January 31, 2022

Ms. Renee Purdy
Executive Officer, Los Angeles Regional Water Quality Control Board
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Los Angeles, California 90013
Renee.Purdy@waterboards.ca.gov

transmitted via electronic mail to: Renee.Purdy@waterboards.ca.gov

Subject: Cleanup and Abatement Order No. R4-2021-0079 -SKYPARK COMMERCIAL PROPERTIES (ASSESSOR PARCEL NO. 7377-006-906), 24701 – 24777 CRENSHAW BOULEVARD AND 2530, 2540, AND 2600 SKYPARK DRIVE, TORRANCE, CALIFORNIA (SCP NO. 1499) c, 24701-24777 Crenshaw Boulevard and 2530, 2540, and 2600 Skypark Drive, Torrance, California and East of Crenshaw Boulevard Property, Lomita, California

Dear Ms. Purdy:

On behalf of the City of Torrance (City), Terraphase Engineering Inc. (Terraphase) hereby submits the attached Groundwater Removal Action Workplan (RAW) for the above referenced properties (the Site). This RAW sets forth two removal actions proposed to be implemented to expeditiously address impacted groundwater (at an approximate depth of 85–115 feet below ground surface [bgs]; "regional groundwater") at the Hi-Shear Corporation (Hi-Shear) property located at 2600 Skypark Drive (Hi-Shear Property) and within the groundwater plume moving east from the east adjacent properties located at 24701–24777 Crenshaw Boulevard and 2530 and 2540 Skypark Drive in Torrance, California (EA Properties), towards the properties east of and across Crenshaw Boulevard into the City of Lomita, California.

The City looks forward to the Los Angeles Regional Board's review and approval of this RAW, and to a dialogue with the Regional Board concerning the implementation of its components.

Terraphase and other City representatives would be happy to meet with LARWQCB staff (virtually or in person) to discuss the RAW or answer any questions you or your staff may have.

Sincerely,
For Terraphase Engineering Inc.

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Enclosure

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Groundwater Removal Action Workplan

Skypark Commercial and Lomita Properties

24701 – 24777 Crenshaw Blvd. and 2530, 2540, and 2600 Skypark Dr., Torrance, California and East of Crenshaw Blvd. Property, Lomita, California

Prepared for

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terraphase engineering

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Acronyms and Abbreviations

µg/L	micrograms per liter
§	Section
§§	Sections
1,1-DCE	1,1-dichloroethene
1,1,1-TCA	1,1,1-trichloroethane
Alta	Alta Environmental
AOPC	area of potential concern
bgs	below ground surface
CalEPA	California Environmental Protection Agency
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
COC	chemical of concern
CWC	California Water Code
DCE	dichloroethene
Dhc	Dehalococcoides
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
DTSC	Department of Toxic Substances
EA Properties	east-adjacent properties located at 24701 - 24777 Crenshaw Boulevard and 2530 and 2540 Skypark Drive in the City of Torrance, California
EA Properties RAW	east-adjacent properties' Remedial Action Workplan, to be provided
EISB	enhanced in-situ bioremediation
E/IC	engineering/institutional controls
ESL	Environmental Screening Level
GE&R	Genesis Engineering and Redevelopment
HASP	Health and Safety Plan
HHRA	human health risk assessment
Hi-Shear	Hi-Shear Corporation
Hi-Shear Plume	contaminated groundwater at the Site
Hi-Shear Property	Hi-Shear Corporation property located at 2600 Skypark Drive in Torrance, California
IDW	investigation-derived waste
LARWQCB	California Regional Water Quality Control Board, Los Angeles Region
Lowe's	Lowe's Home Improvement Center
MCL	maximum contaminant level
MNA	monitored natural attenuation

NAPL	non-aqueous phase liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
Order	RWQCB Cleanup and Abatement Order No. R4-2021-0079
ORP	oxygen reduction potential
PCE	tetrachloroethene
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RAW	Remedial Action Workplan
RWQCB	California Regional Water Quality Control Board
SFRWQCB	San Francisco Regional Water Quality Control Board
Site	the Hi-Shear Property and the aerial extent of the groundwater contamination migrating from it, including contamination within the EA Properties and the properties east of Crenshaw Boulevard within a residential community in Lomita, California
SVE	soil-vapor extraction
SWRCB	State Water Resources Control Board
TCE	trichloroethene
Terraphase	Terraphase Engineering Inc.
TOC	total organic carbon
trans-1,2-DCE	trans-1,2-dichloroethene
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VI	vapor intrusion
VOC	volatile organic compound
WDR	Waste Discharge Requirements
ZVI	zero-valent iron

Signatures

All engineering designs, information, conclusions, and recommendations in this document have been prepared under the responsible charge of a California Professional Engineer.

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January 31, 2022
Date

All geologic information, conclusions, and recommendations in this document have been prepared by a California Professional Geologist.

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1 Introduction

Terraphase Engineering Inc. (Terraphase) prepared this Groundwater Removal Action Workplan (RAW) under the direction of Rutan & Tucker, LLP, on behalf of the City of Torrance, for submittal to the California Regional Water Quality Control Board (RWQCB), Los Angeles Region (LARWQCB). This RAW sets forth a removal action proposed to be implemented to expeditiously address impacted groundwater (at an approximate depth of 85–115 feet below ground surface [bgs]; “regional groundwater” or “regional aquifer”) in the regional aquifer at the Skypark Commercial properties, which includes the Hi-Shear Corporation (Hi-Shear) property located at 2600 Skypark Drive (Hi-Shear Property) and the east adjacent properties located at 24701–24777 Crenshaw Boulevard and 2530 and 2540 Skypark Drive in Torrance, California (EA Properties), along with the properties east of Crenshaw Boulevard in Lomita, California. In this groundwater RAW, the regional aquifer beneath the Hi-Shear Property, and the aerial extent of the regional groundwater contamination migrating from the Hi-Shear Property, including the regional groundwater contamination within the EA Properties and the properties east of Crenshaw Boulevard within a residential community in Lomita, California, are referred to as the “Site” or the “Hi-Shear Plume” (Figure 1).

The Hi-Shear Plume characterization efforts have detected several halogenated volatile organic compounds (VOCs) that impact groundwater at the Hi-Shear property and within the Hi-Shear Plume. The distribution, mass, and nature of the observed VOCs inform remedial priorities. The primary chemicals of concern (COCs) are trichloroethene (TCE) and tetrachloroethene (PCE). TCE is the primary contaminant that appears to have been discharged by Hi-Shear and is detected at the highest concentrations pervasively throughout the Hi-Shear Plume. PCE, which was also discharged by Hi-Shear and detected at significant levels on the Hi-Shear property, but generally at lower concentrations in groundwater on the Hi-Shear property than the TCE levels in groundwater on the Hi-Shear property. TCE and PCE are present in groundwater and soil vapor underlying buildings at the Hi-Shear property, EA Properties, and properties east of Crenshaw. TCE concentrations in groundwater east of Crenshaw present a potential indoor air exposure concern to residents and commercial workers via the vapor intrusion (VI) pathway. The migration of VOCs, such as TCE, from the subsurface to indoor air typically is referred to as VI. TCE presents a unique VI exposure concern and frequently is prioritized over other VOCs in VI investigations due to its potential health effects associated with indoor air exposures over short durations, on the order of weeks or days. The San Francisco RWQCB (SFRWQCB) has developed TCE Trigger Levels (SFRWQCB 2014), and the California Environmental Protection Agency (CalEPA) Department of Toxic Substances (DTSC) has developed TCE Urgent Response Action Levels and Accelerated Response Action Levels (DTSC, Human and Ecological Risk Office 2014) to prioritize indoor air sampling where TCE presents a potential VI concern.

Given its widespread distribution, high detected concentrations, and more stringent short-term VI Trigger Level, TCE is the primary driver for this Removal Action and represents the greatest COC risk via vapor intrusion and impacts to groundwater resources.

To expedite the RAW decision-making process and removal action implementation, the Hi-Shear Plume is divided into three different portions:

- The known and substantial contaminant source on the Hi-Shear property (Hi-Shear Source or Source);
- The body of the Hi-Shear Plume, largely located beneath the EA Properties (Plume Body); and
- The approximate current leading edge of the Hi-Shear Plume (Plume Margin or leading edge).

This RAW addresses the Hi-Shear Source and Plume Margin portions of the Hi-Shear Plume within the Site. A subsequent RAW will be submitted for the Hi-Shear Plume Body located beneath the EA Properties. This and the subsequent RAW submittal collectively will address the entire Hi-Shear Plume in the regional aquifer.

This groundwater RAW was prepared in accordance with 40 Code of Federal Regulations (CFR), Part 300 (National Oil and Hazardous Substances Pollution Contingency Plan [NCP]), Sections (§) 300.410 and 300.415; the CalEPA DTSC guidance memorandum *Removal Action Workplans – Senate Bill 1706,* dated September 23, 1998; California Health and Safety Code, Division 20, Chapter 6.8, Article 5, §§25323 and 25323.1; and California Water Code (CWC) §§13300, 13301, and 13304. This RAW was also prepared in accordance with California State Water Resource Control Board Resolution 92-49, which defines how judgements and decisions are to be made in the selection of appropriate remedial technologies and alternatives to remediate contaminated groundwater and protect public health and the environment. Lastly, this RAW has been completed in general accordance with US Environmental Protection Agency's August 1993 *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* with an Engineering Evaluation/Cost Analysis (EE/CA).

The regional aquifer at and downgradient of the Hi-Shear Property has been impacted with halogenated VOCs, including specifically TCE, PCE, and their degradation products. The Hi-Shear Plume appears to have largely resulted from releases at the following described 10 areas of potential concern (AOPCs), identified as follows by Hi-Shear (Genesis Engineering and Redevelopment [GE&R] 2021a):

- AOPC-1 west of Building No. 3
- AOPC-2 south of Building No. 3
- AOPC-3 east of Building No. 7
- AOPC-4 west of Building No. 6
- AOPC-5 east of Building No. 7
- AOPC-6 northeast of Building No. 1
- AOPC-7 south of Building No. 1
- AOPC-8 west and southwest of Building No. 2
- Former Building No. 4
- Building No. 5

The LARWQCB has been working with Hi-Shear since the early 1990s to characterize the established release areas. In the intervening years, a dissolved VOC groundwater plume, primarily composed of TCE, has continued to migrate from the Hi-Shear Property eastward and towards and into the City of Lomita. The Hi-Shear Plume's Leading Edge now poses a potential VI exposure concern to City of Lomita residents. As a result of the lengthy period since the release areas have been allowed to migrate unabated, a removal action is now necessary to address groundwater quality and mitigate the potential VI exposure from the Hi-Shear Plume's VOCs.

This removal action focuses on remediating VOC contaminant mass in the regional groundwater on and migrating from the Hi-Shear Property and into the City of Lomita. This RAW sets forth proposed removal actions for the regional groundwater to meet the groundwater screening criteria for the evaluation of the VI pathway, including Trigger Levels for TCE for indoor air sampling (SFRWQCB 2014) and Environmental Screening Levels (ESLs; SFRWQCB 2019), as well as maximum contaminant levels (MCLs) in drinking water for the regional aquifer.[1] Additionally, with the implementation of this groundwater RAW, through treatment, VOC concentrations are expected to be reduced in groundwater to the VI screening criteria and MCLs within a reasonable time frame, reducing the potential for unacceptable indoor air exposure via VI within the City of Lomita.

Sections 1.1 and 1.2 include the regulatory basis and objectives for this RAW, respectively, and coordinating elements are outlined in Section 1.3. This RAW includes a description of the Site (Section 2), a summary of Site characterization and remedial activities (Section 3), and the nature and extent of groundwater impacts (Section 4). In accordance with the NCP, this RAW also includes Remedial Action Objectives (RAOs; Section 5) and a comparison of feasible removal alternatives to address the Hi-Shear Plume VOC contamination within the regional aquifer to achieve the remedial objectives (Section 6).

The selected remedies for this RAW are organized and discussed in relation to the Hi-Shear Source and Plume Margin and are described in Section 7. The proposed remedy for the Plume Margin is the forward most downgradient component of the High-Shear Plume remedy—a reductive barrier along Crenshaw Boulevard that will reduce groundwater VOC concentrations along a transect oriented perpendicular to the VOC plume axis, with the objective of achieving MCLs for the regional aquifer for both groundwater resource protection and reduction of potential VI risks to City of Lomita residences to acceptable levels. The selected remedy for the Hi-Shear Source uses the largely successful technology already implemented by Hi-Shear for groundwater, i.e., enhanced in-situ bioremediation (EISB), with a renewed and dedicated repetitive application to the historical known Hi-Shear VOC release areas.

This RAW is designed to immediately abate the continued migration of the Hi-Shear Plume into the residential areas of the City of Lomita (Phase I), and to remediate the regional groundwater contamination at the Hi-Shear Source, before it leaves the Hi-Shear Property.

[1] https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chemicalcontaminants.html

Groundwater monitoring and public participation programs are described in Sections 8 and 9, respectively. Remedial progress monitoring and Waste Discharge Requirements (WDR) permitting compliance reports will be prepared and are explained in Section 10. Upon implementation of the RAW and based upon evaluation of the effectiveness of the remedies, a human health risk assessment (HHRA) could be used to evaluate the effectiveness of the employed measures, also described in Section 10. The remedial action schedule is presented in Section 11 and references are presented in Section 12.

1.1 Regulatory Basis for the RAW

In its August 28, 2018, letter to Hi-Shear's counsel, the LARWQCB referenced the CWC §13267 Order dated October 29, 2009, issued to Hi-Shear, and states that:

> "The TCE plume, which originated from the Hi-Shear Site, continues to migrate offsite and downgradient from the Site east-southeast since 1992, and has crossed past Crenshaw Boulevard and Pennsylvania Avenue. The offsite extent of this Hi-Shear VOC groundwater plume has not been fully delineated.
>
> … Hi-Shear is responsible for cleanup of not only the onsite but also offsite portions of the TCE and other VOC plumes that originated from the Hi-Shear Site such that the approved cleanup goals MCLs and notification levels (NLs) are met in a reasonable amount of time as required in State Water Resources Control Board (SWRCB) Resolution No. 92-49." (LARWQCB 2018)

Additionally, the LARWQCB issued Cleanup and Abatement Order No. R4-2021-0079 (Order) on June 18, 2021. The Order cites to CWS §§13304 and 13267 as the supporting legal authority for its issuance. The Order also requires remedial action and states:

> "For each Property, the Dischargers identified with the Property shall develop a comprehensive Remedial Action Plan(s) (RAP) for cleanup of wastes in the soil matrix, soil vapor, and groundwater originating from the Property and submit it to the Regional Board for review and approval. The RAP shall include, at a minimum:
>
> i. Evaluation of the technology(ies) proposed for remediation of soil matrix, soil vapor, and groundwater
>
> ii. Description of the selection criteria for choosing the proposed method over other potential remedial options. Discuss the technical merit, suitability of the selected method under the given Site conditions and waste constituents present, economic and technological feasibility, and immediate and/or future benefits to the people of the state
>
> iii. Description of any pilot projects intended to be implemented
>
> iv. Estimation of cumulative mass of wastes to be removed with the selected method. Include all calculations and methodology used to obtain this estimate
>
> v. A proposed schedule for completion of the RAP."

