State Water Resources Control Board
Division of Drinking Water

PERMIT AMENDMENT NO. 1910067PA-021

City of Los Angeles

System No. 1910067
Los Angeles County

November 2, 2023 DRAFT

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Engineering Report for Consideration of Permit Amendment No. 1910067PA-021

City of Los Angeles

Los Angeles County

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November 2, 2023 DRAFT

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ACRONYMS AND ABBREVIATIONS

1,1-DCE	1,1-Dichloroethene
1,2-DCA	1,2-Dichloroethane
1,2,3-TCP	1,2,3-Trichloropropane
ANSI	American National Standard Institute
ASME	American Society of Mechanical Engineers
BAT	Best available technology
bgs	Below ground surface
CCR	California Code of Regulations
CCRDL	Consumer Confidence Report Detection Level for PFAS
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CoPCs	Chemicals of potential concern
COC	Chemical of Concern
cis-1,2-DCE	cis-1,2-dichloroethylene
cf	cubic feet
DLR	Detection Limit for Reporting
DWR	California Department of Water Resources
ELAP	Environmental Laboratory Accreditation Program
EDT	Electronic data transfer
ESD	Explanation of Significant Differences
FRP	Fiberglass reinforced plastic
ft bgs	feet below ground surface
GAC	Granular activated carbon
gph	Gallon per hour
gpm	Gallons per minute
HA	Health Advisory Level
HPC	Heterotrophic plate count
IROD	Interim Record of Decision
LGAC	Liquid phase granular activated carbon
MCL	Maximum contaminant level
MG	Million gallons

mg/L	Milligrams per liter
MTBE	Methyl tertiary butyl ether
NDMA	N-nitrosodimethylamine
NEPA	National Environmental Policy Act
ng/L	Nanograms per liter
NL	Notification Level
NMOR	N-Nitrosomorpholine
NOE	Notice of Exemption
NSF	NSF International
OMMP	Operation, Maintenance, and Monitoring Plan
OU	Operable unit
PCE	Tetrachloroethylene
PFAS	Per- and Polyfluoroalkyl Substances
PFAS (25)	The 25 PFAS detected by EPA Method 533 which are
	(1) 11-Chloroeicosafluroro-3-oxanundecane-1 sulfonic acid (11Cl-PF3OUdS),
	(2) 1H,1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2FTS)
	(3) 1H,1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2FTS)
	(4) 1H,1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2FTS)
	(5) 4,8-Dioxa-3H-peflurorpnonanoic acid (ADONA)
	(6) 9-Chlorohexadecafluorro-3-oxanone-1 sulfonic acid (9Cl-PF3ONS),
	(7) Hexafluoropropylene oxide dimer acid (HFPO-DA) (GenX),
	(8) Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)
	(9) Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)
	(10) Perfluoro-3-methoxypropanoic acid (PFMPA)(11) Perfluoro-4-methoxybutanoic acid (PFMBA)
	(12) Perfluorobutane sulfonic acid (PFBS),
	(13) Perfluorobutanoic acid (PFBA)
	(14) Perflurorodecanoic acid (PFDA),
	(15) Perflurorododecanoic Acid (PFDoA),
	(16) Perfluoroheptanesulfonic acid (PFHpS)
	(17) Perfhloroheptanoic acid (PFHpA),
	(18) Perfluorohexane sulfonic acid (PFHxS),

	(19) Perflurorohexanoic acid (PFHxA),
	(20) Perflurononaoic acid (PFNA),
	(21) Perfluorooctyl sulfonic acid (PFOS),
	(22) Perflurorooctanoic acid (PFOA),
	(23) Perfluoropentanesulfonic acid (PFPeS)
	(24) Perfluoropentanoic acid (PFPeA)
	(25) Perfluoroundecanoic acid (PFUnA)
PRP	Potential responsible party
PS Codes	Primary Station Codes
psig	Pounds per square inch, gauge
RAA	Running Annual Average
RED	UV reduction equivalent dose
RI	Remedial Investigation
RL	Response Level
ROD	Record of decision
RSSCT	Rapid Small Scale Column Test
SCADA	Supervisory control and data acquisition
sf	square feet
SOC	Non-Volatile Synthetic Organic Chemicals
SWRCB	State Water Resources Control Board
TCE	Trichloroethylene
TDS	Total dissolved solids
TIC	Tentatively identified compounds
TTHM	Total trihalomethanes
UCMR	Unregulated Contaminant Monitoring Rule
USEPA	U.S. Environmental Protection Agency
UV/AOP	Ultraviolet Light Advanced Oxidation Process
UVT	UV Transmittance
VFD	Variable frequency drive
VOCs	Volatile Organic Chemicals
XLPE	Cross-linked polyethylene

I. INTRODUCTION

1.1 Purpose of Report

The State Water Resources Control Board, Division of Drinking Water (Division) is in receipt of a permit amendment application (**Appendix A**) from the City of Los Angeles Department of Water and Power (hereinafter, LADWP) dated February 2, 2023. The permit amendment is for treating extremely impaired groundwater from the North Hollywood West (NHW) Well Field to meet drinking water standards and distributing the treated water for domestic purposes.

The application is to make the following changes:

1. Extracting and treating groundwater from five impacted wells, which are NH-34, NH-37, NH-43A, NH-44, and NH-45.

2. Adding the North Hollywood West Wellhead Treatment (NHWWT) Facility located at 7000 Whitsett Avenue, North Hollywood, CA 91605 for treatment of contaminated groundwater in the vicinity of the NHW Well Field, which extracts groundwater from the San Fernando Basin (SFB). The NHWWT includes ultraviolet light advanced oxidation process system with hydrogen peroxide (UV/AOP) and a granular activated carbon treatment system (GAC) to treat groundwater from the wells listed above for removal of Volatile Organic Chemicals (VOCs) and 1,4-dioxane.

The purpose of this report is to document the Division's review of the permit amendment application and make recommendations regarding issuance of an amended permit to LADWP.

1.2 Background Information

1.2.1 Permit History

LADWP is operating under the authority of a full domestic water supply permit (Permit No. 04-15-08P-003) issued on May 1, 2008, with multiple amendments. This permit will be the 21st amendment. The permit and permit amendments issued to LADWP are summarized in **Table 1.**

Table 1: LADWP Permit and Amendments

Issue Date	Permit Number	Description	Status
05/01/2008	Full 04-15-08P-003	Revised Full Permit	Current
07/01/2009	Amendment 1910067PA-002	Addition of Encino Microfiltration Plant	Current
05/04/2010	Amendment 1910067PA-003	Operate Tujunga Temporary Groundwater VOC Treatment System	Current
05/09/2011	Amendment 1910067PA-004	Mission Tank: Mission Wells Facility Improvement Project – Phase 1	Current
07/20/2011	Amendment 1910067PA-005	Santa Ynez Floating Cover	Current
12/11/2012	Amendment 1910067PA-006	Santa Ynez Chloramination (Chloramination Phase 1a)	Current
07/09/2013	Amendment 1910067PA-007	Stone Canyon Chloramination (Chloramination Phase 1b)	Current
03/26/2014	Amendment 1910067PA-008	Central Los Angeles Chloramination (Chloramination Phase 2)	Current
05/01/2014	Amendment 1910067PA-009	San Fernando Valley, Santa Monica Mountains, and West LA Chloramination (Phases 3 and 4) and Parekh UV Disinfection Facility	Current
11/13/2014	Amendment 1910067PA-010	Headworks East Reservoir	Current
06/10/2015	Amendment 1910067PA-011	Fluoridation Optimal Dose Revision	Current
09/22/2015	Amendment 1910067PA-012	Mission Onsite Sodium Hypochlorite Generation	Current
01/17/2017	Amendment 2017PA_SCHOOLS	Lead sampling of drinking water at K-12 schools	Current
03/05/2018	Amendment 1910067PA-013	Intertie with the City of Burbank to Deliver Water Produced by the Burbank Operable Unit (BOU)	Current
05/24/2019	Amendment 1910067PA-014	Allow Tujunga Well 8 as a Source of Supply for the Tujunga TGTS	Current
10/11/2019	Amendment 1910067PA-015	Suspend corrosion control treatment at Stone Canyon and Hollywood Reservoirs	Current
09/21/2020	Amendment 1910067PA-016	Construct and operate four new groundwater wells at Manhattan Well Field	Current
11/04/2020	Amendment 1910067PA-017	Construct and operate Mission Well 10 at Mission Well Field	Current
01/31/2022	Amendment 1910067PA-018	UV Disinfection Plant at Los Angeles Reservoir Effluent	Current
08/22/2022	Amendment 1910067PA-019	Chloramination treatment trailer at Cyprean Tank	Current
06/30/2023	Amendment 1910067PA-020	Headworks Reservoir West	Current
xx/xx/2023	Amendment 1910067PA-021	Add five new wells and operate treatment system at new NHWWT Facility	New

1.2.2 Brief Description of the Site

The North Hollywood West (NHW) Well Field is one of LADWP's production well fields within the San Fernando Basin (SFB) and is located along Vanowen Street just west of State Route 170 (SR-170). The NHW Well Field is owned and operated by the LADWP as a permitted drinking water source for the City of Los Angeles. Many of the newer wells are located in and around the Whitsett Fields Park. All NHW wells are taken south into a common collector line on Vanowen St., which flows east into the North Hollywood Pump Station for distribution.

The NHW Well Field has provided a significant volume of groundwater production to the City of Los Angeles; however, in November 2014, LADWP removed seven production wells from service to prevent 1,4-dioxane concentrations from exceeding the Division of Drinking Water (DDW) Notification Level (NL; 1 microgram per liter [µg/L]) at the LADWP blend point downstream of the NHW Well Field. 1,4-Dioxane is a synthetic industrial chemical that is completely miscible in water and a likely human carcinogen (United States Environmental Protection Agency [EPA] 2017). The removal of these wells resulted in a combined loss of more than 24,700 acre-feet per year (AFY) or 65% of the total production capacity of the NHW Well Field.

LADWP has selected the NHW Interim Remedial Action (IRA) to address hazardous chemicals in the NHW Well Field pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) by pumping groundwater from NHW Remediation Wells (NH-34, NH-37, NH-45 plus NH-43A, NH-44) and treating the water at the newly constructed NHWWT Facility. Groundwater modeling shows that pumping of Remediation Wells NH-34, NH-37, NH-45 will draw 1,4-dioxane impacted groundwater away from other production wells within the NHW Well Field and downgradient groundwater resources and will provide sufficient containment to prevent 1,4-dioxane from entering the non-remedy production wells. However, impacted groundwater from up to five Remediation Wells (NH-34, NH-37, NH-45, NH-43A, and NH-44) can be treated at the NHWWT Facility, if necessary.

The treated water will be used as a source of potable water supply pursuant to a permit amendment issued by the Division. The location of the five NHW Remediation Wells is shown in Figure 1.

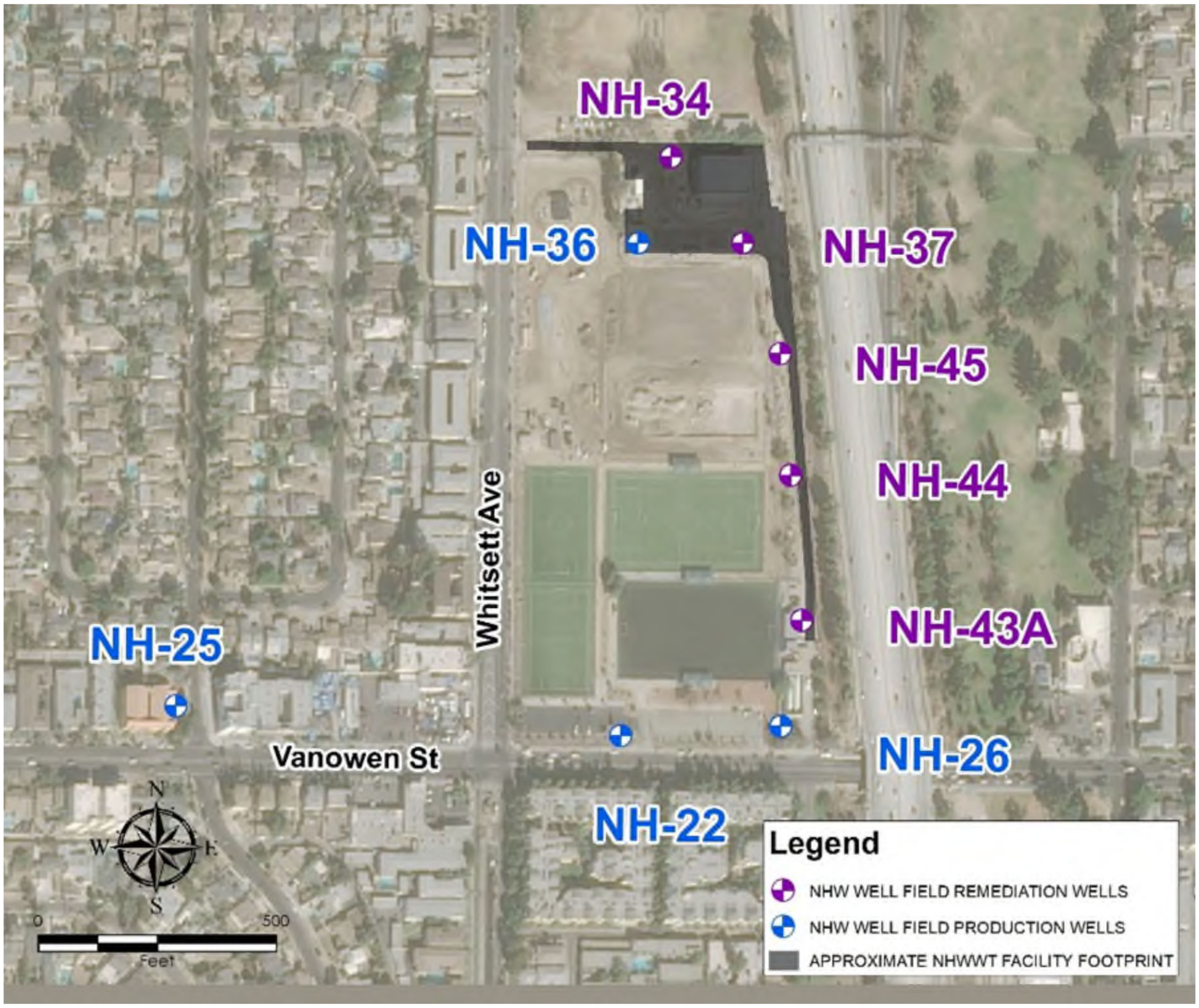

Figure 1: Locations of the Five Remediation Wells at NHW Site

1.2.3 Brief Description of the Contamination Plume

Figures 2 and 3 show the NHW Well Field layout and the potential contamination sites within its 10-year capture zone, respectively. In the vicinity of the NHW production wells, 1,4-dioxane in shallow groundwater above the notification level is generally located immediately east of the well field. These concentrations appear to be influenced by the plume emanating from the Hewitt Pitt area north of the well field. Concentrations in wells immediately east of the NHW production wells are generally above the notification level.

Trichloroethylene (TCE) impacts also occur in the area east of the production wells. Historically, multiple NHW wells, especially wells NH-23, NH-26, and NH-43A, have shown maximum levels of TCE of 35.1 µg/L, 15.6 µg/L, and 33 µg/L, respectively. With the exception of well NH-26, which shows decreasing concentrations below MCL, the general trend for the other 2 wells (Wells NH-23 and NH-43A) has been stable but mostly above the MCL.

There may be a potential source of tetrachloroethylene (PCE) in the area north of the NHW production wells from or near the Hewitt Pit that appears to be captured by the NHW Well Field. This can be observed in elevated concentrations of PCE in several of the northernmost NHW wells, including NH-37, where there are consistent detections of PCE during periods of pumping. There also may be a potential source of PCE west of the NHW wells, as suggested by concentrations of PCE observed in the westernmost monitoring well (NH-MW-08) at 22 and 0.54 µg/L at depths of 430 and 770 feet bgs, respectively. The NHW Well Field has also historically shown detectable concentrations of 1,1-dichloroethylene (1,1-DCE); however, the general trend of concentrations in these wells is declining and concentrations have been mostly below the MCL.

NHW production wells also have concentrations of hexavalent chromium (Cr[VI]) generally ranging between 2 and 5 µg/L. Historical water quality data show that average concentrations of nitrate in NHW range between 1.1 to 5.5 mg/L as N which is below the MCL of 10 mg/L as N. Perchlorate is generally not reported in shallow or deep groundwater in the NHW area.

