Luhdorff & Scalmanini Consulting Engineers, Impact and Response to Perchlorate Contamination, Valencia Water Company, Well Q2 (April 2005)

Impact and Response to Perchlorate Contamination

Valencia Water Company Well Q2

prepared for

Valencia Water Company

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I. Introduction and Background

Perchlorate has been a water quality concern in the Santa Clarita Valley since 1997 when it was originally detected in four Saugus wells operated by the municipal water purveyors in the eastern part of the Saugus Formation, near the former Whittaker-Bermite facility. In late 2002, perchlorate was detected in a fifth municipal well, in this case an Alluvial well also located near the former Whittaker-Bermite site. The five perchlorate-impacted wells have been removed from active water supply service.

At present, perchlorate is not a regulated chemical in drinking water. However, the state Department of Health Services (DHS) requires that water utilities test their water sources for certain unregulated chemicals, and perchlorate is one of those chemicals. The DHS "notification level" for perchlorate is 6 micrograms per liter (ug/l).[1] DHS currently anticipates proposing a Maximum Contaminant Level (MCL) for perchlorate in 2005.

Since the detection of perchlorate and resultant inactivation of impacted wells, the Purveyors have been conducting regular monitoring of active wells near the Whittaker-Bermite site. In late March 2005, that monitoring detected the presence of perchlorate in Valencia Water Company's Well Q2, an alluvial well located immediately northwest of the confluence of Bouquet Creek and the Santa Clara River (Figure I-1). The initial detection of perchlorate was at a concentration of 11 ug/l; two confirmation samples in the first two weeks of April detected perchlorate at concentrations of 9.8 and 10 ug/l, respectively. As a result of the detection and confirmation of perchlorate in its Well Q2, Valencia has removed the well from active service and is pursuing rapid permitting and installation of wellhead treatment, as described herein, in order to return the well to water supply service.

For several years prior to the recent detection of perchlorate in Valencia's Well Q2, the water Purveyors have recognized that, among other aspects of an overall remediation program, such a program would most likely include an element of pumping from impacted wells, or from other wells in the immediate area, to establish hydraulic conditions that would control the migration of contamination from further impacting the aquifer in a downgradient (westerly) direction. The overall program would also include the installation of treatment to allow the restored pumping capacity to be used for municipal supply. In cooperation with state regulatory agencies and

