'SMARTGAS – Connect' Mine Trending Software Project 2010

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Coal Mines Technical Services

Project scope

Develop a cost effective mine gas monitoring software package

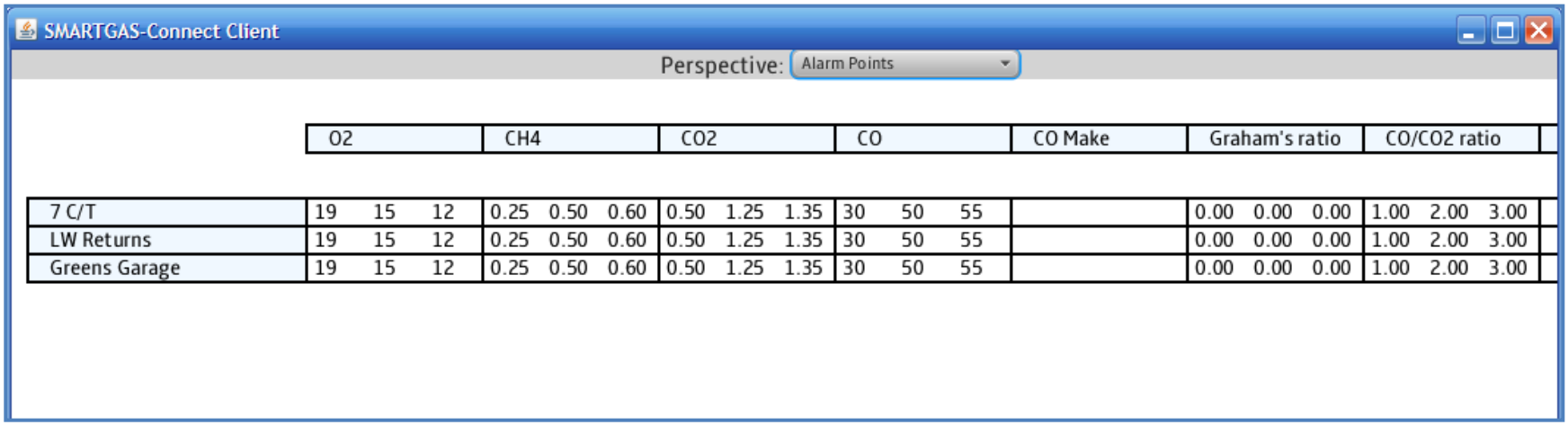
- **Ability to interface with various mine monitoring systems and collect gas data from gas monitoring locations**
- **Display gas monitoring locations on imported mine plan**
- **Display live data from the gas monitoring points**
- **Set security level access for authorised personnel (CRO / VO / UM)**
- **Allow alarm setting for each monitoring point by authorised personnel**
- **Allow acknowledgement of alarms by authorised personnel**
- **Trend/ graph data from monitoring points**
- **Trend/ graph relevant ratios**
- **Ability to produce relevant reports**
- **Comply with relevant regs requirements both NSW and QLD**

Typical data displayed

- **Gas data/ trending for each monitoring point for:**
  - Oxygen
  - Methane
  - Carbon monoxide
  - Carbon dioxide
- **Air flow/ quantities**
- **Barometric pressure**
- **Ratios/ indices including:**
  - CO make
  - Graham's ratio
  - CO/CO2 ratio
  - Explosibility trending
  - User defined

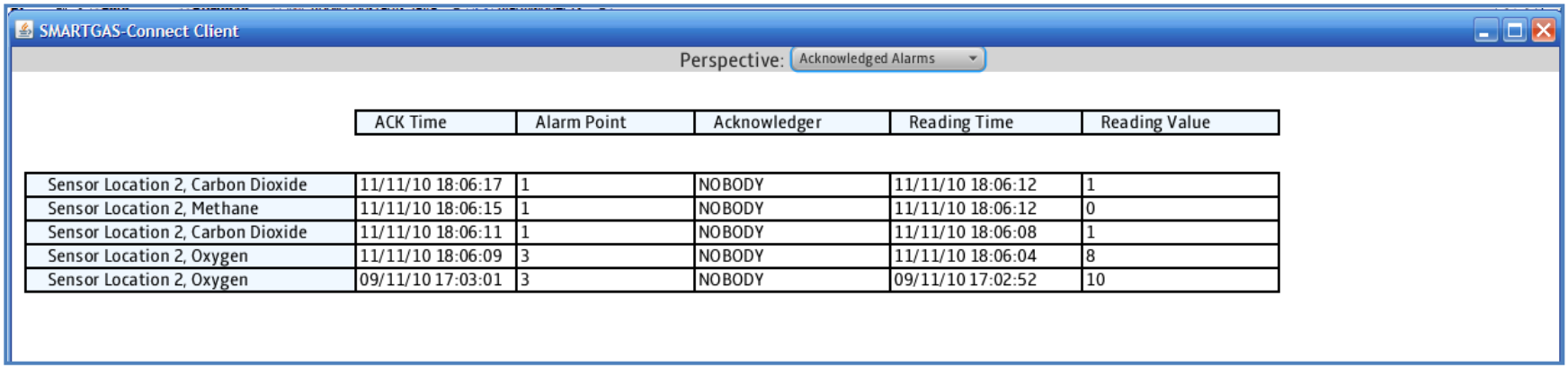

SMARTGAS-Connect Client
File
View
Mine plan
Drag/Zoo
Change password
Notify others
Import
Mine plan
1.46%
scale: 10%
7 Cut Thru
O2 11.8%
CH4 0.35%
CO2 1.46%
CO 0.0 ppm
CO Mk NULL%
GR 0.0000
CO/CO2 0.0000
AV NULL m/s
Greens Garage
O2 8.6%
CH4 0.35%
CO2 1.46%
CO 0.0 ppm
GR 0.0000
CO/CO2 0.0000
Display name for tube 1
O2 10.8%
CO2 1.46%
CO 0.2 ppm
CO/CO2 0.0000
54 Cut Thru
O2 10.8%
CH4 0.35%

