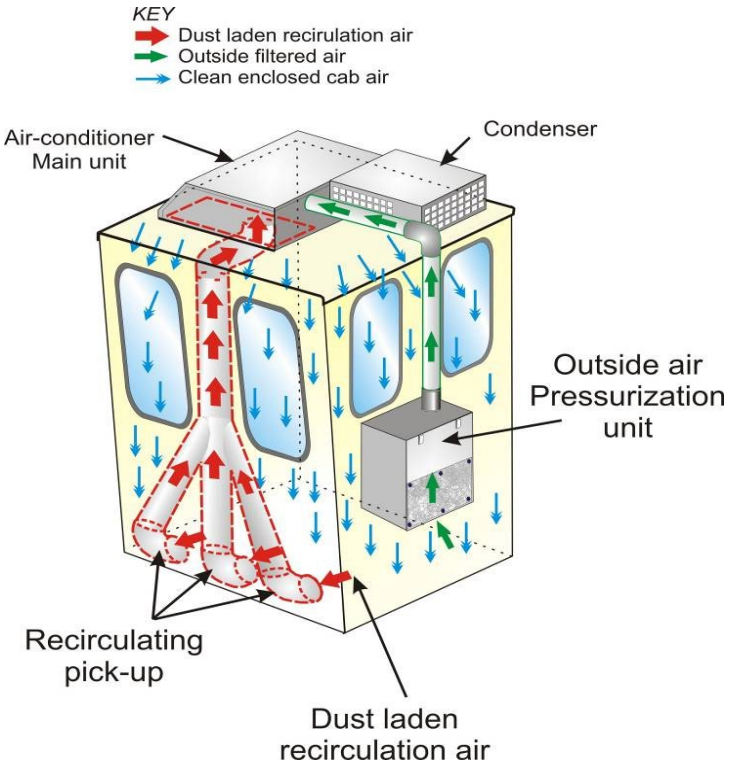
Using Enclosed Cabs for Reducing DPM Exposures

