

# Can We Be More Effective At Managing DPM Exposure?





# Content

- Evaluating Exposure
- Measuring Exposure
- Re-Evaluating Exposure
- Control Measures
- Re-Assessment
- Example of Environmental Assessment
- Common Causes of Increased DPM



Anticipating



# 1. Evaluating Exposure to DPM, Qualitative Exposure Assessment

SEG/Task	Agent	OEL (mg/m <sup>3</sup> )	Likelihood	Severity	Risk
Scoop Operator	Elemental Carbon	0.12	5	16	80
Remote Scoop Operator	Elemental Carbon	0.12	9	16	144
HD Mechanic	Elemental Carbon	0.12	3	16	48
Mobile Mechanic	Elemental Carbon	0.12	5	16	80
Jack Leg Stoper Operator	Elemental Carbon	0.12	2	16	32

**16** Life threatening, or disabling illness

Likelihood		
2	Rare	Once every 5 Years
3	Unlikely	Annually >5/year
5	Occasional	Monthly >12/year
9	Likely	Weekly >4/month
13	Frequent	Daily or less

SEG/Task	Agent	OEL (mg/m <sup>3</sup> )	Likelihood	Severity	Risk
Scoop Operator	Elemental Carbon	0.12	5	5	25
Remote Scoop Operator	Elemental Carbon	0.12	5	5	25
HD Mechanic	Elemental Carbon	0.12	2	5	10
Mobile Mechanic	Elemental Carbon	0.12	4	5	20
Jack Leg Stoper Operator	Elemental Carbon	0.12	2	5	10

**5** Life threatening or disabling illness

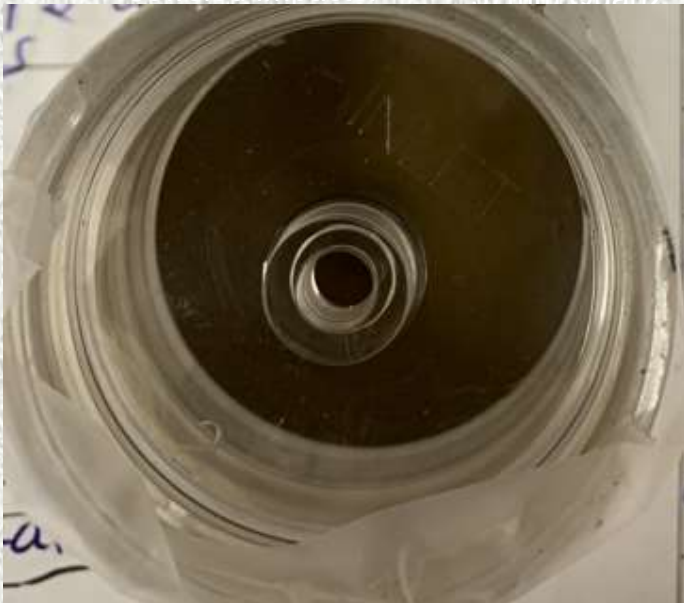
Exposure rating	
Estimated average > Occupational exposure limit	5
Estimated average > 50 % OEL < or = 100 % OEL	4
Estimated average > 25 % OEL < or = 50 % OEL	3
Estimated average > 10 % OEL < or = 25 % OEL	2
Estimated average < 10 % OEL	1



## 2. Evaluating the Exposure (Measuring)



Levelled Impactor 37mm Diameter



NIOSH Method 5040

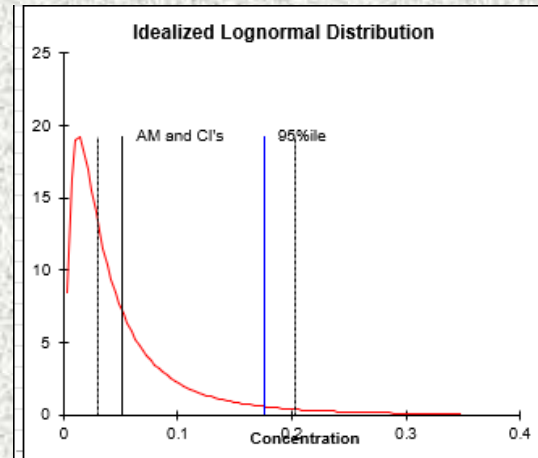


### 3. Qualitative Assessment Becomes Quantitative Assessment (based on collected data).

SEG/Task	Agent	OEL (mg/m <sup>3</sup> )	Likelihood	Severity	Risk
Scoop Operator	Elemental Carbon	0.12	5	16	80
Remote Scoop Operator	Elemental Carbon	0.12	9	16	144
HD Mechanic	Elemental Carbon	0.12	3	16	48
Mobile Mechanic	Elemental Carbon	0.12	5	16	80
Jack Leg Stoper Operator	Elemental Carbon	0.12	2	16	32

A legal limit or guideline, such as an occupational exposure limit (OEL), should never be viewed as a strict boundary between "safe" and "unsafe." These limits are intended to minimize risks.

