

Emissions Monitoring - A New Frontier

mpact2wo

a **molex** Business

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Molex - Quick Facts

GLOBAL PROVIDER OF INNOVATIVE ELECTRONIC SOLUTIONS

73

Manufacturing
locations

in

21

countries

40k+

People working for us
worldwide

\$7.5B+

Revenue

100,000+

Products

MARKETS SERVED:

TELECOM DATACOM CONSUMER INDUSTRIAL MOBILE AUTOMOTIVE MEDICAL AEROSPACE/DEFENSE

Our Foundation:



Market Based Management[®]

Molex Confidential Information

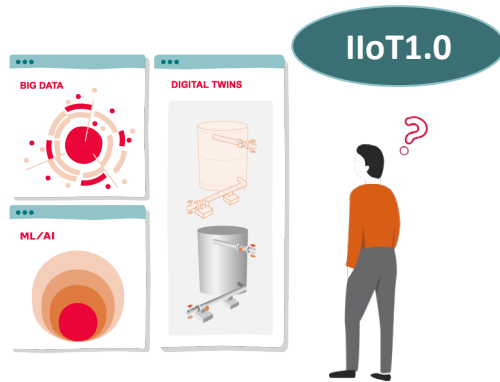
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IIoT2.0 – Putting **Industrial** Back in Digital-**Industrial**

mPACT2WO's Approach



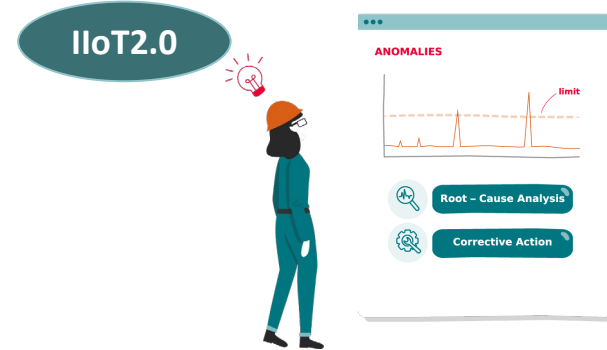
Technology-first approach

SME-centric

disconnect with operator-norm

Complex apps

operator inertia to new use-models



Operator-first approach

Operator-centric

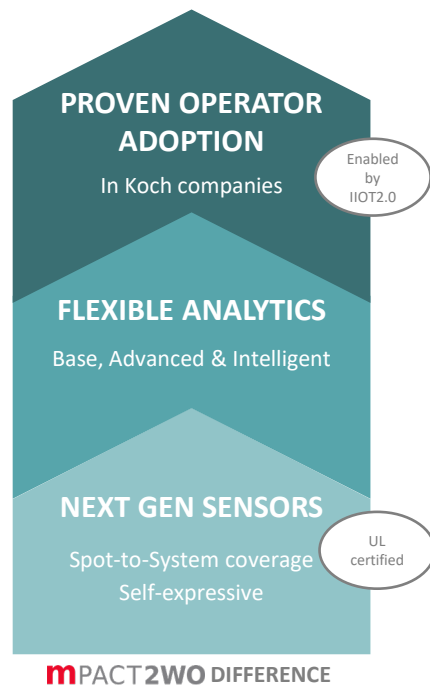
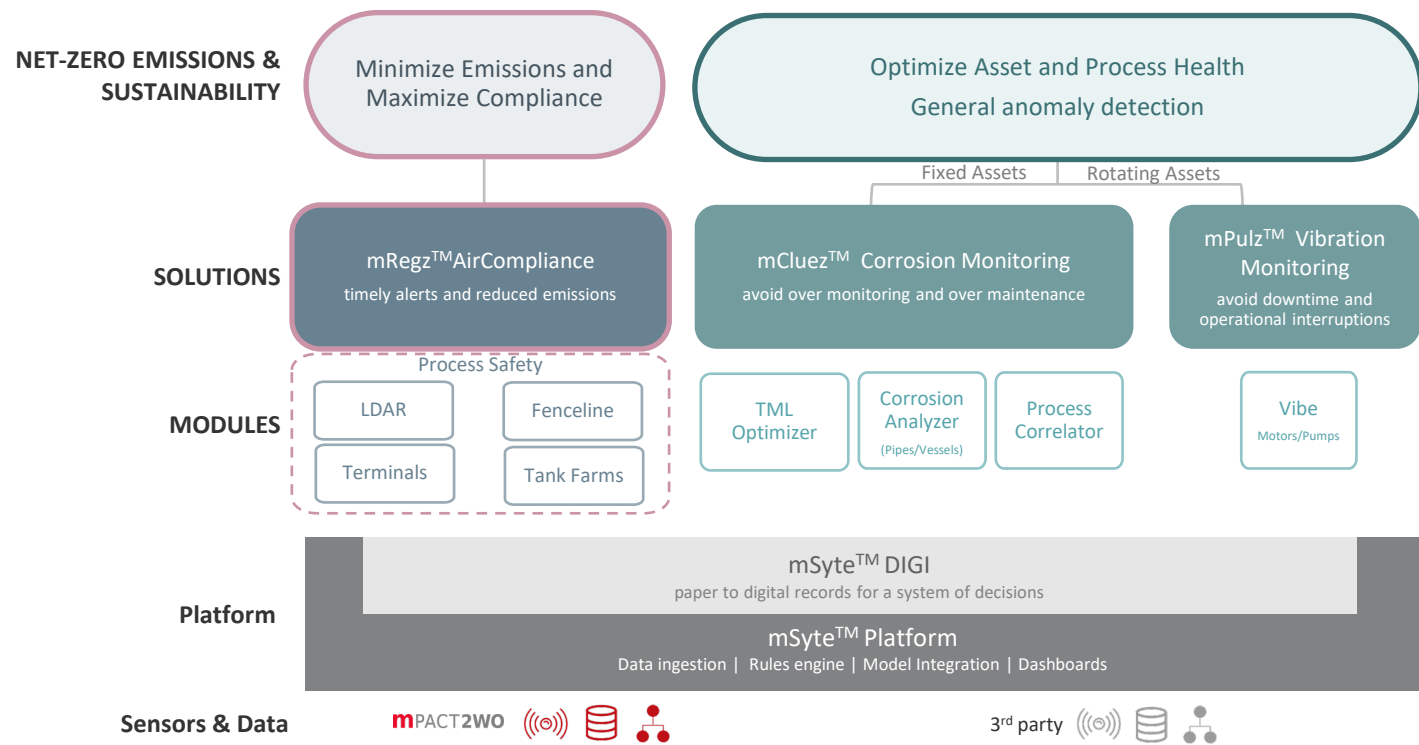
operator familiar & trusted