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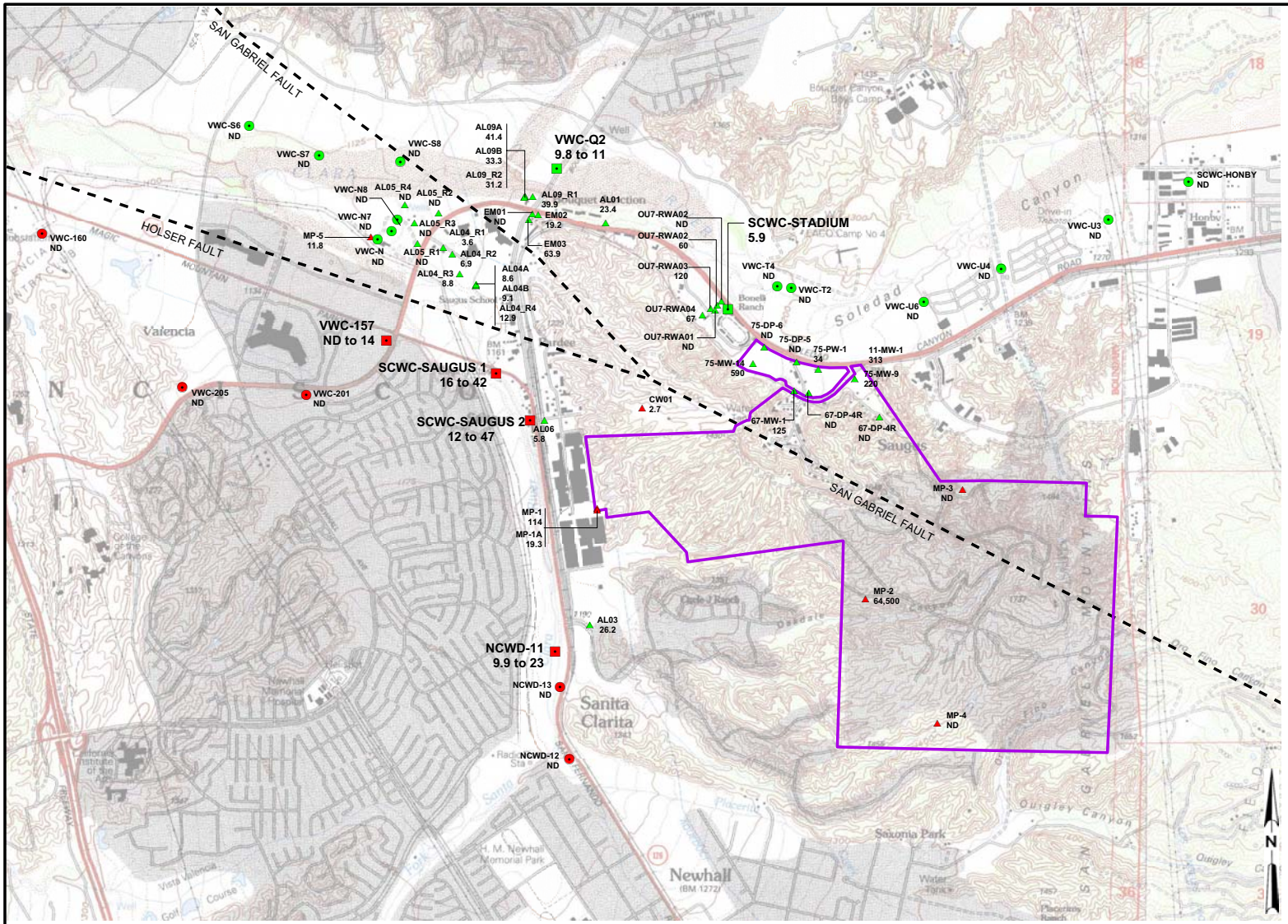
[1] "Notification level" means the concentration level of a contaminant in drinking water delivered for human consumption that DHS has determined, based on available specific information, does not pose a significant health risk but warrants notification pursuant to applicable law. Notification levels are nonregulatory, health-based advisory levels established by DHS for contaminants in drinking water for which maximum contaminant levels have not been established. Notification levels are established as precautionary measures for contaminants that may be considered candidates for establishment of maximum contaminant levels, but have not yet undergone or completed the regulatory standard setting process prescribed for the development of maximum contaminant levels. Notification levels are not drinking water standards.



LEGEND

CONTAMINATED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

UNCONTAMINATED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

MONITORING WELL

- ALLUVIUM
- SAUGUS
- WHITTAKER-BERMITE PROPERTY BOUNDARY

NOTES:

1. VALUES PRESENTED UNDER WELL SYMBOLS REPRESENT PERCHLORATE CONCENTRATION IN GROUNDWATER (µg/L).
2. ND = PERCHLORATE NOT DETECTED IN GROUNDWATER SAMPLE.
3. µg/L = MICROGRAMS PER LITER.

FIGURE 1-1
WELL LOCATION MAP
SANTA CLARITA, CALIFORNIA

CH2MHILL

RDD \\ODIN\PROJ2\55\SANTACLARITA_MOU\FIGURES\MXD\042205\FIG01.MXD FIG01.PDF 04/22/2005

investigators working for Whittaker-Bermite, Castaic Lake Water Agency (CLWA) and the Purveyors, including Valencia Water Company, have developed an off-site plan that will include installation of water treatment facilities to remove perchlorate and restore operation of two of the initially impacted Saugus wells through that treatment process. The operation of those two wells with treatment, scheduled to be in service in 2006, will hydraulically contain the perchlorate contamination moving from the former Whittaker-Bermite site and protect downgradient non-impacted wells. It will also restore the annual volumes of water that were pumped from the impacted wells before they were inactivated. In concert with the installation of treatment and the return of certain impacted wells to active water supply service, the balance of total pumping capacity from the impacted wells will be restored by constructing replacement wells in a non-impacted portion of the basin west of Interstate 5.

The development of the control and restoration plan for the initially impacted wells included consideration that it should fit within the larger scale of on-site and possibly other off-site remediation activities. While such activities did not specifically anticipate the treatment of VWC's Well Q2 as described herein, utilization of the same treatment methodology and operation of the well to contain perchlorate from contamination of downgradient wells, are consistent with currently planned and other potential on-site and off-site remediation activities.

