



Section 9418

Emergency Response Community Air Monitoring

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Emergency Response Community Air Monitoring

9418.1 Introduction

Airborne contaminants, at an incident, can present a potential threat to both site workers and surrounding communities. In particular, high consequence areas (HCAs; e.g., densely populated) or sensitive groups (i.e., people with heart and lung diseases/conditions, older adults and children, hospital patients, etc.) who are at greater risk from the presence of vapors or particles in the air can be adversely impacted by such threats. As such, identification and quantification of these contaminants through air monitoring and sampling is an essential component of protecting human health. Reliable measurements of airborne contaminants are useful for:

- Characterizing airborne threats,
- Delineating areas where protection or evacuation is needed,
- Assessing the potential health effects of exposure, and
- Determining the need for additional monitoring.

Air monitoring in the communities surrounding an incident should be considered when:

- Chemicals, airborne contaminants, and/or smoke are anticipated to impact communities;
- Volatile chemicals have been or may be released; and
- Sensitive populations are in close proximity to a release site or airborne contaminants are at a level that impacts healthy populations.

The purpose of community air monitoring (CAM) during emergencies is to both identify and quantify the airborne contaminant and use these results as a baseline to determine the optimum level of protection needed for the surrounding community.

9418.2 Scope

This document is intended to be used as a tool to assist emergency responders in establishing a CAM program during an emergency response.

It is designed to be applicable to incidents involving a pollutant, chemical, or oil spill site that has or will likely release airborne contaminants that may affect the surrounding community. This may include scenarios where the contaminants are burning, not burning, and/or releasing combustion byproducts.

The intended audience is response personnel who are responsible for establishing and leading CAM activities.

While some elements of this document may be applicable during planned in-situ burning situations, for specific in-situ burning guidance, responders should also refer to Sections 4617 through 4619 and 9407 of the Northwest Area Contingency Plan (NWACP).

Other considerations when using this document:

- Air monitoring activities during a response may overlap between site worker health and safety and community protection; however, this document is focused solely on CAM. Health and safety of site workers is covered by the site safety plan for the incident (as required by 29 Code of Federal Regulations 1910.120) and in Sections 2230 and 9203 of the NWACP.
- This document does not address odor investigations or indoor air quality assessments.
- This document does not address public communications of air monitoring results outside of the Incident Command System (ICS) structure.
- This document is not intended to provide complete training on establishing a CAM program. Personnel engaged in air monitoring should be fully trained and qualified to use the equipment and approaches described herein.

The information provided within this document is not intended to be policy or to be prescriptive and may be modified as appropriate. The document is designed to be generic and generalized, and it is expected that response managers will modify as appropriate to the conditions of each incident.

9418.3 How to Use this Document

This document is organized into variety of response tools and supplemental informational attachments. The tools can be used independently or in conjunction with each other to establish a CAM program during an emergency. A brief description of the tools is included below.

Community Air Monitoring Resource Tiers

Suggested equipment, personnel, and data deliverables are organized into response tiers. This tool is intended to aid response organizations to rapidly determine and mobilize air-monitoring resources for the early phases of incidents

of varying scope and scale. This tool can be used to communicate needs and expectations as the ICS structure forms.

Community Air Monitoring Organization Chart, Information Flow, Roles, and Responsibilities

This figure presents a suggested organization chart that places the CAM group within the Environmental Unit (EU) of the Planning Section with pathways of communication and action level exceedance reporting. Roles and responsibilities within the emergency CAM group are also briefly described.

Community Air Monitoring Implementation Checklists

This section contains two checklists, one short and one detailed, both capturing the major milestones of CAM during an emergency response. Both checklists are loosely arranged in chronological order and further organized into three operational phases: Initial Response and Assessment, Sustained Community Assessment, and Demobilization. The short checklist only communicates major milestones, while the detailed checklist includes specific actions, expectations, and best practices.

Community Air Monitoring Plan Template

A Community Air Monitoring Plan (CAMP) should be completed as soon as possible during an emergency response, to document and plan ongoing air monitoring. Plan components and suggested formats and content are presented in this template. A CAMP will serve as official documentation of CAM activities and as a functional tool to implement CAM actions.

Response Tool Attachments

Informational attachments are included to detail technical components of implementing a CAM program. Content within these sections are referred to throughout the document and may be used to complete the CAM Checklist or CAMP. The attachments include:

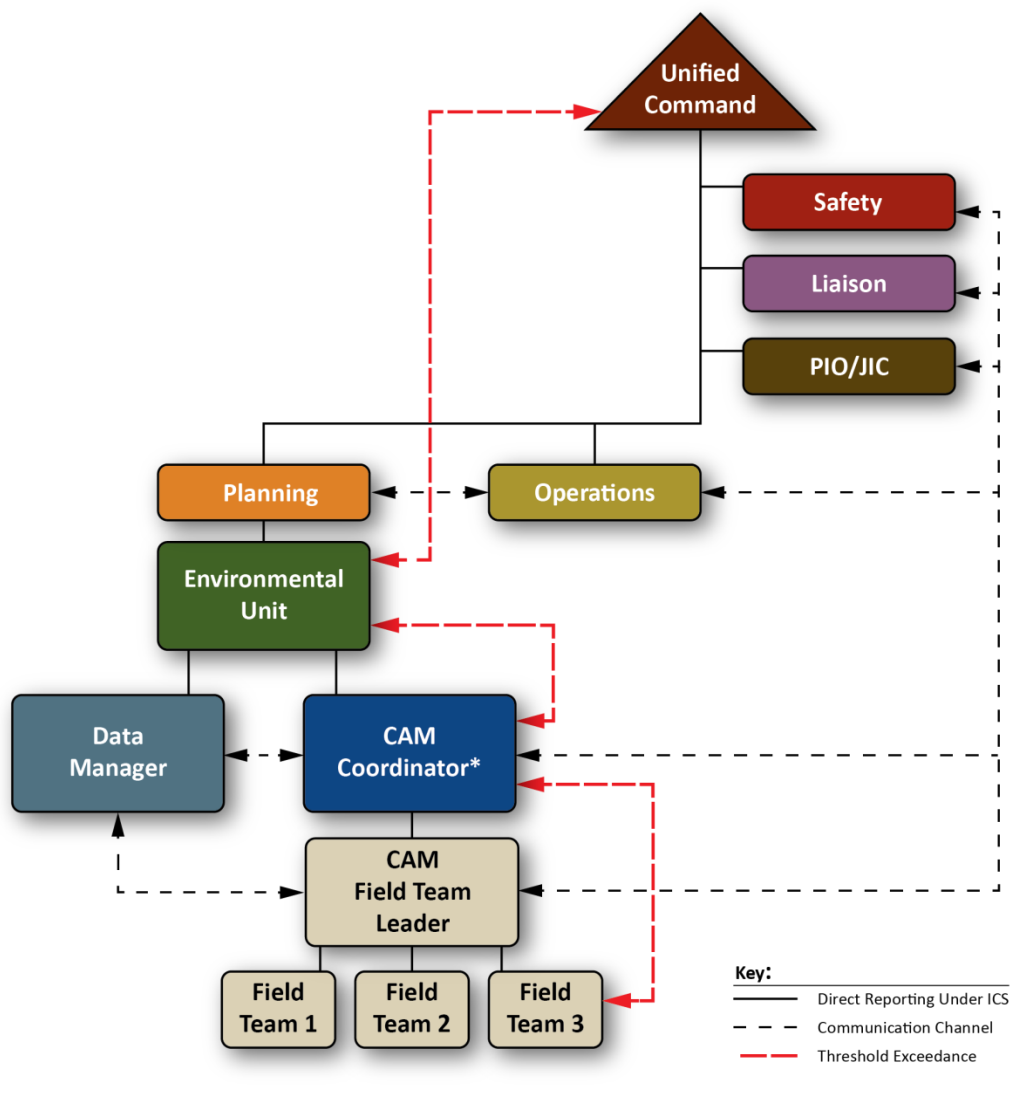
- A. Equipment Considerations
- B. Contaminants of Concern and Recommended Action Levels
- C. Community Air Monitoring Field Team Checklist
- D. Community Air Monitoring Data Management Checklist
- E. Laboratory Analysis

9418.4 Air Monitoring Resource Tiers

Suggested equipment, personnel, and data deliverables are organized into response tiers (see Table 9418-1). This tool is intended to aid response organizations to rapidly determine and mobilize air-monitoring resources for the early phases of incidents of variable scope and scale. This tool can be used to communicate needs and expectations as the ICS structure forms.

Table 9418-1 Air Monitoring Resource Tiers

	Tier			
	1	2	3	4
Potential Roles	Field Team Leader Field Data Manager Field Team Member(s)	Field Team Leader/CAM Coordinator Field Data Manager Field Team Member(s)	CAM Coordinator Field Team Leader Field/Command Post Data Manager GIS/Telemetry Specialist Field Team Member(s)	CAM Coordinator Field Team Leader Field/Command Post Data Manager GIS Specialist Equipment Specialist Sample Custodian Field Team Member(s)
Personnel	2	3-4	5-6	6+
Will Mobilize Within:	Within 2 hours	2-12 hours	2-24 hours	2-48 hours
Data Collection Method	Roaming	Roaming or Fixed	Roaming and/or Fixed	Roaming and/or Fixed
Suggested Instrument Capabilities	Roaming Air Monitoring (as needed) <ul style="list-style-type: none"> PID/FID LEL Electrochemical Sensors Colorimetric Tubes Particulate Monitors Specialized instrumentation 	Roaming Air Monitoring (see Tier 1) Fixed Air Monitoring Telemetry (if available)	Roaming Air Monitoring Fixed Air Monitoring Telemetry	Roaming Air Monitoring Fixed Air Monitoring Telemetry
Air Sampling	<ul style="list-style-type: none"> Grab Samples 	<ul style="list-style-type: none"> Grab Samples Multi-hour Analyte Specific Sampling 	<ul style="list-style-type: none"> Grab Samples Multi-hour Analyte Specific Sampling 	<ul style="list-style-type: none"> Grab Samples Multi-hour Analyte Specific Sampling
Deliverable Examples	<ul style="list-style-type: none"> Site Sketch Aerial Map Verbal Result Communication Summary Data 	Tier 1 Deliverables Upgraded+ <ul style="list-style-type: none"> Basic Modelling Basic Telemetry Basic Geospatial Viewer 	Tier 2 Deliverables Upgraded+ <ul style="list-style-type: none"> Limited Monitoring and Sampling Data Streams Integrated in Geospatial Viewer 	Tier 3 Deliverables Upgraded + <ul style="list-style-type: none"> Monitoring/Sampling Data Streams Integrated in Geospatial Viewer
Frequency of Updates	<ul style="list-style-type: none"> As Exceedance Occurs As Determined by UC 	<ul style="list-style-type: none"> As Exceedance Occurs As Determined by UC Every Operational Period Near-Real Time via Telemetry 	<ul style="list-style-type: none"> As Exceedance Occurs As Determined by UC Every Operational Period Near-Real Time via Telemetry Geospatial Viewer Updates as Needed 	<ul style="list-style-type: none"> As Exceedance Occurs Every Operational Period As Determined by UC Near-Real Time via Telemetry Ongoing Geospatial Viewer Updates

Figure 9418-1 Community Air Monitoring Organization Chart and
Information FlowExample Organization Chart for Community Air Monitoring
Medium to Large Sized Incident

* The CAM group may be placed in other ICS groups such as Safety or Operations depending on site-specific needs.

9418.5 Roles and Responsibilities Community Air Monitoring Coordinator

- Develop and coordinate CAM strategies and tactics with the EU and Incident Commander/Unified Command (IC/UC),
- Establish timeline of operations and communicate monitoring plans with the Environmental Unit Leader (EUL),
- Maintain an ICS 214- Unit Log or other documentation (logbook) of CAM activities,
- Communicate with the Operation Section to ensure team activities are coordinated,
- Identify and recommend Action Levels,
- Determine locations of vulnerable populations with emphasis on populations who may be more sensitive to exposure. (coordinate with Data Manager),
- Monitor weather conditions, specifically wind speed and direction, temperature,
- Ensure background contaminant levels are documented,
- Determine the amount of CAM teams and frequency of monitoring and reporting,
- Delegate and oversee the Field Team Leader and Data Manager,
- Develop and implement the CAMP, and
- Ensure data is communicated to the appropriate parties.

