



CONSISTENCY OF NULL CODES IN AQS

KIMBERLY MITCHELL – GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT



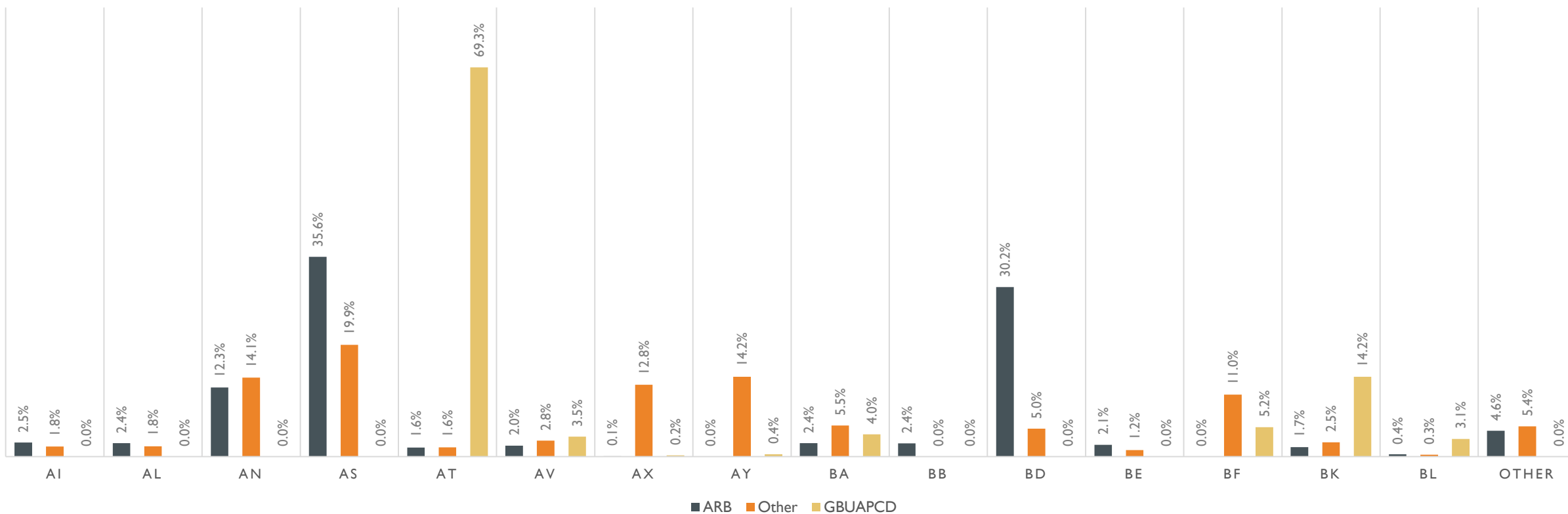
TYPES OF AQS QUALIFIER CODES

Qualifiers

Qualifiers are used when reporting data to AQS. Qualifiers further explain the data.

- **"Null"** qualifiers
 - required when submitting a null (i.e., nothing was collected) sample measurement; All Null qualifiers are available for every parameter
- **"QA"** qualifiers - optional
 - quality assurance qualifiers are used when data is valid but you want to note something. i.e. measurement was "Below lowest calibration level"
- **"Inform"** qualifiers - optional
 - informational qualifiers are used in place of a REQuest EXClusion qualifier; use only when an exclusion of the data will not be requested
- **"ReqExc"** qualifiers
 - required when submitting data that is affected by an Exceptional Event and for which an exclusion will be requested