II. Impact of Water Supply

As a result of the recent detection of perchlorate, Valencia Water Company has removed Well Q2 from active water supply service until it can install wellhead treatment for perchlorate removal, as described herein, such that the well can be returned to service. Although it is expected that the permitting and installation of wellhead treatment can be accomplished by mid-summer, in advance of the peak water demand season, it is appropriate to assess the impact of the removal of Well Q2 on the overall adequacy of Valencia's water supply until such treatment is in place and the well is returned as part of Valencia's total water supply.

The overall adequacy of water supply derives from three considerations: 1) sufficient source capacity (wells and pumps, plus other sources such as, in this case, connections to CLWA's treated surface water distribution system); 2) sustainability of the groundwater resource to meet the demand of Valencia and other pumpers in the basin on a renewable basis; and 3) protection of groundwater sources (wells) from known contamination, or provisions for treatment in the event of contamination. All three considerations are discussed in the following sections.

Adequacy of Source Capacity

The temporary removal of Well Q2 from active service represents a reduction of 1,200 gpm of source capacity. After that removal, Valencia still has a total of 19 active operational wells, 14 wells completed in the Alluvial aquifer and 5 wells completed in the Saugus Formation. The combined pumping capacities of the 14 Alluvial wells is slightly more than 20,000 gpm, and the combined pumping capacities of the 5 Saugus wells is slightly more than 10,000 gpm. The individual pumping capacity of each Valencia well is listed in Table II-1.

In addition to its water supply wells, Valencia has six connections to CLWA's system that distributes treated surface water from the State Water Project to the various municipal purveyors in the Valley. The combined capacity of those four connections (Turnouts V2, V4, V5, V6, V7 and V8) is 26,500 gpm. The individual capacity of each CLWA turnout connection to the Valencia distribution system is listed in Table II-2.

The combined source capacity of Valencia's active wells, after temporary inactivation of Well Q2, and its CLWA turnouts is thus a total of about 57,000 gpm.

As part of recent review of its overall water supply, Valencia examined its maximum day demand in the last year, 2004. The maximum day demand occurred in July, when the largest historical single day demand of 143.3 acre-feet was experienced. That volumetric demand equates to an average flow on that day of nearly 32,500 gpm.

Table II-1
Active Groundwater Source Capacity
Valencia Water Company

Well	Pump Capacity (gpm)	Maximum Annual Capacity (af)	Normal Year Production[1] (af)	Dry Year Production[1] (af)
Alluvium				
Well D	1,050	1,690	690	690
Well N	1,250	2,010	620	620
Well N7	2,500	4,030	1,160	1,160
Well N8	2,500	4,030	1,160	1,160
Well S6	2,000	3,220	865	865
Well S7	2,000	3,220	865	865
Well S8	2,000	3,220	865	865
Well T2	800	1,290	460	460
Well T4	700	1,120	460	460
Well U4	1,000	1,610	935	935
Well U6	1,250	2,010	825	825
Well W9	800	1,290	600	600
Well W10	1,600	2,410	865	865
Well W11	1,000	1,610	350	350
Alluvial Subtotal	**20,350**	**32,760**	**10,720**	**10,720**
Saugus Formation				
159	500	800	50	50
160	2,000	3,220	1,000	1,330
201	2,400	3,670	100	3,577
205	2,700	4,350	1,000	3,827
206	2,500	4,030	1,175	3,500
Saugus Subtotal	**10,100**	**16,270**	**3,325**	**12,284**
Total Active Capacity	**30,450**	**49,030**	**14,045**	**23,004**

1. based on recent actual annual pumping; also as simulated in perchlorate containment analysis (CH2M Hill, 2004).

