



# **NETWORK MODIFICATION**

## Air Monitoring Organization Point of View

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**PROJECT PLANNING**

**SITE SELECTION**

**STATION SELECTION**

**STATION SETUP**

**INTERIOR SETUP &  
INSTRUMENT SELECTION**

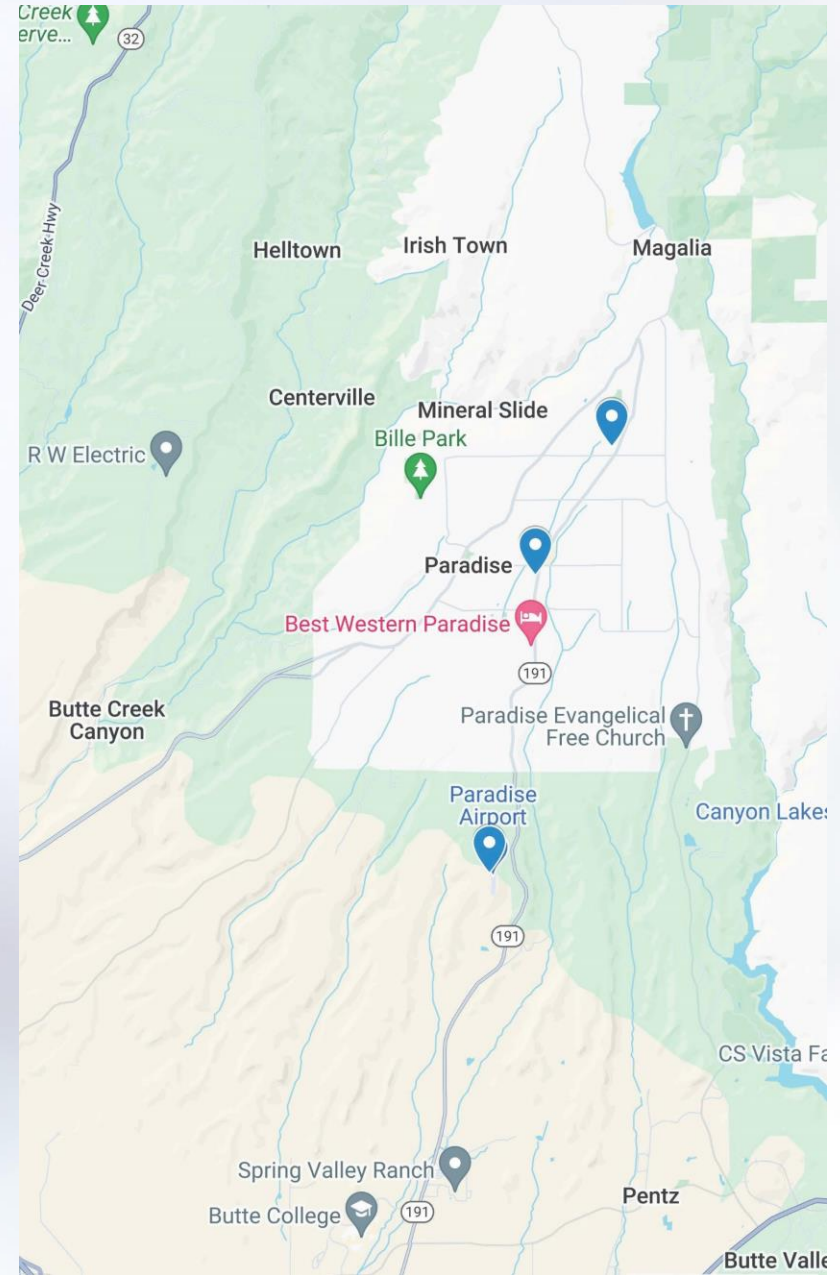
Moving was  
a GREAT idea  
until I started  
packing!!



