Coalburger Mine
Work Hard Coal Company LLC.

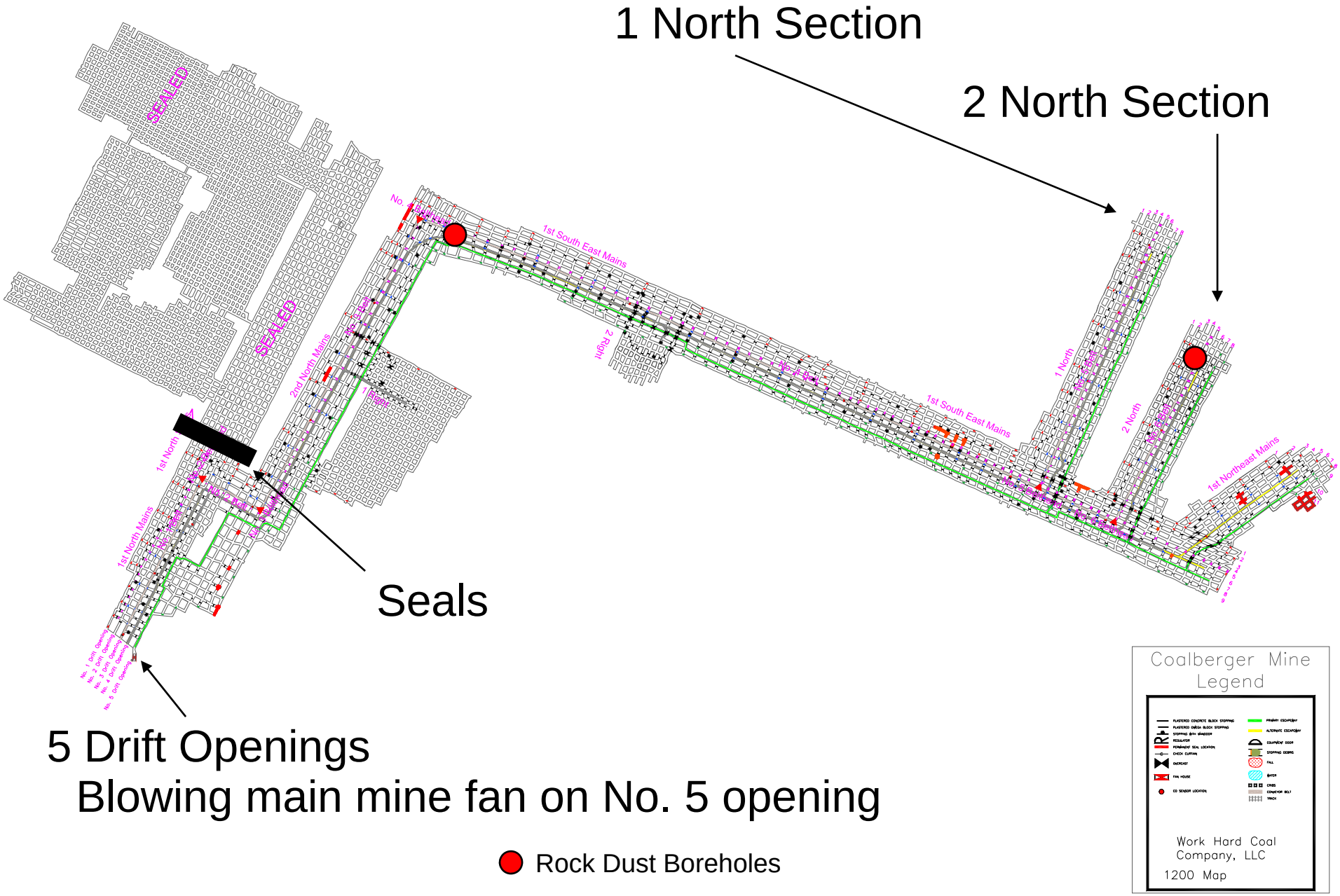
General Information

Coal mine with two active continuous mining sections.

Mine enters seam through five drift openings.

There are two rock dust boreholes entering the mine.

Set of nine seals isolate old works from active mine.


1 North Section
2 North Section
Seals
5 Drift Openings
Blowing main mine fan on No. 5 opening
Rock Dust Boreholes
SEALED
SEALED
1st South East Mains
1st South East Mains
2 Right
1 North
2 North
1st Northeast Mains
2nd North Mains
1st North
1st North Mains
Coalberger Mine Legend
Work Hard Coal Company, LLC
1200 Map

General Information

Coal seam is 7 feet (2.1 meters) thick
Roof conditions are poor, and is prone to large falls.

Blowing main mine fan on No. 5 drift opening

Joy M96-50, 8 degree blade setting
146,600 cfm (69.18 m^3/sec) 1.9 in. w.g.

