



Emergency Response Capabilities Introduction

Andrew Henault

Senior Consultant – CTEH Emergency
Response – Rocky Mountain Region -
Business Development

CTEH[®]
THE SCIENCE OF READYSM

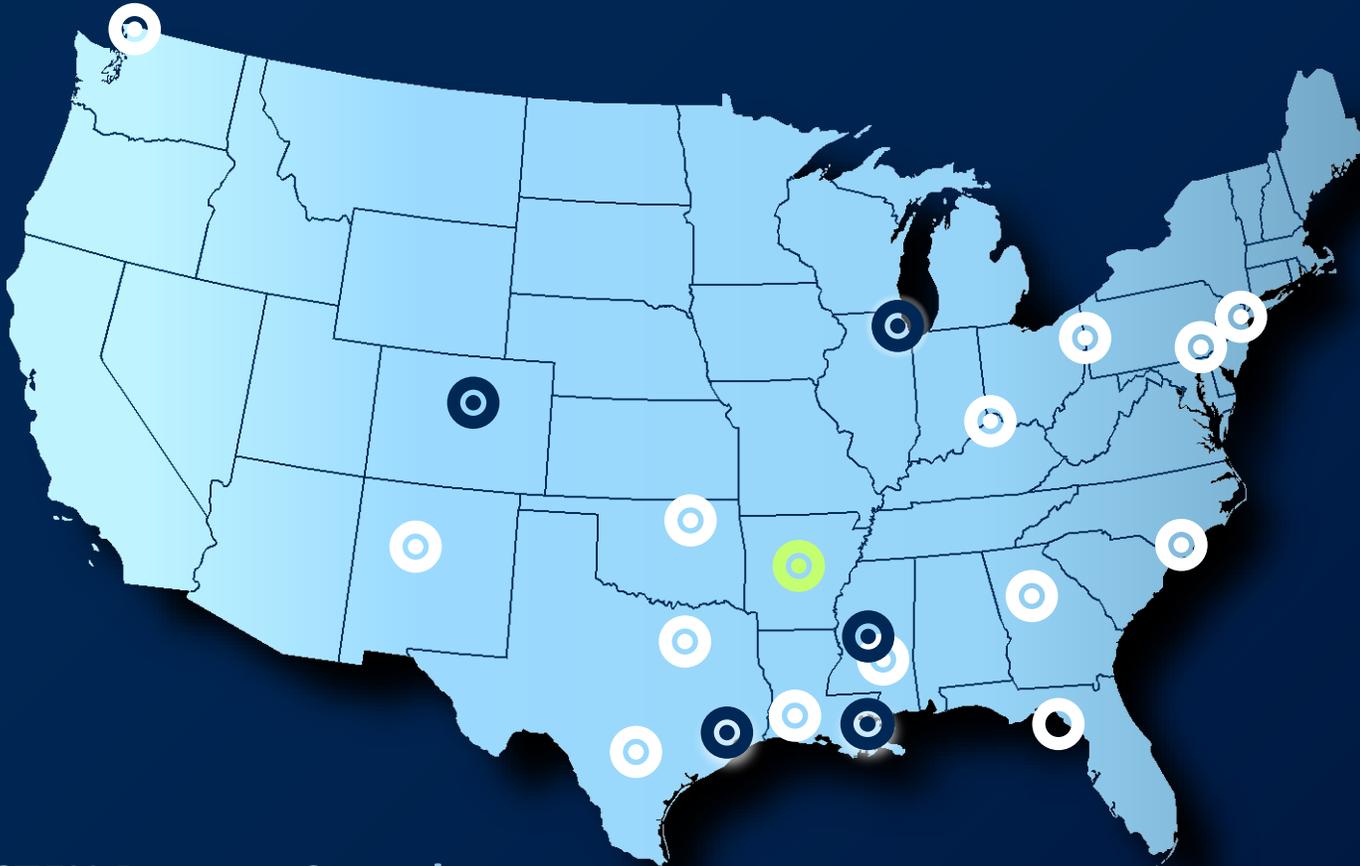


+ **CTEH**[®]
THE SCIENCE OF READYSM

= ONE STOP SHOP FOR YOUR ENVIRONMENTAL NEEDS



GEOGRAPHIC PRESENCE



CTEH Office Locations

North Little Rock, AR *Headquarters*
5120 Northshore Drive, North Little Rock, AR