someecards  
user card

# RECENT AND UPCOMING CARB NETWORK MODIFICATIONS

- Placerville
- Paradise
- Bakersfield Planz
- Nevada City
- Mojave



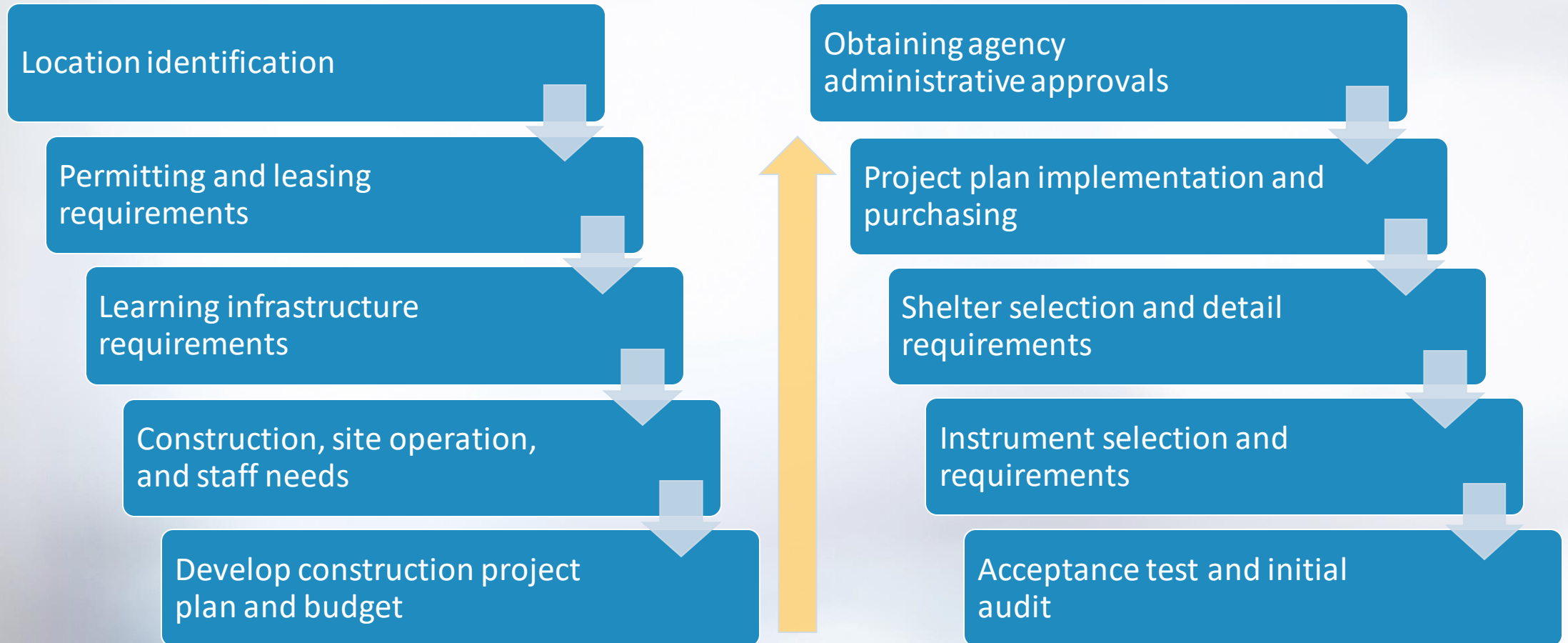
# FAIL TO PLAN, PLAN TO FAIL!

- WHY** Adding a new site or forced to relocate
- WHERE** Site selection process
  - Siting criteria, access to site, permits, leasing, safety
- WHAT** Station & equipment selection
  - Trailer, modular, container, building, other
- WHO** Site construction
  - Own construction, outsource, RFP, contracts, coordination
- WHEN** Construction project
  - Timing
- HOW** Developing project plan with EPA input and guidance

# NETWORK DESIGN/MODIFICATION



# PROJECT GENERAL FLOW



# SITE SELECTION PROCESS

## TYPICAL SITE LOCATIONS

- Private Property
  - Offices
  - Churches
  - Ranches
  - Vacant lots
- Public Property
  - Schools
  - Water well yards
  - Fire Stations
  - Airports
  - County property





# PUBLIC VS. PRIVATE

## PUBLIC

Free or low rent cost!