Data Manager

- Establish and maintain Data Management Plan (DMP),
- Conduct data collection calibration briefings with Field Team(s) before deployments,
- Perform quality assurance/quality control (QA/QC) on data daily after collection,
- Maintain and manage all data forms,
- Process data from Field Team(s) after it is collected and present to CAM Coordinator,
- Produce and manage deliverables for site operations and UC.

Community Air Monitoring Field Team Leader

- Responsible for directly implementing CAM Field Operations,
- Ensure the safety and accountability of CAM field personnel,
- Direct operations of Field Teams to implement strategies and/or tactics outlined by the CAM Coordinator and the EUL to meet Incident and Data Quality Objectives (DQOs),

- Ensure that the Health and Safety Plan includes considerations for CAM field activities and hold operational meetings and daily Health and Safety Meetings,
- Hold operational meetings and daily Health and Safety Meetings,
- Serve as dispatch for CAM Field Teams,
- Communicate with CAM Coordinator:
 - Monitor parameters and equipment to be utilized,
 - Personnel designated for CAM teams and frequency of monitoring, and
 - Determine communication pathways and frequency.
- Communicate with Data Manager:
 - Data flow pathways, data recording utility, valid values, and expectations (QA/QC), and document maintenance and management (storage).

Field Team

- Perform calibration-check and deploy air monitoring equipment;
- Document monitoring results, time, and locations;
- Collect field samples and conduct air monitoring at areas of interest;
- Communicate readings and field observations back to Field Team Leader and/or CAM Coordinator; and
- Perform QA/QC on all data in the field, store in designated location, notify Data Manager of data updates.

9418.6 Community Air Monitoring Implementation Checklists

The following implementation checklists (short version and detailed version) are designed to aid users in establishing a CAM program during an emergency release. The checklists are divided into three sections to reflect the major phases in implementing a CAM program and include best practices where applicable. Additional detailed information is provided in the Response Tool Attachments.

The three phases of CAM include:

Initial Response and Assessment – This phase occurs in the early hours of a response and may take place before a formal ICS is established (generally within the first 24 hours or within the first few operational periods) after the incident is reported. It is composed of immediately deploying a Field Team or teams to conduct an initial rapid assessment and for planning future sustained systematic and/or ad hoc air quality assessments.

Sustained Community Assessments – This phase may begin between one and several days into the response, depending on spill-specific conditions. This phase

involves systematic field assessments as well as targeted, ad hoc assessments at locations that may be impacted by a release.

Demobilization Phase – This phase begins as CAM resources begin to demobilize after airborne contaminant threats have been abated or are no longer a sustained concern.

Short Community Air Monitoring Checklist

The following checklist outlines major points of establishing a CAM program during an emergency response, broken into operational phases. This section may be used as a tracking tool; each point is further detailed in the implementation checklists in later sections.

Initial Response and Assessment Phase (Days 1 - ~2)

- ☐ Conduct/receive initial notification call with the other responding personnel.
- ☐ Establish objectives of the CAMP using the objectives established by IC/UC as guidance.
- ☐ Mobilize readily available personnel and equipment.
- ☐ Prior to or during deployment, collect and assess information about contaminant properties, weather conditions and forecasts, the locations of HCAs (i.e., vulnerable and/or sensitive populations), and potential dispersion of contaminants. This information will help guide initial Field Team assessments.
- ☐ During the course of CAM activities, responders should continually assess the external variables that affect airborne contaminant behavior and data analysis.
- ☐ Determine the scope and scale of the area(s) to be monitored by initial CAM teams.
- ☐ As soon as practicable, deploy experienced rapid response air monitoring CAM Field Team(s) to collect baseline data for airborne contaminants.
- ☐ Establish communication and coordination with appropriate ICS group(s) and/or Air/Public health agencies.
- ☐ Identify initial CAM action levels for the contaminants of concern.
- ☐ Establish a process and schedule (i.e., hourly, daily, etc.) for reporting results and Action Level (or other threshold) exceedances.
- ☐ Determine the number of CAM Field Teams and appropriate level of Command Post staff.
- ☐ Submit Resource Request to Logistics for Field Team personnel and equipment.
- ☐ Establish general expectations, procedures, and accountability for CAM data management tasks.
- ☐ Establish a data management system.
- ☐ Develop a field assessment and reporting schedule as appropriate to provide key assessment information as needed by IC/UC, Safety, Liaison, Public Information Officer (PIO)/Join Information Center (JIC), or others.
- ☐ Identify incident specific health and safety considerations for CAM operations and communicate them to the Safety Officer.
- ☐ Begin drafting a CAMP.

Sustained Community Assessment Phase (Day 3+)

- ☐ At the beginning of each operational period (or as needed), collect and assess critical information that may affect CAM activities.
- ☐ Determine which locations should be assessed and in what order.
- ☐ Ensure that all elements of the CAMP have been completed and or updated as needed.
- ☐ Prepare, deploy, and manage CAM Field Teams conducting monitoring assessments. This may be managed by the Field Team Leader or CAM Coordinator.
- ☐ Finalize or update the process for summarizing and communicating CAM field data.
- ☐ Ensure that assessment data from Field Teams is flowing into the command post and disseminated appropriately.

- ☐ Begin developing CAM assessment endpoints.

Demobilization Phase (To Be Determined)

- ☐ Ensure all expectations agreed upon initially have been met or communicated.
- ☐ Discuss continued CAM results with the EUL and Planning Section Chief, and agree on the forecast plan for CAM survey endpoints.
- ☐ Establish a communication protocol with CAM group that notifies the EUL when monitoring has been completed within a given area.
- ☐ Establish endpoints for area monitoring clearance.
- ☐ Finalize monitoring efforts in all CAM locations based on endpoints.
- ☐ Coordinate personnel and equipment demobilization through the Demobilization Unit.
- ☐ Ensure that all of the CAM documents and data are collected and archived with the Documentation Unit.
- ☐ Identify, evaluate, and report all known gaps, delays, or interruptions of all data deliverables to strengthen future performances in the management and communication of CAM data.

Detailed Community Air Monitoring Checklist**Initial Response and Assessment Phase**

The Initial Response and Assessment phase begins when initial responders first receive notification that a release has occurred. This phase typically lasts approximately 24 hours (or 1–2 operational periods) after the incident is reported and is composed of the initial assessment(s), planning, and preparation for the Sustained Community Assessment phase.

- ☐ **Conduct/receive initial notification call with the other responding personnel; discussion points should include the following:**
 - Contaminants of concern known or suspected to be airborne at the site
 - The size and/or complexity of the incident, including the extent of the release or evacuation area, if known
 - Air monitoring resources deployed or deploying to the site
 - Previous air monitoring results and locations
 - What information decision makers initially need (i.e., data quality objectives)
 - Site access/logistical issues
 - Known or suspected HCAs
 - Other staffing or services that may be needed, such as:
 - Weather forecasting
 - Data Management
 - Geographic information system (GIS) support
 - Plume modelling

BEST PRACTICE: Use the Air Monitoring Resource Tier selection tool (Table 9418-1) to determine the appropriate level of initial response resources.

- ☐ **Establish objectives of the CAM program using the objectives established by IC/UC as guidance.**

BEST PRACTICE: Be clear about the objectives of the CAM program to avoid mission creep – avoid assigning CAM teams extra duties beyond the established objectives (e.g., responder health and safety monitoring, odor investigations, non-essential sampling, etc.) unless warranted.

- ☐ **Mobilize readily available personnel and equipment:**
 - Ensure responders are trained in CAM practices/approaches, equipment, and data collection/management/communication protocols.
 - Ensure requested instrumentation is appropriately configured for CAM processes (data logging, appropriate detection limits, fully charged, etc.) and is bump tested and/or calibrated. More detail about air monitoring equipment can be found in Attachment A, Equipment Considerations.

BEST PRACTICE: One resource for identifying air monitoring resources is the Western Response Resource List (WRRL). The WRRL is an oil spill equipment database that includes air monitoring resources owned and operated by response organizations as well as organizational contact information for requesting air monitoring support. Other sources of air monitoring resources may include local/regional hazardous materials teams, health departments, or wildland firefighting organizations.

- ☐ **Prior to or during deployment, collect and assess information about contaminant properties, weather conditions and forecasts, the locations of HCAs (sensitive populations), and potential dispersion of contaminants. This information will help guide initial Field Team assessments.**

- See Table 9418-2 for more information on collecting and using this information.

Table 9418-2 Data Needs to Implement a Community Air Monitoring Plan

Data Need:	Accessible Via:	How to Use Data:
Contaminant Properties	<ul style="list-style-type: none"> ▪ On-scene personnel ▪ Responsible party ▪ Web-based searches ▪ Safety Data Sheets 	<ul style="list-style-type: none"> ▪ Helps determine equipment needs/capabilities ▪ Indicates contaminant fate and behavior ▪ Advises as to personal hazards and methods of protection
Weather Conditions/Forecast	<ul style="list-style-type: none"> ▪ Web-based weather services will provide initial data ▪ Situation Unit ▪ NOAA Spot forecast 	<ul style="list-style-type: none"> ▪ Establish target monitoring areas ▪ Indicates possible changes in future monitoring
Geospatial Data & Maps	<ul style="list-style-type: none"> ▪ Web-based services ▪ Geodatabases ▪ Situation Unit 	<ul style="list-style-type: none"> ▪ Develop common operating picture for CAM activities
High Consequence Areas/ Sensitive Groups	<ul style="list-style-type: none"> ▪ Local knowledge ▪ Geodatabases 	<ul style="list-style-type: none"> ▪ Establish target monitoring areas
Dispersion/Weathering Models	<ul style="list-style-type: none"> ▪ Basic dispersion models (e.g., ALOHA) ▪ IMAAC ▪ ADIOS 	<ul style="list-style-type: none"> ▪ Establish target monitoring areas

- ☐ **During the course of CAM activities, responders should continually assess the external variables that affect airborne contaminant behavior and data analysis (see Table 9418-3).**

Table 9418-3 Variables that May Affect Airborne Contaminant Assessment

Variable	Impact
Temperature	■ An increase in temperature increases the vapor pressure of most chemicals and can result in increased airborne concentrations near spilled chemicals.
Wind Direction/Speed	■ An increase in wind speed can affect vapor concentrations near a freestanding liquid surface as well as dust and particulate-bound contaminants.
Rainfall	■ Water from rainfall can essentially cap or plug vapor emission routes from open or closed containers, saturated soil, or lagoons, thereby reducing airborne emissions of certain substances. Rainfall may also reduce the concentrations of fire smoke particulate matter during fire events.
Moisture/Relative Humidity	■ Dusts, including finely divided hazardous solids, are highly sensitive to moisture content. This moisture content can vary significantly with respect to location and time and can affect the accuracy of many sampling results.
Vapor Emissions	■ The physical displacement of saturated vapors can produce short-term, relatively high vapor concentrations. Continuing evaporation and/or diffusion may produce long-term low vapor concentrations and may involve large areas.
Work Activities	■ Work activities often require the mechanical disturbance of contaminated materials, which may change the concentration and composition of airborne contaminants.

BEST PRACTICE: Request a National Oceanic and Atmospheric Administration Spot forecast (<https://www.weather.gov/spot/>) for localized weather. This data can be used to develop an air release model.

- ☐ **Determine the scope and scale of the area(s) to be monitored by initial CAM teams. Determination criteria may include:**
- Safe and permissible access to monitoring locations;
 - Established exclusion or evacuation zones; and
 - Data previously collected by other responders, including contaminant concentrations and confirmed off site impacts.

BEST PRACTICE: Try to identify publicly accessible locations for monitoring to avoid acquiring consent for private property access. If private property access is required, seek consent.

- ☐ **As soon as practicable, deploy experienced rapid response air monitoring CAM Field Team(s) to collect baseline data for airborne contaminants.**
- The goal is to obtain a general snapshot of the areas that may be impacted. These teams can provide valuable information that will support additional planning activities for the CAM process as well as near-real time information for the UC (e.g., presence/absence of contaminants, adjustments of evacuation zones, etc.). Any assessment conducted by these teams should be broad in scope and scale, with obtaining and communicating rapid results as a goal.
 - The initial assessment should include:

- Using basic instrumentation to obtain location-based monitoring results;
- Monitoring downwind of an incident then moving 360 degrees around the site;
- Identifying and monitoring at locations with sensitive populations downwind of the incident location;
- Rapid communication of results;
- Documenting plume direction(s);
- An assessment of evacuation areas and boundaries of the exclusion zone; and
- Identification of potential future fixed monitoring locations.

