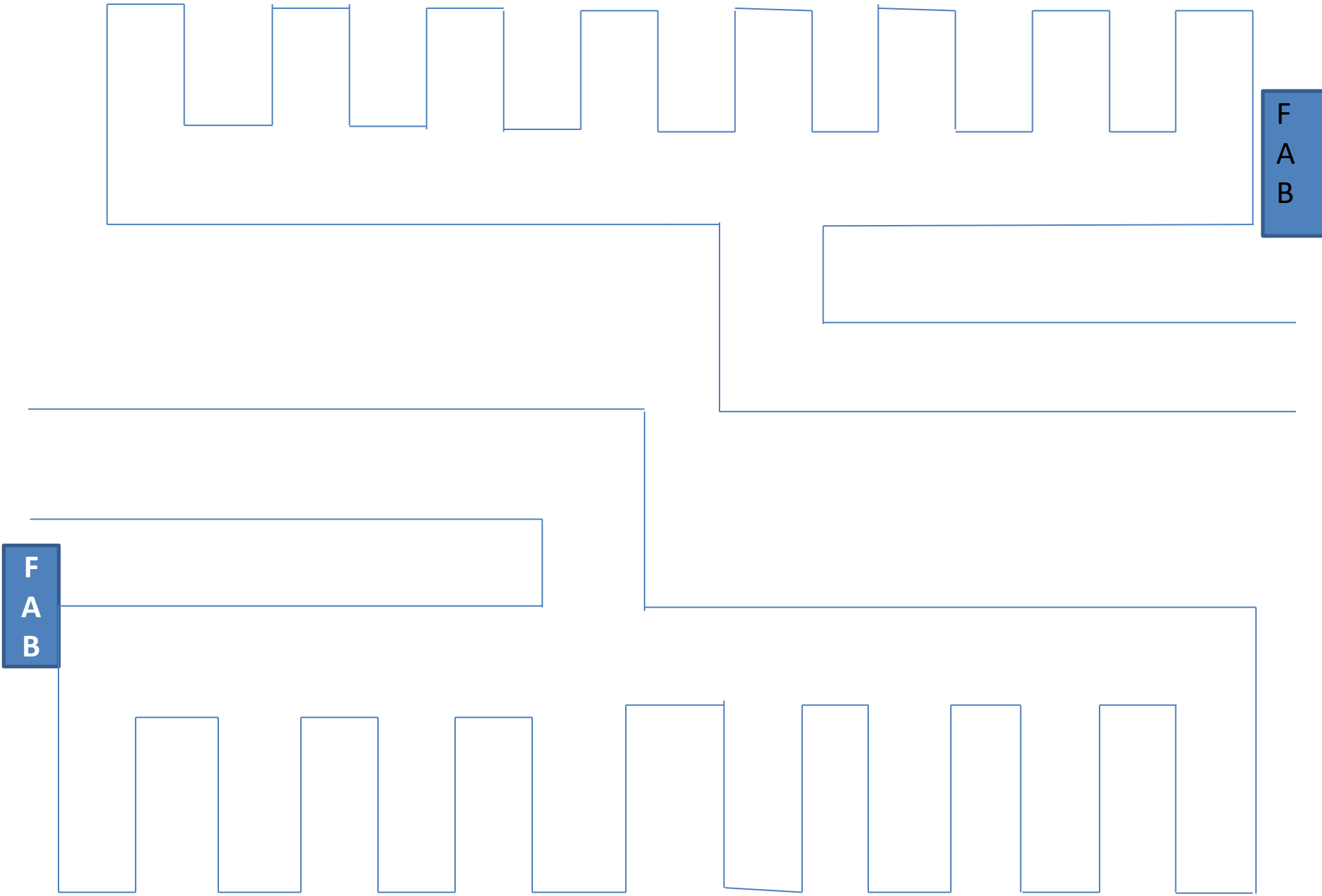
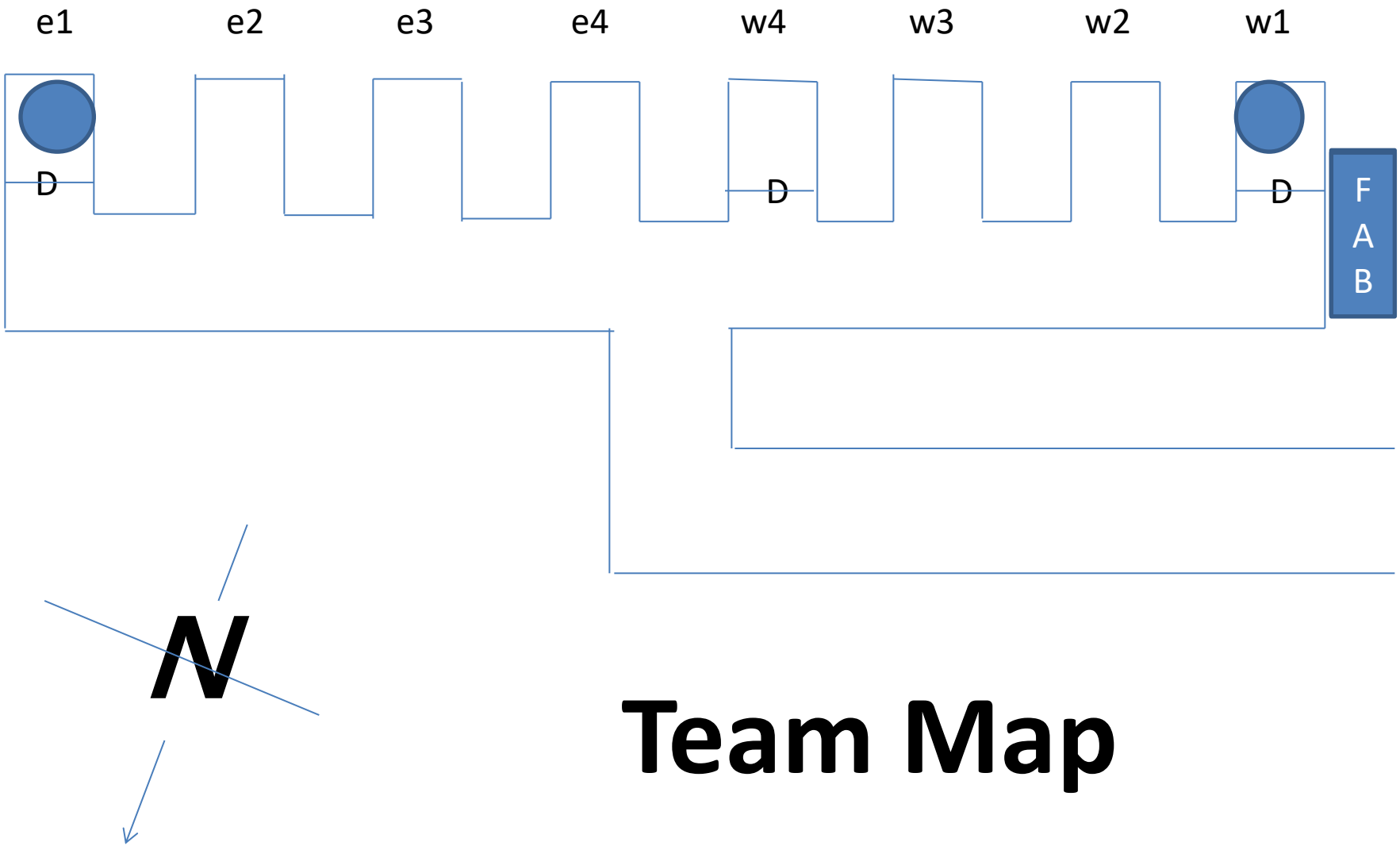
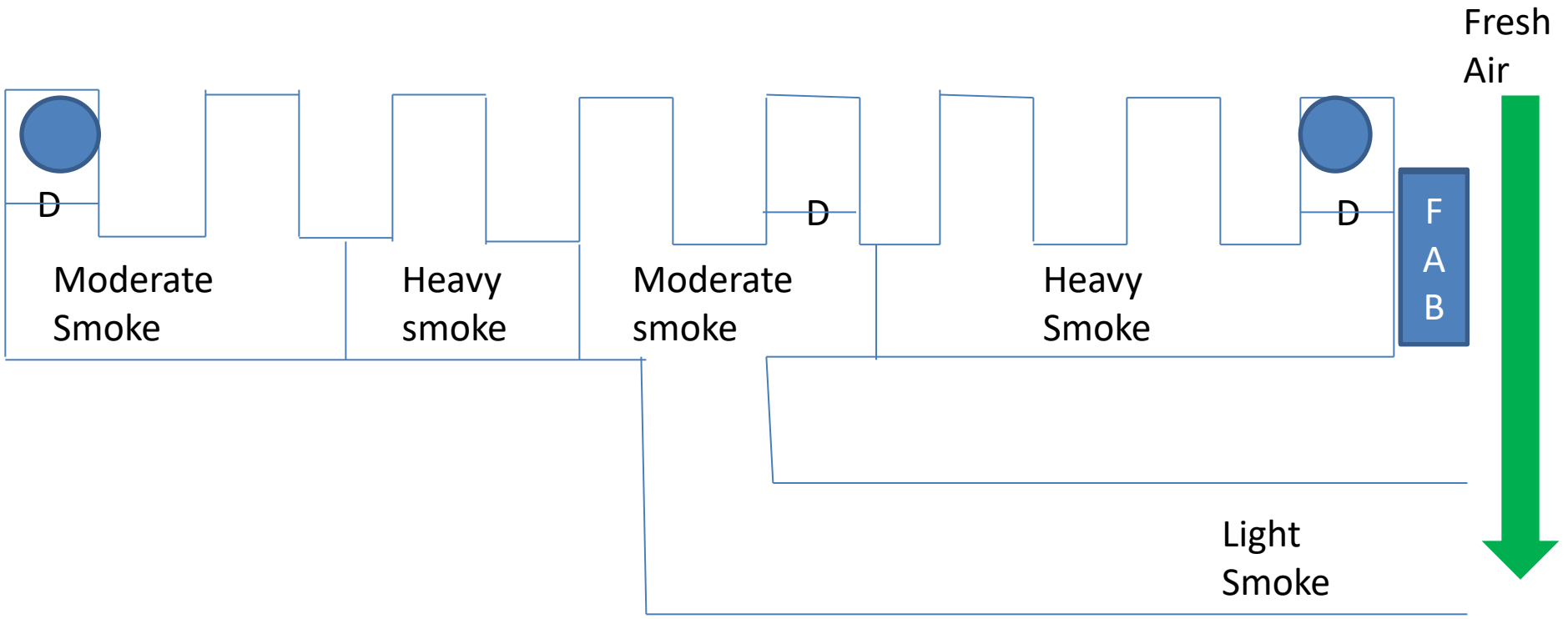


Field layout



Team Map


Fresh
Air
D
D
D
F
A
B
Moderate
Smoke
Heavy
smoke
Moderate
smoke
Heavy
Smoke
Light
Smoke

Smoke Map

The Spring Mine is an underground gold operation that is currently producing. The mine is operating using a multiple level, stope cut and fill mining plan with primary decline, vent shaft with emergency hoist, and 6 mining levels. The mine has one adit entrance, which is used as the only haulage entrance and exit. At present, there are six levels in the mine, but the sixth level is abandoned, and has been backfilled with an aggregate concrete mixture, leaving only the levels entry drift, secondary escape shaft, and vent shaft access.