2017 OZONE NULL CODE USAGE



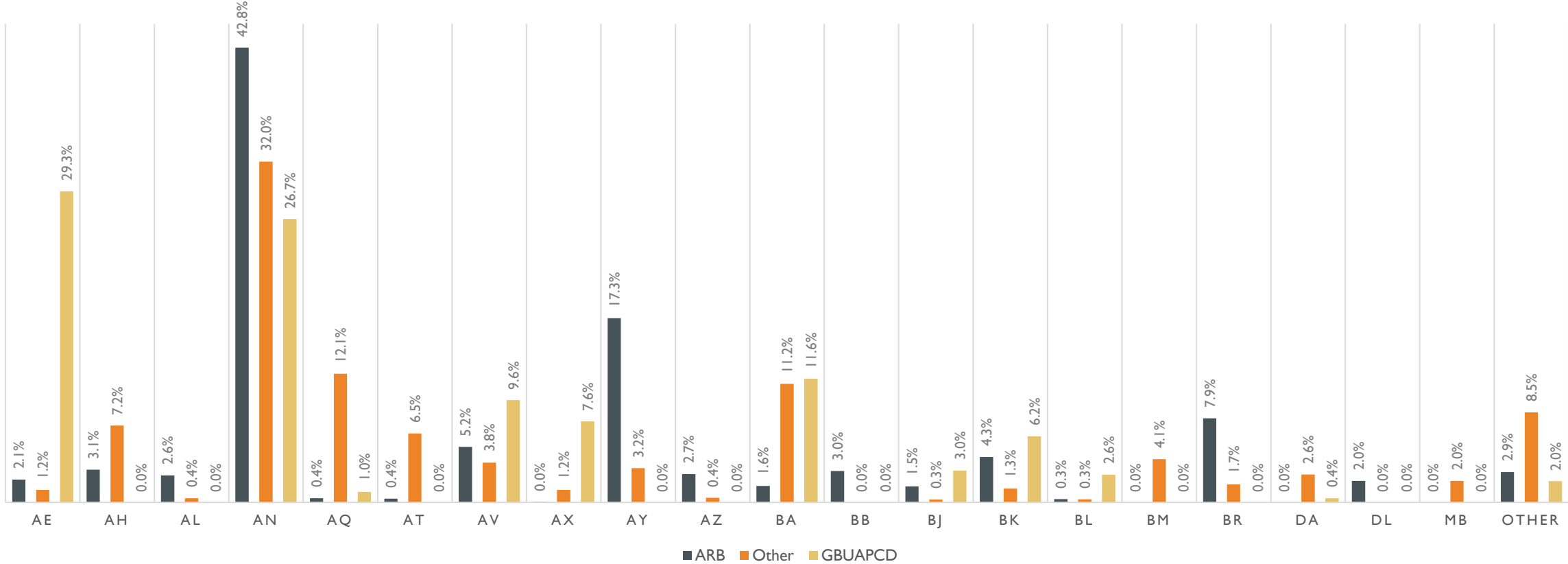
AI: Insufficient Data (cannot calculate)
 AL: Voided by Operator
 AN: Machine Malfunction
 AS: Poor Quality Assurance Results

AT: Calibration
 AV: Power Failure
 AX: Precision Check
 AY: QC Control Points (Zero/Span)

BA: Maintenance/Routine Repairs
 BB: Unable to Reach Site
 BD: Auto Calibration
 BE: Building/Site Repair

BF: Precision/Zero/Span
 BK: Site Computer/Datalogger Down
 BL: QA Audit
 Other: All Other Null Codes with <2% usage

2017 PM 2.5 NULL CODE USAGE



AE: Shelter Temp out of Limits

AH: Sample Flow Rate out of Limits

AL: Voided by Operator

AN: Machine Malfunction

AQ: Collection Error

AT: Calibration

AV: Power Failure

AX: Precision Check

AY: QC Control Points (Zero/Span)

AZ: QC Audit

BA: Maintenance/Routine Repairs

BB: Unable to Reach Site

BJ: Operator Error

BK: Site Computer/Datalogger Down

BL: QA Audit

BM: Accuracy Check

BR: Sample Value Below Acceptable Range

DA: Aberrant Data (corrupt files, aberrant chromo)

DL: Detection Limit Analyses

MB: Method Blank (analytical)

Other: All Other Null Codes with <2% usage



GROUP EXERCISE

GRAB A PEN AND POST-IT STACK



OFF THE GRID
MONITORING
STATION AFTER
BEING STRUCK BY
LIGHTNING

ALSO MY FIRST
WEEK ON THE
JOB



WHERE TO LOOK FOR ADVICE

- Quality Assurance SOP
- Guidelines for the use of AQS Null Codes (created by San Luis Obispo and used by North Coast)
- ARB's SOP
- Pull AMP 360 report
- Reach out to your network
- Review what has been used historically

Guidelines for the use of AQS Null Codes

AQS accepts some 50 Null Codes, however EPA provides scant guidance for their usage. The official description of each Null Code is rather terse,¹ and EPA offers no suggestions for the appropriate use of Null Codes beyond the official description. This document aims to standardize the use of Null Codes within the North Coast Unified Air Quality Management District (NCUAQMD) and the San Luis Obispo County Air Pollution Control District (SLOAPCD).

This guideline was created by the SLOAPCD, and adopted by NCUAQMD. The only difference between the coding used by the two districts is in **BOLD**.