Chicago, IL
1802 Brummel Ave. | Elk Grove Village, IL

Golden, CO
350 Indiana St. Ste. 700 | Golden, CO

Houston, TX
2000 Anders Lane | Kemah, TX

Jackson, MS
660 Lakeland East Dr. Ste. 107 | Flowood, MS

New Orleans, LA
119 Causeway Blvd. | Jefferson, LA

CTEH Remote Consultants

Albuquerque, NM

Denver, CO

Atlanta, GA

Edison, NJ

Fort Worth, TX

Lake Charles, LA

Bandera, TX

Elkton, MD

Fort Wright, KY

New Braunfels, TX

Pittsburgh, PA

Bartlesville, OK

Ferndale, WA

Highland Village, TX

Patel, MS

Wilmington, NC



Montrose is a Pure-Play Environmental Science and Technology company

For Planet and Progress – On a Mission to Protect the Air We Breathe, the Water We Drink & the Soil that feeds Us

The Difference – Montrose Offerings

R&D 17 Patents and 33 under review
Over 9 billion gallons of water treated for PFAS since 2017

Water Treatment Technology

Full range of PFAS treatment products and services including design & engineering of treatment systems



Air Quality Testing

Montrose's air testing teams utilize the cutting-edge innovations to determine PFAS from any emission source



Environmental Assessment & Project Quality Oversight

Multi – disciplinary PFAS investigation and sampling program; data defensibility and lab audits



Testing & Analysis

Ultra-trace laboratory tests for 75+ PFAS compounds, both legacy compounds (such as PFOS/ PFOA) and newer “GenX” compounds



Environmental Compliance

Compliance and Regulatory advisory, including MCLs, NPDES permitting and potentially RCRA / CERCLA



Remediation Including Aqueous Film Forming Foam (AFFF) Solutions

Design, implementation and maintenance of PFAS remediation systems for Govt. and Industrial customers, including AFFF solutions for the DOD

Exposure & Health Risks

Toxicology and health risk assessment and communication expertise to ensure safety



Locations

North America, Australia, and Europe



#9 ENR Top 30 All-Environmental Firms
#38 ENR Top 200 Environmental Firms

ENR THE TOP 200
ENVIRONMENTAL FIRMS

- ~3,500 Employees
- 100+ Offices
- Headquartered in Little Rock, Arkansas



Holistic Suite of Solutions

EMERGENCY RESPONSE

Toxicology Emergency Response Program

Rapid data collection & communication

Environmental Monitoring

ER & NRDA

Industrial Hygiene Strike Team

High Hazard response

Large Network

DISASTER RECOVERY & Building Science

Technology-Enabled Construction/ Contractor Management

Employee Stabilization post storm

Commercial Real Estate Damage Assessment and Recovery Oversight

Indoor air quality assessment

HEALTH & SAFETY

Industrial Hygiene Services

Compliance Assessments

Gap Assessments & Program Development

Personal Protective Equipment (PPE) Assessments

Health and Safety Training

Fatality and Serious Injury Investigations

Occ Health Program

Innovative Services

Emerging contaminants

PFAS

Robotics & Software

Sustainability Consulting (GHG inventory, permitting support for construction)

Orphan well closure - methane



HEALTH SCIENCES & EPIDEMIOLOGY

- Litigation support as SME (Tox Tort, drug/alcohol)
- SDS updating (QRG)
- Epidemic/pandemic consulting (worker health, decontamination)
- Public Health consulting, inequity, social justice

CRISIS & RESPONSE MANAGEMENT

- Response Plan Development
- Drills & Exercise Oversight/Support
- ICS/IMT/SMT Training and Support

