Fenceline Monitoring: an EPA Priority

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SPECTRUM ENVIRONMENTAL SOLUTIONS

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Spectrum Environmental Solutions
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Overview

- Introduction – When Politics and the Fenceline Intersect
- The Recent Evolution of Fenceline Monitoring Rules
  - EPA Refinery MACT (Method 325 A/B) | Dec. 1, 2015
  - Bay Area Air Quality Management District Rule 12-15 | April 26, 2016
  - California Assembly Bill No. 1647 | October 8, 2017
  - South Coast Air Quality Management District Rule 1180 | Dec. 1, 2017
  - Colorado House Bill 21-1189 | June 24, 2021
- Key elements of a modern-day successful air monitoring program

Intro – DOJ says SEPs are out! March 2020

08/06/2020 - EPA Mission Tracker

DOJ Phases Out Supplemental Environmental Projects in Environmental Enforcement

by Hana Vizcarra, Laura Bloomer

On March 12, 2020 the Department of Justice (DOJ) ended a longstanding practice of allowing the inclusion of environmentally beneficial projects in legal settlements with EPA. These projects, known as "Supplemental Environmental Projects" (SEPs), offset the environmental harm caused by the defendant. For decades, SEPs have resulted in significant environmental benefits, helping affected communities recover or avoid future harmful emissions.[1] Eliminating the use of SEPs in the settlement process removes one of the only enforcement tools that directly address harm done to local communities when facilities violate environmental laws. The March announcement is the culmination of a multi-step effort by the Trump Administration to limit and ultimately eliminate SEPs.

https://eelp.law.harvard.edu/2020/08/doj-phases-out-supplemental-environmental-projects-in-environmental-enforcement/

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Intro - Fenceline goes Prime Time
Presidential Debates - October 22, 2020

"Those people live on what they call '*fencelines*'. […] They live near chemical plants that, in fact, pollute. Chemical plants and oil plants and refineries that pollute. […] The fact is those frontline communities, it doesn't matter what you're paying them. It matters how you keep them safe. What do you do? And you impose restrictions on the pollutions, on the pollutants coming out of those *fenceline* communities.

Intro – EPA says SEPS are cool! April 30, 2021

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

April 30, 2021

MEMORANDUM

SUBJECT: Strengthening Enforcement in Communities with Environmental Justice Concerns

FROM: Lawrence E. Starfield
Acting Assistant Administrator

LAWRENCE STARFIELD
Digitally signed by
LAWRENCE STARFIELD
Date: 2021.04.30 08:32:04
-04'00'

TO: Office of Enforcement and Compliance Assurance Office Directors and Deputies
Enforcement and Compliance Assurance Directors and Deputies
Regional Counsels and Deputies

In his message to employees on Wednesday, April 7, 2021, the Administrator directed all EPA offices to "strengthen enforcement of violations of cornerstone environmental statutes" in communities overburdened by pollution.[1] This is consistent with Executive Order 14008.[2] During a recent Office of Enforcement and Compliance Assurance (OECA) overview briefing for the Administrator, I outlined a number of actions that were developed with your participation, that could strengthen enforcement and help advance the protection of communities, using existing resources. This memorandum sets out steps to advance these environmental justice (EJ) goals.[3]

- Specific directives to advance Environmental Justice goals using EPA's existing resources

- Encouraging the use fenceline monitoring and transparency tools ("Next Gen" compliance/enforcement)

- Incorporating supplemental environmental projects (SEPs) like fenceline and community monitoring to settlements

https://www.epa.gov/sites/default/files/2021-04/documents/strengtheningenforcementincommunitieswithejconcerns.pdf

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Intro – Fenceline in the News