Figure 2: NHW Well Field Layout

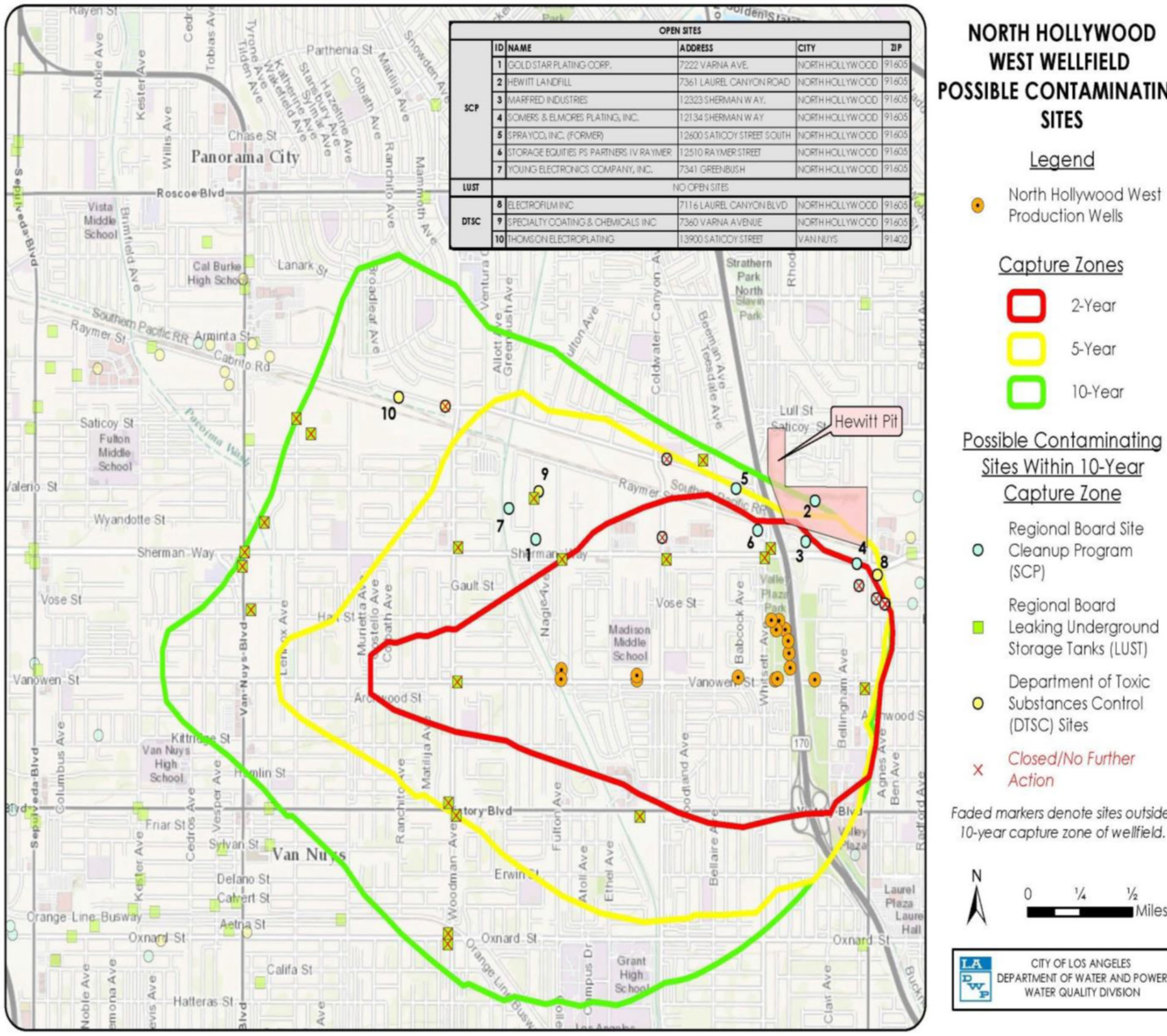

Figure 3: Potential Contamination Sites within NHW Well Field's 10-Year Capture Zone

1.2.4 Brief Description of the System

LADWP is currently operating under the authority of domestic water supply permit 04-15-08P-003 issued on May 1, 2008. LADWP is a community water system that serves over 4 million people through more than 700,000 service connections. It is headquartered at the John Ferraro Building at 111 North Hope Street in downtown Los Angeles and has numerous facilities throughout its system. LADWP obtains drinking water from the Mono and Owens River basins, through the 338-mile Los Angeles Aqueduct System; the San Fernando Valley (SFV) and Central groundwater basins, through local wells; and the

State Water Project and the Colorado River, through the Metropolitan Water District of Southern California (MWD). LADWP operates treatment facilities for surface water, contaminated groundwater, precautionary disinfection, and fluoridation. The LADWP distribution system is divided into more than 100 pressure zones, including approximately 80 pumping stations, 260 regulator stations, 100 storage facilities, and 7,200 miles of pipe. Hundreds of water quality samples are collected each month from sources and the distribution system to ensure the safety of the water supply.

1.2.5 Sources of Information

Information for the preparation of this report was obtained from the State Water Resources Control Board's Division of Drinking Water files, conversations with LADWP personnel, review of LADWP files, records, reports, and operations plans, and from multiple field visits to the NHWWT Facility conducted by Saeedreza Hafeznezami, Senior Water Resource Control Engineer with the Division's Southern California Field Operations Branch.

The following information was specifically reviewed:

- LADWP's final 97-005 Reports Steps 1 through 5, submitted January 2021
- LADWP's Permit Amendment Application, submitted February 2023
- LADWP's TrojanUVFlex200™ - Advanced Oxidation System Performance Test Report, submitted March 2023
- LADWP's NHWWT Engineering Report, submitted June 2023
- LADWP's NHWWT draft Operation, Maintenance, and Monitoring Plan (OMMP), submitted June 2023
- LADWP's Commissioning Report, submitted July 2023

II. INVESTIGATION AND FINDINGS

2.1 Sources of Supply Treated at the NHWWT

All source wells treated by the NHWWT are within SFB. The wells are most vulnerable to contamination in groundwater beneath two major cleanup sites, i.e., the Hewitt Pit Landfill (referred to as HPL or Hewitt Site) and the AlliedSignal/Bendix Corporation/Honeywell Site. Constituents of potential concern (COPCs) identified at the HPL include 1,4-dioxane, TCE, PCE, 1,2,3-trichloropropane (1,2,3-TCP), N-nitrosodimethylamine (NDMA), Cr(VI), and perchlorate. COPCs identified at the AlliedSignal/Bendix Corporation/Honeywell Site include TCE, PCE, 1,4-dioxane, and Cr(VI). Based on the constituents monitored and the source assessment/contaminant assessment steps (SA/CA), the well sources are considered immediately vulnerable to contamination.

Source protection measures are being implemented at the cleanup sites. LADWP has implemented the DDW Interim Sampling Plan since 2015 to evaluate groundwater conditions and will continue to monitor groundwater conditions per the NHW Water Quality Surveillance Plan (WQSP) once the NHWWT Facility is online. Implementation of the NHW WQSP will serve as an early warning of any unexpected increases in contaminant concentration or detection of additional contaminants.

Table 2 lists the capacities of the well pumps. The combined flow rate from three wells (NH-34, NH-37, and NH-45) is 7,900 gallons per minute (gpm) or 11 MGD, and the combined flow rate from five wells (NH-34, NH-37, NH-45, NH43A, and NH-44) is 12,500 gpm or 18 MGD. Table 3 presents the treatment capacities for the two Remediation Well combination scenarios. The entire flow from the five wells will be able to be treated at the NHWWT, which will be sized to accommodate up to 12,750 gpm raw water flow. Table 4 lists the well construction information for the five Remediation Wells.

Table 2: NHW Wells and Well Pumps Information

Well	Pump Capacity
NH-34	2,300 gpm
NH-37	2,800 gpm
NH-45	2,800 gpm
NH-43A	2,300 gpm
NH-44	2,300 gpm

Table 3: Treatment and Pumping Capacities

Remediation Wells	Design Treatment Capacity (gpm/MGD)	Pumping Capacity (gpm/MGD)
NH-34, NH-37, NH-45	9,750/14.0	7,900/11.4
NH-34, NH-37, NH-45, and NH-43A, NH-44	12,750/18.4	12,500/18.0

Table 4: NHW Wells Construction Information Summary

Well Name	Ground Surface Elevation (ft AMSL)	Top of Casing Elevation (ft AMSL)	Year Drilled	Drilling Method	Total Depth (ft bgs)	Conductor Casing Diameter (Inches)	Casing Diameter (Inches)	Sanitary Seal (ft bgs)	Depth to Pump Intake (ft bgs)	Perforation / Screen Interval Depths (ft bgs)	Pump / Motor Type
NH-34	730.6	732.2	1964	Cable Tool	760	26	20	0-50	425	202-263, 280-290, 308-398, 430-462, 494-505, 510-561, 563-574, 608-642, 675-720	Submersible / Constant Speed
NH-37	729.6	731.1	1968	Cable Tool	944	26	20	0-50	425	230-260, 278-390, 430-460, 505-550, 620-640, 700-720, 850-860, 875-910	Submersible / Constant Speed
NH-43A	721.0	722.5	1982	Cable Tool	650	26	20	0-12	425	280-370, 380-390, 420-460, 475-496, 506-565, 690-630	Submersible / Constant Speed
NH-44	722.5	724.0	1984	Reverse Circulation Rotary	800	36	20	0-100	425	340-780	Submersible / Constant Speed
NH-45	725.2	726.7	1984	Reverse Circulation Rotary	810	36	20	0-100	425	340-780	Submersible / Constant Speed

2.1.1 Well NH-34

Well NH-34 was drilled in 1964 by cable tool method. It has a 20-inch diameter inner casing to a depth of 760 feet (ft) and a 26-inch diameter conductor casing to a depth of 42 ft. The well is surface sealed and has a 50 ft sanitary seal that was retrofitted in 2020 using the permeation grouting method. The inner casing perforations extend below ground surface from 202-263 ft, 280-290 ft, 308-398 ft, 430-462 ft, 494-505 ft, 510-561 ft, 563-574 ft, 608-642 ft, and 675-720 ft. The well utilizes a constant speed submersible pump with a designed capacity of 2,300 gpm. The pump intake is set at 425 ft. The water level in this well was 251 ft below reference point (512 ft above mean sea level [AMSL]) in April 2019 and 244 ft below reference point (519 ft AMSL) in October 2019. The well is located ~320 ft east of Whitsett Avenue and 1,300 ft north of Vanowen Street, Los Angeles. The top of well casing is approximately 18 inches above the local ground surface (730.6 ft AMSL) and appears free of flooding hazards. At its closest, the HPL is located ~1,865 ft north of NH-34, and the AlliedSignal/Bendix Corporation/Honeywell Site ~5,000 ft east.

2.1.2 Well NH-37

Well NH-37 was drilled in 1968 by cable tool method. It has a 20-inch diameter inner casing to a depth of 944 ft and a 26-inch diameter conductor casing to a depth of 42 ft. The well is surface sealed and has a 50 ft sanitary seal that was retrofitted in 2020 using the permeation grouting method. The inner casing perforations extend below ground surface from 430-460 ft, 505-550 ft, 620-640 ft, 700-720 ft, 850-860 ft, and 875-910 ft. The well utilizes a constant speed submersible pump with a designed capacity of 2,800 gpm. The pump intake is set at 425 ft. The water level adjacent to this well (in NH-34) ranged from 251 to 244 ft below reference point (512 to 519 ft AMSL) from April to October 2019. The well is located ~150 ft east of Whitsett Avenue and ~1,300 ft north of Vanowen Street, Los Angeles. The top of well casing is approximately 18 inches above the local ground surface (729.6 ft AMSL) and appears free of flooding hazards. At its closest the HPL is located ~1,873 ft north of NH-37, and the AlliedSignal/Bendix Corporation/Honeywell Site ~5,200 ft east.

2.1.3 Well NH-43A

Well NH-43A was drilled in 1982 by cable tool method. It has a 20-inch diameter inner casing to a depth of 650 ft and a 26-inch diameter conductor casing to a depth of 42 ft. The well is surface sealed and has a 12 ft sanitary seal. The inner casing perforations extend below ground surface from 280-370 ft, 380-390 ft, 420-460 ft, 475-496 ft, 506-565 ft, and 690-630 ft. The well utilizes a constant speed submersible pump with a designed capacity of 2,800 gpm. The pump intake is set at 425 ft. The water level adjacent to this well (in NH-34) ranged from 251 to 244 ft below reference point (512 to 519 ft AMSL) from April to October 2019. The well is located ~630 ft east of Whitsett Avenue and ~280 ft north of Vanowen Street, Los Angeles. The top of well casing is approximately 18 inches above the local ground surface (721.0 ft AMSL) and appears free of flooding hazards. At its closest the HPL is located ~2,760 ft north of NH-43A, and the AlliedSignal/Bendix Corporation/Honeywell Site ~5,000 ft east.

2.1.4 Well NH-44

Well NH-44 was drilled in 1984 by reverse circulation rotary method. It has a 20-inch diameter inner casing to a depth of 800 ft and a 36-inch diameter conductor casing to a depth of 100 ft. The well is surface sealed and has a 100 ft sanitary seal. The well is gravel packed and the inner casing is screened from 340-780 ft below ground surface. The well utilizes a constant speed submersible pump with a designed capacity of 2,300 gpm. The pump intake is set at 425 ft. The water level adjacent to this well (in NH-34) ranged from 251 to 244 ft below reference point (512 to 519 ft AMSL) from April to October 2019. The well is located ~600 ft east of Whitsett Avenue and ~600 ft north of Vanowen Street, Los Angeles. The top of well casing is approximately 18 inches above the local ground surface (722.5 ft AMSL) and appears free of flooding hazards. At its closest the HPL is located ~2,460 ft north of NH-44, and the AlliedSignal/Bendix Corporation/Honeywell Site ~4,830 ft east.

2.1.5 Well NH-45

Well NH-45 was drilled in 1984 by reverse circulation rotary method. It has a 20-inch diameter inner casing to a depth of 810 ft and a 36-inch diameter conductor casing to a depth of 100 ft. The well is surface sealed and has a 100 ft sanitary seal. The well is gravel packed and the inner casing is screened from 340-780 ft below ground surface. The well utilizes a constant speed submersible pump with a designed capacity of 2,300 gpm. The pump intake is set at 425 ft. The water level adjacent to this well (in NH-34) ranged from 251 to 244 ft below reference point (512 to 519 ft AMSL) from April to October 2019. The well is located ~580 ft east of Whitsett Avenue and ~860 ft north of Vanowen Street, Los Angeles. The top of well casing is approximately 18 inches above the local ground surface (725.2 ft AMSL) and appears free of flooding hazards. At its closest the HPL is located ~2,200 ft north of NH-45, and the AlliedSignal/Bendix Corporation/Honeywell Site ~4,680 ft east.

2.1.6 Water Quality from NHW Wells and Plant Influent

To estimate the influent concentrations at the NHWWT, LADWP gathered two water quality data sets:

- Water quality data collected from the 13 NHW Well Field production wells; and
- Water quality data collected from the 33 selected groundwater monitoring wells within the NHW Study Area.

To focus on the most recent water quality trends, the water quality characterization only included data collected since January 2011. The studied data included LADWP's Groundwater System Improvement Study (GSIS) completed in 2015 for both production and monitoring wells, and three EPA monitoring wells as part of the SFV database. Water quality data for the Remediation Wells collected between 2011 and 2016 (evaluation period) reported some constituents exceeding the MCL and NL while other constituents were either non-detect or below applicable MCLs. Tables 5 through 9 present the summary of water quality results during the evaluation period at each well.

Table 5: Summary of Primary Chemicals of Concern (COCs) Water Quality Results at Well NH-34

Well ID	Constituent	Guideline (µg/L)	Detected Range (µg/L)	
			Minimum	Maximum
NH-34	TCE	MCL: 5	0.697	**10.5**
	PCE	MCL: 5	0.752	3.13
	Nitrate as N	MCL: 10,000	1,401	6,438
	1,4-Dioxane	NL: 1	**1.17**	**3.17**
	1,2,3-TCP	MCL: 0.005	Non-Detect	Non-Detect
	1,1-DCE	MCL: 6	0.514	4.69

Table 6: Summary of Primary COCs Water Quality Results at Well NH-37

Well ID	Constituent	Guideline (µg/L)	Detected Range (µg/L)	
			Minimum	Maximum
NH-37	TCE	MCL: 5	0.737	**14.3**
	PCE	MCL: 5	0.666	**8.54**
	Nitrate as N	MCL: 10,000	1,220	5,580
	1,4-Dioxane	NL: 1	0.614	**16.1**
	1,2,3-TCP	MCL: 0.005	Non-Detect	Non-Detect
	1,1-DCE	MCL: 6	0.518	2.9

Table 7: Summary of Primary COCs Water Quality Results at Well NH-43A

Well ID	Constituent	Guideline (µg/L)	Detected Range (µg/L)	
			Minimum	Maximum
NH-43A	TCE	MCL: 5	0.505	**25.5**
	PCE	MCL: 5	0.527	**15.6**
	Nitrate as N	MCL: 10,000	1,462	7,545
	1,4-Dioxane	NL: 1	0.65	**35.2**
	1,2,3-TCP	MCL: 0.005	0.0021	0.0021
	1,1-DCE	MCL: 6	0.581	1.96

Table 8: Summary of Primary COCs Water Quality Results at Well NH-44

Well ID	Constituent	Guideline (µg/L)	Detected Range (µg/L)	
			Minimum	Maximum
NH-44	TCE	MCL: 5	0.538	**5.67**
	PCE	MCL: 5	0.2	1.88
	Nitrate as N	MCL: 10,000	973.7	3,118
	1,4-Dioxane	NL: 1	0.079	**2.2**
	1,2,3-TCP	MCL: 0.005	Non-Detect	Non-Detect
	1,1-DCE	MCL: 6	0.37	0.747

Table 9: Summary of Primary COCs Water Quality Results at Well NH-45

Well ID	Constituent	Guideline (µg/L)	Detected Range (µg/L)	
			Minimum	Maximum
NH-45	TCE	MCL: 5	0.708	**5.9**
	PCE	MCL: 5	0.504	2.31
	Nitrate as N	MCL: 10,000	1,281	3,253
	1,4-Dioxane	NL: 1	0.541	**7.59**
	1,2,3-TCP	MCL: 0.005	Non-Detect	Non-Detect
	1,1-DCE	MCL: 6	0.647	0.787

Tables 10 and 11 summarize the estimated influent concentrations and design concentrations ultimately used to calculate the required log reductions of the COPCs for the 3-well and 5-well modes of operation.

