

Technical Systems Audits (TSA): Feel the Love

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Overview

- What is a TSA and Its Purpose?
- What to Expect
- Common Findings



What Is a TSA and Its Purpose?

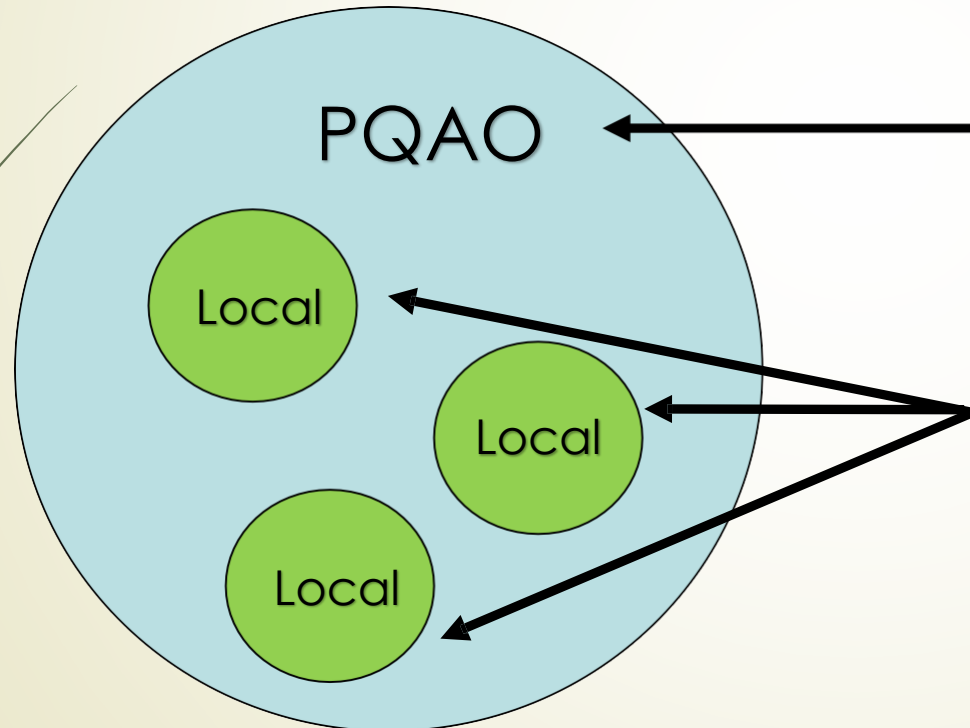
What Is a TSA?

► 40 CFR Part 58, Appendix A Section 2.5 states:

2.5 Technical Systems Audit Program. *Technical systems audits of each PQAQO shall be conducted at least every 3 years by the appropriate EPA Regional Office and reported to the AQS. If a PQAQO is made up of more than one monitoring organization, all monitoring organizations in the PQAQO should be audited within 6 years (two TSA cycles of the PQAQO). As an example, if a state has five local monitoring organizations that are consolidated under one PQAQO, all five local monitoring organizations should receive a technical systems audit within a 6-year period. Systems audit programs are described in reference 10 of this appendix.*

“Reference 10” is..

Consolidated PQAO with 3 Monitoring Agencies



Must be audited
every 3 years (EPA)

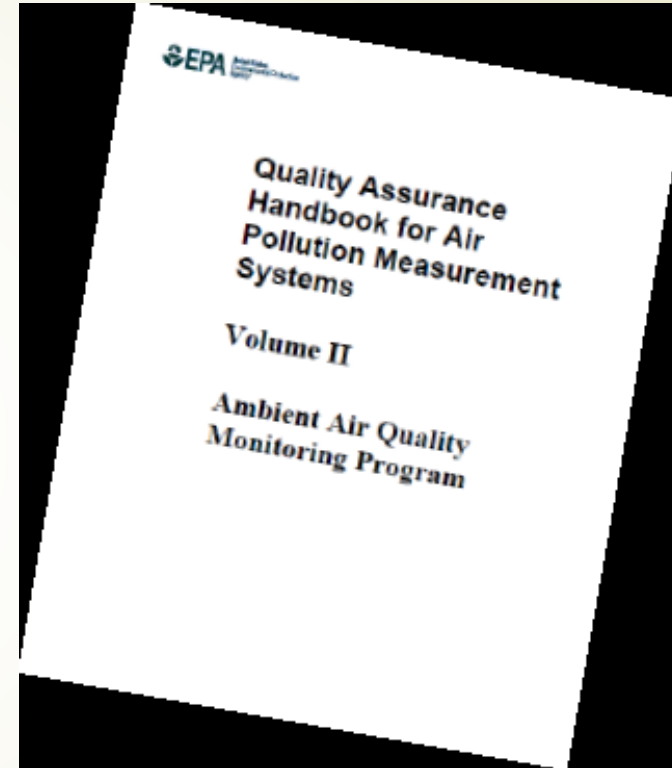
Must be audited
every 6 years (CARB)