Alarm point setting



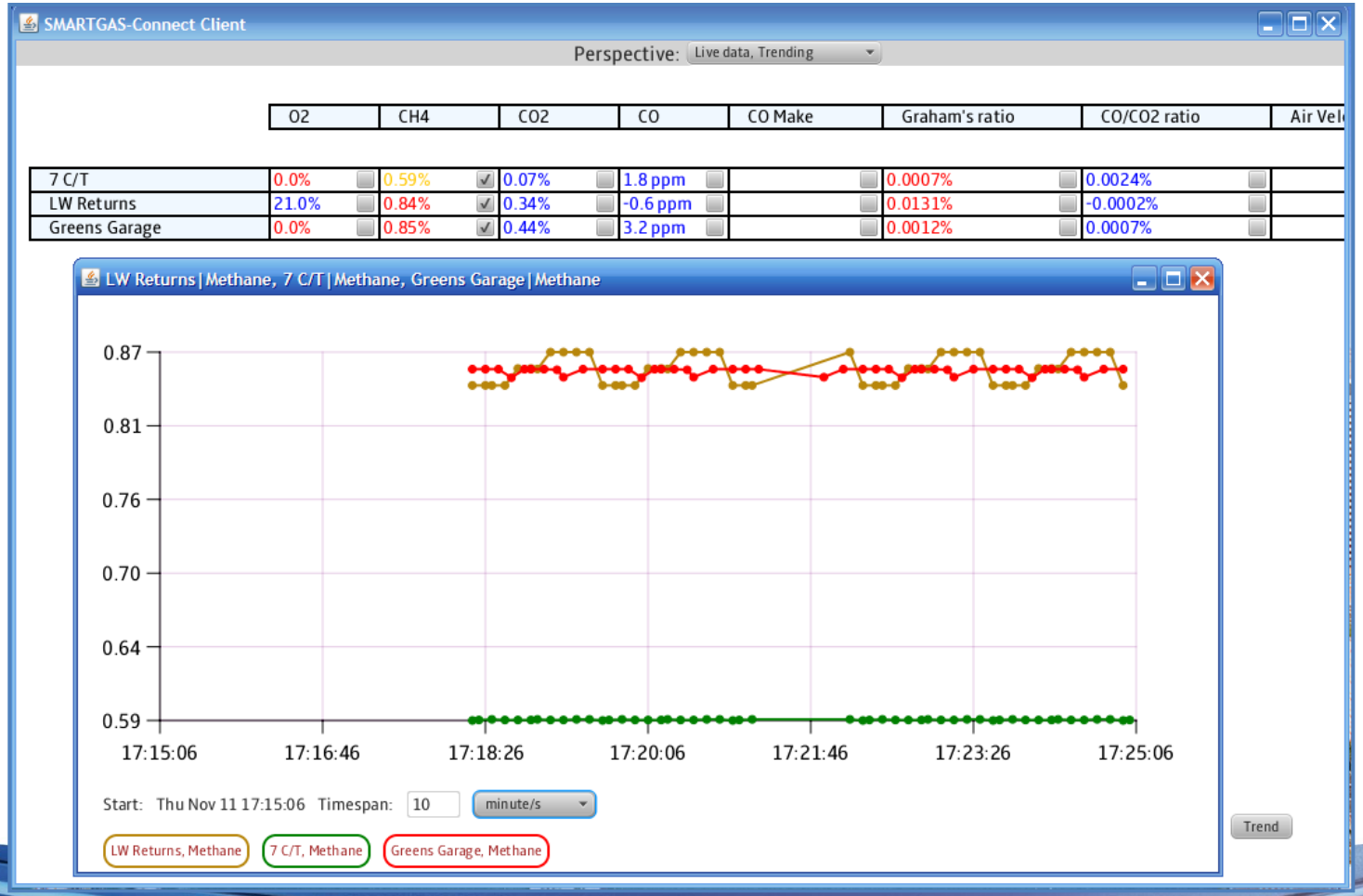
	O2			CH4			CO2			CO			CO Make	Graham's ratio			CO/CO2 ratio		
7 C/T	19	15	12	0.25	0.50	0.60	0.50	1.25	1.35	30	50	55		0.00	0.00	0.00	1.00	2.00	3.00
LW Returns	19	15	12	0.25	0.50	0.60	0.50	1.25	1.35	30	50	55		0.00	0.00	0.00	1.00	2.00	3.00
Greens Garage	19	15	12	0.25	0.50	0.60	0.50	1.25	1.35	30	50	55		0.00	0.00	0.00	1.00	2.00	3.00

Alarm point acknowledgement



	ACK Time	Alarm Point	Acknowledger	Reading Time	Reading Value
Sensor Location 2, Carbon Dioxide	11/11/10 18:06:17	1	NOBODY	11/11/10 18:06:12	1
Sensor Location 2, Methane	11/11/10 18:06:15	1	NOBODY	11/11/10 18:06:12	0
Sensor Location 2, Carbon Dioxide	11/11/10 18:06:11	1	NOBODY	11/11/10 18:06:08	1
Sensor Location 2, Oxygen	11/11/10 18:06:09	3	NOBODY	11/11/10 18:06:04	8
Sensor Location 2, Oxygen	09/11/10 17:03:01	3	NOBODY	09/11/10 17:02:52	10

Typical trending of data



Ongoing project development

- Refine graphics and user operation
- Import gas chromatographic data
- Maintenance reminder system for gas sensors
- Format for International market (i.e. China, USA)
- CCTV display from U/G locations
- Greenhouse emission calculations