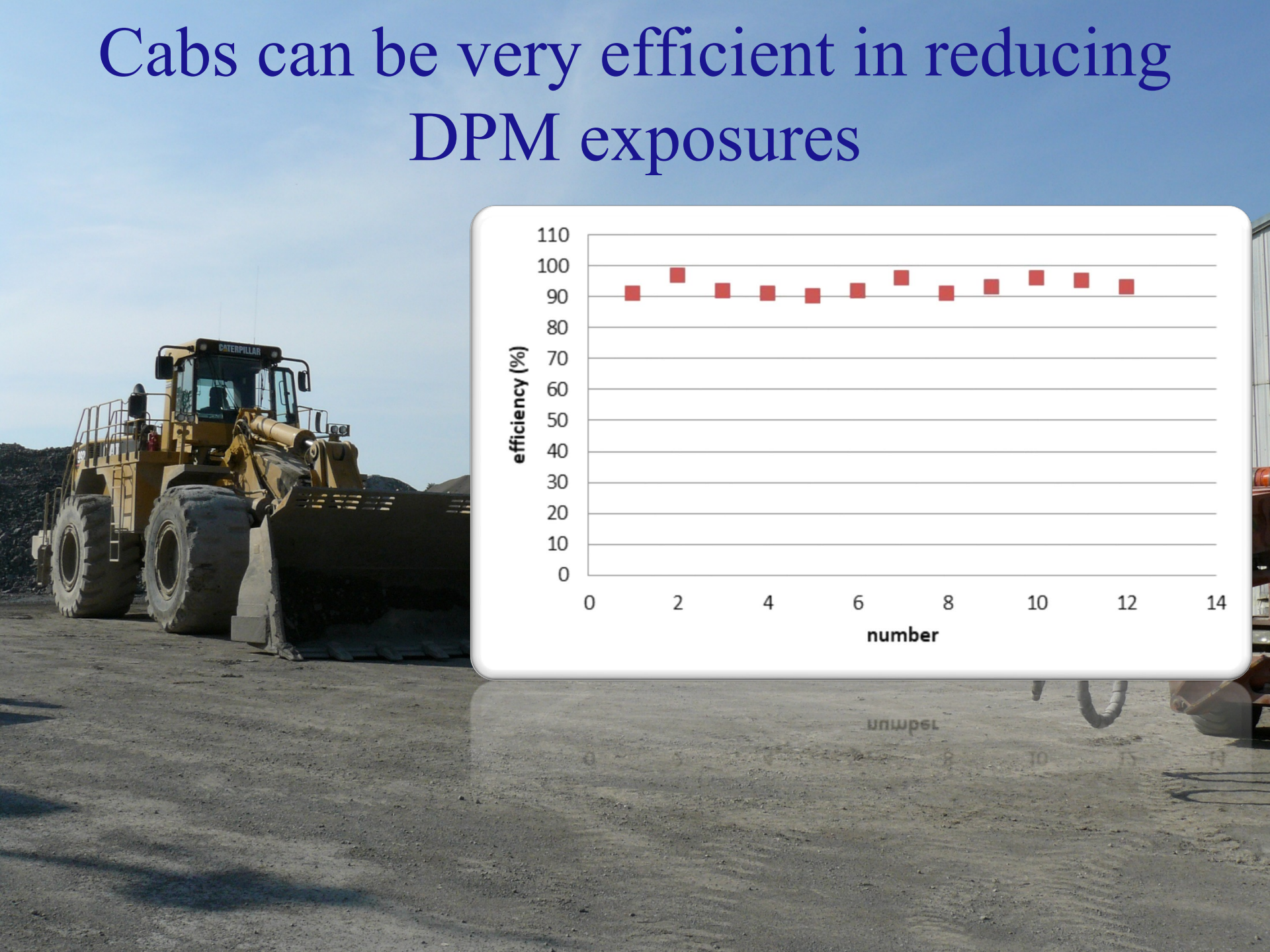
James Noll

NIOSH

Equipment can have pressurized cab



Cabs can be very efficient in reducing DPM exposures



Two Key Components

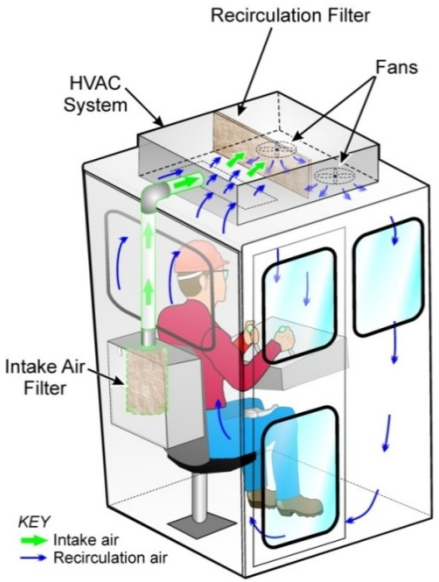
- **Effective Filtration**
- **Cab Integrity**

