Kennedy Jenks

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Memorandum

To: Ernesto Velazquez - SCV Water

From: Stephen Timko, PhD; Mollie Sabo -Kennedy Jenks

Subject: ADDENDUM: Santa Clarita Valley Water Agency, Groundwater Treatment Implementation Plan
K/J 2344216*00

1. Purpose

Kennedy Jenks (KJ) prepared the Santa Clarita Valley Water Agency (SCV Water), Groundwater Treatment Implementation Plan, dated April 2021 (2021 Plan), evaluating compliance options for PFAS and perchlorate in SCV Water's groundwater wells. The 2021 Plan identified wells requiring treatment, presented preliminary recommendations for treatment technologies and treatment locations, provided prioritization of treatment implementation, opinions of probable construction cost, and identified potential funding opportunities.

In March 2023, USEPA announced a proposal to establish a national standard maximum contaminant level (MCL) for PFAS in drinking water. These include limiting PFOA and PFOS to 4 parts per trillion (ppt, ng/L) and utilizing a Hazard Index (HI) approach for several other PFAS including PFHxS, PFBS, PFNA, and HFPO-DA (i.e., Gen-X). The HI is a tool used to evaluate potential health risks from exposure to chemical mixtures, based on an assumption of dose additivity. To calculate the HI, measurements of PFHxS, PFBS, PFNA, and HFPO-DA are divided by their Health Based Water Concentrations (HBWCs) of 9 ppt, 10 ppt, 2,000 ppt, and 10 ppt, respectively, and summed per the equation below.

$$Hazard\ Index\ Value = \frac{PFHxS}{9} + \frac{PFNA}{10} + \frac{PFBS}{2000} + \frac{HFPO-DA}{10}$$

The new proposed limits are lower than previous lifetime health advisory levels set by the USEPA of 70 ppt for PFOA and PFOS, combined, and the California Division of Drinking Water (DDW) established notification level (NL) of 5.1 and 6.5 ppt for PFOA and PFOS, respectively, and the response levels (RL) of 10 ppt for PFOA and 40 ppt for PFOS. The DDW also established NL and RL values for PFHxS at 3 ppt and 20 ppt, respectively, and for PFBS at 500 ppt and 5,000 ppt. NL and RL values for additional PFAS including PFHxA, PFHpA, PFNA, PFDA, and ADONA have been requested by the DDW.

Due to the newly proposed MCLs, SCV Water may be required to perform additional treatment for impacted wells and assess available water supply for treatment. The purpose of this

addendum is to provide an update on the list of impacted wells requiring treatment due to the proposed MCLs and costs for treatment implementation.

2. Treatment Thresholds and Water Quality

2.1 Treatment Thresholds

The 2021 Plan set treatment thresholds at 80% of the RLs for PFOA and PFOS. Previous and updated treatment thresholds are shown in Table 1:

Table 1: Previous and updated treatment thresholds for PFAS

Constituent	Previous Regulatory Level	Previous Treatment Threshold	Updated Regulatory Level	Updated Treatment Threshold
PFOA	10 ng/L (RL)	8 ng/L	4 ng/L (proposed MCL)	3.2 ng/L
PFOS	40 ng/L (RL)	32 ng/L	4 ng/L (proposed MCL)	3.2 ng/L
Hazard Index (PFHxS, PFNA, PFBS, HFPO-DA)	N/A	N/A	1.0 (proposed MCL)	0.8

2.2 Water Quality

Water quality data was updated with 2021 and 2022 samples. Wells that exceeded treatment thresholds in the 2021 Plan continued to exceed the lowered thresholds. Wells that are newly exceeding treatment thresholds are shown in Table 2:

Table 2: PFAS water quality data for wells exceeding updated treatment thresholds

