Technical Memorandum September 16, 2017

To: W.A.T.E.R. & Gateway Neighborhood Association (GNA)

From: Timothy K. Parker, PG, CEG, CHG, Parker Groundwater

Subject: Review of Crystal Geyser Bottling Plant Project Final Environmental Impact Report (FEIR) for groundwater impacts and issues

I am a California Professional Geologist (License #5584), Certified Engineering Geologist (License # EG 1926), and Certified Hydrogeologist (License #HG 12), with over 25 years of geologic and hydrologic professional experience. I reviewed the groundwater portions of the subject FEIR for We Advocate Thorough Environmental Review (W.A.T.E.R), and below are my comments.

Results of Recent Aquifer Pumping Test - RCS Report of Aquifer Testing

Richard C. Slade and Associates, Inc. (RCS) conducted a 72-hour aquifer pumping test using the Mount Shasta Crystal Geyser (CG) water bottling facility domestic well discharging at a rate of 250 gallons per minute (gpm) for 72 hours and monitored 7 CG wells. Only 3 of the monitored wells had adequate responses (drawdown) from the pumping of the Domestic Well, ranging from 0.2 to 0.3 feet. Generally aquifer pumping tests are designed to have radial coverage in space, but this test was blind to the west and southwest, east and northeast, where residential neighborhoods and wells are located. Transmissivities were reported from 311,000 to 174,000 gallons per day per foot, with an average of 256, 000 gpd/ft. Results of the aquifer pumping test suggest very small drawdowns would impact neighboring wells and most likely only those wells completed in the lower fractured bedrock aquifer.

Storativities estimated from the aquifer test indicate that the lower fractured bedrock system is confined to semi-confined (under pressure), which also suggests that impacts from pumping could occur significantly farther then with unconfined systems, as it travels as a pressure wave. The other significant finding of confined versus unconfined is the significant difference in storage capacity of the aquifer: confined aquifers hold significantly less water in storage as indicated by the storage coefficient (storativity). The author makes no mention of the results indicating confined to semi-confined conditions for the fractured bedrock aquifer, and how this new finding changes the hydrogeologic conceptual model of the area. The assumption going into the aquifer pumping test was that the lower fractured bedrock aquifer is unconfined. If the two aquifer system is interconnected, with the

lower fractured bedrock aquifer under pressure, lowering the pressure in the lower aquifer could induce drainage of water from the upper aquifer, which appears limited in extent horizontally and vertically. During drier periods and droughts, this potential cause and effect relationship could exacerbate already reduced supply (by plant operation) in the upper aquifer during drier conditions and contribute to neighboring domestic wells going dry.

Results of the Aquifer Test continue to underscore what and how much we do not know about the upper and lower aquifer systems

1) How interconnected the upper and lower aquifers are and where, and the upper aquifer geometry, heterogeneity and distribution in space – The Report of Aquifer Testing states that results "seem to indicate an upper aquifer system that may be alluvial in nature and possible in hydraulic conductivity (connection) with the underlying fractured rock system," based on a similar pattern of water level changes during the aquifer pumping test.
2) Fractured bedrock pattern and interconnectedness across what distance and depth- The Report of Aquifer Testing states that "The orientation, degree of interconnection, and continuity of the network of fracture systems in the volcanic rocks that make up the primary aquifer system in the area are wholly unknown."

One piece of information that was not clear in the analysis was the thickness of the aquifer used in the aquifer test analysis (450 feet) versus the thickness of the aquifer used in the calculation of groundwater underflow in the Hydrogeologic Evaluation (100 feet). This difference in aquifer thickness would yield a significantly different result in the calculation of underflow and groundwater available for use.