YOUR CALL TO THE

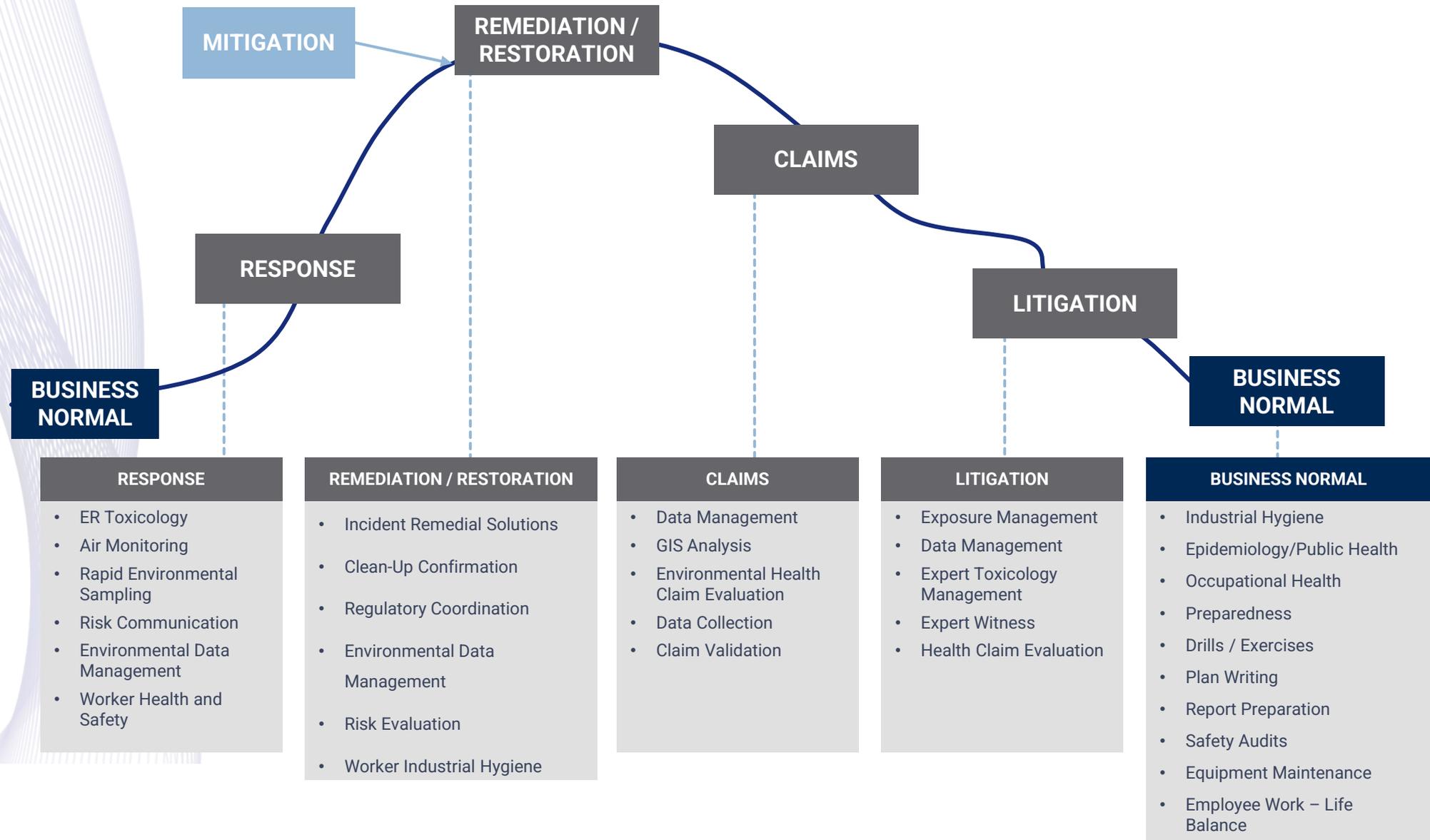
CTEH® HELP DESK (866-869-2834) THIS NUMBER SHOULD BE IN YOUR RESPONSE PLAN

- Reach a member of Senior Management.
- Level of response determined for the scenario you are experiencing.
 - What unit? What all chemicals involved? SDS?
 - Fire Event?
 - Spill to water?
 - Evacuations/Shelter in place?
 - Any current air monitoring readings?
 - Who is the onsite contact that is leading the Air Monitoring Work Group?
 - Expected Duration – Should we think about night shift?
- Always have **6 people, 4 people, 2 people** on call **24-7-365** in our Little Rock, AR, Kemah, TX & Chicago, IL offices, respectively. This includes a Toxicologist, Project Manager specializing in Emergency Response air monitoring, and Environmental Scientists specializing in Industrial Hygiene, Environmental Sampling, Safety, and Community Air Monitoring.

YOUR CALL TO THE CTEH® HELP DESK (866-869-2834)

- **Environmental Response**
 - Real time air monitoring - Fenceline support and community is priority
 - Downwind, sensitive receptors
 - Document Non-detects
 - Work area support to onsite IH team
 - Initiate environmental sampling strategy (surface water, product sample, fire runoff water)
- **Analytical Sampling Equipment** for collecting samples that will be sent to a 3rd party laboratory for analysis,
- **Toxicology** support,
 - Command post– support to PIO/Liaison/JIC
- **Data/GIS Support** for mapping and data summaries,
- **Web-Based Portal** for data viewing as it is collected by the field team.
 - Action levels communicated to OPS (vapor suppression, road closures)
 - Shared with ICP, SITU, export to COP
 - Sharing with Stakeholders (County, City, etc.)