BEST PRACTICE: Field Teams should communicate results (including non-detects) as rapidly as possible to decision makers. This may be achieved by regular phone calls or other field-based communication techniques.

BEST PRACTICE: If possible, collect one or more “grab samples” in SUMMA® canisters or similar sampling containers to aid in quantitative characterization of airborne contaminants as the opportunity to capture such samples may rapidly diminish.

☐ **Establish communication and coordination with appropriate ICS group(s) and/or Air/Public health agencies.**

- Determine the most appropriate point of contact in the ICS for CAM personnel placement during the early stages of the response. Because Safety has an early presence during the formation of the ICS, this may be a suitable location for early phase CAM activities; however, as the ICS grows or as increasing threats to public air resources are identified, placement of the CAM activities under the Planning Section/Environmental Unit are warranted, though CAM could still be managed in the Safety and/or Operations Section depending on site specific circumstances.
- Regardless of CAM placement within the response structure, the Safety Officer should be made aware of Field Team activities.
- Local, Regional and/or State Air Agency and/or Public Health Staff should be contacted early in a response. Coordinate with Liaison to communicate (if these groups are not already present in the response structure).

BEST PRACTICE: As defined under CERLCA and OPA, air is considered a natural resource. As such, monitoring community air quality outside of the site work zones during a chemical or oil release is best managed under the Environmental Unit.

Because the Safety group is often established before the EU, this group may be suitable for initial CAM activities.

☐ **Identify initial CAM action levels for the contaminants of concern.**

- Until IC/UC can approve an incident specific action level, one or more of the levels below may be used.
- See Attachment B, Contaminants of Concern and Recommended Action Levels, for more info on selecting action levels.

Please note that with the exception of PM 10 and PM 2.5 standards for In-Situ Burn situations, none of the action levels below have been approved nor endorsed by the Northwest Area Committee/Region 10 Regional Response Team.

☐ **Recommendations for chemicals:**

- Protective Action Criteria (PACs) are established from chemical-specific available resources in the following order:
 - Acute Exposure Guideline Level (AEGL) values published by the United States Environmental Protection Agency (EPA)
 - Emergency Response Planning Guideline (ERPG) values produced by the American Industrial Hygiene Association (AIHA)
 - Temporary Emergency Exposure Limit (TEEL) values developed by the United States Department of Energy Subcommittee on Consequence Assessment and Protective Actions (SCAPA)
- PACs/TEELs: <https://sp.eota.energy.gov/>
- AEGLs: <https://www.epa.gov/aegl>
- ERPGs: <https://www.aiha.org/get-involved/AIHAGuidelineFoundation/EmergencyResponsePlanningGuidelines/Pages/default.aspx>

☐ **Recommendations for particulates:**

- National Ambient Air Quality Standards (NAAQS) for particulates as reflected in Wildfire Smoke A Guide for Public Health Officials (2016):
https://www3.epa.gov/airnow/wildfire_may2016.pdf
- NWACP In-Situ Burn Criteria (Section 9407)

☐ **Establish a process and schedule (hourly, daily, etc.) for reporting results and Action Level (or other threshold) exceedances.**

- In the event of a sustained action level exceedance or other threshold exceedance, establish a process for rapid notification to the appropriate ICS groups. These groups may include:
 - IC/UC
 - LNO/PIO
 - Safety
 - Operations
 - CAM Coordinator
 - Situation Unit
- Exceedance notifications should be communicated from field responders to the CAM Coordinator, who then notifies the EUL, who then notifies IC/UC.
- Exceedance reports should include location, instrument readings, field conditions, and proximity to at risk populations.

- **BEST PRACTICE:** Once established, send a general message and ensure UC is made aware of the process, locations, and results.

- **BEST PRACTICE:** Even if Field Teams are not detecting contaminants, it is still prudent to communicate non-detects.

- ☐ **Determine the number of CAM Field Teams and appropriate level of Command Post staff.**
 - Determine the initial positions that need to be filled (CAM Coordinator, Field Team Leader, Data Manager, Field Teams, other CAM support staff, etc.) and by whom. The exact number of roles and individuals to fill those roles can vary widely from incident to incident and as conditions change.
 - All personnel must meet or exceed incident specific health and safety requirements for fieldwork and training as defined by the Safety Officer. Individual employers may require training that exceeds the incident specific standards.
 - CAM personnel should have:
 - Safety training that meets or exceeds applicable regulations under 29 Code of Federal Regulations 1910 (e.g., 40-hour Hazardous Waste Operations and Emergency Response training with current refresher and possibly enrolled in medical monitoring program) and the incident specific safety plan
 - Basic ICS training
 - Basic air monitoring training
- ☐ **Submit Resource Request to Logistics for Field Team personnel and equipment.**
- ☐ **Establish general expectations, procedures, and accountability for CAM data management tasks.**
 - Depending on the scale of the response, these responsibilities may be handled by the Field Team Leader, CAM Coordinator, or a delegated Data Manager.
- ☐ **Establish a data management system.**
 - Consider appointing a CAM Data Manager and refer to Attachment D, Community Air Monitoring Data Management Checklist, to accomplish this task.
 - Determine which types of data need to be collected for the response. Examples include:

- Contaminant detection units,
 - Geospatial data,
 - Photographs/video,
 - Command post documentation, and
 - Access agreements.
- Select the appropriate field data collection forms.
- Consider creating a common operating picture geospatial tool for CAM assessment area(s).

☐ **Develop a field assessment and reporting schedule as appropriate to provide key assessment information as needed by IC/UC, Safety, Liaison, PIO/JIC, or others.**

- This schedule should NOT be utilized for situations when action levels or other threshold exceedances are occurring. A separate system for rapid exceedance communication should be created separate of the operational period based reporting cycle.
- The intent of this schedule is to ensure CAM activities are captured in the IAP and/or on ICS 204 Work Assignment and ICS 215 Operation Planning Worksheet forms.

▪ **BEST PRACTICE:** Begin to align field operations and tactics into overarching incident response goals. Organize individual actions and strategies in ICS 234 Work Analysis Matrix form to clarify and communicate CAM goals.

☐ **Identify incident specific health and safety considerations for CAM operations and communicate them to the Safety Officer.**

☐ **Begin drafting a CAMP.**

Sustained Community Assessment Phase

The Sustained Community Assessment Phase may begin between one and several days into the response, depending on incident-specific conditions. This phase may involve recurring assessments at fixed locations, roving data collection, ad hoc assessments, data analysis, and planning for future operational periods.

- ☐ **At the beginning of each operational period (or as needed), collect and assess critical information that may affect CAM activities. These may include:**
 - Weather forecasts
 - Applicable dispersion models or trajectories
 - Contaminant weathering
 - Determining from the EUL and/or Planning Section Chief (PSC) any relevant/new information or shift in objectives or priorities from IC/UC which might affect CAM program.
 - Operations Section tasks that may allow airborne contaminants to escape (e.g., excavation, tank transfers)

- ☐ **Determine which locations should be assessed and in what order.**
 - This may involve assessing any previous collected air monitoring data, reviewing the latest information on weather, applicable models, or field reports.

- ☐ **Ensure that all elements of the CAMP have been completed and or updated as needed.**

- ☐ **Prepare, deploy, and manage CAM Field Teams conducting monitoring assessments.**
This may be managed by the Field Team Leader or CAM Coordinator.
 - Assemble CAM teams to meet CAM field objectives and ensure that all teams have the necessary equipment and direction.
 - Ensure that team assignments are made daily or as appropriate. Be sure the assignments are reflected in ICS 204 Work Assignment forms and passed on to the teams.
 - Ensure teams understand the action levels, thresholds, and reporting processes.
 - Identify and ensure Field Team safety and logistical needs (e.g., Equipment, Transportation, Personal protective equipment, Communication options, Food/Water, etc.) are met daily.
 - Report on relevant weather data to Field Teams.
 - Conduct CAM tailgate safety meeting at the beginning of shifts (as appropriate):

- Review any special considerations that may exist for each team, such as site access (e.g., determine if legal access agreements been signed; is there a need for specialized transportation; are there special safety considerations, communications, limitations, etc.)

■ **BEST PRACTICE:** Conduct calibration training with CAM Field Team members on a periodic basis before sending teams into the field. Ensure that teams use proper terminology and apply guidelines uniformly.

- Conduct debriefings with CAM team members (or a designated team member) and other CAM associated members of the EU at the end of shifts. Debriefings may include the following topics:
 - Work completed during the shift.
 - Signatures on the data forms document consensus.
 - Ensure that documentation and equipment for CAM teams (equipment, maps, photography equipment, gear, communications, etc.) are adequate and all set to the same recording units prior to next deployment.
 - Solicit observations from the Field Team regarding any trends in data
 - Discuss assignments for the next operational period.
 - Ensure that data is being collected and recorded appropriately.

☐ **Finalize or update the process for summarizing and communicating CAM field data and for meeting the following needs:**

- IC/UC Updates
 - As needed or requested by IC/UC (e.g., threshold exceedances warranting immediate notification)
- Liaison/Public Information Updates
 - Provide CAM data and updates to ICS Liaisons and PIO as directed by Planning Section Chief and IC/UC
 - Provide interpretation to facilitate presentation of results by PIO as requested
- Situation Unit updates:
 - Monitoring Locations
 - Results
- Pre-Tactics and Tactics Meeting:

- Coordinate with the EUL, PSC, and OPS to ensure that field observations are available for Tactics meeting if that information may influence where response resources are deployed.
 - The EUL and/or CAM Coordinator will coordinate with PSC and OPS during Tactics Meeting; provide key CAM information to OPS/PSC to help develop ICS 204 Work Assignment forms (e.g., monitoring locations, safety constraints, etc.).
 - Planning Meeting
 - ICS 204 Work Assignments for CAM team deployments are produced.
 - The EUL typically attends; the CAM Coordinator may be asked to attend.
- ☐ **Ensure that assessment data from the Field Teams is flowing into the command post and disseminated appropriately.**
- ☐ **Begin developing CAM survey endpoints.**
- Coordinate with IC/UC and EUL criteria for determining an end to community hazards.
 - Discuss need for continuing air monitoring for flare-ups/secondary releases.

Demobilization Phase

The Demobilization Phase begins as CAM resources begin to demobilize after airborne contaminant threats have been abated or are no longer a concern.

- ☐ **Ensure all expectations agreed upon initially have been met or communicated.**
- ☐ **Discuss CAM results with the EUL and/or Planning Section Chief and agree on a forecast plan for CAM survey endpoints.**
- ☐ **Establish a communication protocol with OPS that notifies the EUL when cleanup work has been completed within a given area.**
- ☐ **Establish endpoints for area monitoring clearance:**
 - Coordinate endpoint metrics with the EUL and IC/UC
 - Establish clear parameters and metrics for Field Teams to assess area clearance
- ☐ **Finalize monitoring efforts in all CAM locations based on endpoints**
- ☐ **Coordinate personnel and equipment demobilization through the Demobilization Unit. Prior to demobilization:**
 - Track all personnel and equipment leaving site, and reporting to CAM Coordinator/CAM Field Team Leader.
 - Create demobilization checklists for all personnel demobilizing from the site.
 - Ensure data is retrieved and processed from all instrumentation used during CAM efforts.
 - Copy or collect all logbooks and field notes taken during the response.
 - Maintain contact information for personnel leaving the site.
- ☐ **Ensure that all of the CAM documents and data are collected and archived with the Documentation Unit.**
- ☐ **Identify, evaluate, and report all known gaps, delays, or interruptions of all data deliverables to strengthen future performances in the management and communication of CAM data.**

9418.7 Community Air Monitoring Plan Template

How to Use this Template

- ☐ *The major headings of this document are suggested for the completion of a Community Air Monitoring Plan (CAMP). A CAMP is not required to follow the formats suggested in the following sections, but should contain commensurate content and detail. CAMP templates may be customized to fill individual organization capabilities and requirements.*
- ☐ *Instructions, suggestions, and pre-populated information are printed in italics in the following sections. Delete and replace these instructions following completion. Rewrite suggested text to fit incident- and organization-specific needs.*
- ☐ *To facilitate rapid planning, many tables are prepopulated with examples or common information that may be relevant to an emergency release scenario. To finish tables, delete irrelevant examples, add further information as dictated by response scenario.*
- ☐ *Values presented in these tables should be verified and adjusted to meet the expectations and capabilities of response organizations, receiving analytical laboratories, and local response agencies.*
- ☐ *Prepare this document according to the standards and practices presented in the Emergency Response Community Air Monitoring Program Document. Reference checklist sections and attachments for supporting detail and information to create this document.*
- ☐ *After completion, review the template as a whole with all parties involved. Evaluate clarity and address potential gaps.*
- ☐ *Retain this document for continuing emergency operations. Information assembled here may be used to create additional site documents and Incident Command System (ICS) planning forms.*

TEMPLATE EMERGENCY RESPONSE COMMUNITY AIR MONITORING PLAN

(Insert Incident Name)

This incident-specific monitoring and sampling plan is approved by:

TITLE

Date

TITLE

Date

TITLE

Date

cc:

1.0 Introduction and Purpose

This emergency response Community Air Monitoring Plan (CAMP) is intended to be used during oil spills, pollutant, or chemical releases where monitoring and/or sampling of atmospheric conditions to protect nearby communities and the public may be required. This plan is designed to consider oil or other hazardous substances that are both burning and not burning.