The ore body is hosted in granite and quartzite that is intersected by a regular pattern of north-south oriented vertical joints. The joint system provides pathways for water inflow, and water has been a problem in some areas, and is pumped from the lowest level through a pump discharging through the vent shaft. Horizontal slip separations have been detected in the roof in several areas, which are suspected to be the cause of some minor roof falls. Roof bolting is done on a spot basis, depending on rock pressures and fractures in certain areas.

A ventilation shaft has been developed and is used for emergency hoisting as a secondary escape. Mine ventilation is provided by a reversible fan located atop the ventilation shaft. Fresh air is drawn into the mine through the portal entrance, and is coursed through the production decline to the vent shaft. Fresh air is drawn into each individual level through an auxiliary 50 horse power fan attached to the roof of the decline, with vent bag attached and placed to the back of the levels. There are emergency escape shafts with ladder ways located at both ends of each level providing access to one level above or one level below, that have air doors to prevent air contamination between levels. Level exhaust is then pushed out of the level entrance and into the downstream flow of the decline, eventually being vented out the shaft. The vent bag is mounted near the roof against the west rib of level entry. There has never been methane detected in the mine, and there are no known gas or oil wells or other underground mines in the area. Elevated levels of NO2 have been measured following production blasts.

The mine operates two 12-hr shifts per day. There are normally 18 miners plus a shift supervisor working underground, but other company personal and various contractors may be underground as well at any given time. The tag board is located on surface, and the mine generally has good compliance with tagging in and out.

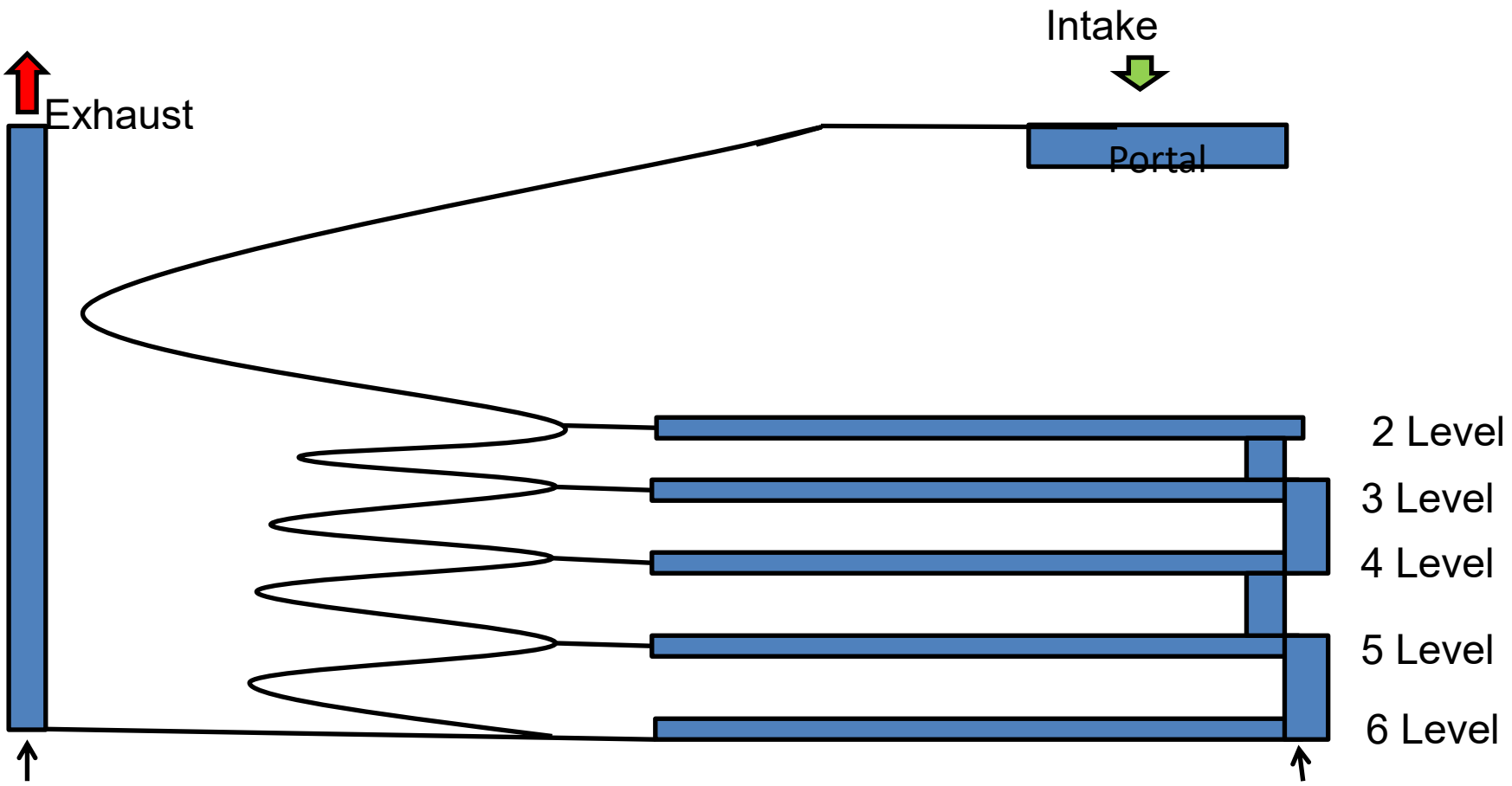
Monday at about 5:30 PM, just before shift change, the shift supervisor smelled and saw smoke near the number 5 level entrance. He started looking for the source of the smoke, but it quickly became heavier, so he ordered a mine evacuation without further delay. The shift supervisor and 16 miners were able to successfully evacuate the mine, and tagged out. Two miners are unaccounted for and are presumed to still be underground. At this time, both underground mine power and the main ventilation fan are left on, they are under guard, and smoke is coming from the shaft.

There have been 3 shifts of two mine rescue teams, which have explored and mapped levels 2, 3, and 6 There was heavy smoke and intense heat encountered midway into the level 5 access, and a regulator has been placed there. Although the fire has not been pin-pointed, it is believed to be coming from an empty stope on level 5 that has been used for a trash dump with materials such as waste lumber, explosives packing material and general waste for the past few years. A fresh air base has been established in the decline on the fresh air side of the level 4 entrance.

The Level 4 fan has tripped, and is not operating. The Breaker has been reset but the fan remains off.

There is a fully equipped mine rescue team ready to be your team's backup, and another team will be sent in to replace you after two hours. If your team is willing to help, we would like you to give us a damage report; extinguish or seal any fires; account for all missing miners; bring any live miners to the surface; and explore and map only level 4 of this mine. All materials needed to work this problem are located in the mine and are identified with placards. Good luck.