Additionally, as outlined in 40 CFR §300.410 of the NCP, assessment of a release that may warrant mitigation through a removal action shall be undertaken, if warranted, "as promptly as possible."[2]

Assessment of the Hi-Shear Property release areas and impact to underlying and off-site downgradient groundwater has been occurring under the oversight of the LARWQCB for approximately 30 years, during which time the Hi-Shear Plume has migrated and grown with additional contaminant mass migrating from the Hi-Shear releases to beneath commercial/industrial and residential receptors. Existing data, particularly the VOCs in the regional groundwater beneath the residential community in Lomita east of Crenshaw Boulevard, indicate that the VOCs off-gas and migrate into the soil vapor beneath residences. This migration of VOCs demonstrates that an immediate removal action to address the VOC-affected groundwater is necessary to address potential VI public health concerns.[3]

As a result of Hi-Shear evaluations under LARWQCB oversight, substantial data exist indicating releases of VOCs in historical VOC use areas within the Hi-Shear Property. These data show that the VOCs have significantly impacted groundwater beneath and downgradient of the Hi-Shear Property, including migration into residential areas of the City of Lomita. The data further demonstrate that if left unmitigated, the VOC groundwater plume emanating from the Hi-Shear Property is expected to migrate further downgradient into the City of Lomita and off-gas VOCs from groundwater to soil vapor beneath its residential neighborhoods.

Pursuant to 40 CFR §300.415 (b)(2), the factors to be considered in determining the appropriateness of a removal action include:

- "Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems;
- Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk containers, that may pose a threat of release;
- High levels of hazardous substances or pollutants or contaminants in soil largely at or near that surface that may migrate;
- Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;
- Threat of fire or explosion;
- The availability of other appropriate federal or state response mechanisms to respond to the release; and
- Other situations or factors that may pose threats to public health or welfare of the United States or the environment."[4]

---

[2] 40 CFR §300.410 (b).

[3] In accordance with 40 CFR §300.415 (a)(1) of the NCP, the RWQCB, as the lead agency, shall consider the Site investigation data and current Site conditions to determine if a removal action is warranted.

[4] 40 CFR §300.415 (b)(2).

Of these factors, the VOCs in the regional groundwater migrating from the Hi-Shear Property present the following potential impacts to resources and risks to residents, requiring the removal action outlined in this RAW:[3]

- "Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems; and
- High levels of hazardous substances or pollutants or contaminants in soil largely at or near that surface that may migrate."

In addition to the potential health threats for unacceptable indoor air exposures to VOCs, most notably TCE, detected in groundwater and migrating into soil vapor, the Hi-Shear Plume degrades regional groundwater rendering it unsuitable for use as drinking water because VOC concentrations occur above the LARWQCB Basin Plan's (2019) water quality objectives. Existing designated beneficial uses for Site groundwater include municipal and domestic supply, industrial service supply, industrial process supply, and agricultural supply (LARWQCB 2019). As the quality of these waters is high and suitable for municipal supply use, the Basin Plan further requires that SWRCB Resolution 92-49 be followed to implement remedial measures to achieve water quality objectives within a reasonable time frame. In addition, the West Coast Basin Barrier Project limits groundwater extraction in this area to manage saltwater intrusion.

Therefore, in accordance with the provisions of the NCP and SWRCB Resolution 92-49, this groundwater RAW addresses the impacted regional aquifer within the Site to diminish potential residential exposure from VI in the Lomita communities, and in the commercial communities of the cities of Torrance and Lomita, by remediating the regional groundwater. This RAW also contains measures to address the VOC-impacted groundwater to reduce concentrations and attain Basin Plan water quality objectives within a reasonable time frame. Consideration will also be given to protect against potential threats to receptors from vapors that could emanate from groundwater while remedial efforts to achieve water quality objectives are implemented.

1.2 Objectives of the RAW

The objectives of this RAW are to:

- Reduce the potential for VI risk into the City of Lomita's residential community east of Crenshaw Boulevard by addressing the principal cause of the soil vapor contamination in that area—the VOC-impacted regional groundwater that continues to migrate from the Hi-Shear Property;
- Further reduce contaminant mass and migration at the Hi-Shear Source areas to diminish the VOC source, longevity, and on-going growth of the Hi-Shear Plume to achieve water quality objectives within a reasonable time frame; and
- Achieve water quality objectives in the regional groundwater (i.e., MCLs) east of Crenshaw Boulevard within a reasonable time frame.

1.3 Elements of the RAW

This groundwater RAW includes the following elements:

- Current Site conditions;
- Summary of previous Site investigations and remedial activities;
- Nature and extent of the COCs;
- Nature of impacts of plume on actual and potential beneficial uses of groundwater;
- RAOs or goals to be achieved by the selected remedial action;
- Screening of the remedial alternatives, and the basis for the selection, including a discussion of its effectiveness and implementability;
- The recommended alternative;
- Implementation of the alternative;
- Permit compliance groundwater monitoring;
- Public participation and community involvement;
- Reporting; and
- Schedule.

2 Site Description

A portion of the Site is located within Los Angeles County Assessor's parcel number 7377-006-906, which is owned by the City of Torrance but has been leased to Hi-Shear since approximately 1954 (2600 Skypark Drive), and with other portions being leased to other commercial entities within the EA Properties.

The approximately 12.25-acre Hi-Shear Property, located at 2600 Skypark Drive, was formerly part of historical Hi-Shear operations that included an additional approximately 13.75 acres adjoining to the west.

The EA Properties are divided into the following three properties:

- EA Property 1 includes 24751 and 24777 Crenshaw Boulevard, currently occupied by South Bay Lexus (vehicle dealership);
- EA Property 2 includes 24701, 24707, and 24747 Crenshaw Boulevard, currently occupied by Dasco Engineering Corporation (manufacturer of precision mechanic aircraft and space components); and
- EA Property 3 includes 2530 and 2540 Skypark Drive, currently occupied by Robinson Helicopter.

The Hi-Shear Property and the EA Properties are shown on Figure 2.

2.1 Site Land Use and History

The Hi-Shear Property has been used for manufacturing and commercial purposes since at least 1954. Prior to 2006, the Hi-Shear Property was a 26-acre property that included the western 13.75-acre area currently occupied by Lowe's Home Improvement Center (Lowe's). The LARWQCB provided environmental oversight of the Lowe's area and issued closure of the top 10 feet of soil at that property (LARWQCB 2006). Hi-Shear reportedly retains the environmental liabilities associated with the entire 26-acre property. Hi-Shear's current long-term lease with the City of Torrance appears to extend to 2054. The EA Properties' (1, 2, and 3) various commercial tenants occupy the eastern portion of the Site, west of Crenshaw Boulevard.

2.2 Adjacent Properties

The Site is bounded by Skypark Drive to the north, Torrance Municipal Airport to the south, and Lowe's to the west. Beyond Skypark Drive to the north is a shopping plaza that includes a Home Depot and other retail businesses. East of Crenshaw Boulevard is a residential neighborhood located within the City of Lomita.

2.3 Site Owner

The owner of the Hi-Shear Property and the EA Properties is the City of Torrance. However, the City of Torrance has never operated or managed chemical handling on these properties but solely leased the properties to different private parties who conducted various commercial/industrial operations with chemical handling activities. Property east of Crenshaw is principally owned by the City of Lomita and various residential owners.

2.4 Regional Geology and Hydrogeology

The Site is located within the West Coast Basin, which is a subbasin in the southwest portion of the larger Los Angeles Basin. The West Coast Basin is constrained to the west by Santa Monica Bay, on the south by the San Pedro Bay and Palos Verdes Hills, to the east by the Newport-Inglewood Uplift, and on the north by the Ballona Escarpment (Water Replenishment District of Southern California 2019). On a regional scale, the primary hydrostratigraphic units within the subbasin are, from youngest to oldest, the Lakewood, San Pedro, and the Pico Formations. Generally, these units consist of thick sequences of unconsolidated marine and continental deposits that are primarily of Pleistocene and Pilocene age (Reichard et al. 2003).

The unconsolidated Pleistocene sediments comprising the Lakewood Formation are heterogeneous with sandy silts and silty sands interbedded within sands that gradually grade to coarser and thicker material with depth (Reichard et al. 2003). Beneath the Site, this hydrostratigraphic unit is approximately 200 feet thick and is characterized by gravel, sand, sandy silt, silt, and clays (GE&R 2021c). The Lakewood Formation also contains the Gage Aquifer, which is greater than 100 feet thick in the immediate proximity of the Site and consists primarily of sands with lesser amounts of gravel and thin lenses of silts and clays (Reichard et al. 2003; GE&R 2021c).

The San Pedro hydrostratigraphic unit lies immediately below the Lakewood Formation, within the Site area, and contains an extensive 40- to 100-foot-thick clay unit, below which lies the Silverado Aquifer (GE&R 2021c). The Silverado Aquifer consists mainly of sands and gravels with interbedded silt and clay along with occurrences of bluish-grey marine-deposited sand, gravel silt, and clay (Reichard et al. 2003). The aquifer is estimated to be between 250 and 550 feet thick within the general region surrounding the Site (GE&R 2021c). Beneath the Silverado Aquifer lies the upper portion of the Pliocene-age Pico formation, which is described as semi-consolidated sand, silt, and marine clay and forms a lower transmissive zone beneath the San Pedro Formation (Reichard et al. 2003).

The regional groundwater flow directions near the Site are largely controlled by the groundwater injection associated with the West Coast Basin Barrier Project to the west and groundwater extractions to the east (Alta Environmental [Alta] 2017). The West Coast Basin Barrier Project has been operational since the early to mid-1960s and includes a series of north-south oriented injection wells over a 9-mile extent; the closest injection well to the Skypark Commercial Properties is approximately 2.75 miles to the west-northwest (Land et al. 2004). The barrier project has injected water into the Gage, Silverado, and Lower San Pedro aquifers to mitigate the intrusion of saltwater into these freshwater systems

(Camp, Dresser, and McKee 1989). Thus, groundwater gradients measured at the Site have generally exhibited an east to southeast regional gradient since the mid-1990s (Alta 2017; GE&R 2021c).

The closest public water supply well appears to be approximately 1.2 miles south–southeast and cross-gradient from the Hi-Shear Plume and does not appear to have chlorinated VOC impacts associated with the Hi-Shear Plume.[5] The closest downgradient water supply wells are located approximately 2.6 miles from the Site and are screened at depths greater than 200 feet bgs (BBL Environmental Services, Inc. 2001). The closest downgradient active well is State well 1910033-022 operated by the California Water Service Company. The well is located over 3 miles from the Site, as shown on GeoTracker (SWRCB 2021) and is screened at an approximate depth of 480 feet bgs. Given the distance of these wells from the Site, and the known chemical concentrations downgradient of the Site, existing data does not indicate that there is a material threat to current drinking water resources at this time.

2.5 Site Geology and Hydrogeology

Site geology consists predominantly of silt and clay within the upper 15 to 25 feet of ground surface. This low-permeability unit is consistently encountered across all geologic borings extending from Lowe's on the west side of the Site to the east side of Pennsylvania Avenue, nearly 3,000 feet in distance (GE&R 2021c). Clays and silts are thickest in the western portions of the Site (commonly 20 to 25 feet thick) and generally thin out to approximately 15 feet thick at the central portion of EA Property 1, extending across Crenshaw Boulevard to the east. Beneath this shallow low-permeable unit is a sand and silty sand interval that is typically 15 to 25 feet in thickness (GE&R 2021c).

A discontinuous clay sequence has been identified beneath this sand and silty sand unit in multiple areas of the Site and beneath Crenshaw Boulevard. Where present, this clay interval is encountered at approximately 30 to 45 feet bgs and ranges in thickness between 5 and 40 feet (Alta 2017; GE&R 2021c). Soil classifications conducted during Site investigation activities characterize the clay as having high plasticity and commonly grayish brown to greenish gray, grading to dark bluish gray with depth (Alta 2017). Perched groundwater has also historically been identified immediately above the clay layer or within the unit's interbeds (Alta 2017; GE&R 2021c). Where the clay sequence is absent, windows are present that contain sand and silty sand. These higher permeability sediments connect the overlying sand interval mentioned previously, with deeper sand and silty sand units.

Perched groundwater has periodically been observed at the top of the clay intervals both on and off Site. On-site perched groundwater was not observed during drilling in 2013, 2015, or 2016 (Alta 2017), but was observed on Site in 2020 at multiple borings at depths between 55 and 65 feet bgs (GE&R 2021c). TCE and cis-1,2-dichloroethene (cis-1,2-DCE) were detected in groundwater at concentrations up to 5,100 and 3,400 micrograms per liter (µg/L), respectively, and PCE, trans-1,2-dichloroethene, 1,1-dichloroethene (1,1-DCE), and vinyl chloride (VC) were also detected in some of the samples. In 2016, perched groundwater was observed on the EA Properties at locations VP-42 and VP-50 at depths between 58 and 63 feet bgs. PCE and 1,1-DCE were reported in the perched groundwater on the EA Properties at concentrations up to 36,600 and 56,000 µg/L, respectively. A third perched zone was

[5] https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/.

observed off Site across Crenshaw Boulevard in 2019 in boring VP-63 at a depth of 41 feet bgs. TCE was reported at a concentration of 812 µg/L.

Regional groundwater, interpreted as part of the Gage Aquifer, is first encountered at a depth between approximately 80 to 90 feet bgs and extends across the Skypark Commercial properties and continues to the east beneath Crenshaw Boulevard (Alta 2017; GE&R 2021c). The depth of the Gage Aquifer extends to approximately 225 feet bgs at the Torrance Municipal Airport to more than 600 feet approximately 1 mile southeast of the Site (Alta 2017).

At the Hi-Shear Property, the Gage Aquifer material includes high permeability, poorly graded and silty fine sand (Alta 2017). These sands are not well lithified, and heaving or flowing sands have been encountered when boreholes were advanced (Alta 2017). An aquifer test was conducted in March 2013, and subsequent data analyses suggest an average hydraulic conductivity value of approximately 50 feet per day for the Gage Aquifer beneath the Hi-Shear Property (Alta 2013). In addition, routine groundwater monitoring events indicate the direction of Site horizontal groundwater flow is generally towards the east or southeast (Figure 3) with a calculated horizontal gradient of approximately 0.001 to 0.002 feet per foot (Alta 2017; GE&R 2021b). On-site groundwater monitoring wells are screened across three zones. Shallow groundwater monitoring wells are generally screened between 75 and 110 feet bgs, with screens ranging from 10 to 30 feet long. Intermediate groundwater monitoring wells are generally screened between 125 and 150 feet bgs, with screens ranging from 2 to 20 feet long. Deep monitoring wells are generally screened between 240 to 285 feet bgs, with screens 5 to 10 feet long. Localized shallow vertical groundwater gradients are variable with both upward and downward directions identified within the Gage Aquifer (GE&R 2021b).

The Site lies within the Coastal Plain of Los Angeles (West Coast) groundwater basin. Existing designated beneficial uses for Site groundwater include municipal and domestic supply, industrial service supply, industrial process supply, and agricultural supply (LARWQCB 2019).

3 Site Characterization

Since 1991, numerous Site characterization investigations have been performed and conceptual site models have been prepared. Remedial action programs have been conducted at the Hi-Shear Property under LARWQCB oversight to target soil, soil vapor, and groundwater impacts. The COCs associated with the Hi-Shear Property are chlorinated solvents, principally TCE and PCE (VOCs). This groundwater RAW is focused on the regional aquifer VOC impacts, dominated by TCE, the most toxic and pervasive of the observed VOCs. As previously explained, this RAW addresses the Hi-Shear Source and the Plume Margin.