Intro – Chemical and Engineering News

The rise of environmental justice

In the midst of a pandemic and an uprising for racial equity, advocates for communities of color near industrial facilities seize the moment
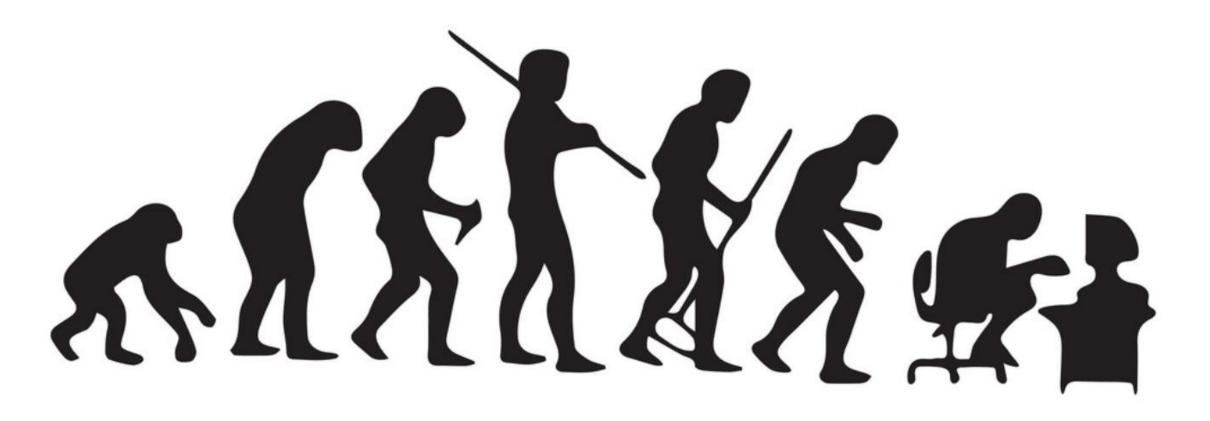
Credit: Julie Dermansky | Members of the Coalition Against Death Alley and their supporters marched by chemical plants in Geismar, Louisiana, on day three of a 5-day march through Louisiana's "Cancer Alley" between New Orleans and Baton Rouge.

Chemical and Engineering News – August 25, 2020 (https://cen.acs.org/environment/pollution/rise-environmental-justice/98/i32

The Recent Evolution of Fenceline Monitoring Rules

EPA Refinery MACT – Dec. 1, 2015

EPA's Fenceline Monitoring Requirements for Petroleum Refineries

Benzene monitor **?**

- Utilizes passive sampling tubes

- Samples deployed over two-week periods

- Samples analyzed afterwards for benzene following EPA Method 325B

- Results not made available to the public for months after the fact

- Is this a fenceline air "monitoring" program?

- Or is this a fenceline air "sampling" program?

BAAQMD Rule 12-15 – April 26, 2016

- Following the Richmond fire in 2012, the BAAQMD Expert Panel was convened
- Recommend technologies, methods, and tools to improve community air monitoring capabilities near refineries
- Panel recommended advanced, continuous open-path fenceline monitoring.
- BAAQMD Rule 12-15 adopted April 26, 2016.
- Affected five local refinery sites

Open-Path Monitoring – How does it work?

- A light source is transmitted down a clear path, often hundreds of meters, to measure what is in the air

- Light source can be broadband infrared, ultraviolet, or visible light, as well as lasers of various wavelengths

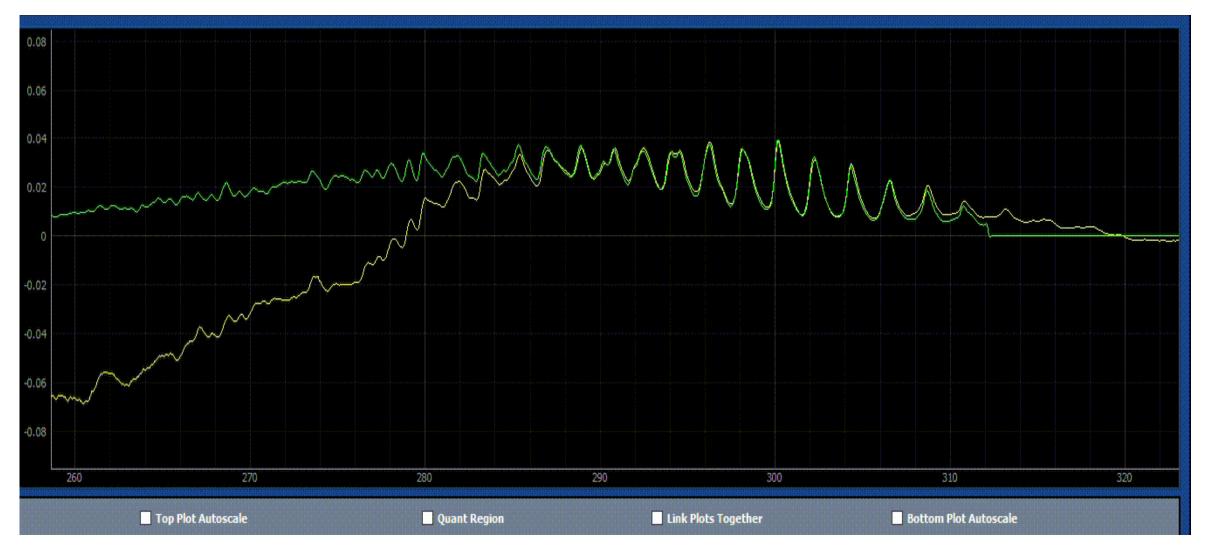- Measurements often take seconds, providing near real-time monitoring.