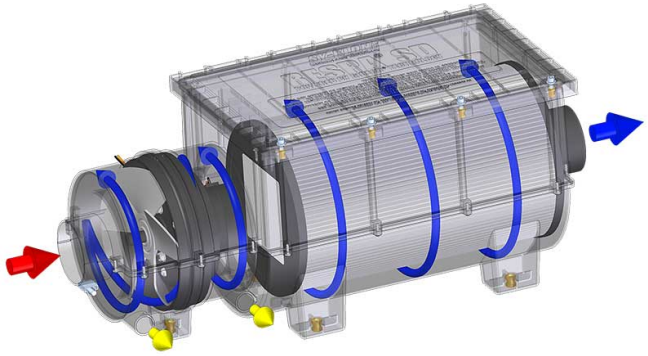
Effective Filtration

1. **Pressurized Intake**
2. **Recirculated Cab Air**

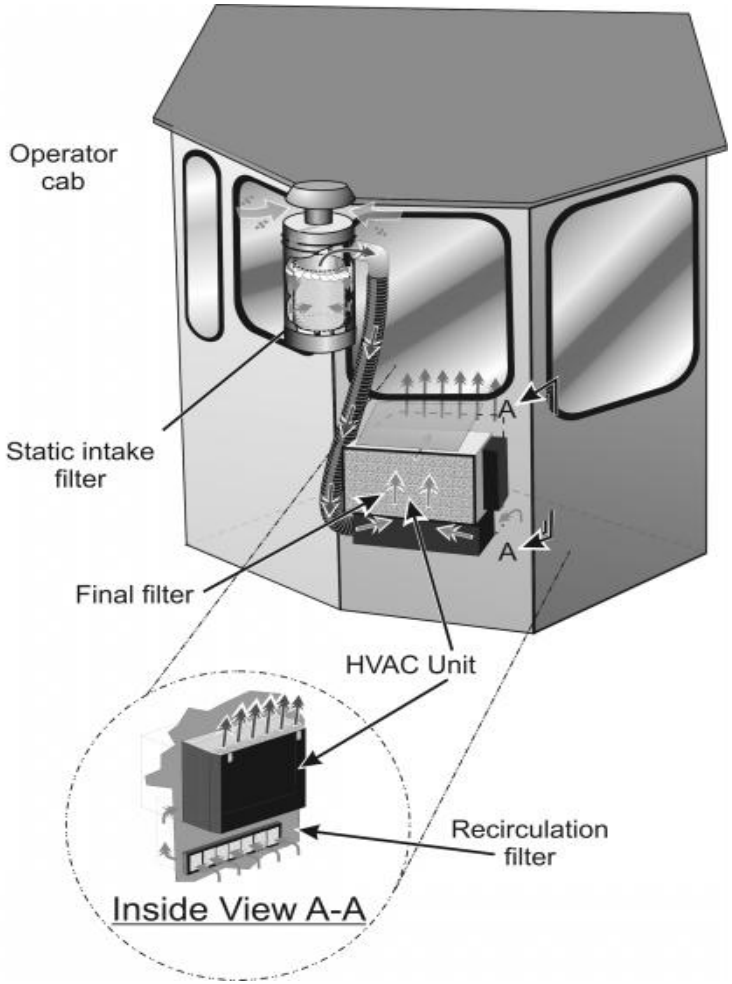
Pressurized Intake (Outside) Air

- **40 – 140 cfm**
- **At least 25 cfm per worker to dilute CO_2**
- **MERV-16 mechanical filter**
- **Powered Unit : Self-cleaning or centrifugal design**





Recirculated Cab Air



Recirculated Cab Air

- **Effectiveness is by multiple passes through filter media**
- **Substantial reduction in cleaning time from in-cab dust sources**
- **MERV 14 -16 rated filter media**
- **3-4 times the intake airflow quantity (200-300 cfm typical)**