Data gathered during the implementation of this plan will be used to assess the potential for community exposures. All fieldwork and data collection will be conducted in accordance with approved work plans and standard operating procedures (SOPs).

The use of this monitoring plan will involve forethought and planning that should help direct the monitoring, sampling, and analytical work. It is meant to be used in emergency responses where monitoring and sampling teams (hereafter referred to as Field Teams) may not have the opportunity to write a more thorough monitoring and sampling plan.

Field Teams should always reference standard quality procedures, SOPs, and standard methods for sampling and analytical guidance.

The development of this plan will improve the documentation, communication, planning, and overall quality associated with the monitoring/sampling and analysis by:

- Encouraging Field Teams to consider their goals and objectives before the generation of environmental data,
- Documenting predetermined information in a standardized format,
- Increasing the communication between sampling personnel and decision makers, and
- Detailing expectations and objectives before samples are collected.

1.1 Objectives

The brief statement about community air monitoring (CAM) Objectives is a short narrative about what Field Teams should accomplish. These objectives should be based on Incident Commander/Unified Command (IC/UC) objectives.

Example objectives of the CAM program may include:

- ☐ *Characterize contaminants and/or determine contamination levels within the exclusion zone.*
- ☐ *Determine the extent and concentrations of contaminants outside of the exclusion zone.*
- ☐ *Determine if the exclusion zone is appropriately defined.*

Example data quality objectives:

Data that are generated will be used:

- ☐ *To compare with site-specific action levels or risk-based action levels to determine if any acute health threat exists.*
- ☐ *To compare to an established background level or with collected background sample(s).*
- ☐ *To assist with determining the area of impact due to a hazardous material release.*
- ☐ *To assist with an off-site acute exposure assessment.*

2.0 Contaminants of Concern and Community Action Levels

Provide an overview of the contaminants and action levels. List compounds in narrative or tabular format that may pose a threat to health and the environment relevant to incident release. This section should strive to be exhaustive and include contaminants that may not be detected by Health and Safety air monitoring equipment. Divide vapor phase and particulate airborne contaminants into separate sections.

For contaminants without established action levels, complex mixtures, or unknown constituents and composition, provide a narrative description and working action level with justification. Example contaminant narratives follow:

Bakken Crude Oil

Contaminants of concern include Bakken crude oil as well as breakdown byproducts. Bakken Crude Oil commonly contains a high fraction of volatile light hydrocarbons, including benzene, toluene, ethylbenzene, and xylenes. Because no real-time monitoring instrument can specifically detect crude oil vapors, total volatile organic compounds will be used as monitoring criteria. Because no Protective Action Criteria (PACs) levels exist for crude oil vapors, 10% of the PAC value for gasoline will be used as the volatile organic compound (VOC) Action Level. Additional monitoring for explosive atmospheres and oxygen levels will also take place. Chemical-specific monitoring may also take place as necessary (e.g., benzene, carbon monoxide, etc.).

Burning crude oil may release dangerous levels of volatile and semi-volatile organic compounds, carbon monoxide, hydrogen sulfide, sulfur dioxide, and particulate matter. Community action levels for Carbon monoxide, hydrogen sulfide, sulfur dioxide are listed Table 2.1.

Alaska North Slope Crude Oil

Contaminants of concern include Alaska North Slope (ANS) crude oil as well as breakdown byproducts. Because no real-time monitoring instrument can specifically detect crude oil vapors, total volatile organic compounds will be used as monitoring criteria. Because no PACs levels exist for crude oil vapors, 10% of the PAC value for gasoline will be used as the VOC Action Level. Additional monitoring for explosive atmospheres and oxygen levels will also take place. Chemical specific monitoring may also take place as necessary (e.g., benzene, carbon monoxide, etc.).

Burning crude oil may releases dangerous levels of volatile and semi-volatile organic compounds, carbon monoxide, hydrogen sulfide, sulfur dioxide, and particulate matter. Community action levels for Carbon monoxide, hydrogen sulfide, sulfur dioxide are listed Table 2.1.

2.1 Volatile Compounds

Compile a list of potential vapor hazards associated with a release scenario. Include chemicals that may not be detectable with on hand instrumentation but may pose a public health hazard. List site community action levels with contaminants and cite source or provide justification.

When compound specific detection is unavailable, 20 parts per million of total volatile organic compounds detected by photoionization detector/flame ionization detector or similar may be used as a surrogate action level

Tables 2.1 and 2.2 list volatile crude oil constituents and commonly transported volatile compounds likely to be encountered in a release scenario.

**Table 2.1: Community Exposure Guidelines for Crude Oil
Chemical Constituent Release Emergencies***

Chemical	CASRN	PAC-1	PAC-2	PAC-3
Benzene	71-43-2	52 ppm _A	800 ppm _A	4,000 ppm _{A,X}
Carbon Monoxide	630-08-0	75 ppm	83 ppm _A	330 ppm _A
Ethylbenzene	100-41-4	33 ppm _A	1,100 ppm _{A,X}	1,800 ppm _{A,X}
Hexane	110-54-3	260 ppm	2,900 ppm _X	8,600 ppm _{A,XX}
Hydrogen Sulfide	7783-06-4	0.51 ppm _A	27 ppm _A	50 ppm _A
Naphthalene	91-20-3	15 ppm	83 ppm	500 ppm
Nitrogen Dioxide	10102-44-0	0.5 ppm _A	12 ppm _A	20 ppm _A
Nitric Oxide	10102-43-9	0.5 ppm _A	12 ppm _A	20 ppm _A
Sulfur Dioxide	7446-09-5	0.2 ppm _A	0.75 ppm _A	30 ppm _A
Toluene	108-88-3	67 ppm _A	560 ppm _{A,X}	3,700 ppm _{A,X}
Xylene	1330-20-7	130 ppm _A	920 ppm _{A,X}	2,500 ppm _{A,X}

* DOE SCAPA, 2012

PAC values marked with a subscript "A" correspond to 60-minute AEGL values.

PAC values marked with a subscript "E" correspond to ERPG values.

PAC values marked by x are $\geq 10\%$ lower explosive limit (LEL) but $< 50\%$ LEL.

PAC values marked by xx are $\geq 50\%$ LEL

PAC values marked by xxx are $\geq 100\%$ LEL

**Table 2.2 Community Exposure Guidelines for Commonly Transported
Hazardous Material Release Emergencies**

Chemical	CASRN	PAC-1	PAC-2	PAC-3
Ammonia	7664-41-7	30 ppm _A	160 ppm _A	1,100 ppm _A
Hydrochloric Acid	7647-01-0	1.8 ppm _A	11 ppm _A	100 ppm _A
Chlorine	7772-60-5	0.05 ppm _A	2.0 ppm _A	20 ppm _A
Propane	74-98-6	5,500 ppm _X	17,000 ppm _{XX}	33,000 ppm _{XXX}
Sulfuric Acid	766-93-9	0.20 mg/m ³ _A	8.7 mg/m ³ _A	160 mg/m ³ _A
Styrene	100-42-5	20 ppm _A	130 ppm _A	1,100 ppm _X
Toluene	108-88-3	67 ppm _A	560 ppm _A	3,700 ppm _X
Carbon Disulfide	75-15-0	13 ppm _A	160 ppm _A	480 ppm _A
Formaldehyde	50-00-0	0.90 ppm _A	14 ppm _A	56 ppm _A
Nitrogen Dioxide	10102-44-0	0.50 ppm _A	12 ppm _A	20 ppm _A

PAC values marked with a subscript "A" correspond to 60-minute AEGL values.

PAC values marked with a subscript "E" correspond to ERPG values.

PAC values marked by x are $\geq 10\%$ lower explosive limit (LEL) but $< 50\%$ LEL.

PAC values marked by xx are $\geq 50\%$ LEL

PAC values marked by xxx are $\geq 100\%$

2.2 Particulate Matter

Table 2.3 lists the threshold levels for different concentrations and the recommended actions that should be taken to prevent harm to community members. If only particulate matter up to 10 microns in diameter (PM 10) measurements are available during smoky conditions, it can be assumed that the PM 10 is composed primarily of fine particles (particulate matter up to 2.5 microns in diameter [PM 2.5]), and therefore the United State Environmental Protection Agency Air Quality Index and associated cautionary statement and advisories for PM 2.5 may be used.

Table 2.3: Threshold Levels and Recommended Response Actions for PM 2.5 and PM 10

PM 2.5 and PM 10 Threshold ¹ Levels (µg/m ³) 24 Hr. Avg. ²	Level of Health Concern and AQI Range	Meaning ³	Action(s) ⁴
0.0 – 12.0	Good (0-50)	Air quality is considered satisfactory, and air pollution poses little or no risk.	<ul style="list-style-type: none"> ▪ If smoke event anticipated, implement communication plan.
12.1 - 35.4	Moderate (51-100)	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive ⁵ to ozone may experience respiratory symptoms.	<ul style="list-style-type: none"> ▪ Prepare for full implementation of School Activity Guidelines (https://www3.epa.gov/airnow/flag/school-chart-2014.pdf) ▪ Issue public service announcements (PSAs) advising public about health effects, symptoms and ways to reduce exposure ▪ Distribute information about exposure avoidance
35.5 - 55.4	Unhealthy for Sensitive Groups (101 – 150)	Although the public is not likely to be affected at this level, people with lung disease, and older adults and children are at a greater risk from exposure to ozone, whereas persons with heart and lung disease, and older adults and children are at greater risk from the presence of particles in the air.	<ul style="list-style-type: none"> ▪ Evaluate implementation of School Activity Guidelines ▪ If smoke event projected to be prolonged, evaluate and notify possible sites for cleaner air shelters ▪ If smoke event projected to be prolonged, prepare evacuation plans
55.5 - 150.4	Unhealthy (151 – 200)	Everyone may begin to experience some adverse health effects, and members of the sensitive groups ⁶ may experience effects that are more serious.	<ul style="list-style-type: none"> ▪ Full implementation of School Activity Guidelines ▪ Consider canceling outdoor events (e.g., concerts and competitive sports), based on public health and travel considerations
150.5 - 250.4	Very Unhealthy (201-301)	This would trigger a health alert signifying that everyone may experience more serious health effects.	<ul style="list-style-type: none"> ▪ Schools move all activities indoors or reschedule them to another day. ▪ Consider closing some or all schools ▪ Cancel outdoor events involving activity (e.g., competitive sports) ▪ Consider cancelling outdoor events that do not involve activity (e.g., concerts)
> 250.5	Hazardous (> 300)	This would trigger a health warning of emergency conditions. The entire population is more likely to be affected.	<ul style="list-style-type: none"> ▪ Consider closing schools ▪ Cancel outdoor events (e.g., concerts and competitive sports) ▪ Consider closing workplaces not essential to public health ▪ If particulate matter level is projected to remain high for a prolonged time, consider evacuation of at-risk populations

Table 2.3: Threshold Levels and Recommended Response Actions for PM 2.5 and PM 10

¹ Threshold values taken from EPA AQI online calculator found at http://airnow.gov/index.cfm?action=resources.aqi_conc_calc.
² 24 Hour PM 2.5 “breakpoints” verified via Federal Register for National Ambient Air Quality Standards (NAAQS) rulemaking, <https://www.gpo.gov/fdsys/pkg/FR-2013-01-15/pdf/2012-30946.pdf>.
³ As defined by <https://www.airnow.gov/index.cfm?action=aqibasics.aqi>.
⁴ Recommendations from Wildfire Smoke: A Guide for Public Health Officials at https://www3.epa.gov/airnow/wildfire_may2016.pdf.
⁵ People who are unusually sensitive to air pollution are a subset of Sensitive Individuals. Unusually sensitive to air pollution can be defined as the very young, the elderly, pregnant women, and the immunocompromised.
⁶ Sensitive groups are defined as people with lung disease, and older adults and children who are at a greater risk from exposure to ozone; and persons with heart and lung disease, and older adults and children who are at greater risk from the presence of particles in the air. <http://www.airnow.gov/index.cfm?action=aqibasics.aqi>.