- Each compound in the air absorbs light in its own unique way, allowing for quantification of how much "stuff" is present along a given path.
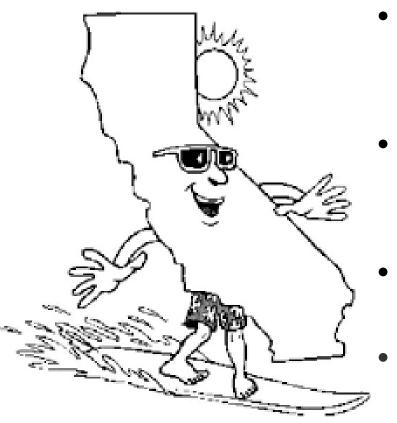
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Open-Path Monitoring – How does it work?

California Bill No. 1647 - October 8, 2017

- Required AQ Districts to do refinery-related community air monitoring and the refineries to do fenceline monitoring by January 2020
- Required the collection of "**real-time** data from these monitoring systems, and to **provide that data as quickly as possible in a publicly accessible format**"
- Required AQ Districts to establish FLM guidance and the list of compounds to measure
- Required that Guidance developed by the AQ Districts incorporate input from **affected parties**

South Coast Air Quality Management District Rule 1180 – Dec. 1, 2017

- called for **open-path** monitoring, stating that *"Conventional fenceline air monitoring techniques rely on point monitors that […] greatly increase the chances of missing surface emissions hotspots or emissions plumes"*

- Required a notification system for communities near refineries when emissions exceed thresholds (e.g., RELs)

- *"Call 1-800-CUT-SMOG to notify the Executive Officer within two hours of discovering that equipment described in the fenceline air monitoring plan […] failed to accurately provide real-time air monitoring information."*

Rule 1180
Refinery Fenceline Air Monitoring Plan Guidelines

South Coast AQMD

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Diamond Bar, California
December 2017

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South Coast Air Quality Management District Rule 1180 – Dec. 1, 2017

Table 1- Refinery-Related Air Pollutants to be Addressed by Fenceline Air Monitoring Plans

Air Pollutants
Criteria Air Pollutants
Sulfur Dioxide
Nitrogen Oxides
Volatile Organic Compounds
Total VOCs (Non-Methane Hydrocarbons)
Formaldehyde
Acetaldehyde
Acrolein
1,3-Butadiene
Styrene
BTEX Compounds (Benzene, Toluene, Ethylbenzene, Xylenes)
Other Compounds
Hydrogen Sulfide
Carbonyl Sulfide
Ammonia
Black Carbon
Hydrogen Cyanide
Hydrogen Fluoride[+]

[+] If the facility uses hydrogen fluoride.

- 20 target compounds

- All but two compounds (black carbon, H_2S) deemed suitable for measurement by open-path technology:

  - UV-DOAS

  - FTIR

Colorado House Bill 21-1189 | June 24, 2021

Gov. Jared Polis signs SB21-1189 in Commerce City. The legislation requires new real-time air monitoring around some of Colorado's heaviest polluters.