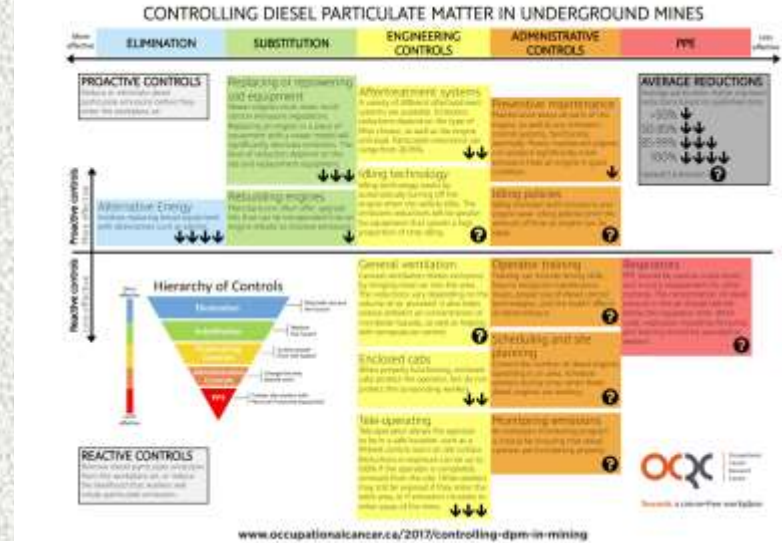
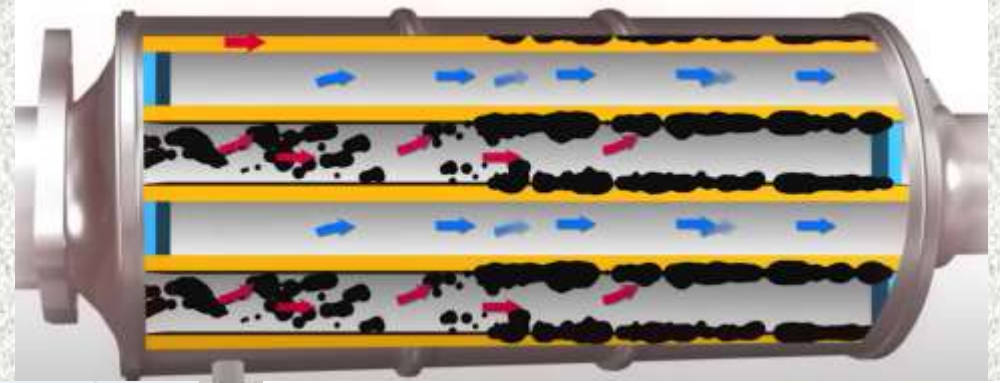
SEG/Task	Agent	OEL (mg/m <sup>3</sup> )	Likelihood	Severity	Risk
Scoop Operator	Elemental Carbon	0.12	3	16	48
Remote Scoop Operator	Elemental Carbon	0.12	9	16	144
HD Mechanic	Elemental Carbon	0.12	2	16	32
Mobile Mechanic	Elemental Carbon	0.12	3	16	48
Jack Leg Stoper Operator	Elemental Carbon	0.12	2	16	32



- Calculate the descriptive statistics for the data set
- Requires large number of samples, min 6-9 samples
- Aim is to have 95% of all measurements under OEL



# 4. Control Measures





## 5. Re-Assessment

- ✓ Continue evaluation via qualitative and quantitative assessment (combined, they generally provide the most accurate results)
- ✓ Continue with personal monitoring sampling
- ✓ Have discussions with workers and supervisors; this is one of the most valuable ways to evaluate the effectiveness of controls
  - “No longer blowing black out of my nose ” “ no more headaches” “not as exhausted”
- ✓ Create controlled test or experiment
  - Compare two pieces of equipment, one with DPF and one without
  - Compare diesel with battery operated equipment
  - Complete a pre-assessment before any major changes
    - ramp
    - truck chute
    - ore pass





