matrices,

6. Internal standard/s, surrogate standard/s (for organic analysis) or tracer (for radiochemistry),

7. Calibration (initial and continuing),

8. Control charts (or other trend analyses of quality control results), and

9. Corrective action (root cause analyses),

10. Specific frequency of QC checks,

11. QC acceptance criteria, and

12. Definitions of a batch (preparation and analytical)

Online Methods

>> Do You Follow Them??

Turbidity QC Requirements

- Standard Methods for the Examination of Water and Wastewater Part 2020
  - MDL
  - Calibration
  - Quality Control Sample
    - Quality control sample (QCS): Analyze an externally generated, blind QCS (unknown concentration) at least annually (preferably semi-annually or quarterly). Obtain this sample from a source external to the laboratory, and compare results to that laboratory's acceptance results. If testing results do not pass acceptance criteria, investigate why, take corrective action, and analyze a new QCS. Repeat this process until results meet the acceptance criteria.

2130 Turbidity

- Calibration of continuous turbidity monitors:
- Calibrate continuous turbidity monitors for low turbidities by determining turbidity of the water flowing out of them, using a laboratory-model nephelometer, or calibrate the instruments according to manufacturer's instructions with formazin primary standard or appropriate secondary standard.

Turbidity MDL

- Follow 40 CFR part 136 Appendix B
  - If the MDL is to be determined in reagent (blank) water, prepare a laboratory standard (analyte in reagent water) at a concentration which is at least equal to or in the same concentration range as the estimated method detection limit. <u>(Recommend between 1 and 5 times the estimated method detection limit.)</u>
- <u>What is the highest Standard I can use for a MDL of 0.5 NTU?</u>

Calibration Table From SM2130

What Standard Would I Use to Report Turbidity to 0.5 NTU ?

Turbidity Range NTU	Report to the Nearest NTU
0–1.0	0.05
1–10	0.1
10–40	1
40–100	5
100–400	10
400–1000	50
>1000	100

Questions from the Auditor

›› OH NO

What are my QC Limits (136.7)