The estimated influent concentrations for 1,4-dioxane are derived from forecast groundwater flow and fate and transport modeling which was described in the 2016 NHW

Well Field Interim Remedial Investigation / Feasibility Study (RI/FS; Hazen 2016). Fate and transport modeling results indicate that the combined 1,4-dioxane concentration from the Remediation Wells is simulated to be between 2 to 4 µg/L for the first two years of remediation, increasing to a maximum of approximately 8 µg/L after two years of Remediation Well pumping. Following that time, the combined 1,4-dioxane concentration from the Remediation Wells is simulated to decrease through time and is expected to decrease below the NL of 1 µg/L after 13 years of remediation, based on the modeling. For TCE, PCE, 1,1-DCE, and cis-1,2-DCE, estimated influent concentrations are based on historical maximum values from production well sampling as described in the NHW Well Field Raw Water Quality Characterization Report (Step 2 of the DDW 97-005 Evaluation; Hazen 2020).

The design influent concentration values for 1,4-dioxane are calculated by applying a safety factor of 2.5 given the uncertainties in raw water quality characterization. The design influent concentrations for TCE, PCE, 1,1-DCE, and cis-1,2-DCE are derived from the treatment capacity available from the 1,4-dioxane removal, when targeting the respective treated water goals for each COPC. These design influent concentrations (Tables 10 and 11) are in fact greater than the historical maximum concentrations and therefore provide additional factor of safety for these COPCs.

Table 10: Estimated Three-Well NHWWT Influent Concentrations

COPC	Estimated Influent Concentration	Safety Factor	Design Influent Concentration
1,4-Dioxane	8	2.5	20
TCE	9.2	--	50
PCE	3.8	--	31.5
1,1-DCE	2.5	--	>500
cis-1,2-DCE	0.7	--	>500

Table 11: Estimated Five-Well NHWWT Influent Concentrations

COPC	Estimated Influent Concentration	Safety Factor	Design Influent Concentration
1,4-Dioxane	4	2.5	10
TCE	11.3	--	24
PCE	5.4	--	20
1,1-DCE	2.2	--	500
cis-1,2-DCE	0.8	--	500

2.2 North Hollywood West Wellhead Treatment (NHWWT)

The NHWWT Facility consists of pre-filtration (i.e., sand separators and cartridge filters), advanced oxidation process (AOP) technology to remove 1,4-dioxane as well as other VOCs such as TCE and PCE, granular activated carbon (GAC) to quench remaining hydrogen peroxide from water downstream of AOP and to provide an additional VOC treatment barrier in case of loss of treatment by AOP. Treatment capacity for the three-well and five-well scenarios are design flows of 9,750 gpm and 12,750 gpm, respectively. Disinfection occurs off-site using existing chemical facilities.

2.2.1 Process Description

The NHWWT Facility has the capacity to treat the combined flow from up to five wells and is sized to accommodate up to 12,750 gpm raw water flow. Treated water will be subsequently blended with water from other wells in the NHW Well Field in the collector line and conveyed to the North Hollywood Pump Station Sump (NH Sump) and Forebay where it will mix with (i) treated (North Hollywood Central Treatment Facility) and untreated flows from LADWP's Rinaldi-Toluca Well Field, (ii) treated flows from the North Hollywood Operable Unit (NHOU), and (iii) then collectively with surface water.

Downstream of the NHWWT, the treated water will be dosed with chlorine at the existing chemical dosing system at the North Hollywood West Chlorination Station using Onsite Sodium Hypochlorite Generation (OSHG). Water will then flow through the NHW Collector Line and on to the NH Sump and Forebay for ammonia dosing to form chloramines, chlorine trimming, and fluoride dosing. Flow from the NH Sump and Forebay is conveyed via gravity or pumping through the existing NH Pump Station to the distribution system.

A schematic plan of the NHWWT treatment system is shown below in Figure 4.

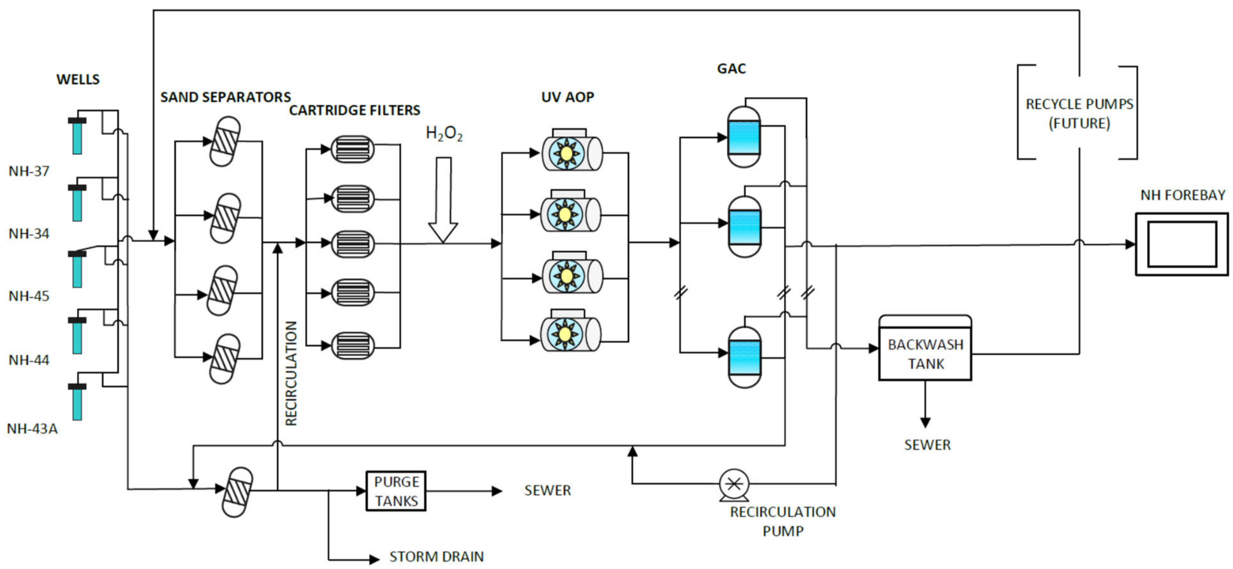

Figure 4: NHWWT Treatment system schematic plan.

2.2.2 Pretreatment

Pretreatment consists of sand separators and cartridge filters to remove sand and small particles prior to the UV reactors and GAC vessels. This removal is intended for the particulate material in the well water during the normal operation and steady-state pumping of the wells. During start-up, the well purge system will be used consisting of a sand separator, purge (baker) tanks, and sewer discharge pumps. The sand separator and cartridge filter units will be designed to operate in parallel, with capacity to temporarily operate with one sand separator and one cartridge filter offline for maintenance.

Sand separators are used for removal of the larger sized particles (sediment/debris) in groundwater extracted from the Remediation Wells and to protect the downstream UV reactors and GAC vessels. The influent water containing the entrained particles is pumped from the well into the top of the sand separator. The heavier particles are separated by centrifugal force and collect/accumulate at the bottom of the separator chamber. The wetted materials are NSF 61 certified for drinking water application. Table 12 summarizes the operating conditions for the sand separators.

Table 12: NHWWT Sand Separator Information

Parameter	Units	3-Well Flow Mode	5-Well Flow Mode
Total Units	--	4	4
Duty/Standby	--	3/1	3/1
Flow/Unit (Duty)	gpm	3,250	4,250
Maximum Capacity/Unit	gpm	4,900	

Purge Valve	--	4 (1 per unit)
Pressure Gauge	--	6 (1 inlet and 1 outlet for each of 3 units)

As a second step of pre-filtration, cartridge filters are used to remove smaller and lighter particles that are not captured by the sand separator. A cartridge filter unit consists of filter elements and a vessel that houses these elements. The filter vessel has inlet and outlet connections equipped with isolation valves. An air release valve is located at the feed side of the vessel, and a drain valve is located at filtrate side of the vessel. All the valves on the cartridge filters are manually controlled. The body of the cartridge filters are made of 316L stainless steel that meets NSF 61 compliance for drinking water applications. Pressure loss through the cartridge filters will vary from 5 psi to 15 psi depending on the state of cleanliness of the cartridges. An average headloss of 10 psi is expected for a flow of 3,000 gpm per unit. A common differential pressure sensor is provided to measure the loss through the cartridge filters. Individual pressure gauges are provided for each unit to allow maintenance workers to verify that units taken offline for maintenance have been depressurized before they are opened. Cartridge filter elements require changeout when the differential pressure of the cartridge filters exceeds an operator adjustable set point, typically 10-15 psi. The differential pressure transmitter will send a signal to SCADA when the high differential pressure set point has been exceeded and an alarm from SCADA will notify the operators that a changeout is required.

Table 13: NHWWT Cartridge Filter Information

Parameter	Units	3-Well Flow Mode	5-Well Flow Mode
Total Units	--	5	5
Duty/Standby	--	3/2	4/1
Flow/Unit (Duty)	gpm	3,250	3,188
Maximum Capacity/Unit	gpm	3,800	
Filter Elements/Vessel	--	190	
Pressure Gauge	--	8 (1 inlet and 1 outlet per unit)	
Differential Pressure Sensor	--	1 common across all vessels	
Clean element maximum headloss	--	5 psi	
Filter Element Changeout Trigger	--	15 psi	

2.2.3 Advanced Oxidation Process (AOP)

AOP was determined to be the treatment technology most effective at destroying 1,4-dioxane (and VOCs) for this project. AOP system for this project uses UV light and hydrogen peroxide as the chemical oxidant, which react to form hydroxyl radicals. Hydroxyl radicals are powerful oxidizers that can oxidize (break down) organic contaminants. Hydroxyl radicals can oxidize 1,4-dioxane, PCE, TCE, 1,1-DCE, and cis 1,2-DCE. Design effluent concentration goals were determined by the detection limit for purposes of reporting (DLR) for TCE and PCE, which corresponds to 0.5 µg/L for both and one-fourth the notification level (NL) of 1 µg/L for 1,4-dioxane as a safety factor. 1,4-dioxane was identified as the limiting target contaminant for treatment. The UV facility includes four trains of UV reactors.

The number of trains and hydrogen peroxide dose will be calculated based on the proprietary manufacturer algorithm, which uses the facility flow rate, UVT, and target contaminant log reduction as inputs. Higher log reductions can be achieved at lower flow rates or higher hydrogen peroxide doses. The vendor program package determined the hydrogen peroxide dose by analyzing an array of scenarios using their hydrogen peroxide equations that incorporate design flow, UVT, nitrate, hydroxyl radical scavenging, UV lamp power and the desired log reduction. The algorithm uses power and hydrogen peroxide costs to optimize doses for UV and hydrogen peroxide.

2.2.3.1 Hydrogen Peroxide (H_2O_2) Feed

The expected hydrogen peroxide dosage under the average expected conditions is 16 mg/L, and the peroxide feed system can deliver a peroxide dose up to 25 mg/L, if required for higher levels of treatment. Hydrogen peroxide is injected upstream of the UV reactors in order to form hydroxyl radicals within the UV reactor. The hydrogen peroxide storage and feed system consist of two peroxide storage tanks, with adequate capacity to accept a full truck delivery of hydrogen peroxide. Combined, the tanks have capacity of at least 30 days of storage under average flow and peroxide dose conditions. The tanks are in secondary containment to capture any hydrogen peroxide leaks. A transfer pump allows operators to transfer hydrogen peroxide between the tanks, pump hydrogen peroxide from a truck to either of the tanks, and to pump hydrogen peroxide from a tank back into a truck.

Peristaltic metering pumps in a duty/standby configuration are used for hydrogen peroxide injection to ensure continuous and consistent dosing. Hydrogen peroxide solution of 27.5% was used for chemical storage and feed system design. Peroxide injection will be accomplished via two pumps (one duty and one standby). Each pump can handle maximum dose of 25 mg/L. Two 316L stainless steel hydrogen peroxide storage tanks, each with a 9,000-gallon capacity, are provided. All components are designed to handle peroxide concentrations up to 50%. Temperature sensors are installed on each tank and linked to SCADA, triggering an alarm if the temperature of the hydrogen peroxide in the tanks were to increase dramatically. All materials that are continually in direct contact with the hydrogen peroxide must be compatible with hydrogen peroxide because non-compatible materials can increase the rate of hydrogen peroxide decomposition. Precautions related to hydrogen peroxide off-gassing and decomposition are also considered in the design. The hydrogen peroxide tanks are equipped with three level monitoring devices. Each tank has a sight level gauge for visual indication, an ultrasonic level sensor that displays level on the SCADA, and a high-level switch.

Two hydrogen peroxide analyzers will measure downstream concentrations. One analyzer measures the concentration of hydrogen peroxide in the pretreated water downstream of the chemical injection and will be used for monitoring and alarming if measured concentrations vary from the setpoint. The second analyzer measures hydrogen peroxide concentrations downstream of the GAC contactors to ensure the contactors are providing adequate hydrogen peroxide quenching.

Table 14: Hydrogen Peroxide Design Criteria

Parameter	Units	Value
H2O2 Solution Concentration	%	Up to 50%
Initial Fill Concentration	%	27%
Maximum Dose	mg/L	25
Number of H2O2 Storage Tanks	--	2
Tank Diameter x Sidewall Height	ft x ft	12 x 12
Tank Material	--	316L Stainless Steel
Tank Capacity	gal	9,000
Total Storage Capacity	gal	18,000
Number of H2O2 Metering Pumps	--	2 (1 duty, 1 standby)
Type of Metering Pumps	--	Peristaltic
Maximum Flow	gph	46

Hydrogen peroxide is injected into the 48-inch pretreated water line. The water line comes aboveground in the hydrogen peroxide dosing room to allow access for chemical injection. The dosing room is located adjacent to the storage room to minimize the distance the hydrogen peroxide must be pumped. There are two adjacent chemical injection points for injection redundancy. The hydrogen peroxide dose can be controlled locally based on the metering pump dose setpoint and flow pacing from SCC. An online hydrogen peroxide analyzer will verify hydrogen peroxide dose. The hydrogen peroxide dosing is controlled by the UV control system.

2.2.3.2 UV Reactors

The system consists of four trains (3 duty+1 standby) of TrojanUVFlex200TM UV Advanced Oxidation Process (UV-AOP) chambers, along with a hydrogen peroxide (H_2O_2) dosing system. Each chamber contains 8 lamp sections, and each section is comprised of 24-1 kW Solo UV lamps.

UV reactors photolyze hydrogen peroxide to generate hydroxyl radicals that oxidize the contaminants being treated. The UV facility utilizes four trains of UV reactors. Each UV train consists of isolation valves, a magnetic flow meter, and one UV reactor. Each UV train also includes power distribution centers (PDCs), hydraulic system centers (HSCs) for wipers, and a local control panel (LCP). Each reactor LCP will contain a programmable logic controller (PLC) for adjusting lamp power and the number of lamps energized. A system control center (SCC), acting as a UV system master control panel, will be provided

by the UV manufacturer to determine the quantity of online UV trains and hydrogen peroxide dose required to meet treatment goals. The vendor program package determined the hydrogen peroxide dose by analyzing an array of scenarios using their hydrogen peroxide equations that incorporate design flow, UVT, nitrate, hydroxyl radical scavenging, UV lamp power and the desired log reduction. The algorithm uses power and hydrogen peroxide costs to optimize doses for UV and hydrogen peroxide. The expected hydrogen peroxide dosage under three and five Remediation Well conditions are estimated to be 25 mg/L and 19.5 mg/L, respectively. A flow meter will be located at the inlet of each UV reactor to measure the flows through each reactor. The UV reactors are pressure rated for 50 psi. To protect the UV reactors from excess pressure, a pressure relief valve is designed to automatically relieve pressure upstream of the UV AOP system.

UVT and hydroxyl radical scavenging demand samples were collected from a range of NHW wells. The lowest measured UVT was 98.0%. A design UVT of 97% was selected as a conservative UVT. Hydroxyl radical scavenging demand was conservatively based on highest observed value from sampling throughout the three wellhead sites (NHC, TJCT, and NHW) conducted between 2015 and 2016, due to variability that was observed in the samples collected from NHW wells. Therefore, the selected design hydroxyl radical scavenging demand was 90,500 s^{-1}. Table 15 summarizes the UV reactor operating conditions.

Table 15: UV/AOP System Design Criteria

Parameter	3-Well Flow Mode	5-Well Flow Mode
Total Design Flow	14 MGD	18.4 MGD
UV Transmittance (UVT)	97%	
Nitrate	7 mg/L as N	
1,4-Dioxane Log Reduction	1.9 log	1.6-log
PCE Log Reduction	1.8-log	1.6-log
TCE Log Reduction	2.0-log	1.68-log
Design Hydroxyl Radical Scavenging Demand	90,500 s^{-1}	
Max H_2O_2 Dose	25 mg/L	
Number of Duty UV Trains	3 trains	4 trains

Redundancy	1 train	None
Number of Reactors per Train	1	1
Lamp Type	Low Pressure High Output	
Number of Lamps per Reactor	192	
Operating Power per Train	220 kW	

2.2.3.3 UV Control and Alarms

The UV AOP facility is controlled by the UV PLC located in the UV control panel (UVCP). There are two Human Machine Interface (HMI) workstations (client and server) for remote control, setpoint entry, and alarm monitoring. The UV PLC will communicate with the UV SCC and each UV reactor PLC on the same control network. The UV PLC will monitor the status of the reactors and provide coordination and control of the UV reactors to ensure sufficient treatment. Treatment targets are attained through the UV reactor algorithm with inputs from the UV PLC. The UV system controls continuously monitor calculated log reductions for the target contaminants based on real time monitoring of flow, UVT, and lamp intensity and calculate the optimum hydrogen peroxide dose and lamp power setting. The UV reactor variables monitored by the PLC includes flow rate, UV intensity, temperature, inlet and outlet valve statuses, and lamp status. Full list of UV system alarms and triggered responses are available in the OMMP, however, major alarms are categorized and listed in Tables 16 and 17.