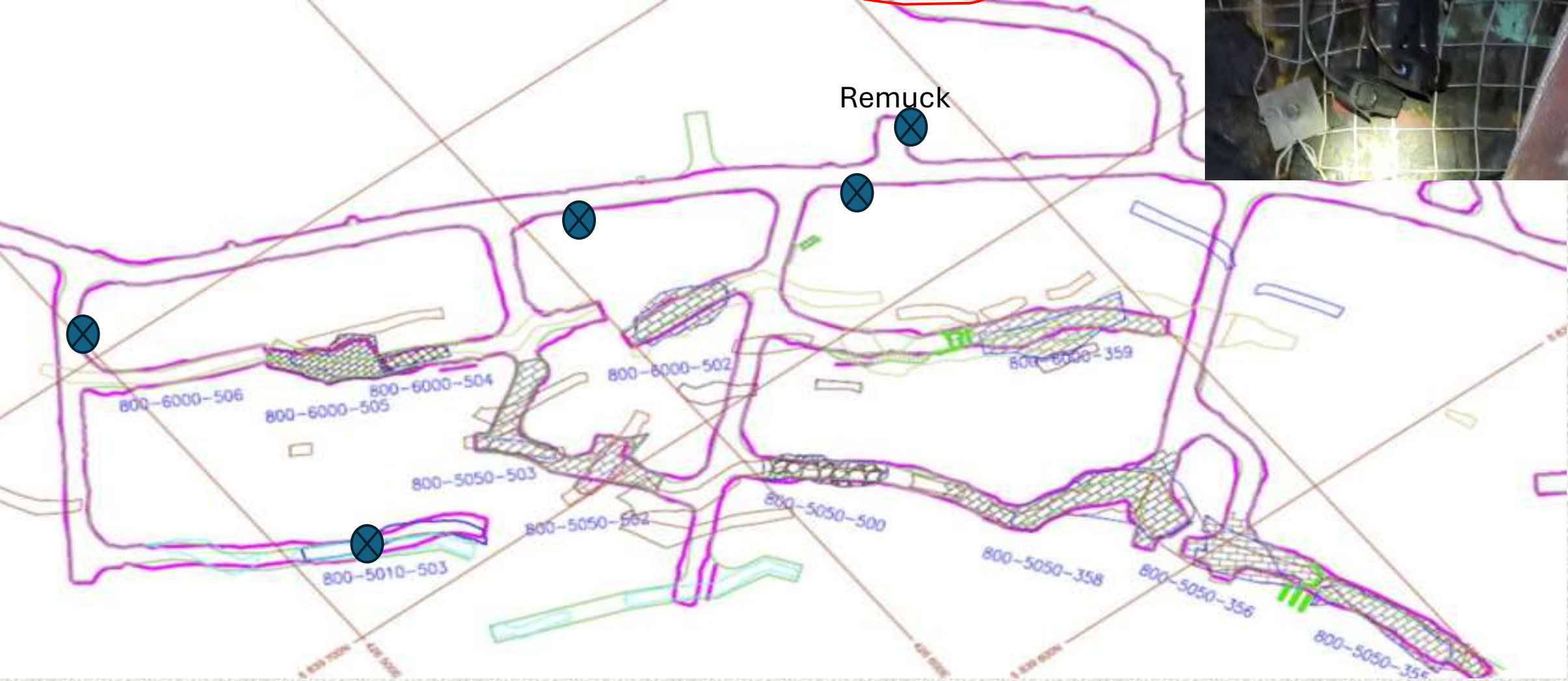
# Example of Environmental Assessment

Personal and area monitoring

⊗ Test sites

Sampling to be considered

- DPM
- Noise
- Respirable Dust
- Silica





# Data Collection, Observations & Other Relevant Information Collection

```

*****
# ECOM - EN3 #
*****
Serial no. EN3-2692
Last calibrat. 27.01.23

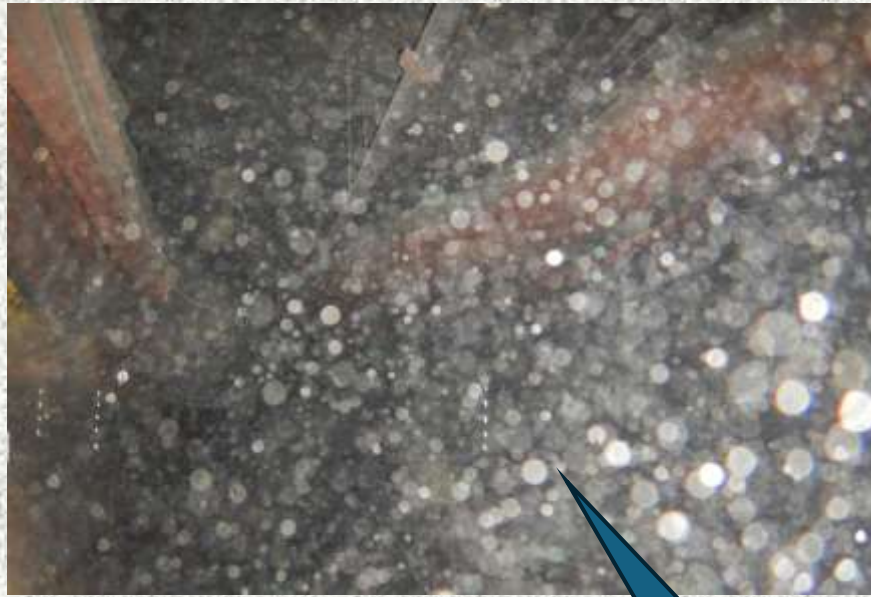
Date      Time
25.07.23  13:53:25

-----
Gas analysis
-----

Fuel type
Diesel Oil

-----
T.Air      86.7  °F
T.Gas      537.6 °F
T.Sensor   82.9  °F
O2         10.76 %
CO         392  ppm
NO         258  ppm
NO2        30   ppm
NOx        288  ppm
CO2        7.51 %
Eff.       82.7 %
Losses     17.3 %
Exc. air   2.06
Dew poi.   104  °F