Table II-2
Turnout Connections to CLWA Treated Water Distribution
Valencia Water Company

Station Number	Number of Pumps and Total Horsepower	Capacity (gpm)
V2	Pressure Regulating Station	3,000
V4	3 – 195	4,500
V5	3 – 155	4,500
V6	2 – 25	1,500
V7	Pressure Regulating Station	5,000
V8	3 – 300	8,000
	Total	**26,500**

In accordance with the provisions of the Waterworks Standards in the California Health and Safety Code, and also in accordance with the provisions of the State Public Water Commission, the source capacity of a municipal water purveyor should be adequate to meet maximum day demand. Generally accepted engineering practice adds a factor of safety to those minimum requirements to account for possible outages of one or more supply sources during a period of maximum day demand. With total source capacity of about 57,000 gpm, after temporary deactivation of Well Q2, Valencia has sufficient source capacity to meet its maximum day demand of 32,500 gpm with allowance for potential outage of one or more individual sources (wells) or treated surface water connections. As a result, the temporary deactivation of Well Q2 does not adversely impact Valencia's ability to meet existing demands; in fact, Valencia has sufficient surplus source capacity to meet future increases in maximum day demand with existing sources, to be increased by returning Q2 to service after installation of treatment as described herein.

Sustainability of Groundwater

In contrast to assessing the adequacy of Valencia's source capacity by examining the total capacity of its water sources and comparing it to Valencia's maximum day demand, the sustainability of groundwater resources in the Valley is more appropriately assessed by

examining the response of the groundwater basin to the collective pumping demands placed on it for municipal and ongoing agricultural water supply. Until recently, the long-term renewability of Alluvial groundwater was empirically determined from approximately 60 years of recorded experience: long-term stability in groundwater levels and storage, with some dry period fluctuations in the eastern part of the basin, over a historical range of Alluvial pumpage from as low as about 20,000 afy to as high as about 43,000 afy. The long-term sustainability of Saugus groundwater was empirically determined from a more historical record that shows fairly low annual pumping in most years, with one four-year period of increased pumping up to about 15,000 afy, that produced no long-term depletion of the substantial groundwater storage in the Saugus. Those empirical observations in both the Alluvium and the Saugus Formation have now been complemented by the development and application of a numerical groundwater flow model, which has been used to predict aquifer response to the planned operating ranges of pumping from both aquifers for both municipal and agricultural water supply. The numerical groundwater flow model has also been used to analyze the control of contaminant migration under selected pumping conditions that would restore, with treatment, pumping capacity that has been inactivated due to perchlorate contamination detected in some wells in the basin as described herein.

To examine the yield of the Alluvium or, in other words, the sustainability of Alluvium on a renewable basis, the groundwater flow model was used to examine long-term projected response of the aquifer to pumping for municipal and agricultural uses in the 30,000 to 40,000 afy range under average/normal and wet conditions, and in the 30,000 to 35,000 afy range under locally dry conditions. To examine the response of the entire aquifer system, the model also incorporated pumping from the Saugus Formation in accordance with the normal (7,500-15,000 afy) and dry year (15,000-35,000 afy) operating plan for that aquifer. The preceding ranges of pumping from the two aquifer systems, commonly known locally as the operating plan for groundwater supply, are described in detail in the Amended 2000 Urban Water Management Plan prepared by CLWA and the municipal Purveyors in the Valley. The model was run over a 78 year hydrologic period which was selected from actual historical hydrology (i.e., precipitation) to examine a number of hydrologic conditions that would be expected to affect both groundwater pumping and groundwater recharge. The selected 78 year simulation period was assembled from an assumed recurrence of 1980 to 2003 hydrologic conditions, followed by an assumed recurrence of 1950 to 2003 hydrologic conditions. The 78 year period was analyzed to define both local hydrologic conditions (normal vs. dry), which affect the rate of pumping from the Alluvium, and hydrologic conditions that affect State Water Project operations, which in turn affect the rate of pumping from the Saugus.

The resultant pumping cycles are summarized as follows:

- Twenty-four years of dry year Alluvial pumping at 30,000 to 35,000 afy,

- One drought of four consecutive dry years of Alluvial pumping at 30,000 to 35,000 afy,

- Two droughts of three consecutive dry years each, with Alluvial pumping at 30,000 to 35,000 afy,

- Three selected years with assigned dry-year Alluvial pumping despite near-normal or above-normal rainfall because each selected year was preceded by a multi-year drought,

- Eighteen years of dry-year pumping from the Saugus, or an average of one dry year approximately every four years,

- Two droughts lasting three years, plus (in both cases) a dry year that occurs two years before the beginning of each three-year drought and another dry year that begins one year after each three-year drought has ended; Saugus pumping increased into the 15,000 to 35,000 afy range in all those years,

- Two droughts lasting two years; Saugus pumping increased into the 15,000 to 25,000 afy range in those years,

- Sixty years of normal-year Saugus pumping, 7,500 to 15,000 afy.