“Reference 10” is..

The U.S. EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II

Otherwise known as:

“The QA Handbook”



What Does It Say?

- **Section 15.3 Technical Systems Audit**
- *“A technical systems audit is an **on-site review** and inspection of a monitoring organization’s ambient air monitoring program to assess **its compliance with established regulations governing the collection, analysis, validation, and reporting of ambient air quality data.**”*

Six Key Areas Addressed in a TSA

- 1) Planning
- 2) Field Operations
- 3) Laboratory Operations
- 4) Quality Assurance/Quality Control
- 5) Data Management
- 6) Reporting

Planning

- Network Design
- Monitoring Strategy and Representativeness
- Meeting Monitoring Requirements
- Resources (Staffing and Equipment)



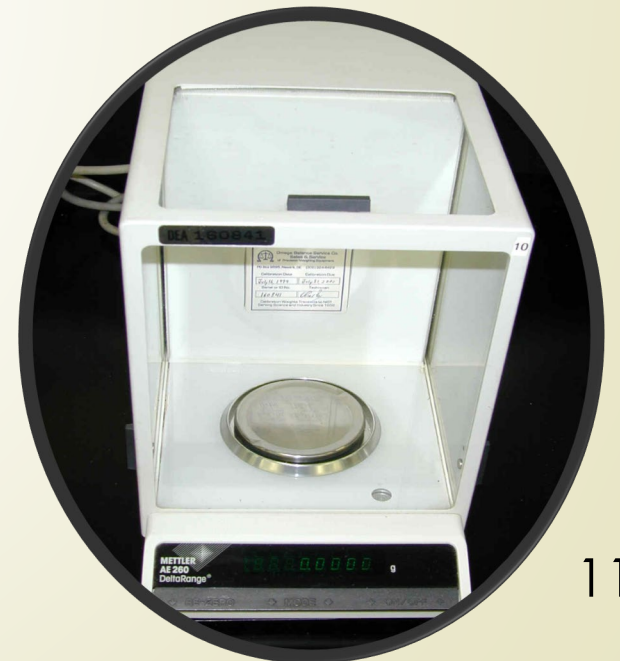
Field Operations

- Use of approved analyzers and samplers for monitoring objective (FRM,FEM) and operating according to FRM/FEM requirements
- Following documented sampling procedures
- Proper siting of monitoring stations, sampler and probes
- Maintenance
- Site safety concerns



Laboratory Operations

- Review documentation/logbooks
- Use of appropriate analytical equipment
- Following documented analytical procedures
- Maintenance capabilities
- Sample handling and storage



Quality Assurance and Quality Control

- Approved and updated QMP and QAPP
- Independence
- QC checks (zero/precision/span checks, calibrations)
- Conducted according to SOPs
- QC checks conducted at the correct frequency
- Documented QA data reviews
- Audits/AQDAs/CANs