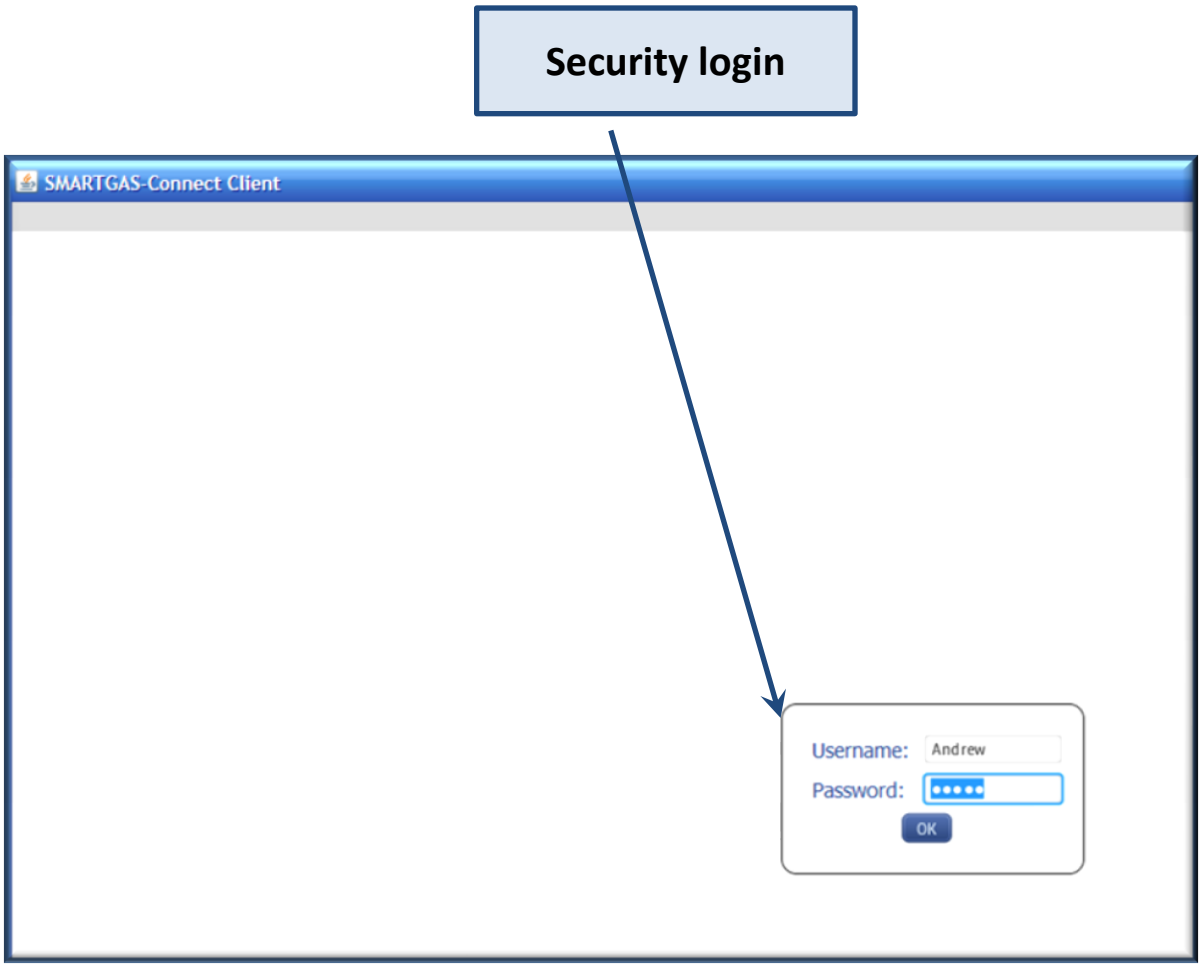
SMARTGAS

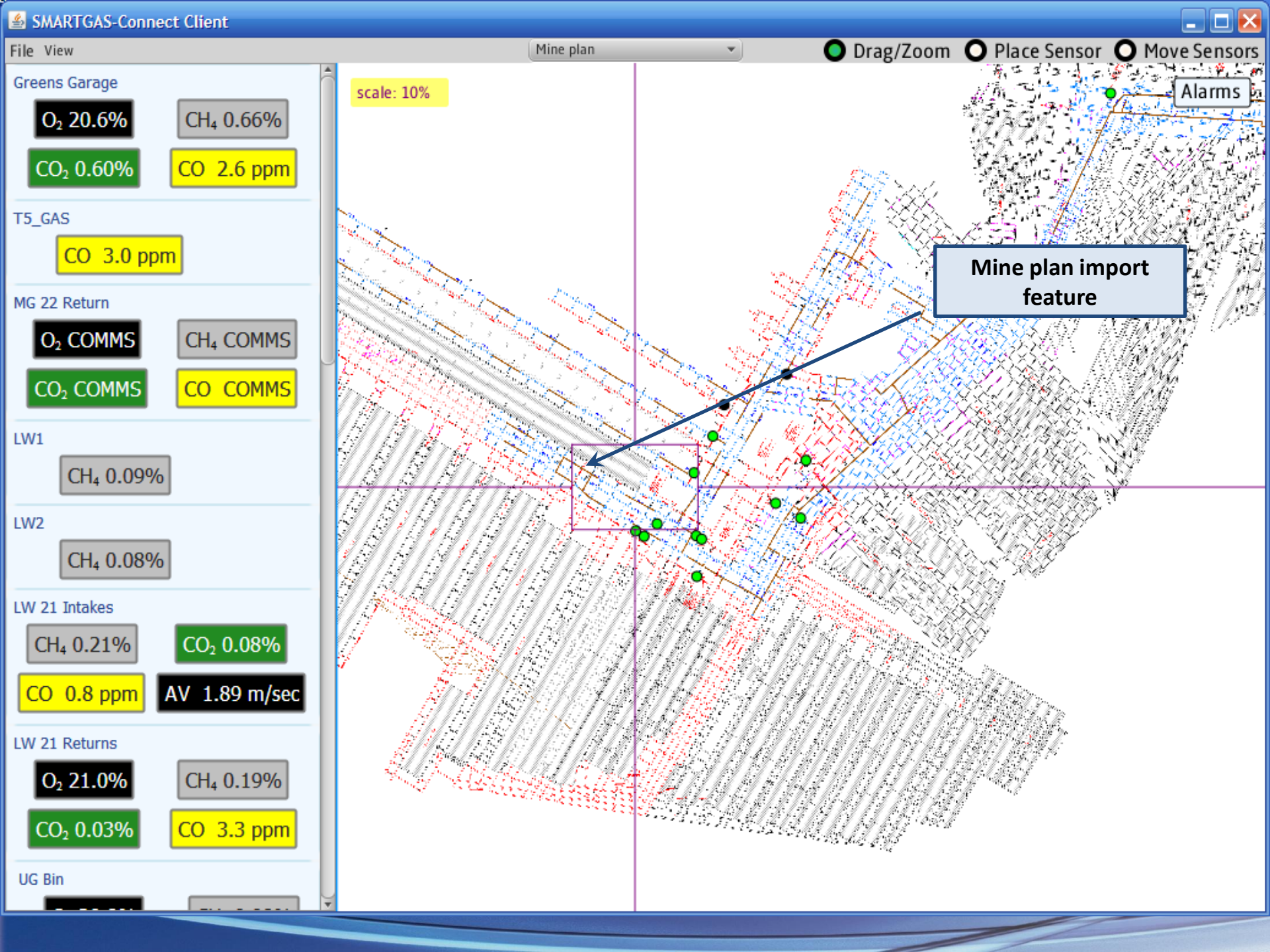
'*Connect*'