Elevated concentrations of TCE and PCE have been reported in shallow soil vapor at depths of 5 feet bgs across the Site, including at the Hi-Shear Property, the EA Properties, and off-site to the east of Crenshaw Boulevard. Other named Potentially Responsible Parties have recently performed or are planning to perform shallow soil source investigations on EA Property 1 (Frey Environmental, Inc. 2021) or on the off-site former Nike Missile facility adjacent to EA Property 1 to the south (MK Environmental Consulting, Inc. 2021; BBJ Group 2021).

This RAW proposes two remedial efforts to concurrently cut off the easterly migration of the VOC regional groundwater plume and to reduce the primary VOC source at the Hi-Shear Source. Pending further investigation of the shallow soil, soil vapor, perched groundwater, and potential deeper (regional) groundwater impacts beneath the EA Properties, additional removal actions will be developed and presented in the EA Properties RAW.

Groundwater impacts on the Hi-Shear Property and properties east of Crenshaw Boulevard are defined to an extent sufficient to design a remedy to treat the concentrations of TCE and PCE in the Hi-Shear Plume. The Hi-Shear Plume currently extends from the Hi-Shear Property off-site to the east beneath the EA Properties to beneath the City of Lomita residential neighborhood east of Crenshaw Boulevard. The most recent concentrations of TCE and PCE reported in groundwater monitoring wells are plotted on Figure 4.

The most recent groundwater monitoring event conducted by Hi-Shear was in November 2020 (off-site wells only) and is documented in the *Second Semi-Annual 2020 Groundwater Monitoring Report* (GE&R 2021b). The tables from this monitoring report are included in Appendix A.

3.1 Groundwater on Hi-Shear Property and Prior Remediation

The first groundwater monitoring wells at the Hi-Shear Property were installed in or before 1991. Groundwater concentrations of TCE over 100,000 µg/L were reported at the Hi-Shear Property in on-site monitoring wells in the 1990s, during a period of lower groundwater elevations. Before initial pilot groundwater remediation on the Hi-Shear Property was performed beginning in 2013, groundwater concentrations of TCE ranged up to 42,000 µg/L in on-site well MW-15. PCE was also commonly detected in on-site monitoring wells, though at lower concentrations than TCE. The reason for the decrease in concentrations between the 1990s and 2013 is unknown but may be related to rising groundwater elevations or soil-vapor extraction activities performed at the Hi-Shear Property. The TCE-impacted groundwater plume extended at least 500 feet off-site from the Hi-Shear Property to the east across Crenshaw Boulevard. At the time of Hi-Shear's pilot groundwater remedial activities, the plume characterization was not bounded to the north, south, or east. At that time, based on concentrations observed in well clusters screened at varying depths, Hi-Shear's consultant, Alta, suggested that the chlorinated solvents in the groundwater plume were primarily migrating horizontally from the Hi-Shear Source in the aquifer rather than vertically (Alta 2012).

Groundwater remedial action programs at the Hi-Shear Property have included two EISB pilot tests in a limited area followed by one round of injection at the Hi-Shear Property. In February 2012, Alta prepared a *Conceptual Remedial Action Plan* and the EISB remedial option was selected (Alta 2012). Before the pilot tests were conducted at the Hi-Shear Property, work plans were submitted to the LARWQCB (Alta 2014a, 2014b, and 2016a). The first pilot test was conducted in August 2013, followed by a second pilot test in October 2015—both applications being upgradient of well MW-15. The pilot tests consisted of EISB supplemented with bioaugmentation and chemical reduction. Following the pilot tests, Alta prepared a *Groundwater Remedial Action Plan* (Alta 2016b) which evaluated a broad range of remedial technologies and alternatives in general accordance with the NCP selection criteria. The 2016 *Groundwater Remedial Action Plan* selected the EISB technology, which included one round of injection of EISB in 77 dual-nested injection wells. The well locations and screening intervals, permitting, mixing and injection procedures, groundwater monitoring, and post-injection reporting were included in Alta's *Groundwater Remedial Action Plan*.

This injection program was conducted by Alta between January 31 and April 5, 2017 (Alta 2017). As a result, the remedial effort showed success in lowering VOC concentrations near the injection wells with the highest reduction of VOCs in the area of the pilot test, upgradient of monitoring well MW-15. The historical highest concentration of TCE in groundwater at MW-15 was 56,000 µg/L in August 2011 but was reduced to 12 µg/L in March 2018, approximately 1 year after the 2017 injection event program. As shown in the most recent groundwater sampling event in December 2019, the sustained TCE concentration of 22 µg/L in well MW-15 has demonstrated, where enough product was injected, the selected remedial technology of EISB was successful (GE&R 2021b).

Other areas of the Hi-Shear Property with elevated VOC concentrations, such as monitoring well MW-18 (with its highest historical TCE concentration of 77,000 µg/L in August 2011), did not show similar large VOC reductions. As shown on Figure 4, the TCE concentration in groundwater at MW-18 was reported at 5,100 µg/L in December 2019, its most recent sampling event (GE&R 2021b).

While some areas exhibited VOC reductions, much of the groundwater plume at the Hi-Shear Property was not sufficiently treated. This conclusion is evident in areas where individual VOC concentrations exceed 1 percent of their pure-phase solubilities (14,720 and 2,000 µg/L for TCE and PCE, respectively) which, consistent with the United States Environmental Protection Agency (USEPA) rule of thumb (1992), is considered indicative of probable dense non-aqueous phase liquid (DNAPL).

DNAPL often requires a long-term iterative EISB strategy or other remedial methods. Other possible reasons for the limited success of the Hi-Shear EISB treatment include poor implementation of the EISB remedy resulting from insufficient product application, poor substrate to VOC contact or poor distribution of the substrate, and/or insufficient geochemistry alteration. It does appear that the first round of injection was sufficient to remediate some of the central plume area near the Hi-Shear property border which effectively bifurcated the groundwater plume with the apparent reduction of VOCs immediately downgradient of the more persistent non-aqueous phase liquid (NAPL; where releases appear to have occurred on the Hi-Shear Property), creating the Hi-Shear Source.

Hi-Shear installed four groundwater monitoring wells (MW-8, MW-12, MW-35, and MW-39) at the EA Properties. Wells MW-8 and MW-12 are screened from 95 to 120 and 90 to 115 feet bgs, respectively, MW-35 is an intermediate monitoring well (150 feet total depth), and MW-39 is a deep monitoring well (250 feet total depth). All wells on the EA Properties, except for deep monitoring well MW-39, appear to be impacted with VOCs—primarily TCE; however, the impacts appear to have been influenced from cross contamination caused during well installation.[6] As shown on Figure 4, TCE concentrations were reported at 10,000 µg/L in Well MW-12 (EA Property 1) and at 5,000 µg/L at well MW-8 (EA Property 3) in December 2019.

The closest upgradient monitoring wells to the EA Properties from the Hi-Shear Property, are MW-13 and MW-34, located in the southeast corner of the Hi-Shear Property. These two wells, along with, MW-21 (installed along Crenshaw Boulevard), were last sampled in 2019 and 2020, when concentrations of TCE and PCE ranged from 6.3 to 130 and 26.8 to 190 µg/L, respectively.

3.2 Off-site Groundwater

Hi-Shear installed 14 wells on and east of Crenshaw Boulevard: MW-9 (abandoned), MW-20, MW-21, MW-23 to MW-31, MW-36, and MW-40. Thirteen of the 14 wells are within the regional aquifer (total depth between 95 to 114 feet); MW-40 is an intermediate monitoring well (total depth of 150 feet). In November 2020, the highest concentration of TCE in groundwater east of Crenshaw Boulevard was reported in well MW-20 at 2,450 µg/L; within the City of Lomita, TCE-impacted groundwater extends to at least MW-26 with a concentration of 105 µg/L (Figure 4; GE&R 2021b). No groundwater remediation/EISB injections have been conducted east of the Hi-Shear Property.

The most recent groundwater monitoring event conducted by Hi-Shear was in November 2020 and is documented in the *Second Semi-Annual 2020 Groundwater Monitoring Report* (GE&R 2021b). The tables from this monitoring report are included in Appendix A.

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[6] Well MW-35 was drilled and installed to 150 feet bgs, through a zone at 90 to 115 feet bgs with a detected TCE concentration of 10,000 µg/L. Well MW-35 was not installed with an outer (conductor) casing, which are typically installed as barriers to minimize the potential for vertical cross contamination to wells installed in deeper zones. Since a conductor casing was not installed, and based on groundwater data collected from this well, it appears that cross contamination occurred during the well installation process. Well MW-35 has been sampled three times since installation in March, June, and November 2020 and concentrations have decreased with each sampling event—from 5,890 µg/L in March, to 3,100 µg/L in June, and 1,180 µg/L in November.

4 Nature and Extent of Groundwater Impacts

Chlorinated VOCs identified at the Site include TCE, PCE, cis-1,2-DCE, trans-1,2-dichloroethene, 1,1-DCE, VC, and 1,1,1-trichloroethane, 1,2-dichloroethane, and 1,1,2-trichloroethane. Other constituents reported in groundwater include benzene, toluene, ethylbenzene, hexavalent chromium, 1,4-dioxane, and perchlorate.

Historical high concentrations of TCE at the Site suggest that DNAPL is present in the regional aquifer within the Hi-Shear Property. As described by the LARWQCB in its 2018 letter to Hi-Shear's counsel, "…the onsite groundwater monitoring wells MW-18, MW-16, and MW-6, and the offsite groundwater monitoring wells MW-13, MW-20, and MW-26 are aligned along the east-southeastward trending axis of the TCE plume originating from the Hi-Shear Site." Free phase TCE (DNAPL) on the Hi-Shear Property presents different remedial challenges because of the greater mass than dissolved contaminants alone. Remediation of DNAPL typically requires multiple long-term repetitive injection efforts spanning longer time periods or a remedial technology that removes or destroys pure non-dissolved product. Remediation of DNAPL can also be accomplished using excavation or thermal remediation methods, such as in-situ thermal conductive heating.

After implementation of the pilot remedial program at the Hi-Shear Property in 2017, the VOC concentrations were reduced primarily along the eastern boundary of the Hi-Shear Property, downgradient (east) of known source areas on the property, where only dissolved contaminant constituents now appear present, bifurcating the historical VOC plume.

While the remedial efforts resulted in reduction of VOC concentrations in groundwater at the Hi-Shear Property (primarily at the eastern boundary in the vicinity of groundwater monitoring well MW-15), they did not reduce VOC concentrations in the portion of the plume that had already migrated beyond the Hi-Shear Property and beneath and beyond the EA Properties. This incomplete remedial effort allows continued migration of the VOC plume east of Crenshaw Boulevard into the residential community within the City of Lomita.

The results of the Hi-Shear EISB injections demonstrate that the pilot remedial technology selected and implemented by Hi-Shear, when effectively designed and implemented, will effectively reduce VOCs in groundwater containing the dissolved constituents; however, since the Hi-Shear pilot was a limited pilot study, it was not implemented in the regional groundwater downgradient from the Hi-Shear Property. Further, in the areas it was implemented, as discussed above, it could have been designed and implemented to achieve more effective results. Therefore, to address the Hi-Shear Plume within the Hi-Shear Source area, a comprehensive remedy is necessary to fully treat the plume within the Hi-Shear Source area. Additionally, a separate and additional remedy is necessary to address the impacted groundwater downgradient of the Hi-Shear Property to treat this groundwater to achieve MCLs and to mitigate the potential VI risks from groundwater off-gassing in the City of Lomita.

5 Removal Action Objectives and Goals

RAOs have been developed for the Site regional groundwater that are consistent with the NCP criteria, the CWC and State Board Resolution No. 92-49. The RAOs were then used to identify the recommended response actions proposed in this groundwater RAW. RAOs are qualitative statements that identify the scope of remediation necessary to protect human health and the environment and attain regulatory compliance. The Site RAOs serve as the basis to develop quantitative remediation goals to address COCs in the regional groundwater. Remediation goals provide a basis for confirming that the RAOs have been achieved.

5.1 Removal Action Objectives

The following RAOs are proposed for the Site:

- Reduce the potential for VI risk into the City of Lomita residential community east of Crenshaw Boulevard by addressing the principal cause of the soil vapor contamination in that area, i.e., the VOC-impacted regional groundwater that has and continues to migrate from the Hi-Shear Property east and into the City of Lomita, such that the total (cumulative) cancer risks are within the target risk range (1×10^{-6} to 1×10^{-4}) considered by USEPA and CalEPA to be protective of human health, and the noncancer hazard indices are less than 1 under a residential use scenario.
- Further reduce contaminant mass at the Hi-Shear release areas to diminish the mass, longevity, and ongoing growth of the Hi-Shear Plume to achieve water quality objectives within a reasonable time frame.
- Reduce VOCs in the regional groundwater to the applicable MCLs to the extent practicable and technologically feasible within a reasonable time frame.

5.2 Remedial Goals

Remedial goals, a subset of RAOs, consist of levels of risk or chemical concentrations that are protective of human health or the environment. Remedial goals are often used at sites to guide remedies that are selected to reduce chemical concentrations to levels that pose acceptable incremental cancer risks or noncancer hazards. For this groundwater RAW, remedial goals for the COCs are their respective VI ESLs and MCLs for groundwater.

6 Engineering Evaluation and Cost Analysis of Removal Alternatives

An engineering evaluation of potential available removal action alternatives was used to screen their potential application to this groundwater removal action using NCP guidelines (40 CFR §300.415). In accordance with 40 CFR §300.415(4)(i) of the NCP, and with EE/CA guidance (USEPA 1993), an estimated relative cost comparison and selection of the optimal remedial action technologies are included in this evaluation. Similar evaluations were performed for the Site in 2012 and 2016 (Alta 2012 and 2016b). This RAW addresses removal action—future additional considerations could amend and modify this selection process. The public and the stakeholders on this removal effort will be afforded the opportunity to provide comments to this NCP evaluation. The NCP criteria include:

- Overall protection of human health and the environment
- Long-term effectiveness and permanence
- Short-term effectiveness
- Reduction of toxicity, mobility, and/or volume
- Implementability of the remedial technology
- Compliance with regulatory requirements
- Cost of remedy

Section 6.1 provides a description of the identified, potential alternatives to address the Plume Margin with a treatment barrier along Crenshaw Boulevard. Section 6.2 provides a description of potential alternatives to address the Hi-Shear Source area. Section 6.3 (and Table 1) sets forth an evaluation of the retained alternatives using the NCP criteria, and a screening level estimation of the respective alternatives' costs. A summary of the selected removal action alternatives is presented in Section 6.4.

6.1 Identification and Screening of Removal Alternatives to Address the Plume Margin

The following removal action alternatives were considered to address the Plume Margin:

1. No Action Alternative
2. Monitored Natural Attenuation (MNA)
3. EISB
4. Zero-Valent Iron (ZVI) Barrier

The alternatives are described the following sections with an analysis of their applicability to the Site (including RWQCB's requirements).

6.1.1 No Action

This alternative does not implement a remedial action. The NCP requires consideration of a no action alternative; however, in this case, none of the RAOs would be attained within a reasonable timeframe. The time to achieve MCLs in the impacted groundwater through a No Action alternative would span several decades or more. No Action also does nothing to timely diminish toxicity, mobility, or the volume of contaminants and is not effective in protecting public health. While the cost for the No Action alternative is very low, it would be unacceptable to the LARWQCB and the community as the VOC concentrations in groundwater exceed MCLs and the impacted groundwater plume would continue to migrate into residential areas which, over time, could create an unacceptable risk of VI.