- If the lowest standard is 20 NTU as per the instrument manufacturer's manual:
  - *This section describes how to calibrate the turbidity sensor against a user-prepared standard as a 2 point Calibration with deionized water, against a 20 NTU user prepared standard as a single point calibration.*
- What is?
  - The lowest MDL I can report as per 136?
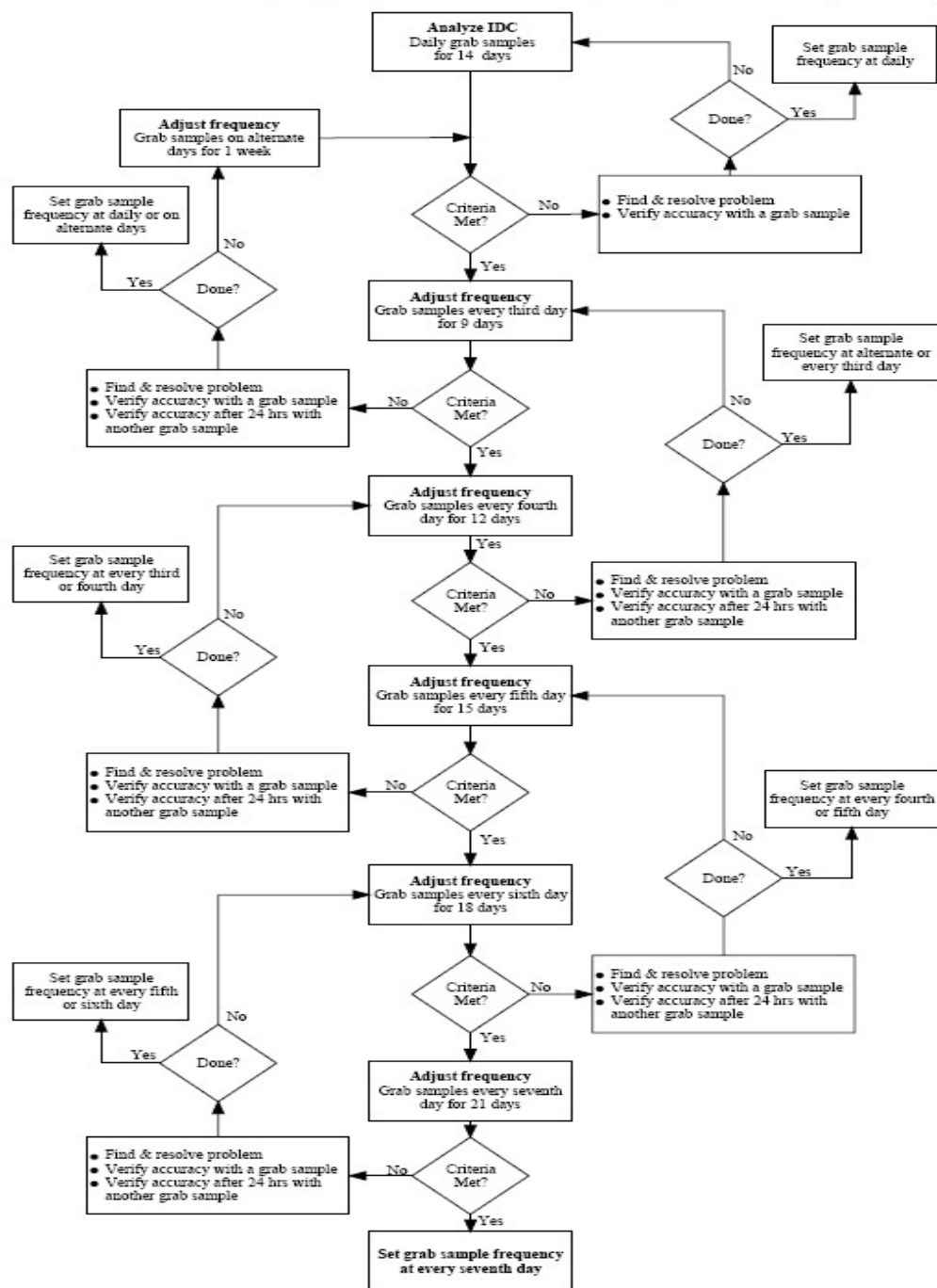 - What are the Reporting Limit? (SM2130)
  - What is the lowest LCS I can run?

Chlorine Meter

>>

Chlorine

- **Standard Methods 4020 (Not EPA 334.0)**
- **Chlorine 4500-Cl**
  - Calibration (Linear (**3 Standards**) or Quad (**5 Standards**), **Daily**)
  - Calibration Verification
  - QCS
  - Blank
  - LFB
  - IDC
  - ODC
  - Blank
  - LFM/LFMD or Duplicates

B. Process for Establishing Frequency of Routine Grab Sample Comparisons to Analyzer Readings

Table 1. Summary of Start-up QC for Grab Sample Methodology			
Method Reference	Requirement	Specification	Acceptance Criteria
10.1.1.2	Generate or validate calibration curve	Analyze method blank & 3 calibration standards that span concentration range (Lowest standard ≤ 0.2 mg/L or the minimum required by primacy agency.)	Each standard is within ±15% of its expected concentration when compared to curve
10.1.1.3	Verify accuracy of secondary standards	Analyze secondary standards on each meter for which they will be used.	Each secondary standard is within ±10% of its expected concentration
10.1.2.1	Initial Demonstration of Capability (IDC) - Accuracy	Analyze method blank & 5 replicate independent reference samples fortified at a concentration near the drinking water concentration	Method blank ≤ 1/3 concentration of lowest calibration standard; Average of 5 replicates is within ±15% of expected concentration
10.1.2.2	Initial Demonstration of Capability (IDC) - Precision	Calculate relative standard deviation (RSD) for 5 independent reference sample replicate analyses	RSD ≤ 15%
10.1.3	Field Sampler IDC	Each sampler must successfully complete 10.1.2.1 and 10.1.2.2 (IDC samples may be prepared by laboratory personnel for analyses by field samplers.)	