Sites are relatively secure and most have good access

Enhances transparency of District activities

Locations are established and generally all services are available

## PRIVATE

Rent is negotiable but it is usually the highest rent cost

Terms are easier to negotiate

Longevity of site is uncertain

# GROUPS TO CONTACT/CONSIDER

- Local Air District or CARB
- CARB Office of Community Air Protection (OCAP)
- Environmental Justice Advisory Committee
- Community Groups/Coalitions



# SITE SELECTION PROCESS

- Emission sources
  - Analyze historic transport trends
- Meteorology and terrain
  - Yearly weather totals, wind direction, visit site in person
- Topography and elevation
  - Satellite photographs
- Modeling
- Traffic count
  - Planned or potential road projects
- Population
  - Planned growth or residential projects



# SITE SELECTION PROCESS

## NEW OR RELOCATION SITE CHECKLIST

<p style="text-align: center;"><b>NEW OR RELOCATION SITE CHECKLIST</b> (For more details refer to 40CFR Pt 58, Appendix D &amp; E).</p> <p style="text-align: center;"><b>General Site Locator Check Sheet</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is Parallel monitoring necessary? Yes: <input type="checkbox"/> No: <input type="checkbox"/></li> <li><input type="checkbox"/> Able to work out necessary agreements, leases, etc.</li> <li><input type="checkbox"/> Adequate space availability (interior)</li> <li><input type="checkbox"/> Adequate space availability (exterior)</li> <li><input type="checkbox"/> Space/layout planning complete, accessibility for QA team.</li> <li><input type="checkbox"/> Security</li> <li><input type="checkbox"/> Safety OSHA requirements, Per. Lessor/Lessee agreement.</li> <li><input type="checkbox"/> Technical specifications complete (e.g. for trailer, enclosure, or contract job)</li> <li><input type="checkbox"/> Site improvements:             <ul style="list-style-type: none"> <li><input type="checkbox"/> Building or room revisions</li> <li><input type="checkbox"/> Power (new service, metering, contract work, electricity (usually 100 or more amps needed). Electrical needs for interior and exterior instruments must be considered. Most stations require at least 4 separate 20 amp circuits. External power?</li> <li><input type="checkbox"/> Communications (including telemetry if needed, new cabling, pole, contract work, etc.)</li> <li><input type="checkbox"/> AC/heating. Separate Air Conditioning System to keep station between 20 and 30 degrees Celsius. Necessary to insure data validity.</li> <li><input type="checkbox"/> Fencing</li> <li><input type="checkbox"/> Asphalt/concrete work</li> <li><input type="checkbox"/> Carpentry (PM10/Met. platforms, ladders, steps, cabinets, etc.)</li> <li><input type="checkbox"/> Miscellaneous (any needed landscaping, plumbing, etc.)</li> <li><input type="checkbox"/> Permits for any of the above</li> <li><input type="checkbox"/> Purchase orders/requests for any of the above</li> <li><input type="checkbox"/> Notifications to ARB/EPA</li> <li><input type="checkbox"/> New ARB Site Reports/EPA Hardcopy Information Reports</li> <li><input type="checkbox"/> Closure ARB Site Reports/EPA Hardcopy Information Reports</li> <li><input type="checkbox"/> Safety and Handicap facilities</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>POLLUTANT XXXXXXXX</u></b></p> <p>Monitoring Network (SLAMS, NAMS, PAMS, SPM) _____</p> <p>Spatial Scale (Middle, Neighborhood, Urban, Regional) _____</p> <p>Vertical Probe (3-15 meters) _____</p> <p>Horizontal Probe (&gt;1 meter) _____</p> <p>Length of Probe (meters) _____ Probe Inside Diameter _____</p> <p>Approximate Flow Rate _____ Approx. Residence Time _____</p> <p>Height of Nearby Obstacles above Probe _____</p> <p>Distance from Nearby Obstacles _____ (&gt; Twice Height Obstacle above Probe)</p> <p>Predominate Wind Direction _____</p> <p>Obstructions within 270 Arc of Predominate Wind Direction _____</p> <p>Name of Nearest Road(s) _____</p> <p>Distance to Nearest Road(s) _____</p> <p>Road Material (Dirt, Pavement Gravel, Concrete) _____</p> <p>Average Daily Traffic (vehicles/day) on Nearest Road(s) _____</p> <p>Minimum Acceptable Distance to Nearest Road(s) _____</p> <p>Spacing from Trees (&gt;20 meters from dripline) _____</p> <p>Spacing from Trees Upwind from Predominate Summer Day-time Wind Direction (&gt;10 meters from dripline) _____</p> <p>List Nearby Possible Emission Sources _____</p> <p>List Emission Sources on Roof _____</p> <p>Inside Temperature Recorded and Controlled between 25°C +/- 5°C _____</p> <p>Reviewer's Signature _____ Date _____</p> <p>Manager's Signature _____ Date _____</p>
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# STATION REQUIREMENTS