Table 16: UV Reactor Alarm Categories

Alarm Level	Alarm Group	UV Reactor Response	Operator Response
Minor	Group 1 Warning	Alarm displayed	Inspect and troubleshoot
Critical	Group 2 Alarm	Alarm displayed	Inspect and troubleshoot
Major	Group 2 Alarm	Alarm displayed and all active lamps ramp to 100% power	Troubleshoot and turn off well(s) as needed.
Shutdown (UV Section)	Group 2 Alarm	Faulted UV section de-energizes immediately. Standby UV section is called on if available.	Inspect and troubleshoot
Shutdown (Reactor)	Group 2 Alarm	All lamps de-energize immediately. Valves wait for UV PLC permission or local	Inspect and troubleshoot

		acknowledgment to close.	

Table 17: UV Reactor Alarms

Alarm Condition	Response
Low hydrogen peroxide feed Rate	Check for leaks. Repair as required.
	Repair or replace pump. Refer to pump manual for troubleshooting.
Low UVT or UVT Analyzer Failure	Verify UVT reading on the HMI with the UVT reading on the UVT Device
	Verify UVT readings with a portable UV Photometer or Spectrophotometer
Loss of UV treatment (power quality event)	Restart UV AOP if wells still operational
AOP cannot maintain target log Reduction	Verify all Chemical equipment, UVT analyzer and UV sensors are operating as expected. Perform calibration on UVT analyzer and UV sensors. Repair as required. Shutdown alarm.

2.2.3.4 UV AOP Performance Testing

The objective of performance testing was to demonstrate that the UV AOP system (TrojanUVFlex200) meet the specified performance requirements and can meet the treatment criteria at the design operating conditions. Performance testing required half the design flow of one well's influent flow (approximately 1,500 gpm). The flow was spiked with UVT absorber (Super Hume was used to lower the water UVT) and 1,4-dioxane as required by the UV AOP specification to simulate design conditions. The treated water was discharged to the purge tanks with disposal to sewer. UV Reactor #2 was used for the testing. All tests were completed using Train 2 with a maximum of 4 lamp sections on, since that was the train that was fully operational at the time of testing. All tests were completed in manual mode to achieve the maximum allowable hydrogen peroxide dose and power input. To conduct these tests in manual mode, the number of lamp sections on, lamp power and H_2O_2 dosage were manually set to the specified/desired values. A secondary objective was to obtain performance data demonstrating removal of 1,4-dioxane treatment at reduced water UVT values. Ambient UVT was tested as well as the design UVT of 97%. Additional tests were completed at UVT values of 95% and 88% to examine the UV/AOP performance at conditions with lower than design UVTs, should such conditions occur in the future. Super Hume was used to lower the water UVT to the desired values.

The performance testing was conducted at NHWWT Facility in December 2022, and LADWP submitted the test report to the Division on March 23, 2023 (**Appendix B**). Well NH-37 was used for all performance tests completed. The results of hydroxyl radical scavenging sampling conducted in November and December 2022 showed an average value of 54,400±5510 s^{-1}. This value is much lower than the design scavenging value of 90,500 s^{-1} which was measured at well NH-37 back in 2016. The design hydroxyl radical scavenging demand of 90,500 s^{-1} was used during performance testing.

The performance testing results are summarized in Table 18. A “greater than” result means the treated water concentration was below the method detection limit (MDL) of 0.028 µg/L. To quantitatively demonstrate the required log reduction targets of 1,4-dioxane, effort was made to estimate the required 1,4-dioxane concentrations in the UV influent such that the contaminant concentrations could be accurately measured in both UV influent and UV effluent samples. Therefore, the influent contaminant concentrations needed to be high enough such that 1,4-dioxane concentrations in the UV effluent samples were greater than the analytical method reporting limit (MRL). The analytical method employed for 1,4-dioxane analysis was EPA Method 522, which has an MRL of 0.070 µg/L and an MDL of 0.028 µg/L.

Furthermore, during the commissioning phase conducted in April and May 2023, eighteen (18) more tests were conducted across different log reduction targets with different wells and reactors. All four reactors were tested in automatic mode with real-time adjustments for flow, UVT, and hydrogen peroxide dose. The hydroxyl radical scavenging term used for commissioning was updated to the highest result observed during performance testing of 63,000 s^{-1} to achieve more accurate log reduction calculations. Ten (10) of 18 tests achieved a treated water 1,4-dioxane concentration that provided an exact log reduction calculation. All tests resulted in measured log reductions being higher than the values predicted by the UV AOP control algorithms, which results in conservative operation.

Table 18. UV/AOP Performance Testing Results

Test Number	Train Flow Rate (GPM)	Reactor	Power (%)	No. of Sections	UVT (%)	Hydrogen Peroxide (mg/L)	Target 1,4-Dioxane Log Reduction	Measured 1,4-Dioxane Log Reduction
Performance								
Control	1538	R2	100	0	98.1	0.2	0.0	0.07
1	1528	R2	100	4	97.3	15.9	>1.9	>2.54
2	1566	R2	95	4	97.1	12.0	>1.6	>2.25
3	1429	R2	100	3	99.2	10.5	>1.4	>2.29
4	1533	R2	100	2	99.5	10.0	>0.9	1.98
5	1479	R2	100	4	94.5	17.8	>1.4	>1.73
6	1464	R2	100	4	88.0	19.8	>1.0	>1.27
7	1524	R2	100	4	98.8	10.8	>1.9	>2.64
8	1521	R2	100	3	99.2	16.8	>1.7	>2.39
Commissioning								
1	3252	R1	87.5	6	98.78	10.1	1.9	>2.5
2	3235	R2	94.5	5	98.81	11.3	1.9	>2.4
3	3233	R1	77.0	5	99.42	9.1	1.6	2.0
4	3222	R2	77.5	5	99.26	9.1	1.6	2.2
5	3213	R1	75.0	3	98.88	8.2	0.9	1.4
6	3176	R2	78.5	3	98.5	8.9	0.9	1.2
7	2646	R3	91.5	5	98.4	11.0	1.9	>2.5
8	2610	R4	89.5	5	98.7	10.1	1.9	>2.4
9	2620	R3	85.5	4	99.0	9.8	1.6	>2.2
10	2590	R4	79.0	4	99.4	8.9	1.6	>2.2
11	2587	R3	93.5	3	99.0	11.8	1.4	1.8
12	2560	R4	91.5	3	99.0	11.0	1.4	2.0
13	2568	R1	85.5	4	99.0	10.8	1.7	2.0
14	2566	R3	80.0	4	99.4	9.8	1.7	>2.2
15	2494	R2	75.5	3	99.1	9.4	1.2	1.5
16	2522	R4	73.0	3	99.3	9.1	1.2	1.4
17	2571	R3	91.5	4	98.0	11.8	1.5	>2.0
18	2537	R4	85.5	4	98.4	10.6	1.5	2.0

2.2.4 Granular Activated Carbon (GAC)

The excess hydrogen peroxide that is added upstream of the AOP system and is not completely photolyzed by the UV light requires quenching downstream of the AOP system. The GAC treatment at NHWWT will provide hydrogen peroxide quenching via catalytic reaction that breaks down the hydrogen peroxide into oxygen and water.

Eighteen (17+1) GAC vessels are designed to operate in parallel, with enough treatment capability to have one vessel out of service for maintenance. The system is designed to achieve a minimum 5 minutes of empty bed contact time (EBCT). The design includes a differential pressure sensor/transmitter on the feed header and the outlet header. The GAC system is designed for a hydraulic loading rate of 8.8 gpm/sf with all 18 vessels in service, and a hydraulic loading rate of 9.4 gpm/sf when one unit is out of service for backwashing. Each vessel is equipped with an effluent flowmeter to verify individual flowrates in a vessel. The GAC vessels will be filled with 15,500 pounds of GAC media. The maximum fill is 20,000 pounds per vessel. The AOP design influent dose of hydrogen peroxide is maximum of 25 mg/L with a design GAC influent concentration of 15 mg/L, and the design GAC effluent is less than 0.2 mg/L.

Backflushing and backwashing activities are to be conducted for maintenance of the GAC vessels. Backflushes are performed routinely to remove entrapped air and fines accumulated in the carbon bed over time during normal operations. Backwashes are performed only during carbon media changeout and require longer duration. One vessel can be backflushed or backwashed at a time with the rest of the vessels in operation. Potable water supplied from the local distribution system is used to backwash the vessels. There is a backflow preventer located on the backwash supply pipe on the west side of the GAC contactors that prevents any backwash wastewater from entering the distribution system. The backflush/backwash wastewater is collected in the 40,000-gallon backwash tank. The backwash tank then discharges at a maximum rate of 200 gpm to the sewer based on the industrial waste permit requirements. The discharge flow rate will be controlled by a 1.5-inch orifice plate on the tank outlet. The backwash tank will be periodically cleaned depending on the rate of solids accumulation.

Table 19 summarizes the GAC treatment system parameters.

Table 19: GAC System Operating Conditions

Parameter	Units	3-Well Flow Mode	5-Well Flow Mode
Total Treatment Flow Rate (one standby vessel)	gpm	9,750	12,750
Number of Vessels	--	18	18
Duty Vessels	--	13	17
Standby Vessels	--	5	1

Parameter	**Units**	**3-Well Flow Mode**	**5-Well Flow Mode**
Configuration	--	Parallel	
Vessel Diameter	ft	10	
Design Flowrate/Vessel	gpm	694	
Maximum Flowrate/Vessel	gpm	750	
Minimum Flowrate/Vessel	gpm	200	
Design Hydraulic Loading Rate	gpm/sf	8.8	
Hydraulic Loading Rate (One Out of Service)	gpm/sf	9.4	
Empty Bed Contact Time at 750 gpm	min	5.1	
Hydrogen Peroxide Influent Concentration	mg/L	25	
Backwash/Backflush Required Bed Expansion	%	30	
Backwash Volume	gal	17,000	
Backwash Duration	min	30	
Backwash Frequency	--	As needed based on media changeout (anticipated to be once every three years)	
Backflush Volume	gal	9,000	
Backflush Duration	min	15	
Backflush Frequency	--	As needed	
Media	--	Catalytic GAC	
GAC Media Mesh Size	-	12x40	
Carbon Weight per Vessels	lbs	Approximately 15,500 depending on media density to provide 5 min EBCT	

To maintain the GAC vessels flooded and avoid nitrate sloughing, a barometric loop is located on the common effluent of the GAC system. On-line nitrate analyzers are provided for the GAC treated water. A centrifugal recirculation pump with operating flow rate of 3,000 gpm, located at the GAC pipe loop, is provided in the design as a tool for low flow management between vessels. The pump circulates water from the GAC pipe loop where it takes the treated water effluent and circulates it back to sand separator No. 5 (used for purging) then to the cartridge filters.

A sample pump with operating flow rate of 3 gpm is provided to reduce the sample time delay between time the sample water leaves the GAC pipe loop to the time the water reaches the post-GAC peroxide and nitrate analyzers located inside the UVAOP building. A reduction in the sample time delay provides more accurate real-time sample concentrations. The expected travel time is about 1.3 minutes.

2.2.4.1 GAC Media Changeout

GAC media changeout is required when the GAC is no longer effective at quenching the hydrogen peroxide residual. Changeout will be required when hydrogen peroxide breakthrough is detected in the GAC effluent. Based on limited previous experience it is estimated that the media life for the GAC system will be in the order of years with one similar facility showing life of over three years.

2.2.4.2 GAC Controls, Monitoring, and Alarms

Residual hydrogen peroxide monitoring will be used to detect breakthrough in the GAC effluent at levels above 0.2 mg/L. A nitrate analyzer on the common effluent collector of the GAC vessels will monitor the nitrate levels. Well blending plan will include staging startup of the wells and monitoring will ensure nitrate concentrations in the GAC effluent will remain below 8 mg/L as nitrogen. If nitrate is greater than 8 mg/L as nitrogen (N), then confirm nitrate will be less than the MCL with blending at the RSCBCL Blend Point. In the future, with written approval from DDW, LADWP may utilize a different blend location between the NH Forebay outflow and RSCBCL Blend Point to confirm nitrate levels. The GAC system will also include a filter to waste system for use at startup. Each GAC vessel will have effluent flowmeters to monitor for the hydraulic loading. The GAC vessels have sampling ports at 25%, 50%, 75% of the bed depth, as well as at the effluent to monitor breakthrough of constituents. The GAC system will be controlled by the UV PLC. The UV PLC will be located in the UV Control building and connected to the Master HMI to allow for remote control, setpoint adjustment, and alarms monitoring. This PLC will connect to the overall plant PLC and to LADWP's SCADA system. Table 20 lists the GAC system alarms and responses.

Table 20: GAC System Operating Conditions

Alarm Type	Location	Response
GAC Inlet Flow High	For each vessel	Alarm displayed
GAC Inlet Flow Low	For each vessel	Alarm displayed
GAC High Differential Pressure	Common Headers	Alarm displayed
Combined Effluent Flow Low	GAC Effluent	Alarm displayed

Combined Effluent Pressure	GAC Effluent	Alarm displayed
Effluent Nitrate	GAC Effluent	Alarm displayed
Backwash/Backflush Supply Flow	Backwash Supply	Alarm displayed
Backwash Waste Tank Level	Backwash Waste	Alarm displayed, high water level inhibits backwash or backflush
Waste to Sewer Flow Rate	Waste Holding Tank Effluent	Alarm displayed

2.2.4.3 GAC Performance Testing

Performance testing of GAC was conducted to demonstrate that the media meets the design criteria for hydrogen peroxide quenching. Testing was carried out in two stages to minimize GAC offline operations:

- Stage 1: GAC 1, GAC 3, GAC 6, GAC 7, GAC 9, GAC 12, and GAC 16
- Stage 2: GAC 2, GAC 4, GAC 5, GAC 8, GAC 10, GAC 11, GAC 13, GAC 14, GAC 15, GAC 17, and GAC18

Testing required an approximate flow rate of 750 gpm per vessel and 25 mg/L of hydrogen peroxide for a minimum of 4 hours of operation. Each vessel was sampled at the inlet, 25%, 50%, 75%, and 100% (outlet) bed depth. Performance testing demonstrated the GAC media meets the criteria of hydrogen peroxide quenching for a maximum concentration of 25 mg/L to less than 0.2 mg/L.

2.2.5 Online Monitoring

Different parameters are monitored online to evaluate the overall performance of the treatment system. For the AOP system, UVT and hydrogen peroxide concentration are monitored and for treated water effluent hydrogen peroxide and nitrate are monitored using online analyzers, which are summarized in Table 21. The water from analyzers and UV reactor drains flow to the UV return sump and sent back to the main treatment header upstream of the sand separators.

Table 21: NHWWT Online Monitoring

Parameter	Location Description	Instrument	Purpose
UVT	UV Building Analyzer Wall	RealTech UV254	Measures UVT, the amount of UV light that can pass through a water sample. A lower UVT will require the UV reactors to operate at a higher UV output. UVT is measured before hydrogen peroxide dosing.
Hydrogen Peroxide	UV Building Analyzer Wall	Hydrogen Peroxide Analyzer No. 1	Measures the concentration of hydrogen peroxide prior to UV.
Hydrogen Peroxide	UV Building Analyzer Wall	Hydrogen Peroxide Analyzer No. 2	Measures the concentration of hydrogen peroxide downstream of combined GAC to confirm adequate quenching of hydrogen peroxide in GAC vessels.
Nitrate	UV Building Analyzer Wall	Nitrate Analyzer	Monitors nitrate concentrations in downstream of combined GAC to determine if water is sent to sewer or the North Hollywood Forebay

2.3 Operator Certifications, Reporting, and Record Keeping

2.3.1 Operator Certifications

The NHWWT Facility is classified as a Treatment 3 (T3) facility per Title 22, CCR, Section 64413.1. A completed treatment classification worksheet can be found in **Appendix C**. This requires a chief operator with at least a T3 certification and shift operator(s) with at least a T2 certification.

2.3.2 Reporting and Recordkeeping

Operational records will be maintained at the NHWWT Facility. Records will be maintained by LADWP, and exceptions will be reported to the Division. Major equipment and process failures and corrective actions taken will also be recorded and the records will be maintained by LADWP for a minimum of five years.

2.4 Water Quality and Process Monitoring

2.4.1 Source Monitoring

LADWP must conduct source water monitoring for all active sources. All production wells treated by the AOP and GAC treatment system must be monitored. In addition, LADWP must follow the monitoring requirements of CCR Title 22, Division 4, Chapter 15. The source monitoring program is shown in Table 22 below.

Table 22: Source Monitoring Program for Sources Treated at NHWWT Facility

Sample Location and PS-Code	Parameter	Frequency
Well NH-34 (CA1910067_095_095) Well NH-37 (CA1910067_098_098) Well NH-43A (CA1910067_104_104) Well NH-44 (CA1910067_105_105) Well NH-45 (CA1910067_106_106)	Complete Title 22 VOCs	Monthly
	1,4-dioxane	Monthly
	Nitrate	Monthly
	Alkalinity	Monthly
	Calcium	Monthly
	Hardness	Monthly
	Iron	Monthly
	Manganese	Monthly
	Sulfate	Monthly
	Total Dissolved Solids (TDS)	Monthly
	Specific Conductance	Monthly
	UV Transmittance (Lab)	Monthly
	Total Coliform / E. coli	Monthly
	HPC	Monthly
	1,2,3-TCP	Quarterly
	PFAS	Quarterly
	VOC and SVOCs with TIC reported	Annually
	Total Organic Carbon (TOC)	Annually
	Nitrosamines	Annually
	NMOR	Annually
	Cr(VI)	Quarterly
	Perchlorate	Annually

Sample Location and PS-Code	Parameter	Frequency
	Langelier Index	Annually

2.4.2 Treatment Process Monitoring

LADWP must conduct compliance monitoring as well as monitoring to evaluate performance of treatment processes. Additional details must be provided in an OMMP approved by the Division. Monitoring is subject to Division's review and approval. All analytes must be sampled with Drinking Water Methods that meet those specified in Title 22, CCR, Section 64415 (Laboratory and Personnel), Title 22, CCR. Unregulated chemicals must be monitored with methods approved by the Division.