Cab Integrity

Installing new doors gaskets and seals/plugging and sealing cracks and holes

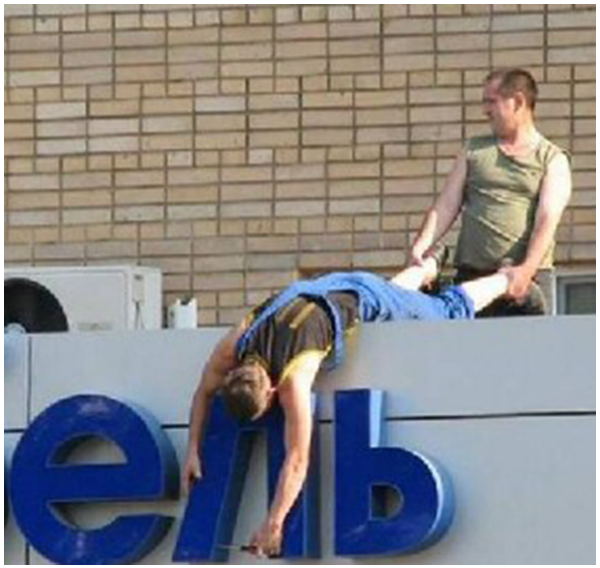
Pressure Monitoring Testing

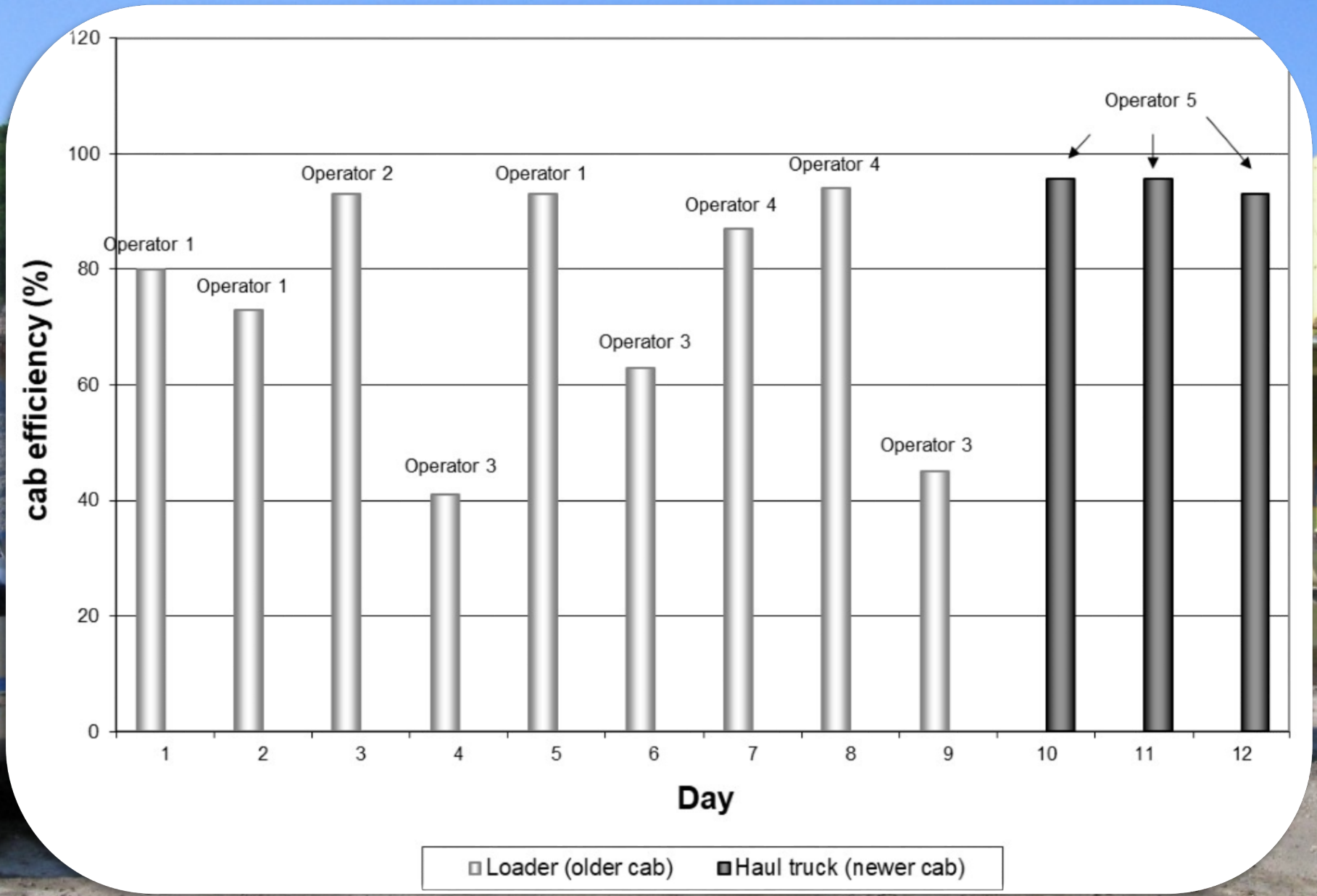
Outside tubing location for pressure monitor

Data logger and Pressure Monitoring System


Dwyer
-.009
DM-2000
PRESSURE 1
ZERO
UNITS
OFF
RUN
START
EMERGENCY STOP
NO HYD OIL
HIGH HYD OIL TEMP
LOW HYD OIL
RH PSI FILTER
MUTED
IRON LIFE