Pollutant	Scale (maximum monitoring path length, meters)	Height from ground to probe, inlet or 80% of monitoring path	Horizontal and vertical distance from supporting structures to probe, inlet or 90% of monitoring path (meters)	Distance from trees to probe, inlet or 90% of monitoring path (meters)	Distance from roadways to probe, inlet or monitoring path (meters)
SO <sub>2</sub>	Middle (300 m) Neighborhood Urban, and Regional (1 km)	2–15	> 1	> 10	N/A
CO	Micro, middle (300 m) and Neighborhood (1 km)	3±½; 2–15	> 1	> 10	2–10; see Table E–2 of this appendix for middle and neighborhood scales.
NO <sub>2</sub> , O <sub>3</sub>	Middle (300 m) Neighborhood, Urban, and Regional (1 km)	2–15	> 1	> 10	See Table E–1 of this appendix for all scales.
Ozone precursors (PAMS)	Neighborhood and Urban (1 km)	2–15	> 1	> 10	See Table E–4 of this appendix for all scales.
PM, Pb	Micro, Middle, Neighborhood, Urban and Regional	2–7 (micro); 2–7 (middle PM <sub>10–2.5</sub> ); 2–15 (all other scales)	> 2 (all scales, horizontal distance only)	> 10 (all scales)	2–10 (micro); see Figure E–1 of this appendix for all other scales.

Table E–4 of Appendix E to 40 CFR Part 58—Summary of Probe and Monitoring Path Siting Criteria

# STATION REQUIREMENTS

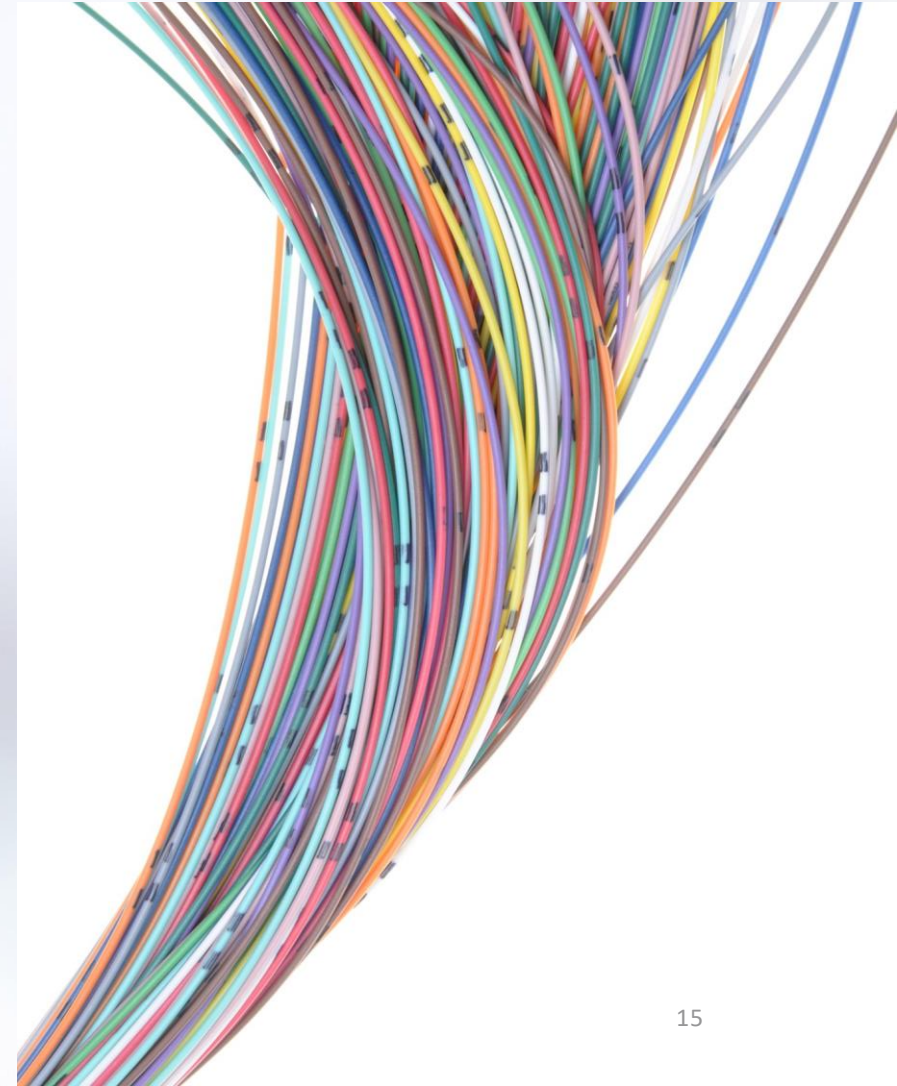
- Exterior lights
- Fencing and locks
- Weatherproof
- Safe access to station and roof
- Ladder gate
- Cover up lattice-type met towers
- Exhaust everything
- CO alarms
- Video surveillance
- Restroom nearby