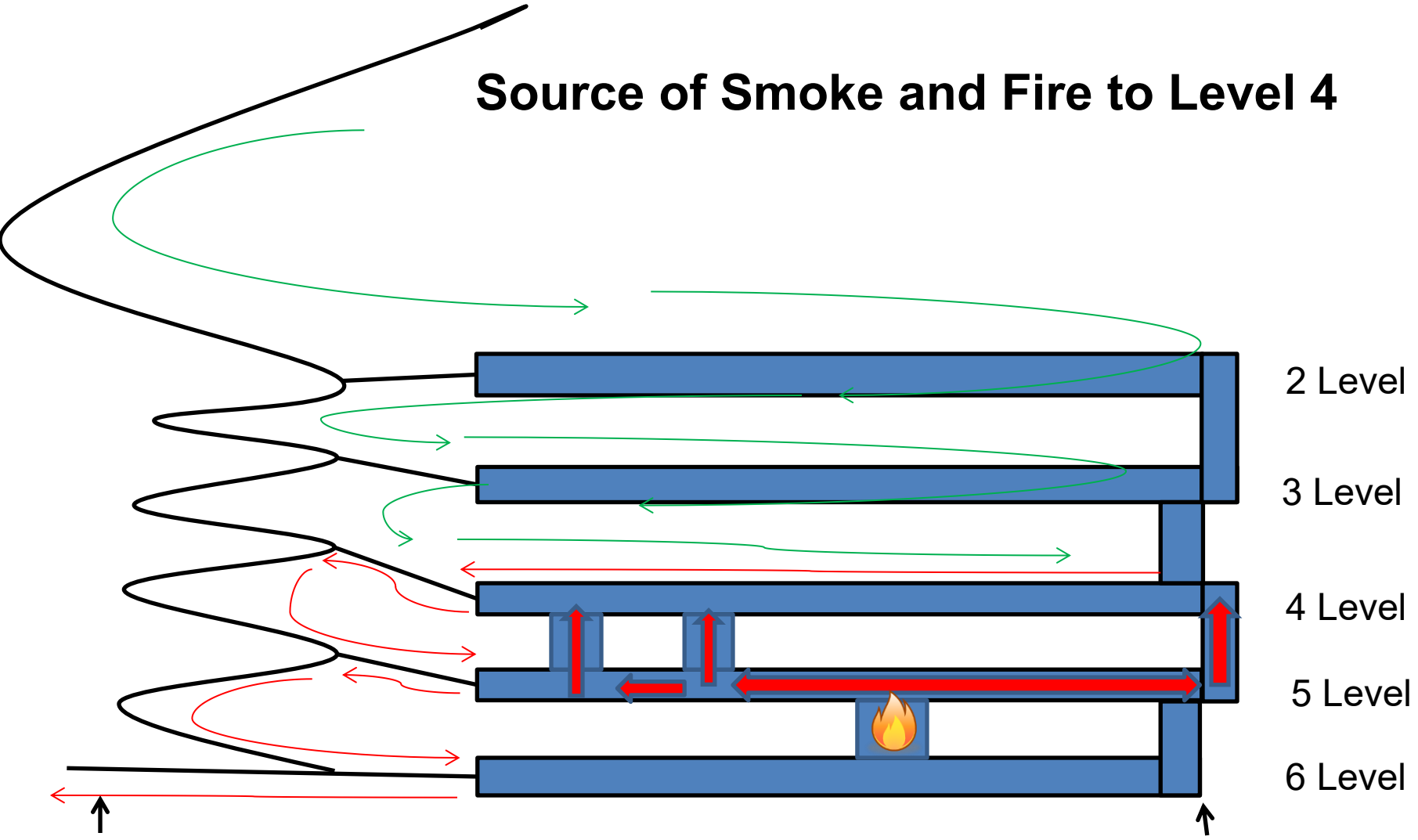
MINE MAP



12 foot vent shaft with reversible fan on surface, and emergency hoist

Secondary escape shaft, Level to Level, ladder decks

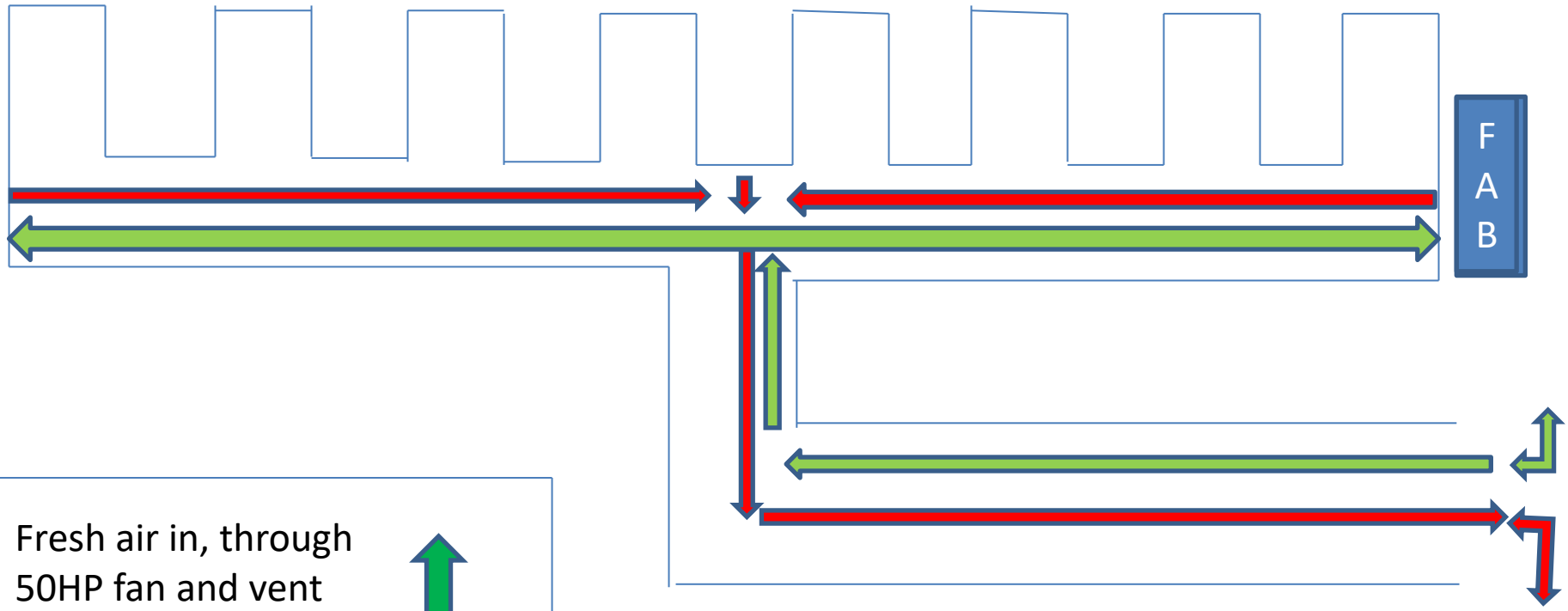
Source of Smoke and Fire to Level 4



12 foot vent shaft with
reversible fan on surface

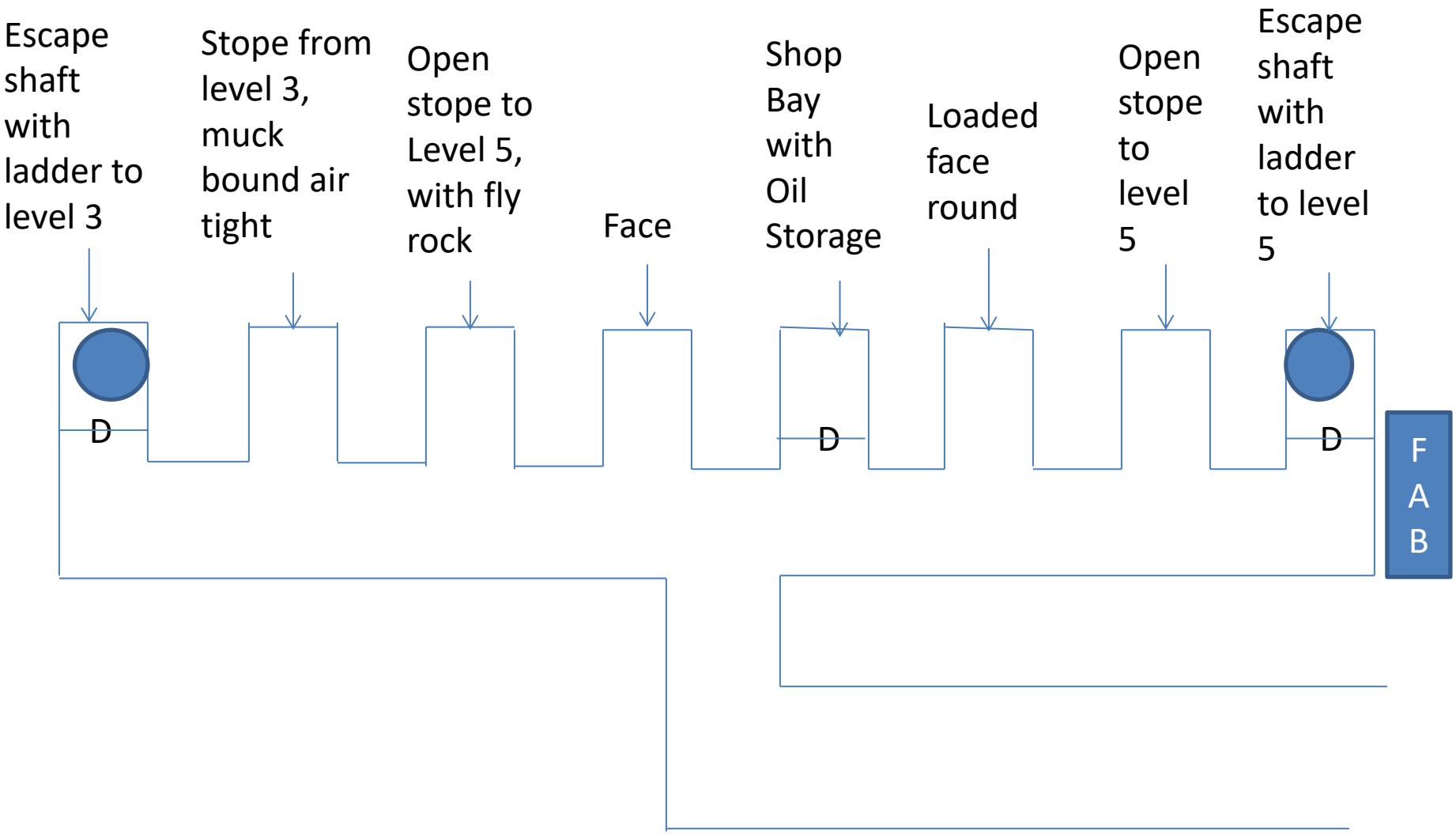
Secondary escape shaft,
Level to Level, ladder decks