6.1.2 MNA

MNA relies on naturally occurring processes, such as biodegradation, dispersion, and diffusion to reduce contaminant impacts. This technology reduces contaminant impacts more slowly than other more active remedial technologies and can be employed when there is extended time to achieve the water quality objectives. MNA is often applied after active remedies have already reduced the impacts and risks of contaminants. Continued groundwater monitoring verifies that natural attenuation of VOCs continues in the aquifer via biological and chemical degradation over time. This alternative by itself will not be protective of human health and the environment, will not timely reduce groundwater concentrations, nor will it timely comply with RAOs. However, MNA is very implementable, and the cost is low compared to other alternatives since only routine groundwater monitoring will be performed.

This alternative alone will also not be acceptable to the LARWQCB or community as the VOC concentrations in groundwater exceed MCLs and the impacted groundwater plume will continue to extend into residential areas, and potential VI risks would remain. However, MNA will be implemented following an active groundwater remedy to ultimately achieve water quality objectives (MCLs) after the higher concentrations have been diminished. This alternative is not retained as a stand-alone groundwater remedy but will be used following an active groundwater remedy.

6.1.3 EISB

During EISB, the process of reductive dechlorination by bacteria (the breakdown of PCE to TCE, TCE to cis-1,2-DCE, cis-1,2-DCE to VC, and then to the final step of ethene) is increased by adding an organic carbon source and nutrients to alter the groundwater geochemistry as well as non-native bacteria to the subsurface to work symbiotically with the indigenous bacteria. Materials typically used include an organic carbon source, nutrients, electron acceptors, and/or microbial cultures such as Dehalococcoides (Dhc). This technology could address the dissolved-phase VOC impacts through the creation of suitable geochemical conditions to establish EISB.

This technology typically can be maintained for 3 or more years after its application, depending on the nature of the geochemistry and substrate used to establish EISB conditions. To maintain longer treatment time frames, however, or to address more recalcitrant conditions, such as DNAPL which exists in the Hi-Shear source area, multiple applications are required. Aquifers that are under anaerobic conditions are conducive to EISB remediation. Implementation of EISB may include installation of injection wells or use of a one-time application using direct-push injections; other than groundwater monitoring, no ongoing operation and maintenance is required after the injection event, until the substrate becomes spent by the biological activities induced. For EISB to be effective, the organic carbon source, nutrients, electron acceptors, and/or microbial cultures must be properly distributed. Also, enhanced subsurface conditions must be maintained for a sufficient time to fully dechlorinate the VOCs. The microbial cultures consume only dissolved chemicals, requiring repeated applications to address DNAPL.

Similar considerations and evaluations were performed for the Hi-Shear Source area in 2012 and 2016 (Alta 2012 and 2016b) which identified EISB as the preferred technology for the groundwater beneath and migrating from the Hi-Shear Property. Reasonable success was observed from these efforts, but the Hi-Shear Source area contains DNAPL, and the DNAPL thus continued to contaminate the groundwater in this area, after the EISB treatment, with additional dissolved VOCs. Also, to date, EISB has not been proposed or used as a reductive barrier to address the Plume Margin. The shortcomings of the previous Alta EISB remedial efforts were in the short duration of implementation as well as the incomplete and limited application of this technology and the injections. This EISB technology has been retained as it was demonstrated to be successful to reduce the groundwater COCs during the previous applications at the Hi-Shear Property, and injection wells and other monitoring wells are in place, diminishing the costs to re-administer the substrate and microbial bioaugmentation for the Hi-Shear Source area. These same economies, however, do not exist to address the Plume Margin with EISB, because no injection wells were previously installed along Crenshaw Boulevard.

To enhance bioremediation of VOCs at the Site, a bioaugmentation culture (e.g., KB-1®) could be used in conjunction with EISB to address the Plume Margin. Bioaugmentation cultures have been used for over two decades to enhance bioremediation of chlorinated solvents. These cultures introduce key microorganisms to contaminated sites where they are absent or in low concentrations. Bioaugmentation with KB-1® is an effective solution to enhance remediation of a growing range of chlorinated solvents and other recalcitrant compounds including:

- Chlorinated ethenes (PCE, TCE, all DCE isomers, VC)
- Chlorinated ethanes (1,1,1-trichloroethane, 1,2-dichloroethane, 1,1,2,2-tetrachloroethane, and others)
- Chlorinated methanes (chloroform, dichloromethane)
- Chlorinated propanes (1,2,3-trichloropropane and 1,2-dichloropropane)
- Chlorofluorocarbons

EISB technology is also included in the LARWQCB general WDR permit for the application of substrates for groundwater remediation. This technology would be protective of human health and the environment, comply with RAOs, provide long-term effectiveness, and over time, reduce VOCs in groundwater to MCLs, if properly implemented. However, to be used as a barrier to address the Plume Margin, injection wells would need to be installed along Crenshaw Boulevard and routine injections would be required. The costs to implement EISB to address the Plume Margin as a reductive barrier for 14 years, over a 500-foot-long area along Crenshaw Boulevard, inclusive of groundwater monitoring and well abandonment, would be approximately $3,200,000 assuming five injections (one injection per year for the first 2 years and three additional injections, once every 3 years, thereafter, based on the assumption that active treatment will continue for 3 years following each injection event). Establishment and maintenance of the proper geochemical conditions can sometimes prove problematic in some areas, requiring on-going monitoring and maintenance of the injection's potency. EISB would likely be acceptable to the LARWQCB and the community since it has already been implemented at the Site within the Hi-Shear Source area and has been shown to be effective. An EISB alternative is retained for potential application to address the Plume Margin.

6.1.4 ZVI

ZVI is manufactured by several vendors in micro- or nano-scale sizes. It is typically entrained in a slurry for placement or injection into groundwater to facilitate different reactions, in which it slowly oxidizes to ferrous iron and releases two electrons and creates hydrogen, which causes VOC degradation. This technology abiotically dechlorinates toxic contaminants (e.g., TCE and PCE) to ethene, making it compatible and similar to EISB in its reduction of toxicity.

ZVI can be applied in a variety of ways but given the depth of the Hi-Shear Plume, it is recommended that this application be achieved through high-pressure injections (entrained in slurry). Another way to apply ZVI is through the construction of permeable gravel/sand barriers with the ZVI blended in. Given the depth of the affected groundwater, construction of permeable gravel/sand barriers would be highly costly and problematic making high-pressure injection the most feasible and cost-effective placement method at the Site. ZVI can persist for extended periods that typically exceed 5 years and have shown to have treatment reactivity for over 10 years.

ZVI can be applied in conjunction with EISB to create synergistic reactions which enhance the performance of both ZVI and EISB. ZVI is emplaced in a particulate slurry which forms a stable barrier, whereas EISB substrates are injected as solutions that are more susceptible to subsurface dilution and migration away from their point of injection. The cost to install a ZVI barrier with EISB substrates at the Site to groundwater, over a 500-foot-long area along Crenshaw Boulevard, is approximately $2,000,000 for installation and well abandonment and $600,000 for oversight and monitoring costs, equaling a total cost of $2,600,000. It is assumed that the monitoring will be conducted quarterly for the first year, semi-annually for the next 2 years, and annually thereafter for the remaining 12 years. This cost includes installation of the barrier, LARWQCB oversight, 15 years of groundwater monitoring and oversight following installation to monitor performance, and injection well abandonment costs. A ZVI remedy, with EISB substrates, will be protective of human health and the environment, comply with RAOs, and be effective in the short and long term. ZVI is capable of reducing VOCs to acceptable levels in groundwater and is implementable and effective. ZVI is a proven technology and will likely be acceptable to the LARWQCB and the community. ZVI with EISB substrates is retained for potential application.

6.1.5 Plume Margin- Retained Alternatives

The alternatives retained for further analysis are:

- Alternative 1 – No Action
- Alternative 2 – EISB
- Alternative 3 - ZVI, with EISB substrates

6.2 Removal Action Alternatives -Hi-Shear Source

The VOCs present from the releases of VOCs to the soils and groundwater within the Hi-Shear Source area have resulted in the Hi-Shear Plume. The treatment of the VOCs in the Hi-Shear area is necessary to control and abate the on-going degradation of the waters found in the Hi-Shear Plume. The following removal action alternatives were considered to address the VOCs in the Hi-Shear Source area:

1. No Action Alternative
2. MNA
3. Groundwater Pump and Treat
4. Thermal Technologies with SVE
5. In-Situ Chemical Oxidation
6. EISB

The alternatives are described in the following sections with an analysis of their applicability to the Site (including LARWQCB's requirements).

6.2.1 No Action

This alternative does not implement a remedial action. The NCP requires consideration of a no action alternative; however, in this case, none of the RAOs would be attained within a reasonable period of time. The time to achieve MCLs in the impacted groundwater through a No Action alternative would span several decades or more. No Action does nothing to timely diminish toxicity, mobility, or the volume of contaminants and is not effective in timely protecting public health. While the cost for the No Action alternative is very low, it would be unacceptable to the LARWQCB and the community as the VOC concentrations in groundwater exceed MCLs and the impacted groundwater plume extends into residential areas which, over time, could create an unacceptable risk of VI.

6.2.2 MNA

MNA relies on naturally occurring processes, such as biodegradation, dispersion, and diffusion to reduce contaminant impacts. This technology reduces contaminant impacts more slowly than other more active remedial technologies and can be employed when there is extended time to achieve the water quality objectives. MNA is often applied after active remedies have already reduced the impacts and risks of contaminants. Continued groundwater monitoring verifies that natural attenuation of VOCs continues in the aquifer via biological and chemical degradation over time. This alternative by itself will not be protective of human health and the environment, will not timely reduce groundwater concentrations, nor will it timely comply with RAOs. However, MNA is very implementable and the cost is low compared to other alternatives since only routine groundwater monitoring will be performed. This alternative alone will not be acceptable to the LARWQCB or community as the VOC concentrations in groundwater exceed MCLs and the impacted groundwater plume will continue to extend into residential areas and potential VI risks would remain. However, MNA may be implemented following an active groundwater remedy to ultimately achieve water quality objectives (MCLs) after the higher concentrations have been diminished. This alternative is not retained as a standalone groundwater remedy but will be used in conjunction with an active groundwater remedy.

6.2.3 Groundwater Pump and Treat

Groundwater pump and treat extracts impacted groundwater for treatment for subsequent disposal either to storm drains or the sanitary sewer (both under regulatory authority). This technology can be effective to contain the migration of contaminants in homogenous sandy aquifers but has not been successful in remediating groundwater to MCLs in heterogenous aquifers. Although this alternative could be effective in hydraulically containing the VOC plume and may be protective in the short term of human health and the environment within the radius of groundwater capture, groundwater will continue to exceed MCLs outside the radius of capture, and further creating a potential unacceptable VI risk.

Groundwater pump and treat is also not cost effective as a remedy to achieve water quality objectives due to the required number of wells, treatment system infrastructure, and long-term operation (typically decades) to treat and dispose of large volumes of extracted groundwater. Due to the length of time the system(s) would be required to operate (decades), and given the need for the treatment of large volumes of groundwater for this Site (in light of the large area of offsite migration of the Hi-Shear Plume to date), this alternative would not be cost-effective, as the cost for this alternative is estimated at $27,000,000 or higher, and would involve pumping from a large number of groundwater extraction wells, installation of significant infrastructure, the operation of several large treatment systems for an extended period of time, and the treatment and disposal of a significant volume of groundwater.

Further, given the apparent existence of DNAPL, this technology could exacerbate the contamination by pulling otherwise clean groundwater down past the DNAPL source areas, thereby resulting in the need for treating additional contaminated groundwater. This technology is implementable but would require substantial permitting and infrastructure—possibly with multiple treatment systems capable of treating large volumes of groundwater. Further, as this area is being actively managed to control saltwater intrusion, extraction of groundwater would be contrary to this goal, and likely would not be allowed. Groundwater pump and treat would also not likely be acceptable to the LARWQCB or the community, as groundwater will continue to exceed MCLs and create an unacceptable risk. This alternative was not retained.

6.2.4 Thermal Technologies with SVE

Thermal treatment is predominantly a mass transfer technology that involves heating the aquifer and vadose zone to volatilize and mobilize VOCs from the formation, including groundwater into vapors, which are then extracted by a SVE system. This technology is most often applied to areas where DNAPL has been observed. Thermal technologies include steam enhanced extraction, dynamic underground stripping (steam injection and electrical resistance heating), electrical heating (applying electrical energy to heat the subsurface by electrical resistance heating, six-phase soil heating, or radio-frequency heating), and thermal conduction. Thermal technologies require considerable energy and cause significant greenhouse gas production. As an alternative for the Hi-Shear Source area, a thermal system would be installed to treat DNAPL within the Hi-Shear Source area, which would require significant infrastructure, and have a high cost—approximately $26,000,000 compared with other technologies. Given the high reliance on energy, extensive infrastructure required, and high capital cost, this alternative was not retained for further evaluation.

6.2.5 In-Situ Chemical Oxidation

In-situ chemical oxidation consists of the injecting oxidizing compounds such as hydrogen peroxide(H_2O_2), activated sodium persulfate ($Na_2S_2O_8$), potassium or sodium permanganate ($KMnO_4$ or $NaMnO_4$), or ozone (O_3) into the contaminated groundwater plume. These oxidizers destroy VOCs on contact; therefore, the effectiveness of this approach is dependent on subsurface distribution across the VOC impacted areas. Conditions to consider when using this remedial technology are the concentrations of organic matter (i.e., soil oxidant demand), the effective porosity and the hydraulic conductivity (distribution of the oxidizing compounds in the groundwater), the pH of the oxidizing compound, the half-life of the oxidant (i.e., hydrogen peroxide is on the order of hours while activated persulfate and permanganate are more persistent and may remain in the groundwater for days to weeks), and the heterogeneity of the aquifer system (the even distribution of the product increases the effectiveness of the in-situ treatment). A drawback to this remedial alternative is the potential conversion of trivalent chromium to hexavalent chromium.

Critical to the success of this remedial approach is the volume of compound injected into the groundwater and possible multiple injection rounds (short half-life of the oxidant). The oxidizing compounds can be injected into the groundwater through temporary injection points, vertical wells, horizontal or inclined wells, or infiltration galleries/permeable reactive barriers. Although this approach could be implemented, this alternative was not retained for further evaluation because of the presumptive need for multiple injections (due to the short half-life of the products), and the difficulties in gaining contact with the regional groundwater VOC plume, and because of the potential generation of hexavalent chromium. As a result, this alternative would not be cost-effective as a remedy for the regional groundwater. In addition, this technology creates an oxidative condition in groundwater, inconsistent with the prior EISB implemented by Hi-Shear, which already has induced anaerobic reductive conditions. Thus, this alternative is not retained for further consideration.

6.2.6 EISB

Previous regional groundwater remedial action at the Hi-Shear Source area included EISB pilot tests with limited injections. During EISB, the process of reductive dechlorination by bacteria (the breakdown of PCE to TCE, TCE to cis-1,2-DCE, cis-1,2-DCE to VC, and then to the final step of ethene) was shown to be increased by adding non-native bacteria to the subsurface to work symbiotically with the indigenous bacteria. In-situ bioremediation typically also includes adding nutrients. Materials used often include an organic carbon source, nutrients, electron acceptors, and/or microbial cultures such as Dhc. This technology addresses the dissolved plume, with suitable conditions to establish EISB being maintained for approximately 3 years after its application, depending on the nature of the geochemistry and the nature and quantity of the substrate used to establish the EISB conditions. Aquifers that are under anaerobic conditions are conducive to EISB remediation. Implementation of EISB may include installation of injection wells (Hi-Shear has already installed an array of injection wells) or use of direct-push application; no ongoing operation and maintenance, other than monitoring, is required after the injection event until the substrate becomes spent by the biological activities induced. For EISB to be effective, the organic carbon source, nutrients, electron acceptors, and/or microbial cultures must be properly maintained and distributed to enhance subsurface conditions for a sufficient time to fully dechlorinate the VOCs. The microbial cultures consume only dissolved chemicals, requiring repeated applications to address DNAPL, which is dissolved over time.

