Two Types of Geothermal Resources

There are two types of geothermal resources associated with hot Magma doing the heating. One is vapor dominate (i.e. steam) and the other is liquid dominate (water at very high temperatures and pressures). In both cases the water comes naturally into contact with very hot rocks and is heated.

In the vapor dominated geothermal resource (as in Iceland and California) the reason for drilling, when drilling is necessary, is to tap into a reservoir of steam. The hot steam comes to the surface and is used directly in heat exchangers or turbines, all with the intent to make electricity.

In the liquid dominate geothermal resource (Puna Geothermal Venture) very hot water (called brine) under great pressure is the goal of drilling. The high pressure water is brought to the surface through drilling. There it is flashed to steam by reducing the pressure of the water. The steam produced is then again used in heat exchangers and turbines, all with the intent to make electricity.

When the steam (vapor dominated in Iceland and California) is the resource, the path of the steam deep in the ground removes residues, some poisonous and/or radioactive, and allows the non-condensable gas H2S (Hydrogen Sulfide) to be removed by S02 (Sulfur Dioxide).

When the liquid is brought to the surface, as is the case at PGV, the residues and non-condensible gases have to be dealt with at the power plant. To the degree possible, PGV attempts to re-inject the residue and non- condensable gases. However, the toxic and possible radioactive residues clog up the equipment as scale. This scale is removed from equipment about every six months to two years. The weight of scale removed has been reported to amount to tons of material. Additionally, during certain plant casualties, the steam has to be dumped to the atmosphere. When this happens non condensable gases, including H2S, escape to the atmosphere after passing through a rig designed to reduce the quantity by chemically absorbing or converting it.

After PGV removes the water/steam from the ground, PGV does pump the condensed steam, entrained solids, and gases back into the ground. Also note that the "residues" are pumped through the re-injection well back into the deep cavity in which they started, but in so doing they pass through the water table and various tubes, strata, and rocks that make up the surface of the earth. A blow out or leak from the re-injection (or production) wells would put these residues into these surface layers. In PGV's history, these leaks or blowouts have happened twice.

In a vapor dominated system like in California, any breakout in the production or re-injection well would cause steam to be released, steam that is largely devoid of the residues and H2S.

If you wish to stay informed about community action and receive the Puna Pono Alliance Newsletter and Bob Petricci's Updates, email **newsletter@punapono.com** with NEWSLETTER in the subject line. ***Puna Pono Alliance needs funds to keep up the fight for Puna. Please contribute by credit card or PayPal at punapono.com/contribute or by check to PO Box 492668, Keaau, HI 96749.*** If you want to help in other ways please call (808) 339-4344.