EMERGENCY RESPONSE LIFE CYCLE



EMERGENCY RESPONSES

REFINERY FIRE – COMMUNITY IMPACT



WELL BLOWOUT – COMMUNITY AND ENVIRONMENTAL IMPACT



PIPELINE RELEASE – COMMUNITY AND ENVIRONMENTAL IMPACT



PIPELINE RELEASE – COMMUNITY AND ENVIRONMENTAL IMPACT



PIPELINE RELEASE – WATERWAY IMPACT



Chemical Emergency Data Collection

Quality Data Is Essential!



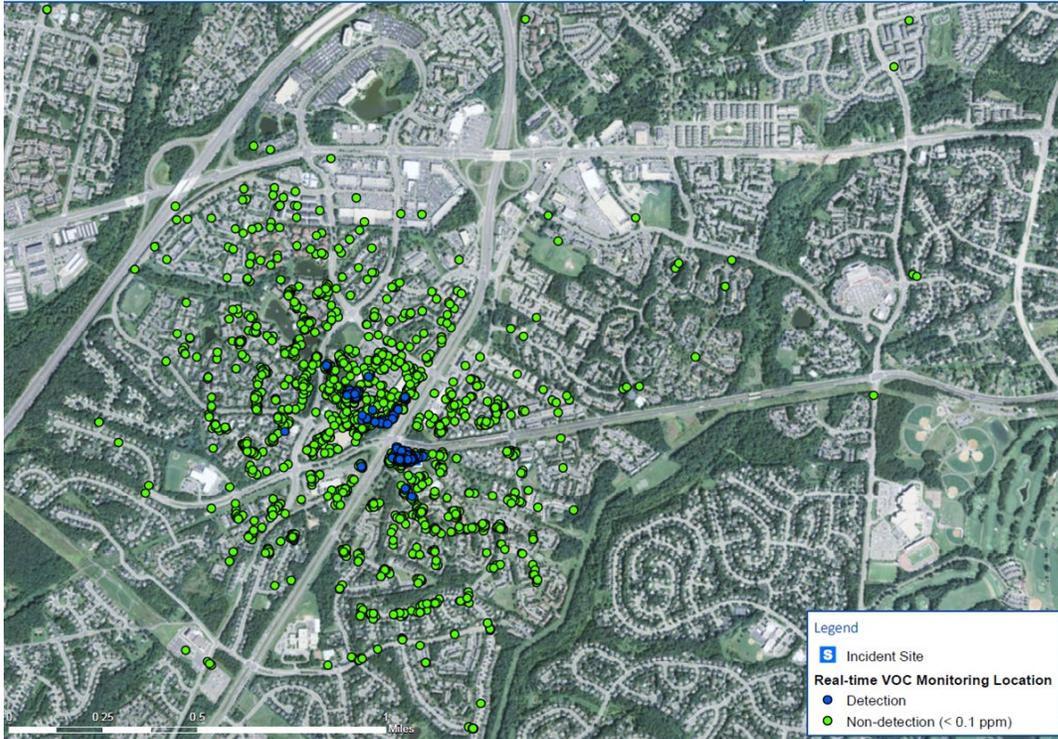
CHARACTERISTICS OF GOOD DATA

- **Accuracy:** It correctly reflects the real-world condition it is meant to measure.
- **Validity:** It measures what you *intend* to measure — the method matches the question.
- **Reliability/Consistency:** It can be reproduced under the same conditions with the same results.
- **Completeness:** No important parts are missing; all needed variables are present.
- **Timeliness:** Up to date and relevant for the current situation.
- **Relevance:** Useful and appropriate for the decision or analysis at hand.
- **Transparency:** Clear about how the data was collected, processed, and by whom.
- **Representativeness:** It fairly reflects the whole population or situation, not just a biased part.

✘ SIGNS OF BAD DATA

- **Errors or inaccuracies:** Contains mistakes, typos, or measurement errors.
- **Bias:** Systematically favors certain outcomes or groups.
- **Incomplete:** Missing values, gaps, or partial information.
- **Outdated:** No longer relevant to current conditions.
- **Inconsistent:** Conflicting results when repeated or compared with other sources.
- **Unverified source:** Unknown or unreliable origin, with no way to check its credibility.

COMMUNITY MONITORING



Provide data in real time for documentation, communication, and decision-making.

ANALYTICAL AIR SAMPLING

Gives sensitive and highly specific chemical concentration averages over time.