Similar considerations and evaluations were performed for the Site in 2012 and 2016 (Alta 2012 and 2016b) which identified EISB as the preferred technology for the groundwater beneath and migrating from the Hi-Shear Property. The shortcomings of the previous Alta remedial efforts were in the short duration of implementation, as well as the incomplete and limited application of this technology within the Hi-Shear Property at the time. This technology is retained as it was demonstrated to be successful to reduce the groundwater COCs during the previous applications at the Hi-Shear Property, despite its incomplete application and implementation.

To enhance bioremediation of VOCs at the Hi-Shear Source area, a bioaugmentation culture (e.g., KB-1®) should be used in conjunction with EISB. Bioaugmentation cultures have been used for over two decades to enhance bioremediation of chlorinated solvents. These cultures introduce key microorganisms to contaminated sites where they are absent or are in low concentrations. Bioaugmentation with KB-1® is an effective solution to enhance remediation of a growing range of chlorinated solvents and other recalcitrant compounds including:

- Chlorinated ethenes (PCE, TCE, all DCE isomers, VC)
- Chlorinated ethanes (1,1,1-trichloroethane, 1,2-dichloroethane, 1,1,2,2-tetrachloroethane, and others)
- Chlorinated methanes (chloroform, dichloromethane)
- Chlorinated propanes (1,2,3-trichloropropane and 1,2-dichloropropane)
- Chlorofluorocarbons

This technology is included in the LARWQCB general WDR permit for the application of substrates for groundwater remediation. This technology would be protective of human health and the environment, comply with RAOs, provide long-term effectiveness, and reduce VOCs in groundwater to MCLs, if properly implemented. EISB injections at the High-Shear property would utilize the existing 77 injections wells shown on Figure 5.

Costs to implement EISB within the regional aquifer within the Hi-Shear Source area, utilizing the existing 77 injection wells, is estimated to be approximately $3,600,000 ($3,000,000 for permitting, injections well abandonment and $600,000 for LARWQCB oversight and monitoring). This cost includes an initial injection event including all 77, dual nested wells (154 total well screens), and three additional injection events (each 3 years apart) using half of the injection volume (50 percent event), with 13 total years of monitoring and LARWQCB oversight while the treatment is active. Some injection wells may only require one or two applications, while others, where DNAPL is present, may require three or more applications. EISB would be acceptable to the LARWQCB and the community since it has already been implemented at the Site and shown to be effective. An EISB alternative for the Hi-Shear Source area is retained for potential application.

6.2.7 Hi-Shear Source Area Retained Alternatives

Based on the evaluation presented in Section 6.1, retained alternatives for further NCP analysis to address the Hi-Shear Source area are:

- Alternative 1 – No Action
- Alternative 2 – EISB

A summary of the retained alternatives is presented in Table 1.

6.3 NCP Analysis of Removal Action Alternatives

The removal action alternatives for both the Hi-Shear Plume Margin and the Hi-Shear Source area retained alternatives, are evaluated below with respect to the NCP Threshold, Primary Balancing, and Modifying criterion. The narrative analysis is presented in Table 1. The evaluations are based on published documentation, experience at similar sites, Site data, the site-specific RAOs, prior similar screening on and experience at the Site, and Terraphase's professional judgment. The estimated costs for full-scale implementation of the proposed alternatives for the Hi-Shear Plume Margin and the Hi-Shear Source area, are presented in Table 1 as rough order of magnitude engineer estimates and are intended for use in this comparative analysis of the alternatives. The analysis of removal action alternatives is discussed below for the Plume Margin barrier and the Hi-Shear Source area.

The purpose of this section is to provide a comparative analysis against each of the evaluation criterion of the retained alternatives presented in Section 6. This effort will further clarify the advantages and disadvantages of each retained alternative relative to one another and facilitate the selection and assembly of the recommended removal action.

Pursuant to the NCP and EE/CA guidance (USEPA 1993), the identified alternatives are analyzed using the following NCP evaluation criteria: effectiveness, implementability, and cost. The effectiveness of each alternative was evaluated by each alternative's protectiveness of human health and the environment; reduction of toxicity, mobility, or volume through treatment; long-term effectiveness and permanence; and short-term effectiveness. The implementability criterion addresses the technical feasibility of implementing the response (including availability of services and materials), the administrative feasibility, and state and community acceptance. Projected costs were calculated using direct capital costs, indirect capital costs, and annual post-removal site control costs. The projected costs presented for the removal action alternatives are estimates only for the purpose of comparing alternatives and should not be considered design-level cost estimates.

6.3.1 Plume Margin Alternatives

Below, the retained alternatives for the Plume Margin are considered in accordance with NCP criteria. The retained alternatives are:

- Alternative 1 – No Action
- Alternative 2 – EISB
- Alternative 3 – ZVI with EISB substrates

6.3.1.1 Effectiveness

This section evaluates the alternative's ability to meet the RAOs as identified in Section 5; in particular, its ability to achieve the criteria of protectiveness of human health and the environment and to achieve the RAOs and the remedial goals. Other factors that affect the overall protectiveness of a removal action include preference for treatment to reduce contaminant toxicity, mobility, or volume for principal threats, short-term effectiveness, and long-term effectiveness/permanence. Judgements and details regarding the effectiveness evaluation criteria are presented in the following subsections.

Overall Protection of Human Health and the Environment

Under Alternative 1, No Action, no active efforts will be made to remediate groundwater. Therefore, VOCs in groundwater will remain elevated and could continue to migrate further and continue to pose a potential risk to human health and the environment.

Alternative 2 would use EISB as a barrier to reduce VOC concentrations. EISB has already been shown to work within the groundwater in the Hi-Shear Source area and would be protective of human health and the environment downgradient of the barrier. However, this alternative requires that geochemical conditions be altered and maintained throughout the entire length of the installed barrier to be effective, which will likely be problematic.

Alternative 3 would use ZVI as a barrier with EISB substrates. ZVI is capable of reducing toxic VOCs, like TCE, to non-toxic compounds. A ZVI barrier would reduce VOCs as they migrate past the barrier, toward the City of Lomita, and would be protective of human health and the environment downgradient of the barrier. This alternative would need to be constructed in a manner that distributes the ZVI so that it intercepts and contacts the groundwater as it passes the barrier to be effective.

Of the alternatives evaluated, Alternatives 2, 3, and 4 provide the highest level of protection to human health and the environment, with MNA used only as appropriate where water quality objectives would be achieved within a reasonable time frame after being reduced substantially by a more active remedy.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1, No Action, does not actively reduce the toxicity, mobility, or volume of VOCs in groundwater. The VOCs will persist in groundwater for decades and will continue to pose an unacceptable risk to human health and the environment.

Alternatives 2 (EISB) and 3 (ZVI with EISB substrates) will actively reduce the toxicity, mobility, or volume of VOCs in groundwater.

Short-Term Effectiveness

Alternative 1, No Action, has poor short-term effectiveness because potential risk from VOCs in groundwater is not actively reduced. The length of time until protection is achieved would be decades under this alternative.

Alternatives 2 (EISB) and 3 (ZVI with EISB substrates) offer equal short-term effectiveness as both alternatives, once implemented, would immediately begin to reduce high VOC concentrations in groundwater. Given that Alternative 3, ZVI with EISB substrates, does not require the establishment of biological conducive conditions and does not migrate, this technology appears best suited to create a treatment barrier, whereas Alternative 2, EISB, would likely be problematic in forming a treatment barrier that would last for an extended period of time.

Long-Term Effectiveness

Alternatives 1, No Action, does not provide long-term effectiveness or a permanent remedy for elevated VOCs in groundwater.

Alternative 2, EISB, provides a moderate level of long-term effectiveness by reducing VOCs in groundwater. However, EISB injections require operation and maintenance through monitoring and timely reapplication of substrates to maintain an active barrier for a lengthier period of time.

Alternative 3, ZVI with EISB substrates, provides the highest level of long-term effectiveness and ZVI effectiveness typically lasts for more than 5 years, often 10 years or more. This alternative effectively eliminates the unacceptable risks to human health and the environment downgradient of the barrier.

6.3.1.2 Implementability

This section provides an evaluation of the technical feasibility of implementing the alternative and the materials and services that would be required for its implementation.

Technical Implementation Considerations

No technical implementation considerations are associated with Alternative 1, No Action, because no action is taken. Alternative 2, EISB, is implementable but poses challenges to establish a vigorous and sustainable treatment barrier as VOC concentrations and geochemical conditions vary by location and over time. Alternative 3, ZVI with EISB substrates, is technically implementable.

Administrative Feasibility

Permits will be required from the LARWQCB and City of Torrance to implement EISB and ZVI injections, but these permits are common and pose no hinderance to implement these alternatives. Additionally, access to properties along the western border of Crenshaw Boulevard, for well installation and injections, from existing City of Torrance tenants, would be necessary. No Action poses no administrative procedural obstacles for implementation.

State Acceptance

State acceptance of Alternatives 1, No Action, is unlikely given no active efforts to minimize contaminated areas or migration pathways would be made, and potential VI risks and water quality impairment would remain and worsen. State acceptance of Alternative 2, EISB, is considered moderate, since EISB has been used at the Site, but not as a barrier. State acceptance of Alternative 3, ZVI with EISB substrates, is considered high due to ZVI's longevity and ability to reduce VOCs to non-toxic compounds. Final state acceptance will be determined following public comment.

Community Acceptance

It is anticipated that Alternatives 2, EISB, and 3, ZVI with EISB substrates, would receive community acceptance; however, final acceptance will be determined following the community review and comment period following the completion of the RAW.

6.3.1.3 Cost

This section provides an evaluation of the costs associated with implementing the removal action alternatives. Cost estimates are based on currently available costs and approximate time and materials requirements developed for the sole purpose of comparing alternatives. The EE/CA cost estimates should not be considered design-level estimates. They are representative within −30 to +50 percent and were prepared with consideration to the guidance provided in the USEPA's "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (USEPA 2000).

There are no capital, operation, or maintenance costs associated with Alternative 1, No Action. The only costs are administrative/regulatory approval costs that are negligible.

The estimated cost to implement Alternative 2, EISB, is approximately $3,200,000 ($2,600,000 capital and abandonment costs and $600,000 monitoring and oversight). The capital costs include the labor, equipment, and materials for five EISB injections (one 100-percent event, and four 50-percent events) as well as an estimate of the professional and technical services necessary to support the implementation. The costs assume installation of 20 injection wells along Crenshaw Boulevard over a 500-foot-long area, and 5 EISB injection events (two injections in the first 2 years and three injections every 3 years), along with 11 groundwater monitoring events.

The estimated capital cost to implement Alternative 3, ZVI with EISB substrate, is $2,000,000 (capital and well abandonment) and $600,000 (monitoring and oversight) covering an assumed 15 years of active treatment. The capital costs include the labor, equipment, materials to inject ZVI, and to abandon the wells following treatment, as well as an estimate of the professional and technical services necessary to support the implementation. Fifteen years of monitoring and LARWQCB oversight have been included in the cost estimate. Alternative 3 assumes injection of ZVI and EISB substrate at 44 locations to create a barrier approximately 500 feet long, in addition to monitoring and oversight for a period of 15 years after the injection. Other than ongoing monitoring, reporting, and LARWQCB oversight costs, there are no O&M costs associated with Alternative 3 once the ZVI injections have been completed.

6.3.2 Hi-Shear Source Area Alternatives

Below, the retained alternatives to address the Hi-Shear Source area are considered in accordance with the NCP criteria. The retained alternatives are:

- Alternative 1 – No Action
- Alternative 2 – EISB

A summary of the retained alternatives is presented in Table 1.

6.3.2.1 Effectiveness

This section evaluates the alternative's ability to address the Hi-Shear Source area to achieve RAOs as identified in Section 5; in particular, its ability to achieve the criteria of protectiveness of human health and the environment and the RAOs and remedial goals. Other factors that affect the overall protectiveness of a removal action include preference for treatment to reduce contaminant toxicity, mobility, or volume for principal threats, short-term effectiveness, and long-term effectiveness/permanence. Details regarding the effectiveness evaluation criteria are presented in the following subsections.

Overall Protection of Human Health and the Environment

Under Alternative 1, No Action, no active efforts will be made to remediate groundwater. Therefore, VOCs in groundwater will remain elevated and could continue to migrate further and pose a potential risk to human health and the environment.

Alternative 2 would use EISB to reduce VOC concentrations. Substrates would be injected into the existing injection well network at the Hi-Shear property. EISB has already been shown to work at the Hi-Shear portion of the Site and would be protective of human health and the environment downgradient of the barrier. Alternative 2, EISB, migrates reasonably well as the substrates and nutrients injected solubilize and move with water, providing good opportunities to effect treatment to areas downgradient and where fluid flow occurs.

Of the two alternatives evaluated, Alternative 2 provides the highest level of protection to human health and the environment.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1, No Action, does not actively reduce the toxicity, mobility, or volume of VOCs in groundwater. The VOCs will persist in groundwater for decades and will continue to pose an unacceptable potential risk to human health and the environment.

Alternative 2, EISB, will actively reduce the toxicity, mobility, or volume of VOCs in groundwater.

Short-Term Effectiveness

Alternatives 1, No Action, has poor short-term effectiveness because potential risks from VOCs in groundwater are not reduced. The length of time until protection is achieved would be decades under this alternative, and the HI-Shear Plume would continue to migrate, expand, and pose potential risks to receptors and resources.

Alternative 2, EISB, provides high short-term effectiveness as once implemented, would immediately begin to reduce high VOC concentrations in groundwater.

Long-Term Effectiveness

Alternatives 1, No Action, does not provide long-term effectiveness or a permanent remedy for elevated VOCs in groundwater.

Alternative 2, EISB, provides a moderate level of long-term effectiveness by reducing VOCs in groundwater. EISB injections will require repetition until VOC concentrations are reduced to acceptable levels. EISB provides good coverage due to its mobility with water and Hi-Shear has already installed many injection wells which are anticipated to be used repeatedly to effect EISB injections to maintain treatment.

6.3.2.2 Implementability

This section provides an evaluation of the technical and administrative feasibility of implementing the alternative and the materials and services that would be required for its implementation.

Technical Implementation Considerations

No technical implementation considerations are associated with Alternative 1, No Action, because no action is taken. Alternative 2 (EISB) is a technically feasible alternative that has been implemented at many other sites.

Administrative Feasibility

Permits will be required from the LARWQCB and City of Torrance to implement EISB injections, but these permits are common and pose no hinderance to implement this alternative. No Action poses no administrative obstacles for implementation.

State Acceptance

State acceptance of Alternative 1, No Action, is unlikely to be accepted, given no active efforts to minimize contaminated areas or migration pathways would be made. State acceptance of Alternative 2, EISB, is considered high since EISB has been used at the Site with success.

Community Acceptance

It is anticipated that Alternatives 2, EISB, would receive community acceptance; however, final acceptance will be determined following the community review and comment period following the completion of the RAW. No Action, Alternative 1, would not be expected to be accepted as this alternative does not abate the current threats to receptors or resources.

6.3.2.3 Cost

This section provides an evaluation of the costs associated with implementing the removal action alternatives. Cost estimates are based on currently available costs and approximate time and materials requirements developed for the sole purpose of comparing alternatives. The EE/CA cost estimates should not be considered design-level estimates. They are representative within −30 to +50 percent and were prepared with consideration to the guidance provided in the USEPA's "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (USEPA 2000).

