



## Weird & Wireless: Why is the use of cell phones discouraged around petrol pumps?



*Welcome again to the wonderful but sometimes weird world of wireless comms, written by Joel Young, [CTO of Digi International](#)*

This is another one of those puzzlers for me. I've noticed recently that the number of posted signs prohibiting cell phone usage around gas pumps in the US has gone down. Often times they seem to disappear when

the pumps are upgraded or replaced. So what's the deal?

Well, let's look at what we know: Gasoline really only burns in its gaseous state, not in the liquid form. This is why you may have heard someone say that you could extinguish a cigarette in a bucket of gasoline. DON'T try this.

For a while the liquid gasoline will most definitely extinguish the cigarette and the path the cigarette has to take to get to the liquid will have it move through gasoline vapour mixed with oxygen - a deadly combination.

In order for gasoline vapour to ignite, it also needs oxygen and a heat source. The gasoline vapour / air mix must be in the range of 1.4 percent to 7.6 percent. That tells me that your ignition source, on a calm day, will need to be a few inches to no more than a few feet away from the liquid gasoline (I haven't done the calculations so it is just my swag).

Once we have the right mix of gas vapour and air, we need an ignition source that can provide the proper ignition temperature. For this mix of gasoline vapour and oxygen, we need at least 495 degrees Fahrenheit (280 degrees C).

The only practical way you get that kind of temperature is a spark or flame. This is why smoking a cigarette while pumping gas will put you in the category of the fools.

This is also why we are told to keep ourselves well grounded while we get in and out of our car so that we don't create one of those nasty static electricity sparks while pumping gas.

The problem here is that none of this relates to cell phone usage. In this case we must ask - what are we afraid of?

A cell phone draws the most current when transmitting and much of this power going to send those little signals out the antenna at someplace up to 2100 MHz in Europe. This is all low frequency stuff, meaning that these electromagnetic waves won't really do anything in free space unless you have a liquid and really high power (in the hundreds of watts) like a microwave oven.

The other path is moving a wire or electrical conductor through the cell phone transmission to generate a current. Unfortunately, we again need a lot of power to get a voltage high enough for a spark. So that rules out raw emissions of the antenna, leaving other sources for a spark - namely where the battery connects to the phone.

Fortunately, some really smart people have studied things like this and there are many guidelines for operating electronics in environments where flammable gases are present. You will see this referred to as Class 1 Division 1 or Intrinsically Safe. You can do your own research here but in general, you want to keep the voltage under 30 volts and the current under 300 mA.

Fortunately, modern cell phones have batteries less than 10 volts - most are closer to 6 volts and are also in the safe current range.

That wasn't true in the analogue bag phone days; however, so I believe these cell phone safe signs are a throw-back to the old analogue days.

So, unless you are going to do something stupid like remove you cell phone battery and short it out within a few feet of filling your gas tank (which would start a toxic fire), you should be fine. Just make sure to keep yourself well grounded, because static electricity is probably your biggest safety risk.

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