The preceding ranges of Saugus pumping included the planned restoration of recent historic pumping from the perchlorate-impacted wells. That pumping was analyzed to assess, in addition to the overall recharge of the Saugus, the effectiveness of controlling the migration of perchlorate by extracting and treating contaminated water close to the source of contamination.

Simulated Alluvial aquifer response to the preceding range of hydrologic conditions and pumping stresses was essentially a long-term repeat of the historical conditions that have resulted from similar pumping over the last several decades. The resultant response consisted of: 1) generally constant groundwater levels in the middle to western portion of the Alluvium, and fluctuating groundwater levels in the eastern portion of the Alluvium as a function of wet and dry hydrologic conditions, 2) variations in recharge that directly correlate with wet and dry hydrologic conditions, and 3) no long-term decline in groundwater levels or storage. Based on the combination of actual experience with Alluvial aquifer pumping at capacities similar to those planned for the future and the resultant sustainability (recharge) of groundwater levels and storage, complemented by modeled projections of aquifer response to planned pumping rates that also show no depletion of groundwater, the Alluvial aquifer can be considered a sustainable water supply source to meet the Alluvial portion of the operating plan for the groundwater basin.

Simulated Saugus Formation response to the ranges of pumping under assumed recurrent historical hydrologic conditions was consistent with actual experience under smaller pumping rates. The response consisted of: 1) short-term declines in groundwater levels and storage near pumped wells during dry-period pumping, 2) rapid recovery of groundwater levels and storage after cessation of dry-period pumping, and 3) no long-term decreases or depletion of groundwater levels or storage. The combination of actual experience with Saugus pumping and recharge up to about 15,000 afy, now complemented by modeled projections of aquifer response that show long-term utility of the Saugus at 7,500 to 15,000 afy in normal years and rapid recovery from higher pumping rates during intermittent dry periods, shows that the Saugus Formation can be considered a sustainable water supply source to meet the Saugus portion of the operating plan for the groundwater basin.

Protection of Other Sources (Wells)

Some detail of the overall perchlorate contamination issue, which has had a larger impact on the Saugus Formation than on the Alluvium, is included in **Status of Saugus Restoration and Containment** below. As detailed in that section, there has been extensive investigation of the extent of perchlorate contamination which, in combination with the groundwater modeling described above, has led to the current plan for integrated control of contamination migration and restoration of impacted pumping (well) capacity by 2006. While most of the perchlorate control and restoration plan is focused on the Saugus Formation, part of that plan includes induced capture of potentially contaminated groundwater in the Alluvium by pumping of selected Saugus wells. Specific long-term resolution of perchlorate contamination in the Alluvium, which had previously impacted just one water supply well, is currently expected to focus on source control through on-site treatment in the northern Alluvium (at the north of the former Whittaker-Bermite site) and subsequent restoration of the contaminated Stadium Well. In the interim, the questions are how the recently impacted Well Q2 will be resolved, and whether other active Alluvial wells could be contaminated and, if so, what effect that might have on the adequacy of Alluvial groundwater supplies.

Until the recent detection of perchlorate in Valencia's Well Q2, ongoing monitoring of all active municipal wells near the Whittaker-Bermite site had shown no detections of perchlorate in any active Alluvial wells. However, based on a combination of proximity to the Whittaker-Bermite site and prevailing groundwater flow directions, there was logical concern that perchlorate could contaminate nearby, downgradient Alluvial wells, and, as a result, there have been provisions in place to respond to perchlorate contamination if it should occur. The groundwater model was used to examine capture zones around Alluvial wells under planned operating conditions (pumping capacities and volumes) for the time period through currently scheduled restoration of impacted contaminated wells by 2006. That capture zone analysis of Alluvial wells generally near the Whittaker-Bermite site suggested that inflow to those wells would either be upgradient

of the contamination site, or would be from the Alluvium beyond where perchlorate is most likely to be transported.