There are no capital, operation, or maintenance costs associated with Alternative 1.

The estimated capital and abandonment cost to implement Alternative 2, EISB, is approximately $3,000,000 with another $600,000 for monitoring and oversight. The capital costs include the labor, equipment, and materials for EISB injections as well as an estimate of the professional and technical services necessary to support the implementation. The costs assume that the existing injection well network of 77 dual-nested injection wells on the Hi-Shear property will be used for injections and no new injection wells will be required and that these wells will be abandoned upon completion of the EISB treatment. The cost also assumes that four EISB injections on the Hi-Shear property (one 100-percent injection and three additional 50-percent injections). Further, the costs assumes that groundwater monitoring will be performed throughout the time of the assumed active treatment, covering 13 years, and that LARWQCB oversight and monitoring will be required throughout that period.

6.4 Recommended Removal Action Alternatives

The following subsections discuss the selected remedial alternative for the Plume Margin treatment and Hi-Shear Source area treatment to reduce groundwater VOC concentrations and to abate potential risks.

To abate the advance of the Plume Margin, an emplaced ZVI permeable reactive barrier with KB-1 Plus biological amendments along Crenshaw Boulevard will be constructed to treat and reduce VOCs in groundwater as they pass through the placed treatment barrier. Following construction of the barrier, groundwater monitoring will be performed to monitor effectiveness and evaluate residual potential risks during the assumed 15-year period of assumed active treatment.

To address the Hi-Shear Source area, four EISB injection events on the Hi-Shear property are assumed to be adequate and will be conducted to effect 13 years of active treatment. Once concentrations approach MCL concentrations, MNA should be adequate to achieve water quality objectives, or MCLs. The implementation assumes four EISB injections on the Hi-Shear property, one injection in all wells, followed by three additional injections in an estimated 50 percent of the wells to address the persistent DNAPL, along with 1 year of quarterly performance groundwater monitoring, followed by 2 years of bi-annual monitoring, and then annually for the remaining active treatment time.

The current monitoring being conducted by Hi-Shear is assumed to continue and augmented as indicted herein to be conducted by Hi-Shear during and following the performance monitoring periods.

These removal actions are designed to achieve the RAOs and the remedial goals, by abating further migration of the Hi-Shear Plume downgradient into the EA properties and into the residential areas of the City of Lomita, thus reducing the VI potential. and addressing the VOC adverse impacts on water quality. Below, the implementation of these selected removal actions is presented in greater detail.

6.4.1 Plume Margin

An emplaced ZVI barrier, which will be applied with some limited EISB substrate and biological enhancement, is the selected remedial alternative for establishment of the treatment barrier to minimize further migration of the Plume Margin and to remediate the regional groundwater as it is passing through the barrier. The biological component augments the ZVI for a limited time to assist in the placement of the ZVI which will form the main reductive barrier to limit the advancement of the Plume Margin. As concentrations in the plume reduce, MNA would be a reasonable last technology to apply to achieve MCLs. Based on the available data, the barrier will be installed along a 500-foot-long area along the west side of Crenshaw Boulevard, as shown on Figure 6. With adequate contact, ZVI effectively dechlorinates toxic contaminants (e.g., TCE and PCE) by chemical reduction to essentially nontoxic ethene.

Chemical reduction with ZVI involves delivery of micro-scale ZVI into the subsurface to contact VOCs in groundwater. Once emplaced into the subsurface, the ZVI produces hydrogen as it reacts (oxidizes) with the groundwater and aquifer media. Hydrogen released from the ZVI reaction destroys VOCs by displacing chlorine atoms on the VOC molecule with hydrogen atoms.

Once the barrier has been constructed, performance groundwater monitoring will be conducted by Hi-Shear during the period of assumed active treatment as indicated herein to quantify reduction of VOCs and evaluate the alternative’s performance. We assume that the existing groundwater monitoring program will continue to be conducted as augmented herein by Hi-Shear during and following the performance monitoring period.

The use of ZVI as a reactive barrier along Crenshaw Boulevard is intended to be long-lived line of defense against the further advancement of the VOC plume eastward toward the City of Lomita, while the remedy in the Hi-Shear Source area is being implemented and has been found to be effective. This reactive barrier would limit the potential for VI by treating high VOC concentrations in groundwater before migrating to the City of Lomita, while the upgradient sources and plume on and migrating from the Hi-Shear Property, are simultaneously abated.

The treatment of the Hi-Shear Plume Body beneath the EA Properties will be addressed in a separate subsequent RAW.

The ZVI barrier alternative for the Plume Margin is consistent with the NCP, the CWC, Resolution 92-49 and California Health and Safety Code §§ 25323 and 25323.1. Implementation of the ZVI barrier is described in more detail below. When fully implemented, the ZVI barrier should achieve the RAOs and the remedial goals.

6.4.2 Hi-Shear Source Area

EISB, followed by MNA, is the selected remedial alternative to address the Hi-Shear Source area. This substrate injection effort will be performed at the Hi-Shear Property using the previously installed 77 substrate injection wells placed by Hi-Shear for their pilot study. This alternative assumes four EISB injections on the Hi-Shear property, one injection in all wells, followed by three additional injections in an estimated 50 percent of the wells to address the persistent DNAPL, along with quarterly performance groundwater monitoring for the first year, 2 years of biannual monitoring, and then annually for the remainder of the estimated 13-year active treatment period.

EISB has been shown to be an effective remedy to address the regional groundwater VOC impacts at the Site. If properly implemented, EISB will address the DNAPL, treat the soluble VOCs in the regional aquifer on the Hi-Shear property, and limit additional VOC mass from migrating off the Hi-Shear property. Alta previously conducted a comprehensive investigation at the Site and performed feasibility studies, including an aquifer test (2013). At the Hi-Shear Property, Alta implemented EISB pilot tests in 2013 and 2015 (near well MW-15) and one injection event in 2017. The pilot tests and the 2017 injection event resulted in significant reduction of VOC concentrations in localized areas on the Hi-Shear Property. Most notably, at well MW-15, TCE concentrations were reduced from 56,000 µg/L in August 2011 to 22 µg/L in December 2019.

Based on the evaluation of remedial alternatives (Table 1), and Alta's localized success in remediating VOC-impacted groundwater through EISB, the use of the existing injection well network is recommended to further implement EISB remediation at the Hi-Shear Property. EISB on the Hi-Shear Property, combined with MNA, is expected to achieve the RAOs, be protective of human health and the environment, and lower the impact to the adjacent community more effectively than the other remedial action alternatives considered. ZVI was not selected for use on the Hi-Shear property, as it is most effectively used in a permeable reactive barrier constructed perpendicular to the groundwater gradient, allowing VOC-impacted groundwater to pass through and be reduced to non-toxic compounds.

The EISB removal action on the Hi-Shear property is consistent with the NCP, the CWC, Resolution 92-49 and California Health and Safety Code §§ 25323 and 25323.1. The implementation of EISB remediation is described in the following section. EISB will reduce concentrations of dissolved chlorinated VOCs in the groundwater and enhance the dissolution of DNAPL and achieve the RAOs and remedial goals over time.

7 Removal Action Implementation

The Hi-Shear Plume emanates from the Hi-Shear Property, migrates through the EA Properties and extends easterly into the City of Lomita. A combined EISB and chemical reduction with ZVI remedy will address the sources of VOCs in groundwater and mitigate the further migration of the Plume Margin east of Crenshaw Boulevard into the City of Lomita. Figure 2 shows the Site divided into two regions, designated as the Plume Margin ZVI Barrier and Hi-Shear Source area reduction, that will be targeted for treatment to attenuate the advance of the groundwater VOC plume and reduce overall VOC concentrations in groundwater in the following sequence:

1. **Plume Margin**– treatment of the leading margin of the plume to minimize the forward advance of the VOC plume, the highest concentrations of which are greater than 2,000 µg/L at monitoring well MW-20 (Figure 4), and the prevention of the continued migration of groundwater contamination east of Crenshaw Boulevard into the residential community within the City of Lomita, thereby reducing the VI potential, and over time, reducing VOC concentrations in regional groundwater east of Crenshaw to achieve the RAOs and the remedial goals.
2. **Hi-Shear Source Area**– treatment of the primary VOC source at the Hi-Shear Property, where VOC concentrations exceed 5,000 µg/L (e.g., monitoring well MW-18, Figure 4), thereby preventing the continued migration of VOCs into the regional aquifer from the Hi-Shear Property and into the EA Properties and east of Crenshaw Boulevard.

7.1 Plume Margin

This section provides an overview of the treatment technologies, design, and injection specifications.

7.1.1 Treatment Technologies

The ZVI Barrier is the forward component of the remedy, a reactive barrier that will reduce groundwater VOC concentrations along a transect oriented perpendicular to the VOC plume axis at Crenshaw Boulevard (Figure 6) depending on chemical reduction caused by ZVI placement as groundwater passes through the barrier to achieve MCLs over time and ensure the potential for VI is kept down to acceptable levels. Limited EISB substrate will also be applied during the placement of the ZVI, increasing the reductive conditions for a limited time. Chemical reduction with ZVI involves delivery of micro-scale ZVI into the subsurface to contact VOCs in groundwater. Once emplaced into the subsurface, the ZVI produces hydrogen as it reacts (oxidizes) with the groundwater and aquifer media. The hydrogen that is released from ZVI reactions destroys VOCs by displacing chlorine atoms on the VOC molecule with hydrogen atoms.

The use of ZVI, deployed as a reactive barrier along Crenshaw Boulevard, is intended to be a fast-acting and long-lived line of defense (likely 10 or more years) that will greatly diminish the ongoing migration of the VOC plume eastward into the City of Lomita, and eventually reducing the groundwater contamination concentrations to MCLs.

7.1.2 Design

Based on the available data, the ZVI Barrier will be constructed through the delivery of ZVI and KB-1 Plus bioaugmentation culture to accelerate and activate the ZVI reactivity amendments into a 25-foot-thick zone of contamination approximately 90 to 115 feet bgs. The EISB amendments will primarily serve as the media to transport the particulate ZVI in a slurry under high pressure injections to gain the desired distribution. As shown of Figure 6, the ZVI and amendment materials will be emplaced through a total of 28 injection points aligned over an estimated 500-foot transect to treat groundwater total VOC concentrations greater than 200 µg/L. Treatment at the threshold level greater than 200 µg/L of total VOCs along Crenshaw Boulevard will limit the advance of the portion of the groundwater plume that has the potential to create a future VI concern in the City of Lomita. Currently, three groundwater monitoring wells (MW-20, MW-21, and MW-23) are located along Crenshaw Boulevard proximal to the ZVI Barrier. The most recent groundwater TCE concentrations in these wells were 3,450, 6.3, and 32.5 µg/L, respectively. Due to the limited groundwater quality data along the proposed ZVI Barrier transect, it will be necessary to further improve the understanding of the north and south ends of the barrier where total VOC concentrations exceed 200 µg/L. This will be achieved by collecting confirmation groundwater samples during installation of the outmost injection wells. Based on the available data, the presumed layout of the 500-foot ZVI Barrier is an array of two rows of injection locations in the center 250 feet of the VOC plume and a single row of injection points extending the barrier 125 feet to the north and south. The sampling of wells will better inform the length and makeup of the ZVI Barrier.

The ZVI Barrier treatment media will be delivered to the target zone using a high-pressure hydraulic injection technique that creates sheet-like structures (i.e., propagations) that can be emplaced over predicable and measurable radii from the injection point. ZVI Barrier injections will create propagations with 15 feet radii. The injection layout spaces the injection points have been spaced to achieve a 30 percent overlap of the propagation radii along the single injection well row and 10 percent overlapping radii along the double row. Up to seven propagations will be emplaced at each injection to distribute the media vertically over the 25-foot-thick treatment zone.

In addition to the ZVI, the commercial bioaugmentation culture KB-1 Plus® and plant-based substrate (guar) will be used to form a slurry with the ZVI to be injected into the treatment zone to initially accelerate VOC degradation via metabolism of the organic substrates (guar) and reductive dechlorination of PCE and TCE to innocuous ethene. While the EISB substrate is being employed to place the ZVI, the design more fundamentally depends on the ZVI for long term performance, with the EISB component being used for its short-term benefits rather than simply water which provides less benefit to the treatment of VOCs.

7.1.3 Injection Specifications

The ZVI Barrier will be composed of 134 metric tons of ZVI to achieve a mass loading of 0.5 to 0.7 percent ZVI percent by dry weight soil. The ZVI will be injected under high pressure with 43 metric tons of sand in a water- and food-grade guar carrier fluid. In addition to the ZVI, 90 liters of the commercial bioaugmentation culture KB-1® will be injected to accelerate VOC degradation via metabolism of the guar and reductive dechlorination of VOCs to innocuous ethene.

The high-pressure injections will be conducted through 4-inch-diameter PVC casings installed to 115 feet bgs. The casings will be installed in an 8-inch-diameter borehole that will be advanced with sonic drilling technology. The boring annulus will be grouted to the surface with a cement-bentonite grout and the borehole will be completed with a traffic-rated flush-mount cover at the surface. The high-pressure injection tooling will be mobilized to each location and will emplace the propagations by shearing through the PVC casing wall and grouted annulus. The target radius of influence of the injection of 15 feet will be confirmed through continuous pressure logging at 10 percent of the injection locations using the methodology provided in Appendix B.

7.2 Hi-Shear Source Area

This section provides an overview of Hi-Shear Source area reduction EISB technology, design, and injection specifications.

7.2.1 EISB Technology

As discussed above, EISB involves delivery of organic substrates and bioaugmentation cultures to degrade VOCs via reductive dichlorination using Hi-Shear's already installed injection wells. For chloroethenes, the parent VOC (PCE) serves as an electron acceptor and is dechlorinated sequentially to daughter VOCs TCE, cis-1,2-DCE, VC, and finally, to ethene. Ethene can be further reduced to ethane (de Bruin et al. 1992). Most aquifer environments contain bacteria that are capable of reductively dechlorinating TCE to cis-1,2-DCE. Microorganisms that can mediate this reaction include *Desulfitobacterium*, *Dehalobacter restrictus*, *Desulfuromonas, Dehalospirillum multivorans*, and *Dhc ethenogenes* (Sholz-Muramatsu et al. 1995; Gerritse et al. 1996; Krumholz 1996; Maymo-Gatell et al. 1997; Löffler, Sun, and Tiedje 2000). However, only cultures that contain Dhc have been shown to dechlorinate cis-1,2-DCE and VC to ethene (Maymo-Gatell et al. 1997; Fennell et al. 2001; Duhamel et al. 2002; Lendvay et al. 2003). EISB was successfully deployed on the Hi-Shear property, suggesting that Dhc organisms are naturally present in the Site groundwater and that a second deployment of the EISB technology in the Hi-Shear Source area will further reduce the VOC source on the Hi-Shear Property to achieve the RAOs and the remedial goals.

7.2.2 Design

The limiting factor for microorganisms present in the Hi-Shear Source area to further degrade the Hi-Shear VOC source, is the strength of the Dhc population and availability of electron donors in the form of soluble organic carbon, which the microorganisms metabolize to create hydrogen. Dhc in engineered EISB systems requires a minimum of 100 milligrams per liter of total organic carbon (TOC) to sustain a robust biologically active zone. Therefore, the Hi-Shear Source area design will involve the delivery of electron donors and bioaugmentation culture through the existing network of Alta's 77 dual-nested wells at the Hi-Shear Property to reestablish and then maintain prolonged dechlorinating biological activity of the Hi-Shear VOC source. Prior to any injection work, all wells will need to be inspected for potential bio-fouling due to previous substrate injections. If needed, the injection wells will be developed prior to injections by using air or water jetting methods. A general construction diagram for the existing injection wells located on the Hi-Shear Property is included as Appendix C.