CO2        7.51 %
Eff.       82.7 %
Losses     17.3 %
Exc. air   2.06
Dew poi.   104  °F
PD index   0.52
    
```

Undiluted exhaust test



Observations



Gravimetric sampling

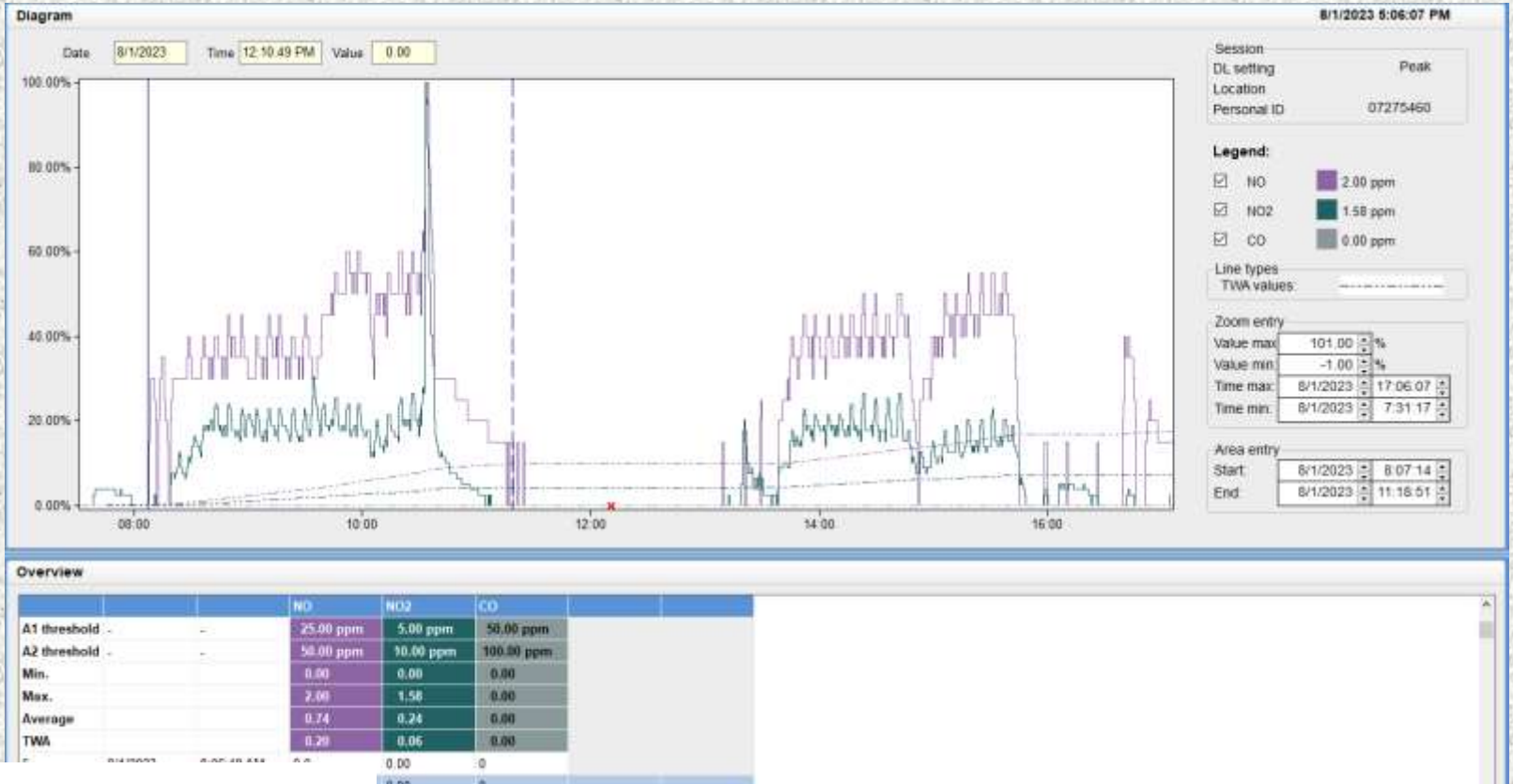
Diesel Particulate Matter as Carbon							
<u>Sample ID</u>	<u>Lab ID</u>	<u>Air Vol liter</u>	<u>Analyte</u>	<u>Result ug</u>	<u>Blank ug</u>	<u>Total ug</u>	<u>Conc ug/m3</u>
246074	L602416-1	1008.21	Organic Carbon	31	20	11	11
			Elemental Carbon	40	<1.2	40	40
			Total Carbon	71	20	52	51
246080	L602416-2	1040.78	Organic Carbon	23	15	7.2	6.9
			Elemental Carbon	14	<1.2	14	13
			Total Carbon	36	15	21	20
246115	L602416-3	1008.53	Organic Carbon	38	20	18	18
			Elemental Carbon	53	<1.2	53	52
			Total Carbon	91	20	71	70