# STATION REQUIREMENTS

## UTILITIES, PERMITS, & INSURABILITY

- Power
- Communications / telemetry
- Insurance coverage
- Fire Marshall approval
- Clearance restrictions
- 220V outlet for audit van



# STATION SELECTION OPTIONS

- Office
- Standalone cabinet
- Trailer
- Metal container
- Modular shelter
- Other





# STATION SELECTION

## WEATHER & CLIMATE CONTROL

- Strive for energy efficient & environmental friendliness
- Plan sites to be comfortable with stable room temperature
- Optimally, the site should have minimal upkeep needs
- Maintain 20 – 30°C



# STATION SELECTION

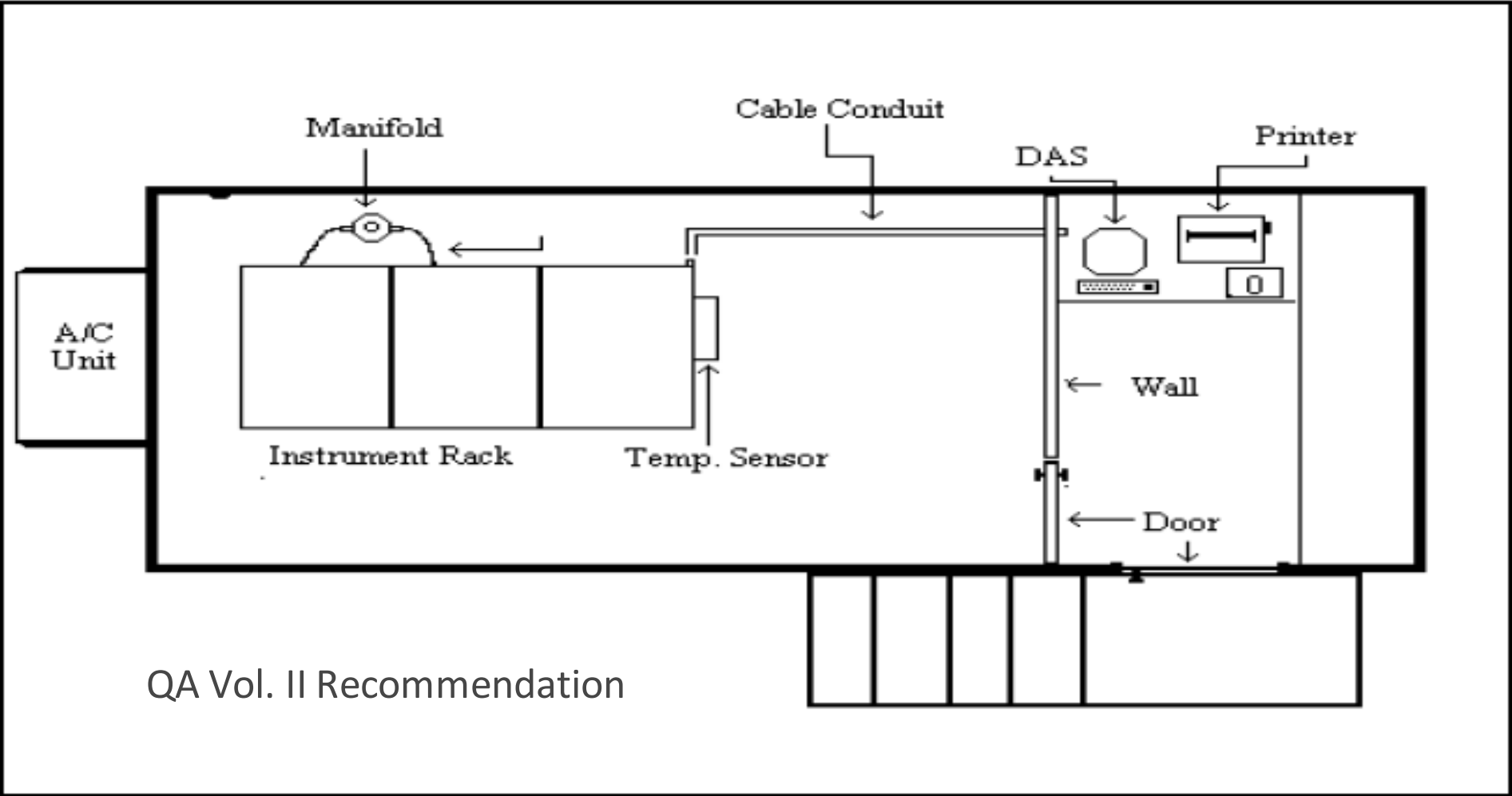
ALWAYS KEEP SAFETY IN MIND



# STATION SELECTION

- **New purchase?**
  - Design according to needs and requirements
  - Evaluate feasibility to contract construction project out
  - Construction project could be 100% turn-key or mix type
- **Moving into existing building?**
  - Any concerns with storing chemicals or compressed gasses?
  - Have approvals for punching holes in their roof?
  - Tenant modifications?
- **Monitoring stand alone enclosure?**
  - Consider preventative maintenance challenge due to adverse weather

# COMMON STATION LAYOUT



# SITE SET UP

- **Monitor Placement**

- Make sure to firmly secure samplers
- Avoid vibrations that could cause leaks or disconnections
- Make sure that AC vents do not blow directly on samplers
- EARTHQUAKES - Secure racks, instruments, and everything else
- Grounding

- **Meteorological Instrumentation**

