How dangerous might fuel emergency be? How can a situation develop in case of fuel problems on board.

Fuel system related problems in flight can be extremely dangerous. As we know fuel system brings fuel to engines and without fuel the engines will lose power and stop operating and the aircraft can't be in the air. Depending on the extent/nature of the fuel system malfunction, fuel problems may lead to diversion to alternate aerodrome for refueling (technical stop). In the worst case the crew will declare an emergency and request priority for landing at the nearest suitable aerodrome. If they are unable to reach this point the crew will perform a forced landing at any surface including water (ditching is possible). Moreover (even more) fuel leak can be the reason for fire on board or on the ground.

- ***What terms may be used to describe the fuel status?***

To describe the fuel related situations pilots may use the following definitions:

- **Fuel leak** – flow of avgas from the fuel system
- **Fuel contamination** – the presence of water or debris in fuel.
- **Fuel shortage** – a low fuel situation (e.g. due to **fuel mismanagement**, increased **fuel consumption**, fuel gauge malfunction, fuel leak, etc.)
- **Fuel starvation** - a situation when fuel is unable to reach the engine(s) (e.g. due to fuel contamination, fuel pump malfunction, etc.)
- **Fuel exhaustion** - a situation when an aircraft is completely out of fuel

- ***What factors can affect fuel consumption in flight?***

Fuel consumption mostly depends on aircraft type and weight (performance) it depends on altitude, speed, destination/distance, weather, wind in particular. Heavy aircraft spend more fuel. At high levels aircraft use less fuel than at low altitudes. Aircraft may use more fuel due to fuel system problems, for example: fuel starvation, fuel leak or contamination, faulty pumping system and so on.

- ***How can weather affect fuel consumption?***

Actually strong head and cross wind may increase fuel consumption and cause fuel exhaustion. Tail wind ,on the contrary, decreases it. In case of bad weather aircraft may need to avoid affected area so fuel consumption is greater.

- ***What are weather conditions that increase fuel consumption?***

These flight conditions are: head wind, jet stream of the opposite direction and may be low temperature. Any weather phenomena requiring avoidance.

- ***How can wind affect fuel consumption?***

On the one hand at taking off with a head wind lifting power increases and the aircraft can take off quicker and save fuel. It's good. On the other hand (as I have already said) strong head and cross wind may increase fuel consumption and cause fuel exhaustion. A tail wind , on the contrary, decreases it.

- ***What is the best wind for the flight en-route?***

Of course, it's a tail wind. Tail wind increases speed over the ground so it takes the aircraft less hours to reach the destination (it decreases flight time), it burns/uses less fuel and fuel consumption decreases.

- ***What wind increase fuel consumption?***

It's a headwind. With the head wind a plane needs extra hours to fly the same distance. So the pilot will have extra hours of fuel consumption. So, the fuel remaining may become critical and not enough for reaching the destination.

- ***What factors lead to fuel starvation?***

Fuel starvation is a situation when fuel is unable to reach the engine. Such a case may arise because of fuel pump malfunction, contaminated fuel (water, metal chips, debris blocking fuel lines and filters), or fuel freezing in very low temperatures.

- ***What problems may arise due to low outside temperature?***

Flying in conditions of extremely low temperatures for a long time may cause fuel freezing, ice crystals formed in the fuel can clog/block filters, it can lead to fuel starvation. (I have already mentioned about it earlier). It's very dangerous because engines may cutoff/stall and it may the reason for crash and fatality.

- ***What are possible pilot's actions in case of low fuel temperature?***

In such a situation pilots will request to descend to lower altitudes . Also they can increase revolution per minute and heat the fuel system. At least, I think so.

- ***What are pilots' requests and actions in case of low fuel endurance?***

MINIMUM FUEL is not an emergency situation and does not require traffic priority, but an emergency situation is possible in case of any additional delay. In low fuel emergency a pilot will declare 'MAYDAY FUEL', and report fuel remaining in minutes. The crew will request diversion to the next suitable or alternate aerodrome for priority landing. After landing they will need emergency services and towing equipment. Also forced landing or ditching.

- ***How dangerous is a fuel emergency?***

It's really a very dangerous situation. It's potentially fatal. Without fuel and engines aircraft can crash, catch fire and explode.

- ***What are controllers' actions in case of fuel emergency?***

I think, the best way for controllers is to follow the Euro-control ASSIST principle

ASSIST ***(A*** *– acknowledge* ***S*** *–Separate* ***S*** *– Silence* ***I*** *– Inform* ***S*** *– Support* ***T*** *– Time)*

Additionally, controllers should clarify with the flight crew the actual fuel status, ask for number of Persons On Board (POB) and if dangerous goods on board, arrange towing equipment standing by.

- ***Have you ever had/heard of a situation connected with a fuel problem on board***?

I'd like to tell about a case /an event which happened when I worked as an Approach controller. I had an overflying flight and when it enetered my zone the pilot reported a fuel system problem and his decision to land at our aerodrome. I immediately informed my supervisor, he in his turn alerted/involved airport authorities, emergency services, the ground staff. All the necessarry vehicles were prepared for arriving of the aircraft. It landed and evacated the RW safely without any damage and injuries. Later the crew explained that they could use fuel only from one tank, the second one became unavailable. So the crew started experiencing difficulties controlling the plane due to imbalance and I think, the only correrct dicision for them was to land as soon as possible.