Level Ventilation Design

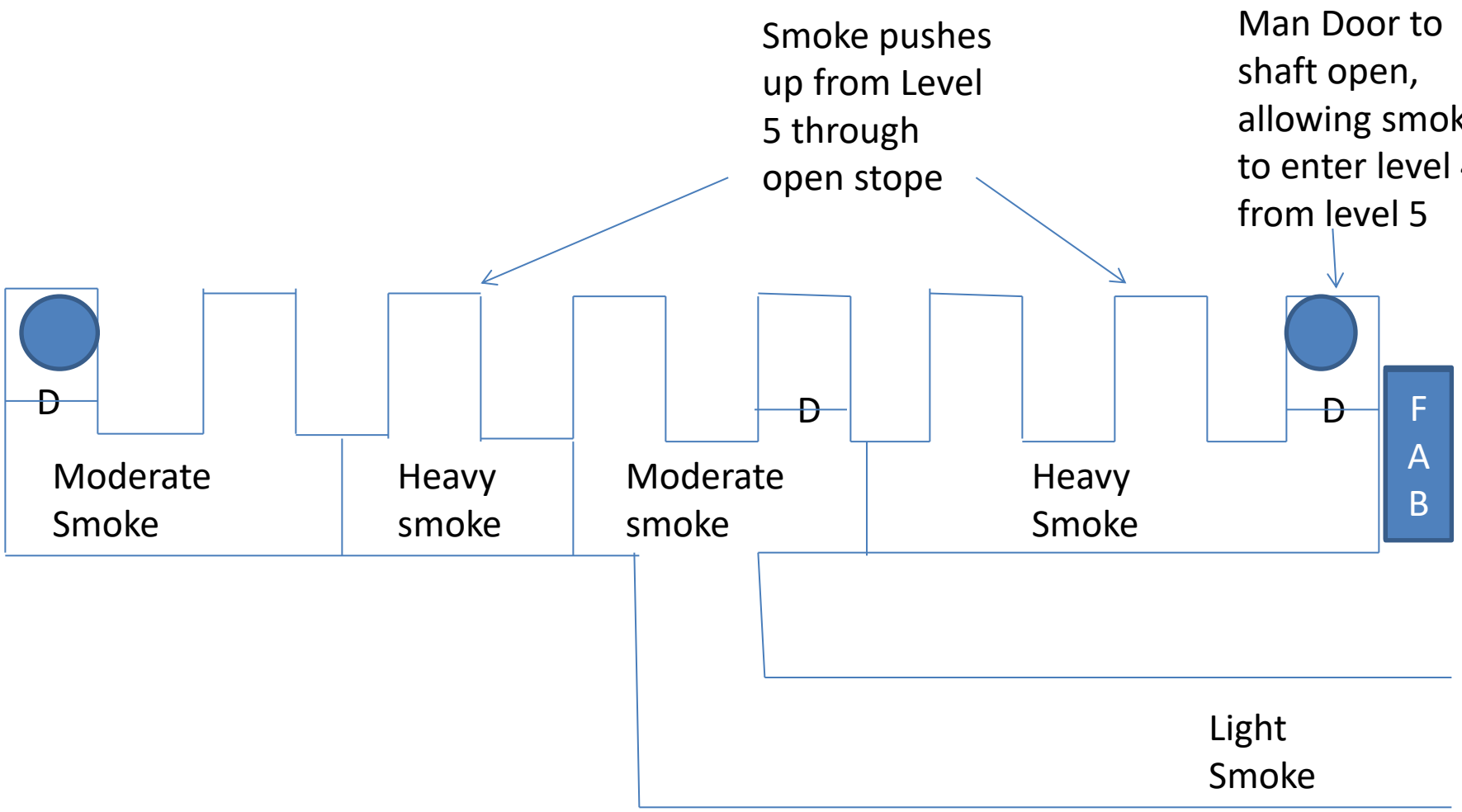


Fresh air in, through 50HP fan and vent bag

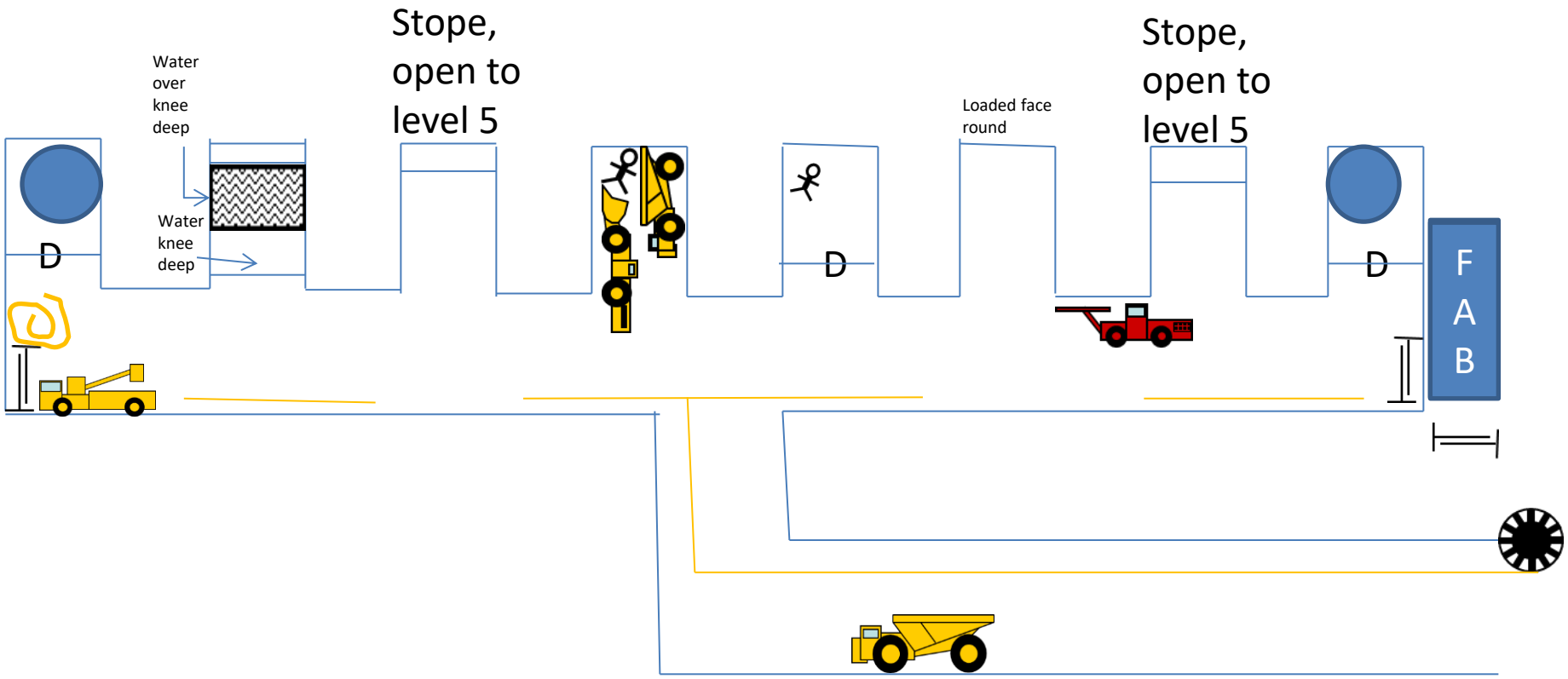
Exhausts pushes out back into the decline to the vent shaft


Escape shaft with ladder to level 3
Stope from level 3, muck bound air tight
Open stope to Level 5, with fly rock
Face
Shop Bay with Oil Storage
Loaded face round
Open stope to level 5
Escape shaft with ladder to level 5
D
D
D
F
A
B

Problem Map

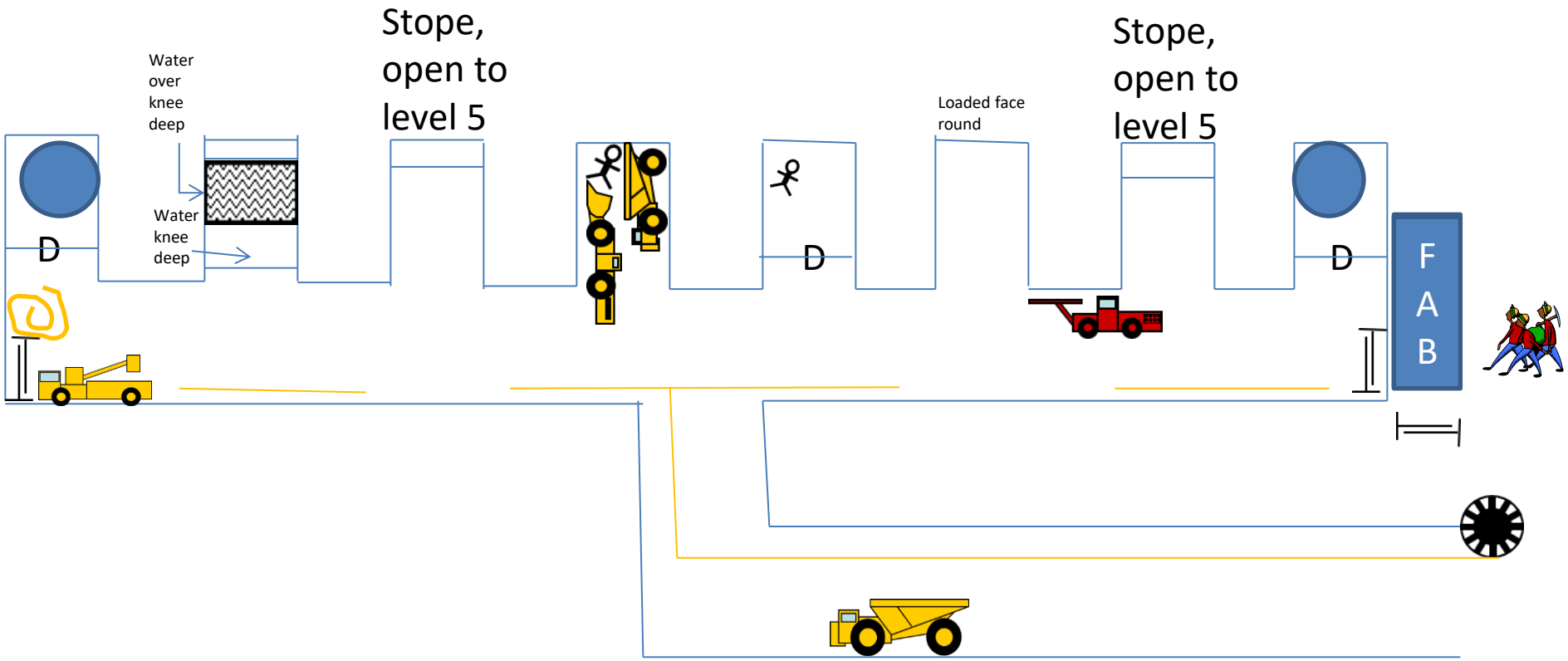

Smoke pushes up from Level 5 through open stope
Man Door to shaft open, allowing smoke to enter level 4 from level 5
D
D
D
F
A
B
Moderate Smoke
Heavy smoke
Moderate smoke
Heavy Smoke
Light Smoke