Table 23: Treatment Process Monitoring at NHWWT Facility

Sample Location and PS-Code	Parameter	Monitoring Frequency
UV/AOP Combined Influent (Before H_2O_2 addition) (CA1910067_299_292)	Complete Title 22 VOCs	Weekly for one year of operation. Monthly after one year of operation pending review and approval by the Division.
	1,4-dioxane	Weekly for one year of operation. Monthly after one year of operation pending review and approval by the Division.
	UVT	Continuous monitoring with online analyzer.
	Nitrate	Monthly
	Alkalinity	Weekly
	Calcium	Weekly
	Hardness	Weekly
	Sulfate	Monthly
	Total Dissolved Solids (TDS)	Weekly
	Specific Conductance	Weekly
	UV Transmittance (Grab)	Weekly
	pH (Grab)	Weekly
	Total Coliform / E. coli	Monthly
	HPC	Monthly
	Temperature	Weekly
	Total Organic Carbon	Monthly

Sample Location and PS-Code	**Parameter**	**Monitoring Frequency**
	(TOC)	
	Nitrosamines	Monthly
	NMOR	Monthly
UV/AOP Combined Influent (After H_2O_2 addition) (CA1910067_299_293)	Hydrogen peroxide	Continuous monitoring with on-line analyzer.
	Hydrogen peroxide (Grab)	Weekly
	UV Transmittance (Grab)	Weekly
	Hydroxyl Radical Scavenging Demand	Quarterly
UV/AOP Train 1 – Effluent (CA1910067_299_294) UV/AOP Train 2 – Effluent (CA1910067_299_295) UV/AOP Train 3 – Effluent (CA1910067_299_296) UV/AOP Train 4 – Effluent (CA1910067_299_297)	Complete Title 22 VOC 1,4-dioxane Nitrosamines NMOR	If VOCs, 1,4-dioxane, nitrosamines, NMOR are detected at UV/AOP combined effluent. (CA1910067_299_298)
UV/AOP Combined Effluent (CA1910067_299_298)	Complete Title 22 VOC	Once after system initial start-up or re-startup Weekly
	1,4-dioxane	Weekly
	Nitrosamines	Monthly
	NMOR	Monthly
	Nitrate	Monthly
	Alkalinity	Monthly
	Calcium	Monthly
	Hardness	Monthly
	Sulfate	Monthly
	Total Dissolved Solids (TDS)	Monthly
	Specific Conductance	Monthly
	UV Transmittance (Grab)	Weekly
	Total Organic Carbon (TOC)	Monthly
	pH (Grab)	Monthly
	Total Coliform / E. coli	Monthly

Sample Location and PS-Code	**Parameter**	**Monitoring Frequency**
	HPC	Monthly
	Temperature	Monthly
	Hydrogen peroxide (Grab)	Weekly
	Formaldehyde	Annually
	Glyoxylic Acid	Annually
	Chloropicrin	Annually
	Acetaldehyde	Annually
	Total Trihalomethanes (TTHM)	Annually
	Haloacetic Acids - Five (HAA5)	Annually
Individual GAC Vessel Effluents	Hydrogen peroxide (Grab)	If >0.2 mg/L, perform corrective actions per OMMP and put train back in operation, Test again and confirm peroxide less than 0.2 mg/L.
	Total Coliform / E. coli	If positive Total Coliform at Combined GAC Effluent, sample each Vessels within 48 hours
	Arsenic Antimony Iron Manganese Aluminum Nickel Uranium	After vessel is reloaded, backwashed and soaked per approved OMMP
GAC System Combined Effluent (Compliance Point) (CA1910067_299_299)	Hydrogen peroxide	Continuous monitoring with on-line analyzer.
	Hydrogen peroxide (Grab)	Weekly
	Complete Title 22 VOCs	Monthly
	1,4-dioxane	Monthly
	Nitrate	Continuous monitoring with on-line analyzer.
	Nitrate	Weekly
	Total Coliform/E. coli	Once after system initial start-up or re-startup Monthly
	HPC	Once after system initial start-up or re-startup

Sample Location and PS-Code	Parameter	Monitoring Frequency
		Monthly
	pH (Grab)	Weekly
	1,2,3-TCP	Quarterly
	PFAS	Quarterly
	VOC and SVOCs with TIC reported	Annually
	Total Organic Carbon (TOC)	Annually
	Nitrosamines	Annually
	NMOR	Annually
	C(VI)	Annually
	Perchlorate	Annually
	HAA5	Annually
	TTHM	Annually

2.4.3 Water Quality Surveillance Plan

The Process Memo 97-005-R2020 notes that “supplemental monitoring wells are typically required to provide periodic glimpses of the original contamination and to provide an early warning in case unexpectedly high concentrations or new contaminants. The water quality surveillance plan should include specific proposed monitoring wells to provide early warning of any unexpected increases in contaminant concentrations or detections of additional contaminants, so that appropriate actions can be taken (97-005-R2020, p. 11). Early monitoring allows verification if existing treatment is adequate for new contaminants or concentrations.

LADWP must conduct monitoring at upgradient monitoring wells between the origin of the contamination and the Remediation Wells treated in this Project per the Water Quality Surveillance Plan in an OMMP reviewed and approved by the Division.

III. APRAISAL OF SANITARY HAZARDS & PUBLIC SAFETY HAZARDS

3.1 California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) applies to proposed projects initiated by, funded by, or requiring discretionary approvals from state or local government agencies. The proposed NHW Project constitutes a project as defined by CEQA (California Public Resources Code, Section 21065). LADWP, as a municipal utility, would implement and operate the proposed Project and will therefore act as the CEQA lead agency. LADWP funds the proposed Project, but in addition, receives funding from available sources, including State Proposition 1 funds.

The Initial Study determined that the implementation of the Proposed Project could cause some potentially significant impacts on the environment, but as shown in the environmental analysis contained in the Mitigated Negative Declaration (MND), all of the Project's potentially significant impacts would be reduced to less than significant levels through the implementation of mitigation measures.

LADWP submitted the December 2016 prepared MND to the Division on November 1, 2021 (**Appendix D**).

3.2 Evaluation of Process Memo 97-005 Submittal

The Division issued the original Policy Memo 97-005 on November 5, 1997, as a policy guidance for direct domestic use of extremely impaired sources. The Policy Memo 97-005 was revised on September 21, 2020 (SWRCB-DDW, 2020). The purpose of the Revised Process Memo 97-005 is to set forth the process and principles by which the Division would evaluate the proposals, establish appropriate permit conditions, and approve the use of an extremely impaired source for direct potable use. The Revised Process Memo's evaluation elements that must be addressed are listed below.

1. Drinking water source assessment and contaminant assessment
2. Full characterization of raw water quality
3. Drinking water source protection
4. Effective treatment and monitoring
5. Human health risks associated with failure of proposed treatment
6. Completion of the CEQA review of the project
7. Submittal of permit application
8. Public hearing
9. Drinking evaluation and recommendations

Completion of CEQA requirements, item 6, is discussed in Section **3.1** of this report. A permit amendment application was submitted to the Division by LADWP on **02/03/2023**, which satisfies item 7 noted above. A copy of the permit amendment application is included in **Appendix A** of this report. The first five elements listed above have been submitted by LADWP to the Division in final technical reports dated December 2020, prepared by Hazen and Sawyer in accordance with Revised Process Memo 97-005. The draft 97-005 reports were reviewed by the Division and comments were provided to LADWP between July 2018 and January 2020. Evaluation of the 97-005 elements one through five follows.

3.2.1 Drinking Water Source Assessment and Contaminant Assessment

This section includes discussion of Drinking Water Source Assessment (SA) and Contaminant Assessment (CA), based on Step 1 of 97-005 Evaluation Report submitted by LADWP.

The SA section provides an assessment of the physical boundaries and chemical characteristics of groundwater that may flow to and be pumped by the production wells. The assessment delineates the groundwater capture zone and identifies origins of contaminants found in the source water, predicts contaminant trends, and possible contaminating activities (PCA) within the capture zone.

The purpose of the CA is to provide a characterization of the contamination of soils and groundwater at and around the contamination and former contamination sites located within the long-term capture zone or watershed areas of the drinking water source. Relevant investigations, cleanup, and monitoring wells are discussed as well as regulated and non-regulated chemicals.

For the CA all contaminants with potential health effects must be identified and considered. The project applicants must also identify the list of contaminants of concern and the potential contaminants of concern for the proposed drinking water sources. The contaminant concentration ranges ascertained in the CA are used in the subsequent step of estimating the concentration of contaminants at the inlet of the proposed treatment equipment. If contaminants are found to be detectable at the production wells, their treatability must be evaluated to see if they can be removed.

The following is the condensed information from the detailed discussions in the 97-005 report (Appendix E, LADWP, 2020a). The addendum is also discussed.

a. San Fernando Basin Hydrogeology

The SFB contains water-bearing sediments that are characterized as alluvial deposits. The basin is bounded on the north and northwest by the Santa Susana Mountains, on the north and northeast by the San Gabriel Mountains, on the east by the San Rafael Hills, on the south by the Santa Monica Mountains and Chalk Hills, and on the west by the Simi Hills. Bedrock underlies all potentially water-bearing sediments in the SFB and is exposed at ground surface in the hill and mountain watershed areas of the Upper Los Angeles

River Area (ULARA). The alluvial fill in the SFB consists primarily of permeable sands and gravels interbedded with localized lenses of low permeable silt and occasional clays.

The depth to groundwater ranges from approximately 200 to 350 feet below ground surface (bgs). Regionally, groundwater flow is to the southeast, toward the Los Angeles River Narrows and locally, groundwater flow direction is influenced by groundwater recharge at the Hansen, Branford, Pacoima, and Tujunga Spreading Grounds where excess runoff and imported water is spread for groundwater recharge purposes.

The area of interest to this project, North Hollywood (NH), is divided into four hydrostratigraphic zones:

- The Upper Zone, the shallow aquifer that occurs between the present ground surface and 200 to 250 feet bgs and is composed of variable alluvial deposits.
- The Middle Zone, an aquitard that typically occurs between approximately 250 and 300 feet bgs, averages 50 ft thick and is characterized by relatively abundant fine-grained sands, silts, and clays.
- The Lower Zone, the main water supply aquifer that occurs between approximately 300 and 850 ft bgs, is approximately 300 to 500 ft in thickness and is characterized primarily by coarse sand and gravel horizons.
- The Deep Zone, which occurs to a depth of at least 1,200 ft bgs and is composed of fine to coarse alluvium with variable permeability.

The zones described above have also been referred to using a different nomenclature for hydrostratigraphic units in the SFB. For example, the “Upper Zone” and “Middle Zone” generally correspond to the “A-Zone”, the “Lower Zone” generally corresponds to the “B-Zone” and upper portion of the “Deeper Units”, and the “Deep Zone” generally corresponds to the lower portion of the “Deeper Units”.

b. NHW Well Field Overview

The NHW Well Field, located in the eastern SFB along Vanowen Street just west of SR-170, is owned and operated by LADWP and comprises 18 wells, some of which have been destroyed or shut down (LADWP, 2020a, Figure 1-9). The depths of the wells range from 500 to 944 feet with the newer wells being deeper and producing larger quantities of water. The NHW Well Field extracts water from the underlying aquifer, which predominantly comprises permeable sands and gravels interbedded with laterally discontinuous lenses of less permeable finer grained silt and clays. LADWP removed seven production wells from service in November 2014 to prevent 1,4-dioxane concentrations from exceeding the notification level (NL). As an Interim Remedial Action

(IRA), LADWP has planned that contaminated groundwater from up to five Remediation Wells within the NHW Well Field (NH-34, NH-37, NH-45, NH-43A, and NH-44) will be extracted and treated at the NHWWT Facility to prevent migration of 1,4-dioxane contaminated groundwater to other wells.

c. Capture Zones and Contaminating Activities

LADWP has a groundwater flow model for the SFB developed using MODFLOW program which incorporates physical boundaries, geologic and hydrogeologic data from monitoring wells and other information sources evaluated as part of the Remedial Investigation (RI). The model has been calibrated to historical hydrogeologic recharge and pumping data. This groundwater model was used by LADWP to delineate 2, 5, and 10-year capture zones for NHW Well Field (LADWP, 2020a, Figure 1-3).

The historical land use in the SFB has included aerospace and defense manufacturing, machinery degreasing, dry cleaning, landfills, and metal plating among others. First detections of VOCs in excess of state and federal drinking water standards in groundwater in the SFB date back to early 1980s. The most prevalent contaminants detected were TCE and PCE. Since then other contaminants of emerging concern, such as 1,4-dioxane, Cr(VI), NDMA, and perchlorate have been detected in the SFB groundwater. For chlorinated solvents and Cr(VI), the primary releases were typically leaking storage tanks or piping, leaching from sumps of other disposal practices, spills or generally poor housekeeping from the aerospace manufacturers and supporting industries. Landfills can also be sources of both organic and inorganic chemicals if they are unlined or liner failure has occurred. For other contaminants, such as nitrate and perchlorate, potential sources include agricultural, industrial, and municipal practices in the SFB.

d. Contaminants and Sources in SFB

LADWP has identified 12 contaminants of concern (COC) as high priority in the SFB based on occurrence in the production wells, toxicity, and regulatory thresholds which are the following:

- TCE
- PCE
- cis1,2-Dichloroethene (*cis*-1,2-DCE)
- 1,1-Dichloroethene (1,1-DCE)
- 1,2-Dichloroethane (1,2-DCA)
- Carbon tetrachloride (CTET)
- 1,2,3-trichloropropane (1,2,3-TCP)
- 1,4-dioxane
- N-Nitrosodimethylamine (NDMA)
- Hexavalent Chromium (Cr(VI))

- Perchlorate
- Nitrate

Contaminant plume maps have been prepared by LADWP and EPA and are provided in the 97-005 report (LADWP, 2020a, Attachments D and E). An assessment using the GeoTracker and EnviroStor databases was conducted to identify the known and potential contaminant sources within the capture zones of NHW Well Field (LADWP, 2020a, Tables 1-1 and 1-2, Figure 1-6). Of the identified contaminant sources the Hewitt Pit Landfill (Hewitt Site) and a portion of the AlliedSignal/Bendix Corporation/Honeywell Site are within the NHW Study Area (Appendix F, LADWP, 2020b, Figure 4). Additionally, there are open RWQCB and DTSC sites identified within the capture zones of NHW Well Field (LADWP, 2020b, Table 3)

The main contaminants observed at the Hewitt Site are VOCs including TCE and PCE, 1,2,3-TCP, as well as Cr(VI) 1,4-dioxane, perchlorate, and NDMA. Maximum concentrations of these contaminants at the Hewitt Site are available in GeoTracker (LADWP, 2020a, Table 2-1).

The main contaminants at the AlliedSignal/Bendix Corporation/Honeywell Site are TCE, PCE, Cr(VI), and 1,4-dioxane (LADWP, 2020a, Table 2-2). This site is located at the eastern edge of the ten-year capture zone and both onsite and offsite systems are in place and operating to address contamination from this site.

e. Contaminants in NHW

TCE has been historically detected at multiple NHW wells at levels above the MCL (LADWP, 2020a, Table 1-3) with the maximum concentration of 33 μg/L detected at well NH-43A.

There is a potential PCE source area north of the NHW production wells from or near the Hewitt Pit site that appears to be captured by the NHW Well Field. There also appears to be a potential source of PCE west of the NHW wells. Highest concentration of PCE among the five Remediation Wells in this project has occurred at well NH-43A at 15.6 μg/L.

1,1-DCE has been historically found at NHW wells with exceedances above the MCL; however, in the recent years the levels have shown a declining trend with concentrations mostly below the MCL.

1,4-dioxane has been detected at NHW wells at levels above the NL with the maximum concentration of 35.2 μg/L at well NH-43A. Concentrations seem to be influenced by the contaminant plume originating from the Hewitt Pit site.

Concentrations of Cr(VI) in NHW production wells range between 2 and 5 μg/L. Perchlorate has not been detected at any of the NHW wells. Nitrate concentrations at the five NHW Remediation Wells are generally below the MCL with the exception of well NH-43A which has had an MCL exceedance in the past. It appears based on historical water quality data that there is a correlation between pumping rates at NHW Well Field and capture of nitrate present east of NHW.

3.2.2 Full Characterization of Raw Water Quality

The end product of this step is to characterize the quality of the water that will be fed into the treatment system, so that the treatment system is properly designed. This should include an evaluation of all the contaminants found present in the CA and whether they are or will eventually appear at the production or extraction wells and plant influent (SWRCB-DDW, 2020, p. 8).

The following is the condensed information from the detailed discussions in the 97-005 report (Appendix F, LADWP, 2020b).

a. NHW as an Extremely Impaired Source

Groundwater in the vicinity of the NHW Well Field meets four of the criteria listed in Process Memo 97-005 as an extremely impaired source:

• Contains a contaminant that exceeds 10 times its NL based on chronic health effects which is 1,4-dioxane.

• Is extremely threatened with contamination due to known contaminating activities within the long term, steady state capture zone of a drinking water well. As described in the Drinking Water Source Assessment and Contaminant Assessment section, Hewitt Pit Landfill is located within the NHW Study Area and is an identified contamination site.