Methane liberation 90,700 cfd (2600 m^3 per day)

Overburden ranges between 380 and 540 feet
(117 to 166 meters)

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Battery track haulage main line via No. 4 Drift

Coal transported via belt conveyor, No. 3 Drift
and common with No. 2 Drift

Main Return No. 1 Drift

General Information

Mine rescue services contracted to local association

140 miners total mine employment underground
31 Miners are underground on this shift

Miners work two production shifts each day
Maintenance shift on third shift

Fire detection in belt entry using CO-based AMS, alert and alarm levels 10 and 15 ppm, respectively

General Information

Sections use exhaust curtain to direct air to faces

Equipment on sections include two remote controlled Continuous mining machine, four electric shuttle cars, two twin-boom electric roof bolters and one battery scoop.

Depth of cut is 40 feet at each working place

Methane concentrations on faces normally less than 0.2 percent; however, significant liberation is possible from a rider seam exposed by large roof falls.

General Information

Mine phones are located at each section loading point, and at all belt drives.

Primary escapeway is the intake air course, and secondary escapeway is the track.

CSE SCSRs are carried by miners, and spare units are cached in the mine near the section loading points

A portable refuge chamber is located one crosscut outby each section loading point.

General Information

Mine examiners and supervisors carry either an Industrial Scientific LTX 310 or iTX gas detector. CSE Model 102LD is used on sections for making required methane checks.

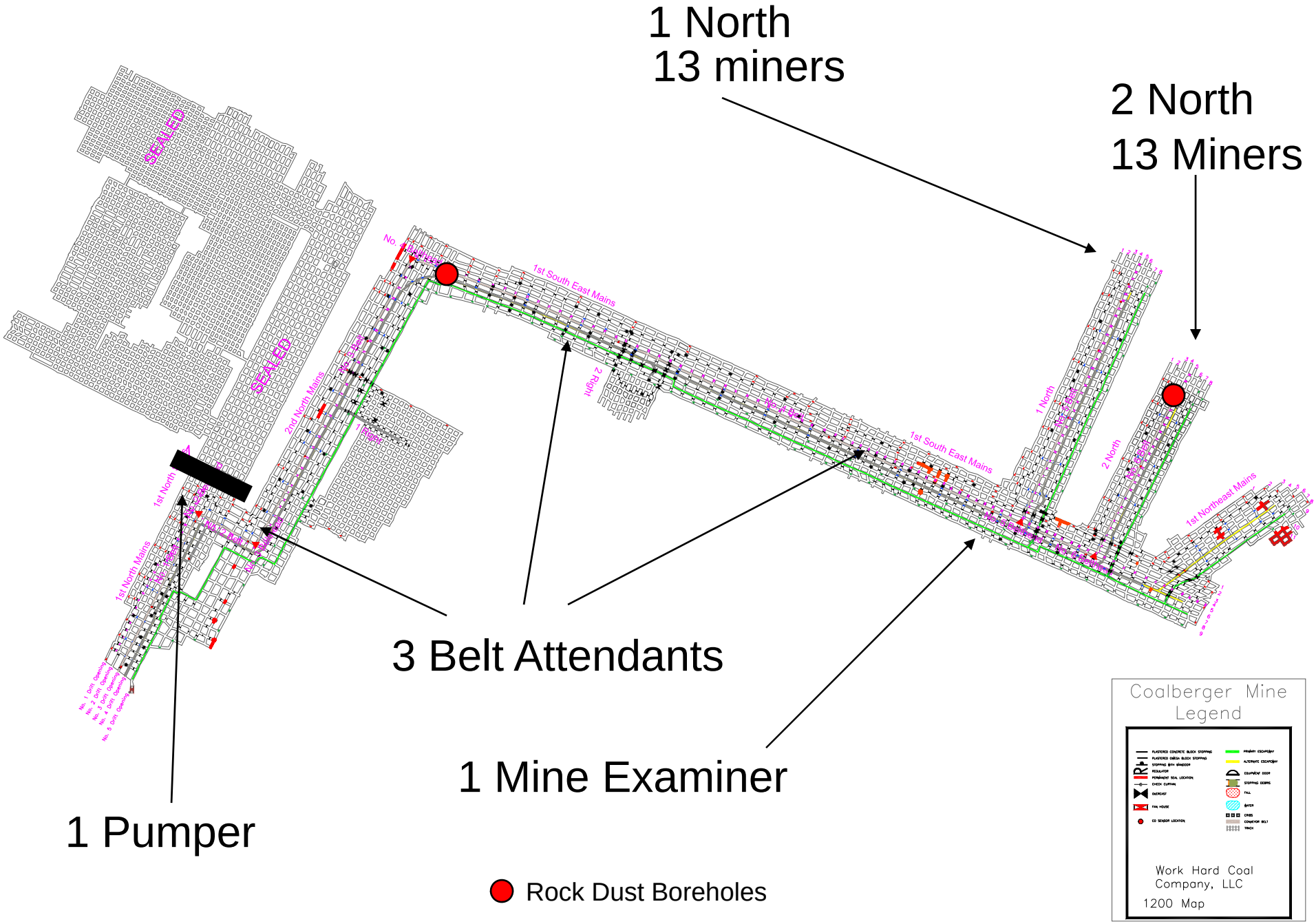
There are two rock dust boreholes entering the mine – one near 2 North and one in Southeast Mains. Both tend to exhaust due to the blowing ventilation system.

