

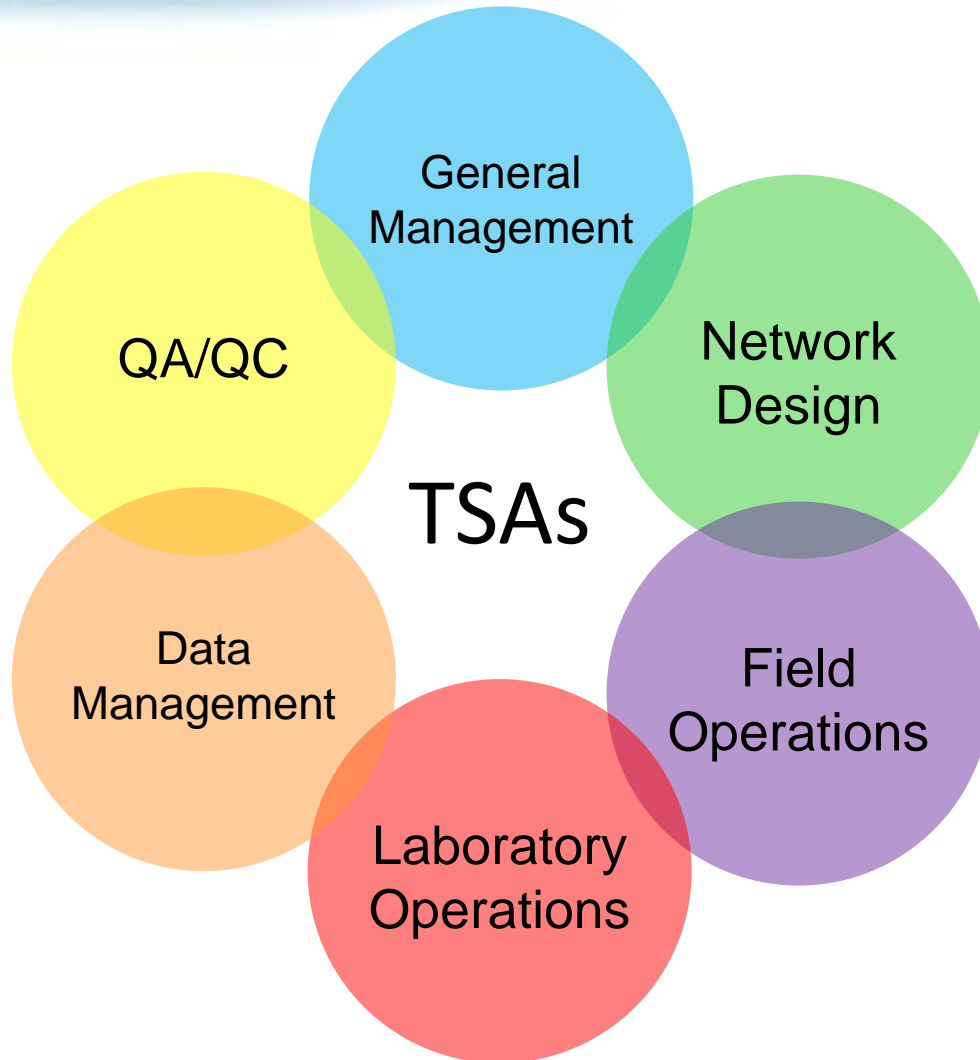


Technical System Audits

Dena Vallano
Air Quality Analysis Office
EPA Region 9

2017 ARB PQAQ Training Workshop
January 25, 2017

TSAs

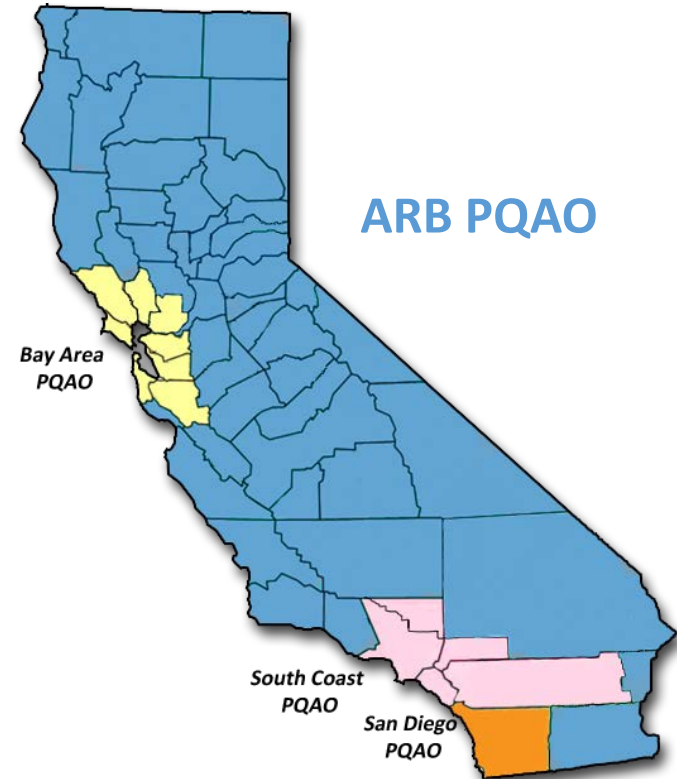


TSA on Consolidated PQAOs



40 CFR Part 58, Appendix A, Section 2.5 says:

- A TSA is required for each PQAO every three years
- If a PQAO is made up of several monitoring organizations, all monitoring organizations should be audited within six years (two TSA cycles of the PQAO).



EPA and ARB collaborate to conduct TSAs of all monitoring organizations within the ARB PQAO on a schedule of every 3-6 years