Smoke Map



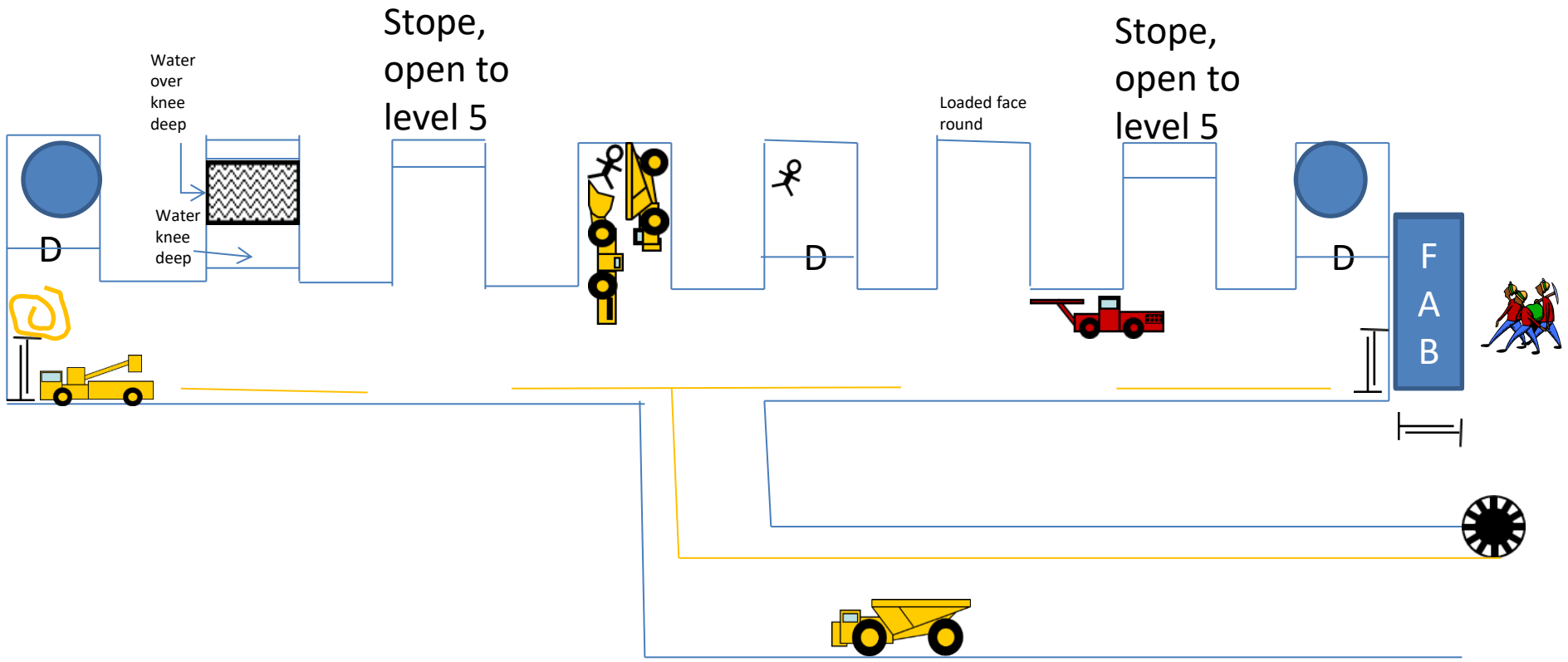
Problem

Solution



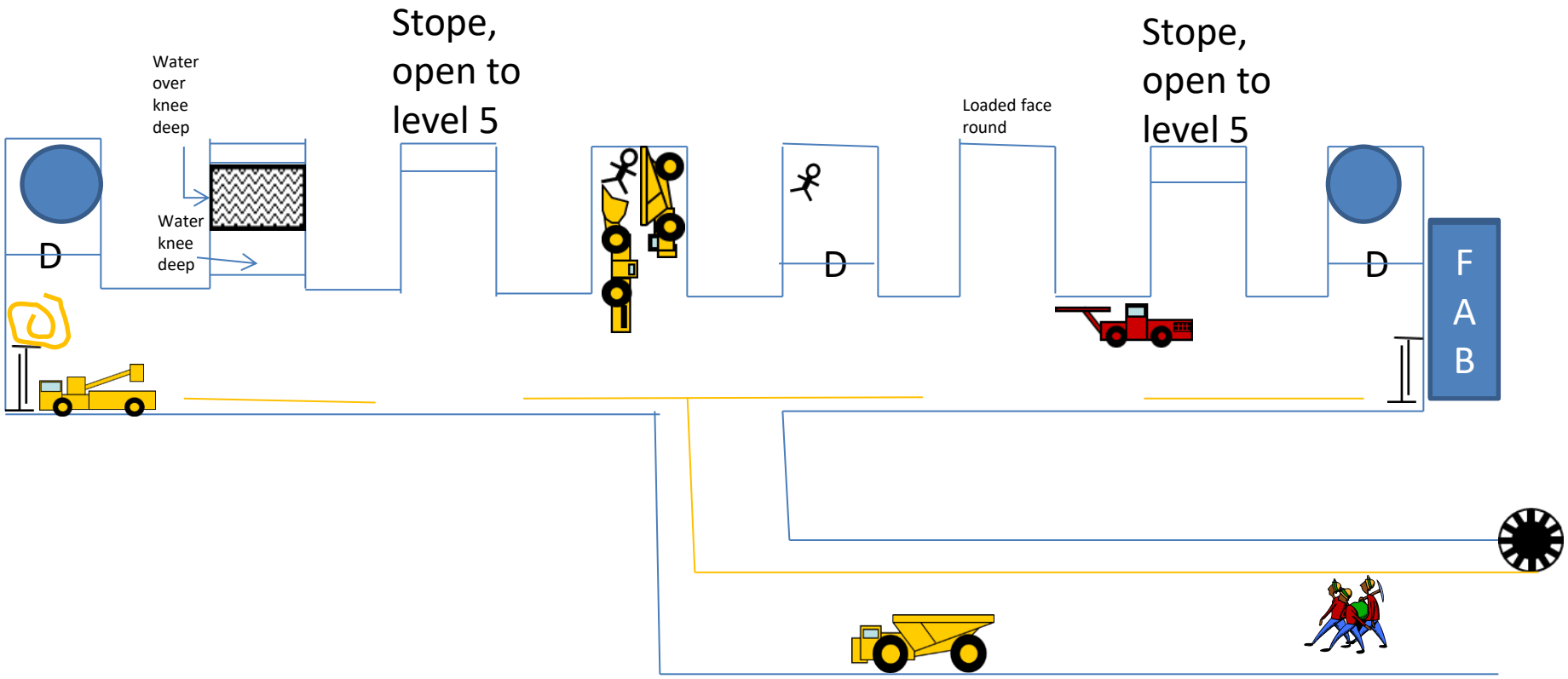
Problem

Solution



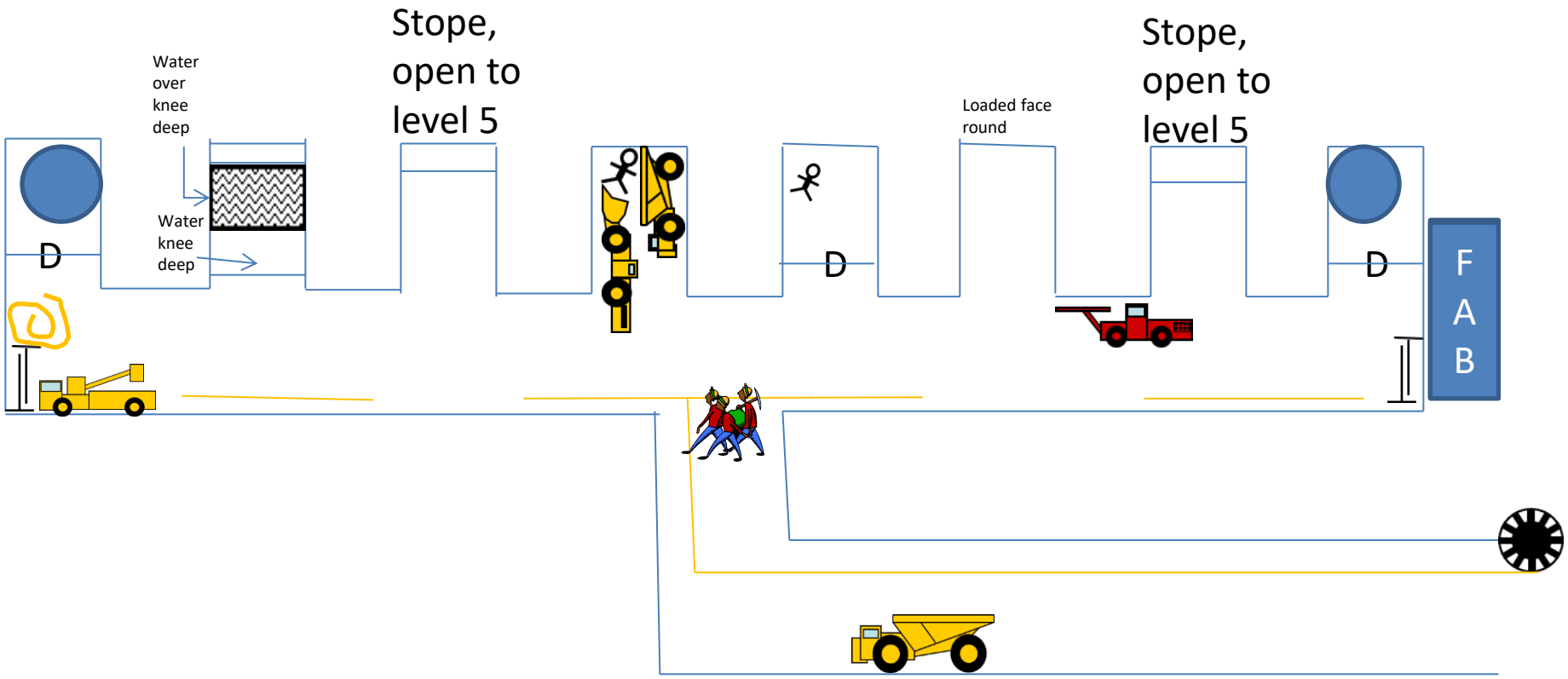
Problem Solution

Team arrives and receives the problem from the number 1 judge at the fresh air base, and prepares to enter the level. They will complete their team checks and explore level openings. Teams will likely gather brattice material from FAB, and travel into the level.



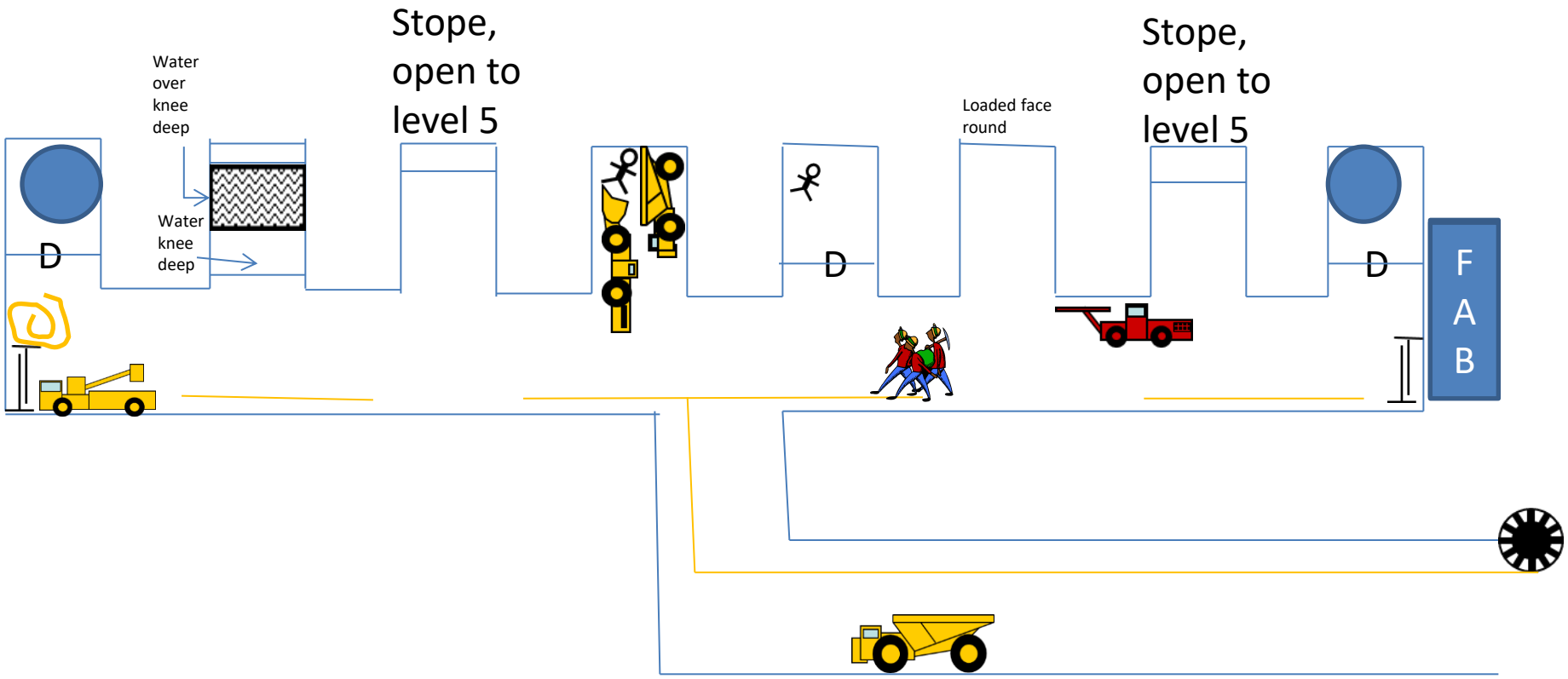
Problem Solution

The teams will count off entering the mine, and entering smoke, they will complete their 50’ check and begin systematic exploration. Teams will move quickly into the entrance, mapping a parked truck and coming to the intersection of the level. They will then travel either east or west.