Consumerized apps

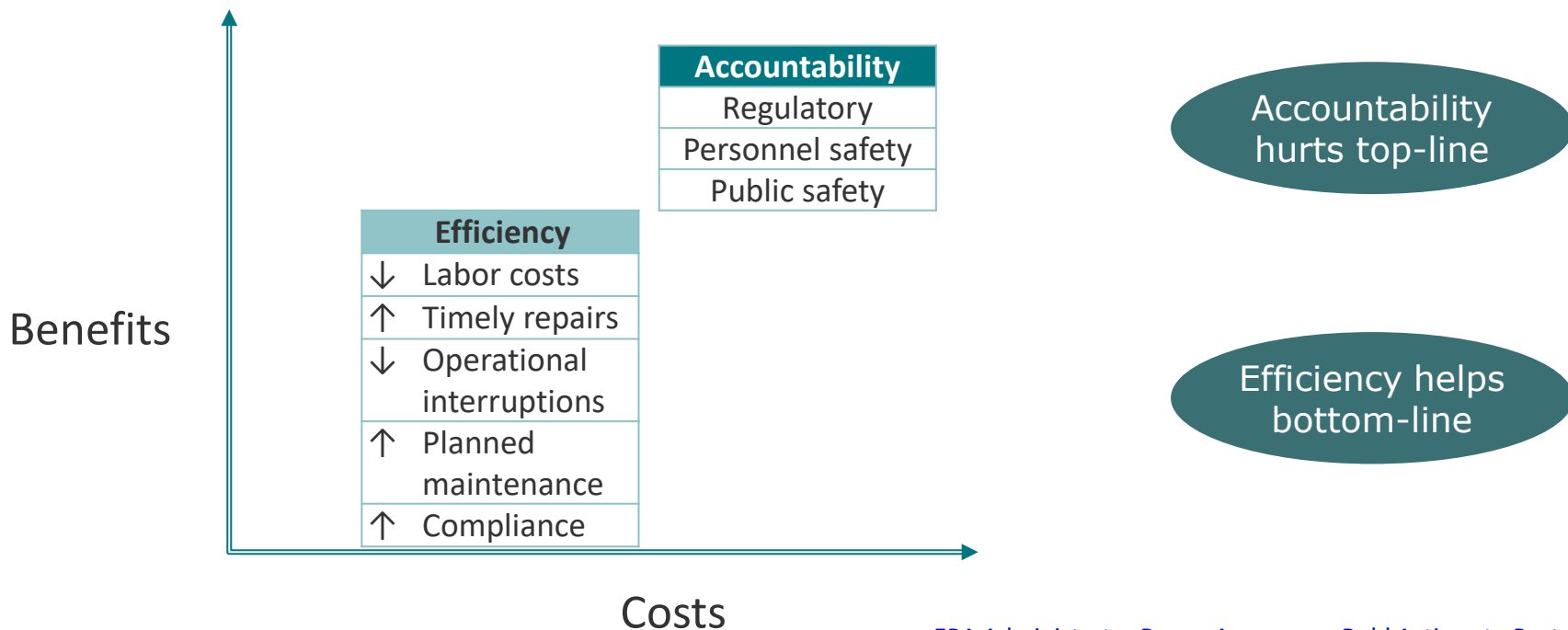
fit with operator work processes

mPACT2WO Solutions

operator-first approach enabling a higher value digital industrial operator (DIO)