3.0 Real-Time Monitoring

3.1 Contaminants of Concern

Outline the procedures, practices, and logistics necessary to collect, interpret, and act on real-time air monitoring information. Match contaminants of concern with available instrumentation and direct read resources along with respective detection limits. Contaminants may be listed in tabular format. Less common contaminants without reference action levels or detection methods should be listed in narrative format, with actions and conclusions justified.

Table 3.1: Real-Time Air Community Air Monitoring Plan

Analyte	Action Level	Action Level Basis	Field Action	Instrument	Detection Limit	Notes
VOCs	20 ppm			MultiRAE Pro	0.1 ppm	
				MultiRAE Plus	1 ppm	
				AreaRAE	0.1 ppm	
				UltraRAE 3000	0.05 ppm	
				ppbRAE	1 ppb	
				MiniRAE 3000	0.1 ppm	
				TVA 1000b	PID: 0.5 ppm, FID: 1 ppm	
				(Other Instruments)		
Oxygen	<19.5 %, >22.0%			MultiRAE Pro	0.1% Volume	
				MultiRAE Plus	0.1% Volume	
				AreaRAE	0.1% Volume	
				(Other Instruments)		
LEL	10 % LEL			MultiRAE Pro	1%	
				MultiRAE Plus	1%	
				AreaRAE	1%	
				(Other Instruments)		
Carbon Monoxide	12.5 ppm			MultiRAE Pro	0.1 ppm	
				AreaRAE	1 ppm	
				(Other Instruments)		
Chlorine				MultiRAE Pro	0.1 ppm	
				MultiRAE Plus	0.1 ppm	
				ToxiRAE	0.1 ppm	
				(Other Instruments)		

Table 3.1: Real-Time Air Community Air Monitoring Plan

Analyte	Action Level	Action Level Basis	Field Action	Instrument	Detection Limit	Notes
Ammonia				MultiRAE Pro	1 ppm	
				MultiRAE Plus	1 ppm	
				(Other Instruments)		
Hydrogen Cyanide				MultiRAE Pro	0.5 ppm	
				MultiRAE Plus	1.0 ppm	
				(Other Instruments)		
Hydrogen Sulfide				MultiRAE Pro	0.1 ppm	
				AreaRAE	1 ppm	
				(Other Instruments)		
Phosphine				MultiRAE Pro	0.1 ppm	
				(Other Instruments)		
Butadiene				UltraRAE 3000	0.05 ppm	
				(Other Instruments)		
Benzene				UltraRAE 3000	0.05 ppm	
				(Other Instruments)		
Particulates, PM 2.5				TSI AM510	0.001 mg/m ³	
				DustTrak	0.001 mg/m ³	
				DataRam 4000	0.0001 mg/m ³	
				(Other Instruments)		
Particulates, PM 10				TSI AM510	0.001 mg/m ³	
				DustTrak	0.001 mg/m ³	
				DataRam 4000	0.0001 mg/m ³	
				(Other Instruments)		
(Analytes as needed)	(Action levels, as available)	(Rational and Source of Action Level)	(Field action and reporting when level exceed)	(Instrumentation or method of detection)	(Limit of detection)	

3.2 Monitoring Locations

Develop strategies and approaches for where real-time monitoring will occur. Where applicable, allocate resources between roving and fixed air monitoring stations. A reference map may be helpful to delineate roving team areas of responsibility and fixed monitoring locations.

3.2.1 Roving

Designate geographic areas for CAM Field Teams to assess. Prioritize areas of public exposure and sensitive populations. Consider wind direction and available plume models to gauge the extent of possible release.

Establish consistent data acquisition practices and communicate procedures to Field Teams. Include instrument operation and data recording.

Consider instrumentation, logistics, and transportation resources as well as personnel composition for each team.

*Establish data reporting practices, criteria, and frequency for Field Teams. **If an exceedance occurs, CAM personnel should ensure that UC is notified immediately through the CAM Coordinator and Environmental Unit Leader.***

3.2.2 Fixed Air Monitoring Stations

Designate initial locations for fixed air monitoring stations; establish a systematic naming convention and record addresses and/or lat/long for each station.

Example: FS01, Fixed Station 01

Consider plume models and sensitive populations in air station placement. Plan data reporting practices and/or telemetry monitoring. Designate procedures for responding to action level exceedances. These locations may differ from sampling locations (Section 4.2); if so, note the difference.

Table 3.2: Fixed Air Monitoring Station Locations

Air Monitoring Station Name	Location		Detectable Contaminants	Equipment
	Address	Lat./Long		

4.0 Analytical Air Sampling

4.1 Contaminants of Concern

List all target analytes, reference methods, and air sampling media in tabular format. Table 4.1 presents example laboratory methods and method compliant sample media. Entries to this table may be substituted for equivalent methods and

requisite media. Further analytes and methods may be added to this table as needed.

Table 4.1: Suggested Air Sampling Methods and Media for Hazardous Substance Releases

Analyte	Method	Media Type	Sample Media Product Number
Ammonia	NIOSH 6015	Sorbent Tube	
Asbestos	NIOSH 7402 TEM NIOSH 7400 PCM	Cassette	
BTEX/VOCs	NIOSH 1501 EPA TO-15	Sorbent Tube SUMMA Canister or Tedlar Bag	
Chlorine/Bromine	NIOSH 6011	Sorbent Tube	
Fire Vapors	EPA TO-15	SUMMA Canister or Tedlar Bag	
Mercury	NIOSH 6009	Sorbent Tube	
Metals	NIOSH 7300	Cassette	
PAHs	NIOSH 5506	Sorbent Tube with Pre Filter	
Particulates	NIOSH 0500 or 0600	Cassette	
SVOCs	NIOSH 5506	Sorbent Tube	
(Other Analytes as Available)	(Laboratory Methods)	(Method Compliant Media Type)	(Manufacturer's Product Number)

4.2 Sampling Locations

Establish a systematic naming convention for air sampling locations and record addresses and/or lat/long for each station. An effective naming convention will allow more sample locations to be added throughout a response. These locations may differ from monitoring locations (Section 3.2.2); if so, note the difference.

Example: AS01, Air Sample 01

Indicate the Sampling Location Name and describe the rationale for the each sample location chosen. Select locations that provide adequate upwind and downwind plume characterization and assess air quality for vulnerable populations. Determine how air sampling for vulnerable populations will be prioritized.

Include an aerial map or sketch with labeled sample locations.

Table 4.2: Air Sampling Station Locations

Sampling Station Name	Location		Target Analyte	Equipment
	Address	Lat./Long		

5.0 Data Management

5.1 Data Quality Objectives

A well-constructed Data Quality Objective (DQO) consists of the following:

- *Activity;*
- *Criteria for making a decision (Action Level); and*
- *What your action is going to be after you make the decision.*

An initial DQO for CAM may be:

- *Air Monitoring will be performed using roving teams. If a reading exceeds the established action levels, the exceedance will be communicated immediately to UC/IC. If no exceedances are found, monitoring will continue.*

5.2 Data Management Plan

Arrange processes into tabular format (see Table 5.1) to ensure consistent data management. Each column represents the practices necessary for retrieving, storing, and processing raw data into usable formats; rows should represent a single data source. Where necessary, specify data management and processing procedures in narrative format.

Table 5.1: Data Sources and Data Management

Data Source	Required Information	Processing Instructions	Processing Frequency	Processing Responsibility	Storage Location [digital storage location and/or physical copy]	Final Output [file format]
Site Documents	<i>Site Files, Health and Safety Plan, CAMP</i>	<i>File hard copies and electronic copies in indicated storage location</i>	<i>Beginning of project, and as needed</i>	<i>CAM Coordinator</i>	Digital: Hard Copy:	<i>.doc, .pdf and other formats</i>
Camera	<i>Date, time, direction, photographer, description</i>			<i>Data Manager</i>		
Sample Information	<i>Sample No., Date, Time, Sampler, Location</i>			<i>Sample Coordinator</i>		
Real Time Monitoring Data	<i>Background Concentrations Instrument Data with time and location</i>	<i>(Instrument and equipment specific including needed software)</i>		<i>Data Manager</i>		
<i>(Other Data Sources as Required)</i>						

5.3 Data Reporting

List deliverables from data collected in CAM operations in Table 5.2. Required deliverables should be coordinated with Environmental Unit Leader and IC/UC.

Table 5.2 Data Reporting Requirements and Deliverables

Reporting Task	Data Inputs	Deliverables Format	Frequency	Responsibility
<i>Community Air Monitoring Reports</i>	<i>Real-time air monitoring results w/ locations. Air Sampling analytical results,</i>	<i>Tabular, .xls</i>	<i>Daily</i>	<i>Data Manager</i>
<i>Situational Reports</i>	<i>Photos, Field reports, Air Monitoring Results</i>	<i>Document</i>	<i>Daily</i>	<i>Data Manager</i>
<i>(Other Deliverables as Needed)</i>				

5.4 Quality Assurance and Quality Control

Write in narrative format the steps and considerations to establish robust quality assurance for incoming and published data. As appropriate, identify predetermined standards for data verification, analysis, and reporting.

Quality assurance and quality control (QA/QC) may be organized into functional activities as follows with suggested QA/QC Procedures. Adjust this format and suggested content to fit site-specific needs.

Real-Time Monitoring

- Real-time instruments may be calibrated in excess of the manufacturer's recommendations.
 - At a minimum, calibrate whenever indicated by site conditions or instrument readings.
- Daily instrument checks to verify operations, memory capacity, and data logging functions.
- Co-located sampling for analytical analysis may be conducted, if necessary, to assess accuracy and precision in the field.
- Field Team meetings will be held daily to ensure quality data is correctly collected and applicable.

Sampling and Analytical Results

- Chain-of-custody documents may be completed for each sample.
- Level IV data validation may be performed on the first sample group analyzed.
- Level IV data validation may be performed on 10% of all samples.

Data Reporting and Deliverables

- Daily Data Summaries may be provided for informational purposes using data that have not undergone complete QA/QC.
- Comprehensive reports of real-time and/or analytical data may be generated following QA/QC and may be delivered 60 days following receipt of validated results, if applicable.

6.0 Project Organization and Responsibilities

Designate personnel to fill CAM Roles and Responsibilities within Organizational structure. Use Table 9418-1: Air Monitoring Resource Tiers in the CAM program to determine the appropriate level of initial response and ongoing resources. Adjust the sample ICS organizational chart accordingly.

6.1 Assigned Roles and Responsibilities**CAM Coordinator**

Name:	Click here to enter text	Primary Contact Phone:	Click here to enter text
Organization:	Click here to enter text	Secondary Contact:	Click here to enter text

Data Manager

Name:	Click here to enter text	Primary Contact Phone:	Click here to enter text
Organization:	Click here to enter text	Secondary Contact:	Click here to enter text

CAM Field Team Leader

Name:	Click here to enter text	Primary Contact Phone:	Click here to enter text
Organization:	Click here to enter text	Secondary Contact:	Click here to enter text

Field Team 1 Contact

Name:	Click here to enter text	Primary Contact Phone:	Click here to enter text
Organization:	Click here to enter text	Secondary Contact:	Click here to enter text

Additional Personnel and Positions as Needed

Name:	Click here to enter text	Primary Contact Phone:	Click here to enter text
Organization:	Click here to enter text	Secondary Contact:	Click here to enter text

7.0 Community Air Monitoring Plan Attachments

The following attachment list may be populated with organization-specific documents. Where applicable, appropriate procedures, practices, and information may be described here.