Table 2. Summary of Start-up QC for On-line Chlorine Analyzer

Method Reference	Requirement	Specification and Frequency	Acceptance Criteria
10.2.1	Verify or adjust analyzer calibration	Analyze grab sample & compare to analyzer reading; Adjust analyzer to agree with grab sample measurement; Iterative process until agreement is reached	Analyzer reading is within ± 0.1 mg/L or ± 15% (whichever is larger) of grab sample measurement
10.2.2	Initial Demonstration of Capability (IDC)	Compare analyzer measurement to a grab sample analysis on a daily basis for 14 consecutive days (or business days)	Analyzer reading must be within ± 0.1 mg/L or ± 15% (whichever is larger) of the grab sample measurement for each data pair

Table 3. Routine QC for Grab Sample Methodology

Method Reference	Requirement	Specification and Frequency	Acceptance Criteria
11.1.1	Routine calibration check	Analyze a check standard: • When calibration of the on-line chlorine analyzer is adjusted • At least quarterly	Standard is within ±15% of its expected concentration
11.1.2	Secondary standards	Recommended: analyze each day grab sample method is used (This is only applicable to methods that use a spectrophotometer/colorimeter.)	Each secondary standard is within ±10% of its expected concentration

Table 4. QC for On-line Chlorine Analyzer			
Method Reference	Requirement	Specification and Frequency	Acceptance Criteria
11.2	Routine calibration check	Compare analyzer measurement to a grab sample analysis: • on a routine basis (at least once each week) • immediately after analyzer calibration is adjusted • one day after analyzer calibration is adjusted	Analyzer reading must be within ± 0.1 mg/L or ± 15% (whichever is larger) of the grab sample measurement
11.3	Non-routine calibration check	Compare analyzer measurement to a grab sample analysis: • after routine maintenance • when analyzer drifts upward or downward without explanation (recommended)	Analyzer reading must be within ± 0.1 mg/L or ± 15% (whichever is larger) of the grab sample measurement
11.4	Emergency calibration check	If the analyzer indicates a large (≥ 50%) unexpected change in chlorine residual, compare analyzer measurement to a grab sample analysis as soon as possible	Analyzer reading must be within ± 0.1 mg/L or ± 15% (whichever is larger) of the grab sample measurement

Questions from the Auditor

›› OH NO

What are my QC Limits ? (141-334.0)

- Online Chlorine Meter Manual
  - *Press the up arrow or down arrow until the value is the same as the value given by the digital photometer.*
  - *Press OK to save the new calibration or Esc to abort without saving*
- Is the Chlorine Meter Calibrated as per SM or 334:
- What is the lowest MDL I can report?