# Data Collection, Observations & Other Relevant Information Collection



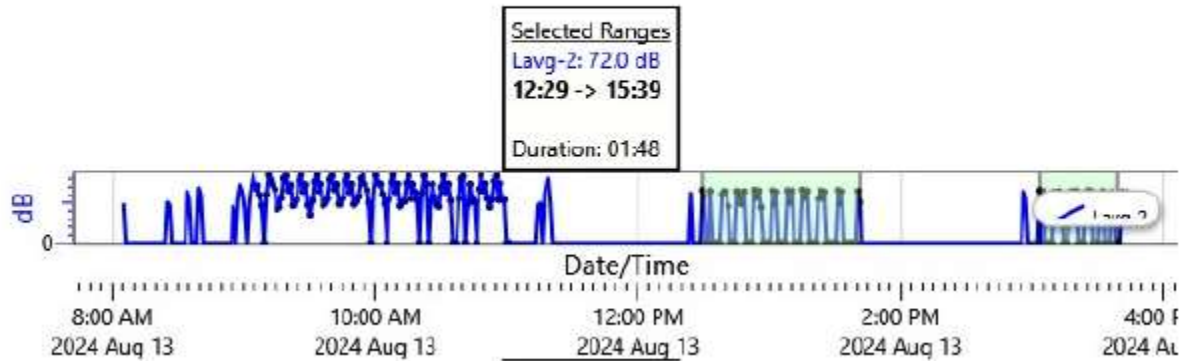
Ventilation

Noise survey



## Logged Data Chart

ESU010093\_20240813\_172636: Logged Data Chart



Gas monitoring



## Most Common Causes of Increased DPM Exposure

- Lack of ventilation
  - “poor” ventilation design, installations
  - damaged ventilation duct etc.
  - improper measurement of air flow
  - recirculating air
- Poor maintenance practices
- Old equipment (outdated engine)
- Inadequate or lack of worksite inspection
- Ignoring controls such as diesel control board or no idling policy
- Worker too close to the source i.e. diesel generator



# Occupational Disease



## Preventing occupational illness

Industrial hygiene means keeping workplaces safe by predicting, identifying, evaluating, and managing potential dangers that could harm workers' health. An occupational disease is a health problem caused by the work environment or related activities. It can be serious, cause disabilities, and sometimes be fatal. Examples include hearing loss, asthma, infections, and cancer.

**Download and share these free resources**

[Home | Workplace Safety North](#)



---

THANK YOU

---