Suggested Null Codes for Common Situations

Situation	Null Code	Official Description	Notes
Automated zero/span/precision checks	BF	Precision/Zero/ Span	AT and ED are calibrations, implying a change was made.
Power failure	AV	Power Failure	
Power back on, but instrument still recovering from power failure	AV	Power Failure	
Instrument offline for repairs or scheduled maintenance	BA	Maintenance/ Routine Repairs	
Calibration of instrument	AT	Calibration	
Biweekly BAM QC check	AX	Precision Check	
ARB/EPA performance audit	BL	QA Audit	AZ is "QC Audit", but ARB audits are performed by the QA department.
Instrument reporting bad status for any reason other than recovery from power failure	AN	Machine Malfunction	
Data invalidated or instrument offline because instrument or sample train found to be broken, contaminated, etc.	AN	Machine Malfunction	
Negative BAM data, below lower validation limit or BAM2.5+ > BAM10	DA	Aberrant Data	

¹ "Qualifier Codes NULL," <https://aqs.epa.gov/aqswb/codes/data/QualifierCodesNULL.html>.

H	Interference/ co-elution/ misidentification	
W	Wildlife damage	
S	Poor Quality Assurance Results	
E	Shelter Temperature Outside Limits	
	Operator error	
	Insufficient Data (cannot calculate)	

is equally appropriate. For example, an instrument may report Bad Status. The next day a technician arrives at the site, fixes the instrument. In this situation, the missing data from before the fixed instrument should be coded AN (machine malfunction), and the hours invalidated during the power outage should be coded BA (Maintenance/Routine Repairs). However, unless a problem at the top of the hour, there will be at least one hour both broken and being repaired, so for this hour AN and BA are principle that it is desirable to have evidence of both the power outage and the repair. So, for example, if the instrument began reporting an arrived at 8:46 and performed a quick repair, and the instrument reporting at 9:00, code 5:00 through 7:00 as AN and 8:00 as BA, even so be coded as AN.

are ARB/EPA audits in the null coding. Therefore, if an hour seems to be broken or BA or AN or something else, the BL code takes precedence and

an automatic may cause the automatic to be invalidated. Invalids may be reported to the effected hour, however if the automatic is deemed invalid,

then the lost hour should be coded AV.

id by a power failure and this causes an extended data outage, then all power failure as AV and subsequent offline hours as AN. If power fails from a power failure on its own (for example, it simply needs to report missing data as AV.

nd by Operator*) and AM ("Miscellaneous Void")—there is almost no code available.

HOW TO BUILD IN CONSISTENCY

- Utilize data management system tools
- Document code usage and scenarios
- Share documentation and recommendations with all necessary staff
- Avoid vague Null Codes
 - AM: Miscellaneous Void
 - AL: Voided by Operator

The screenshot displays the ADVP Editor interface for configuring a rule. The main window is titled 'ADVP Editor' and contains several sections:

- Rule Information:**
 - Rule Name:** Flag -- PNL_Temp -- Lone Pine
 - Description:** TEOM: Temperature >2 (1.5 for rounding) and <40 (40.5 for rounding)
 - Average Interval:** 001h
 - Max Lookback Intervals:** 6
- Actions:**
 - Site:** Lone Pine
 - Parameter Template:** PM_1HR
 - Apply Null Code:** AE - Shelter Temperature Outside
 - Clear Null Code:** (empty)
 - Apply Qualifier Code:** (empty)
 - Clear Qualifier Code:** (empty)
 - Assign Value:** (empty)
 - Assign Data Grade:** (empty)
 - Apply Flag:** * - QA Needs Review
 - Clear Flag:** (empty)
 - Add Annotation:** Shelter Temperature Outside of Limit
 - Category:** ADVP
 - Add Log Book Entry:** (empty)
 - Log Book Message:** (empty)
- Send Email:**
 - Subject:** Shelter Temperature Outside of Limit
 - Tag Email Urgent:** (checkbox)
 - Email Message:** Shelter Temperature is out of range.
- Conditions Triggering Rule:**
 - Add Condition:** (+ icon)
 - Delete Condition:** (- icon)
 - Condition List:**

Condition Number	Logical Operator to Next
1	OR
2	
- Condition Details:**
 - Condition Number:** 1
 - Comparison Type:** Value
 - Relationship:** Greater Than or Equal
 - Compare:** Site: Lone Pine, Parameter Template: ITEMP
 - To:** Value Comparison Type
 - Fixed Value:** (selected) Fixed Value: 40.500000
 - Historical Average:** (radio)
 - Historical Composite:** (radio) Historical Composite Years: (input) +/- Days: (input)
 - Minimum Detectable Limit (MDL):** (radio)



QUESTIONS?