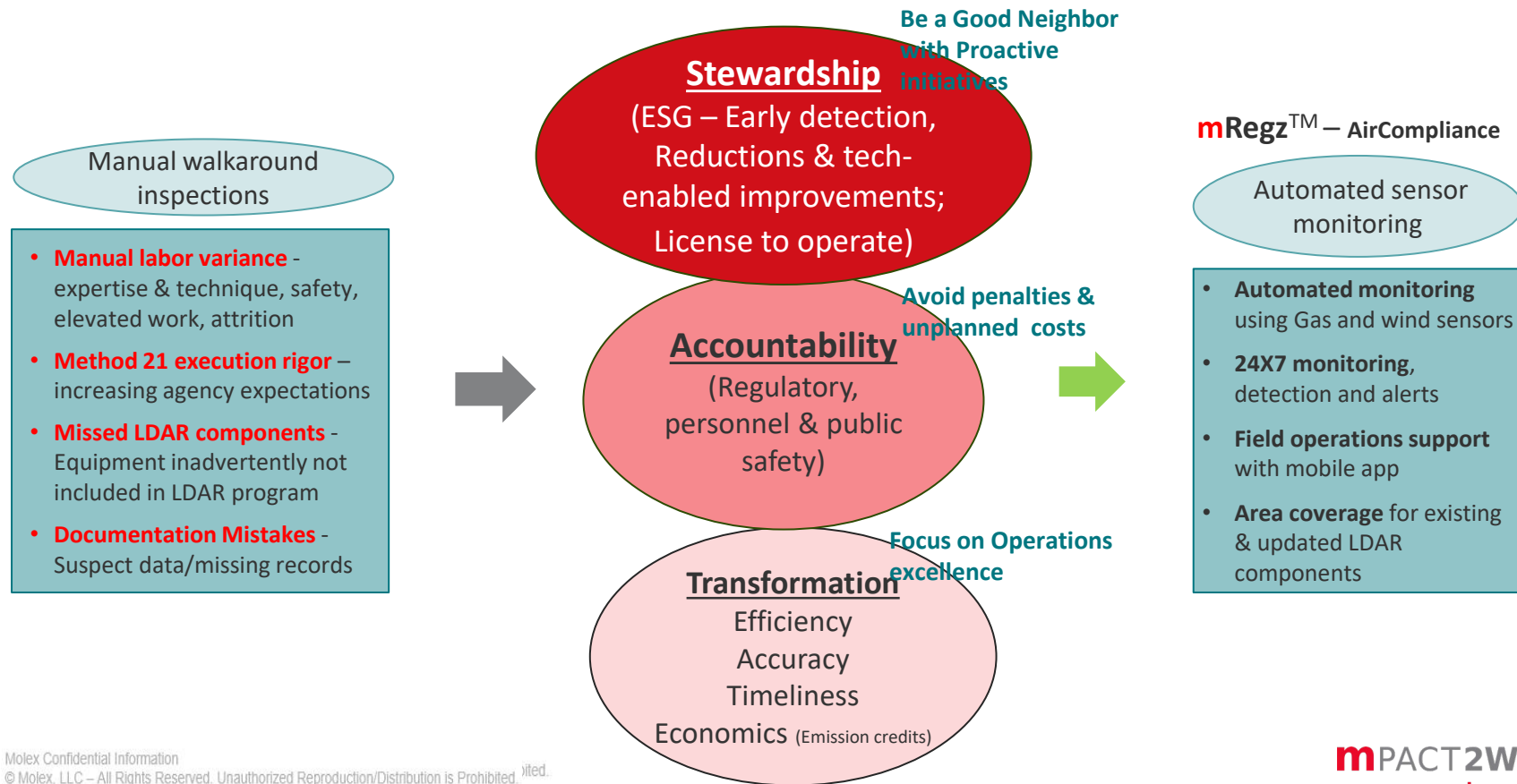


Emissions Monitoring – Need for New Norm

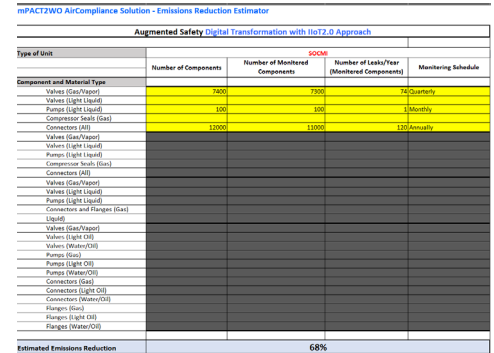


[EPA Administrator Regan Announces Bold Actions to Protect Communities Following Journey to Justice Tour](#) - Jan 26, 2022