Effect of work practices



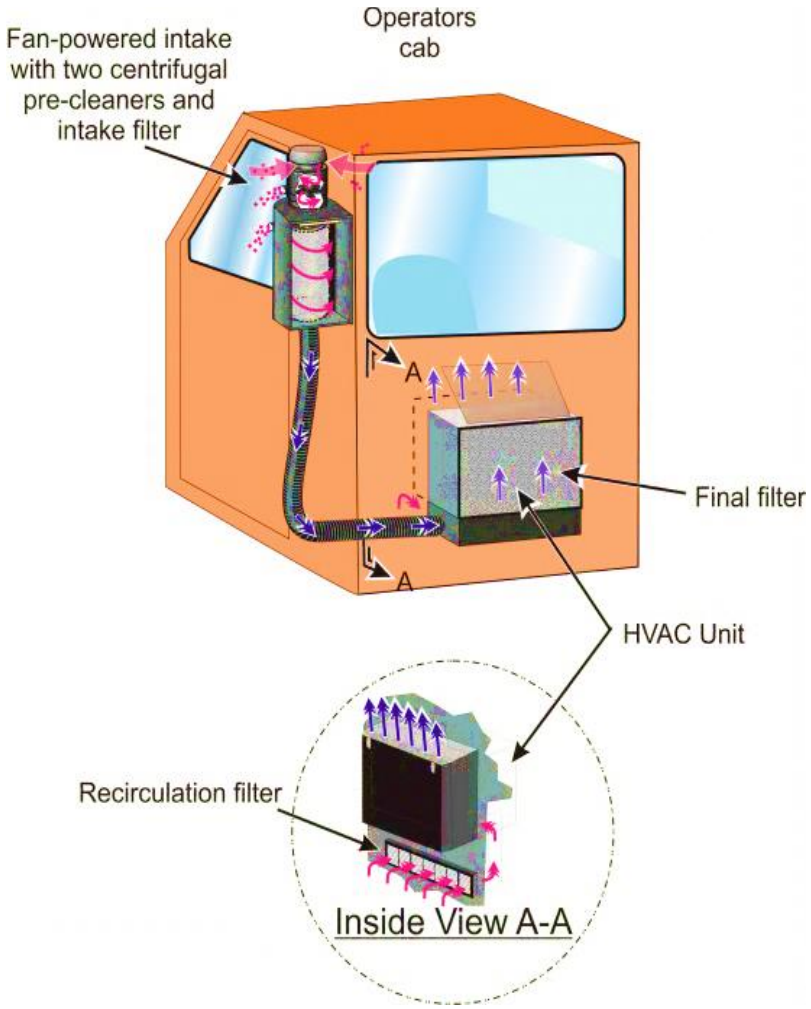

120
100
80
60
40
20
0
cab efficiency (%)
Operator 1
Operator 1
Operator 2
Operator 3
Operator 1
Operator 3
Operator 4
Operator 4
Operator 3
Operator 5
1
2
3
4
5
6
7
8
9
10
11
12
Day
Loader (older cab)
Haul truck (newer cab)