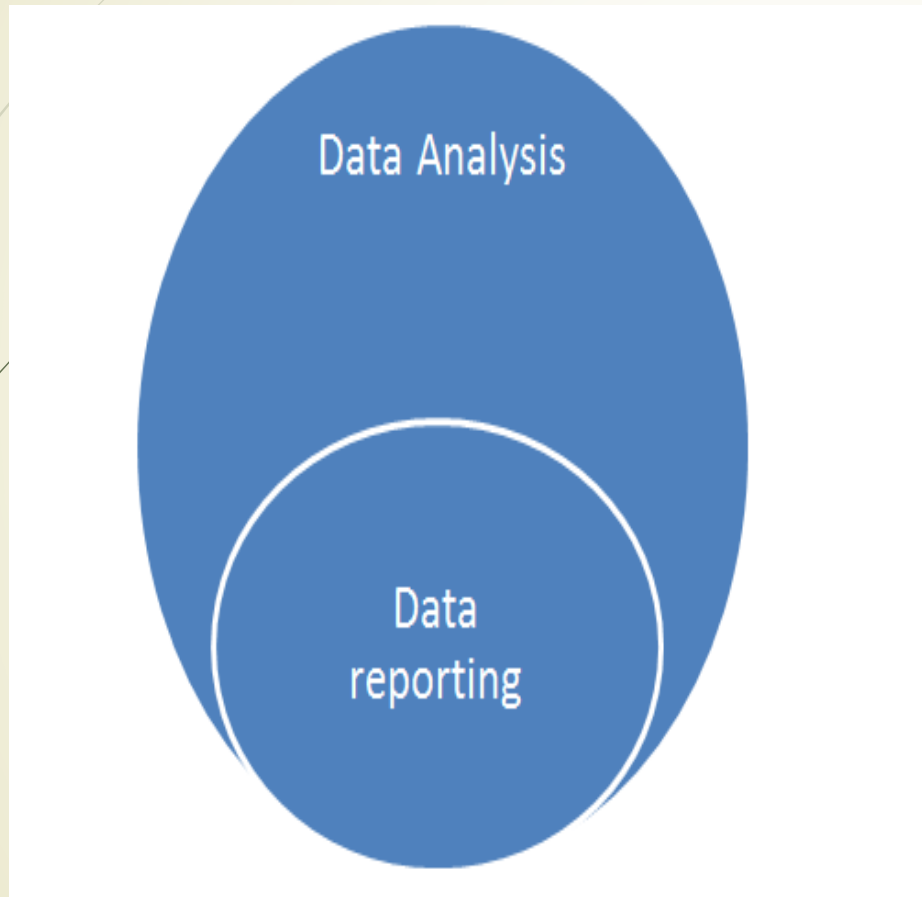


Data Management

- Data acquisition system
- Data backup
- Data flow SOP or flowchart
- Documentation
- Review AMP reports
- Archival protocol (paper and electronic)



Reporting



- Data in AQS
- Timely reporting
- Correct flagging
- Correct null coding
- Metadata
- Certification



What to Expect?

What to Expect

- Pre-Audit Activities
- On-Site Assessment & Interviews
- Post-Site Assessment Activities



Pre-Audit Activities

Agency's TSA
Questionnaire Response

c) Independent Quality Assurance and Quality Control

1. Status of Quality Assurance Program

Question	Yes	No	Comment
Does the agency perform QA activities with internal personnel? If no go to Section d			
Does the agency maintain a separate laboratory to support quality assurance activities?			
Has the agency documented and implemented specific audit procedures separate from monitoring procedures?			
Are there two levels of management separation between QA and QC operations? Please explain:			
Does the agency have identifiable auditing equipment and standards (specifically intended for use only) for audits?			

2. Internal Performance Audits

Question	Yes	No	Comment
Does the agency have separate facilities to support audits and calibrations?			
If the agency has in place contracts or similar agreements either with another agency or contractor to perform audits or calibrations, please name the organization and briefly describe the type of agreement.			
If the agency does not have a performance audit SOP (included as an attachment), please describe performance audit procedure for each type of pollutant.			
Does the agency maintain independence of audit standards and personnel?			
Please provide information on certification of audit standards currently being used. Include information on vendor and internal or external certification of standards.			
Does the agency have a certified source of zero air for performance audits?			
Does the agency have procedures for auditing audit's validating performance of meteorological monitoring?			
Please provide a list of the agency's audit equipment and age of audit equipment.			

How does the agency verify that the SOPs are implemented as provided?
How are the updates distributed?

Agency's Quality
Documents



Review Data Package

Review Data!!