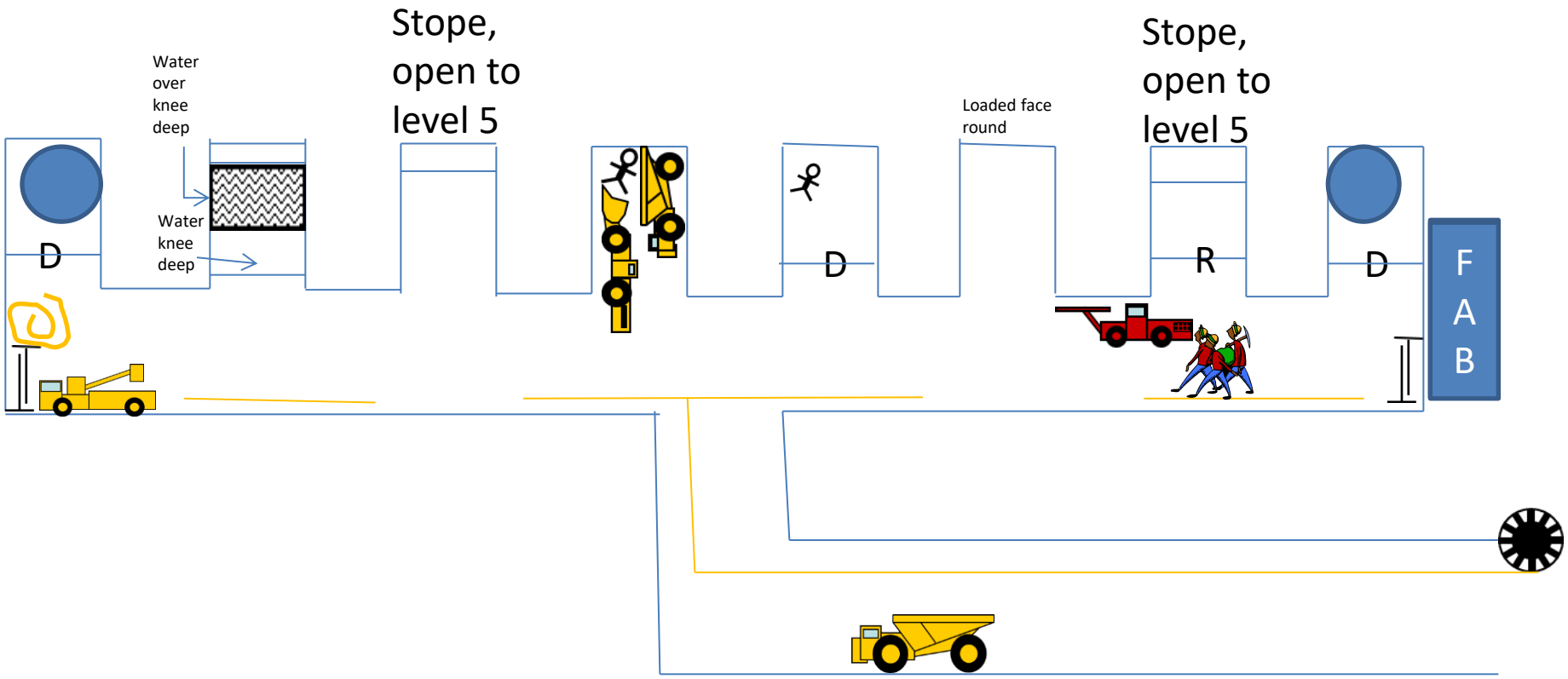
Problem Solution

The teams will explore into the level drifts, mapping and testing gas as the proceed. They will find vent bag with an air line running into it, with a live miner in it, at the face in E4 (the mine with babble incoherently). The team will be unable to remove the miner due to dangerous gas levels. The team will either travel further east or west to the closed door on the shop. They will knock and check for persons but will receive no answer.



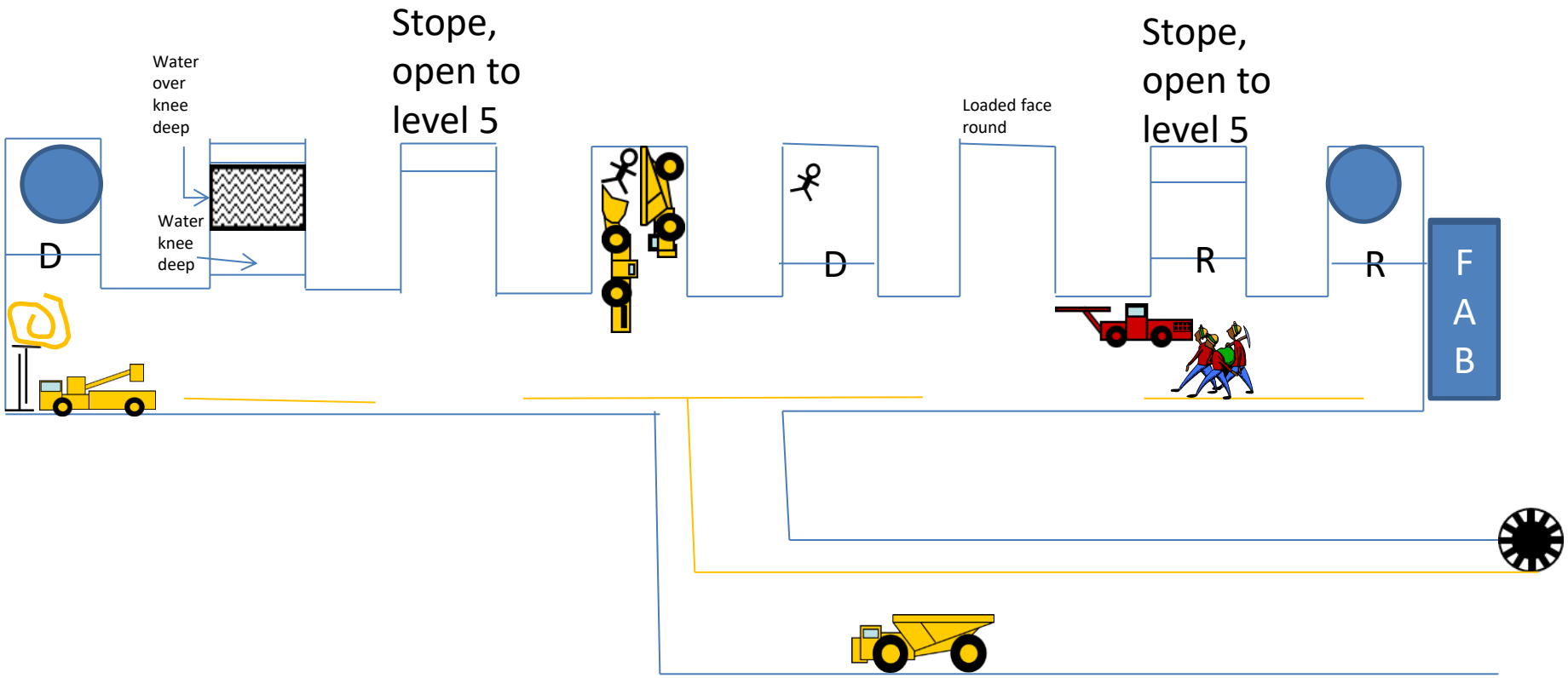
Problem Solution

The teams will discover the vent bag is not in tact, but have no supplies to put it back in place. They will then need to shunt the blasting cap in W3 for team safety, and finish exploring the face. They should then proceed into W2, where they will find a stope, open to Level 5. The team must identify this as an access to the fire, and construct a regulator, without delay.