INITIAL SETUP

The time is 5:30 am. The upcoming production shift is the first for the past 2 weeks due to mine idling. Mine examinations, water pumping and maintenance have been conducted.

The pre-shift examination was started at 3:30 am. No hazardous conditions were found, and all systems are operating properly. One mine examiner remains underground.

One production crew (2 North), and one belt attendant leave the surface at 6:00 am. At 6:15 am, the second crew (1 North) enters the mine along with two belt attendants and one pumper.


1 North
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3 Belt Attendants
1 Mine Examiner
1 Pumper
Rock Dust Boreholes
Coalberger Mine
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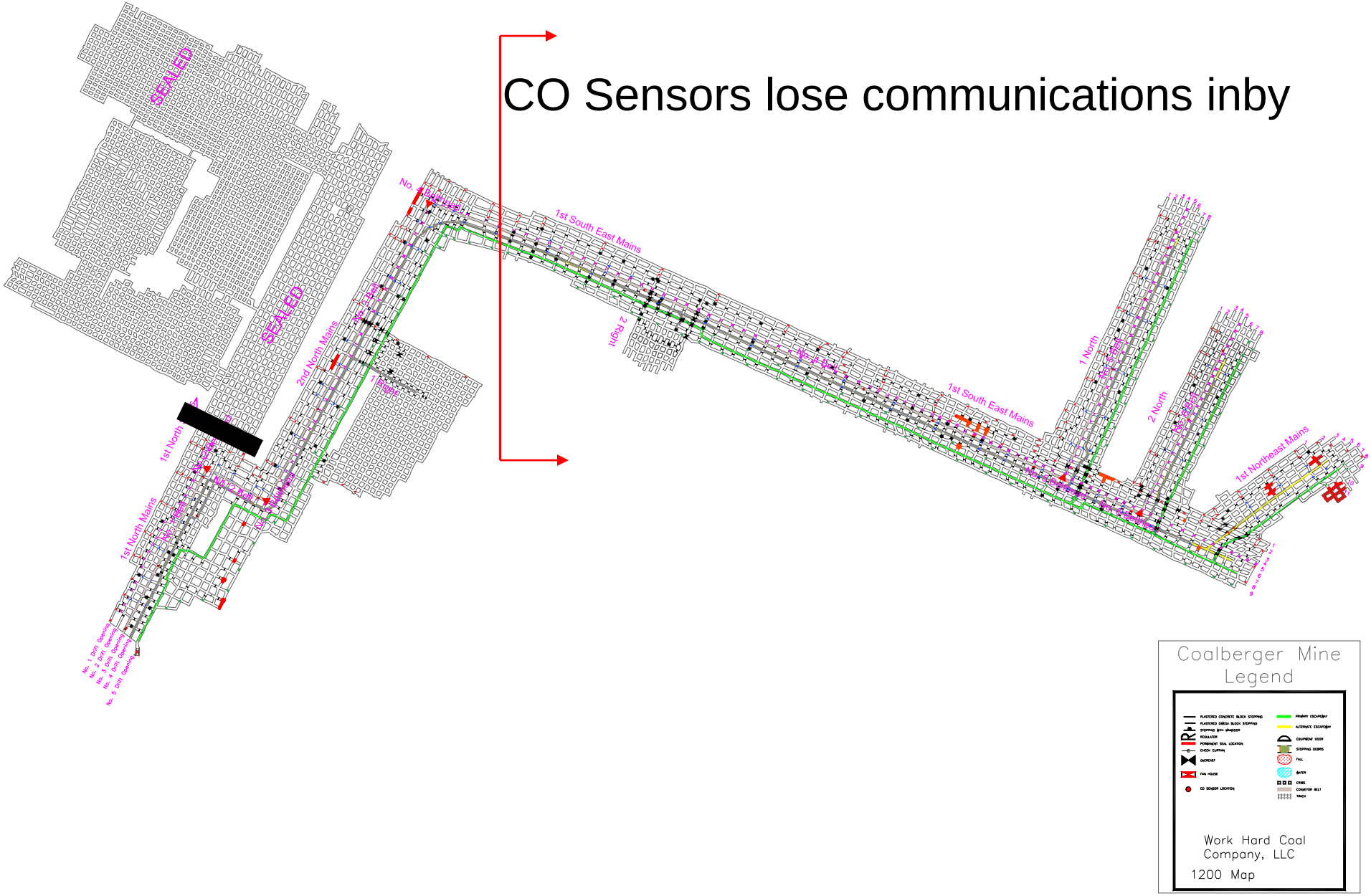
1200 Map