- Pull the agency's data from AQS
 - AMP 350 (Raw Data Report)
 - AMP 251 (QA Raw Data Assessment Report)
 - AMP 256 (QA Data Quality Indicator Report)
 - AMP 430 (Data Completeness Report)
 - AMP 480 (Design Value Report)
 - AMP 503 (Extract Sample Blank Data)
 - AMP 504 (Extract QA Data)
 - AMP 600 (Certification Evaluation & Con

AMP 350 Report

Code change?

What malfunctioned?
Where is maintenance & recalibration?

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	MAXIMUM
1	5.5	1.8	3.2	2.9	3.2	2.1	2.3	3.4	7.1	5.6	2.9	2.7	2.1	3.2	5.7	8.1	11.0	8.7	1.7	2.3	2.2	1.8	2.4	3.0	24	11.0
2	4.7	4.1	4.1	5.5	5.2	2.6	1.3	2.0	2.9	2.2	1.9	1.0	.9	.7	.7	.8	.6	.8	.6	.5	.6	.8	1.0	24	5.5	
3	1.5	.9	.7	.7	.6	.6	.6	1.0	1.0	.7	.7	1.3	1.1	1.5	1.9	.9	.5	.5	.5	.4	.5	.5	.4	.5	24	1.9
4	1.5	.7	.5	.4	.4	.4	.4	.4	.8	2.5	3.6	4.9	8.6	1.5	.9	.8	.7	.7	.8	.5	.5	.4	.5	.4	24	8.6
5	2.6	1.0	.7	.6	.6	.6	.7	.7	.9	1.1	1.9	2.7	BF	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	12	2.7
6	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	0	
7	AN	AN	AN	AN	AN	AN	AN	AN	AN	BA	BA	BA	AN	BC	BC	BY	AN	AN	AN	AN	AN	AN	AN	AN	0	
8	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	BA	BC	BC	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	0	
9	AN	AN	AN	AN	AN	AN	AN	AN	AN	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	0	
10	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	
11	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	
12	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	
13	AS	AS	AS	AS	AS	AS	AS	AS	AS	AY	AS	AY	AY	1.0	.7	.3	.2	.1	.4	.3	.2	.3	.5	.4	11	1.0
14	4.3	1.6	1.0	1.2	1.5	1.3	1.3	1.2	1.4	1.9	2.3	2.4	2.1	2.4	2.0	1.8	1.6	1.4	1.5	2.4	4.3	3.5	2.3	1.4	24	4.3
15	4.4	1.7	1.5	1.2	1.2	.5	.5	.6	2.3	4.3	4.4	4.7	8.5	13.2	12.9	10.1	8.1	8.3	5.7	2.1	.8	.5	.4	.4	24	13.2
16	4.6	1.4	.7	.5	.5	.4	.6	.5	.4	1.0	4.9	8.5	8.8	6.2	5.3	4.9	17.6	21.7	6.7	2.6	1.6	1.7	2.0	2.2	24	21.7
17	4.0	1.5	.9	.8	.8	.7	.6	.5	.5	2.8	4.7	4.1	3.7	3.3	3.1	2.8	2.4	1.9	1.5	1.4	1.2	1.1	1.1	1.0	24	4.7
18	3.6	1.9	1.5	1.1	.6	.9	.9	.9	.8	2.1	3.9	6.3	12.9	8.9	6.7	5.7	6.5	5.5	3.1	1.8	1.1	.5	.4	.3	24	12.9
19	3.7	1.1	.7	.7	.7	.6	.6	.5	.7	1.8	3.4	7.0	BF	10.0	6.7	4.0	3.3	3.0	2.9	2.8	2.3	2.1	1.7	1.6	23	10.0
20	3.8	2.5	1.8	1.6	1.7	1.0	.7	.6	1.2	3.0	3.7	6.5	9.2	8.7	7.3	8.0	6.1	5.0	5.4	6.0	5.8	4.9	4.6	3.1	24	9.2
21	3.8	1.9	1.4	.9	.8	1.3	1.0	.9	1.4	1.6	2.4	4.7	7.8	10.7	6.6	5.1	4.2	2.5	1.9	1.7	1.2	.7	.5	.5	24	10.7
22	3.1	1.2	.8	.7	.8	.4	.5	.5	.7	.6	1.0	7.4	28.6	18.1	9.2	4.3	2.5	1.5	1.3	1.3	1.5	3.2	4.0	2.9	24	28.6
23	4.1	4.7	12.5	13.1	8.0	2.5	2.0	1.0	.3	.3	.2	.1	.2	.1	.1	.9	.1	.0	.0	.0	.0	.1	.1	.0	24	13.1
24	1.5	.5	.3	.1	.0	.0	.2	.1	.3	.6	.4	.3	.4	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	24	1.5
25	3.2	1.3	1.1	2.3	3.2	3.2	3.6	3.9	5.0	3.5	3.5	10.4	6.3	4.4	4.3	4.4	4.9	2.8	2.6	1.8	1.9	1.4	.9	.8	24	10.4
26	2.4	1.0	.6	.3	.3	.4	.3	.6	.6	1.4	2.2	2.1	2.7	3.3	2.1	1.7	2.1	2.8	4.6	5.5	1.9	1.2	1.4	2.2	24	5.5
27	3.6	1.1	.7	.4	.3	.1	.2	.2	.4	5.4	5.6	4.9	13.3	5.4	1.1	.5	.2	.1	.2	.0	.0	.0	.0	.0	24	13.3
28	4.0	1.2	.9	.6	.5	.6	.4	.4	.5	.5	1.4	8.2	6.7	3.6	2.5	1.9	2.1	2.0	1.1	.5	.2	.1	.3	.2	24	8.2
29	3.3	1.2	.7	.7	.6	.6	.8	.6	1.4	1.7	2.1	23.0	16.1	27.1	23.7	14.1	10.0	14.7	4.1	2.4	1.4	1.4	1.9	4.3	24	27.1
30	7.9	4.0	2.8	2.5	2.4	2.2	2.3	3.6	6.4	5.3	4.6	3.6	2.6	2.4	2.4	4.4	7.2	2.3	1.2	1.0	.9	.7	.4	.4	24	7.9