• Contains a mixture of contaminants of health concern beyond what is typically seen in terms of number and concentration of contaminants. In the NHW wells 1,4-dioxane, TCE, PCE, 1,1-DCE, and nitrate have been detected.

• Is designed to intercept known contaminants of health concern. The NHWWT Facility is planned to be operated in a manner that will draw contaminated groundwater toward the Remediation Wells to remove contaminants and provide hydraulic control by preventing migration of contaminants toward other non-remedy production wells and downgradient wells.

b. NHW Study Area

The study area for the project was delineated by aggregating the updated 2, 5, and 10-year capture zones based on the latest pumping plans and performing reverse particle tracking for each production well (LADWP, 2020b, Figure 3).

c. Raw Water Quality Data

Raw water quality data from 13 production wells and 33 groundwater monitoring wells installed by LADWP and EPA were obtained and combined into a database for assessment in this step (LADWP, 2020b, Tables 4 and 5, Figure 5). Only data since 2011 were deemed relevant and considered for this assessment to estimate the future raw water quality at the treatment plant influent.

The sources of data for this assessment include:

- Groundwater System Improvement Study (GSIS): a 6-year study completed in 2015 consisting of a comprehensive list of chemicals sampled in 2012/2013 and 2014.
- LADWP NHW Production and GSIS Groundwater Monitoring Well Data: sampling conducted routinely by LADWP since 2011 as part of DDW water supply permit.
- EPA SFV Monitoring Program and Database: a monitoring program implemented by EPA at 84 groundwater monitoring wells. For this assessment only 3 wells were considered that are located in the relevant vicinity of NHW production wells.

Statistical analysis was conducted on data from both production wells (LADWP, 2020b, Tables 8 and 9) and monitoring wells (LADWP, 2020b, Tables 11 and 12) using ProUCL software version 5.1 (EPA 2015). Assessment of the raw water quality considered exceedances of MCL, NL, SMCL, and PHG. Tentatively Identified Compounds (TICs) were included in the GSIS data for both production and monitoring wells.

The contaminants with at least one exceedance of an MCL or NL at any of the production wells were identified as:

- 1,4-dioxane
- 1,1-DCE
- PCE
- TCE
- Nitrate
- 1,2,3-TCP

These contaminants with the exception of 1,2,3-TCP were considered as the primary constituents of potential concern (COPC). 1,2,3-TCP was excluded because of the limited number of detections and the last detection above the MCL being from back in 2014.

The contaminants exceeding regulatory thresholds in monitoring wells were also identified as future COPCs:

- 1,1-Dichloroethane (1,1-DCA)
- 1,2-Dichloroethane (1,2-DCA)

- 1,4-Dioxane
- Benzene
- Chlorate
- cis-1,2-Dichloroethene (cis-1,2-DCE)
- Di(2-ethylhexyl)phthalate (DEHP)
- Nitrate (as N)
- PCE
- TCE

d. Estimating Treatment Plant Influent Concentrations

Multiple approaches were used for calculating the treatment plant influent concentrations including groundwater flow and fate and transport modeling for 1,4-dioxane, water quality data analysis for production wells, and water quality data analysis for monitoring wells. Only constituents that had at least one exceedance of an MCL or NL were considered in each approach. Each approach used the following two well combinations to calculate the flow-weighted influent concentrations:

- Three Remediation Wells: Combined Flow from the following wells: NH-34, NH-37 and NH-45
- Five Remediation Wells: combined flow from the following wells NH-34, NH-37, NH-43A, NH-44 and NH-45

The influent concentrations results based on the Kaplan Meier method (KM mean), 95 percent upper confidence limit of the population mean (UCL95), 95th percentile, and maximum detection value are presented in Tables 13 through 16 of the submittal (LADWP, 2020b). The results show that 1,4-dioxane is the main contaminant of concern exceeding the NL, with PCE and TCE also exceeding the MCL under some scenarios and assumptions. Therefore, considering the various areas of uncertainty in the data, a safety factor of 2 was adopted for 1,4-dioxane, PCE, and TCE.

Trend analyses were also conducted on the data sets from all production wells to assess temporal changes of the COPCs and evaluate their future concentrations. While trend calculations were not possible for all wells for all COPCs, either statistically significant or visually observable increasing trends were identified for different COPCs at all five Remediation Wells.

An assessment of COPC concentration variability with pumping rates and time was also conducted (LADWP, 2020b, Table 18 and Appendix K). Strong correlations between concentrations of COPCs and pumping were observed in most production wells. No correlation with wet and dry periods was observed in the concentrations of any of the five COPCs.

Final design concentration numbers are presented in the Effective Treatment and Monitoring section 3.2.4.

3.2.3 Drinking Water Source Protection

Pursuant to Process Memo 97-005, for an extremely impaired source to be used as an approved drinking water supply, there needs to be a program in place to prevent the level of contamination from rising and to minimize dependence on treatment for contaminant removal.

The 97-005 Report submitted by LADWP to address this step (Appendix G, LADWP, 2020c) provides the following information related to the various remediation programs, cleanup actions, mitigation measures, and regulations applicable to the protection of the drinking water source for NHW Well Field capture zones (2, 5, and 10-year capture zones).

To protect the well field, LADWP implemented the following elements:

- LADWP's evaluation of contamination source areas;
- Identification and evaluation of major clean-up projects within the NHW Well Field capture zones;
- A detailed evaluation of existing source protection programs; and
- A Communication Plan, which identifies LADWP personnel that will act as liaisons with appropriate agencies.

There are various existing source protection programs and regulations applicable to the management and handling of storage tanks, hazardous materials, and waste within the NHW Well Field area that are described in the 97-005 report.

LADWP has a Source Protection and Groundwater Remediation team that is in continuous communication with the EPA and RWQCB and is informed of any sources of contamination that could potentially impact the source water quality in the SFB. The 97-005 Report lists positions within LADWP that act as liaisons with the Division of Drinking Water, RWQCB, EPA, and DTSC.

3.2.4 Effective Treatment and Monitoring

Pursuant to Process Memo 97-005, the project submittal must include a treatability assessment for all contaminants projected to be detectable at the production or extraction wells. The project must address all contaminants of health concern and to treat down to the lowest concentration feasible. The submittal must also include a sampling and analysis plan for the drinking water source(s) and at appropriate locations in the treatment plant. Monitoring associated with a proposal to use an extremely impaired source as a drinking water supply will also require more extensive monitoring, in terms of frequency of testing as well as numbers of contaminants, than is associated with typical drinking water sources. The water quality surveillance plan should include specific proposed monitoring wells or monitoring locations and a proposed sampling and analysis plan. The purpose of these requirements is to provide early warning of any unexpected increases in contaminant concentrations or detections of additional contaminants, so that appropriate actions can be taken. LADWP has addressed these elements in a 97-005 report submittal summarized below (Appendix H, LADWP, 2020d).

a. Treated Water Goals

The associated planned treatment facility is referred to as the NHWWT Facility. The purpose of establishing treated water goals is to ensure the cumulative risk of multiple contaminants under normal plant operation has been addressed. LADWP evaluated treated water goals for two flows:

• Three Remediation Well Treatment - NHWWT effluent based on the collective flow from three Remediation Wells: NH-34, NH-37 and NH-45; and

• Five Remediation Well Treatment - NHWWT effluent based on the collective flow from five NHW Remediation Wells: NH-34, NH-37, NH-43A, NH-44 and NH-45.

The COPCs considered for treated water goals included nitrate, 1,1-DCE, 1,2,3-TCP, 1,2-DCA, 1,4-Dioxane, DEHP, Benzene, PCE, TCE, cis-1,2-DCE, 1,1-DCA, and Cr(VI). The proposed treated water goals for the NHWWT are to below DLR for PCE, TCE, 1,1-DCE, cis-1,2-DCE, and 1,4-dioxane. The estimated influent concentrations and treated water goals for the three-well and five- well scenarios are listed below. Design influent concentrations for TCE, PCE, 1,1-DCE, and cis-1,2-DCE are based on treatment capacity when targeting 1,4-dioxane at design influent concentrations of 20 and 10 µg/L for the three and five well scenarios, respectively.

Three-Well Treatment Goals

Constituent	Design Influent Concentration (ug/L)	Design Effluent Concentration (ug/L)	Log Reduction
1,4-dioxane	20	<0.25	1.9-log reduction
TCE	50	<0.5	2.0-log reduction
PCE	31.5	<0.5	1.8-log reduction
1,1-DCE	>500	<0.5	>3.0-log reduction
cis-1,2-DCE	>500	<0.5	>3.0-log reduction

Five-Well Treatment Goals

Constituent	Design Influent Concentration (ug/L)	Design Effluent Concentration (ug/L)	Log Reduction

1,4-dioxane	10	<0.25	1.6-log reduction
TCE	24	<0.5	1.68-log reduction
PCE	20	<0.5	1.6-log reduction
1,1-DCE	500	<0.5	>3.0-log reduction
cis-1,2-DCE	500	<0.5	>3.0-log reduction

b. Treatability Assessment

LADWP considered various technologies for treatment of COPCs including UV/AOP, air stripping, and carbon adsorption (LADWP, 2016). While air stripping and carbon adsorption are Best Available Technologies (BATs) for many of the VOCs included in this project, they are ineffective for removing 1,4-dioxane. Therefore, LADWP determined that the treatment plant for this project would include a pre-filtration system, an UV/AOP system consisting of UV and hydrogen peroxide, and a GAC system for hydrogen peroxide quenching.

The USEPA “Drinking Water Treatability Database” notes Ultraviolet Irradiation + Hydrogen Peroxide has the capability of oxidizing a variety of organic and inorganic contaminants and has been shown to be effective in destroying many micropollutants present in the groundwater (e.g., methyl tertiary butyl ether [MTBE], perchlorate, pesticides, 1,4-dioxane, etc.) through direct chemical oxidation. UV/AOP technology uses UV light and a chemical oxidant such as hydrogen peroxide, which react to form hydroxyl radicals. Hydroxyl radicals, which are powerful oxidizers, can oxidize and break down organic contaminants such as 1,4-dioxane, PCE, TCE, 1,1-DCE and cis 1,2-DCE. EPA has found UV AOP to be effective at removing 1,4-dioxane with up to greater than 99% effectiveness (EPA, 2011).

c. Treatment Technologies

The NHWWT will utilize sand separators and cartridge filters as pre-treatment for protection of downstream systems, followed by UV/AOP with hydrogen peroxide for removal of 1,4-dioxane and other VOCs, and finally GAC vessels for removing the excess hydrogen peroxide (LADWP, 2020d, Figure 5-1).

d. Maximum Contaminant Level (MCL) Equivalents

Pursuant to Process Memo 97-005, MCL-equivalent assessment is used to judge the appropriateness of treatment for an extremely impaired source with multiple contaminants. If known contaminants can be reduced to an MCL-equivalent of 1 or lower or even to 0 for the mixture of contaminants, it is DDW’s belief that a prudent and practical approach has been implemented in providing extra caution for the protection of public health. MCL-equivalent for each group of contaminants (acute vs chronic endpoint) is calculated separately, with a goal for each group to be below an MCL-equivalent of 1. The procedure used for calculating the MCL-equivalents for the Project are discussed in Appendix A of the 97-005 report (LADWP, 2020d). MCL-equivalent assessment was conducted for both three-well (NH-34, NH-37, NH-45) and five-well (NH-34, NH-37, NH-43A, NH-44, NH-45) flows (LADWP, 2020d, Appendix A Tables 3-1 and 3-2). MCL-equivalents for each scenario were calculated using both the normal anticipated and maximum concentrations of COPCs in the NHWWT effluent.

The most conservative combination of scenarios resulted in MCL-equivalent of 0.50 for the acute risk contaminants and MCL-equivalent of 0.58 for chronic cancer health risk contaminants.

As water quality can change over time, this can affect the MCL-equivalent calculation causing the calculation to be no longer representative of treatment and contaminant exposure. The MCL-equivalent calculation must be reviewed and updated every 5 years with the new calculation submitted to the Division. In the event there is a new contaminant or a change in concentration that causes the MCL-equivalent calculation to be above 1, then operational changes must be made.

e. Compliance and Process Monitoring

Key process control parameters monitored online analyzers are provided in Table 6-1 of 97-005 report (LADWP, 2020d) and below.

System	Parameter	Analyzer Location
UV/AOP	UVT	UV Influent
	UV Intensity	Each UV reactor
	Flow Rate	Each UV reactor
	Hydrogen Peroxide	UV Influent
GAC	Differential Pressure	Influent and effluent of each GAC vessel
	Flow Rate	Each GAC Vessel
	Hydrogen Peroxide	GAC treated effluent

Sampling locations, constituents, and frequencies for the source and treatment processes are summarized in Section 2.4 of this report based on information provided in 97-005 report (LADWP, 2020d, Figure 8-1 and Tables 8-1, 8-2, 8-3) and DDW's recommendations.

3.2.5 Human Health Risks Associated with Failure of Proposed Treatment

The Process Memo 97-005 calls for an evaluation of the risks of failure of the proposed treatment system and an assessment of the potential health risks associated with such failures. LADWP has addressed these elements in a 97-005 report submittal summarized below (Appendix I, LADWP, 2020e)

An assessment of each of the NHWWT component modes of failure, LADWP concluded that the sand separators, cartridge filters, and GAC contactors do not affect the treatment performance and therefore do not pose a health risk to the public under a failure scenario. Rather, failure of these components would result in increased maintenance activities. On the other hand, failure of hydrogen peroxide feeding and UV reactor would pose an increase in risk to the public. However, online monitoring and a four-hour window of operator troubleshooting of the equipment would limit the high exposure potential.

The results of the human health risk assessment using maximum calculated COPC concentrations in untreated effluent, indicate that, even in the event of total NHWWT Facility failure, incremental cancer and non-cancer risks are within accepted risk limits. The assessment considered both three and five well flow modes and included both single treatment failure and multiple treatment failure scenarios and the calculated risk values were below the de minimis cancer risk of 1E-06 and the non-cancer hazard index of 1.

3.2.6 Completion of CEQA

CEQA for this permit has been completed as discussed in Section 3.1 of this report.

3.2.7 Commissioning and Acceptance Testing

LADWP submitted the Commissioning Report to the Division on July 18, 2023 (**Appendix J**). Commissioning was the final phase of start-up and performance testing for the NHWWT Facility which was conducted from April 17 through May 05, 2023. The objective was to verify performance and reliability of all NHWWT equipment at average well flows under normal operating conditions with the facility operating in automatic control over a three (3) week period. Importantly, this included evaluating the accuracy of the UV AOP control equations for predicting 1,4-dioxane log reductions. Each reactor was cycled and sampled at least four times. Commissioning included verification of the performance of the four NHW UV reactor trains in automatic mode with flow rates ranging from 2,500 to 3,200 gpm. Only one reactor was online at any time and chemical (1,4-dioxane) spiking was only performed during sampling events. Treated water was sent to the storm drain. Upon completion of sampling the well was shut down. Likely due to wells being offline for an extended period, 1,4-dioxane concentrations in samples collected from the Remediation Wells before the commissioning were below the MDL. Therefore, 1,4-dioxane spiking upstream of the UV AOP reactors was conducted to achieve sufficient concentrations in the influent and detectable concentrations in the UV AOP effluent to allow for accurate log reduction calculations.

Eighteen (18) tests were conducted across different log reduction targets with different wells and reactors. All four reactors were tested in automatic mode with real-time adjustments for flow, UVT, and hydrogen peroxide dose. The hydroxyl radical scavenging term used for commissioning was updated to the highest result observed during performance testing of 63,000 s-1 to achieve more accurate log reduction calculations. However, the design hydroxyl radical scavenging demand of 90,500 s^{-1} will be the initial input during the beginning of plant operations for conservative log reduction calculations. Ten (10) of 18 tests achieved a treated water 1,4-dioxane concentration that provided an exact log reduction calculation. In cases of treated water concentrations below the MDL, the MDL of 0.028 µg/L was used as the UV treated water concentration to calculate log reductions. All tests resulted in measured log reductions being higher than the values predicted by the UV AOP control algorithms, which results in conservative operation. Higher measured log reductions show actual performance exceeds predicted removal. All UV/AOP effluent 1,4-dioxane concentrations were lower than the treated water goal of 0.25 µg/L.

Excess hydrogen peroxide was then quenched by the GAC vessels. The facility flow rate was split between 8 GAC vessels with flows averaging 348-358 gpm to confirm peroxide quenching. Eight GAC vessels were operational during commissioning to quench excess hydrogen peroxide from UV reactor effluent. GAC flow rates and differential pressures were monitored. Flow rates ranged between 348-358 gpm on average. Influent hydrogen peroxide concentrations averaged 6.63 mg/L and hydrogen peroxide was not detected in the treated water. GAC media was successful at quenching excess hydrogen peroxide from the UV AOP system.

Other VOCs were also monitored during commissioning and detectable concentrations of trichloroethene (TCE) were reported in two influent samples with the concentration of TCE in the treated water being non-detect.

3.2.8 Public Hearing and Comment

Public comment may be part of the permitting process for extremely impaired sources. LADWP has informed its customers of the proposed treatment facilities, the contaminants of primary concern, and the added wells that are designated as extremely impaired sources.

LADWP invited public comment and informed its customers of the methods of comment, the duration of the comment period, and the repository locations of the Division's draft permit and engineering report subject to public comment. The public notice instructed that interested parties should submit comments to LADWP starting XX XX, 2023 and that the comments must be dated or postmarked no later than XX XX, 2023. The Division's draft permit and engineering report were available for review at xxx and online at LADWP's website. The public comment period was concluded on XX XX, 2023 and a public hearing meeting was held at xxx on XX XX, 2023.