The Report of Aquifer Testing documents the lack of understanding and acknowledges the complexity of the aquifer system, yet the Project Proponent and County continue to be satisfied that there is sufficient water to supply the project and ignore the possibility of third party impacts by not collecting the data necessary to demonstrate otherwise. These data include collecting water level data in wells in the adjacent neighborhoods completed in the lower and upper aquifer along with CG daily pumping and precipitation data. These data would demonstrate whether or not there are or could be potential third party impacts to neighboring wells in the adjacent neighborhoods from CG operations and pumping.

DEIR Concerns and Deficiencies that have not been Adequately Addressed

- Specific concerns and deficiencies regarding the DEIR and groundwater studies conducted include:

- The studies were focused solely on the connection between the Crystal Geyser bottling plant production well (DEX-6) and Big Springs, and theoretical models were used instead of monitoring water levels in neighboring domestic wells to measure possible third-party impacts and are therefore inadequate to determine a "no significant impact finding."
- The hydrogeology is particularly complex leading to significant uncertainty and raising concern that neighboring domestic wells will be impacted, and there are no mitigations provided for if and when these impacts occur.
- Testing of the interconnection between the lower aquifer system (fractured volcanic rock) from which the production wells pump, and the upper aquifer system (alluvial sand and clay) that dominantly supplies domestic wells was never evaluated. And only theoretical calculations have been used to predict the potential impact of renewed plant operations.

As indicated in the Results of Aquifer Pumping Test by RCS above, an attempt was made to collect data to better understand the connection between the upper and lower aquifers and whether the neighborhood would be impacted. Unfortunately wells screened in the upper alluvial aquifer that were monitored did not respond significantly enough in a short, 72 hour pump test, to draw conclusions, and no upper alluvial aquifer wells were monitored in the areas of the adjacent neighborhoods. Long-term pumping at the two CG wells will likely put more stress on the upper aquifer, based on the finding that the upper and lower aquifer are connected. The complexity of the hydrogeology due to the volcanic origin is extremely heterogeneous with likely strong northeast-southwest directional depositional attributes, emanating from Mt. Shasta, and the neighborhood area to the northeast of the plant simply has not been addressed because of a lack of data collection focused on that specific area.

Page 4.8-26 Section 4.8 Hydrology and Water Quality - Groundwater Withdrawal Impacts to Adjacent Users

" Proximal to the site are residential/commercial areas. On the north, south, and west, these residential areas are served via the City's water supply and sanitary sewer systems. However, on the east, each residence has its own domestic water well and subsurface septic/leach field system."

Homes with these water supply wells and septic systems are understated in the FEIR. There are home and businesses to the north, south and east "proximal to the site" (the plant) and entire neighborhood east of the Dex 6 well that each have their own water well and septic systems. The **only** homes on City services are directly east of the plant.

Page 3-34 Section 3.0 Response to Comments

"As discussed further below, the (PUMPIT) modeling conducted by RCS to determine potential impacts to adjacent domestic wells provides conclusions that are supported by substantial evidence collected through historic monitoring data; therefore, a physical pump test at DEX-6 is not warranted."

Previous DEIR discussion and assumptions considered the upper and lower aquifer system to be unconfined and not connected. The results of the Domestic well aquifer pumping test indicate that the upper and lower aquifer are hydraulically connected, and that the lower aquifer is confined to semiconfined based on the storativity values derived by RCS. The PUMPIT is a very simple analytical model that makes "gross assumptions for an ideal aquifer system," and is not capable of accurately modeling this complex system stated above. Historic monitoring data was limited to CG wells, and once again ignores domestic wells located to the northeast of the plant that have had well problems during previous plant operations.