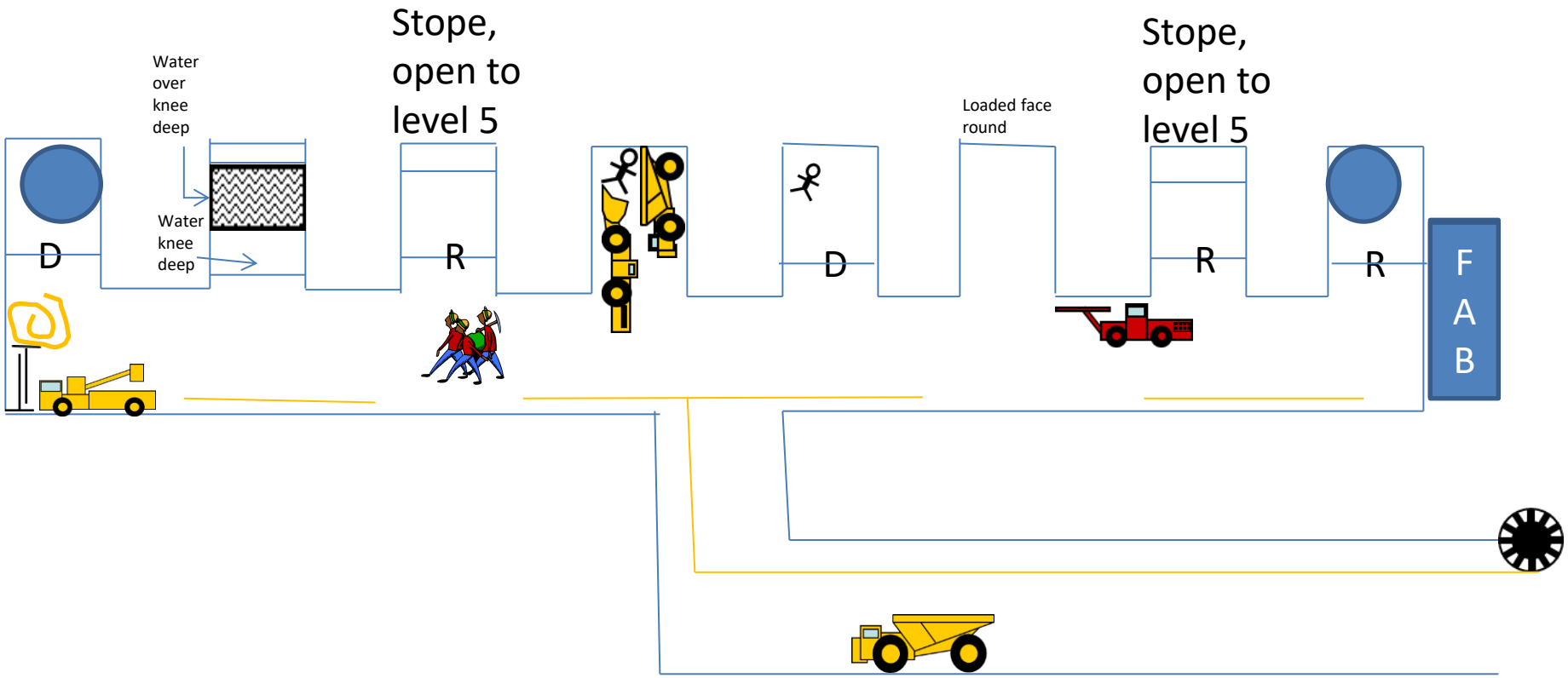
Problem Solution

There are no discounts for systematic, or 2 + 3 in this problem. Teams should now continue to travel west, were they will discover another set of brattice. They will then explore the shaft that leads to level 5. They will find the door is partially open, and that it is a source of smoke, and a path to the fire. They must explore behind the air door, and should use the air door as a regulator when they're finished..



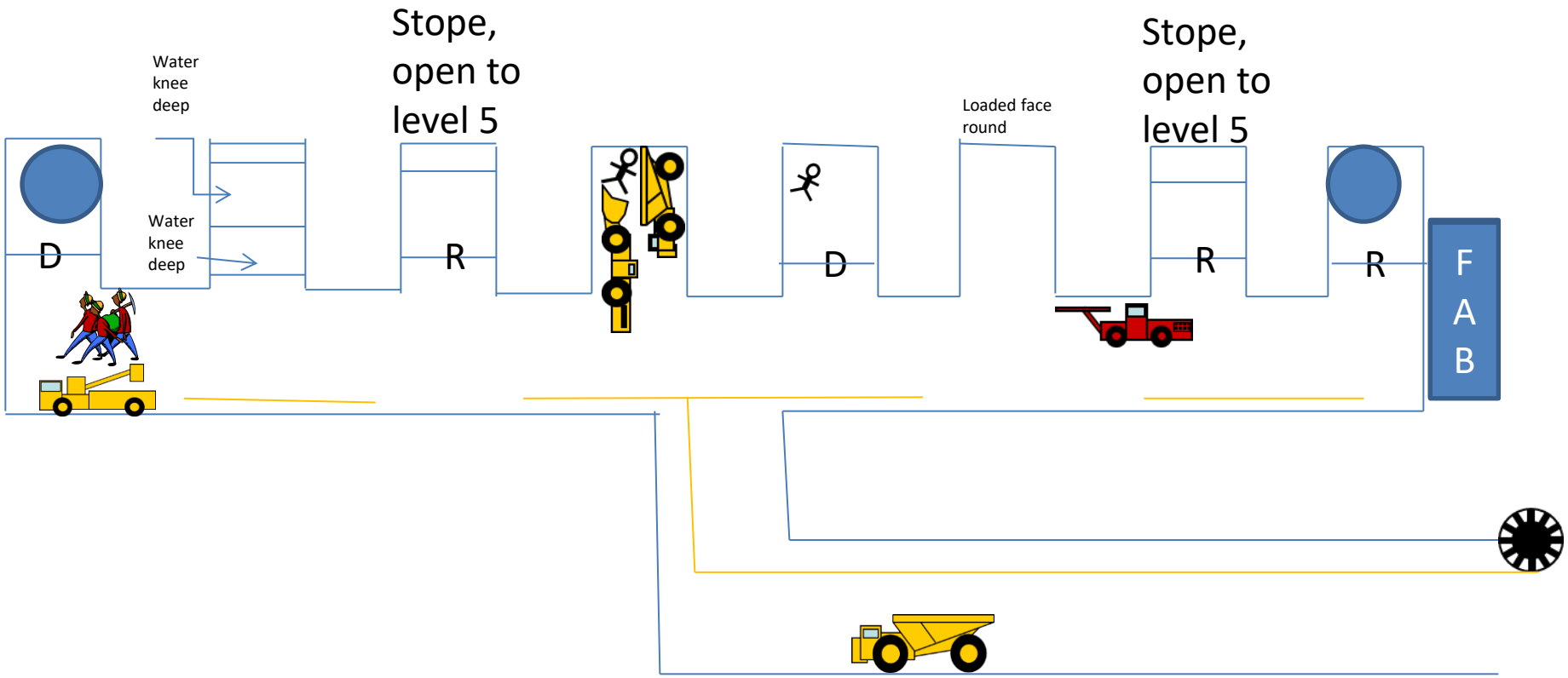
Problem Solution

The team should now travel back to the east drifts, finding another open stope to level 5, also emitting smoke and a path to the fire. The team will again need to use their brattice (if they took it) to regulate the fire. If they left the brattice, they will need to return to retrieve it, returning directly to regulate the fire or they shall be discounted for undue delay.



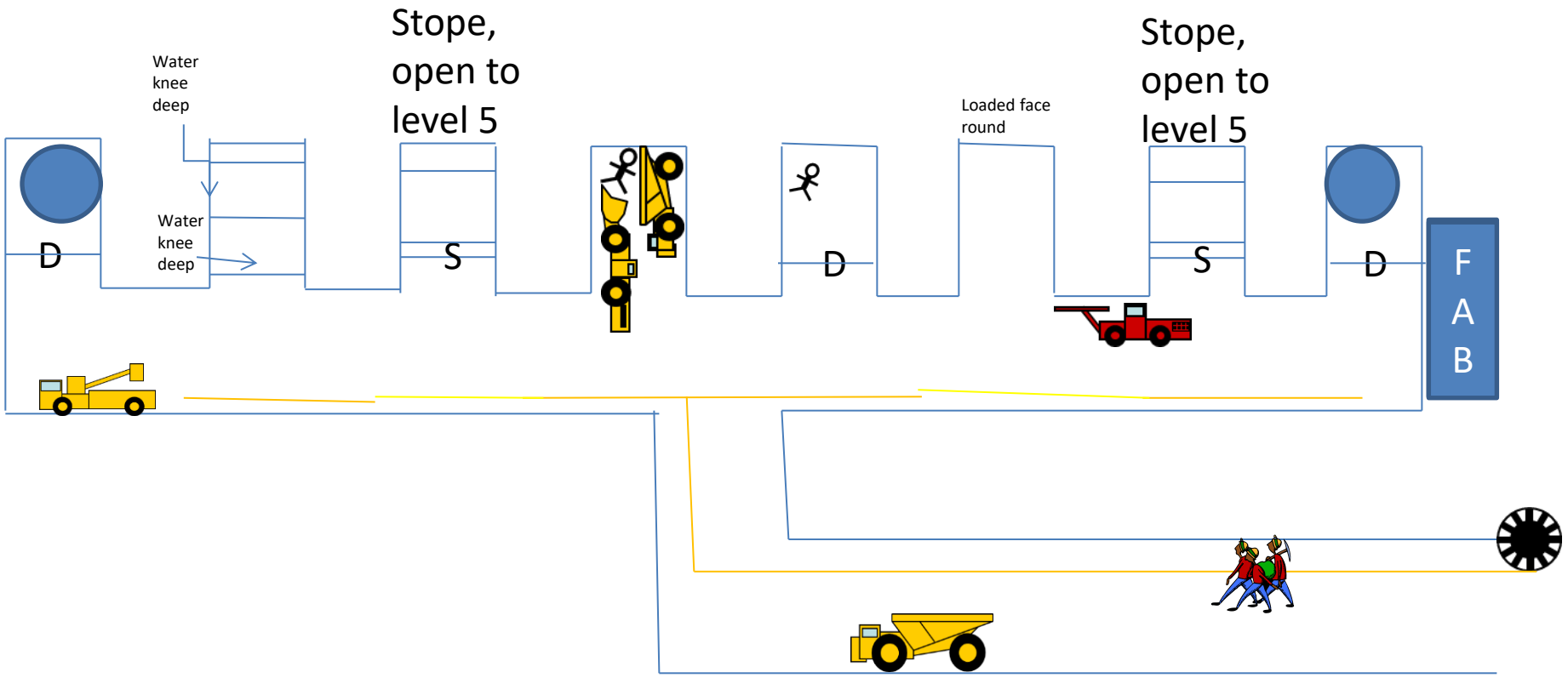
Problem Solution

The team will map that the vent bag in the main drift is out in the entry to the level. They will not have any material to repair it at this time, so they should continue exploration to the east. They will enter into water knee deep in drift e2, but not entering water over knee deep. The team will not have a pump to finish exploring this drift at this time, so they should continue to the east. The team will find another brattice, spare vent bag, and a small air activated water pump.