Sam Brasch/CPR News

- Influenced by SCAQMD Rule 1180, but…

- HB 21-1189 evolved quite differently than in California

- Legislative declaration: "low-income neighborhoods and residents who identify as Black, Indigenous, Latino, and People Of Color and are disproportionately affected by air toxics emissions"

- Legislation targets FLM for three specific air toxins: benzene, hydrogen sulfide and hydrogen cyanide

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Colorado House Bill 21-1189 | June 24, 2021

- Rule calls to "*provide for monitoring […] using optical remote sensing technology or other monitoring technology with the ability to provide real-time spatial and temporal data*"

- Public notifications and website required

- Applies to:
  - Petroleum Refineries
  - Petroleum Bulk Terminals
  - Aircraft Parts and Manufacturing

- Refinery fenceline monitoring live by January 1, 2023!

Key Elements of a Successful, Modern-Day Air FLM Program

- Quality measurement equipment and responsive, reliable support service
- State-of the art software
- Responsive onsite operations and maintenance
- Knowledgeable offsite operations staff
- Robust QA/QC procedures and processes
- Expertise in air quality data analysis and data validation
- Program management experience
- Robust data management platform
- Customizable data dissemination tools and processes
  - Websites
  - Automated notifications

Data Management and Dissemination

- Real-time data processing

- Secure accounts (login/password combos) with unique levels of access associated with each account

- Automated real-time alerting (text, email and phone)

- Automated QA/QC checks

- Ability to handle unique data payloads from differing instrumentation

- Graphical display tools and dashboard capability

ONE 5-MINUTE FTIR DATA PAYLOAD JSON FORMAT – 9000 CHARACTERS

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Big Data – Why does it matter?

Site	Analyzer	# Compounds	Measurement Periods per Hour	Hourly Measurement Results per Hour	Hourly Measurement Results per Quarter
OPA-1	UV	7	12	84	185,472
	FTIR	11	12	132	291,456
OPA-1R	H2S	1	12	12	26,496
	BC	1	12	12	26,496
	UV	7	24	168	370,944
	FTIR	11	24	264	582,912
	H2S	1	12	12	26,496
OPA-2	BC	1	12	12	26,496
	UV	7	24	168	370,944
	FTIR	11	24	264	582,912
	H2S	1	12	12	26,496
OPA-3	BC	1	12	12	26,496
	UV	7	12	84	185,472
	FTIR	11	12	132	291,456
	H2S	1	12	12	26,496
OPA-4	BC	1	12	12	26,496
	UV	7	12	84	185,472
	FTIR	11	12	132	291,456
	H2S	1	12	12	26,496
OPA-5	BC	1	12	12	26,496
	UV	7	12	84	185,472
	FTIR	11	12	132	291,456
	H2S	1	12	12	26,496
OPA-6	BC	1	12	12	26,496
					4,133,376

- Refinery fenceline monitoring program in Torrance, CA

- 12 measurement paths, 6 stations
  - 6 FTIR analyzers
  - 6 UVDOAS analyzers
  - 6 H2S point analyzers
  - 6 black carbon analyzers

