SUMMARY REPORT ON FIELD HYDROGEOLOGY RECONNAISSANCE

CENTRAL PLATEAU & THOMASSIQUE AREA, HAITI

REPORT DATE: AUGUST 10, 2009
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The following is a brief summary of the findings from field reconnaissance performed by V3 Companies for Haiti Outreach in the Central Plateau of Haiti in May 29th through June 2nd, 2009. The purpose of the investigation was to characterize potential aquifers in the Central Plateau and locate favorable drilling locations in an area to the northwest of Thomassique where drilling success has been poor. The field operations were conducted by Manager of Geosciences, James Adamson, and Project Geologist, Jeff Paddock, P.G.

This report is supplemented by the Map titled: *Thomassique Area, Central Plateau, Haiti – Rapid Assessment and Observation Based Drilling Recommendations, Maps A1,A2 & A3 (Adamson and Paddock 2009).*

Vast Regional Aquifer System (Plateau Aquifer)

Based on our reconnaissance we have collected geology and water quality data that suggests that there is a vast regional aquifer system beneath the entire Central Plateau. This aquifer is within the Lower Miocene and Upper Eocene limestones that outcrop in the mountains that surround the plateau, which is where the direct recharge occurs. The aquifer is overlain throughout the entire plateau by very thick and mostly impermeable units of Middle and Upper Miocene age. The drilling depths to reach this vast aquifer can range from 300 to over 5,000 feet and it is extremely important to perform due diligence prior to attempting to drill to it. This aquifer is shallowest along the perimeter of the Central Plateau and along the axis of anticlines and dome uplift structures. The water quality is expected to be very good in this aquifer based on the results of ion water quality analysis that was performed, the water likely increases in hardness and dissolved minerals towards the center of the plateau as the water becomes older. This aquifer is more than likely present beneath the entire plateau and would produce variable yields dependent on the amount of bedrock fracturing and presence of solution cavities (caves). The aquifer is likely under significant pressure and will have piezometric surfaces much shallower than the drilling depths required to reach the system. Artesian conditions are likely to occur in some areas. This unit represents the future water supply for the development of the region; prior to significant development of this aquifer we recommend characterizing the system and addressing the sustainability and protection of the resource.

Middle & Upper Miocene Units

These units are located above the vast regional aquifer system and essentially blanket the entire Central Plateau with up to 5,000 feet of material. The majority of wells in the Central Plateau have been drilled into these units because they are exposed throughout the plateau and many of the population centers are situated atop them. These units provide an important barrier above the vast regional system that protects it from contamination and keeps it beneath under pressure.

The units are essentially impermeable and do not hold significant or laterally continuous units of water. There are some thin and localized layers of sandstone, limestones and conglomerates that do exist and produce water throughout the plateau but they typically support only low yielding hand pump wells and are not laterally extensive. Most of the hand pump wells throughout the Central Plateau are supported by these types of geologic units. Based on our interpretation of the stratigraphy of these thick units, it seems typical to have a 5 – 20 foot unit that may contain water for every 800 – 1200 feet in depth. The lower (deeper & older) units of Middle Miocene have slightly higher groundwater probabilities as there are more sandstone and conglomerate layers. We expect that the water from the underlying vast regional aquifer seeps upwards through fault zones, joints and other cracks to supplement some of the water bearing units of Middle and Upper Miocene; we believe this to be occurring in the Pignon area.

Groundwater conditions in the Middle and Upper Miocene units need to be evaluated on a site by site basis due to the discontinuity and spatial variability of the geology.

Thomassique Area

The supporting maps (A1, A2, A3) illustrate our findings and recommendations for the targeted study area northwest of Thomassique. This particular area has been targeted by Haiti Outreach as water poor region of the Central Plateau, many past drilling efforts have been unsuccessful and the locals suffer from lack of freshwater.

Our field reconnaissance revealed very difficult conditions for discovering shallow groundwater in this area. The area is covered by the Upper Miocene geology which is very thick and fine grained and does not create conditions favorable to discovering water. There were a few conglomerate and sandstone layers that were observed in this area that "could" hold sufficient water to develop a hand pumping well, our recommendations listed on map A1 are primarily targeting these thin and discontinuous units as Haiti Outreach only has 330 feet of drilling stem. Shallow water bearing units that are discovered in this area may have water quality high in dissolved solids and be undesirable for drinking water purposes. The units may also have low recharge and create difficulty keeping up with the demands of a hand pumping well. A ½ gpm well would be considered a success in this area and such a discovery would require using a well volume below the water bearing zone to act as a reservoir. The recommended drilling locations shown on map A1 are the locations that we feel would most likely produce water within 330 feet of drilling.

Overall our confidence of discovering quality water of sufficient quantity in this area is low and we would recommend exploring the development of the deeper aquifers which are present. This would provide a water source that extends throughout the entire area and also would provide a sustainable and high quality water supply into the future. Map A3 shows the estimated drilling depths to the deeper regional aquifer system in this study area. Map A2 shows the drilling depths to a shallower unit that we believe contains water sufficient to develop into a water supply. These estimated drilling depths are **estimates** based on field measurements and extrapolations to provide Haiti Outreach an idea of what type of drilling depths to expect.

The deeper aquifer units are likely under significant pressure and would create a static water level that is much shallower than the drilling depth required to reach the aquifer. It is also possible that artesian conditions may exist if the drilling is performed in a low lying area.

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