On-site Assessment & Interviews

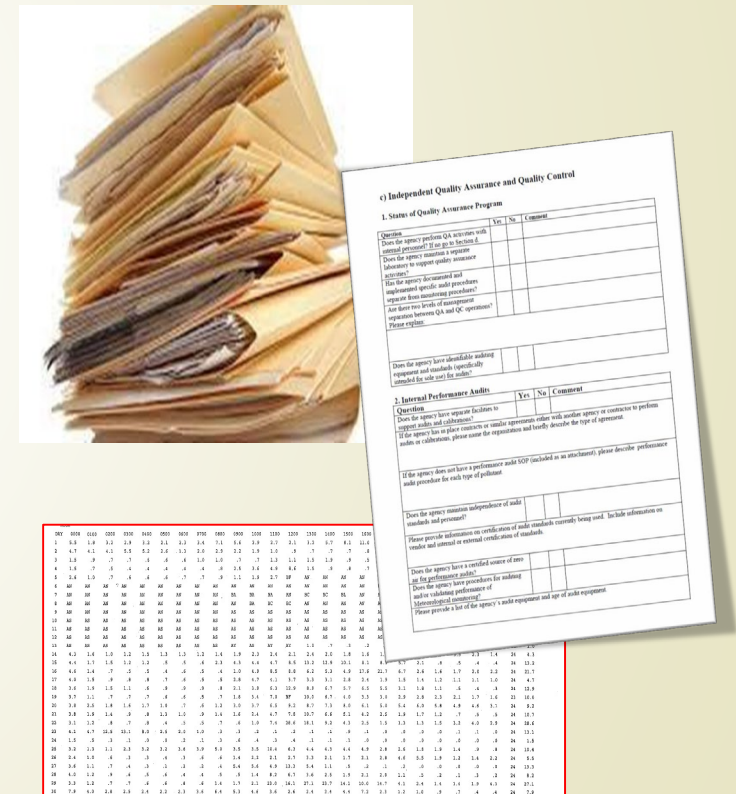
Office Tour

- Entrance briefing
- Take the office tour!
 - File Room
 - Repair shop
 - Certification/QA shop
 - Warehouse
 - Laboratory

Field Site Visit

- Housekeeping
- Review logbooks
- QA/QC docs
- Talk to the field tech
 - Demonstrate procedures?
- Check sample lines
 - Proper plumbing?
 - Condensation free?
 - Approved materials?
- Evaluate Appendix E