- Over four million hourly average concentration values per quarter

- Storing data is the easy part

- **How are you going to use it?**

- **How do you turn it into action?**

Dashboards – Tsunami Data Platform

					Open Path										
Site	Instrument	Pathway	Compound	1Hr Conc. (ppb)	1Hr EDL (ppb)	Last 5min Null Flag	←Timestamp	N2O (ppb)	Signal | Scans	Valid% Prev Hr	Latest Data	Latest Non-Null	Latest Bkg	Moog Align	Alerts?
Northwest (OPA-1)	FTIR	1	1,3-Butadiene	0.30	1.16			337	1.92	100%	4	4	14	Y	Y
	FTIR	2	1,3-Butadiene	0.42	1.00			322	2.06	83%	9	9	19	Y	Y
	OPUV	1	Benzene	-0.09	0.69				5884	83%	9	9	19	Y	Y
	OPUV	2	Benzene	-0.19	0.65				6850	100%	4	4	14	Y	Y
East (OPA-4)	FTIR	7	1,3-Butadiene	0.34	1.73 L	08-16 21:55		284	1.4	100%	4	4	14	Y	Y
	FTIR	8	1,3-Butadiene	0.69	1.82 L	08-16 21:50		283	1.48	83%	9	9	19	Y	Y
	OPUV	7	Benzene	0.19	0.39				11578	83%	9	9	19	Y	Y
	OPUV	8	Benzene	0.21	0.34				13120	100%	4	4	14	Y	Y
Southeast (OPA-5)	FTIR	9	1,3-Butadiene	-0.50	1.28			283	4.71	100%	4	4	14	Y	Y
	FTIR	10	1,3-Butadiene	0.45	3.11			324	2.17	83%	9	9	19	Y	Y
	OPUV	9	Benzene	0.05	0.34 L	08-14 19:40			11196	83%	9	9	19	Y	Y
	OPUV	10	Benzene	0.11	0.26 L	08-17 08:55			8655	100%	4	4	14	Y	Y
Southwest (OPA-6)	FTIR	11	1,3-Butadiene	-0.50	2.29			276	1.28	100%	4	4	14	Y	Y
	FTIR	12	1,3-Butadiene	0.51	2.65			280	1.14	83%	9	9	19	Y	Y
	OPUV	11	Benzene	0.07	0.57				3070	83%	9	9	19	Y	Y
	OPUV	12	Benzene	0.09	0.39				5587	100%	4	4	14	Y	Y
Links								N2O (ppb)	FTIR | OPUV					FTIR | OPUV	

				Point Source							
Site	Instrument	Pathway	1Hr Conc. (ppb)	Rack Temp. (F)	Last 5min Null Flag	←Timestamp	Valid% Prev Hr	Latest Data	Latest Non-Null	Latest MET	Alerts?
West (OPA-1a)	Black Carbon	West	0.68	-			92%	4	4	4	Y
	Total Sulfur	West	0.61	-			92%	4	4	4	Y
North (OPA-2)	Black Carbon	North	0.69	79.9			100%	4	4	0	Y
	Total Sulfur	North	0.59	79.9			100%	4	4	0	Y
Northeast (OPA-3)	Black Carbon	Northeast	0.70	78.4			100%	4	4	0	Y
	Total Sulfur	Northeast	0.55	78.4			100%	4	4	0	Y
East (OPA-4)	Black Carbon	East	0.63	77.3			100%	4	4	0	Y
	Total Sulfur	East	0.51	77.3			92%	4	4	0	Y
Southeast (OPA-5)	Black Carbon	Southeast	0.59	80.5			100%	4	4	0	Y
	Total Sulfur	Southeast	0.34	80.5			100%	4	4	0	Y
Southwest (OPA-6)	Black Carbon	Southwest	0.74	74.8			100%	4	4	0	Y
	Total Sulfur	Southwest	0.75	74.8			100%	4	4	0	Y
Northwest (OPA-1)	Rack Temp		-	77				4			

TORC Dashboard last updated 08-17 09:59 PT   Show STI?   LATEST WEATHER| Conditions: Mostly Clear WS: 6.42mph WD: 135deg Temp: 76.1F Vis: 30MI RH: 64.7% Precip: 0in [08-17 10:00]

Dashboards – Tsunami Data Platform

FTIR												
Site	Pathway	Datetime	Flags	LaserR	LaserX	LaserY	IR Source Curr	IR Source Pwr	Num Scans	Board Temp (C)	Temp (C)	Press (atm)
Northwest (OPA-1)	1	08-17 09:55		5.29	4.24	4.83	2.05	9.33	364	30.53	23.56	0.99
	2	08-17 10:00		5.39	4.44	5.11	2.05	9.33	376	30.76	23.3	0.99
East (OPA-4)	7	08-17 09:55		4.84	5.17	5.35	2.02	9.14	312	28.66	23.24	1
	8	08-17 10:00		4.93	5.26	5.19	2.02	9.13	304	28.78	23.24	1
Southeast (OPA-5)	9	08-17 09:55		5.11	5.36	5.48	2.06	9.15	332	31.5	23.69	0.99
	10	08-17 10:00		4.9	5.09	5.3	2.06	9.15	340	31.75	24.04	0.99
Southwest (OPA-6)	11	08-17 09:55		4.8	4.54	4.52	2.01	9.32	356	31.25	23.56	0.99
	12	08-17 10:00		4.72	4.19	4.48	2.01	9.32	364	31.24	23.3	0.99