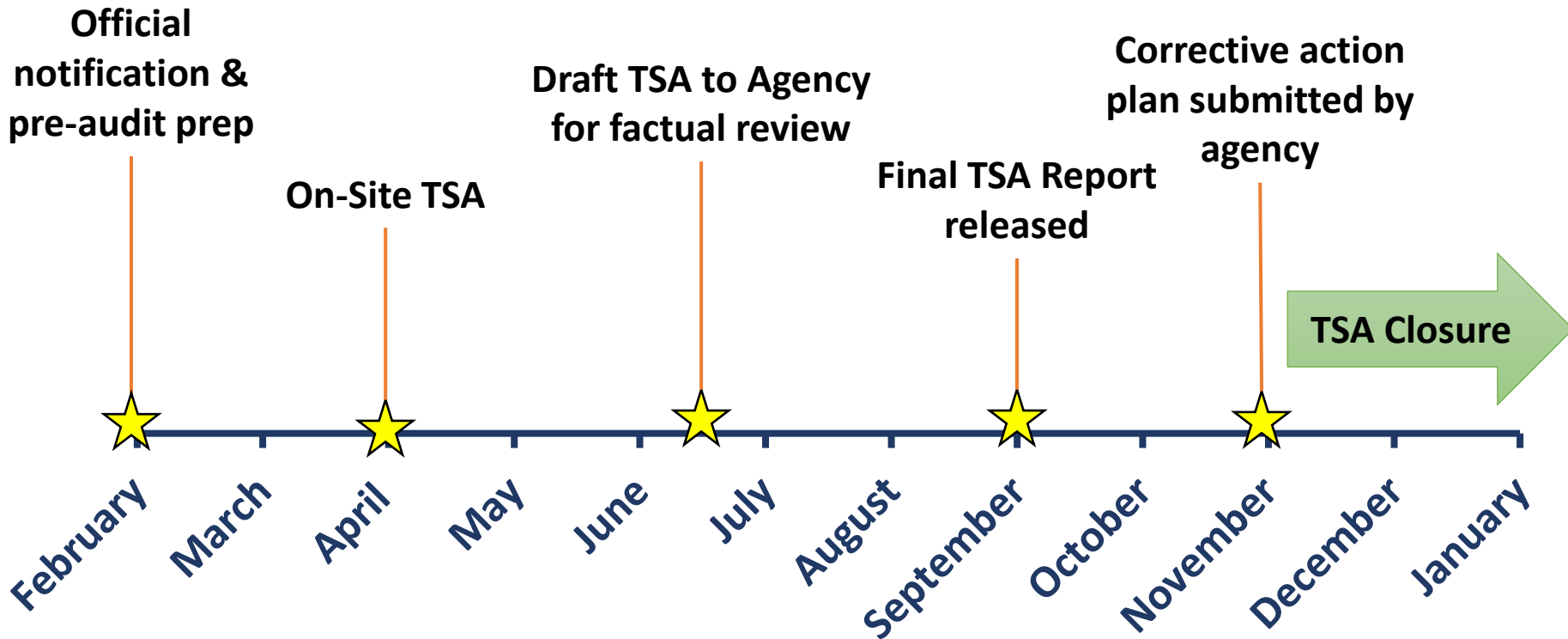
R9 TSA Objectives



- Emphasize criteria pollutants and regulatory requirements:
 - ✓ Defensible documentation
 - ✓ Data reported to AQS are accurate
 - ✓ Effective, efficient technical procedures that adhere to QAPPs/SOPs
 - ✓ Consistency and best practices
 - ✓ On-site operations/field site knowledge
 - ✓ Feedback on monitoring systems
 - ✓ Learn new and better monitoring techniques



R9 TSA Timeline



R9 TSA Process



TSA Prep



TSA On-Site



**Post-TSA
Assessment**



Data Tracking

A cradle to grave assessment of air quality data as a tool to evaluate appropriate implementation of an agency's air monitoring programs.

Pre-TSA Scoping & AQS Pulls

- Focus on specific parameters (pollutants, sites)
- Review AQS reports and choose data points

TSA On-Site Field Activities

- Site/Station Evaluation: Review instrument or station logbooks, maintenance sheets, site operator interview, etc.
- Data Management System Evaluation: Review data validation procedures and documentation, standard certifications, etc.

R9 Data Audit Process



Missing Values

Null Data Codes and QA
Qualifier Flags

Irregular Data Patterns

Max/Min Values



Data loss due to instrument
malfunctions

Null/qualifier codes in AQS
are not appropriate

Inadequate field
oversight/training

Inappropriate data
invalidation (negative
values)

R9 Data Tracking



REPORT FOR: OCTOBER 2013

DURATION: 1 HOUR
 UNITS: Micrograms/cubic meter (25 C)
 MIN DETECTABLE: -50

DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN		
1	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0		
2	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0		
3	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0		
4	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0		
5	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0		
6	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0		
7	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0		
8	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0		
9	92	91	84	51	117	110	120	212	127	51	102	108	104	166	72	80	97	97	145	156	140	114	116	110	94	11	111.0	
10	31	24	29	22	30	75	53	113	83	83	74	55	61	58	64	59	61	67	72	75	91	114	92	72	24	24	64.9	