- Avoid manual lowering of tower, it is a safety risk
- Recommend crank up-down telescopic tower

# SITE SET UP

## RESIDENCE TIME CONSIDERATION



- **U.S. EPA Requirement (<20 seconds)**
  - U.S. EPA QA Handbook Vol II Appendix D
- **Residence Time is a common audit issue**
- **Recommend using setups that can be audited**
  - Use only accepted materials
  - See U.S. EPA QA Handbook Vol II section 7.3.1

# SITE SET UP

- AC vent on ceiling
- BAM on shelf
- Instrument rack with slides
- Lights over instruments
- Closet for storage
- Nearby outlets
- Surge protectors



# INSTRUMENT SELECTION

## TARGETING UNIFORM OPERATION

- Federal reference method (**FRM**), Federal equivalent method (**FEM**), approved regional method (**ARM**)
  - <https://www.epa.gov/amtic/air-monitoring-methods-criteria-pollutants>
- **Standardization within PQAO**
  - Enables opportunities for sharing resources, having uniform methods, facilitates QA support
- **Compatibility with existing equipment**
- **Become familiar with the instrumentation**
  - Obtain a demo unit for testing and familiarization with instrumentation





# ACCEPTANCE TEST INSTRUMENT VERIFICATION

- Verifies purchase specifications
- Test operation before deployment
- Outlined in CARB's Air Quality Surveillance Branch (AQSB) Acceptance Testing Protocols
- PQAO Quality Management Document Repository for related instrument SOPs
  - <https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-management-document-repository>