Re-think LDAR – Manual to Automated Methods

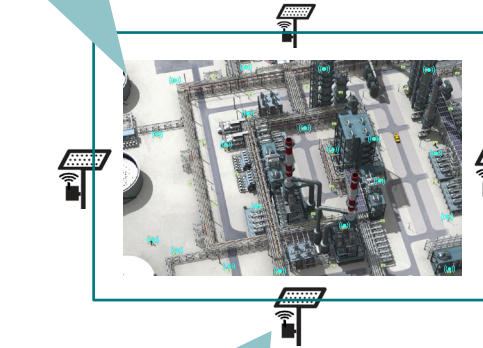


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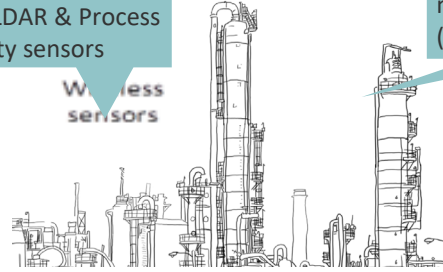


Automated and Continuous Monitoring for Emissions

1.a Sensor placement optimized for LDAR & Augmented safety



2.a LDAR & Process safety sensors



2.b Fenceline sensors

1.b Sensor placement optimized for Augmented Fenceline monitoring



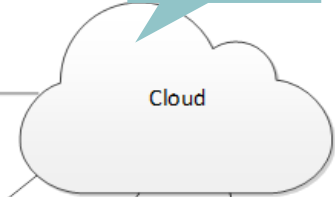
6. Field ops uses alert info on **mobile app** for isolating leaks

3. 24X7 Sensor network monitors emissions (coupled with wind)



IPSec Tunnel

4. Sensor data transmitted to cloud



5. Sensor data analyzed, and automated alerts sent to central monitoring



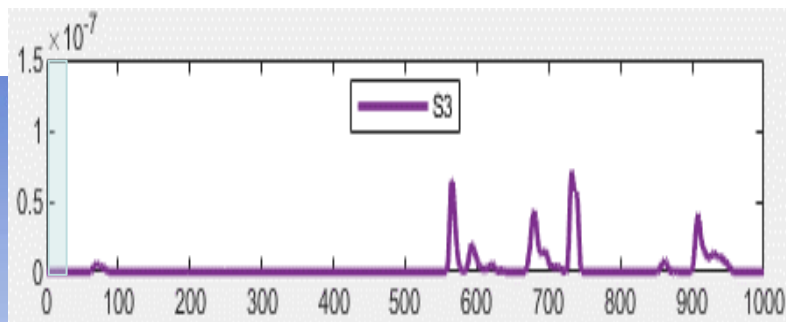
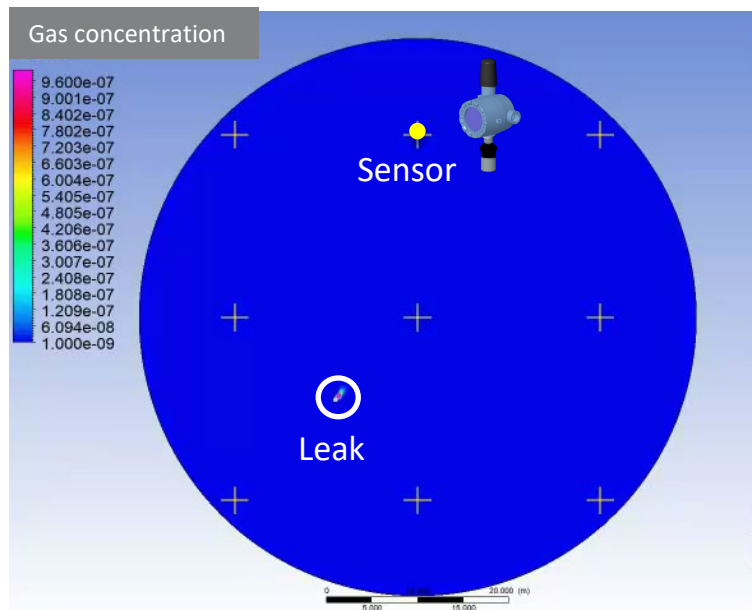
User 1



User 2

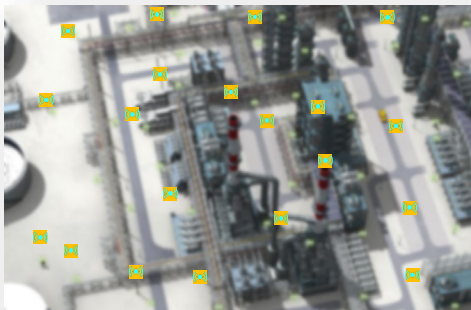
- Shift from manual to data-driven procedures
- Real-time accessible anytime-anywhere across **enterprise-compliance-chain**
- Enabled by sensors, software, data, and analytics (patents pending)