A. Documentation

A.1 Field Logbooks

A.2 Sample Labels

A.3 Custody Seals and Chain-of-Custody Record

B. Standard Operation Procedures and Instrument Calibration

B.1 Modification or Additions to Applicable Standard Operating Procedures

B.2 Calibration and Maintenance of Monitoring Instruments

C. Packaging and Shipping

D. References

9210.8 Response Tool Attachments

- A. Equipment Considerations
- B. Contaminants of Concern and Recommended Action Levels
- C. Community Air Monitoring Field Team Checklist
- D. Community Air Monitoring Data Management Checklist
- E. Laboratory Analysis

Attachment A: Equipment Considerations

Broadly speaking, responders should use air monitoring equipment that meets the following performance criteria:

- Rugged and portable: The monitor should be suitable for fieldwork, withstand shock, and be easily transportable in a vehicle, small boat, or helicopter.
- Suitability: The instrument should be suitable for the media measured, i.e., smoke particulates, VOCs, etc. and be within the calibration timeframe established by the manufacturer or operating organization.
- Operating duration: Eight hours or more.
- Readout: The instrument should provide real-time, continuous readings, as well as time-weighted average readings where necessary.
- Data logging: The instrument should provide data logging for eight hours or more.
- Reliability: The instrument should be based on tried-and-true technology and operate as specified.
- Sensitivity: The instrument should have a detection limit below the applicable exposure criteria.
- Data download: The instrument should be compatible with readily available computer technology, and provide software for downloading data.

Other qualities of air monitoring equipment may include the capability to broadcast data over a cellular or radio network (telemetry) or the capability to determine time-weighted averages over a specified period.

During an emergency, real-time air monitoring results are essential for rapid decision making. These results are generated from hand-held instrumentation that produce near-instantaneous measurements of a substance in real-time. The term real-time denotes that the instrument is able to generate immediate readings about the present level of hazardous contaminants in the air. Because these readings pertain to current conditions, results do not represent levels of contamination throughout longer periods and cannot represent contamination exposure to receptors including residences and workers over time.

Direct read instruments are designed to alert operators when early signs of contaminant concentrations are present in the local atmosphere. These instruments typically utilize specialized sensors to detect contaminant concentrations down to one part contaminant per billion parts of air. These sensors are specific to contaminant qualitative characteristics rather than identifying each contaminant and cannot narrow down if more than one contaminant is present. Sensors are installed in direct read air monitoring units to detect for unsafe atmospheric conditions. These sensors are specific for flammable or explosive atmospheres,

oxygen deficiencies, specific gases and vapors, and ionizing radiation. From real-time readings, responders can determine if additional contaminant specific instrumentation is needed and further develop a site-specific air monitoring plan, which may involve air sampling plan for specific analyses.

While direct read instruments are highly valuable in time sensitive decision making, there are limitations in the array of their detection of hazards. For most sensors, detection limits are set to detect and/or measure no lower than 1 parts per million (ppm) and are specific to measuring only specific chemical characteristics. Alternatively, some instruments are designed for targeted sampling for only one detectable substance, which commonly do not have a correction factor for chemical interferences, which may result in false positives.

Air monitoring instruments are designed to be easy to operate but do require necessary calibrations and a qualified user whom is familiar with operational guidelines and limitations for using the instrument in the field. Calibration methods vary but in many cases require additional equipment such as an array of calibration gasses with regulators. Calibration requires following a method with a corresponding order of operations that are specific to each sensor. Likewise is true for the data interpretation and validation of the results the instrument produces, it is necessary to have trained personnel who are knowledgeable of the instrument's operating principles and limitations. Instruments should be calibrated on a schedule designed to meet the requirements for both the instrument manufacturer's instructions and operating organization's standard operating procedures (SOPs). If the instrument is calibrated, a bump test or calibration test can be performed in the field to ensure the unit is holding its calibration. Remember that instrument readings have value for health and safety decisions but limited value when contaminants are unknown. Additionally, when results read "0 ppm," a contaminant may still be present but below the instrument detection level.

Some air monitors can be equipped with telemetry systems capable of transmitting real-time readings to be displayed remotely back at the incident command post and/or stored in an off-site repository (e.g., server or cloud network). This is advantageous for many reasons, but most especially in allowing more than one user to view results instantaneously. Several different types of real-time transmission systems are available for specific types of air monitoring instrumentation. Limitations include instrument specific hardware needed for real-time transmission and possible signal variability and interference.

Attachment B: Contaminants of Concern and Recommended Action Levels

Note: With the exception of PM 10 and PM 2.5 standards for In-Situ Burn situations, none of the action levels below have been officially approved nor endorsed by the Northwest Area Committee (NWAC)/Region 10 Regional Response Team (RRT 10).

Following chemical or oil release emergencies, questions often arise regarding potential community airborne exposures. Air monitoring can be performed to evaluate whether airborne particulate matter (smoke) and/or gaseous vapor chemicals are present at levels that could potentially affect human health. Health-protective action levels are generally employed as part of a CAMP to provide information for corrective action to limit chemical exposure, and the same approaches are applicable to crude oil releases involving fire and without fire.

Chemical Constituent Recommendations Regarding Community Action Levels

The United States Department of Energy SCAPA has established PACs for over 3,300 chemicals for planning and response to emergency chemical releases. These criteria, combined with estimates of exposure, provide the information necessary to evaluate emergency releases for taking appropriate community protective actions. During an emergency response, these criteria may be used to evaluate the severity of the event and to inform decisions regarding what protective actions should be taken.

PAC values are based on the following exposure limit values:

1. AEGL values published by the EPA,
2. ERPG values produced by the AIHA, and
3. TEEL values developed by SCAPA.

For any particular chemical, the following hierarchy is used to establish its PAC:

- Use AEGLs (including final or interim values) if they are available;
- If AEGLs are not available, use ERPGs; or
- If neither AEGLs nor ERPGs are available, use TEELs.

AEGLs, ERPGs, and TEELs have three common benchmark values for each chemical. Each successive benchmark is associated with an increased severity of potential effect(s) associated with exposure to the specified level.

The three benchmarks present estimated threshold levels for:

PAC I: Mild, transient health effects.

- **AEGL-1:** The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure (NRC 2001).
- **ERPG-1:** The maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor (AIHA 2014).
- **TEEL-1:** The airborne concentration (expressed as ppm or milligrams per cubic meter [mg/m^3]) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience notable discomfort, irritation, or certain asymptomatic, nonsensory effects. However, these effects are not disabling and are transient and reversible upon cessation of exposure (DOE 2017)

PAC II: Irreversible or other serious health effects that could impair the ability to take protective action.

- **AEGL-2:** The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape (NRC 2001).
- **ERPG-2:** The maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action (AIHA 2014).
- **TEEL-2:** The airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience irreversible or other serious, long-lasting, adverse health effects or an impaired ability to escape (DOE 2017)

PAC III: Life-threatening health effects.

- **AEGL-3:** The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death (NRC 2001).
- **ERPG-3:** The maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing or developing life-threatening health effects (AIHA 2014).
- **TEEL-3:** The airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour,

could experience life-threatening adverse health effects or death (DOE 2017).

Table B-1 below provides the PACs for a number of potential crude oil-associated airborne chemical constituents. RRT 10 recommends that the Federal On-Scene Coordinator/UC conduct monitoring for applicable chemical-specific air contaminants such as benzene carbon monoxide, nitrogen dioxide, and sulfur dioxide as conditions and available response equipment allow.

Table B-1: Action Levels for Crude Oil Chemical Constituent Releases *

Chemical	CASRN	PAC-1	PAC-2	PAC-3
Benzene	71-43-2	52 ppm _A	800 ppm _A	4,000 ppm _{A,X}
Carbon Monoxide	630-08-0	75 ppm	83 ppm _A	330 ppm _A
Ethylbenzene	100-41-4	33 ppm _A	1,100 ppm _{A,X}	1,800 ppm _{A,X}
Hexane	110-54-3	260 ppm	2,900 ppm _X	8,600 ppm _{A,XX}
Hydrogen Sulfide	7783-06-4	0.51 ppm _A	27 ppm _A	50 ppm _A
Naphthalene	91-20-3	15 ppm	83 ppm	500 ppm
Nitrogen Dioxide	10102-44-0	0.5 ppm _A	12 ppm _A	20 ppm _A
Nitric Oxide	10102-43-9	0.5 ppm _A	12 ppm _A	20 ppm _A
Sulfur Dioxide	7446-09-5	0.2 ppm _A	0.75 ppm _A	30 ppm _A
Toluene	108-88-3	67 ppm _A	560 ppm _{A,X}	3,700 ppm _{A,X}
Xylene	1330-20-7	130 ppm _A	920 ppm _{A,X}	2,500 ppm _{A,X}

* DOE SCAPA 2012

PAC values marked with a subscript "A" correspond to 60-minute AEGL values.

PAC values marked with a subscript "E" correspond to ERPG values.

PAC values marked by x are $\geq 10\%$ lower explosive limit (LEL) but $< 50\%$ LEL.

PAC values marked by xx are $\geq 50\%$ LEL

PAC values marked by xxx are $\geq 100\%$ LEL

Table B-2 below provides the PACs for hazardous materials that are commonly transported or utilized by industry and, as such, may be subjected to releases that are more frequent.

Table B-2: Community Exposure Guidelines for Commonly Transported Hazardous Material Release Emergencies

Chemical	CASRN	PAC-1	PAC-2	PAC-3
Ammonia	7664-41-7	30 ppm _A	160 ppm _A	1,100 ppm _A
Hydrochloric Acid	7647-01-0	1.8 ppm _A	11 ppm _A	100 ppm _A
Chlorine	7772-60-5	0.05 ppm _A	2.0 ppm _A	20 ppm _A
Propane	74-98-6	5,500 ppm _X	17,000 ppm _{XX}	33,000 ppm _{XXX}
Sulfuric Acid	766-93-9	0.20 mg/m ³ _A	8.7 mg/m ³ _A	160 mg/m ³ _A
Styrene	100-42-5	20 ppm _A	130 ppm _A	1,100 ppm _X
Toluene	108-88-3	67 ppm _A	560 ppm _A	3,700 ppm _X
Carbon Disulfide	75-15-0	13 ppm _A	160 ppm _A	480 ppm _A
Formaldehyde	50-00-0	0.90 ppm _A	14 ppm _A	56 ppm _A
Nitrogen Dioxide	10102-44-0	0.50 ppm _A	12 ppm _A	20 ppm _A

PAC values marked with a subscript "A" correspond to 60-minute AEGL values.

PAC values marked with a subscript "E" correspond to ERPG values.

PAC values marked by x are $\geq 10\%$ lower explosive limit (LEL) but $< 50\%$ LEL.

PAC values marked by xx are $\geq 50\%$ LEL

PAC values marked by xxx are $\geq 100\%$

Longer duration exposures to ongoing, low level airborne emissions of chemicals may also be a potential health concern for sensitive community receptors, such as children, the elderly, or individuals with a compromised immune system.

Analytical air sampling¹ can be performed to evaluate whether airborne chemicals are present at levels that could potentially affect human health. Chemical-specific screening levels can be utilized as part of a health-protective screening process to identify air samples or sampling areas that may warrant further evaluation.

The Agency for Toxic Substances & Disease Registry have derived Minimal Risk Levels (MRLs) as an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure (ATSDR 2015). These chemical-specific estimates, which are intended to serve as screening levels, are derived for acute (1-14 days), intermediate (>14 -364 days), and chronic (365 days and longer) inhalation exposure durations. It should be noted that exposure to a level above the MRL does not mean that adverse health effects will occur; however, analytical results above an MRL could warrant additional investigation.

Table B-3 provides the MRLs for a number of potential refinery-associated airborne chemical constituents.

¹ Analytical air sampling refers to the collection of discrete quantities of air using containers or chemical specific media for further analysis by an off-site laboratory. Laboratory analysis of analytical air samples provides chemical-specific results at lower chemical detection limits than real-time air monitoring instrumentation albeit a delay is required to receive the results of analytical air samples.