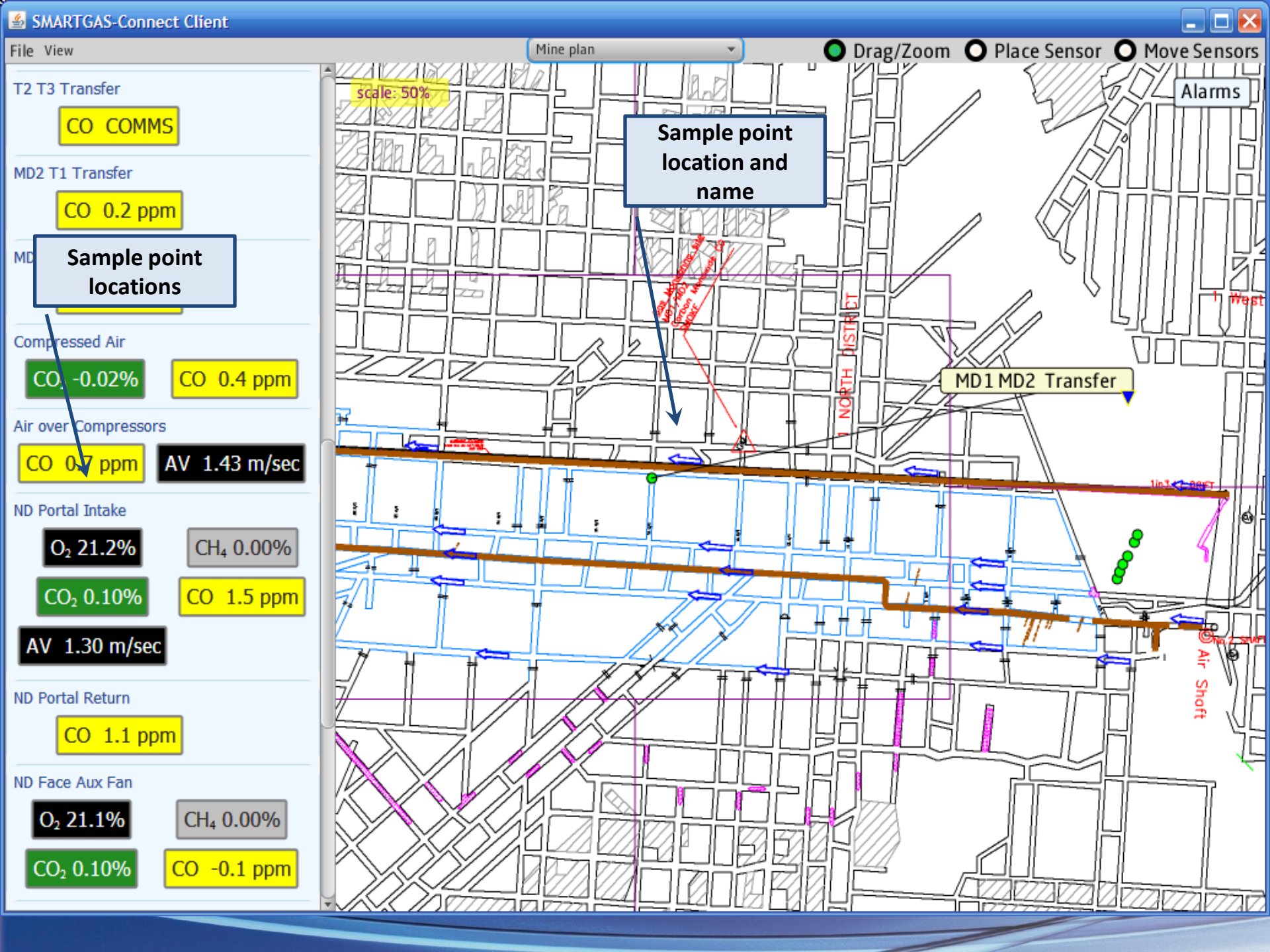
2011

Coal Services Pty Limited

Secure access to *SMARTGAS*-connect

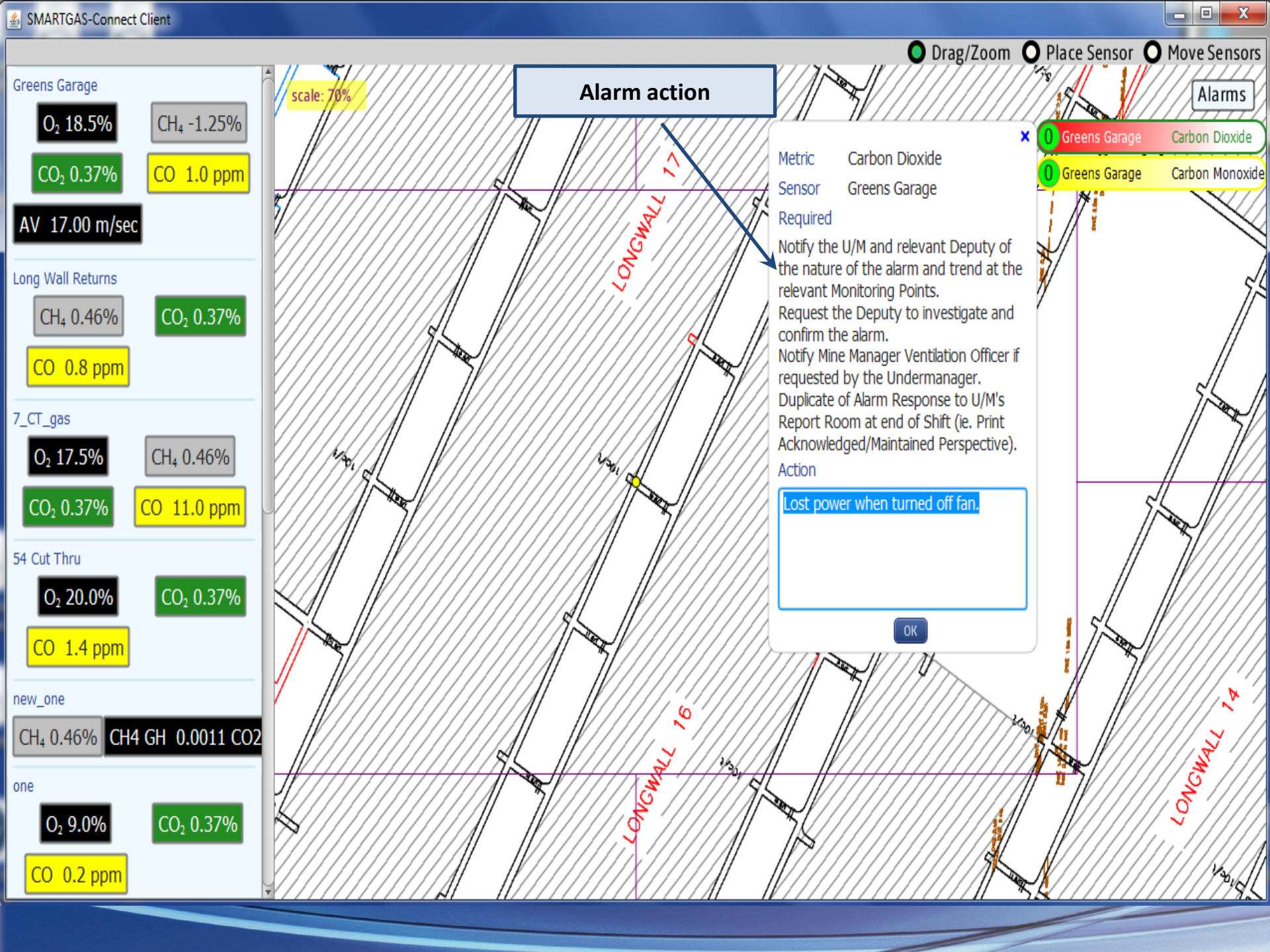



SMARTGAS-Connect Client
File View
Mine plan
Drag/Zoom
Place Sensor
Move Sensors
Greens Garage
O2 20.6%
CH4 0.66%
CO2 0.60%
CO 2.6 ppm
T5_GAS
CO 3.0 ppm
MG 22 Return
O2 COMMS
CH4 COMMS
CO2 COMMS
CO COMMS
LW1
CH4 0.09%
LW2
CH4 0.08%
LW 21 Intakes
CH4 0.21%
CO2 0.08%
CO 0.8 ppm
AV 1.89 m/sec
LW 21 Returns
O2 21.0%
CH4 0.19%
CO2 0.03%
CO 3.3 ppm
UG Bin
scale: 10%
Alarms
Mine plan import feature


SMARTGAS-Connect Client
File View
Mine plan
Drag/Zoom
Place Sensor
Move Sensors
T2 T3 Transfer
CO COMMS
MD2 T1 Transfer
CO 0.2 ppm
Sample point locations
Compressed Air
CO -0.02%
CO 0.4 ppm
Air over Compressors
CO 0.7 ppm
AV 1.43 m/sec
ND Portal Intake
O2 21.2%
CH4 0.00%
CO2 0.10%
CO 1.5 ppm
AV 1.30 m/sec
ND Portal Return
CO 1.1 ppm
ND Face Aux Fan
O2 21.1%
CH4 0.00%
CO2 0.10%
CO -0.1 ppm
scale: 50%
Sample point location and name
Alarms
MD1 MD2 Transfer
1 NORTH DISTRICT
Air Shaft

Alarm threshold display (3 levels)

Automatic alarm threshold display


SMARTGAS-Connect Client
Drag/Zoom
Place Sensor
Move Sensors
Alarm action
Greens Garage
O2 18.5%
CH4 -1.25%
CO2 0.37%
CO 1.0 ppm
AV 17.00 m/sec
Long Wall Returns
CH4 0.46%
CO2 0.37%
CO 0.8 ppm
7_CT_gas
O2 17.5%
CH4 0.46%
CO2 0.37%
CO 11.0 ppm
54 Cut Thru
O2 20.0%
CO2 0.37%
CO 1.4 ppm
new_one
CH4 0.46%
CH4 GH 0.0011 CO2
one
O2 9.0%
CO2 0.37%
CO 0.2 ppm
scale: 70%
LONGWALL 17
LONGWALL 16
LONGWALL 14
Alarms
0 Greens Garage Carbon Dioxide
0 Greens Garage Carbon Monoxide
Metric Carbon Dioxide
Sensor Greens Garage
Required
Notify the U/M and relevant Deputy of the nature of the alarm and trend at the relevant Monitoring Points.
Request the Deputy to investigate and confirm the alarm.
Notify Mine Manager Ventilation Officer if requested by the Undermanager.
Duplicate of Alarm Response to U/M's Report Room at end of Shift (ie. Print Acknowledged/Maintained Perspective).
Action
Lost power when turned off fan.
OK