11	76	62	70	72	63	66	118	165	125	90	79	84	63	76	59	59	50	60	71	63	75	73	53	55	24	24	77.5	
12	64	60	66	59	47	52	61	73	52	65	77	54	39	42	DA	50	59	66	80	108	100	85	81	72	23	23	65.7	
13	76	51	39	32	19	11	16	35	35	165	126	62	43	33	26	28	22	35	47	56	53	52	36	39	24	24	47.4	
14	63	39	38	49	44	65	93	72	44	44	68	63	40	40	48	47	62	72	103	59	57	64	66	48	24	24	57.8	
15	41	40	48	46	58	53	52	AS	AS	82	85	90	85	68	62	65	57	67	76	80	73	70	98	73	22	22	66.8	
16	64	69	60	62	71	88	155	148	125	115	76	40	35	39	28	32	59	91	133	161	113	107	83	81	24	24	84.8	
17	79	62	52	51	69	76	91	113	101	89	97	118	98	68	61	47	50	73	76	90	92	80	87	85	24	24	79.4	
18	82	90	95	108	99	83	113	127	131	125	93	60	67	59	73	67	79	131	161	103	109	101	89	98	24	24	97.6	
19	98	95	81	78	85	99	113	179	336	147	105	79	75	80	77	87	64	79	77	84	65	78	72	79	24	24	100.5	
20	82	72	70	77	84	106	132	131	204	100	59	45	26	37	33	24	35	65	76	92	97	64	49	78	24	24	76.6	
21	84	89	78	67	106	109	140	148	74	90	104	69	50	69	77	104	60	95	136	112	102	93	88	92	24	24	93.2	
22	97	81	71	88	98	99	168	204	AS	AS	102	121	97	79	97	84	91	137	164	125	117	116	97	83	22	22	108.9	
23	102	124	101	93	114	128	184	200	214	125	82	97	97	81	76	77	101	124	139	118	128	88	90	91	24	24	115.6	
24	95	124	110	120	95	103	180	212	208	165	123	94	84	76	56	45	57	74	114	133	110	102	81	71	24	24	110.0	
25	72	55	65	65	45	31	54	46	47	58	68	60	62	75	44	68	98	103	180	112	66	62	49	48	24	24	68.0	
26	49	67	63	52	60	51	69	121	111	180	204	177	53	76	95	78	96	103	113	121	94	109	152	120	24	24	103.8	
27	112	98	94	104	116	102	103	143	110	117	92	67	45	40	35	28	46	93	98	90	211	418	416	332	24	24	129.6	
28	286	312	194	128	152	256	176	57	36	58	DA	DA	DA	DA	DA	84	47	49	15	2	DA	DA	DA	DA	15	15	123.5	
29	DA	DA	DA	4	DA	11	45	63	63	33	22	23	DA	DA	26	26	DA	55	31	30	28	29	30	23	17	17	31.9	
30	19	14	16	16	12	19	34	42	39	35	AS	AS	AS	55	223	38	35	53	95	63	51	44	48	62	21	21	48.2	
31	53	47	47	44	39	55	106	96	90	119	94	75	37	36	52	55	50	52	73	83	85	81	65	59	24	24	66.4	
NO.:	22	22	22	23	22	23	23	22	21	22	21	21	20	22	22	24	23	24	24	24	23	23	23	23	23			
MAX:	206	312	194	128	152	256	184	212	336	180	284	177	184	166	223	104	101	145	180	161	211	418	416	332				
AVG:	82.6	80.3	72.1	64.7	73.8	80.3	103.3	122.7	112.1	97.5	95.8	78.1	66.6	64.8	66.1	58.3	62.7	81.6	98.3	91.0	90.6	96.3	90.9	82.3				