	PFOS			PFOA			PFBS			PFHxS			Hazard Index		
Well	**Min**	**Average**	**Max**	**Min**	**Average**	**Max**	**Min**	**Average**	**Max**	**Min**	**Average**	**Max**	**Min**	**Average**	**Max**
Mitchell 5A	9.4	13.4	20.0	5.7	8.0	11.0	5.0	6.8	9.9	4.4	5.4	6.8	0.49	0.60	0.76
Sand Canyon	4.0	5.4	7.1	2.9	4.8	7.3	6.3	9.4	12.0	5.6	8.8	12.0	0.63	0.98	1.34
Newhall Well N13	0.0	4.0	5.1	0.0	4.0	5.1	0.0	9.2	11.0	2.5	29.1	34.0	0.28	3.24	3.78
Castaic Well C1	3.5	5.2	6.5	0.0	0.0	0.0	0.0	0.2	2.1	0.0	0.0	0.0	0.00	0.00	0.00
Saugus 1	3.0	3.6	4.1	3.1	3.5	3.8	0.0	0.7	2.6	5.0	5.4	5.6	0.56	0.59	0.62
Well 201	0.0	1.0	4.5	0.0	1.2	8.5	0.0	0.8	5.9	2.1	3.3	5.9	0.23	0.37	0.66
Well 206	0.0	2.2	3.4	0.0	0.0	0.0	0.0	0.0	0.0	2.1	3.2	4.8	0.23	0.36	0.53
Well 207	0.0	3.6	5.2	0.0	6.2	8.5	0.0	5.4	8.3	0.0	3.8	5.0	0.00	0.42	0.56
Well W9	0.0	0.3	2.4	2.9	4.3	7.4	4.0	7.2	10.0	0.0	0.0	0.0	0.00	0.00	0.01
Pinetree Well P3	2.1	3.4	5.3	0.0	1.1	3.1	2.2	3.9	7.7	0.0	1.6	20.0	0.00	0.24	3.04

Red = exceeds treatment threshold defined in Table 1

3. Newly Impacted Wells

3.1 Well Identification

Wells newly identified as requiring treatment based on updated water quality and regulatory levels are shown in Table 3:

Table 3. Newly Exceeding Wells

Zone	Well	Exceedance
Newhall 1	Newhall Well N13	PFOS, PFOA, Hazard Index
Castaic 1A/1D	Castaic Well C1	PFOS
Pinetree 1	Well P3	PFOS
North Oaks	Mitchell 05A	PFOS, PFOA
North Oaks	Sand Canyon	PFOS, PFOA, Hazard Index
Transmission Pipeline	Saugus 1	PFOS, PFOA
IIA-N	Well 201	PFOS, PFOA
IIA-N	Well 206	PFOS
IIA-N	Well 207	PFOA, FPOS
IIA-N	Well W9	PFOA

The Mitchell 05A well has been destroyed; however, the analysis includes costs and treatment sizing assuming a new well of the same capacity will be drilled in the SCV Water service area.

The Saugus 1 well is currently treated with IX for perchlorate. The IX resin used for perchlorate treatment will also remove the PFAS present in the groundwater, so no PFAS treatment costs will be included in the analysis.

Average concentrations of PFOA and PFOS at Well 201 have been below the treatment threshold, although maximum values exceed the threshold. Well 201 is being treated for perchlorate with IX, which will also remove PFAS, so no PFAS treatment costs will be included in the analysis.

Average concentrations of PFOS at Well 206 have been below the treatment threshold, although maximum values exceed the threshold. Additional sampling at Well 206 is recommended to monitor trends in PFOS concentrations. Costs for treatment of Well 206 will be included at a lower priority level than wells consistently exceeding the treatment threshold.

One sample from Newhall Well 12 exceeded the treatment threshold for PFOS and PFOA. This sample was collected in November 2019, and 10 subsequent samples have shown non-detect

PFOS and PFOA. The 2019 sample is therefore considered an outlier, and treatment is not recommended for Newhall Well 12.

3.2 Treatment Approach

Ion exchange (IX) was selected as the preferred treatment technology in the 2021 Plan. SCV Water has successfully implemented IX treatment at the N Wells, Q2 Well, Valley Center Well, and Saugus Wells for treatment of PFAS and perchlorate. Treatment design criteria in the 2021 Plan were used for sizing of treatment systems at wells newly identified as requiring treatment. Proposed treatment locations are provided in Attachment A.

Flow from Sand Canyon will be treated at a centralized facility with the Mitchell 05B and Lost Canyon wells groundwater. Lost Canyon 2A and Sand Canyon are both offline due to exceeding the PFOA RL.

Treatment of Pinetree Well P3 will be centralized with Pinetree Wells P1 and P5. Treatment of the Pinetree Wells is a low priority due to limited utilization of the wells.

Newhall Well 13, Well 207, and Well W9 will be treated at the wellhead.