Pre-Audit Findings



Post-Site Assessment Activities

Follow up calls/emails

- Clarify Finding
- Request support Docs

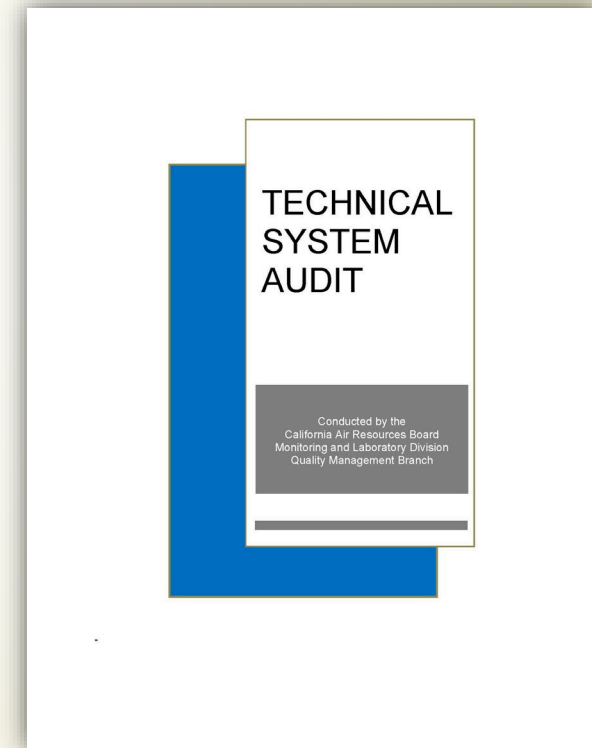
Compose findings

Recommendation #	FO-1
Agency:	District AQMD
Date of Audit:	Date of On-Site Visit
Program Area:	Field Objectives

Finding:
General Description of finding
Description:
Detailed description of the finding, outlining what was observed during our research or site visit
References:
Quality Assurance Guidance Document 2.12, EPA-454/B-16-001, January 2016, (Section 9.0 Gravimetric Lab Design and Set-up)
Suggested Actions to Address Finding:
A potential solution to resolve the finding is given. The ultimate resolution to the finding is decided upon the District, but must be submitted and approve by CARB.

1

Final report to District





Common Findings

And How to Avoid Them

Documentation

- Missing and/or outdated documentation
 - Quality management Plan (QMP) –Update every 5 years
 - Quality Management Project Plan (QAPP) – Update every 5 years
 - Gaseous pollutants and particulate matter
 - Standard Operating Procedure (SOP) – Update every 3 years
 - All field and lab operations
 - Data management
 - Training plans
 - Corrective action process



How to Avoid a Documentation Finding

- Adopt CARB QA/QC Documents!
 - Create an addendum that is specific to the District
 - Submit to CARB for review and approval

No need to reinvent the wheel; use CARB docs!



Logbooks

- Calibration information is not documented
- Information regarding instrument quality control checks and maintenance are not documented
- Entries in logbooks are incomplete:
 - who was present at the site
 - Serial numbers of problematic instruments
 - Descriptions of actions taken
 - How much data could be impacted

Logbooks, continued

- Records of any instrument calibrations or checks performed, specifically the results, and where to find any related reports or check sheets.
- Dates that instrumentation were repaired or changed out and serial numbers of replacement instruments.
- Station repairs should be noted in chronological order in a central logbook at the time they are performed.



Data Management

- Need a multilevel review process
 - Operator, peer and management review required
- Formally documented in SOP
- Correct codes used
 - Consistency between all operators



Summary

- ▶ TSA is a 3-Step Process
 - ▶ Pre-audit Questionnaire
 - ▶ On site visit (3-5 days)
 - ▶ Follow up/Final report (5-6 months)
- ▶ Major Findings
 - ▶ Documentations (SOPs, QMP, QAPP)
 - ▶ Logbooks
 - ▶ Calibration information
 - ▶ QC/QA control checks and results
 - ▶ Instrument repairs and downtime
 - ▶ Data Management Process and SOP



Thank You – Questions?

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