MONTHLY OBSERVATIONS: 539 MONTHLY MEAN: 83.8 MONTHLY MAX: 418.

AS – Poor QA Results	AZ – QC Audit
DA – Aberrant Data	BA – Maintenance/Routine Repairs
High Values - Hourly >155 or Mean > 120	

Post-TSA Corrective Action Plans



Corrective Action Plans = "CAPs"

Finding Corrective Action Form

Agency:
Audit Date:
Finding Number:

Finding: <i>[Put finding in here]</i>	
Description of the Problem: <i>[Describe the cause of the problem]</i>	
Actions Taken or Planned to Correct the Cause: <i>[Describe any actions that have been taken or are planned to address the cause of the finding]</i>	
Timetable for Above "Actions Taken or Planned to Correct the Cause" <i>[List schedule of activities with expected dates]</i>	
Deliverables to Demonstrate Implementation (as appropriate) <i>[List what documentation will be provided to EPA to show that the corrective action has been implemented and the finding addressed.]</i>	
Corrective Action Author & Date: <i>[Prepared by: _____ Date: _____]</i>	Point-of-Contact for Corrective Action <i>[List the person who is responsible for planning and tracking the corrective action for this finding]</i>

[This section to be filled out by EPA]

Plan to Address Finding
Reviewed by:
Date:
Plan to address finding approved?

- Finding
- Description of the Problem
- Corrective Action
- Timetable
- Deliverables
- Author/Point of Contact
- EPA Review/Response

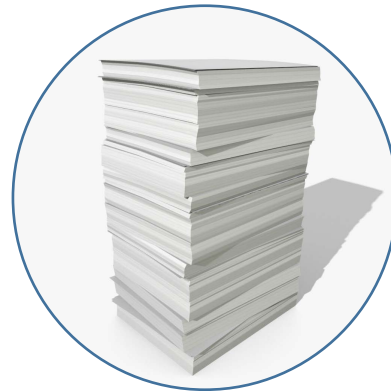
Overview of CAP Process



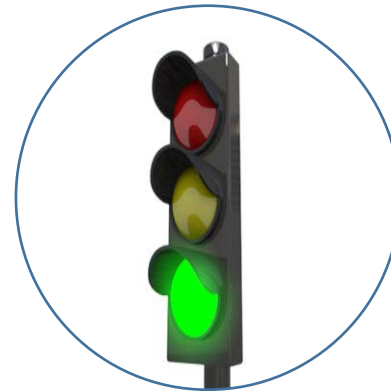
Streamlining the CAP Process



Communication



Assessment
of previous
CAPs



CAP
Submission
& Approval
Process



CAP
Implementation
& Closures

Common CAP Issues



- Appropriate documentation
 - SOPs, QAPPs, QMPs, technical memos, etc.
 - Adequate training and protocol formalization
- Address individual findings on a systematic level if applicable
- Implementation details
 - Target dates
 - Level of detail for corrective action(s)



Example Corrective Action Plan



Finding:

The Yuba City site has several significant siting issues that need to be resolved.