Due to its lower treatment priority, costs for treating Well 206 are assumed to be at the wellhead. There is the potential to centralize treatment at Well 207, but with both wells at 2,500 gpm, separate treatment plants may be as cost-effective as a centralized facility.

The Castaic Wells operate under a blending strategy to reduce elevated levels of manganese in Castaic 02. The strategy dictates the order in which wells turn on and off to ensure that sufficient blending water is present when Castaic 02 is on. Average PFOS concentrations in Castaic 01 are 5.2 ng/L (6.5 ng/L maximum), and with the blending water from Castaic 02 and 07 (and/or N-1), can be reduced to below the treatment threshold for all observed PFOS concentrations. Castaic 01 therefore does not require treatment to meet water quality goals, making treatment installation a low priority for SCV Water. A proposed modified blending strategy for manganese and PFAS is provided in Attachment B. Treatment costs are provided for planning purposes, and include piping to bring water from Castaic 01 to the Castaic 04 site as there is insufficient footprint for treatment at Castaic 01.

4. Preliminary Planning Level Costs

Preliminary planning level costs were prepared in accordance with the assumptions presented in the 2021 Plan. Equipment costs were confirmed with recent construction costs of treatment at SCV Water sites. Escalation costs were increased to 6% per year given recent market conditions. Land acquisition costs at the Newhall site was calculated at $8/sf based on a recent appraisal. Land acquisition costs of $18/sf were assumed for sites at the following wells:

- Mitchell 5A
- North Oaks West, East, and Central
- W10
- Clark Well

Costs for drilling and equipping a new well to replace Mitchell 5A were estimated at $4M based on recent costs for drilling and equipping in the region, including costs at Well 205.

Table 4. Summary of Preliminary Planning Level Costs

Wells	Flow (gpm)	Construction Costs	Annual O&M Costs
Well W9	900	$6,495,000	$337,000
Well 206	2,500	$10,456,000	$415,000
Well 207	2,500	$10,456,000	$864,00
Lost Canyon 2, 2A, Sand Canyon (Mitchell 5B)	4,500	$13,782,000	$1,355,000
Mitchell 5A	800	$15,302,000	$443,000
Newhall 13	2,250	$11,993,000	$769,000
Castaic Well C1	640	$7,716,000	$208,000
Pinetree P1, P3, P5	1,350	$7,731,000	$627,000

5. Updated Implementation Schedule

Table 5 provides updates to SCV Water's well treatment implementation schedule based on this evaluation:

Table 5: Well Treatment Implementation Schedule

Wells	Priority	Status	Start-Up	Design/ Permitted Capacity (gpm)	Design/ Permitted Supply (afy)	Construction costs	Annual O&M costs
(N Wells) N, N7, N8		Online	12/20	6,250	10,081	$9,626,000	$1,724,000
Q2		Online 7/23	05/23	1,200	1,936	$2,426,000	$353,000
Valley Center		Online	10/22	1,200	1,936	$5,120,000	$381,000
Santa Clara, Honby	1	Construction	12/23	2,000	3,226	$9,626,000	$643,000
Well 201 VOC	2	Construction	01/25	2,000	3,226	$9,100,000	$150,000
T7, U4, U6 PFAS, S1/S2 VOC	3	Final Design	10/25	3,450	5,565	$9,626,000	$1,422,000
Well 205	4	Design	10/25	2,700	4,355	$23,548,000	$1,659,000
S6, S7, S8	5	Final Design RFP	09/26	3,000	4,839	$20,440,000	$3,012,000
(Saugus) N11 + N13	6	Planning	01/26	2,250	8,710	$11,993,000	$769,000
E14, E15, E16, E17	6	Planning	12/26	4,800	7,742	$17,947,000	$1,702,000
North Oaks West, Central & East	7	Planning RFP issued	06/28	2,150		$10,608,000	$929,000
Sierra Well	7	Planning RFP issued	06/28	1,000		$6,495,000	$456,000
Well W10	8	Planning RFP issued	06/28	1,500		$7,923,000	$633,000
Well W9	8	Planning RFP issued	06/28	900		$6,495,000	$337,000
Well D	8	Planning RFP issued	06/28	1,050		$7,050,000	$480,000
Lost Canyon 2, 2A, Sand Cyn (Mitchell 5B)	9	Planning RFP issued	06/28	3,700		$13,782,000	$1,355,000
Well 207	10	Planning RFP issued	06/28	2,500		$10,456,000	$864,000
Clark Well	11	Planning RFP issued	06/28	550		$6,620,000	$344,000
Saugus N12	12	Planning	TBD	2,500		TBD	TBD
Well 206	13	Planning	TBD	2,500		$10,456,000	$415,000
Mitchell 5A	14	Planning	TBD	800		$15,302,000	$443,000
(Castaic) Well C1	15	Plan to operate under blending strategy	TBD	640		$7,716,000	$208,000
(Pinetree) Well P3	16	No planned treatment	TBD	1,350		$7,731,000	$627,000