Situation 1

- At approximately 6:40 AM, the Atmospheric Monitoring System (AMS) starts indicating a series of simultaneous alert and alarm signals (> 15 ppm) from sensors. The AMS also indicates "Communications Dead" which means a loss of signal from sensors located on the two working sections No. 5 Belt and No. 6 Belt. Also, the sensor located along No. 4 Belt inby 2 North. All other CO sensors outby indicate normal, ambient conditions. The dispatcher notifies the Maintenance Foreman of the signal activations, who reports the signals to you.

CO Sensors lose communications inby



Situation1 Con't.

- Initially, the Maintenance Department believes the CO system is experiencing electrical malfunctions and sends a mechanic to investigate. However, approximately 7 minutes later, the 1 North section foreman telephones the dispatcher and states that he believes an explosion occurred in the mine, inby the No. 62 Crosscut of the 1st South East Mains. The 1 North section foreman also states that he and his men are evacuating the mine by the intake escapeway.

Situation 1 Con't.

- The Mine Superintendent and Mine Foreman are meeting to discuss operations since returning from the production shutdown. They overhear the section foreman conversation with the dispatcher. The Mine Superintendent joins the conversation with the section foreman in an attempt to get more details. The section foreman tells them about the conditions he experienced such as a rush of air, dust and debris. He also says that he experienced changes in air pressures, as his ears "popped". The foreman tells him very little about their escape to this point. The Mine Superintendent does not think it was an explosion, but a large roof fall and notifies the section foreman that he and the Mine Foreman would don their safety apparel and travel into the mine.

Situation 1 Con't.

- The Superintendent asks the section foreman to continue to evacuate with his crew out the primary intake escapeway but to listen for them and try to meet them somewhere between his current position and the mine opening. The Mine Superintendent also directs the Dispatcher/AMS Operator to contact the inby crew to ascertain their condition and to have them with withdrawn from the mine. The Safety Supervisor and Maintenance Superintendent overhear this conversation, they grab their gear and travel into the mine.

Conditions

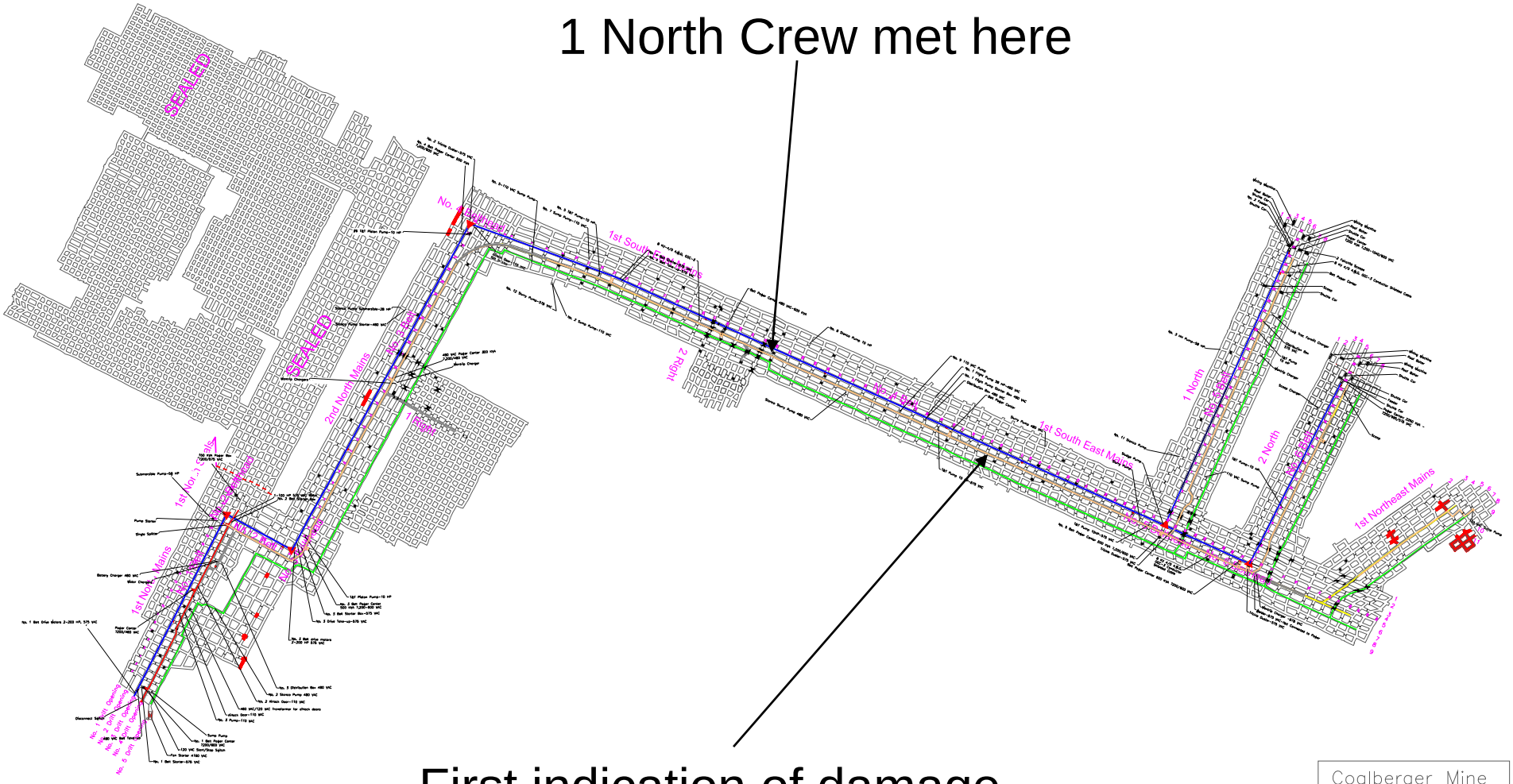
- The Mine Superintendent, Mine Foreman, Safety Director and Maintenance Foreman proceed to the mine opening and enter the mine on a battery-powered manbus. In their haste, only the Mine Superintendent obtains a gas detector. They travel to the No. 26 Crosscut, No. 4 Conveyor Belt and encounter the 1 North crew, who have heard the manbus in the track entry. The 1 North crew and foreman brief the four managers. Also, they inform the four managers that they have had no communication with the 2 North crew since entering the mine at the start of the shift. The Mine Superintendent, 1 North section foreman and Safety Director decide to exit the manbus and remain in the mine.