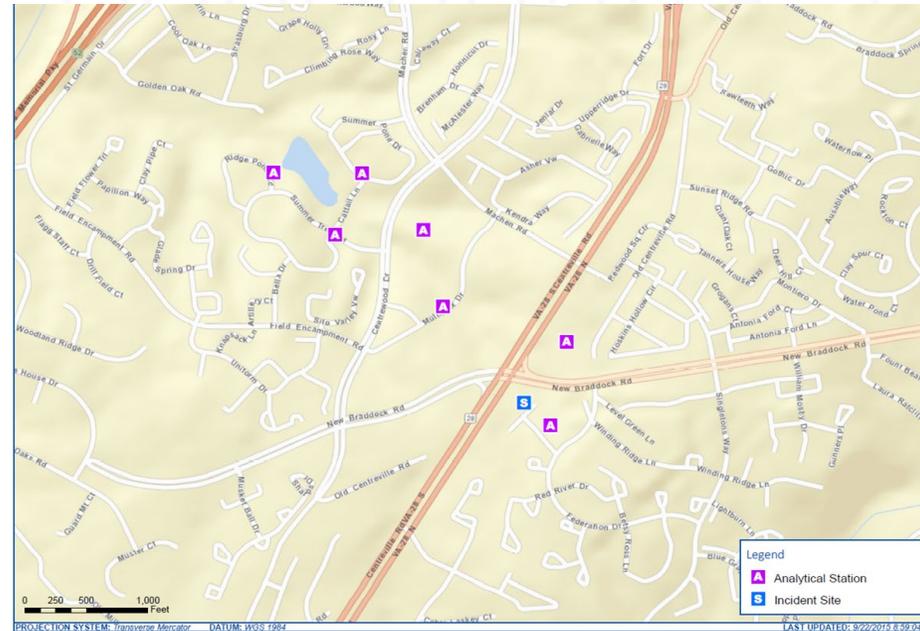
Canister
Sampling



Worker personal samples
in the exclusion zone



Air Sampling Pump
and Collection
Media



REAL-TIME DATA PORTAL

CTEH Data Entry/Responder Training



Real Time Readings for Nov 29, 2022 (1)

Time	Category	Analyte	Reading	Comments
11/29 14:20	Community Monitoring	Benzene	<0.05 ppm	Down wind of incident site; School; 06.2022 QC No. 90629

Not all real time data on this website have undergone full QA/QC (quality assurance/quality control) analysis. It has been provided expeditiously to regulatory agencies and on-site contractors for informational purposes only.

CTEH Contacts

Manager	Lauren Garner	501-416-6629
Director	Cole Ledbetter	
Data Manager	Ashley Reardon	(501) 247-6691

Timeline

2021/06/11

- Update 06/11 12:04**
Used Multirae Serial number: M010000157 for confirmation on AR01 serial number W01B00001724 Mild crude oil odor detected Multirae reading 1.7 ppm Voc AR01 1.3 ppm
- Update 06/11 11:27**
1.3 ppm vov areaRAE 1.7 ppm vov multiRae slight smell crude oil odor present pm contacted and informed
- Update 06/11 10:38**
AreaRAE W01B00001724 confirmed with multirae. Record time of drift turned off Record time of drift turned on.
- Update 06/11 10:34**
W01B00001724 confirmed detection with multirae (number) Drift time turned off and the drift time turned on. Actions taken: don respirator, report to PM, and clear the area.
- Update 06/11 10:22**
Went to AreaRAE AR03 and got a non detect. Need to shut down AreaRAE AR03 to recalibrate drift.
- Update 06/11 10:20**
Confirmed areaRAE reading 1.3 ppm and multiRAE got a reading of 1.7 ppm and need to contact PM
- Update 06/11 10:10**
Confirmed reading of LEL the AR03 has detected. There was

Project Reference Files [View All](#)

There are no reference files.

REAL-TIME DATA PORTAL

CTEH Company ▾ #111222 Plans ▾ Analytical ▾ Assessments ▾ RealTime Readings ▾ SIERAS ▾ MORE ▾

Real Time Readings: 111222 ⓘ

[All Real Time Readings](#)
[Print All/Paged](#)
[Map](#)
[KML](#)
[Add Real Time Reading](#)
[Return to Project Dashboard](#)

[By Sampler](#) | [By Location](#) | [By Location Category](#) | [By Region](#) | [By Plan](#) | [By Assessment](#)
 Split by Instrument