SMARTGAS-Connect Client

Acknowledged/Maintained

	Time	Type	Duration	Who	Alarm Threshold
9 CT BW Versatrac	21/10/11 12:47:13 PM	M	1	Christopher Murphy	
	Putting in maintenance normal one.				
10 CT NW Versatrac	21/10/11 12:45:29 PM	M	1	Christopher Murphy	
	Putting in maintenance even thou there is a comms failure.				
T5_GAS, Carbon Monoxide	21/10/11 9:54:25 AM	A		Christopher Murphy	1
	Phil did this one too				
Greens Garage, Oxygen	21/10/11 9:45:10 AM	A		Christopher Murphy	2
	Power went down and everyone was evacuated				
MG 22 Return, Oxygen	21/10/11 9:45:02 AM	A		Christopher Murphy	2
	Power went down and everyone was evacuated				
LW 21 Returns, Oxygen	21/10/11 9:44:57 AM	A		Christopher Murphy	2
	Power went down and everyone was evacuated				
No 3 Shaft, Oxygen	21/10/11 9:44:50 AM	A		Christopher Murphy	2
	Power went down and everyone was evacuated				
UG Bin, Oxygen	21/10/11 9:44:44 AM	A		Christopher Murphy	2
	Power went down and everyone was evacuated				
No 3 Shaft, Carbon Monoxide	21/10/11 9:44:30 AM	A		Christopher Murphy	1
	Power went down and everyone was evacuated				
LW2, Methane	21/10/11 9:43:49 AM	A		Christopher Murphy	2
	Power went down and everyone was evacuated				
MG 22 Return, Oxygen	19/10/11 10:50:43 AM	A		Christopher Murphy	2
	This was a test alarm, coming back after 49 seconds, but we will make it two minutes.				
10 CT NW Versatrac	19/10/11 10:04:39 AM	M	1	Christopher Murphy	
	Experiment one hour test see comes back				

PDF Report

SMARTGAS-Connect Client

Alarm Thresholds

	O2 (%)			CH4 (%)			CO2 (%)			CO (ppm)			
	1	2		1	2		1	2		1	2		
MG 22 Return	20.0	19.5	✓	0.80	1.80	✓	0.80	1.10	✓	15.0	40.0	✓	
LW1				1.00	1.80	✓							
LW2				1.00	1.80	✓							
LW 21 Intakes				0.25	0.50	✓	0.25	0.50	✓	15.0	40.0	✓	0
LW 21 Returns	20.0	19.5	✓	0.80	1.80	✓	0.80	1.10	✓	15.0	40.0	✓	
Greens Garage	20.0	19.5	✓	0.80	1.80	✓	0.80	1.10	✓	15.0	40.0	✓	
UG Bin	20.0	19.5	✓	0.25	0.50	✓				15.0	40.0	✓	
No 3 Shaft	20.0	19.5	✓	0.80	1.80	✓	0.80	1.10	✓	10.0	15.0	✓	
T5_GAS										30.0	50.0	✓	
T2 T3 Transfer										15.0	40.0	✓	
MD2 T1 Transfer										15.0	40.0	✓	
MD1 MD2 Transfer										15.0	40.0	✓	
Compressed Air							1.20	2.00	✓	10.0	15.0	✓	
Air over Compressors										15.0	40.0	✓	0
ND Portal Intake	20.0	19.5	✓	0.20	0.25	✓	0.80	1.25	✓	10.0	15.0	✓	0
ND Portal Return										15.0	40.0	✓	
ND Face Aux Fan	20.0	19.5	✓	0.25	0.50	✓	0.50	1.25	✓	10.0	15.0	✓	
ND Survey Point 1				0.20	0.25	✓							
ND Survey Point 2				0.20	0.25	✓							
ND Compressed Air										10.0	15.0	✓	
8 CT BW Versatrac										15.0	40.0	☐	
9 CT BW Versatrac										15.0	40.0	☐	