Conditions Con't.

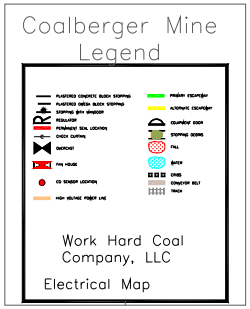
- The crew is loaded onto the manbus and transported out of the mine. The Mine Superintendent asks the 1 North section foreman to travel outby to the next mine phone and call the dispatcher to obtain an update on the unaccounted 2 North crew, CO system status and any other information. The Mine Superintendent and Safety Director travel inby until they encounter damaged stoppings at No. 44 Crosscut. They also find CO level of 10 ppm, Methane is 1.8% in the main return.

- WHAT DO YOU DO?

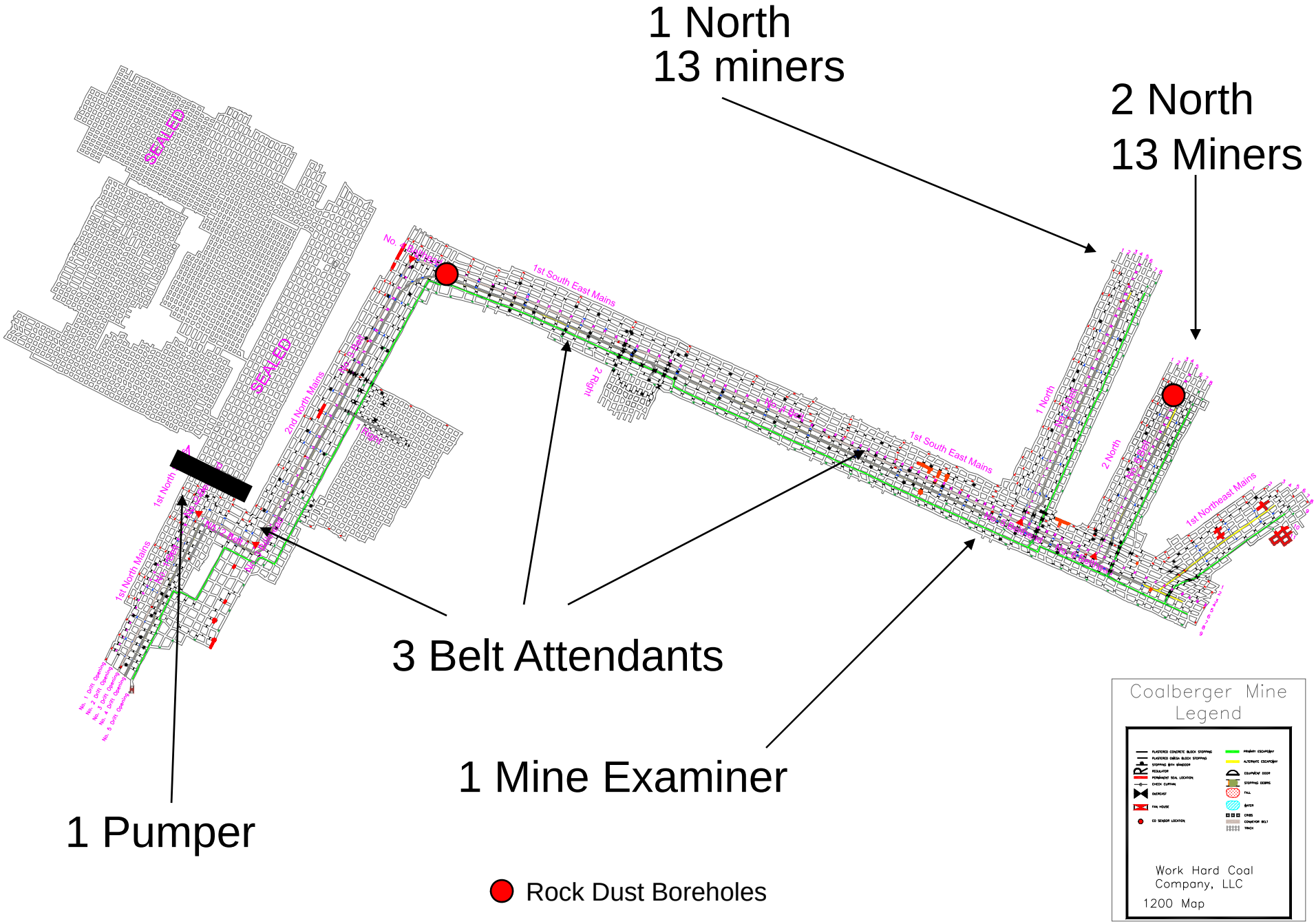
1 North Crew met here



First indication of damage
to ventilation controls
Return 10 ppm CO 1.8% CH_4



1. Need to report accident to MSHA?
2. Need to call for mine rescue teams?
3. How many teams are needed?
4. Continue exploration or Evacuate Mine?
5. If exploring, what respiratory protection is available?
6. How many miners are underground?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1200 Map

- CO levels are rising quickly and are now 25 ppm in the main return where the initial damage to ventilation controls was found (crosscut 44). Methane levels are rising quickly also, and are now 3.0 percent. A smell of burning material is also evident, and the mains ahead are full of smoke.

Situation 2