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IV. CONCLUSIONS AND RECOMMENDATIONS

The State Water Resources Control Board, Division of Drinking Water finds that the sources, works, and operation, as described in this report can provide safe, wholesome, and potable water supply. It is anticipated, based upon available information, that the quality of water delivered will meet all applicable State Drinking Water Standards. Issuance of an amended domestic drinking water supply permit by the Division to the City of Los Angeles Department of Water and Power is recommended subject to the following conditions:

General Conditions

1. This document amends and adds to the domestic water supply permit issued to the City of Los Angeles Department of Water and Power (LADWP) by the Division on May 1, 2008 and subsequent amendments. If any provision of this amendment conflicts with the permit and its subsequent amendments, the provisions of this amendment must be followed.

2. LADWP must comply with all requirements set forth in the California Safe Drinking Water Act, California Health and Safety Code and any regulations, standards, or orders adopted thereunder.

3. The only sources approved for potable water supply are listed below. No other source can be used without first obtaining an amended permit from the Division.

Table 1. Groundwater Sources

Source	Primary Station (PS) Code	Status	Capacity (gpm)
Erwin Well 06	CA1910067_031_031	Standby	1,170
Erwin Well 10	CA1910067_033_033	Standby	490
Manhattan Well 05	CA1910067_053_053	Active	1,800
Manhattan Well 06-A	CA1910067_054_054	Active	990
Mission Well 06	CA1910067_059_059	Active	1,480
North Hollywood Well 04	CA1910067_070_070	Active	1,210
North Hollywood Well 07	CA1910067_072_072	Active	1,080
North Hollywood Well 22	CA1910067_083_083	Active	1,880
North Hollywood Well 25	CA1910067_086_086	Active	2,020
North Hollywood Well 26	CA1910067_087_087	Active	1,970
North Hollywood Well 32	CA1910067_093_093	Active	1,440
North Hollywood Well 33	CA1910067_094_094	Active	1,970
Pollock Well 04	CA1910067_108_108	Active	1,710
Pollock Well 06	CA1910067_110_110	Active	1,440

Table 1. Groundwater Sources

Source	Primary Station (PS) Code	Status	Capacity (gpm)
Rinaldi Toluca Well 01	CA1910067_118_118	Active	3,730
Rinaldi Toluca Well 02	CA1910067_119_119	Active	3,550
Rinaldi Toluca Well 03	CA1910067_120_120	Active	3,640
Rinaldi Toluca Well 04	CA1910067_121_121	Active	3,770
Rinaldi Toluca Well 05	CA1910067_122_122	Active	3,410
Rinaldi Toluca Well 06	CA1910067_123_123	Active	3,280
Rinaldi Toluca Well 07	CA1910067_124_124	Active	3,640
Rinaldi Toluca Well 08	CA1910067_125_125	Active	3,460
Rinaldi Toluca Well 09	CA1910067_126_126	Active	3,500
Rinaldi Toluca Well 10	CA1910067_127_127	Active	3,730
Rinaldi Toluca Well 11	CA1910067_128_128	Active	3,320
Rinaldi Toluca Well 12	CA1910067_129_129	Active	3,730
Rinaldi Toluca Well 13	CA1910067_130_130	Active	3,320
Rinaldi Toluca Well 14	CA1910067_131_131	Active	3,140
Rinaldi Toluca Well 15	CA1910067_132_132	Active	3,010
Tujunga Well 01	CA1910067_178_178	Active	3,900
Tujunga Well 02	CA1910067_179_179	Active	3,590
Tujunga Well 03	CA1910067_180_180	Active	4,220
Tujunga Well 04	CA1910067_181_181	Active	3,990
Tujunga Well 05	CA1910067_182_182	Active	4,040
Tujunga Well 06	CA1910067_183_183	Active	3,730
Tujunga Well 07	CA1910067_184_184	Active	3,810
Tujunga Well 08	CA1910067_185_185	Active	4,040
Tujunga Well 09	CA1910067_186_186	Active	4,350
Tujunga Well 10	CA1910067_187_187	Active	4,040
Tujunga Well 11	CA1910067_188_188	Active	3,770
Tujunga Well 12	CA1910067_189_189	Active	3,810
Verdugo Well 11	CA1910067_141_141	Standby	1,710
Verdugo Well 24	CA1910067_145_145	Standby	2,000
Manhattan Well 8	CA1910067_282_282	Active	2250
Manhattan Well 10	CA1910067_283_283	Active	1800
Manhattan Well 11	CA1910067_284_284	Active	1800
Manhattan Well 12	CA1910067_285_285	Active	1800
Mission Well 10	CA1910067_289_289	Active	2700

Table 2. Groundwater Sources Added in this Permit

Source Name	PS Code	Current Status	Capacity	Comments
Well NH-34	CA1910067_095_095	Inactive	2,300 gpm	

Source Name	PS Code	Current Status	Capacity	Comments
Well NH-37	CA1910067_098_098	Inactive	2,800 gpm	Approved source for North Hollywood West Wellhead Treatment Facility
Well NH-43A	CA1910067_104_104	Inactive	2,300 gpm	
Well NH-44	CA1910067_105_105	Inactive	2,300 gpm	
Well NH-45	CA1910067_106_106	Inactive	2,800 gpm	

Table 3. Other Sources

Source	PS Code	Status	Capacity (gpm)
Aqueduct Filtration Plant Influent	CA1910067_012_012	Active	416,600*
MWD Connection LA-35 - Raw (State Water Project West Branch—raw water)	CA1910067_203_203	Active	314,200
Encino Reservoir	CA1910067_193_193	Active	6,732*
BWP-LADWP Interim Interconnection	CA1910067_286_286	Active	3,200
Metropolitan Water District of Southern California (MWD) Connections—Treated Water			
MWD Connection LA-01 – Treated	CA1910067_227_227	Active	22,400
MWD Connection LA-02 – Treated	CA1910067_228_228	Emergency	9,000
MWD Connection LA-03 – Treated	CA1910067_229_229	Emergency	4,500
MWD Connection LA-04 – Treated	CA1910067_195_195	Active	18,000
MWD Connection LA-05 – Treated	CA1910067_230_230	Active	18,000
MWD Connection LA-08 – Treated	CA1910067_231_231	Emergency	6,700
MWD Connection LA-09 – Treated	CA1910067_232_232	Active	13,500
MWD Connection LA-10 – Treated	CA1910067_233_233	Emergency	22,400
MWD Connection LA-11 – Treated	CA1910067_234_234	Active	2,200
MWD Connection LA-12 – Treated	CA1910067_197_197	Active	11,200
MWD Connection LA-13 – Treated	CA1910067_198_198	Active	4,500
MWD Connection LA-16 – Treated	CA1910067_200_200	Active	18,000
MWD Connection LA-17 – Treated	CA1910067_196_196	Active	150,300
MWD Connection LA-21 – Treated	CA1910067_199_199	Active	56,100
MWD Connection LA-22 – Treated	CA1910067_235_235	Emergency	13,500
MWD Connection LA-23 – Treated	CA1910067_236_236	Active	13,500
MWD Connection LA-24 – Treated	CA1910067_201_201	Active	22,400
MWD Connection LA-25 – Treated	CA1910067_202_202	Active	179,500
MWD Connection LA-26 – Treated	CA1910067_237_237	Active	5,400
MWD Connection LA-29 – Treated	CA1910067_238_238	Active	58,300
MWD Connection LA-31 – Treated	CA1910067_240_240	Active	58,300
MWD Connection LA-32 – Treated	CA1910067_241_241	Emergency	11,200

Table 3. Other Sources

Source	PS Code	Status	Capacity (gpm)
MWD Connection LA-33 – Treated	CA1910067_242_242	Active	56,100
MWD Connection LA-34 – Treated	CA1910067_243_243	Emergency	67,300
MWD Connection LA-37 – Treated	CA1910067_290_290	Emergency	44,900

*Limited by capacity of treatment plant.

4. The only treatment facilities approved and permitted for use by LADWP are listed in the table below. No other sources and/or treatment facilities other than those outlined can be added and no changes, modifications or additions in the treatment processes listed in this provision can be made without receiving approval through an amended domestic water permit from the Division.

Table 4. Treatment Facilities

Facility	PS Code	Treatment	Class
99th Street Wells - Treated	CA1910067_208_208	Corrosion Control, Chlorination, Fluoridation	T2
Buena Vista Chlorination Station (Elysian Reservoir)	CA1910067_264_264	Rechlorination	T3
Eagle Rock Reservoir Outlet	CA1910067_215_215	Rechlorination	T3
Encino Reservoir Microfiltration Plant	CA1910067_277_277	Microfiltration, Chlorination	T3
Green Verdugo Reservoir Outlet	CA1910067_267_267	Chloramination	T3
Griffith Park Rechlorination Stations (Crystal Springs, Travel Town, and Zoo)	None	Rechlorination	T2
Hollywood Pump Station	CA1910067_268_268	Rechlorination	T3
Los Angeles Aqueduct Filtration Plant (LAAFP), Parekh UV Facility, Van Norman Complex, and Cottonwood Treatment Plant	CA1910067_011_011	Ozonation, Coagulation, Flocculation, Filtration, UV Disinfection, Chloramination, Fluoridation, Arsenic Removal	T5
Los Angeles Reservoir UV Disinfection Plant (LARUVDP)		UV Disinfection	
Los Angeles Reservoir Effluent	CA1910067_206_206	Chloramination	T4
Manhattan Wells - Treated	CA1910067_210_210	Chloramination, Fluoridation	T2

Table 4. Treatment Facilities

Facility	PS Code	Treatment	Class
Mission Wells - Treated	CA1910067_211_211	Chlorination, Fluoridation	T2
North Hollywood Aeration Treatment	CA1910067_159_159	Aeration (VOC Removal), Chlorination	T2
North Hollywood Pump Station	CA1910067_133_133 (RSC BCL) CA1910067_244_244 (TOYONIN)	Blending (VOC, Nitrate Reduction), Chloramination, Fluoridation	T5
Pollock Wells Blend Point	CA1910067_204_204	Granular Activated Carbon (VOC Removal), Chlorination, Fluoridation, Blending (Nitrate Reduction)	T2
Rowena Reservoir Outlet	CA1910067_269_269	Rechlorination	T2
Santa Ynez Reservoir	CA1910067_270_270	Chloramination	T2
Stone Canyon Chloramination Facility (Upper)	CA1910067_214_214	Chloramination	T3
Stone Canyon Reservoir Outlet (Upper)	CA1910067_272_272	Corrosion Control, Chloramination	T3
Tujunga TGTS	Tujunga Well 6 Plant Effluent: CA1910067_278_278 Tujunga Well 7 Plant Effluent: CA1910067_279_279	Granular Activated Carbon (VOC Removal)	T4
Tujunga Wells/TJ CANTERBURY	CA1910067_205_205	Blending (VOC Reduction), Chloramination, Fluoridation	T4
Chloramination Treatment Trailer at Cyprean Tank	CA1910067_291_291	Chloramination	T1
North Hollywood West Wellhead Treatment	CA1910067_299_299	Treat water produced by Wells NH-34, NH-37, NH-43A, NH-44, and NH-45 with UV/AOP and LGAC for 1-4-dioxane and VOCs.	T3

The Primary Station Codes (PS Codes) associated with the NHWWT Facility are provided in the table below.

Table 5. NHWWT Facility Sample Points

Treatment Facility	Sampling Point Name	PS Code
North Hollywood West Wellhead Treatment	UV/AOP Combined Influent (Before H_2O_2 addition)	CA1910067_299_292
	UV/AOP Combined Influent (After H2O2 addition)	CA1910067_299_293
	UV/AOP Train 1 – Effluent	CA1910067_299_294
	UV/AOP Train 2 – Effluent	CA1910067_299_295
	UV/AOP Train 3 – Effluent	CA1910067_299_296
	UV/AOP Train 4 – Effluent	CA1910067_299_297
	UV/AOP Combined Effluent	CA1910067_299_298
	GAC System Combined Effluent	CA1910067_299_299

5. All water supplied by LADWP for domestic purposes must meet all Maximum Contaminant Levels (MCL) established by the Division. If the water quality does not comply with the California Drinking Water Standards, additional treatment must be provided to meet standards, subject to permit approval.

6. LADWP must maintain an up-to-date Water Quality Emergency Notification Plan (WQENP) identifying how customers will be notified in the event of a water quality emergency. LADWP must refer to the WQENP for phone numbers to contact the Division after normal business hours in the event of a water quality emergency. LADWP must immediately notify, in accordance with the WQENP on file, the purveyors receiving the treated water and the Division after learning that the LADWP treated water contains total coliform or fails to meet any MCL, any provision in this permit, or any order issued under applicable laws and regulations.

Cross-connection Control Program

7. LADWP must comply with Title 17, CCR, and subsequent regulations and policy handbooks, to prevent the water system and treatment facility from being contaminated by possible cross-connections. LADWP must maintain a program

for the protection of the domestic water system against backflow from premises having dual or unsafe water systems in accordance with Title 17 and subsequent regulations and policy handbooks. All backflow preventers must be tested at least annually.

Additives

8. LADWP must only use direct additives in water that have been tested and certified as meeting the specifications of NSF International/American National Standard Institute (NSF/ANSI) Standard 60, pursuant to CCR, Title 22, Section 64590. This requirement must be met under testing conducted by an ANSI accredited product certification organization.

9. LADWP must only use indirect additives, chemicals, materials, lubricants, or products that have been tested and certified as meeting the specifications of NSF/ANSI Standard 61, pursuant to CCR, Title 22, Section 64591, in the production, treatment or distribution of drinking water that will result in its contact with the drinking water. This includes process media, protection materials (i.e. coating, linings, liners), joining and sealing materials, pipe and related products, and mechanical devices used in treatment/transmission/distribution system, unless conditions listed in Section 64593, Title 22, CCR are met. This requirement must be met under testing conducted by a product certification organization accredited for this purpose by ANSI.

Annual Reports

10. LADWP must submit an electronic Annual Report (eAR) to the Division of Drinking Water each year, documenting specific water system information for the prior year. The report must be in the format specified by the Division.

11. LADWP must prepare and submit an annual report to the Division, which must include the status and condition of the NHWWT Facility, technical review and summary of performance and compliance with the permit, any treatment failures, upsets, or difficulties encountered by LADWP in the year prior. The report should also note if there is an increase in concentration for contaminants not reliably removed by existing treatment system, if there are changes to MCLs, NLs, RLs, PHGs, or EPA Health Advisories, and should evaluate the potential impact on the MCL-equivalent calculations.

12. LADWP must prepare and submit annually to the Division a report, which must provide an evaluation and technical review of the water quality data gathered from the upgradient surveillance wells and other upgradient production wells and discuss any changes in the characteristics of the plume and the possible impact on the Remediation Wells feeding the NHWWT Facility.

Consumer Confidence Report

13. LADWP must prepare a Consumer Confidence Report on an annual basis minimum, which must be distributed to customers and a copy provided to the Division by July 1 of each year.

Records

14. LADWP must maintain an operator logbook detailing the operator's daily notes related to the operation of the NHWWT Facility. The status and production of wells must be recorded daily. The treatment facilities must be inspected daily for any abnormal occurrences including, but not limited to, leaks, unusual noises, or pressure readings. The logbook must be kept for at least five years and made available for the Division to review when requested.

15. All instruments, including but not limited to chemical analyzers and flow meters, must be calibrated at the frequencies and by methods recommended by their respective manufacturers. Records for all instrument calibrations must be maintained by LADWP and made available to the Division when requested. Records of the calibrations must be maintained for at least five years.

16. LADWP must keep complete records of any emergency and scheduled interruptions in water service. These records should include:

    a. Location of the problem
    b. Cause of the interruption
    c. Date and approximate time of the problem
    d. Precautions taken to minimize contamination of the supply and notification of affected users.

Production Wells

17. Prior to operation, all wells must be demonstrated to be in accordance with the California Department of Water Resources (DWR) Bulletins 74-81 and 74-90 and the American Water Works Association (AWWA) Standard A100-06 for Water Wells. If wells are not in accordance, LADWP must obtain written waiver or approval from the Division.

18. Well production data must be recorded at least monthly or more frequent.

19. LADWP must monitor its active sources for all primary inorganic and organic chemicals, radionuclides, and secondary standard constituents, in accordance with Title 22, CCR, Chapter 15, the most recent Vulnerability Assessment and Monitoring Frequency Guidelines issued by the Division, and specific permit provisions.

20. If any regulated chemicals are newly detected in the wells, that were not previously detected, during any monitoring event, LADWP must do the following:

    a. As soon as possible within 24 hours notify the Division of the detection,
    b. Within seven days of being notified by the laboratory, resample to confirm the presence and concentration of the detected contaminant, and
    c. If confirmed, contact the Division and discuss the subsequent monitoring schedule for the newly detected chemical.

21. If any unknown chemicals or Unregulated Chemicals Requiring Monitoring (UCMR) are newly detected in the wells, that were not previously detected, during any monitoring, LADWP must notify the Division within seven days to discuss a sampling plan.

22. Notification levels are health-based advisory levels established by the State Board for chemicals in drinking water that lack maximum contaminant levels (MCL). Notification levels are advisory levels and not enforceable standards. If a chemical is detected above its notification level in a drinking water source, LADWP must notify the local governing bodies.

23. Bacteriological samples must be taken from the wells and the result confirmed to be negative before placing the wells into service after a repair, after a well is permitted, or after a well has not been in operation for more than three months. LADWP must monitor the wells for total coliform, and E. coli whenever necessary, in accordance with the Groundwater Rule. The results of the monitoring must be reported to the Division by the tenth day of the following month. Triggered bacteriological groundwater source monitoring must be conducted in accordance with Ground Water Rule.