Sensor Response Simulation – Near Real-Time Detection



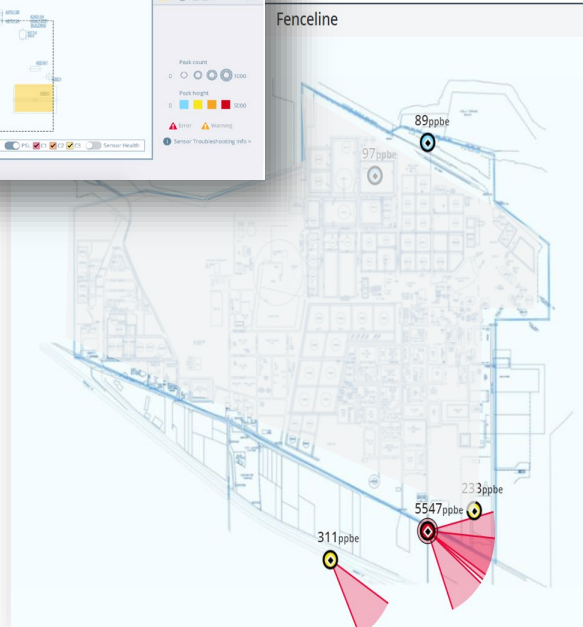
Extensive controlled release & leak testing done at EPA ORD and a real industrial setting

1st Mile - Innovative Sensors and Optimized Placement



- Accurate & reliable
- Optimal coverage
- Easy calibration & maintenance
- Broad applicability - VOC & common gas streams detectable by photoionization detectors (PID)

mPACT2WO -Intelligent Analytics and Insights



- Precise triangulation
- Operator familiar
- Operations aware
- One holistic solution

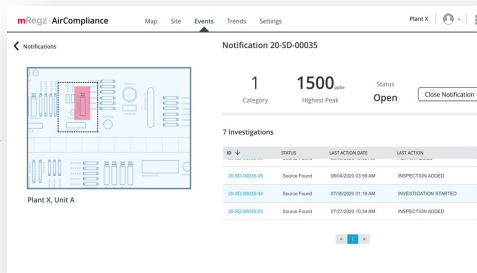
LDAR - Automated and Continuous Monitoring

Continuous Monitoring & Notifications via Desktop App

Potential Source Locations (PSL) & Sensor Health



Notifications



Field Investigation via Mobile App

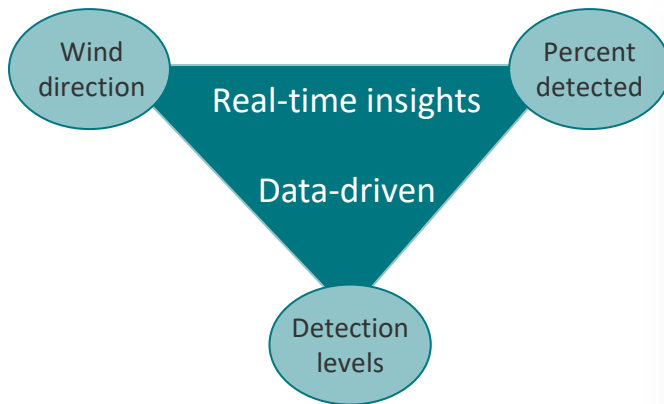
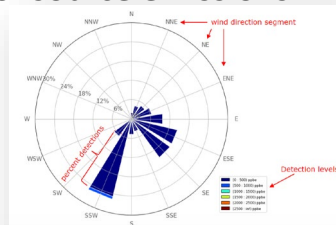
PSL ID	PEAK (ppm)	PSL UPDATED
20-SD-00050	65	08/23/2020 08:00 PM
20-SD-00054	83	08/23/2020 08:00 PM
20-SD-00055	77	08/23/2020 08:00 PM
20-SD-00058	65	08/23/2020 08:00 PM
20-SD-00059	712	08/23/2020 08:00 PM

- Automated 24x7 Monitoring
- Area Coverage - existing & updated LDAR components
- Digital Recordkeeping - traceability and single source of truth from data collection to insights to corrective actions

Augmented Fenceline Monitoring

- Part of a comprehensive AirCompliance solution
- Result of multi-year collaboration between Molex, US-EPA & FHR
- Fenceline monitoring – Augments with early warning in near real-time
- Uses new generation of sensors, cloud data, analytics and apps

- Detect a broad range of VOCs such as BTEX compounds and naphtha
- Continuous, real-time measurements of gas as frequent as 1 sample per second
- Visualization of Potential source location or direction of source emissions
- Data-driven insights in a time period
- Flexible deployment options:
 - WiFi or cellular data transmission
 - 24VDC or Solar-battery power options