Evaluation of Enclosed Cabs

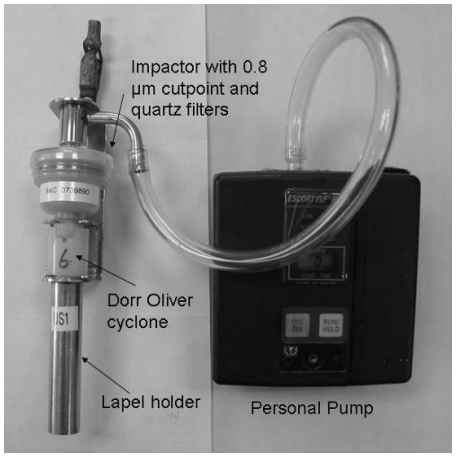
Bolter

Drill

Enclosed cab design

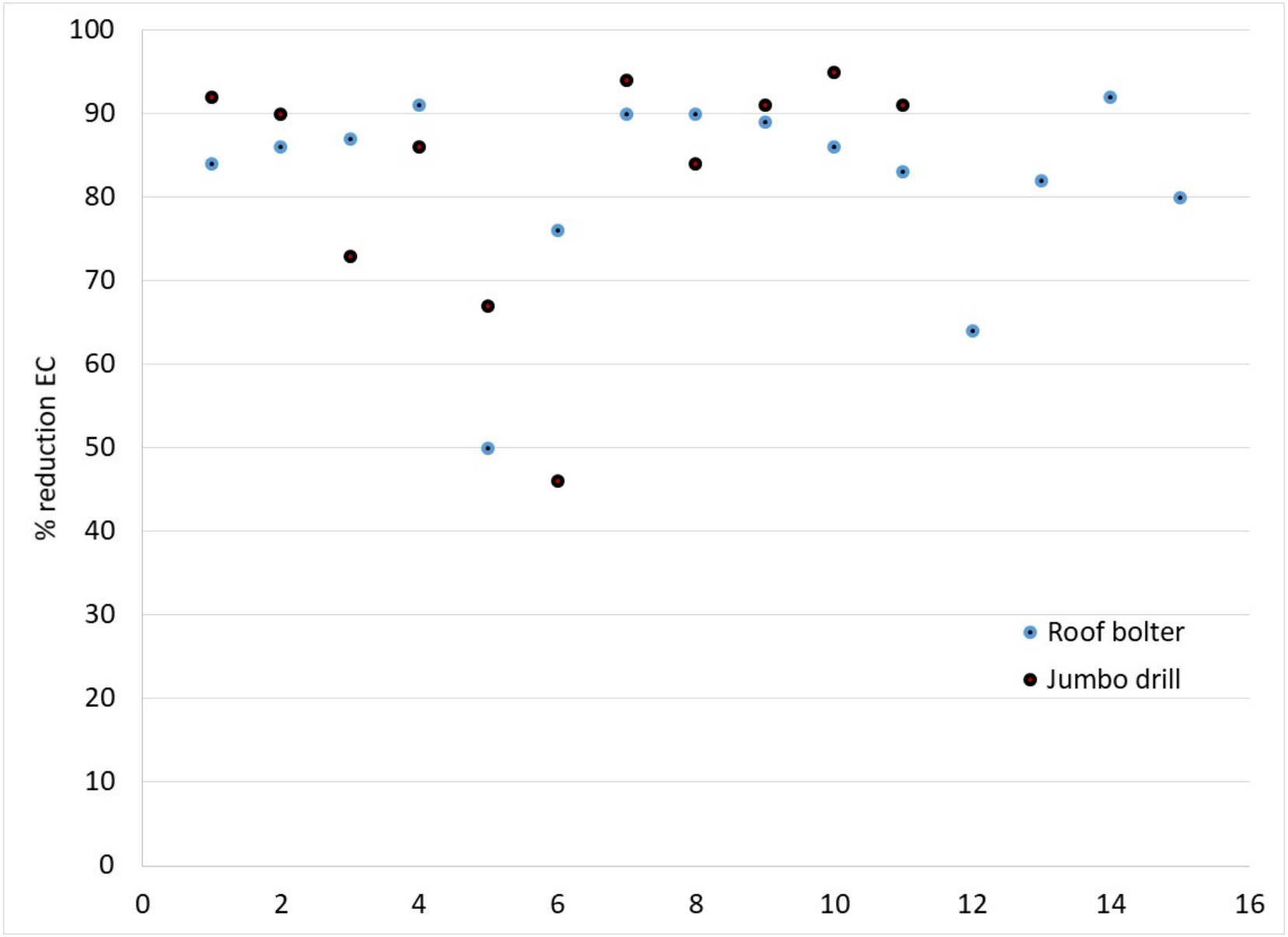


PRESSURE

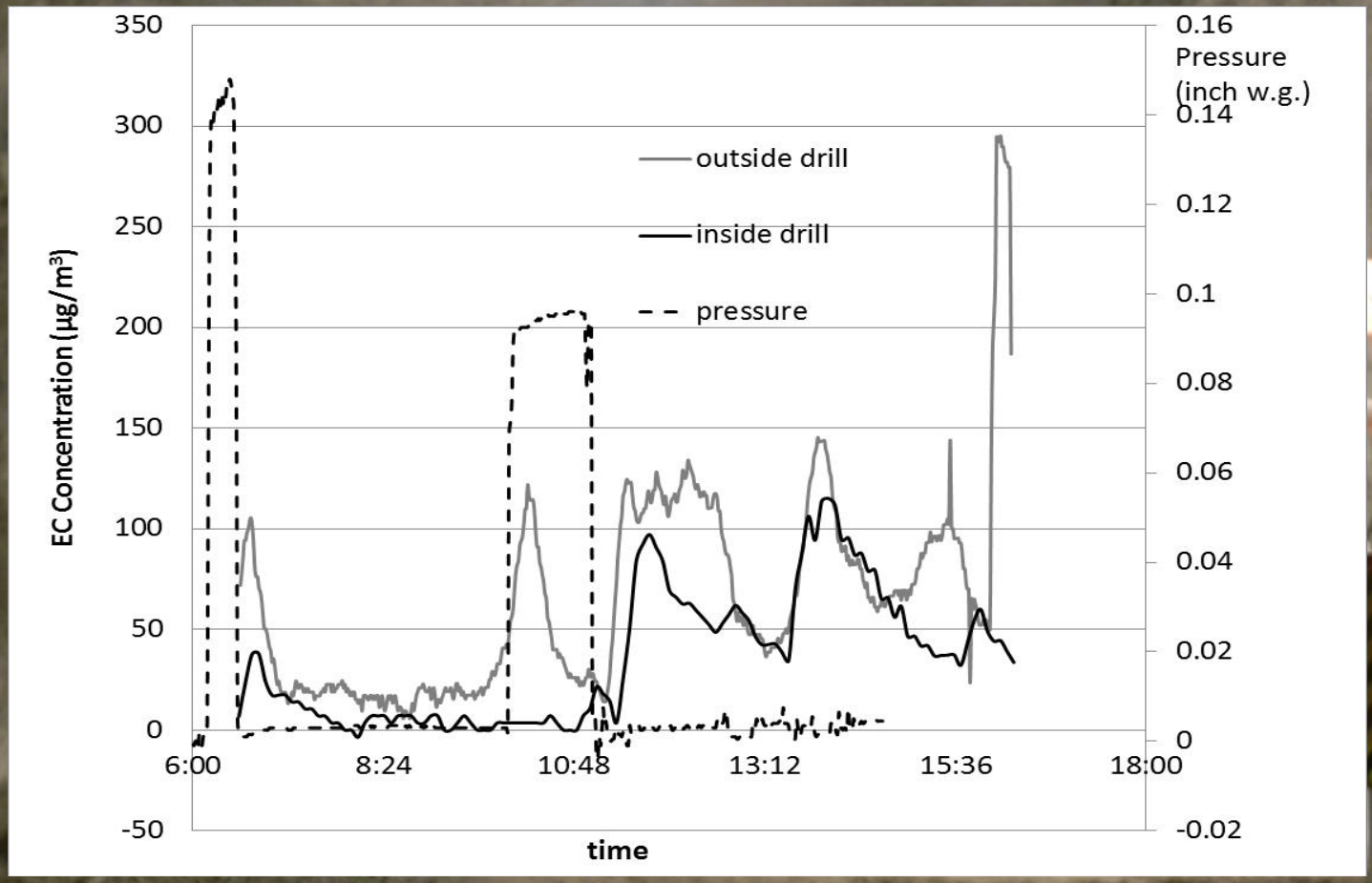


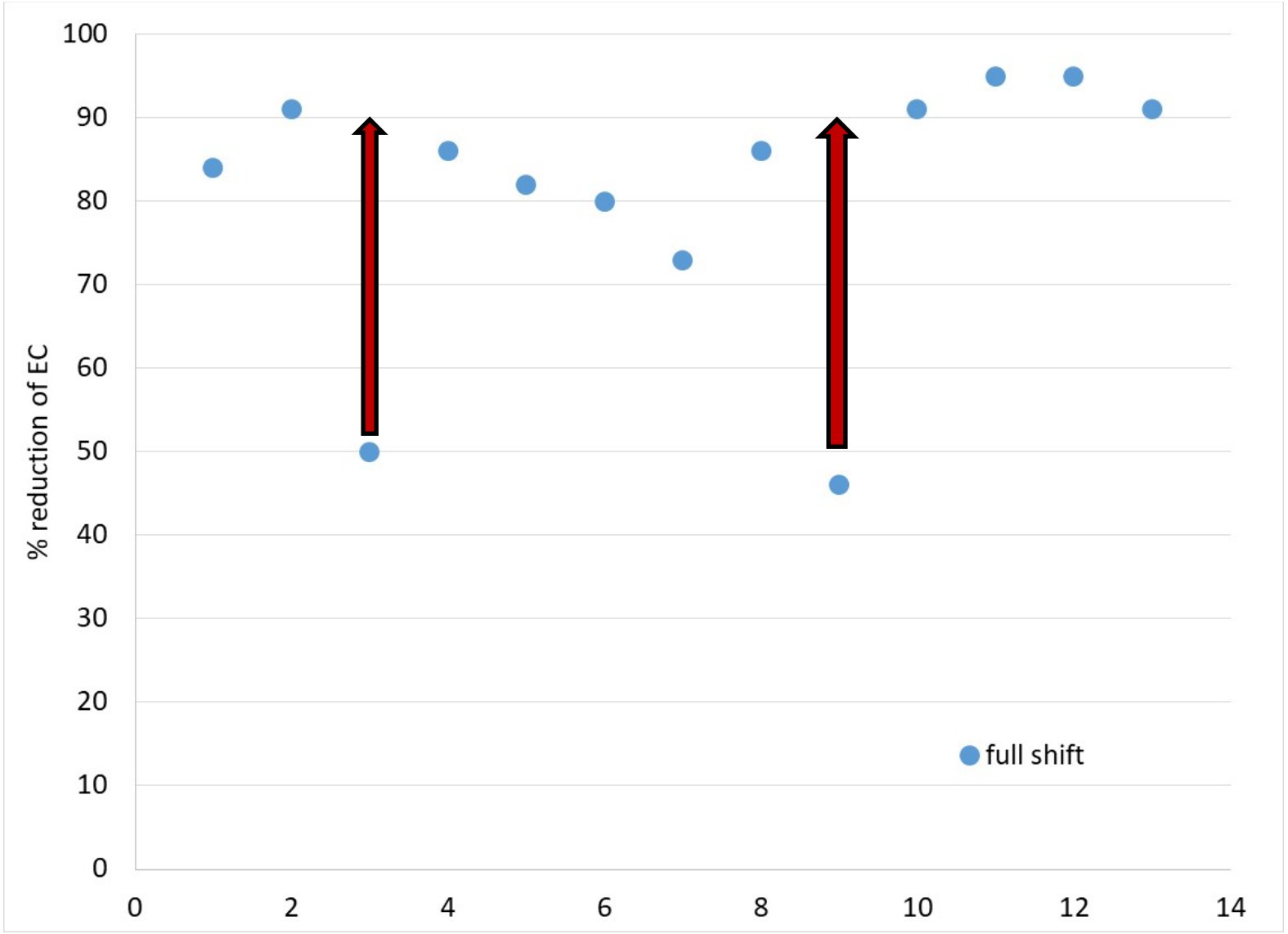
NIOSH 5040 EC/TC

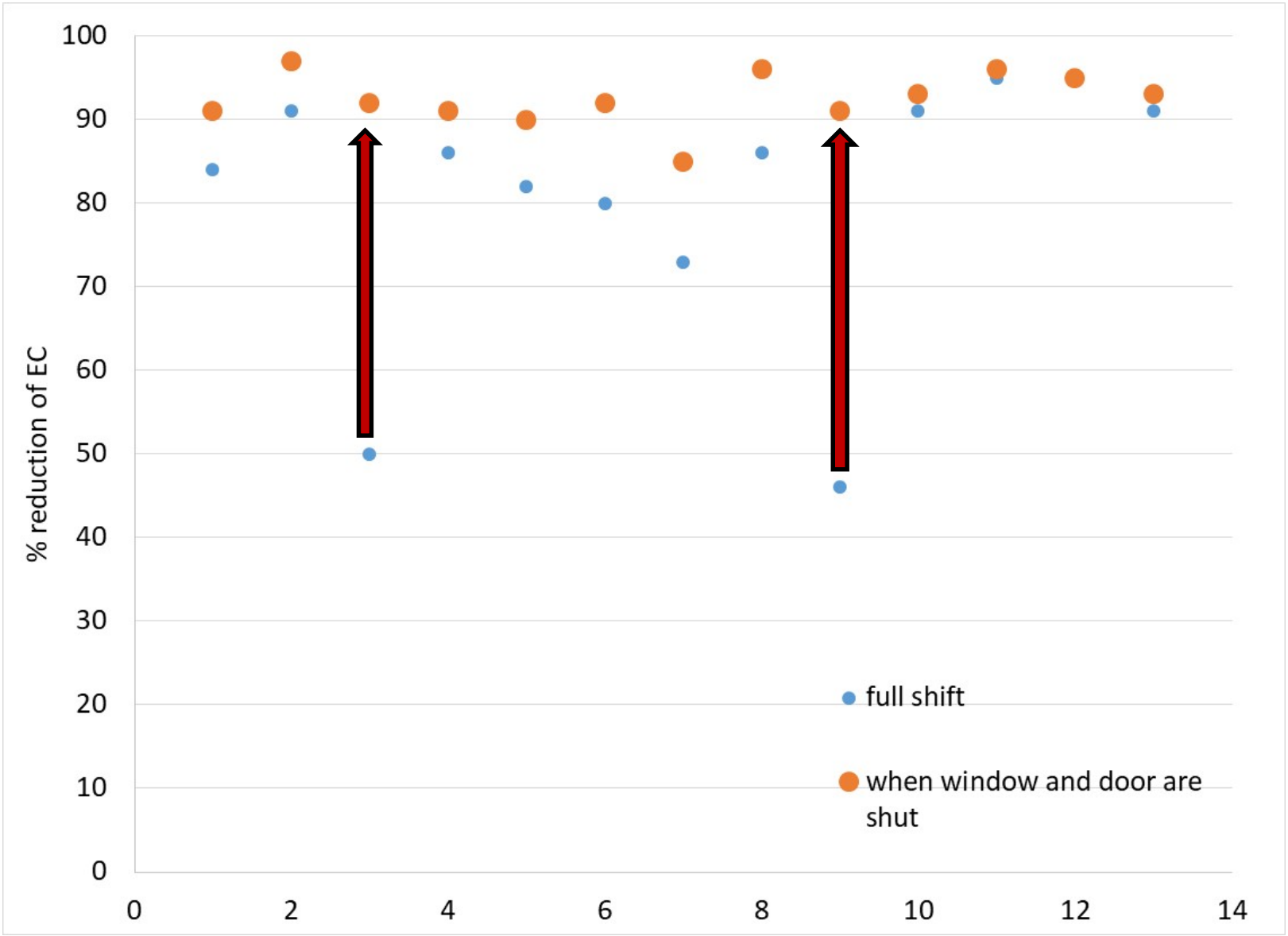
REAL TIME EC


100
90
80
70
60
50
40
30
20
10
0
% reduction EC
0
2
4
6
8
10
12
14
16
Roof bolter
Jumbo drill

Cab Door Opening




100
90
80
70
60
50
40
30
20
10
0
% reduction of EC
0
2
4
6
8
10
12
14
full shift


100
90
80
70
60
50
40
30
20
10
0
% reduction of EC
0
2
4
6
8
10
12
14
full shift
when window and door are shut

Limitations

- **Maintenance**
  - **Change filters**
  - **Cab integrity**

Limitations

- Maintenance
  - Change filters
  - Cab integrity
- **Not all vehicles have an effective enclosed cab**
  - **Size**
  - **Visibility**

Limitations

- Maintenance
  - Change filters
  - Cab integrity
- Not all vehicles have an effective enclosed cab
  - Size
  - Visibility
- **Not all miners can work in enclosed cabs**


Questions???
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