{Blank} - Map - View All - View Filtered

Analyte	Count of Readings	Count of Detects	Conc. Range
()	2	2	NaN

Community Monitoring - Map - View All - View Filtered

Analyte	Count of Readings	Count of Detects	Conc. Range
()	9	9	NaN
Benzene (ppm)	195	35	0.04 - 1000 ppm
Hexane (ppm)	11	3	30 - 800 ppm 1 >
LEL (%)	111	6	0 - 15 %
O2 (%)	92	81	1 - 21.4 %
PM10 (mg/m3)	17	13	0.003 - 0.415 mg/m3
PM2.5 (mg/m3)	103	97	0.002 - 2.5 mg/m3
Toluene (ppm)	15	8	0.5 - 1250 ppm 1 >
VOCs (ppm)	134	31	0.004 - 105.7 ppm
Xylene (ppm)	35	22	0.025 - 1200 ppm 2 >
null (null)	2	2	NaN

Site Assessment - Map - View All - View Filtered

Analyte	Count of Readings	Count of Detects	Conc. Range
Benzene (ppm)	15	0	< 0.05 ppm
Hexane (ppm)	2	2	3 - 400 ppm
LEL (%)	5	0	< 1 %
O2 (%)	4	3	20.9 %
PM10 (mg/m3)	7	6	0.002 - 0.003 mg/m3
PM2.5 (mg/m3)	3	3	0.004 - 0.009 mg/m3
Toluene (ppm)	1	0	< 0.5 ppm
VOCs (ppm)	13	3	1.7 - 20.9 ppm
Xylene (ppm)	2	2	1000 ppm
null (null)	1	1	NaN

Worker Exposure Monitoring - Map - View All - View Filtered

Analyte	Count of Readings	Count of Detects	Conc. Range
Benzene (ppm)	450	50	0.01 - 0.75 ppm
Hexane (ppm)	2	0	< 1 ppm
LEL (%)	103	1	20.9 %
O2 (%)	116	100	0.2 - 21.6 %

Time	Category	Analyte	Instrument	Reading
3/30 @ 13:44	Community Monitoring	Benzene	Gastec Tube 121L	1.5 ppm
3/30 @ 14:01	Community Monitoring	Benzene	Gastec Tube 121L	0.5 ppm
3/30 @ 14:33	Community Monitoring	Benzene	Gastec Tube 121L	0.5 ppm
3/30 @ 15:00	Community Monitoring	Benzene	UltraRAE	0.06 ppm
4/26 @ 15:05	Community Monitoring	Benzene	UltraRAE	0.6 ppm
4/27 @ 13:21	Community Monitoring	Benzene	UltraRAE	5 ppm
4/27 @ 13:21	Community Monitoring	Benzene	UltraRAE	5 ppm

Sampling and Analysis Plan (SAP)

Plan 2: Community Monitoring

Objective: Report air levels before they reach those causing nuisance or health issues

Analyte	Action Level*	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Total VOCs	0.5 ppm 5 minutes	Report reading to PM; Assess for the presence of BTEX-H compounds	Approximate background level - Reading sustained for 5 minutes	MultiRAE PID	0.1 ppm	Range: 1 – 5,000 ppm	Variable [†]
				AreaRAE PID			
Benzene	Detection	Assess only as requested; Report reading to PM/PTD	Inform PM/PTD of potential off-site issues	UltraRAE PID	0.01 ppm	UltraRAE - Change SEP tube frequently	NA
				Gastec tube #121L	0.05 ppm	Range: 0.1 – 65 ppm Volume: five 100 ml pump strokes	Var.
				Drager XPID 8000/8500	0.02 ppm	Range: 0.05 – 25 ppm	NA
Toluene	Detection	Assess only as requested; Report reading to PM/PTD	Inform PM/PTD of potential off-site issues	Gastec tube #122L	0.5 ppm	Range: 1 – 100 ppm Volume: four 100 ml pump strokes	Var.
				Drager XPID 8000/8500	0.33 ppm	Range: 1 – 100 ppm	NA
Ethyl benzene	Detection	Assess only as requested; Report reading to PM/PTD	ACGIH TLV-TWA	Gastec tube #122L	0.5 ppm	Range: 1 – 70 ppm Volume: four 100 ml pump strokes	Var.
				Drager XPID 8000/8500	1 ppm	Range: 1 – 200 ppm	NA
Xylene	Detection	Assess only as requested; Report reading to PM/PTD	ACGIH TLV-TWA	Gastec tube #122L	0.5 ppm	Range: 2 – 200 ppm Volume: four 100 ml pump strokes	Var.
				Drager XPID 8000/8500	1 ppm	Range: 1 – 200 ppm	NA
Hexane	Detection	Assess only as requested, Report reading to PM/PTD	Inform PM/PTD of potential off-site issues	Gastec tube #102L	1 ppm	Range: 4 – 1,200 ppm Volume: five 100 ml pump strokes	Var.