Detection Response

Use Case2 – Nearby Sensitive Receptors

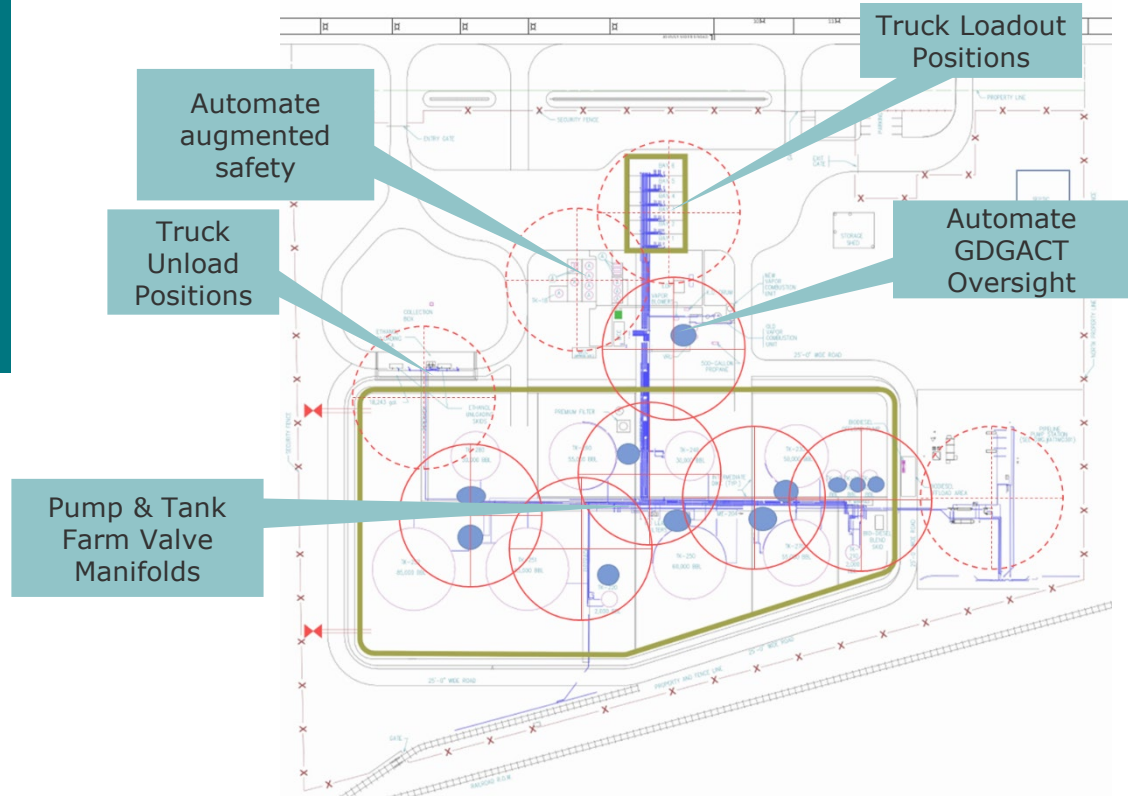
Fenceline Monitoring

- Sensitive receptor locations - include residential neighborhoods, hospitals, schools, parks, recreational areas, etc.
- Fenceline monitoring helps real-time discovery and correction of leaks
- Reduces potential for dangerous exposure, health hazards and related issues