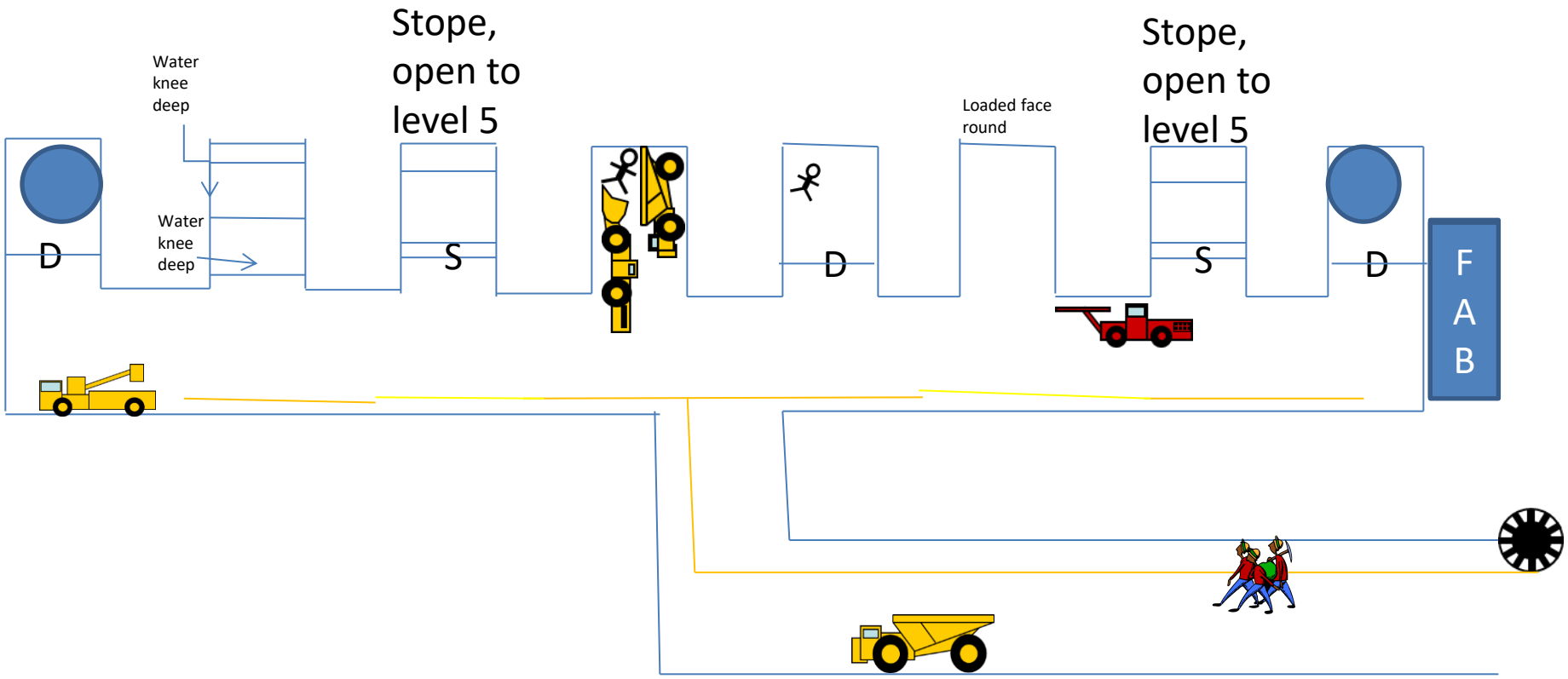
Problem Solution

The team needs to place the pump in e2, and pump out the water, exploring to the air tight muck bound stope. At this point the teams have explored all available areas, and need to begin ventilating the level. They will repair both sections of missing vent bag, seal the regulators and start the level fan. If teams ask to seal the level 5 regulator, the number one judge will inform them it's now sealed.



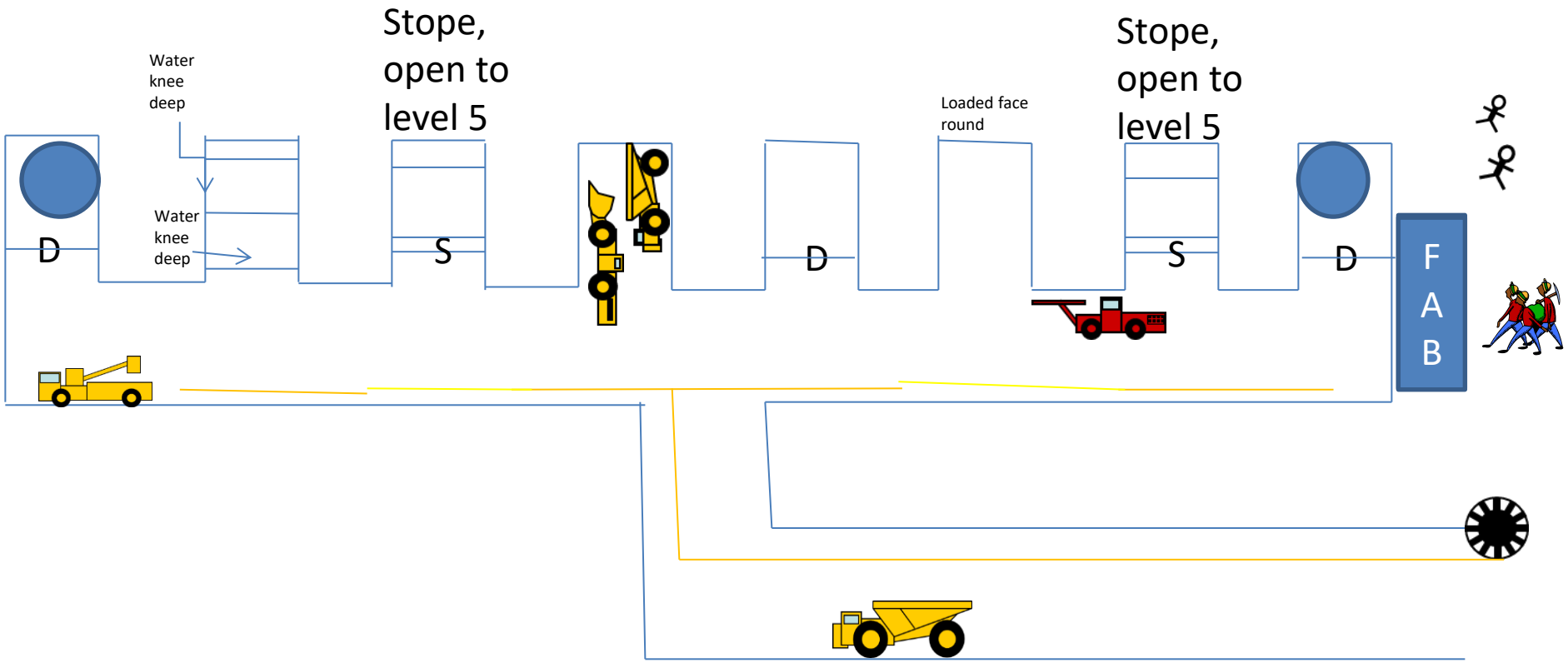
Problem Solution

If teams move muck out of e2 or open the vent doors to level 3 located in e1 to exhaust smoke, they will contaminate the fresh air base, and shall be discounted for team endangerments. Ventilated properly, the air will clear very fast, and the placards should be turn to reflect clear air. The teams should now re-enter the level, testing gas at each intersection. They will need to use a wing curtain, to help ventilate in front of air doors, and into levels they wish to enter. This level must be ventilated this way.



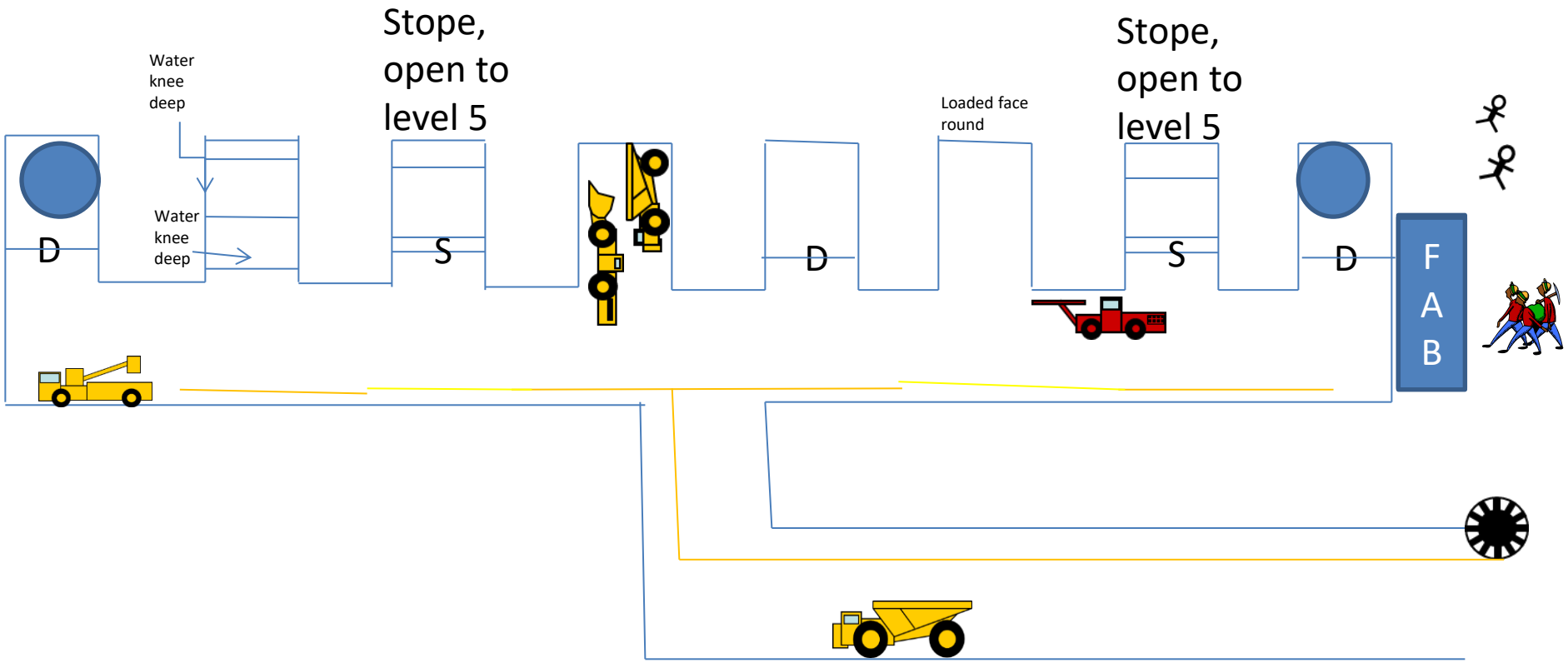
Problem Solution

Teams must return to the patient in e4 directly, if they acknowledged a victim there. They do not need to build an air lock here, since the miner is in a section of vent bag with mine air, and there are no unknown areas they are entering. The teams will find they can complete an initial assessment, and walk the miner to fresh air,



Problem Solution

Teams should then return to drift w4 (maintenance bay). They will need to hold a wing curtain to sweep the air in front of the door, and construct an air lock to enter the air door, since they are unaware of conditions behind the door. Once they enter, they will find a miner standing in good condition, they can conduct their initial assessment, complete exploration of this area and again walk the miner to fresh air.



Problem Solution

Teams have the problem completed, except for one area left over for exploration. They will need to travel back into the mine, retrieve their brattice, and air lock into the door in e1, to complete exploration of the level.

Team will then return to the fresh air base to stop the clock, and conclude the problem.

Level Template