24. Any well testing positive for fecal coliform or E. coli in their repeat sample set must be removed from service, disinfected, pumped to waste until zero chlorine residual is obtained, and re-sampled after 24 hours for coliform and heterotrophic bacteria using the cycle test procedure. All re-samples must be negative for coliform and have a heterotrophic plate count (HPC) less than 500 colonies/ml prior to placing the source back into service. If removal of the well from service may result in a water outage or failure of a drinking water standard, LADWP must contact the Division to discuss interim requirements for the use of this source.

25. Prior to operation of the production wells, LADWP must collect the required samples pursuant to the Division's requirements and submit the analytical results to the Division for review and approval.

NHWWT General Conditions

26. The NHWWT Facility treatment plant is approved for a maximum flow capacity of 12,750 gallons per minute of treated water. It must not be operated at a daily flow in excess of this capacity without first applying for and obtaining an amended permit from the Division.

27. The North Hollywood West Wellhead Treatment (NHWWT) Facility, using four trains of UV advanced oxidation process (UV/AOP) in parallel followed by 18 Granular Activated Carbon (GAC) vessels is an approved water treatment facility for 1,4-dioxane and Volatile Organic Chemicals for Wells NH-34, NH-37, NH-43A, NH-44, and NH-45. Changes in treatment, sources, or chemicals treated will require a permit amendment. Changes in operation require Division's review and approval.

28. The NHWWT must be operated, maintained, and monitored per the approved Operations, Maintenance, and Monitoring Plan (OMMP) and any accompanying manufacturer's specifications or manuals. Subsequent changes and revisions to operations are subject to Division's review and approval. At any time, the Division can require a plan to be modified due to changing conditions, changes in laws or regulations, or concerns of the public.

29. Within 120 days of receiving this permit amendment, LADWP must submit a revised OMMP for the NHWWT to the Division for review and approval. LADWP must revise the OMMP to incorporate all the conditions specified in this permit amendment and changes in operation procedures.

30. At least once every five years, LADWP must prepare and submit a report to the Division including updated MCL-equivalent calculations for the NHWWT to verify the MCL-equivalent is 1 or less and re-evaluating the project components impacted by significant changes, such as changes in influent or upgradient water quality, detection of new chemicals, and increasing concentration trends that may not be reliably removed by the existing treatment system. If new or revised MCLs, NLs, RLs, PHGs or EPA Health Advisories have been published, the report must also include updated MCL-equivalent calculations. Accordingly, raw water quality for the capture zones must be updated based on the most current water quality data. Updated groundwater modeling will be required if warranted by significant differences between the actual field data and information provided in the current 97-005 report.

NHWWT Ultraviolet Light Advanced Oxidation Process (UV/AOP)

31. Each TrojanUVFlex reactor treatment train must be initially operated within the highest demonstrated flow rate of 3,250 gpm per train for the first full month of operation and subsequently not to exceed a maximum flow rate of 6,500 gpm per train upon the Division's review and approval of the monthly monitoring report. Upon collection of data and further demonstration of system performance, the

maximum flow rate per train may be increased per the Division's review and approval. There is no treatment bypass allowed.

32. The UV/AOP treatment system objective is to deliver treated water with 1,4-dioxane and VOC concentrations that are non-detect and less than detection limit for reporting (DLR). If these levels are exceeded at the UV/AOP combined effluent, corrective action must be taken immediately.

33. Unless otherwise approved by the Division in writing, the UV/AOP system must be operated with the following conditions as noted in approved OMMP:

    a. Utilizing the PLC automatic control function to control electrical energy input and hydrogen peroxide dose in response to the changing flow rates and UV transmittances,
    b. Setting the 1,4-dioxane Log Removal value in the PLC automatic control system to be no less than 1.9-log. After one year of operation and collection of data, this setting may be adjusted per the Division's review and approval.
    c. Setting the Hydroxyl Radical Scavenging Demand Term in the PLC automatic control system to no less than 90,500 s^{-1}.

34. The Hydroxyl Radical Scavenging Demand in the influent water to the NHWWT Facility must be sampled and measured on a monthly basis during the first year of operation. Following the first year, the sampling frequency may be lowered to no less than quarterly. Results must be submitted to the Division for review prior to determining the frequency of continued monitoring and any potential adjustments to the required setpoint for the operation of the UV/AOP system at the NHWWT Facility.

35. Unless alternative lamps are approved for use by the Division, all replacement lamps for the TrojanUVFlex reactors must be identical to the lamps used during the 2022 performance testing. Specifications for the replacement lamps must be identified in the OMMP.

36. To verify the effectiveness of the TrojanUVFlex reactors in removing 1,4-dioxane and VOCs, LADWP must sample the combined effluent of the UV reactors for 1,4-dioxane and VOCs at approved frequencies in this permit. When 1,4-dioxane or VOCs are detected in the combined effluent of the UV reactors, LADWP must sample individual UV trains for the detected chemical(s) in order to identify the reactor(s) in question.

37. LADWP must monitor the formation of the oxidation by-products and must sample the combined effluent of the UV reactors for potential oxidation by-products, such as: acetaldehyde, formaldehyde, glyoxylic acid, and any other by-products detected subsequently at the approved frequencies.

Liquid Phase Granular Activated Carbon (GAC)

38. The GAC treatment system objective is to deliver treated water with hydrogen peroxide concentrations less than 0.2 mg/L. If these levels are exceeded at the GAC combined effluent, corrective action must be taken immediately.

39. The NHWWT GAC treatment system must not be operated above its maximum design capacity of 750 gpm per vessel. In addition, the GAC vessels must not be operated below a minimum of 200 gpm, to minimize the potential of channeling effect caused by insufficient pressure drop across the vessel. The minimum empty bed contact time (EBCT) for each GAC vessel must be 5.1 minutes at 750 gpm flow rate. There is no treatment bypass allowed.

40. LADWP must conduct GAC treatment startup monitoring for initial start-up after each GAC loading or re-start up after the GAC system has been removed from service.

41. Both the initial and replacement carbon media utilized in the GAC vessels must be in accordance with the specifications identified in the OMMP reviewed and approved by the Division. The GAC adsorbers must be maintained according to the manufacturer's specifications. Any change of the carbon specifications must be approved in writing by the Division.

42. The carbon media must be changed out and replaced according to the criteria specified in the OMMP reviewed and approved by the Division. LADWP must implement a DDW approved arsenic leach test protocol for all new GAC media installations and obtain DDW written approval prior to placing vessels with new or replacement media into service.

43. Replacement carbon must be new carbon that complies with ANSI/NSF 61. Replacement carbon must meet the specifications identified in the OMMP. Any change of carbon specifications must be approved in writing by the Division.

NHWWT Upgradient Surveillance Wells Monitoring and Reporting

44. The designated monitoring wells must be sampled and monitored in accordance with the OMMP reviewed and approved by the Division which will include the constituents, frequency, and analytical methods in order to provide early detection of any new constituents or significant changes to concentrations of previously identified constituents that may impact the production wells. If any of these monitoring wells become unavailable, then LADWP must propose and drill replacement monitoring wells and continue the same monitoring program.

NHWWT Source and Treatment Monitoring and Compliance

45. Except for bacteriological analyses and constituents without chemical storet numbers, all water quality monitoring results obtained at a certified laboratory must be submitted to the Division by Electronic Data Transfer (EDT) using designated primary station code (PS-Codes). The source monitoring results must be submitted to the Division's California Laboratory Intake Portal (CLIP) in an electronic deliverable format using the assigned PS Codes.

46. All water samples for compliance purposes must be analyzed at a laboratory certified by the Division's Environmental Laboratory Accreditation Program (ELAP) for each analytical technique. If no certification is available for a particular compound, the method and detection limit must be submitted for approval by the Division on a case-by-case basis.

47. The laboratory performing the analyses must be instructed to report all calibrated peaks on gas chromatographic/mass spectroscopic (GC/MS) analyses. Uncalibrated peaks on chromatographic analyses must be reported according to the September 10, 2003 Division guidance documents *Analysis and Reporting of Volatile Non-Target Organic Compounds in Extremely Impaired Water Sources and Recycled Water by Methods 524.2*, and *Analysis and Reporting of Non-Target Semi-Volatile Organic Compounds in Extremely Impaired Water Sources and Recycled Water Using Methods 3510C/8270 C*.

48. LADWP must monitor the NHWWT, including raw water and treated water, in accordance with the approved OMMP. Any proposed change in the monitoring frequencies of the raw water or treated water is subject to prior review and approval from the Division. LADWP must revise its raw water monitoring plan if additional chemicals were found in the upgradient surveillance wells that might threaten the quality of water produced by the production wells, new chemicals detected at the production wells, or the monitoring data indicate a rapid change in the contaminants concentrations and more frequent monitoring is necessary.

49. If necessary, the Division may modify the monitoring requirements specified in this amendment based upon the review of the operation and monitoring records. LADWP may request for modification of any monitoring requirements based upon substantiating operation and monitoring data.

50. Any change in the monitoring frequency of the raw water and treated water is subject to review and approval from the Division.

51. The sources for NHWWT must be sampled for constituents noted below at frequencies no less than the minimum noted.

NHWWT Source and Influent Monitoring Requirements

Sample Location and PS-Code	**Parameter**	**Frequency**
Well NH-34 (CA1910067_095_095), Well NH-37 (CA1910067_098_098), Well NH-43A (CA1910067_104_104), Well NH-44 (CA1910067_105_105) Well NH-45 (CA1910067_106_106)	Complete Title 22 VOCs	Monthly
	1,4-dioxane	Monthly
	Nitrate	Monthly
	Alkalinity	Monthly
	Calcium	Monthly
	Hardness	Monthly
	Iron	Monthly
	Manganese	Monthly
	Sulfate	Monthly
	Total Dissolved Solids (TDS)	Monthly
	Specific Conductance	Monthly
	UV Transmittance (Grab)	Monthly
	Total Coliform / E. coli	Monthly
	HPC	Monthly
	1,2,3-TCP	Quarterly
	PFAS	Quarterly
	VOC and SVOCs with TIC reported	Annually
	Total Organic Carbon (TOC)	Annually
	Nitrosamines	Annually
	NMOR	Annually
	Cr(VI)	Quarterly
	Perchlorate	Annually
	Langelier Index	Annually

52. The NHWWT UV/AOP unit process must be sampled for constituents noted below at frequencies no less than the minimum noted.

NHWWT UV/AOP Monitoring Requirements

Sample Location and PS-Code	**Parameter**	**Monitoring Frequency**
UV/AOP Combined Influent (Before H_2O_2 addition) (CA1910067_299_292)	Complete Title 22 VOCs	Weekly for one year of operation. Monthly after one year of operation pending review and approval by the Division.
	1,4-dioxane	Weekly for one year of operation.

Sample Location and PS-Code	**Parameter**	**Monitoring Frequency**
		Monthly after one year of operation pending review and approval by the Division.
	UVT	Continuous monitoring with online analyzer.
	Nitrate	Monthly
	Alkalinity	Weekly
	Calcium	Weekly
	Hardness	Weekly
	Sulfate	Monthly
	Total Dissolved Solids (TDS)	Weekly
	Specific Conductance	Weekly
	UV Transmittance (Grab)	Weekly
	pH (Grab)	Weekly
	Total Coliform / E. coli	Monthly
	HPC	Monthly
	Temperature	Weekly
	Total Organic Carbon (TOC)	Monthly
	Nitrosamines	Monthly
	NMOR	Monthly
	Hydroxyl Radical Scavenging Demand	Quarterly
UV/AOP Combined Influent (After H_2O_2 addition) (CA1910067_299_293)	Hydrogen peroxide	Continuous monitoring with on-line analyzer.
	Hydrogen peroxide (Grab)	Weekly
	UV Transmittance (Grab)	Weekly
UV/AOP Train 1 – Effluent (CA1910067_299_294) UV/AOP Train 2 – Effluent (CA1910067_299_295) UV/AOP Train 3 – Effluent (CA1910067_299_296) UV/AOP Train 4 – Effluent (CA1910067_299_297)	Complete Title 22 VOC 1,4-dioxane Nitrosamines NMOR	If VOCs, 1,4-dioxane, nitrosamines, NMOR are detected at UV/AOP combined effluent. (CA1910067_299_298)
	Complete Title 22 VOC	Once after system initial

Sample Location and PS-Code	**Parameter**	**Monitoring Frequency**
UV/AOP Combined Effluent (CA1910067_299_298)		start-up or re-startup Weekly
	1,4-dioxane	Weekly
	Nitrosamines	Monthly
	NMOR	Monthly
	Nitrate	Monthly
	Alkalinity	Monthly
	Calcium	Monthly
	Hardness	Monthly
	Sulfate	Monthly
	Total Dissolved Solids (TDS)	Monthly
	Specific Conductance	Monthly
	UV Transmittance (Grab)	Weekly
	Total Organic Carbon (TOC)	Monthly
	pH (Grab)	Monthly
	Total Coliform / E. coli	Monthly
	HPC	Monthly
	Temperature	Monthly
	Hydrogen peroxide (Grab)	Weekly
	Formaldehyde	Annually
	Glyoxylic Acid	Annually
	Chloropicrin	Annually
	Acetaldehyde	Annually
	Total Trihalomethanes (TTHM)	Annually
	Haloacetic Acids - Five (HAA5)	Annually

53. The NHWWT GAC unit process must be sampled for constituents noted below at frequencies no less than the minimum noted.

NHWWT GAC Monitoring Requirements

Sample Location and PS-Code	**Parameter**	**Monitoring Frequency**
Individual GAC Vessel Effluents	Hydrogen peroxide (Grab)	Weekly If >0.2 mg/L, perform corrective actions per OMMP and put train back in operation, Test again and confirm peroxide less than 0.2 mg/L.
	Total Coliform / E. coli	If positive Total Coliform at Combined GAC Effluent, sample each Vessels within 48 hours
	Arsenic Antimony Iron Manganese Aluminum Nickel Uranium	After vessel is reloaded, backwashed and soaked per approved OMMP
GAC System Combined Effluent (CA1910067_299_299)	Hydrogen peroxide	Continuous monitoring with on-line analyzer.
	Hydrogen peroxide (Grab)	Weekly
	Complete Title 22 VOCs	Monthly
	1,4-dioxane	Monthly
	Nitrate	Continuous monitoring with on-line analyzer.
	Nitrate	Weekly
	Total Coliform/E. coli	Once after system initial start-up or re-startup Monthly
	HPC	Once after system initial start-up or re-startup Monthly
	pH (Grab)	Weekly
	1,2,3-TCP	Quarterly
	PFAS	Quarterly
	VOC and SVOCs with TIC reported	Annually
	Total Organic Carbon (TOC)	Annually

Sample Location and PS-Code	Parameter	Monitoring Frequency
	Nitrosamines	Annually
	NMOR	Annually
	C(VI)	Annually
	Perchlorate	Annually
	HAA5	Annually
	TTHM	Annually

54. Treatment compliance of the NHWWT for primary and secondary MCL is calculated from all samples collected at the combined effluent of the GAC treatment system, PS-Code CA1910067_299_299. Calculation procedures must follow the specific contaminant and must be below the MCL.

NHWWT Operation and Maintenance

55. All personnel who operate the treatment facilities must be certified in accordance with Title 22, CCR, Section 63765. LADWP is required to be operated by a chief operator possessing a minimum grade T3 operator certificate and a shift operator with a minimum T2 operator certificate.

56. The alarm set points as presented in the OMMP must not be changed without prior approval from the Division. In the event of an emergency, where changes to the alarm set points must be made immediately, the Division must be notified by the end of the next business day following an emergency change in the alarm set points.

57. The alarms and automatic shutdowns of the plant must be physically tested at least quarterly. Records of the quarterly testing must be maintained by LADWP and made available to the Division when requested.

58. Sampling ports, including for the production wells, the TrojanUVFlex reactors and GAC vessels, must be maintained in good operating condition.

59. LADWP must establish a maintenance schedule for lamps, and set lamp life alarms, according to the recommendations of the manufacturer. Said recommendations must consider any estimated reduction in lamp life resulting from repeated lamp starts. The maintenance schedule and alarm set points must be included in the OMMP.

60. LADWP must minimize system downtime by working with the carbon supplier to arrange for timely carbon change out. However, if the system must shutdown and the shutdown lasts over two weeks, the vessels must be drained and filled with potable water. When the vessels are started up again, startup monitoring must be

completed, and the carbon beds must be checked to see if a disinfection of carbon bed is required. Once the disinfection is completed, the vessel must be backwashed prior to startup.

61. If bacteriological growth in the GAC vessels causes the deterioration of bacteriological quality of treated water, LADWP must remove the affected LGAC trains from service until the cause of the excess growth is remedied and the facilities are cleaned.

Records and Reporting

62. A monthly monitoring report of the NHWWT Facility must be submitted to the Division by the 10th day of the following month. At a minimum, the report must include:
    a. A summary of analytical results received by LADWP in the reporting calendar month.
    b. Any problem related to the testing of reliability features of the treatment facilities together with corrective action taken.
    c. A summary of all contaminants in the upgradient surveillance wells as data becomes available, production wells, and the plant effluent detected at or above MCLs or NLs.
    d. A summary of the bacteriological quality of water leaving the GAC.
    e. A summary of the NHWWT Operational Records, including:
        - The daily operation, time of use and production of the wells.
        - The daily operation, length of time in use, and production through each UV/AOP and GAC train.
        - When GAC carbon last changed out
        - Summary of all process monitoring
        - Operation schedule and problems; both scheduled interruptions and any unscheduled interruption.

63. Copies of reports, inspections, and all treatment plant records must be kept for at least five years. Water quality records must be kept for at least ten years.

64. Within 24 hours of receiving notification from the laboratory, LADWP must notify the Division of any exceedance of an MCL or NL in the finished water leaving the NHWWT.

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