OPUV											
Site	Pathway	Datetime	Flags	No. Bad Scans	DarkCorrect	ActualDuration	IntegrationTime	No. Sat. Scans	Subt. Mult.	Temp (C)	Press (atm)
Northwest (OPA-1)	1	08-17 10:00		0	true	270.04	57.6	183	0.45	18.44	1
	2	08-17 09:55		0	true	270.74	38.39	6	0.37	18.44	1
East (OPA-4)	7	08-17 10:00		0	true	245.29	28.5	15	0.35	21.31	0.99
	8	08-17 09:55		0	true	241.83	17.25	12	0.23	21.31	0.99
Southeast (OPA-5)	9	08-17 10:00		0	true	267.04	22.98	11	0.54	20.32	0.99
	10	08-17 09:55		0	true	265.1	24.72	213	0.59	20.32	0.99
Southwest (OPA-6)	11	08-17 10:00		0	true	265	62.15	80	1.04	18.66	0.99
	12	08-17 09:55		0	true	262.57	36.95	25	0.61	18.66	0.99

Dashboard last updated 08-17 10:03 PT

LATEST WEATHER| Conditions: Mostly Clear WS: 6.42mph WD: 135deg Temp: 76.1F Vis: 30MI RH: 64.7% Precip: 0in [08-17 10:00]

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Internal Notifications and Automated Actions

Internal Notifications and Automated Actions

Internal Notifications and Automated Actions
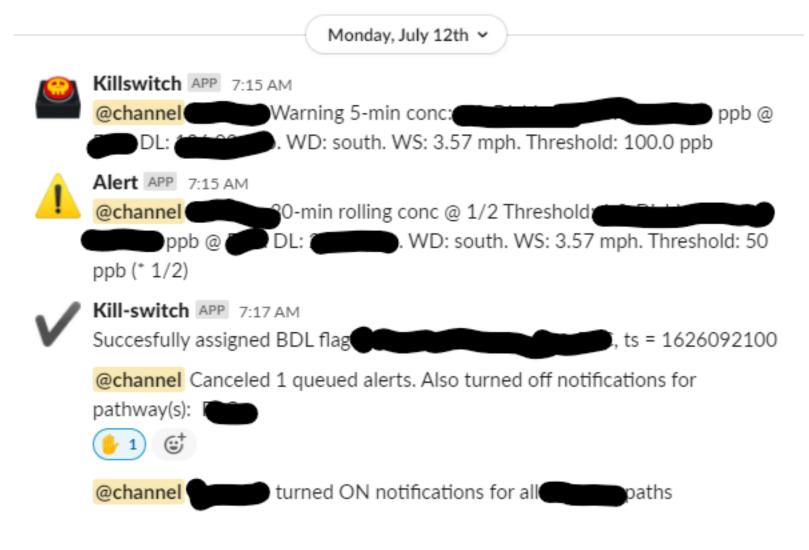
Minimizing False Alarms

Key Elements of a Successful, Modern-Day Air Monitoring Program

- Quality measurement equipment and responsive, reliable support service
- State-of the art software
- Responsive onsite operations and maintenance
- Knowledgeable offsite operations staff
- Robust QA/QC procedures and processes
- Expertise in air quality data analysis and data validation
- Program management experience
- Robust data management platform
- Customizable data dissemination tools and processes
  - Websites
  - Automated notifications

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Conclusions

- Affected communities and EJ advocates are increasingly involved in the development of fenceline and community air monitoring legislation, rules and regulations

- Fenceline monitoring rules are becoming more complex with
  - expanded target analyte lists
  - requirements for real-time measurements, reporting and alert notifications
  - the need to utilize state-of-art monitoring techniques
  - a stated preference for open-path monitoring techniques over conventional point monitors

- These complex, multi-faceted air monitoring programs require an experienced team with a variety of different skills to be successful

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Louisiana Section

Thank You!

Questions?

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