At the time of the preceding analysis, a noted possible exception to its conclusions involved Valencia Water Company's Pardee wellfield, which includes its Wells N, N7, and N8. Although the capture zone analysis did not show the Pardee wells to be impacted, they were considered to be at some potential risk due to the proximity of their capture zone to the Whittaker-Bermite site. Other nearby Alluvial wells, including Valencia's Well Q2, were considered to be at lesser risk due to their distances from the site, orientation to groundwater flow near the site, and other factors such as the presence of the Santa Clara River between the wells and the Whittaker-Bermite site.

With recognition that potentially at-risk wells such as Valencia's Pardee wellfield could be readily replaced on an interim basis by utilizing some of the surplus capacity among all the other Alluvial wells, Valencia has planned for some time that, if the Pardee wells were impacted by perchlorate contamination, it has made site provisions at those wells for installation of wellhead treatment. Such treatment would be the same methodology as planned for long-term treatment of the contaminated Saugus wells. With treatment installed, Valencia would retain the wells in service for the same objectives as planned for restoring impacted Saugus pumping capacity by extracting contaminated water, treating it for beneficial (drinking water) use, and controlling local groundwater flow to protect further downgradient wells. The response to perchlorate detection in Well Q2 is identical to what was envisioned in the event of contamination at the Pardee wells.

III. Response Plan for Well Q2

As described in the status discussion below, one of the completed tasks in the overall response to perchlorate contamination of four Saugus wells has been the evaluation of alternative treatment methodologies and the selection of ion exchange for removal of perchlorate from water to be pumped from the two impacted wells that will be used for a combination of containment and capture of perchlorate contamination. As a result of that completed work, Valencia was in a position to immediately respond to the confirmed detection of perchlorate in Well Q2 by opening contract discussions with a selected contractor who can furnish, install and operate the same ion exchange treatment methodology which has been selected for the impacted Saugus wells.

In light of the preceding, after detection of perchlorate in its Well Q2, Valencia contacted USFilter to prepare a complete turnkey service contract to install and maintain treatment facilities capable of removing perchlorate pumped from the well to a non-detectable level. USFilter would cover all major components and estimate of installation materials and labor for start-up. The specific Q2 treatment system will incorporate USFilter HP1220HF ion exchange pressure vessels operating in a lead/lag configuration. The vessels are 12 feet in diameter and each will contain a selective resin designed to remove perchlorate. There is no waste brine generated from this treatment system. If resign replacement is necessary, USFilter will remove the resin from the treatment system and destroy it by incineration at an approved waste site.

Well Q2 is located along Bouquet Canyon Road adjacent to the Rio Vista Pump Station owned by CLWA. The treatment system will be located on the existing well site property which is owned by Valencia or, if necessary, use a small portion of land owned by CLWA. Valencia is preparing a site plan that will require constructing a concrete foundation for the ion exchange pressure vessels and other ancillary equipment and controls required to integrate the treatment system into its water supply operations.

Installing wellhead treatment at Well Q2 will require review and approval by the California Department of Health Services (DHS). Valencia will prepare and submit an application to amend Valencia's water supply permit allowing wellhead treatment at Well Q2. DHS approval is expected since ion exchange technology is recognized by DHS as "best available technology" for perchlorate removal, and multiple ion exchange treatment systems have been approved and permitted by DHS for drinking water systems. Also, the Department of Toxic Substances Control (DTSC) will include this project as part of the interim actions required to address perchlorate contamination in the Northern Alluvium. Their review was contemplated under the existing Environmental Oversight Agreement between the water purveyors and DTSC.

Since Valencia is able to rapidly respond to the contamination of its Well Q2 by installation of site modifications and turnkey contracting for treatment equipment, it intends to cooperatively pursue the amended water supply permit so it can return the well to service as soon as possible.