Table B-3: Inhalation Minimal Risk Levels for Select Potential Crude Oil-Associated Airborne Chemical Constituents*

Chemical	CASRN	Acute MRL	Intermediate MRL	Chronic MRL
Benzene	71-43-2	0.009 ppm	0.006 ppm	0.003 ppm
Ethylbenzene	100-41-4	5 ppm	2 ppm	0.06 ppm
Hexane	110-54-3	--	--	0.6 ppm
Hydrogen Sulfide	7783-06-4	0.07 ppm	0.02 ppm	--
Naphthalene	91-20-3	--	--	0.0007 ppm
Sulfur Dioxide	7446-09-5	0.01 ppm	--	--
Toluene	108-88-3	2 ppm	--	1 ppm
Xylene	1330-20-7	2 ppm	0.6 ppm	0.05 ppm

* ATSDR 2015

"--" = MRL has not been established for this exposure duration

Particulate Matter Recommendations Regarding Community Action Levels for Incidents Involving Crude Oil Fires

The NWAC/Regional Response Team (RRT) has adopted a modified version of the Special Monitoring of Applied Response Technologies (SMART) protocols that incorporates both PM 10 and PM 2.5 monitoring during controlled in-situ burning situations. The modified SMART protocols can be found in Section 9407 of the NWACP. However, there are currently no PAC or other guidelines for the impacts of fire smoke particulate matter for communities affected by crude oil spills involving uncontrolled fires.

While the NWAC/RRT modified SMART protocols may be used for CAM during uncontrolled burns, responders can also consider utilizing values published jointly by the EPA, United States Forest Service, Centers for Disease Control, and the California Air Resources in Wildfire Smoke: A Guide for Public Health Officials (hereafter referred to as the Wildfire Smoke Guidelines). Fire smoke originating from a crude oil fire is very similar in composition and characteristics to smoke from other types of fires (i.e., wildland fires, chemical plant fires, volcanic activity). As such, the Wildfire Smoke Guidelines may be adapted to advise decision makers on the safety of communities, including sensitive subgroups, whose air quality is affected by a crude oil fire (or other fire types).

The following section provides guidance for the identification of community action levels for fire smoke particulate matter that may affect communities during crude oil fires. The combustion of petroleum, which occurs after an accidental release, is generally a short-lived event (i.e., lasting hours to a few days) and associated air quality impacts would be transient in nature.

The action levels in the Wildfire Smoke Guidelines are based on the NAAQS values for particulate matter of particle sizes <2.5 and <10 micrometers (PM 2.5

and PM 10) and thus are based on a 24 hour average. In addition to providing particulate matter levels as $\mu\text{g}/\text{m}^3$, the relative hazards are also expressed in terms of the EPA Air Quality Index (AQI), which is a nationally uniform index used for reporting and forecasting daily air quality. The AQI informs the public how clean or polluted the air is using a standardized vocabulary (i.e., Good, Moderate, Unhealthy, etc.) and an easy-to-understand normalized numerical scale of 0 to 500.

Equally as important as providing a numerical action level value, the Wildfire Smoke Guidelines also list actions that would be appropriate based on varying severities of air quality impacts. Most actions involve public notifications, limitation of outdoor activities, and shelter-in-place recommendations. Of note, evacuation or relocation of sensitive subpopulations is only recommended in instances where severe air quality impacts from particulate matter are sustained for more than a few hours. As stated in the Wildfire Smoke Guidelines: “Leaving an area of thick smoke may be a good protective measure for members of sensitive groups, but it is often difficult to predict the duration, intensity, and direction of smoke, making this an unattractive option to many people. Even if smoky conditions are expected to continue for weeks, it may not be feasible to evacuate a large percentage of the affected population. Moreover, the process of evacuation can entail serious risks, particularly if poor visibility makes driving hazardous. In these situations, the risks posed by driving with reduced visibility need to be weighed against the potential benefits of evacuation. Therefore, in areas where fires are likely to occur, public health officials are encouraged to develop plans for local protection of sensitive groups. In addition, in the context of crude oil fires, smoke impacts on air quality may be so transient that by the time actions for evacuation and/or relocation can be organized, communicated and implemented, the hazard could have already subsided.

There are other smoke and crude oil vapor constituents such as irritant gases (sulfur dioxide), asphyxiant gases (carbon monoxide), and volatile hydrocarbons (i.e., benzene, etc.) which may be of a relatively lesser concern to a community in proximity to a crude oil spill and fire. Though communities may experience air quality impacts due to fire smoke, members of the public tend to stay away from, or are prevented from going near, fires for their safety. It is important to note that the composition of fire smoke changes dramatically as smoke travels away from a fire toward downwind/distant receptors. Irritant and asphyxiant gases and hydrocarbons tend to dissipate out of the smoke into the atmosphere beginning at very short distances from the fire. As a result, particulate matter remains as the primary constituent of the smoke distant from a fire, hence the focus on particulate matter in the Wildfire Smoke Guidelines for community smoke impacts. Impacts of irritant and asphyxiant gases and hydrocarbons in fire smoke tend to pose a risk only to individuals in close proximity to a fire, such as first responders and emergency response workers.

Table B-4 lists the threshold levels for different concentrations of PM 2.5 and PM 10 and the recommended actions that should be taken to prevent harm to community members. If only PM 10 measurements are available during smoky conditions, it can be assumed that the PM 10 is composed primarily of fine particles (PM 2.5), and that therefore the AQI and associated cautionary statement and advisories for PM 2.5 may be used. Table B-4 can be used as guidance for public health officials with regards to measures that can be taken to protect public health at different AQI categories. These AQI categories correspond to particulate matter levels (PM 2.5 and PM 10) at 24-hour average exposure periods. The AQI value for particulate matter is derived from estimated or measured 24-hour average concentrations. The Wildfire Smoke Guidelines does not publish levels for shorter average times (e.g., 1- to 3-hour or 8-hour averages) similar to PACs. As such, responders will have to determine how to assess the threats posed when particulates have not been present nor measured for 24 hours.

**Table B-4: Threshold Levels and Recommended Response Actions
for PM 2.5 and PM 10**

PM 2.5 and PM 10 Threshold ¹ Levels (µg/m ³) 24 Hr. Avg. ²	Level of Health Concern and AQI Range	Meaning ³	Action(s) ⁴
0.0 – 12.0	Good (0-50)	Air quality is considered satisfactory, and air pollution poses little or no risk.	<ul style="list-style-type: none"> ▪ If smoke event anticipated, implement communication plan.
12.1 - 35.4	Moderate (51-100)	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive ⁵ to ozone may experience respiratory symptoms.	<ul style="list-style-type: none"> ▪ Prepare for full implementation of School Activity Guidelines (https://www3.epa.gov/airnow/flag/school-chart-2014.pdf) ▪ Issue public service announcements (PSAs) advising public about health effects, symptoms and ways to reduce exposure ▪ Distribute information about exposure avoidance
35.5 - 55.4	Unhealthy for Sensitive Groups (101 – 150)	Although the public is not likely to be affected at this level, people with lung disease, and older adults and children are at a greater risk from exposure to ozone, whereas persons with heart and lung disease, and older adults and children are at greater risk from the presence of particles in the air.	<ul style="list-style-type: none"> ▪ Evaluate implementation of School Activity Guidelines ▪ If smoke event projected to be prolonged, evaluate and notify possible sites for cleaner air shelters ▪ If smoke event projected to be prolonged, prepare evacuation plans
55.5 - 150.4	Unhealthy (151 – 200)	Everyone may begin to experience some adverse health effects, and members of the sensitive groups ⁶ may experience effects that are more serious.	<ul style="list-style-type: none"> ▪ Full implementation of School Activity Guidelines ▪ Consider canceling outdoor events (e.g., concerts and competitive sports), based on public health and travel considerations

**Table B-4: Threshold Levels and Recommended Response Actions
for PM 2.5 and PM 10**

PM 2.5 and PM 10 Threshold ¹ Levels (µg/m ³)	Level of Health Concern and AQI Range	Meaning ³	Action(s) ⁴
24 Hr. Avg. ²			
150.5 - 250.4	Very Unhealthy (201-301)	This would trigger a health alert signifying that everyone may experience more serious health effects.	<ul style="list-style-type: none"> ▪ Schools move all activities indoors or reschedule them to another day. ▪ Consider closing some or all schools ▪ Cancel outdoor events involving activity (e.g., competitive sports) ▪ Consider cancelling outdoor events that do not involve activity (e.g., concerts)
> 250.5	Hazardous (> 300)	This would trigger a health warning of emergency conditions. The entire population is more likely to be affected.	<ul style="list-style-type: none"> ▪ Consider closing schools ▪ Cancel outdoor events (e.g., concerts and competitive sports) ▪ Consider closing workplaces not essential to public health ▪ If particulate matter level is projected to remain high for a prolonged time, consider evacuation of at-risk populations

¹ Threshold values taken from EPA AQI online calculator found at http://airnow.gov/index.cfm?action=resources.aqi_conc_calc

² 24 Hour PM 2.5 “breakpoints” verified via Federal Register for National Ambient Air Quality Standards (NAAQS) rulemaking, <https://www.gpo.gov/fdsys/pkg/FR-2013-01-15/pdf/2012-30946.pdf>

³ As defined by <https://www.airnow.gov/index.cfm?action=aqibasics.aqi>

⁴ Recommendations from Wildfire Smoke: A Guide for Public Health Officials at https://www3.epa.gov/airnow/wildfire_may2016.pdf

⁵ People who are unusually sensitive to air pollution are a subset of Sensitive Individuals. Unusually sensitive to air pollution can be defined as the very young, the elderly, pregnant women, and the immunocompromised.

⁶ Sensitive groups are defined as people with lung disease, and older adults and children who are at a greater risk from exposure to ozone; and persons with heart and lung disease, and older adults and children who are at greater risk from the presence of particles in the air. <http://www.airnow.gov/index.cfm?action=aqibasics.aqi>

Attachment C: Community Air Monitoring Field Team Checklist

- ☐ **Prepare air monitoring instruments for deployment**
 - Consult with Project Manager to determine resource needs and ensure instrumentation is bump tested and ready for monitoring.

- ☐ **Verify communications pathway between CAM Coordinator and Data Manager**

- ☐ **Take rapid baseline field readings and relay back to CAM Coordinator**
 - Establishing baseline reading within the first 24 hours Include non-detections as well as high readings.
 - Time is critical for this data collection; consider this before troubleshooting advanced collection methods.
 - Report readings back quickly to CAM Coordinator and provide context
Location:
 - Date/Time,
 - Measurements Visual Observations,
 - Odor and Visibility (if applicable), and
 - Smell.

BEST PRACTICE: Collect background readings at a location far from anticipated contaminant dispersion or at minimum upwind of a release location.

- ☐ **Review CAMP with CAM Coordinator and CAM Field Team Leader**
 - Note CAM action levels,
 - Analytes for contaminants of concern, and
 - CAM locations.

- ☐ **Review DMP with Data Manager**
 - Familiarize site scope and data collection objectives,
 - Understand valid values to be used for data entry, and
 - Understand the data pathways.