Description of the Problem:

The Yuba City site monitors for the following pollutants for comparison to the National Ambient Air Quality Standards: Ozone, Nitrogen Dioxide, Particulate Matter (PM10) (high vol. filter-based), Particulate Matter (PM2.5) (filter-based)

The site also has a Particulate Matter (PM2.5) Beta Attenuation Model that is used for non-National Ambient Air Quality Standards purposes.

The monitors are on the roof of a small commercial building in a generally residential neighborhood. The gaseous probe is on the northeastern portion of the roof. The particulate monitors are on the southern portion of the roof and the Beta Attenuation Model inlet is on the northwestern portion of the roof.

The gaseous probe is within 3 meters of trees and 4 meters from the roadway. This probe must be at least 10 meters from the roadway and the drip line of adjacent trees. This could be resolved by moving the probe to the south and trimming the adjacent trees.

The particulate monitors are within 6 meters of a tree(s) to the east and 10 meters of a tree to the southwest. The instruments must be at least 10 meters from adjacent trees (a distance of 20 meters is preferable). This could be resolved by trimming trees.



Example Corrective Action Plan



Actions Taken or Planned to Correct the Cause:

California Air Resources Board has issued an Air Quality Data Action request, to address the siting issues recorded during this audit. Air Quality Data Action 8152 was issued for the siting of trees at this site. As a result, the trees were trimmed (as shown below) to bring the station in compliance with the applicable requirements. There are plans to move the probe to meet the requirements by June-2013.



Example Corrective Action Plan



Timetable for Above Actions	Point-of-Contact for Corrective Action
The trees were trimmed on June 26, 2012. Probe to be moved by June 1, 2013	Glen Jennings, Air Pollution Specialist California Air Resources Board (916) 324-9748

Implementation of Corrective Action:

- An Air Quality Data Action (AQDA) request was issued on 5/7/12 by the Quality Assurance Section for the siting issues described above and resolved on 6/26/12 (see attached AQDA# 8152).
- Trees surrounding the site have been trimmed and the gaseous probe has been moved (see attached photographs).
- The station is now in compliance with Title 40, Code of Regulations, Part 58, Appendix E, Section 5 requirements.



Chief – Quality Management Branch

10/3/13

Date



QAPP/SOPs

- “Agency does not have QAPPs for O₃, SO₂, NO₂, CO, and NCore monitoring; QAPPs for PM₁₀ and PM_{2.5} are outdated and should be revised.”
- Required to review them every 5 yrs; Addendums – on ARB’s website

AQS Coding

- “No flags are entered into AQS for any continuous instrument data.”

Training

- “Agency should have formalized training requirements for all air monitoring staff.”

Data Validation

- “The data review and validation process is not complete and/or independent.”

QA Independence

- “The EPA requirement for independent quality assurance is not being fully met.”



Key Findings

- Inadequate training and technical support
- Out of date ARB and district QAPP/SOPs
- Lack of documentation for the quality of zero air
- Inconsistent AQS coding
- ARB Standards Laboratory QA System has a number of deficiencies
- Lack of complete and/or independent data review and validation procedures

2015 ARB TSA Highlights: Notable Enhancements



ARB has put into place multiple systems and infrastructure to promote better communication between ARB and the districts

- PQAQO District Liaisons
- PQAQO trainings
- Roles and Responsibilities (R&R) documents
- New data management system (DMS)
- Data validation SOP
- Quality Assurance (QA) Webpage
- California Monitoring Network Assessment Tool (CAMNAT)



EPA TSA Workgroup



- Goal: Develop a more consistent national TSA approach
 - Discuss audit findings, actions and follow-up
 - Build auditor expertise
 - Develop audit tools
- Next Steps:
 - [TSA Guidance Document](#)
 - Statistical tools to analyze monitoring and QC data
 - Webinars for auditors to develop skills





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