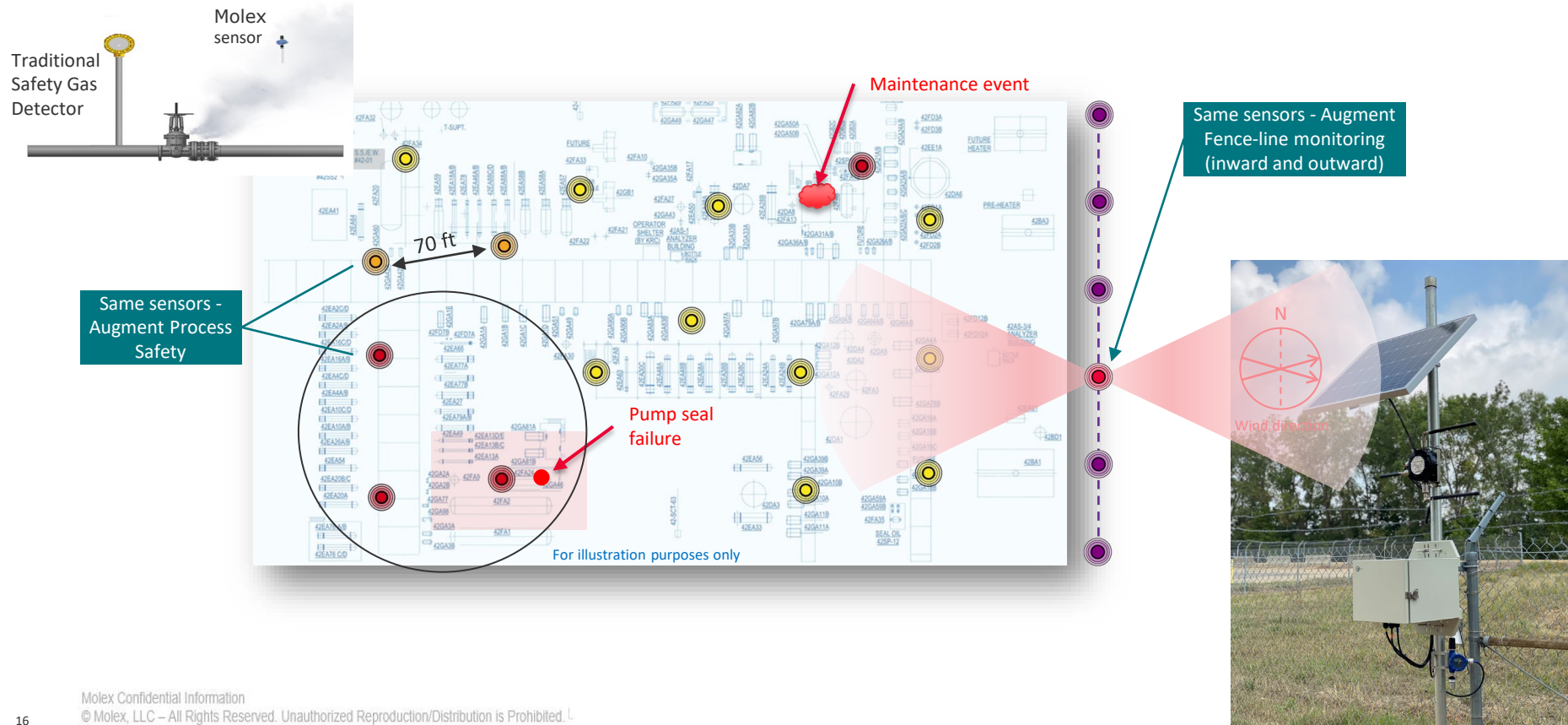


Pipelines & Terminals Monitoring – A Holistic Approach

- Scope spans leaks to process safety w/continuous monitoring
- Automated sensor-monitoring with real-time alerts for insipient release detection
- Leak triangulation to quickly isolate potential leak source



Augments Process Safety & Fence-Line Monitoring



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Use Case - *Early emission detection enabling
quick response*

The Asset

mRegz - AirCompliance

Category 1 Detection

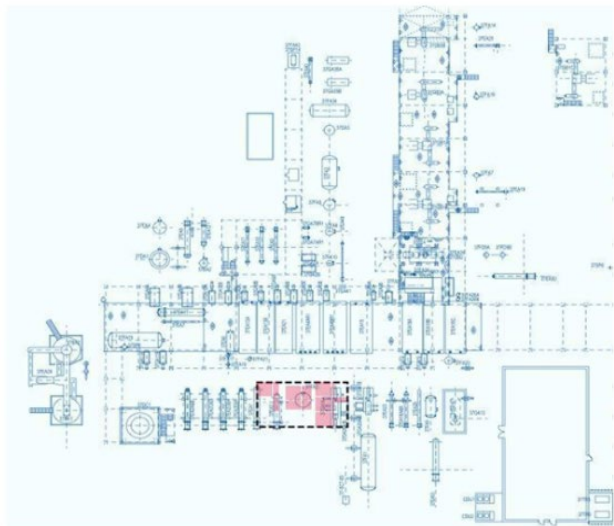
**Controlled Safe
SD/SU of High
Pressure
Hydrocarbon
Processing Unit**

Level	1
PSL Created	11/09/21 02:38 PM
PSL Updated	11/09/21 03:15 PM
Timezone	America/Chicago
Category	1
Highest Peak	7263 ppbe

- Emissions potentially go undetected until the scheduled quarterly monitoring.
- High re-monitoring cost.

The Alert

Tue, 11/9/21 Ops Team Received Alert from mPACT2WO AirCompliance solution

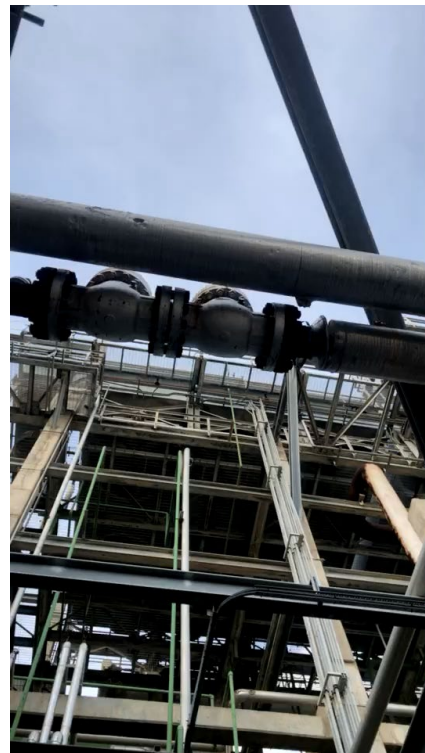


**Notification indicating potential source
location unit map in red**

- Alert showed a red highlighted box on site-map
- Control room identified the red box area as high-pressure section
- Using the alerts details, the control room decided on troubleshooting approach

The Investigation

- Within minutes of the alert, operations personnel were dispatched to the unit.
- After ~ 30 minutes of searching, a small high-pressure, elevated leak was located in the vicinity of the targeted area (red box on the alert)
- Video of the leak shown here