SMARTGAS-Connect Client

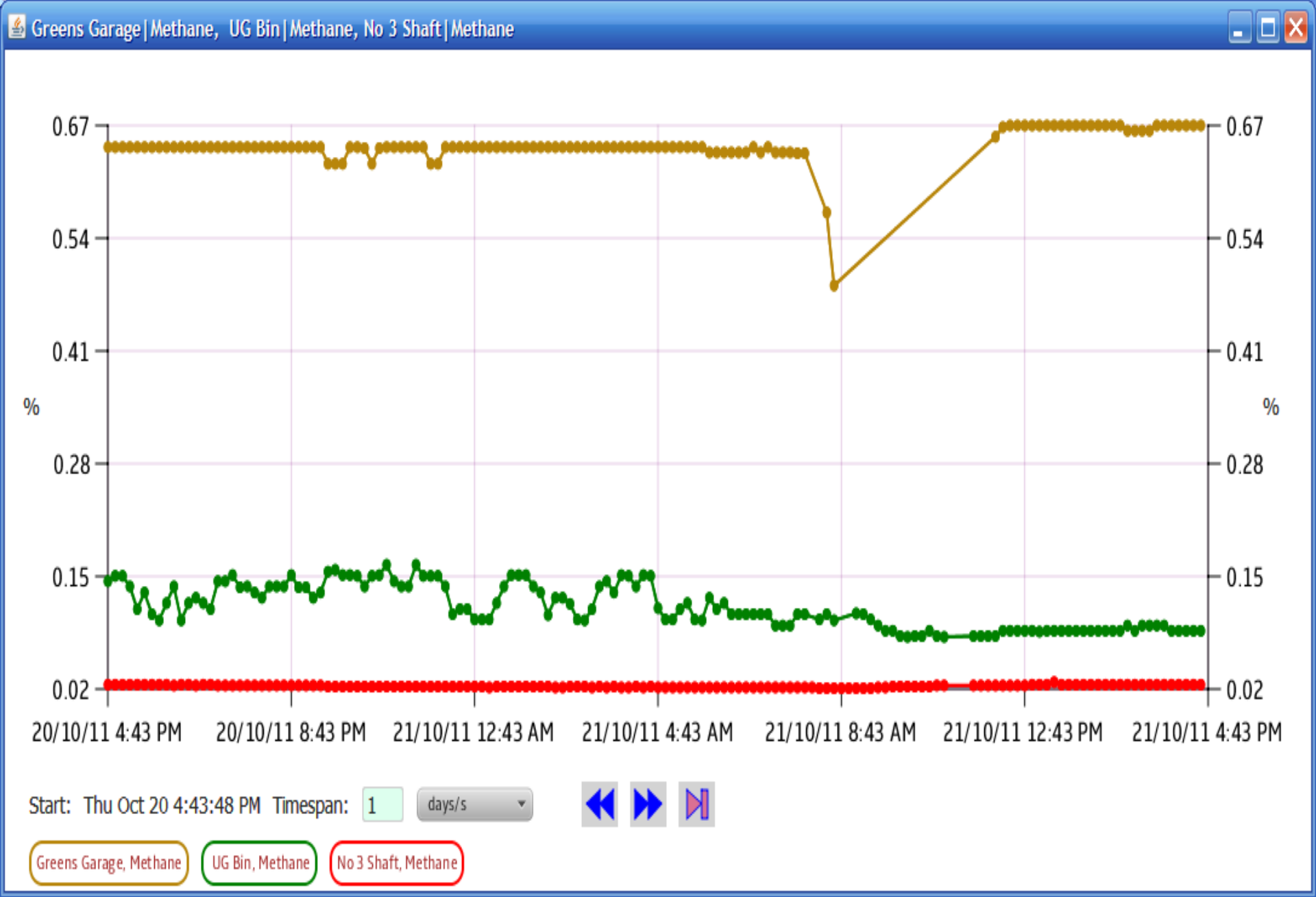
Live data, Trending

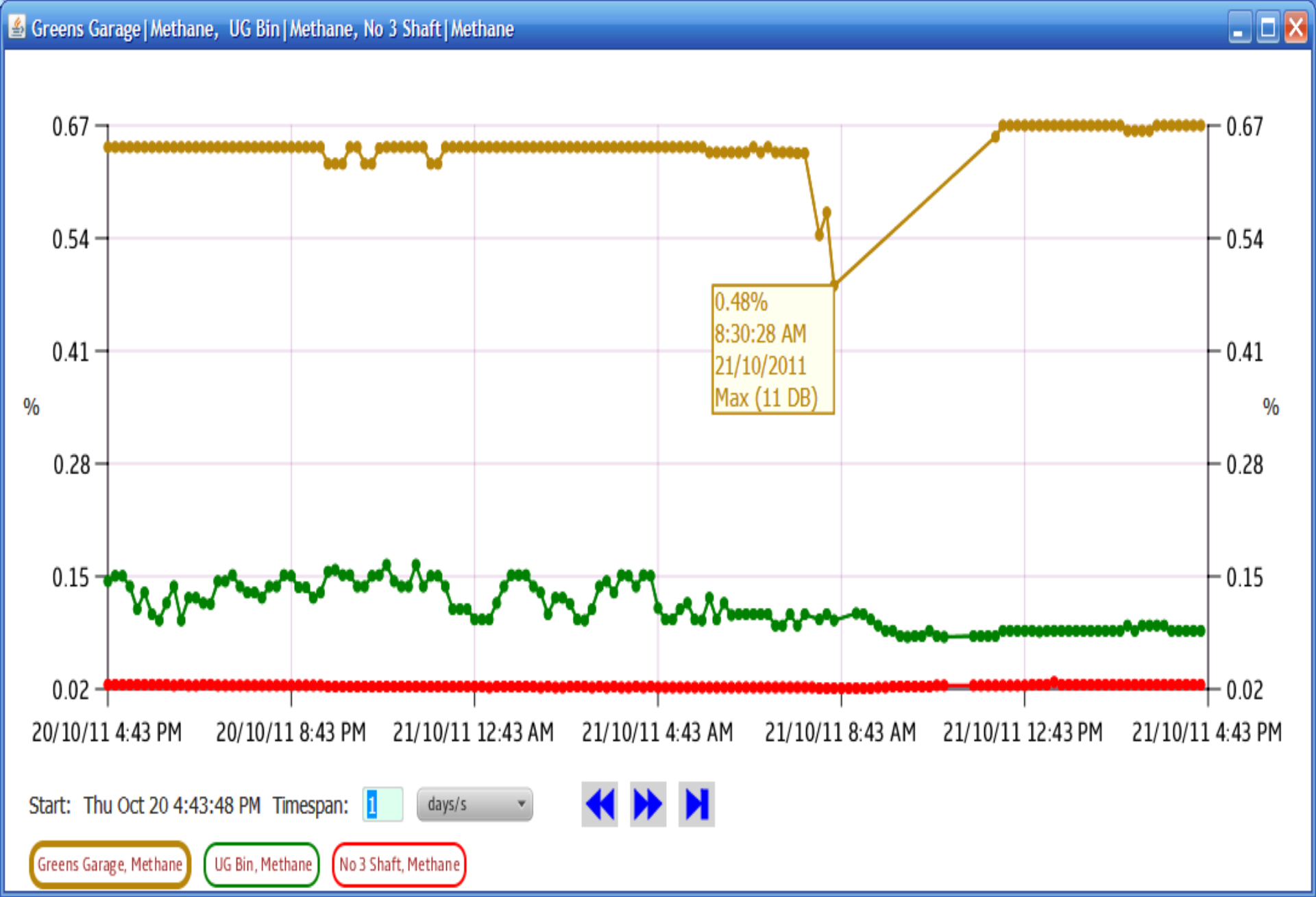
	O2 (%)	CH4 (%)	CO2 (%)	CO (ppm)	Air Velocity (m/sec)
MG 22 Return					
LW1		0.05%			
LW2		0.08%			
LW 21 Intakes		0.21%	0.08%	0.8 ppm	1.60 m/sec
LW 21 Returns	21.0%	0.19%	0.03%	3.2 ppm	
Greens Garage	20.6%	0.66%	0.60%	2.7 ppm	
UG Bin	20.8%	0.08%		-0.1 ppm	
No 3 Shaft	20.9%	0.02%	0.38%	0.1 ppm	
T5_GAS				3.0 ppm	
T2 T3 Transfer					
MD2 T1 Transfer				0.2 ppm	
MD1 MD2 Transfer				0.0 ppm	
Compressed Air			-0.02%	0.4 ppm	
Air over Compressors				0.7 ppm	1.39 m/sec
ND Portal Intake	21.2%	0.00%	0.11%	1.5 ppm	1.44 m/sec
ND Portal Return				1.4 ppm	
ND Face Aux Fan	21.1%	0.01%	0.11%	0.2 ppm	
ND Survey Point 1		-0.01%			
ND Survey Point 2		0.00%			
ND Compressed Air				3.1 ppm	
8 CT BW Versatrac				2.1 ppm	
9 CT BW Versatrac				3.3 ppm	
10 CT NW Versatrac					