7.2.3 Injection Specifications

The Hi-Shear Source area injections will involve delivery of emulsified soybean oil and/or other organic substrates to achieve an injection TOC concentration range of 3,000 to 5,000 milligrams per liter to account for its dilution and dispersion throughout the Hi-Shear Source area after injections. The more highly concentrated emulsified soybean oil solution will be injected in the Hi-Shear Source area with the highest VOC concentrations. The existing injection wells at the Hi-Shear Property are dual-nested, the shallower of which are screened from 88 to 98 feet bgs, and the deeper screened from 103 to 113 feet bgs (Alta 2017).

Prior to injection, each of the existing injection wells on the Hi-Shear Property will be inspected for visual signs of biofouling or saponification of electron donor materials that were previously injected into them. If excessive biomass or precipitates are encountered, the injection well will be flagged for cleanout and redevelopment prior to use. The EISB amendments will include soybean oil, emulsifiers, nutrients, and other soluble organic carbon substrates that will be delivered to the Site in tanker trucks, intermediate bulk containers (totes), drums, and sacks and will be mixed on Site in designated mixing tanks (i.e., Baker tanks or similar). Based on prior injection work at the Hi-Shear Property, injection rates of 40 gallons per minute are possible in the treatment zone. Therefore, once mixed, the electron donor solutions will be manifolded and pumped under positive pressure into multiple existing injection wells. Injection pressures at the well head will be monitored and are not expected to exceed 40 pounds per square inch. To assess the radius of influence, the depth to water, pH, temperature, electrical conductivity, dissolved oxygen (DO), and oxygen reduction potential (ORP) will be measured in nearby injection and groundwater monitoring wells.

The electron donor specifics are described in Tables 2 and 3. The estimated injection rate is 5 to 20 gallons per minute per injection well.

A total of four Injections will be performed. The timing of the three subsequent injection events will be based on the results of the last sampling event following the prior injection.

7.3 Fieldwork Preparation and Permits

Permitting and pre-field work necessary to implement remedial action are described in the following sections and will be conducted during mobilization for the first injection event.

7.3.1 Permits

The City of Torrance will coordinate with their tenants for the field activities at their respective properties (Figure 2) for the ZVI Barrier. The ZVI Barrier will be installed along the western side of Crenshaw Boulevard, on City of Torrance property, but access will need to be obtained from the city's various tenants. Injection well permits from the Los Angeles County Department of Public Health's Drinking Water Program, as well as the City of Torrance, will be obtained for installation of injection wells. The injection program will be conducted under a LARWQCB WDR permit, which will be obtained prior to initiating the injection program.

The Hi-Shear Source area remedy will be implemented entirely on the Hi-Shear Property, where DNAPL and the most elevated TCE concentrations occur, using existing injection wells, thus using the prior Hi-Shear expenditure and requiring more limited coordination and permits from the regulatory agencies.

7.3.2 Health and Safety Plan Preparation

A site-specific Health and Safety Plan Preparation (HASP) will be prepared pursuant to Occupational Safety and Health Administration requirements (29 CFR §1910.120 and Title 8 California Code of Regulations §5192) for well installation, injection events, and the groundwater monitoring program. The HASP will include a description of potential contaminants and hazards, project contact information, personal protective equipment requirements, and the route to the nearest hospital with emergency room services. The HASP will be available at the Site during field work (drilling, well installation, injection, and sampling). Field staff and subcontractors will be required to read and sign the HASP and attend daily meetings.

7.3.3 Underground Service Alert and Subsurface Utility Survey

Prior to well installation activities, the locations of the injection wells will be marked, and DigAlert/ Underground Service Alert will be contacted. A list of the utility providers who will be notified will be provided by Underground Service Alert. In addition, a subsurface utility survey will be performed at each proposed injection location to clear for underground utilities.

7.3.4 Traffic Control

Temporary fencing, caution tape, and delineators will be used at each work area to identify the work exclusion zone. Traffic at the Site will be diverted to protect workers.

7.3.5 Investigation-Derived Waste

Investigation-derived waste (IDW) generated during injection well installation may include asphalt/concrete cores, soil cuttings, and water from development and equipment cleaning/decontamination activities. Solid IDW will be stored in roll-off bins. Representative samples of the IDW soil will be collected for waste profiling purposes. The soil is expected to be non-hazardous. Water IDW will be stored in Department of Transportation-approved 55-gallon drums and profiled. The IDW will be properly disposed as required by applicable regulations.

7.4 Injection Casing Installation and Surveying

The locations of the proposed Plume Margin injection casings are shown on Figure 6. Phase I injections will be performed through injection casings installed as described in Section 7.1.3.

The newly installed injection well casings will be surveyed by a State of California-licensed land surveyor. The survey will be relative to the nearest Los Angeles County Public Works benchmark. The northing and easting coordinates of the wells will be surveyed in accordance with the California State Plane (North American Datum of 1983) system and the vertical datum measured in feet above mean sea level.

8 WDR Groundwater Monitoring Program

Groundwater compliance monitoring will be conducted in accordance with the WDR permit (to be obtained prior to initiating injection activities). It is expected that WDR compliance groundwater monitoring will initially be conducted quarterly for 1 year, bi-annually for 2 years, and then annually thereafter as discussed in Section 8.1. Protocols for WDR groundwater compliance monitoring are described in Section 8.2. It is assumed that routine tri-annual groundwater monitoring will continue to be conducted separately by Hi-Shear.

8.1 WDR Permit Compliance Groundwater Monitoring

It is expected, at a minimum, that the new WDR permit will include requirements for the following analyses:

- VOCs by USEPA Method 8260;
- Dissolved gases (methane, ethene, ethane, and carbon dioxide) by Method RSK-175M;
- Sulfate/nitrate/chloride by USEPA Method 300;
- Dissolved iron by USEPA Method 6010B;
- Boron by USEPA Method 200.7;
- Total dissolved solids by Standard Method 2540C;
- TOC by Standard Method 5310D;
- Total alkalinity/carbonate/bicarbonate (each as calcium carbonate) by Standard Method 2320B; and
- Dhc by polymerase chain reaction methodology.

In addition, Terraphase assumes that the LARWQCB will request that up to 15 groundwater monitoring wells be sampled, 8 groundwater monitoring events will be required, and WDR monitoring events will be performed by Hi-Shear concurrently with remedy performance monitoring.

8.2 WDR Groundwater Monitoring Protocols

WDR groundwater compliance monitoring will be conducted in general accordance with USEPA's *Low Stress Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells*, dated July 30, 1996, revised January 19, 2010. At each quarterly WDR event, the depth to water will be measured prior to purging activities. During purging, the groundwater at each well will be monitored for pH, temperature, electrical conductivity, turbidity, DO, and ORP using a multimeter and a flow-through cell. When the groundwater parameters have stabilized, or three consecutive readings are within at least 10 percent, groundwater samples will be collected into laboratory-provided sample bottles for the analytes listed in Section 8.1. In addition, field quality control samples will be collected. Sample bottles will be labeled and immediately placed into a cooler with ice under chain-of-custody procedures. Equipment used (such as submersible pumps and well sounders) will be decontaminated prior to reuse. Groundwater samples for bioassay analyses will be to a specialty laboratory. All other groundwater samples will be submitted to a California-certified laboratory.

9 Public Participation/Community Involvement

In compliance with LARWQCB requirements and community involvement (NCP Criteria No. 9 – Community Acceptance), the groundwater RAW should be subject to a 30-day public comment period. A notice of the availability of the RAW for public review and comment will be submitted to the LARWQCB for approval. The approved notice will be published and sent to the LARWQCB-required mailing list recipients. The RAW and other supporting documents will be available at the LARWQCB's office and in the local information repository. Once the public comment period is completed, the LARWQCB will review and respond to comments. The RAW will be revised, as necessary.

10 Reporting

While the WDR permit is in effect, quarterly (or as required) WDR reports will be submitted to the LARWQCB in accordance with the new WDR permit. Remedial progress reports will be submitted to the LARWQCB as a part of the groundwater monitoring reporting and will include a progress evaluation of the remediation efforts.

Upon completion of the first injection event, a report documenting the field activities will be prepared, which will include the details of injection well installation and the implementation of the first injection event (volumes, flow rates, and pressures).

Following installation of the ZVI barrier, implementation of the first round of injections within the Hi-Shear Source area, and completion of four rounds of groundwater monitoring, the groundwater results will be evaluated to assess the effectiveness of the remedies. Remedy effectiveness will consider:

- VOC degradation and by-products (cis-1,2-DCE, VC, and ethene [the end by-product]) concentrations; and
- Increases/decreases in concentration of dissolved gas (methane, ethane, and ethene), carbon dioxide (a byproduct of microbe respiration), TOC, availability of microorganisms as an electron donor for the degradation process (DO and ORP), and nitrate, dissolved iron, and sulfate.

Based on the evaluation of the effectiveness of the remedies, if appropriate, an HHRA will be performed to determine current risk levels and inform additional remediation, if warranted. Based on the results of the HHRA, as discussed above, additional injections will likely need to be performed in the Hi-Shear Source area and additional WDR groundwater monitoring will be conducted. The groundwater monitoring results will be evaluated for the appropriateness of requesting regional groundwater closure.

11 Cost and Schedule

This section presents the remedial action estimated cost and schedule. The estimated costs assume that the tri-annual groundwater monitoring required by the LARWQCB will continue to be conducted by Hi-Shear.

11.1 Cost

The estimated cost to implement the Plume Margin Barrier alternative is approximately $2,000,000 (capital and well abandonment) with an additional $600,000 for monitoring and oversight over the presumed 15-year period of active treatment. This cost includes permitting, baseline groundwater sampling, ZVI barrier installation, post-installation groundwater monitoring, well abandonment, and LARWQCB oversight.

The estimated cost to implement the Hi-Shear Source EISB injections is approximately $3,000,000 with an additional $600,000 for monitoring and oversight. This cost includes permitting, four injections (delivery of electron donor and bioaugmentation and well abandonment), and 13 years of monitoring and oversight.

The estimated costs for each alternative are presented in Tables 4 and 5.

11.2 Schedule

The following presents a generalized project schedule. The project schedule is presented on Figure 7.

- **ZVI Barrier (at Crenshaw)**
  - Permitting and contracting – 2 months after LARWQCB approval
  - Injection casing installation – 6 weeks
  - Material staging – 2 weeks
  - Injection – 1 month
  - Post-injection sampling – 15 years (4 quarterly events, 4 bi-annual events and annual thereafter)
  - Additional injections – unnecessary
- **Hi-Shear Source Area EISB Injections**
  - Permitting and contracting – 2 months after LARWQCB approval
  - Baseline groundwater sampling – 1 week
  - Redevelop 77 existing injection wells – 1 month
  - Material staging – 3 weeks
  - Initial Injections – 7 weeks

- Post-injection sampling – 4 quarterly events, 4 bi-annual events and 10 years of annual monitoring thereafter.
- A total of four (4) Injections will be performed. The timing of subsequent injection events will be based on the results of the fourth quarterly sampling event following the initial injections.

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Tables

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2 Hi-Shear EISB Injection Well Volumes
3 Hi-Shear EISB Injection Product Quantities
4 ZVI Barrier Cost Estimate
5 EISB Cost Estimate

Table 1
Summary Evaluation of Remedial Technologies
Skypark Commercial and Lomita Properties
24701 - 24777 Crenshaw Blvd and 2530, 2540, and 2600 Skypark Dr, Torrance, CA
and East of Crenshaw Blvd Property, Lomita, CA

Alternative	Threshold Criteria[1]		Primary Balancing Criteria[1]					Modifying Criteria[1]		Alternative Retained	Summary
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9		
	Overall Protection of Human Health and the Environment	**Compliance with Remedial Action Objectives (RAOs)[2]**	**Long-Term Effectiveness and Permanence**	**Reduction of Toxicity, Mobility, or Volume through Treatment**	**Short-Term Effectiveness**	**Implementability**	**Cost[3]**	**State Acceptance**	**Community Acceptance**		
Plume Margin Alternatives- Section 6.3.1											
Section 6.1.1 No Action	Will not be protective of human health and the environment.	Will not achieve water quality objectives within a reasonable time period and will not minimize potential to cause vapor intrusion risk.	Not effective as groundwater will exceed water quality objectives for decades and potential for vapor intrusion will not be mitigated.	Will not reduce the toxicity, mobility, and volume of the volatile organic compounds (VOCs) in groundwater within a reasonable timeframe.	Not effective, as RAOs would not be achieved.	Implementable.	negligible	Will not be accepted by RWQCB since water quality objectives will not be achieved in a reasonable time frame and vapor intrusion risks will not be addressed.	Will not be accepted since water quality objectives will not be achieved in a reasonable time frame and vapor intrusion risks will not be addressed.		Will not be accepted by RWQCB based on elevated groundwater concentrations, water quality objectives not being met in a reasonable timeframe and vapor intrusion risks not being addressed. This alternative is not retained.
Section 6.1.3 Enhanced In-Situ Bioremediation (EISB)	Effective in treating the groundwater plume and will provide protection of human health and the environment.	If implemented correctly, would reduce VOCs to attain both water quality objective RAOs and to diminish potential for vapor intrusion risks.	If this technology were applied to the entire plume area, long-term permanence could be achieved. Less effective in areas where DNAPL is present.	EISB would result in reduction of toxicity, mobility, and volume of VOCs in the groundwater. Would be less effective in areas where DNAPL was identified.	EISB meets short-term effectiveness as it enhances the dichlorination of the VOC- impacted groundwater.	Moderately Implementable	$3,200,000	A proven technology that has already been implemented at the Site. Will likely be accepted.	Will likely be accepted.	✓	EISB has been successful in the previous localized applications at the Site for the regional groundwater plume, but has not been used as a reductive barrier. EISB injections would be required regularly, every 3 years, to maintain a barrier.
Section 6.1.4 Emplaced Zero-Valent Iron (ZVI) Barrier	Effective in treating the groundwater plume and limiting high VOC concentrations from migrating east of Crenshaw Boulevard. Will reduce potential of vapor intrusion in residential areas and will provide protection of human health and the environment.	If implemented correctly, would reduce VOCs in groundwater downgradient of the barrier to attain both water quality objective RAOs and to reduce potential for vapor intrusion risks.	Zero-valent iron is proven to reductively dechlorinate TCE and PCE and can be effective up to about 15 years .	The ZVI barrier would result in reduction of toxicity, mobility, and volume of VOCs in the groundwater. This is less effective for NAPL.	The ZVI barrier provides short-term effectiveness as it causes the dechlorination of the VOC- impacted groundwater.	Highly Implementable	$2,600,000	A proven technology and will likely be accepted.	Will likely be accepted.	✓	ZVI is used widely to effectively dechlorinate VOCs such at PCE and TCE to essentially non-toxic compounds ethane and ethane.