pH Meter

SM 4500-H$^+$

- Standard Methods 4020 pH 4500-H$^+$
  - Calibration (Linear (**3 Standards**) or Quad (**5 Standards**), Daily)
  - QC Check with Bracketed pH Standard
  - IDC
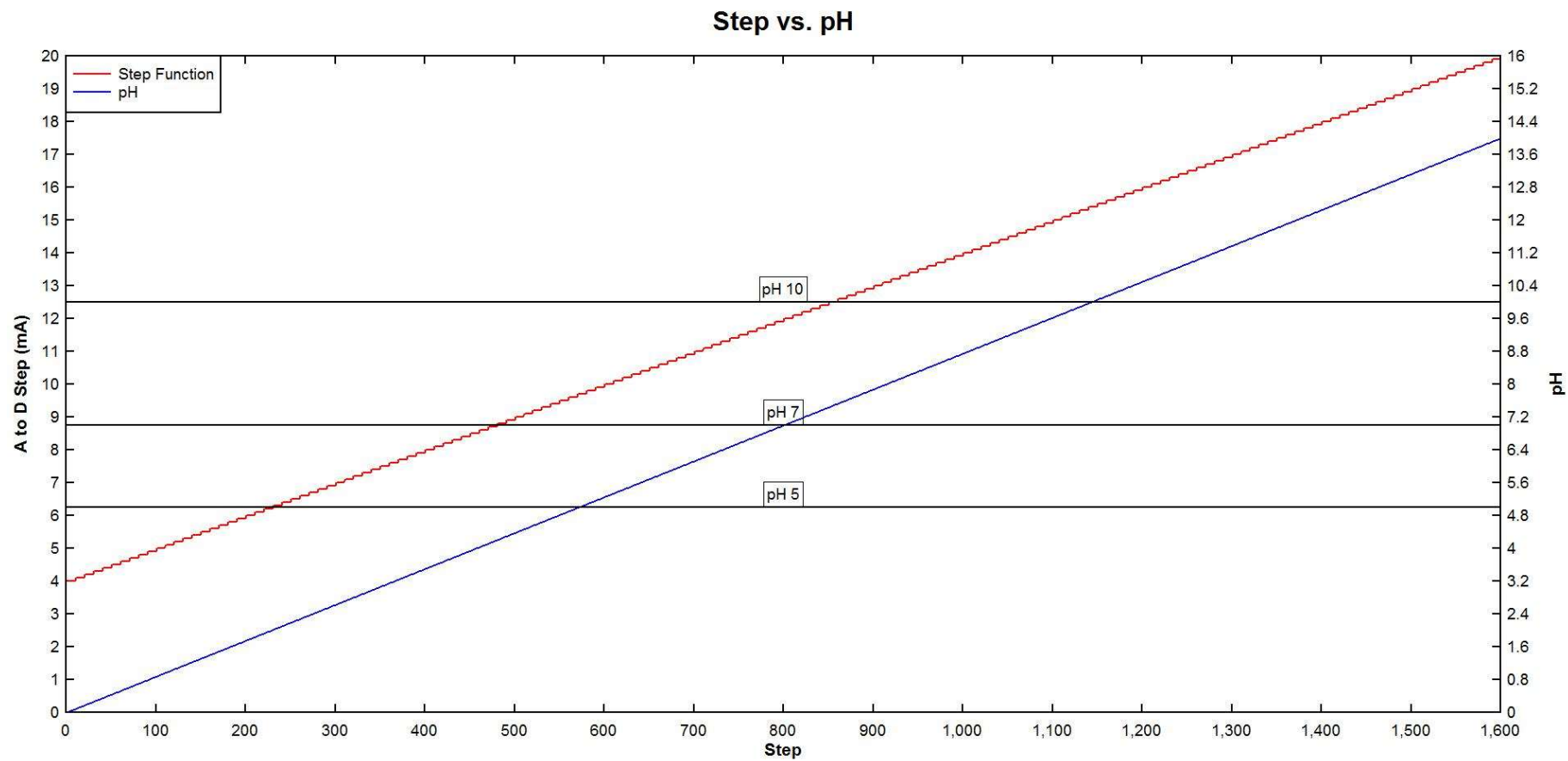 - ODC
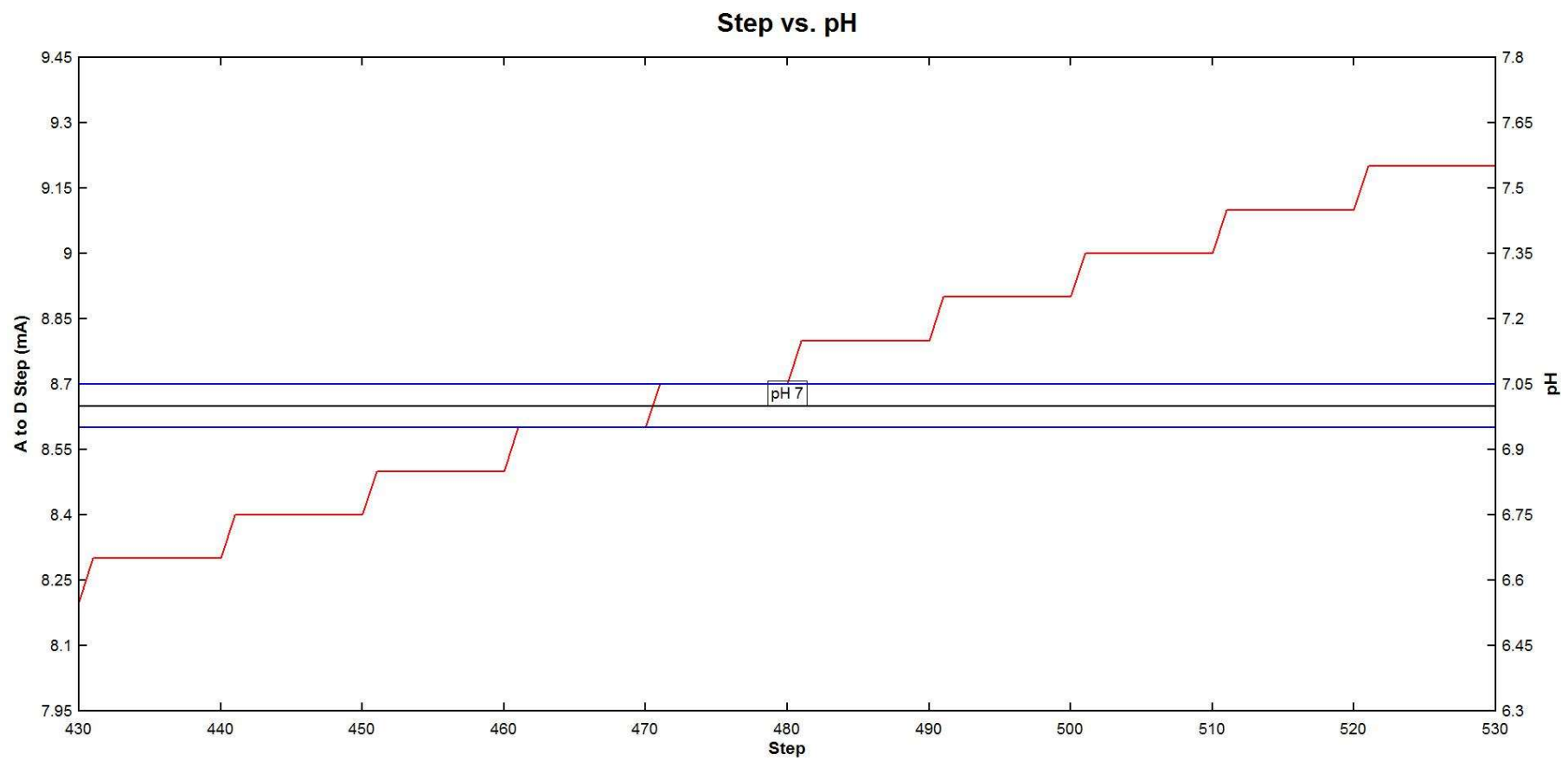 - Duplicates