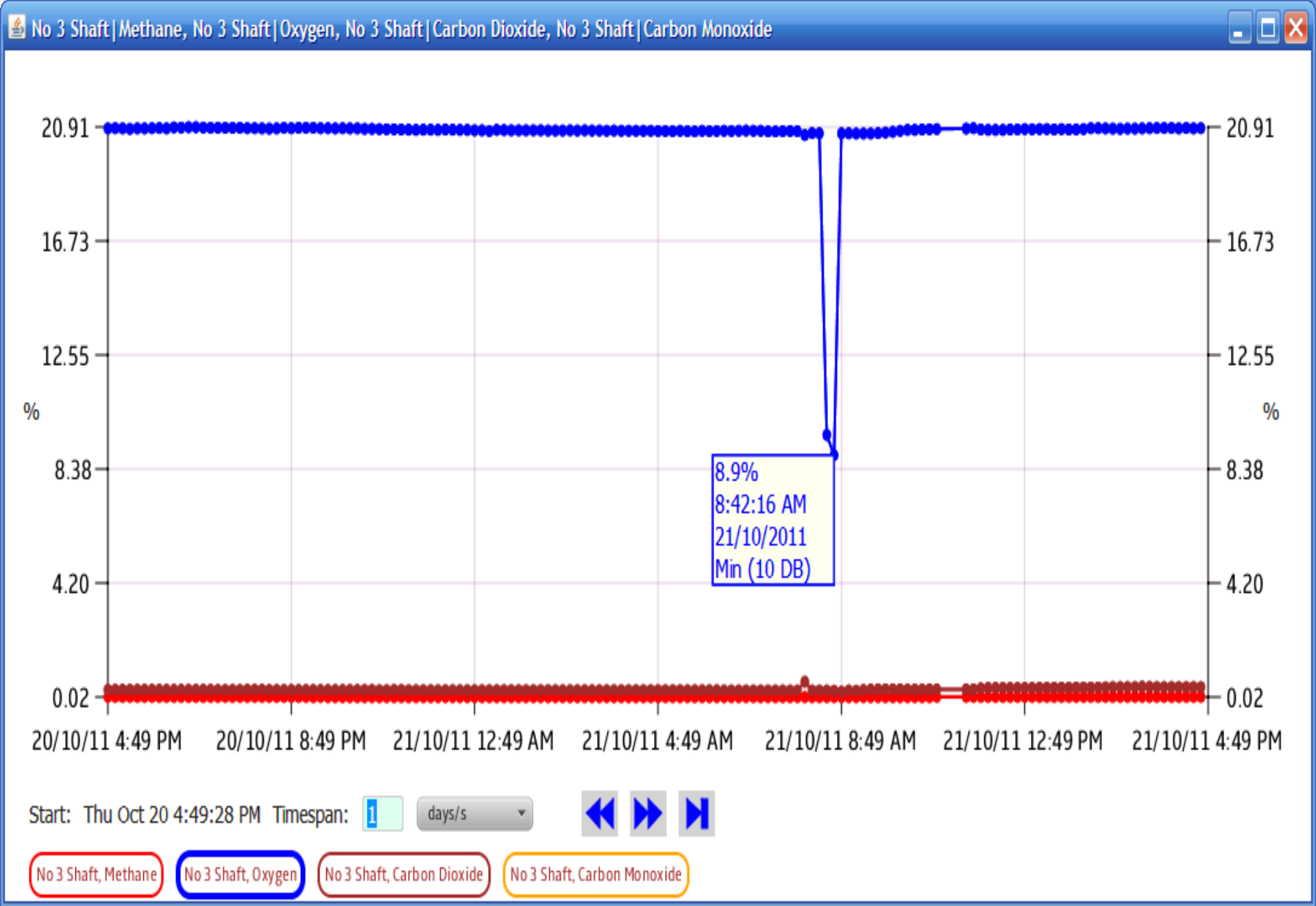
Trend

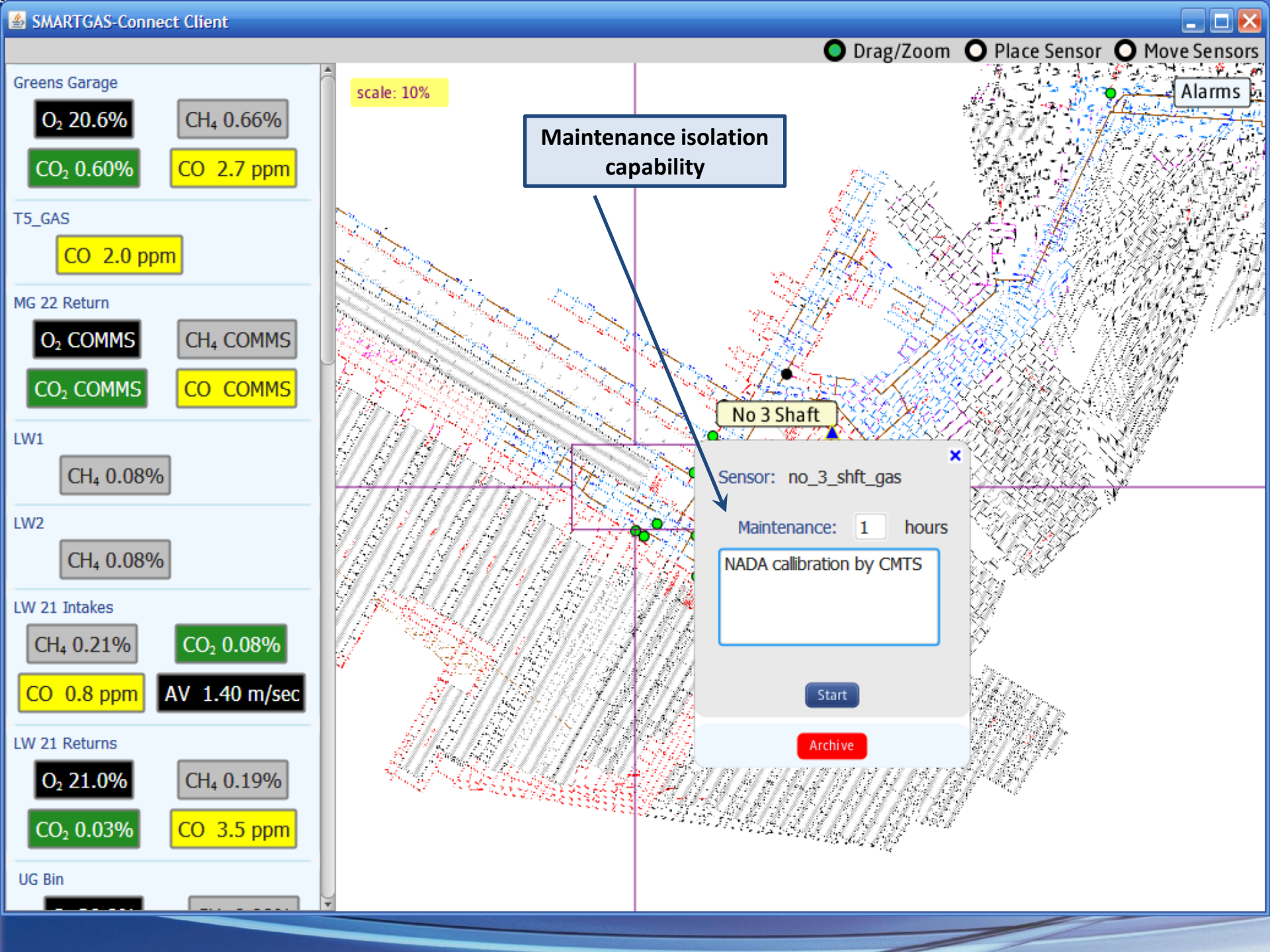
Trending of data

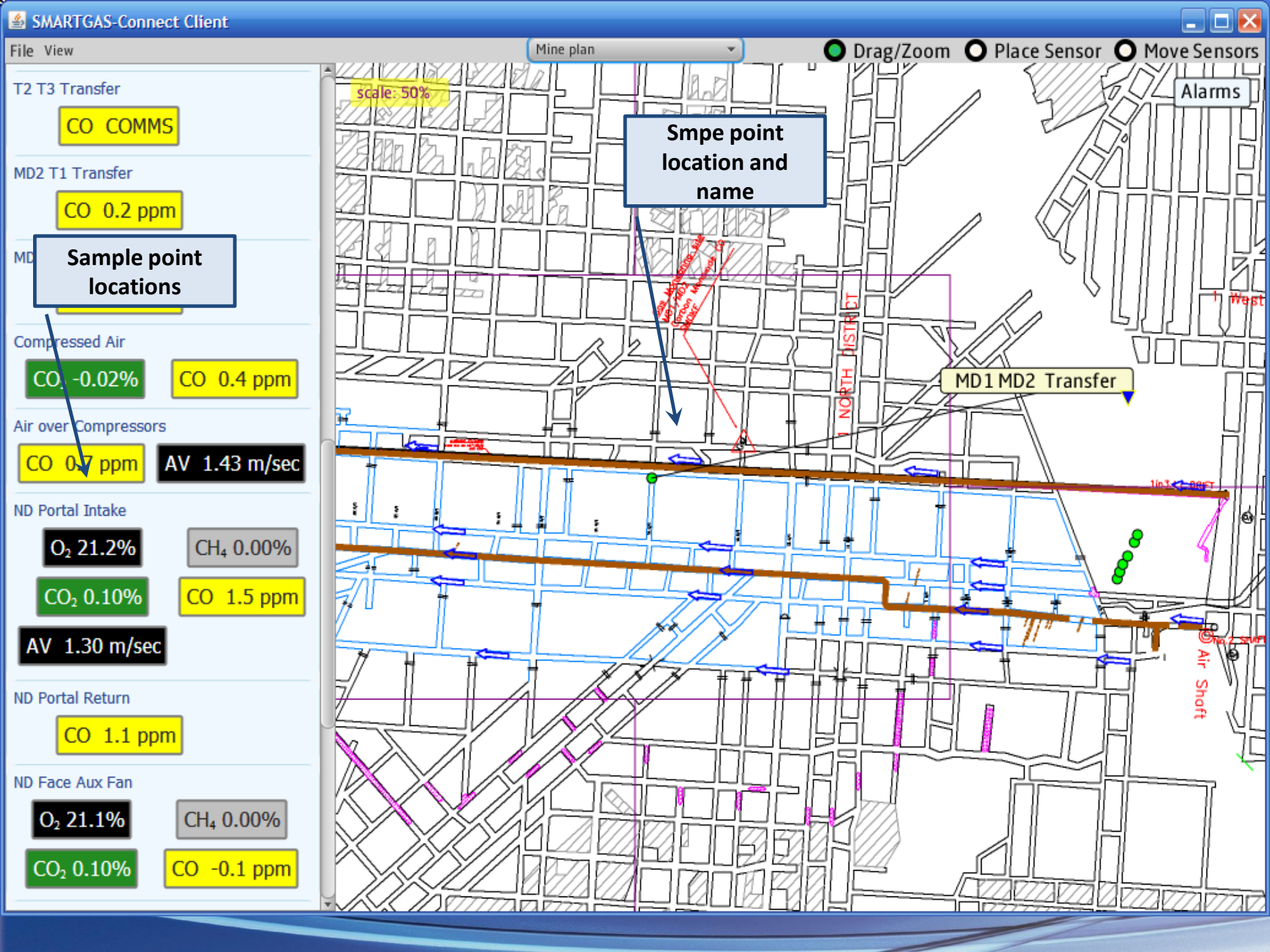
Live data trending


Greens Garage|Methane, UG Bin|Methane, No 3 Shaft|Methane
0.67
0.54
0.41
%
0.28
0.15
0.02
20/10/11 4:43 PM
20/10/11 8:43 PM
21/10/11 12:43 AM
21/10/11 4:43 AM
21/10/11 8:43 AM
21/10/11 12:43 PM
21/10/11 4:43 PM
Start: Thu Oct 20 4:43:48 PM Timespan: 1
days/s
Greens Garage, Methane
UG Bin, Methane
No 3 Shaft, Methane