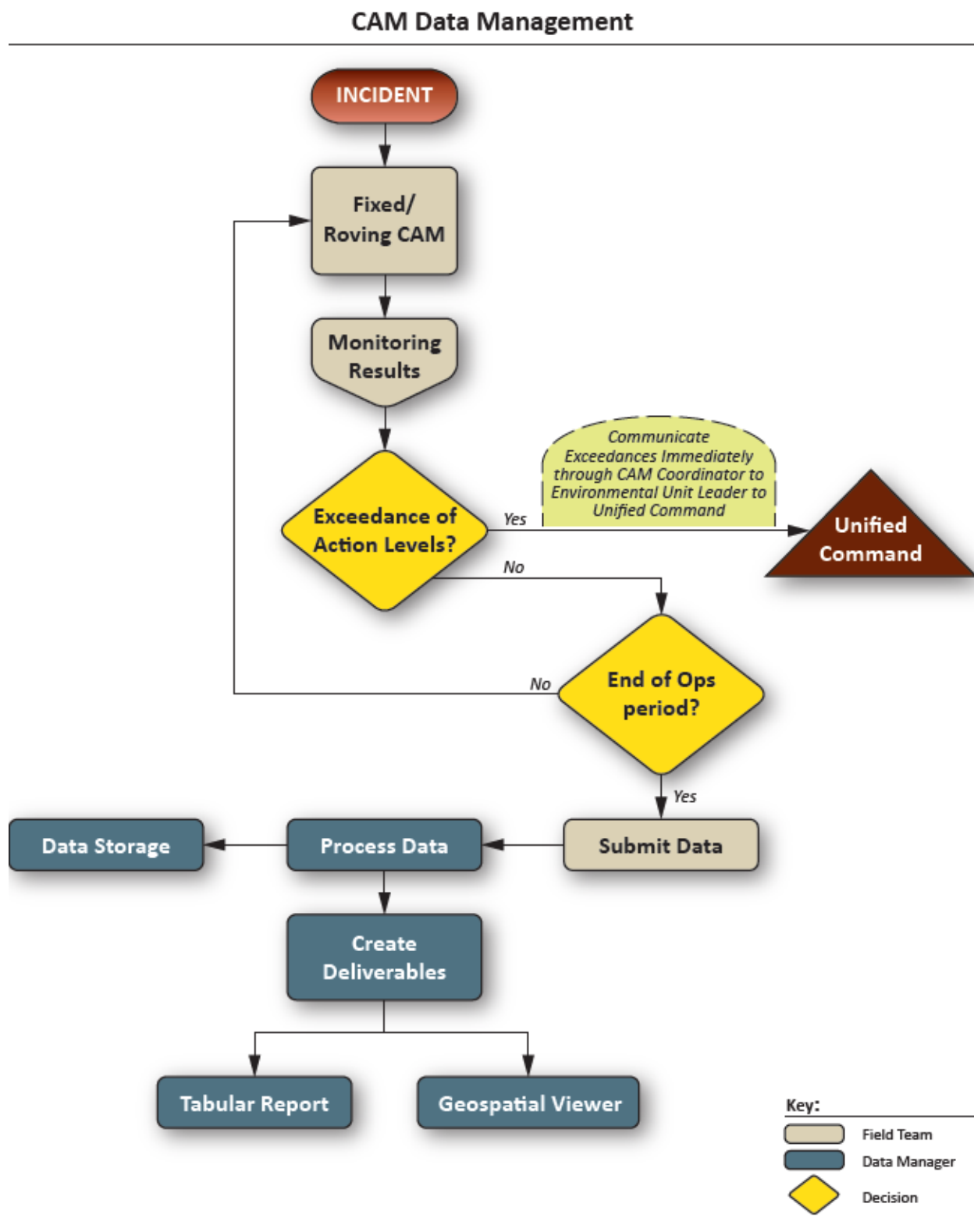
- ☐ **Conduct Sustained Assessments**
 - Troubleshoot/deploy field equipment;
 - QA/QC all data in the field;

- Keep note of monitoring and data logging instrumentation: log unit ID, user, location, date/time; battery life of instrumentation varies; and
 - If instruments are switched out, if time allots, note instrument serial number or ID numbers, this will be important when instrument data is downloaded to know the location/task that the data was collected in.
-
- ☐ **Report readings back quickly to CAM Field Team Leader and CAM Coordinator and provide context**
 - Location,
 - Date/Time,
 - Measurements (exceedances above action levels?), and
 - Odor and Visibility (if applicable).
 - ☐ **Record Instrument Data to pre-determined destination**
 - Download data in pre-determined location for Data Manager and back-up.
 - ☐ **Report results to CAM Coordinator as outlined**
 - ☐ **Field Teams conduct CAM Surveys until instructed otherwise by CAM Coordinator or IC/UC**
 - ☐ **Ensure that all logged data is downloaded into the pre-determined location for the Data Manager and CAM Coordinator.**
 - ☐ **Once communicated by CAM Coordinator and IC/UC to end monitoring efforts, return instruments to charging location, update logbook.**

Attachment D: Community Air Monitoring Data Management Checklist

- The purpose of this attachment is to provide guidance to personnel responsible for setting up a data management system for CAM. The following checklist items are listed chronologically, but due to potential changes in size and scope of CAM deployments, some items may be reprioritized based on incident needs.
- Depending on the scale of the incident, Data Manager responsibilities may be handled by the CAM Field Team Leader, CAM Coordinator, or a delegated Data Manager. The following checklist is broken into several sections:
 - Initial Data Management,
 - Data Collection,
 - Data Processing,
 - Data Presentation, and
 - Continuing Data Management/Storage.

Community Air Monitoring Data Flow Chart



Initial Data Management

☐ Select a Data Manager to oversee CAM Data Management

- Assess the status of incident data management. As data may already be being collected and processed, it is imperative to quickly come up to speed on the following:
 - How is data being collected, processed, presented or communicated?
 - Are there established DQOs?
 - Is there a DMP?

BEST PRACTICE: A DMP is a great tool to document DQOs, data collection, processing, presentation, and deliverable schedules. However, the creation of a DMP should not hinder the active communication of data and can be completed as time permits.

☐ Determine DQOs

- A well-constructed DQO consists of the following:
 - Activity,
 - Criteria for making a decision (Action Level), and
 - What your action is going to be after you make the decision.
- An initial DQO for CAM may be:
 - *Air Monitoring will be performed using roving teams. If a reading exceeds the established action levels, the exceedance will be communicated immediately to UC/IC. If no exceedances are found, monitoring will continue.*

Data Collection

- ☐ **Develop a data collection process that meets established incident DQOs. Ensure that the appropriate CAM forms and associated data collection documents/tools are available.**
 - Define the data elements CAM teams will collect (required fields, photos, other observations, etc.)
 - Choose forms to meet incident-specific needs as appropriate. Ensure that forms are designed to meet established DQOs.
 - Ensure CAM teams/forms are using standardized location naming conventions (e.g., location identification numbers) that can be integrated into mapping/database/GIS systems being developed, and that are consistent with Operational Division naming conventions.

BEST PRACTICE: Prioritize tasks in the early phase of a CAM incident to get Field Teams out collecting data as soon as practicable. Systems can be refined later as long as essential data can be collected expeditiously.

- ☐ **Evaluate equipment requirements/standards for data collection and management**
 - Coordinate this review with the CAM Field Team Leader or CAM Coordinator as appropriate.
 - Common data collection equipment may include real-time air monitoring instruments, digital cameras, hand-held global positioning system units, forms, personal digital assistants, tablet computers, etc.
- ☐ **Establish a communication plan for Field Teams to communicate results.**
 - Develop and maintain contact list for CAM team members.
 - Verify that teams know how results will be communicated (radio, cell phone, email, data submission).
 - Establish a communication schedule with Field Teams to meet data reporting needs for ICS meetings.
- ☐ **Conduct data collection calibration meeting for CAM teams prior to initial assessment.**
 - The following topics should be covered:
 - DQOs, Data Elements and Valid Values;
 - Methods of data collection with alternatives for effectively collecting data for a rapid assessment. Ensure a backup data collection method is available (logbook, verbal reporting, etc.);
 - Communication pathway for reporting exceedances;
 - On-going communication of results below action levels; and
 - Post field data transfer and QA/QC process.

Data Processing☐ **Establish a DMP**

- Outline the following:
 - DQOs;
 - Instrumentation (data pathway for data logging instruments);
 - Data Flow Pathways (Data Entry to Quality Assurance to Decision Makers to Data Storage); and
 - Reporting schedule.

☐ **As appropriate, identify predetermined standards for data verification, analysis, and reporting.**

- Identify and put in place verification SOPs and checklists such as standard verification queries (auditing of data) and reporting SOPs & procedures and requirements.

☐ **Establish process for collecting and archiving digital and paper documents.**

- Establish file directory structure and file naming conventions for managing documents, data, and photos.
 - Establish both on-site backup and an off-site, secure repository for all data and documentation. Coordinate with Documentation Unit for final archiving.
 - Determine/establish appropriate permissions for database access and editing.

☐ **Share and Communicate Resources**

- Coordinate data and map transfers with the PSC and EU (e.g., base maps, overflight maps, etc.) as appropriate.
- Acquire the spatial data and maps necessary to meet the data needs of the CAM program and (in particular) the Field Teams.
- Create base maps for field planning and use.

☐ **Oversee QA/QC of field data**

- Collate results from multiple teams if applicable,
- Ensure required data elements have been recorded,
- Ensure units are correct and appropriate for action levels, and
- Ensure data is in a clean format for generation of deliverables.

Data Presentation☐ **Brief with CAM Coordinator and EU to determine deliverable needs and establish deliverable schedule**

- Deliverable types may include:
 - Site sketch,
 - Aerial Map,

- Verbal Result Communication,
 - Summary Data,
 - Dispersion Modelling,
 - Real-Time Telemetry, and
 - Geospatial Viewer.
- Review deliverable schedule with the CAM Coordinator and the EUL to best fit incident requirements:
 - As exceedance occurs,
 - For ICS meetings:
 - Command & General Staff Meeting,
 - Tactics Meeting, and
 - Planning Meeting.
 - Every operational period,
 - Real-time telemetry, and
 - Real-time mapping.
- **Create and manage deliverables for EU including GIS Maps, models, and data tables.**
 - Coordinate with the EU or CAM Coordinator and identify what maps or models are important for decisions.
 - Ensure that all deliverables requested by EU are completed.

Continuing Data Management & Storage

- ☐ **Develop a document management system and/or CAM database (if appropriate).**
 - Determine/establish appropriate permissions for database access and editing.
 - Ensure every data stream is captured and managed appropriately.
 - ☐ **Ensure that all data from Field Teams has been downloaded and backed-up to appropriate location for site documentation, deliverables, and reports.**
 - ☐ **Establish general expectations, procedures, and accountability for CAM data management tasks.**
 - Address data sharing protocols and data access issues between stakeholders (i.e., Fed/State/Responsible Party) when making these determinations.
 - Each agency/organization representative working on CAM data should be familiar with their own organization's data policy and be able to discuss any critical issues including public disclosure requirements.
- **BEST PRACTICE:** Be sure to discuss the following: frequency of data archiving, who can access the data and how, will copies be permitted, etc.
- ☐ **Adjust data management organization for future operational periods**
 - Is the current system meeting the response needs and/or scale (e.g., electronic vs. paper-based)?
 - If not, recommend to CAM Coordinator to upgrade tiers.
 - Are there issues affecting the quality of data?
 - Recommend and implement corrective actions as necessary.
 - Maintain data quality:
 - Hold team meetings daily to ensure quality data is correctly collected and applicable.
 - Ensure Field Teams are performing field QC of their data collected.
 - QC data daily update Field Teams if a corrective action is required.

Attachment E: Laboratory Analysis

While direct read monitors are essential for real time air monitoring and used for time critical decision making, they are limited to a handful of specific substances and generally do not have low detection limits for contaminants. Air sampling can be used to detect minute concentrations of known chemicals. As stated previously, analytical air sampling refers to the collection of discrete quantities of air using containers or chemical specific media for further analysis by an off-site laboratory. Laboratory analysis of analytical air samples provides chemical-specific results at lower chemical detection limits than real-time air monitoring instrumentation albeit a delay is required to receive the results of analytical air samples. Sampling can be in the form of fixed, stationary samples or mobile samplers worn by responders to monitor responder health and safety. Choosing between different types of air samplers is dependent on the type of contaminant aimed to detect and the use of results. The following text is focused on fixed air sampling stations used in community air assessments as opposed to personal air samplers, which are typically used to monitor worker exposures.

Air samplers are broken into active or passive samplers, active samplers draw ambient air into the pump and through the filter medium, whereas passive samplers simply expose the medium to the ambient air. Samplers can be outfitted with a variety of sampling media types. Media types are often contaminant specific, and largely dependent on the physical state of the contaminant. Media is often in the form of a Glass Fiber Filter (used for particulates including PM 10 and PM 2.5) or a sorbent tube (used for gases such as benzene). In most cases, samples are shipped to analytical labs with variable turnaround times on delivery of results dependent on lab and analytical methods.

Fixed air sampler instrumentation generally includes a power source with a fixed flow adjustable air sampling pump containing attached tubing and media. Air sample duration and flow rate is specific to laboratory method requirements but usually several hours of sampling are needed to obtain a minimum liters per minute needed for analysis. Air sampling results are generally used in aiding specific types of decisions involving health and safety as well as contaminant clearances.

The lag of time from initial sampling to result reporting and data validation is a large disadvantage, and because of this, air samples are generally not used for rapid decision making. In some cases, by the time the results are received from the lab, the airborne contaminants may have already dissipated. These data, however, can still be used to confirm air monitoring results obtained via direct read instrumentation.