- All miners except for the 2 North crew and the mine examiner/belt man have evacuated the mine. Communication could not be established from the surface to either the 2 North section crew or the mine examiner. Federal and State enforcement agencies personnel begun arriving. Mine rescue teams were notified and are expected to begin arriving at the mine site around 10 am. By 8:45 am the return air in Drift opening No. 1 is being monitored by mine personnel with a hand-held gas detector. The initial measured gas concentrations are as follows: methane 1.4%, carbon monoxide 77 parts per million (ppm), and oxygen 19.4% in light smoke. The return continues to be monitored and by 11 AM, the first mine rescue teams, if called, have arrived and are staged.

Situation 2 Con’t.

- WHEN WOULD YOU DECIDE TO ENTIRE THE MINE WITH MINE RESCUE TEAMS, AND WHAT FACTORS WOULD BE USED AS A BASIS FOR ENTERING?

Conditions

- The following information is known:
  1. Handheld gas detector results of the No. 1 Drift indicate rising methane (2.0%) and CO (120 ppm). Some smoke is also visible. Belt also shows some methane (1.1%) and CO (90 ppm).
  2. Handheld gas detector results of the other drift openings (track and intake) are fresh air.
  3. Fan pressure recording chart showing a pressure spike, as well as a drop in the operating fan static pressure, at 6:40 am.
  4. Information from crew who evacuated mine in which they stated the following:

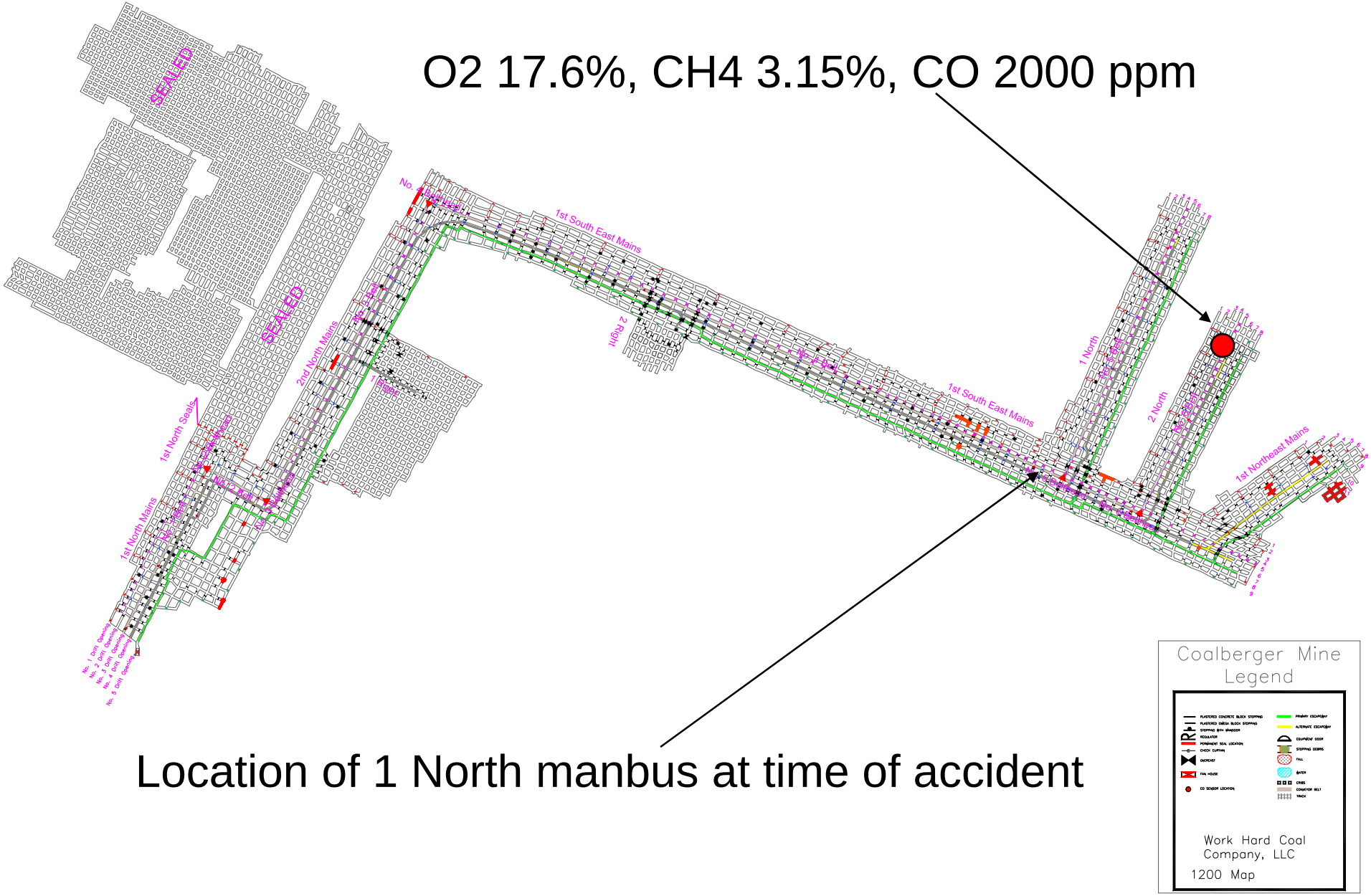
Information from the 1 North Crew :

1. The crew never entered the section. While on the manbus in the South East Mains they experienced a rush of air, dislodging some items such as hardhats and safety glasses.
2. Dust seen in air at time of event
3. Miners heard debris hitting the manbus
4. They experienced changes in air pressures, their ears "popped".
5. Minimal visibility while the 1 North crew tried to evacuate. They initially estimated only a couple of feet.
6. Debris on the tracks in South East Mains.
7. Stoppings damaged in South East Mains.
8. Light smoke in the primary intake escapeway in South East Mains was encountered when they initially tried to enter it.

Situation 3

- The mine has been explored to No. 77 Crosscut in the 1st Southeast Mains, some ventilation controls are reestablished to that point, and a fresh air base has been established at No. 66 Crosscut. A mine rescue team is exploring the first 10 crosscuts in 2 North. The exploration team has found an abandoned manbus on the track at No. 6 Crosscut. Evidence indicated that the 2 North miners left the manbus and donned their SCSRs. Footprints suggest that they traveled toward the mouth of the section after donning their SCSRs. The 2 North miners tracks could be followed until they reached some water accumulated on the mine floor. It is thought that the 2 North miners could have retreated back to the face area. The face area of the section is approximately 2,500 feet from the fresh air base. Barometer is rising slowly.
- Also, information from a rock dust borehole near the section loading point is available: O_2 17.6%, CH_4 3.15%, CO 2000 ppm.