The Result

Right risk profile decision leads to controlled unit shutdown

- Early detection and location information enabled operations to make informed decision on a high-pressure Hydrocarbon leak and not require a unit shutdown to isolate the leak
- A controlled shutdown was executed, and a repair plan formulated

A timely repair of leak took place within few hours on same day
A safe successful startup occurred the next day

mPACT2WO AirCompliance Solution for LDAR, Fenceline, Process safety, Tanks farms & Terminals, monitoring

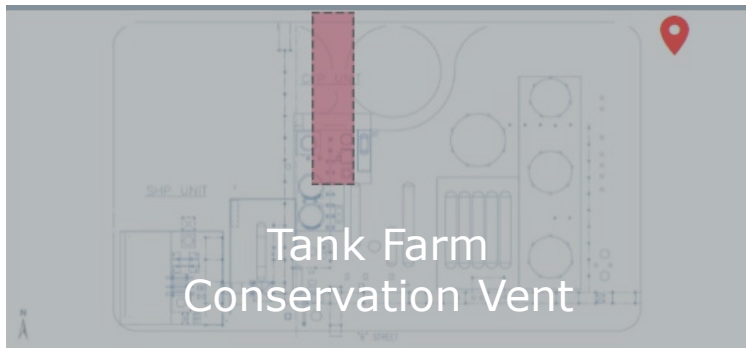
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Use Case *Early emission detection enabling quick response to achieve a safer working environment*

Tank Farm

The Asset – Large US Refinery



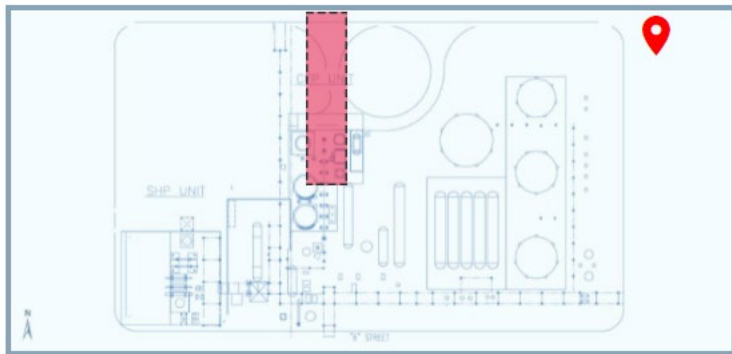
Tank Farm
Conservation Vent

Source Located	01/6/2022 03:00 PM
Location Description	Tank conservation vent
Location Comments	Conservation vent stuck open
Classification	Authorized Emission, Outside Unit

- Authorized emission source experienced abnormal condition.
- Subject to annual visual monitoring requirement, which could have allowed abnormal condition to persist for several weeks or more.
- Early detection reduced safety and/or personnel exposure risk.


The Alert

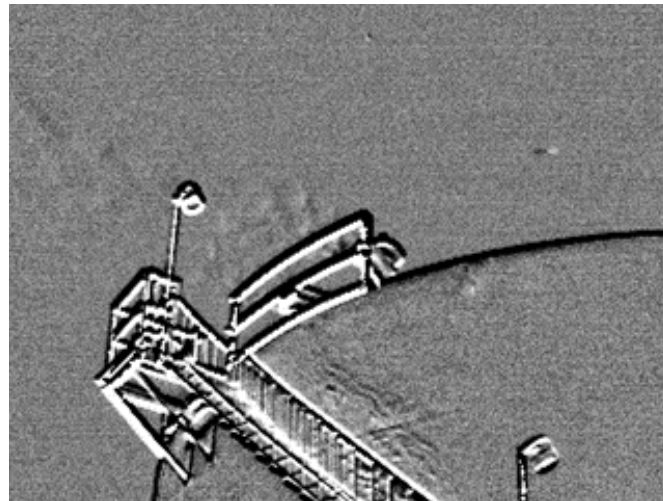
1/6/22 Ops Team Received Alert Notification of high VOC readings from mPACT2WO AirCompliance solution



- Alert showed a red highlighted box on site-map.
- Control room identified the red box area as in the vicinity of numerous tanks and associated piping.
- Using the alerts details, the control room decided on troubleshooting approach.

The Investigation

- Within minutes of the alert, operations personnel were dispatched to the area.
- Initial investigation in the red box area did not identify leak source.
- Investigation area was expanded and FLIR camera deployed.
- Within 4 hours of initial notification, emission source was located and corrected shortly thereafter.
- Video of the leak shown here 



The Result

Early Detection leads to a safer working environment

- Early indication and location information enabled operations to find and correct Tank Farm “stuck” conservation vent within hours, rather than weeks, of occurrence.
- Avoided potential unsafe condition and/or personnel exposure due to the abnormal equipment condition.
- Condition discovered and corrected prior to exceeding emission limits.

A timely repair of leak took place within few hours on same day

mPACT2WO AirCompliance Solution for Emissions and Compliance Monitoring

IMPACT2WO

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