Questions from the Auditor

» OH NO

What are my QC Limits ?

- Online pH Meter Manual
  - *The meter provides a calibration procedure for the pH probes using commercially prepared buffer solutions. Up to 4 Buffers may be used.*
- Can I calibrate the pH meter to meet SM and 40 CFR part 136?

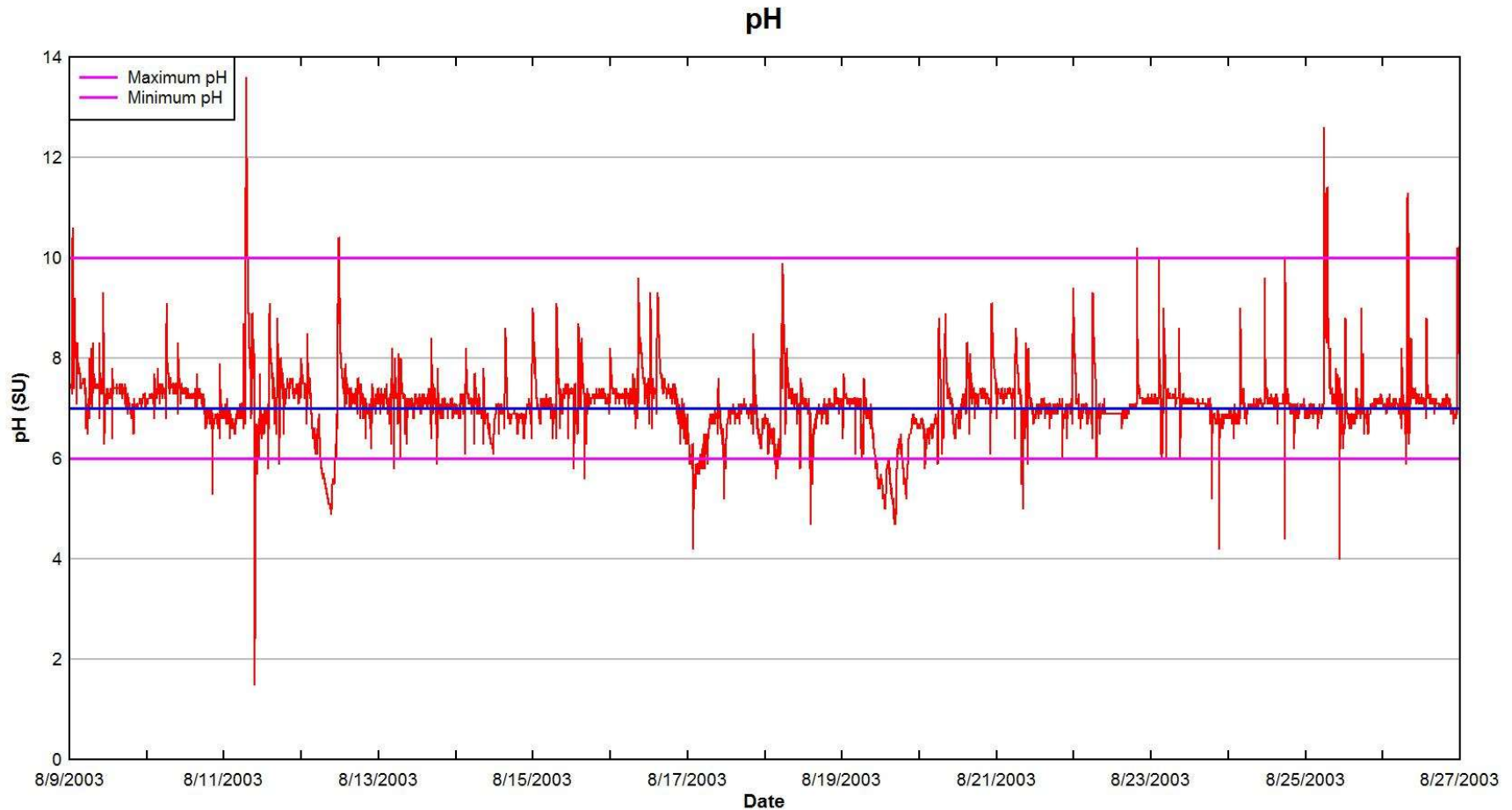# But, What about my PLC A to D Converter?

» Step Function Accuracy?

Step vs. pH

Actual Data

» Can I regulate on This?

Illicit pH Discharge (40 CFR part 403)

Questions????