O2 17.6%, CH4 3.15%, CO 2000 ppm



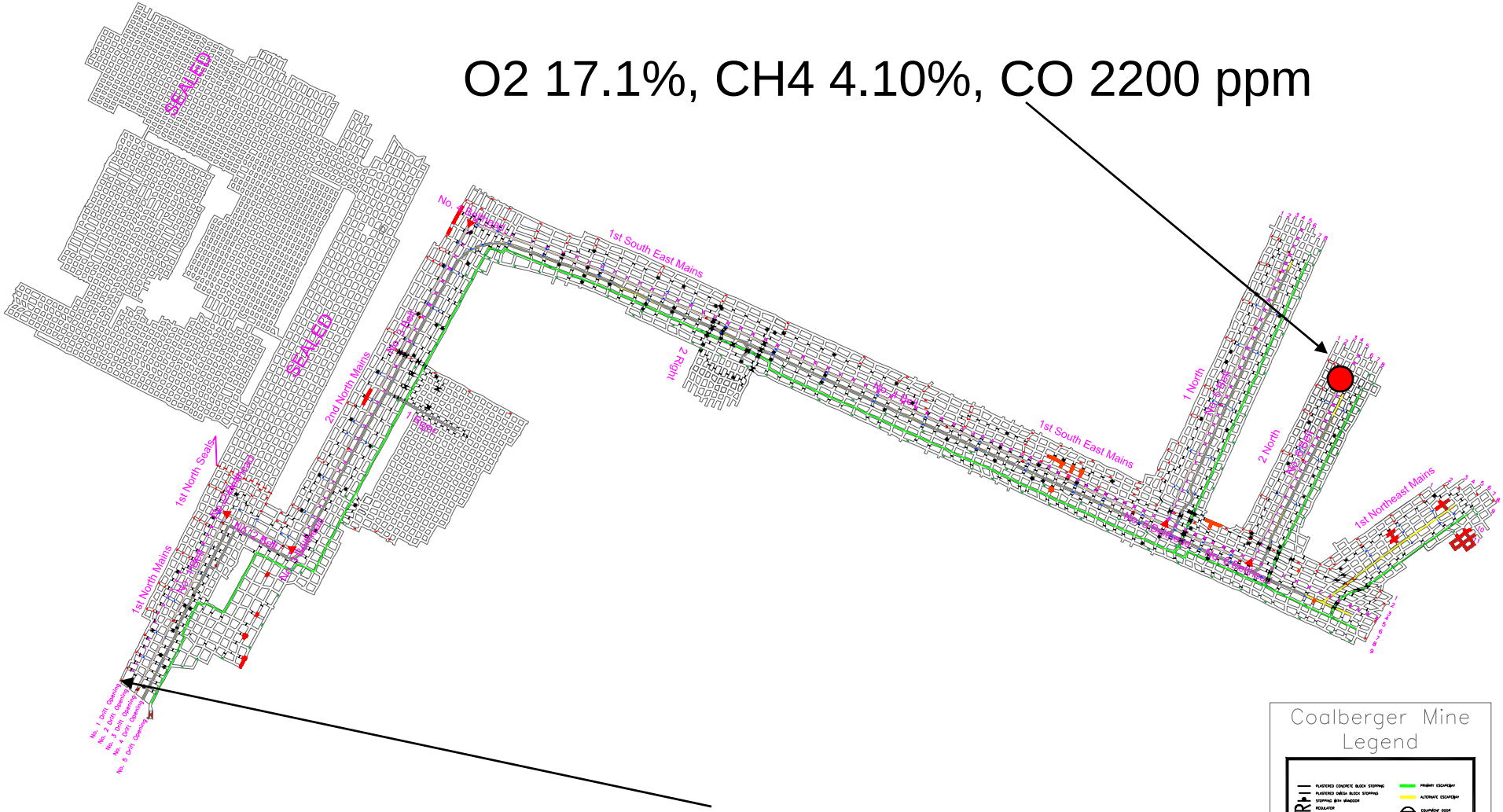
Location of 1 North manbus at time of accident

Conditions

- The following information is available:
  1. No sampling locations are explosive
  2. CO at the rockdust borehole are steady to slightly rising, now at 2200 ppm. Methane 4.1 percent (highest methane at any underground location) . Also light smoke and smell of burning.
  3. Handheld gas detector results of the drift openings remain steady
  4. Gas chromatograph results from samples collected from the borehole drilled into the 2 North section are consistent with handheld readings.
  5. Information from mine rescue team exploration on damage which is shown on the mine map for situation 3.

- WHAT WOULD YOU RECOMMEND AND WHY?
  What are the potential ignition sources on the section?

O2 17.1%, CH4 4.10%, CO 2200 ppm



O2 18.9%, CH4 2.2%, CO 220 ppm

Situation 4

- Methane levels in the section return (2 North) 4.0 %, intake 3.6%.
- Also, information from a rock dust borehole near the section loading point is available: O_2 17.2%, CH_4 3.90%, CO 2240 ppm. Ventilation controls are repaired to 3 breaks inby the mouth of 2 North.
- Miners may have entered the portable refuge chamber. What effect does this have on your next decision?

Situation 5

- Methane levels in the section return (2 North) 4.9 %, intake 4.0%.
- Also, handheld readings from the rock dust borehole near the section loading point is : O_2 14.4%, CH_4 5.9%, CO 2240 ppm.
- Thirteen miners are on the section – What is the main concern for the mine rescue team if the miners are in the refuge chamber?