Possible Solution to Stop the Deep Water Oil Leak at its Source

Below, in short form is a possible solution for stopping the major oil/gas leak in the Gulf of Mexico. Thank you for taking your time to read and consider this idea. Thinking of an idea is one thing, but getting anyone to consider it is something else. Lines of communication to sources that can actually do something seem to be virtually closed, and anything with real-world potential is ignored.

Actually I believe the method described here will stop any petroleum leak if you can get to it. It is also an idea that has never been proposed before. So in that respect, unlike drilling relief wells, it is theoretical (but I know the problems that can be encountered in hard rock drilling at depths of only 2000-3000 feet, and relief wells at the depth they are currently attempting are unproven too).

Those currently working on this problem in the Gulf seem to be approaching it from the wrong direction, as if they were fighting a leak of a denser material in a gaseous environment (oil in air). That seems apparent when you consider what has been attempted so far (injecting golf balls and shredded tires, etc, which is like throwing feathers into the wind, since golf balls are not much denser than the surrounding brine/petroleum mixture at the depth of 5000 feet).

They also don't seem to understand the problems and potential benefits of crystallization, and how in using the right substance crystallization can be turned into an advantage (its interesting that the rapid growth of methane hydrate crystals that form when methane hits the cold water cause so much trouble by clogging the pipe intended to bring the oil to the surface but have no value for preventing the escape of the oil and methane from the well itself).

Consider that saltwater is actually pumped into oil wells to get as much oil from them as possible, because oil is the less-dense medium in the process and will float on the aqueous saline solution. Right now, that is what is happening in the Gulf, and I don't think that anyone has mentioned it yet, but there is more at stake here than just one well. A major portion of the Gulf oil field may be lost if this deep well continues to hemorrhage oil, because many of these offshore wells are actually connected through porous layers of bedded sedimentary, metasedimentary, and metamorphic rocks at depth, well below the sea floor.

The method I am proposing is to flood or inject the leaking pipe(s) and/or damaged blowout preventer with liquefied gallium metal through the leaking containment cap (which is currently in place).

Gallium is a very unusual element, but aside from a few important uses, it is often just considered a curiosity. I became fascinated with gallium at a very young age when I saw some of its most interesting properties demonstrated at Hanford Atomic Works in Washington State.

Gallium will melt in your hand and is non-toxic. So it becomes molten and behaves as a liquid at a very low temperature, essentially room temperature (approx. 85 °F or 29 °C). You can hold molten gallium in your hand, pour it from your hand onto a cool surface, and watch it quickly solidify. It also has one of the longest liquid ranges of any metallic element (boiling at about 2175 °C). This makes it easy to control in the liquid state so it can be easily transported and it also makes a very durable solder.

With a specific gravity of 5.9 elemental gallium is also much denser than saltwater or oil (or drillers mud, which is commonly used to stop oil leaks). And when gallium solidifies from the liquid state it gains volume, becoming less dense, and it expands slightly (gains about 3% in volume). This means that it can form very tight seals in and on almost anything. This also means that it can be injected as a warm non-toxic liquid metal, and when it cools below 85 °F or 29 °C it solidifies and forms a very tight and durable plug. As you know, very few compounds or elements in nature have the characteristic of becoming less dense and expanding in volume when they solidify (one other example is thankfully water/ice).

Gallium is easy to control as a liquid and is a rigid, strong metal when it is solid. Injected into any pipe it forms a solid extremely tight plug due to its slight expansion that can only be removed by intentionally melting it.

Gallium has the advantage of solidifying and expanding at conditions that currently prevail at the Deepwater Horizon blow-out site. The pressure at that depth would lower the freezing point by only about 2 °C if gallium behaves anything like water. That would still mean you could pretty easily deliver molten gallium to the site and have it freeze on contact with the water at ~18 °C, well below the ~27 to 29 °C freezing point of gallium.

Apparently one of the main reasons the Deepwater Horizon leak is so challenging is because the gusher wants to blow everything away before you can get it in place. Since they already tried to inject the blow-out with golf balls and other debris of low density (they called it a junk shot), I know it is possible to inject the problem area at that 5000 foot depth. Another attempt to plug the leak employed drilling mud that they tried to get the well to accept. It was probably a barite-based slurry with a specific gravity of about 3.9. Because of the fast flow of the petroleum out of the damaged well, and because it takes time for such a slurry to set-up, the drilling mud slurry was just blown back out.

Because it is also very cold at that depth in the ocean, if liquefied (heated) gallium was used (instead of golf balls or slow-setting drilling mud) I feel a successful plug would be formed since (as its elemental behavior and density suggests), the gallium would flow along the inner walls of the pipes and harden on them, thinning the inner diameter of the pipes-preventer- and containment cap and choking off the flow of oil.

The density of the gallium itself would also help facilitate this operation since gravity would be working in favor of such an effort and the gallium would be much denser than the saline ocean water or the oil, and as a dense liquid it would be less likely to be pushed aside or “bullied” by the oil, gas, and saline brine, which has been a problem in the immediate past.

Gallium in liquid form could even be mixed with finely powdered lead, lead sulfide (the mineral galena), or even depleted uranium that would serve as a carrying agent, creating a colloidal mixture with an even higher specific gravity than pure gallium. It could also be assisted by creating an electromagnetic field around the damaged structures and mixing in a strongly magnetic powder such as neodymium or magnetized iron which would also aid in making the gallium stay in place along the inner walls of the damaged structures while it hardened.

I have also thought of two plausible hydraulically-powered or compressed gas, piston-driven delivery or injection systems for the gallium. While I don’t have detailed schematics of the actual blowout or the present condition of the existing hard structures, I do know the basics, that there are two vertical pipes (one going to the surface and the other into the seafloor) with a damaged blowout preventer between them, and a poorly fitting containment cap on the top. I feel that this structure, regardless of present damage could be successfully injected and plugged with liquefied gallium.

I know this is entirely theoretical but it seems that we need to "think outside the box" here, since we have never faced this type of disaster before, and we will very likely face it again, even after this present problem is dealt with.

Thank you for taking your time to read and evaluate this idea. If you think this approach might have some merit, with your considerable contacts, please pass it along to anyone that you feel might be able to help. I can be reached at work (760) 603-4569, home (760) 734-3812, or on my cell phone (760) 822-8710.

Most Sincerely,

John Koivula