# COLLOCATION

40 CFR Part 58, Appendix A

PQAO must have 15% of the primary monitors of each method designation collocated (FEM or FRM)

Coordinate with your PQAO liaison

# I WAS TOLD THERE'D BE NO MATH...

# Primary FEMs of a unique method designation	# Collocated	# Collocated with an FRM	# Collocated with same method designation
1–9	1	1	0
10–16	2	1	1
17–23	3	2	1
24–29	4	2	2
30–36	5	3	2
37–43	6	3	3

Table from Section 3.2.3.2 of Appendix A to 40 CFR Part 58  
Example of the distribution of collocated monitors for each unique FEM



## **BUT, WHERE?**

- 50% should be deployed at sites with annual average or daily concentrations estimated to be within  $\pm 20\%$  of either the annual or 24-hour NAAQS
- Siting requirements
- Check with PQAO Liaison to ensure you're meeting requirements!

# CALIBRATIONS

**Shutdown**

Perform shutdown calibrations before shutting down equipment.

**Startup**

Perform startup calibrations after starting new analyzer/sampler or method.

# DOCUMENTING CHANGES

- Update network Quality Assurance reports and Annual Network Plans, Quality Management Plan/Quality Assurance Project Plan, site logs, etc.
- Update site's U.S. EPA Air Quality System (AQS) information
- Standard Operating Procedures



# INITIAL AUDIT

...and when all is up and running,  
contact CARB Quality Assurance  
Section to schedule the initial  
audit



# REFERENCES



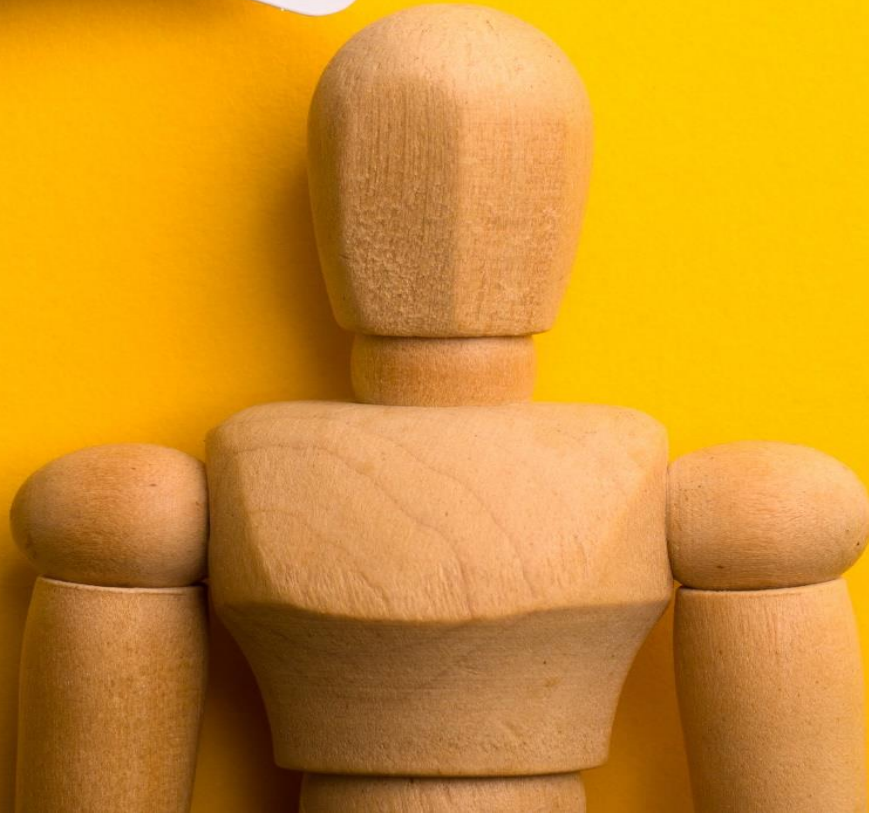
- U.S. EPA QA Handbook Vol. II and IV
- 40 CFR Part 58, Section 14
- 40 CFR Part 58, Appendix D, E
- CARB Quality Assurance Manual
  
- CARB PQAQO liaison







# Questions?



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