6. Summary and Findings

PFAS treatment thresholds were updated in accordance with the proposed MCLs by the EPA. Wells newly exceeding the treatment thresholds were:

- (Newhall) Well N13
- Mitchell 05A (Replacement)
- Sand Canyon
- Well 201
- Well 206
- Well 207
- Well W9
- Saugus 1
- (Castaic) Well C1
- (Pinetree) Well P3

Newhall Well N13 is newly identified for treatment. Treatment for Sand Canyon will be included in a centralized treatment facility with the Lost Canyon wells, for which a planning RFP has been issued. An RFP for planning services has also been issued for Wells W9 and 207. Saugus 1 and Well 201 are newly exceeding for PFAS, but are currently being treated for perchlorate with IX resin that will treat PFAS and requires no additional treatment. Planning costs for drilling a replacement well for Mitchell 05A and treating for PFAS were included.

Castaic Well C1 operates under a blending plan for manganese in Castaic Well C2. The blending plan can be modified to maintain PFAS compliance in Castaic Well C1 under the treatment thresholds for the proposed MCLs. Pinetree Well P3 has limited production, and is the lowest treatment priority for SCV Water.

Capital and construction costs from the 2021 Plan were updated with costs for treatment of the newly identified wells.

Attachment A: Conceptual Treatment Locations


Castaic 04
Approximate Treatment Area
Castaic 01


Newhall Creek
Railroad Ave
Newhall 13
Approximate Treatment Area


Approximate Treatment Area
Pinetree 03
Pinetree 05
Pinetree 01
Soledad Canyon Rd
Soledad Canyon Rd
Soledad Canyon Rd
Rosehaven Ln
Rosehaven Ln
Ada St
Loretta Ln
Marilyn Dr
Rue Daniel
Nasturtium Dr
Oak Springs Canyon Rd
Norland Dr
Santa Clara River
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Approximate Treatment Area
W9
Mosquito Creek Trail


Approximate Treatment Area
Sand Canyon
Lost Canyon 2, 2A
Mitchell 05B
Soledad Canyon Rd
Antelope Valley Fwy
Santa Clara River
Lost Canyon Rd
La Veda Ave
Zion Dr
Teton Ln
Dyer Wy
Provo Ln
Titus Ln
Road

Attachment B: Draft Castaic Blending Plan

Blending Plan Start Up and Shut down Process

Manganese and PFAS

1.
   - Action: Reservoir level reaches low set point
   - Response: SCADA calls out to wells
2.
   - Action: Well 7 ~~and Well 1~~ receive SCADA call
   - Response: Well 7 (and/or N-1) ~~and Well 1~~ come on-line
3.
   - Action: Reservoir levels continue to drop
   - Response: SCADA calls out to additional wells
4.
   - Action: Well 2 ~~receives SCADA call~~ and Well C1 receive SCADA call
   - Response: Well 2 ~~comes on-line~~ and Well C1 come on-line
5.
   - Action: Reservoir reaches first fill set point
   - Response: SCADA calls out to shut down Well 2 and Well C1
6.
   - Action: Well 2 ~~receives SCADA call~~ and Well C1 receive SCADA call
   - Response: Well 2 ~~shuts down~~ and Well C1 shut down
7.
   - Action: Reservoir reaches second fill set point
   - Response: SCADA calls out to shut down Wells ~~1 and~~ 7 (and/or N-1)
8.
   - Action: ~~Well 1 and~~ Well 7 (and/or N-1) receive SCADA call
   - Response: ~~Well 1 and~~ Well 7 (and/or N-1) shut down