IV. Protection Plan for Non-Impacted Wells

As noted above, based on a combination of proximity to the Whittaker-Bermite site and prevailing groundwater flow directions, there is a logical concern that perchlorate could impact nearby downgradient Alluvial wells, the closest of which are owned and operated by Valencia. As part of assessing their overall groundwater supply during the period before the impacted Saugus wells are restored in 2006, the Purveyors commissioned the use of the groundwater flow model to examine capture zones around nearby Alluvial wells under planned pumping operations through that time period. The results of that work, as reported in the CH2M Hill Technical Memorandum "*Analysis of Near-Term Groundwater Capture Areas for Production Wells Located Near the Whittaker-Bermite Property*" (Santa Clarita, California), suggested that inflow to the nearby Alluvial wells would either be upgradient of the contamination site, or would be from the Alluvium beyond where perchlorate is most likely to be transported. However, again due primarily to proximity, in this case between the capture zones and the Whittaker-Bermite site, the nearest Valencia Pardee wellfield (Wells N, N7 and N8) was considered to be at some potential risk because perchlorate had been detected in nearby Alluvial monitoring wells that were installed as part of a federally funded investigation of the extent and nature of contamination by the Army Corps of Engineers. As previously described, the other nearby Alluvial wells, including Valencia's Well Q2, were considered to be at lesser risk. Ultimately, irrespective of model simulations or other considerations, Valencia has responsibilities to supply both adequate and safe municipal water and, as a result, is prepared to respond to impacts at any of its nearby Alluvial wells in a similar manner as described for Well Q2 herein.

Thus, the response by Valencia to any future well impacted by perchlorate contamination will be to install wellhead treatment as soon as practicable, thereby ensuring adequate supplies of high quality water to its customers. Toward that end, Valencia has already dedicated space at each of the nearest well sites for addition of wellhead treatment facilities, as will be installed at Well Q2, if necessary. This short-term response plan complements the longer term actions being taken by the property owner under supervision of DTSC. For example, studies conducted by consultants under contract with the property owner have completed successful testing of in-situ groundwater remediation of perchlorate. It is anticipated this program along with several other measures approved by DTSC will be implemented over time to contain and remove perchlorate from the Northern Alluvium. Once this is accomplished, the detection of perchlorate in the Northern Alluvium is expected to decline below detectable levels over time. Successful groundwater remediation will ultimately result in the removal of wellhead treatment at wells no longer impacted by perchlorate contamination.

V. Status of Saugus Restoration and Containment

From the outset of dealing with the detection of perchlorate in the four Saugus wells in 1997, the Purveyors have recognized that, among other aspects of an overall remediation programs, such a program would most likely include an element of pumping from impacted wells, or from other wells in the immediate area, to establish hydraulic conditions that would control the migration of contamination from further impacting the aquifer in a downgradient (westerly) direction. Thus, the Purveyors expected that, as the regulatory process moved forward, the overall perchlorate remediation program could include dedicated pumping from some or all of their impacted wells, with appropriate treatment, such that two desirable objectives could both be achieved: control of subsurface flow and protection of downgradient wells, and restoration of some or all impacted water supply. Not all impacted capacity is required, however, for control of groundwater flow. As a result, the remaining capacity would be replaced by construction of replacement wells at other non-impacted locations.

In cooperation with state regulatory agencies and investigators working for Whittaker-Bermite, CLWA and the water Purveyors in the Santa Clarita Valley have developed an off-site plan that focuses on the above concepts of groundwater flow control and restored pumping capacity, and also fits within the larger scale of on-site and possibly other off-site remediation activities. As specifically relates to water supply, the plan includes the following:

- constructing and operating a water treatment process that removes perchlorate from two contaminated wells such that the produced water can be used for municipal supply,

- hydraulically containing the perchlorate contamination moving from the Whittaker-Bermite site toward the impacted wells by pumping the wells at rates that will capture water from all directions around them,

- protecting the downgradient non-impacted wells via the same hydraulic containment that results from pumping two of the contaminated wells,

- restoring the annual volumes of water that were pumped from the impacted wells before they were inactivated, and also restoring the wells' total capacity to produce water in a manner consistent with the Purveyor's operational plan for groundwater supply.

The schedule for implementation of the plan to restore the initially impacted wells is that permitting, design and construction is to be complete by 2006.

Returning any of the contaminated wells to municipal water supply service by installing treatment requires issuance of a permit from DHS before the water can be considered potable and safe for delivery to consumers. The permit requirements, contained in DHS Policy Memo 97-005 for direct domestic use of impaired water sources, include formal studies and engineering work to demonstrate that pumping these wells and treating the water will be protective of public health for users of the water. The policy memo requires that DHS review the water purveyor's plan, establish appropriate permit conditions for the wells and treatment system, and provide overall approval of returning the contaminated wells to service for potable use. Ultimately, the Purveyor's plan and the DHS requirements are intended to ensure that the water introduced to the potable water distribution system has no detectable concentration of perchlorate.