Page 3-35 Section 3.0 Response to Comments

Comments provided in the DEIR phase by some of the community members characterized by the County as "anecdotal information regarding wells adjacent to the project site" indicate that many of them have experienced well problems (2001-2010) and believe their wells have been impacted by plant operations, and that wells are in jeopardy from future pumping operations at the proposed project. The CGWC Mt. Shasta bottling plant expansion is an appropriation and export of water from the area, not an overlying groundwater user putting the water they require to beneficial use. The CGWC needs to include monitoring operations to satisfy the community concerns instead of blowing them off – the CGWC is making a profit on local resources and should use some of those profits to ensure the adjacent community can continue to have a safe and reliable supply of groundwater for beneficial uses. The County has a responsibility to recognize the difference between their community of people using the resources to survive and subsist versus corporations profiting on these same resources. The County states: "If any of the wells were to go "dry", a direct cause and effect would need to be established between the pumping of the wells at the Plant, and any residential wells that have "gone dry" during the same period. Such a cause and effect relationship does not exist in the available database. " The primary reason that there is no cause and effect relationship in the available database is because there is no groundwater level or groundwater quality monitoring in the area of the residential wells by the County or the Project Proponent. If some residential wells experience declining yield, water level declines or water quality impacts in the future, whether it is from plant

operations or variable climate conditions, it may result in litigation. Therefore, the County should make certain that data is collected and made available in the database **before** plant operations commence so that in the future County officials are able to differentiate between cause and affect of plant operations and variable climate on neighboring residential wells. Either the CG should install and collect data from dedicated monitoring wells to the northeast of the plant, or the County should; either way the County assumes responsibility and accountability for impacts to domestic well owners in the future by CG plant operations by being the Lead Agency on this FEIR.

To plan for further testing or monitoring of neighboring wells and mitigation plans, Raven Stevens, a domestic well owner who lives near the CG facility, is coordinating the Big Springs Groundwater Elevation Study that began in 2013 and continues to this day. She has collected and maintains data and continues to communicate regularly to the homeowners of all domestic wells on the program, and can be reached at flyraven@sbcglobal.net.

Section 4.0 Mitigation Monitoring and Reporting Plan and Siskiyou County Planning Commission Staff Report Crystal Geyser Use Permit (UP-16-03)

In Section 4.0 Mitigation Monitoring and Reporting Plan, there is not one single mitigation, stipulation or safeguard for the neighboring domestic well users in the adjecent neighborhood. The September 20, 2017 Staff Report sent to the Planning Commission for approval of the project, contains the following general conditions of approval:

"Conditions of Approval are found in Exhibit B-1. Conditions include standard conditions and conditions implementing mitigation measures identified in the EIR. Additional conditions include measures agreed to by the Applicant that were part of an agreement with the previous operator. This is referred to as the 1998 Mitigation Agreement. The Applicant has committed to implementing measures within the 1998 Mitigation Agreement that are applicable to the Proposed Project, including the following:"

- Groundwater and Surface Water - limited to erosion control.

- Biological Resources includes:
  - "If there are significantly reduced flows on Big Springs Creek, CGWC will discuss and participate with all other water users in developing a proportionate, equitable and mutually agreed action plan to address such an issue. "

Protection of the limited groundwater supplies and the neighboring domestic and light industry business wells, along with Big Springs Creek, should be included in mitigation measures and/or in stipulations like the one above, including monitoring of groundwater monitoring wells in the adjacent neighborhood, along with CG wells DEX-1, DEX-3A, DEX-4, DEX-6, MW-01, MW-02, MW-03, the CG Domestic Well, and Big Springs.

Upgrading Existing Well Permitting Codes

As the well permitting agency, the County should consider updating the Siskiyou County Code of Ordinances, Title 5 Sanitation and Health, Chapter 8 Standards for Wells, as it currently references outdated state standards. The state standards, which are minimum standards only that well permitting agencies have to comply with, have not been updated for over 25 years, and were never finalized. Local well permitting standards should be customized to meet the needs of local hydrogeologic conditions and issues. The county should also consider whether or not specific well permitting requirements should be in place for the Project Site location, where there has been a significant amount of scientific debate about the upper (alluvial) aquifer and lower (fractured rock) aquifer, since "the degree of interconnectivity of these systems has not been established" (Response to Comments Page 3-123, Paragraph 3).