Greens Garage|Methane, UG Bin|Methane, No 3 Shaft|Methane
0.67
0.54
0.41
0.28
0.15
0.02
%
0.48%
8:30:28 AM
21/10/2011
Max (11 DB)
20/10/11 4:43 PM
20/10/11 8:43 PM
21/10/11 12:43 AM
21/10/11 4:43 AM
21/10/11 8:43 AM
21/10/11 12:43 PM
21/10/11 4:43 PM
Start: Thu Oct 20 4:43:48 PM Timespan: 1 days/s
Greens Garage, Methane
UG Bin, Methane
No 3 Shaft, Methane

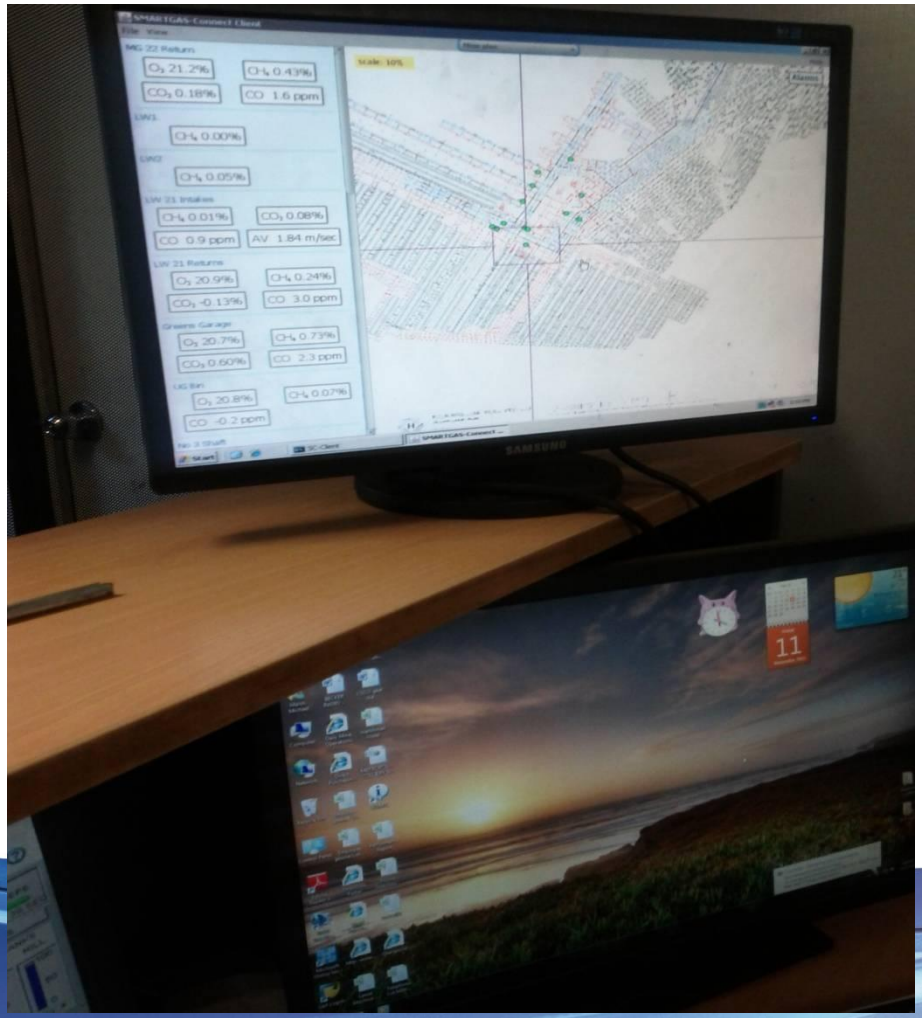

No 3 Shaft|Methane, No 3 Shaft|Oxygen, No 3 Shaft|Carbon Dioxide, No 3 Shaft|Carbon Monoxide
20.91
16.73
12.55
%
8.38
4.20
0.02
8.9%
8:42:16 AM
21/10/2011
Min (10 DB)
20/10/11 4:49 PM
20/10/11 8:49 PM
21/10/11 12:49 AM
21/10/11 4:49 AM
21/10/11 8:49 AM
21/10/11 12:49 PM
21/10/11 4:49 PM
Start: Thu Oct 20 4:49:28 PM Timespan: 1 days/s
No 3 Shaft, Methane
No 3 Shaft, Oxygen
No 3 Shaft, Carbon Dioxide
No 3 Shaft, Carbon Monoxide


SMARTGAS-Connect Client
Drag/Zoom
Place Sensor
Move Sensors
Greens Garage
O2 20.6%
CH4 0.66%
CO2 0.60%
CO 2.7 ppm
T5_GAS
CO 2.0 ppm
MG 22 Return
O2 COMMS
CH4 COMMS
CO2 COMMS
CO COMMS
LW1
CH4 0.08%
LW2
CH4 0.08%
LW 21 Intakes
CH4 0.21%
CO2 0.08%
CO 0.8 ppm
AV 1.40 m/sec
LW 21 Returns
O2 21.0%
CH4 0.19%
CO2 0.03%
CO 3.5 ppm
UG Bin
scale: 10%
Maintenance isolation capability
Alarms
No 3 Shaft
Sensor: no_3_shft_gas
Maintenance: 1 hours
NADA callibration by CMTS
Start
Archive


SMARTGAS-Connect Client
File View
Mine plan
Drag/Zoom
Place Sensor
Move Sensors
T2 T3 Transfer
CO COMMS
MD2 T1 Transfer
CO 0.2 ppm
Sample point locations
Compressed Air
CO -0.02%
CO 0.4 ppm
Air over Compressors
CO 0.7 ppm
AV 1.43 m/sec
ND Portal Intake
O2 21.2%
CH4 0.00%
CO2 0.10%
CO 1.5 ppm
AV 1.30 m/sec
ND Portal Return
CO 1.1 ppm
ND Face Aux Fan
O2 21.1%
CH4 0.00%
CO2 0.10%
CO -0.1 ppm
scale: 50%
Smpe point location and name
Alarms
MD1 MD2 Transfer
1 NORTH DISTRICT
Air Shaft

On line and active Peabody Metropolitan Colliery

Metropolitan Control Room



Metropolitan Control Room

Interested Parties

- Peabody North Wambo
- Vale Interga Mine
- Ensham Mine
- Calendon Cook Colliery

Smartgas CONNECT

- Peabody Metropolitan Mine
- Peabody North Wambo
- Ensham Mine
- Vale Interga Mine
- Calendon Cook Colliery

CMTS
Smartgas
CONNECT

Practical Presentation

Coal Services Pty Limited

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CONNECT

Thanks