As part of the formal permitting for use of impacted wells with treatment, DHS Policy 97-005 requires an analysis to demonstrate contaminant capture and protection of other nearby water supply wells. The development and calibration of a numerical groundwater flow model of the entire basin was initiated as a result of a 2001 Memorandum of Understanding among the Upper Basin Water Purveyors (CLWA, CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, and Valencia Water Company) and the United Water Conservation District in Ventura County. Although the groundwater model was initially intended for use in analyzing the yield and sustainability of groundwater in the basin, it was adaptable to analyze both the sustainability of groundwater under an operational scenario that included the full restoration of perchlorate-impacted supply, and the containment of perchlorate near the Whittaker-Bermite property (i.e. by pumping some of the impacted wells), including preventing the movement of perchlorate contamination to other portions of the aquifer system. DTSC reviewed and approved the construction and calibration of the regional model as described in the final model report "*Regional Groundwater Flow Model for the Santa Clarita Valley, Model Development and Calibration*" (CH2M Hill, April, 2004).

After DTSC approval of the model, it was used to simulate the capture and control of perchlorate via restoration of contaminated wells, with treatment, as described above. The results of that work are summarized in a second report "*Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California*" (CH2M Hill, September 2004). The modeling analysis indicated that the pumping of contaminated wells SCWC-Saugus1 and SCWC-Saugus2 at rates of 1,200 gpm each on a nearly continual basis will effectively contain perchlorate migrating westward in the Saugus Formation from the Whittaker-Bermite property. The analysis also indicated that 1) no new production wells are needed in the Saugus Formation to meet the perchlorate containment objective, 2) impacted well NCWD-11 is not a required component of the containment program, and 3) the use of other water supplies in lieu of pumping at SCWC-Saugus1 and SCWC-Saugus2 would likely be detrimental to the long-term quality of groundwater in the Saugus Formation because pumping at SCWC-Saugus1 and SCWC-Saugus2 is necessary to prevent migration of perchlorate to other portions of the Saugus Formation.

The perchlorate containment report also includes the general design of a sentinel groundwater monitoring network and program required by DHS as part of its 97-005 permitting. The perchlorate containment report was approved by DTSC in November 2004. With that approval, the model is now being used to support the source water assessment and the balance of the permitting process required by DHS under is 97-005 policy.

A detailed history of the perchlorate issue and its impact on municipal water supply in the Valley is included in the Amended 2000 Urban Water Management Plan for the Valley. Included in that history are discussions of the detection of perchlorate in municipal supply wells, investigation and oversight by regulatory agencies, federally funded investigation of the extent and nature of contamination, litigation by the affected Purveyors, and cooperative settlement work toward selection and implementation of solutions that will restore impacted municipal groundwater supply and control the migration of perchlorate, the latter to protect downgradient wells. As noted above, the overall schedule for installation of treatment and return of impacted wells to service has been that those facilities be operational by 2006. The most current status of overall work toward that schedule was prepared in early April 2005. As of that date, the treatment and well reoperation project description has been finalized, and final settlement discussions were proceeding between the Purveyors and the Whittaker-Bermite parties. A draft Remedial Action Plan (RAP) has been completed; finalization of the RAP is pending determination of requirements by DTSC. A final report on the federally funded conceptual hydrogeology investigation prepared by the Army Corps of Engineers was completed in January 2005; funding is in place for limited monitoring of existing test wells in the next fiscal year. Draft reports on Source Water Assessment, Water Quality Investigation, and Source Protection Plan, all part of the DHS 97-005 approval process, are complete and in review. Draft reports on Effective Monitoring and Treatment, Human Health Risk, and Alternatives Evaluation are scheduled for completion in early May and June, respectively. CEQA review is scheduled for completion by the first of July. In the general area of design and construction, pipeline alignment studies have been completed, and work is continuing on final treatment process selection. The start of construction is scheduled for October 2005, with startup of the restored wells and new treatment facilities scheduled for February 2006. Thus, the descriptions of planned perchlorate containment, restoration of impacted wells, and adequacy of water supply in the interim remain as detailed in the Amended 2000 Urban Water Management Plan. The response plan for Valencia's Well Q2, as detailed herein, is consistent with maintaining the planned volumes and distribution of Alluvial pumping that are part of the overall restoration of perchlorate-impacted groundwater supply in the Valley.

VI. References

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