Plan 1: Worker Monitoring

Objective: Report air levels before they reach those requiring respiratory protection

Analyte	Action Level	Action to be Taken	Basis
Total VOCs	30 ppm 5 min.	Assess for the presence of benzene/toluene/hexane; Report reading to PM	To avoid over exposure to benzene/toluene/hexane
Benzene	0.5 ppm 5 min.	Confirm reading with secondary instrument; Exit Area or don air purifying respirator; Report reading to PM	ACGIH TLV-TWA
	2.5 ppm 5 min.	Exit Area or don air purifying respirator; Report reading to PM	ACGIH TLV-STEL
Toluene	20 ppm 5 min.	Sample only as requested; Exit Area or don air purifying respirator; Report reading to PM	ACGIH TLV-TWA
Hexane	50 ppm 5 min.	Sample only as requested; Exit Area or don air purifying respirator; Report reading to PM	ACGIH TLV-TWA
Hydrogen sulfide	1 ppm 5 min.	Exit Area; Report reading to PM	ACGIH TLV-TWA

Combustion Products

Analyte	Action Level	Action to be Taken	Basis
Particulate Matter (PM _{2.5} or PM ₁₀)*	351 µg/m ³ 5 min.	Report reading to PM	Wildfire Smoke Guidelines for 1 hr. avg. upper-bound breakpoint for unhealthy AQI
PM2.5 or PM10	200 µg/m ³ 8 hrs.	Report reading to PM	See above - 8 hr. guideline
Carbon monoxide	25 ppm 5 min.	Report reading to PM	ACGIH TLV-TWA
Sulfur dioxide	0.2 ppm 5 min.	Report reading to PM	ACGIH TLV-STEL
Nitrogen dioxide	0.2 ppm 5 min.	Report reading to PM	ACGIH TLV-TWA
Formaldehyde	0.1 ppm 5 min.	Report reading to PM	ACGIH TLV-TWA

*Monitoring for combustion products may be discontinued when the fire is extinguished

Flammability

Analyte	Action Level	Corrected Value	Action to be Taken	Basis
%LEL	1 % 1 min	2.5 %	Notify PM	Elevated %LEL sustained 1 min
%LEL	4 %	10 %	Exit area and Notify PM	

*Rough estimate based on common crude oil volatiles

REAL TIME AIR MONITORING



Benzene
MDI
TDI
HF
HCN
HCl
H2SO4
formaldehyde



NORM
Mercury



VOC
LEL
O2
CO2
ETO
H2S
Cl
NH3
NOX
SOX
particulate



RISK COMMUNICATION

WHAT IS IT AND WHY IS IT SO IMPORTANT



“A science-based approach for communicating effectively in high-concern, high-stress, emotionally charged, or controversial situations.”

–Dr. Vincent Covello, Center for Risk Communication

You can do all the right things in a response, but the public will think that “nothing is being done”

If the Public does not understand what you did or why you did it, they will think that you are irresponsible or are incompetent.



ADDRESSING COMMUNITY CONCERNS

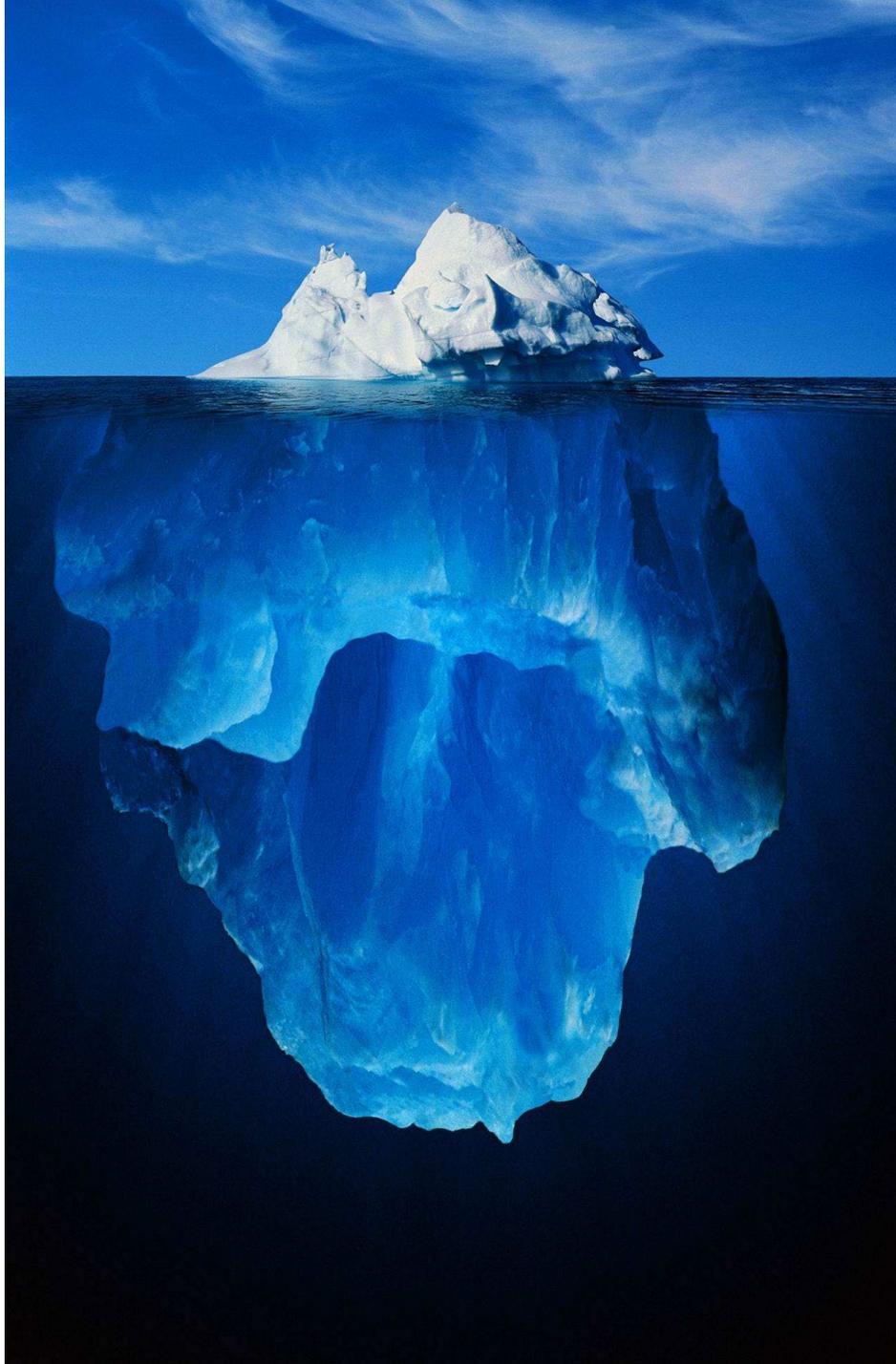
- 1) What are the acute health effects of exposure?
- 2) Is the air safe to breathe?
- 3) Is my drinking water safe?
- 4) Is it safe to swim?
- 5) Can I eat recreationally caught fish?

TYPICAL CTEH ROLES AS RISK COMMUNICATORS

- Establish Human Health Call Center for the Public
- Draft Public Fact Sheets for Distribution at Events
- Attend Public Meetings to Provide Information
- Act as a Resource for Media Interaction



ICEBERG MODEL



POOR COMMUNICATION AND CLAIMS

Lawsuits and Claims

```
graph TD; A[Lawsuits and Claims] --> B[Claims filed by those actually injured]; A --> C[Claims filed by those who think they have been injured. Especially likely to file if they think no one cares.]; A --> D[Fraudulent claims];
```

Claims
filed by
those
actually
injured

Claims filed by
those who **think**
they have been
injured.

Especially likely to
file if they think no
one cares.

Fraudulent
claims

PROTECTING HUMAN HEALTH & ENVIRONMENT DURING A RESPONSE

- Demonstrate Water Quality
- Demonstrate Air Quality
- Demonstrate Soil/Sediment Quality
- Demonstrate Food Quality (i.e., Fisheries Advisories)
- Demonstrate Lifestyle Quality (e.g., Beach Closure Advisories, as needed)

Through Sampling
& Analysis

Who in a Response is Responsible for each of these Functions?

- Environmental Unit?
- Public Health Unit?
- Safety Officer/ Safety Team?



PROTECTING YOUR ASSETS DURING A RESPONSE

- Background / Baseline Media Sampling
- Source Sampling for Comparative Fingerprinting
- Due Diligence Sampling (e.g., Pre-Impact Sampling for Waste and Material Staging Areas)

- These do not typically have objectives in an ICS response and hence are not a focus. But if you consider these items on the front end, your lawyers (and pocketbook) will thank you.

Questions?

CTEH[®]
THE SCIENCE OF READYSM



Andrew Henault

*Senior Consultant – CTEH Emergency Response
– Rocky Mountain Region – Business
Development*

ahenault@cteh.com