Table 1
Summary Evaluation of Remedial Technologies
Skypark Commercial and Lomita Properties
24701 - 24777 Crenshaw Blvd and 2530, 2540, and 2600 Skypark Dr, Torrance, CA
and East of Crenshaw Blvd Property, Lomita, CA

Alternative	Threshold Criteria[1]		Primary Balancing Criteria[1]					Modifying Criteria[1]		Alternative Retained	Summary
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9		
	Overall Protection of Human Health and the Environment	Compliance with Remedial Action Objectives (RAOs)[2]	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Cost[3]	State Acceptance	Community Acceptance		
Hi-Shear Source Alternatives											
Section 6.2.1 No Action	Will not be protective of human health and the environment.	Will not achieve water quality objectives within a reasonable time period and will not minimize potential to cause vapor intrusion risk.	Not effective as groundwater will exceed water quality objectives for decades and potential for vapor intrusion will not be mitigated.	Will not reduce the toxicity, mobility, and volume of VOCs in groundwater within a reasonable timeframe.	Not effective, as RAOs would not be achieved.	Implementable.	negligible	Will not be accepted by RWQCB since water quality objectives will not be achieved in a reasonable time frame and vapor intrusion risks will not be addressed.	Will not be accepted since water quality objectives will not be achieved in a reasonable time frame and vapor intrusion risks will not be addressed.		Will not be accepted by RWQCB based on elevated groundwater concentrations, water quality objectives not being met in a reasonable timeframe and vapor intrusion risks not being addressed. This alternative is not retained.
Section 6.2.6 Enhanced In-Situ Bioremediation (EISB)	Effective in treating the groundwater plume and will provide protection of human health and the environment.	If implemented correctly, would reduce VOCs to attain both water quality objective RAOs and to diminish potential for vapor intrusion risks.	If this technology were applied to the entire plume area, long-term permanence could be achieved. Requires long-term repetitive applications in areas where DNAPL is present.	EISB would result in reduction of toxicity, mobility, and volume of VOCs in the groundwater. Repetitive long-term applications required in areas where DNAPL was identified.	EISB meets short-term effectiveness as it enhances the dechlorination of the VOC- impacted groundwater.	Highly Implementable	$3,600,000	A proven technology that has already been implemented at the Site. Will likely be accepted.	Will likely be accepted.	✓	EISB has been successful in the previous localized applications at the Site. May require numerous applications where DNAPL is present.

1. Criteria are based on those described in the National Oil and Hazardous Substances Pollution Contingency Plan, Title 40 Code of Federal Regulations Section 300.415 (NCP).
2. The remedial objectives are relevant to this evaluation and are considered herein.

Table 2

Hi-Shear EISB Injection Well Volumes

Skypark Commercial and Lomita Properties

24701 - 24777 Crenshaw Blvd and 2530, 2540, and 2600 Skypark Dr, Torrance, CA

and East of Crenshaw Blvd Property, Lomita, CA

EISB Injection Well Screens [1]	Total Injection Well Screened Length	Pore Volume[2]
Quantity	Feet	Gallons
110 (above 10 mg/L TCE (2017)	10 (88-98 and 103-113)	1,163,287
40 (below 10 mg/L TCE (2017)	10 (88-98 and 103-113)	423,013
2 (above 10 mg/L TCE (2017)	25 (87-102)	52,877
Totals		
152 “screens” (75 nested wells + 2)	1,550 linear feet	1,639,177

Notes:

[1] Total screened intervals for nested extraction wells on the Hi-Shear Property

[2] Well diameter and 20% effective porosity used to calculate pore volume

EISB = Enhanced In-situ Bioremediation

mg/L = milligrams per liter

TCE = trichloroethene

Table 3
Hi-Shear EISB Injection Product Quantities
Skypark Commercial and Lomita Properties
24701 - 24777 Crenshaw Blvd and 2530, 2540, and 2600 Skypark Dr, Torrance, CA
and East of Crenshaw Blvd Property, Lomita, CA

Number of Injection Wells	EDS-ER (soybean-oil based)	EDS-Activator (alkaline + donor)	Substrate Shuttle (alcohol based)	TersOx Nutrients-QR	Total Injection Volume
	Pounds (@ 6.4 g/L)	Pounds (@ 1.2 g/L)	Pounds(@ 0.3 g/L)	Pounds(@ 0.1 g/L)	Gal
110	62,594 (8,153 gal)	11,444 (1,652 gal)	3,275 (499 gal)	976	517,000 (4,700 gal/pt, 10-ft ROI)
40	22,761 (2,965 gal)	4,161 (601 gal)	1,191 (182 gal)	355	188,000 (4,700 gal/pt, 10-ft ROI)
2	2,845 (371 gal)	520 (75 gal)	149 (23 gal)	44	19,500 (9,750 gal/pt, 9-ft ROI)
Totals					
152	88,200 (11,488 gal)	16,125 (2,328 gal)	4,615 (704 gal)	1,375	724,500 (~44% pore volume replacement)

Notes:
EDS-ER = Electron Donor Solution – Extended Release
EISB = Enhanced In-situ Bioremediation
ft = feet
g/L = gram per liter
gal = gallon
gal/pt = gallon per point
ROI = radius of influence

Table 4
Plume Margin Barrier Cost Estimate
Skypark Commercial and Lomita Properties
24701 - 24777 Crenshaw Blvd and 2530, 2540, and 2600 Skypark Dr, Torrance, CA
and East of Crenshaw Blvd Property, Lomita, CA

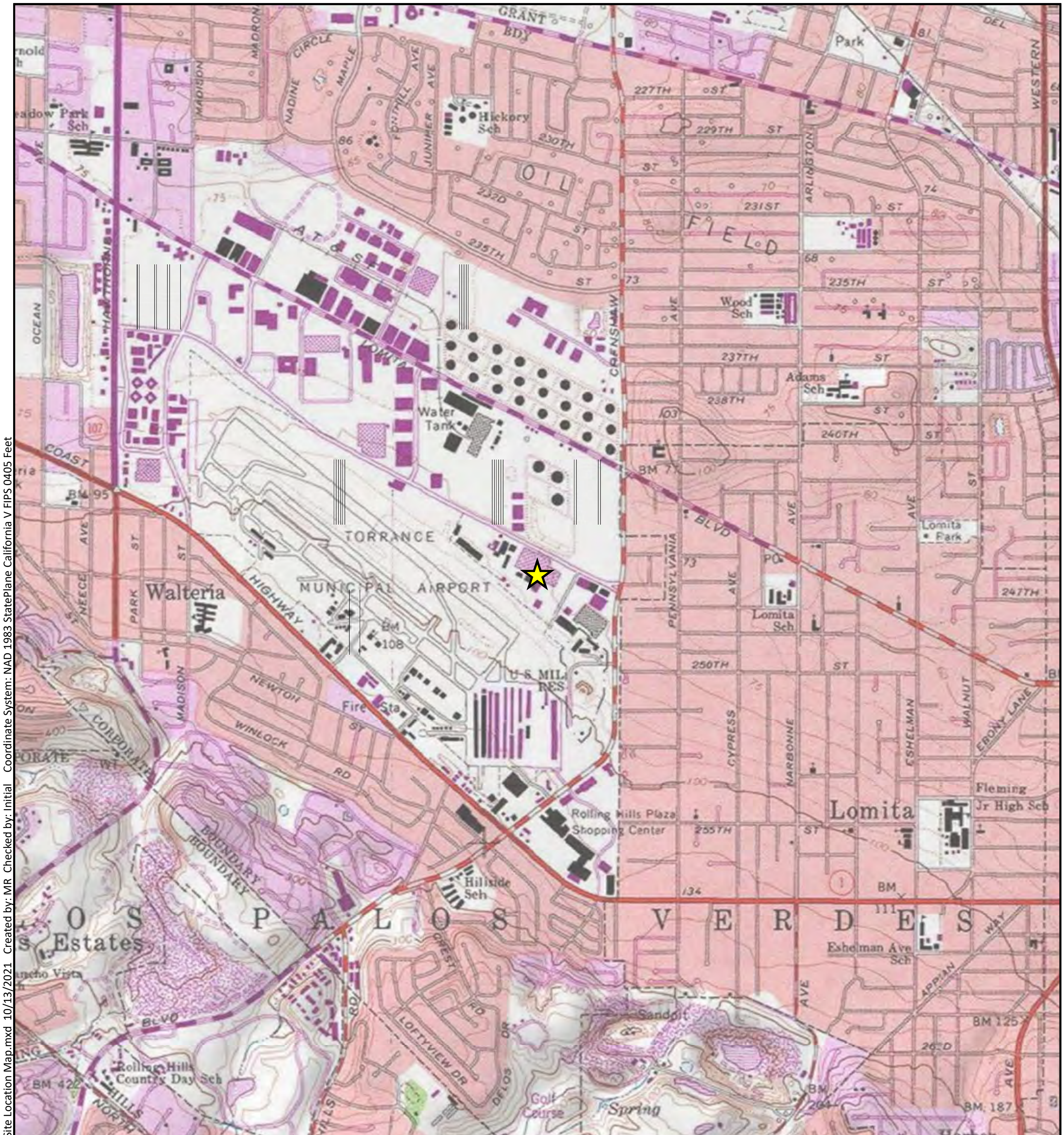
Line Item	Estimated Unit Cost ($)	Estimated Quantity	Units	Subtotal	Notes and Assumptions
Regulatory, permitting, design and project management	$50,000	Plu	lump sum	$50,000	-
Drilling and zero-valent iron placement	$20,000.00	78	days	$1,560,000	Permeable reactive barrier length = 500 feet. 25 drilling and zero-valent iron injection loctions.
Labor	$2,000	90	days	$180,000	Assume 75 injection field days and 15 days equipment setup and mob/demob
RWQCB Oversight	$5,000	15	year	$75,000	LARWQCB oversight for 15 years
Monitoring and Sampling	$26,000	20	event	$520,000	13 monitoring wells, $2,000/well, 8 events in 1st 3 yrs. then annual for 12 additional yrs.
Well abandonment	$4,100	44	well	$180,400	Abandon after active treatment completed
Total				**$2,565,400**	**-**

Table 5
Hi-Shear Source Cost Estimate
Skypark Commercial and Lomita Properties
24701 - 24777 Crenshaw Blvd and 2530, 2540, and 2600 Skypark Dr, Torrance, CA
and East of Crenshaw Blvd Property, Lomita, CA

Line Item	Estimated Unit Cost ($)	Estimated Quantity	Units	Subtotal	Notes and Assumptions
Regulatory, permitting, design and project management	$50,000	-	lump sum	$50,000	-
First Injection Event	$913,200	1	event	$913,200	
Injection equipment	$400,000	1	lump sum	$400,000	-
LARWQCB Oversight	$7,500	13	year	$97,500	LARWQCB oversight for 13 years
Monitoring and Sampling	$25,000	19	event	$475,000	13 monitoring wells, $2,000/well, 8 events in 3 yrs., then annual for 11 yrs.
Additional injection event	$456,600	3	event	$1,369,800	Half the scope of the initial injection
Well Abandonment	$4,100	77	injection well	$315,700	Overdrill each existing nested injection well
Total				**$3,621,200**	**-**

Figures

1 Site Location Map
2 Plume Margin and High-Shear Remediation Areas
3 Shallow Hydraulic Head Contours
4 PCE and TCE Groundwater Concentrations
5 High-Shear Injection Well Locations
6 Plume Margin ZVI Barrier
7 Project Schedule



0 2,000 4,000 Feet

1 inch = 2,000 feet

N

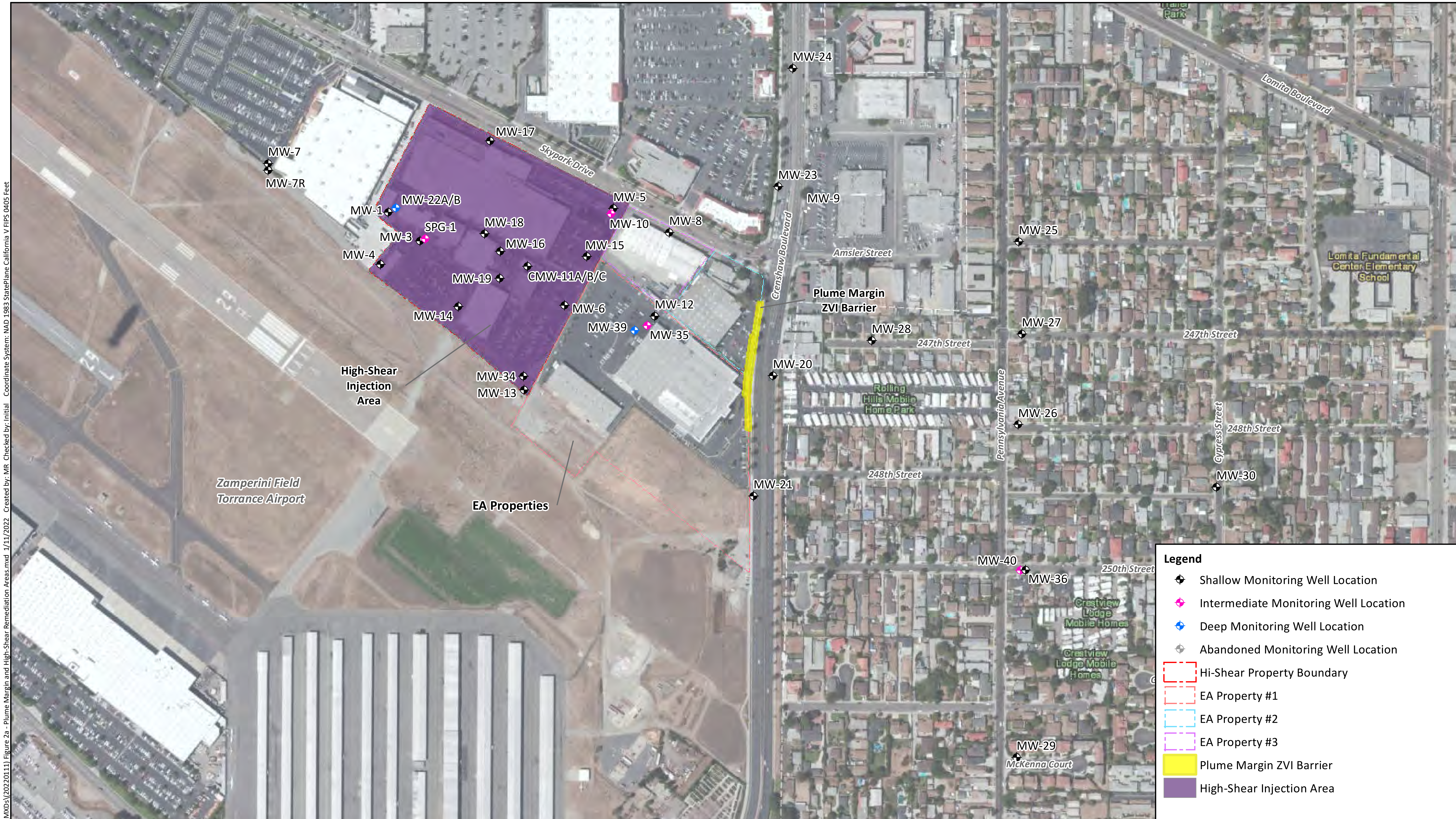
Legend

Site Location

Base Map: USGS Torrance (1981) 7.5 Minute Quadrangle

SAFETY FIRST	CLIENT: Rutan & Tucker	**Site Location Map**
terraphase engineering	PROJECT: Hi-Shear	
	PROJECT NUMBER: S042.002.002	**FIGURE 1**

File: N:\GIS\Prj\S042.002_HiShear\MXDs\(20211013) Figure 1 - Site Location Map.mxd 10/13/2021 Created by: MR Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS

0 175 350 525 700 Feet

1 inch = 350 feet

N

SAFETY FIRST

terraphase engineering

CLIENT: Rutan & Tucker

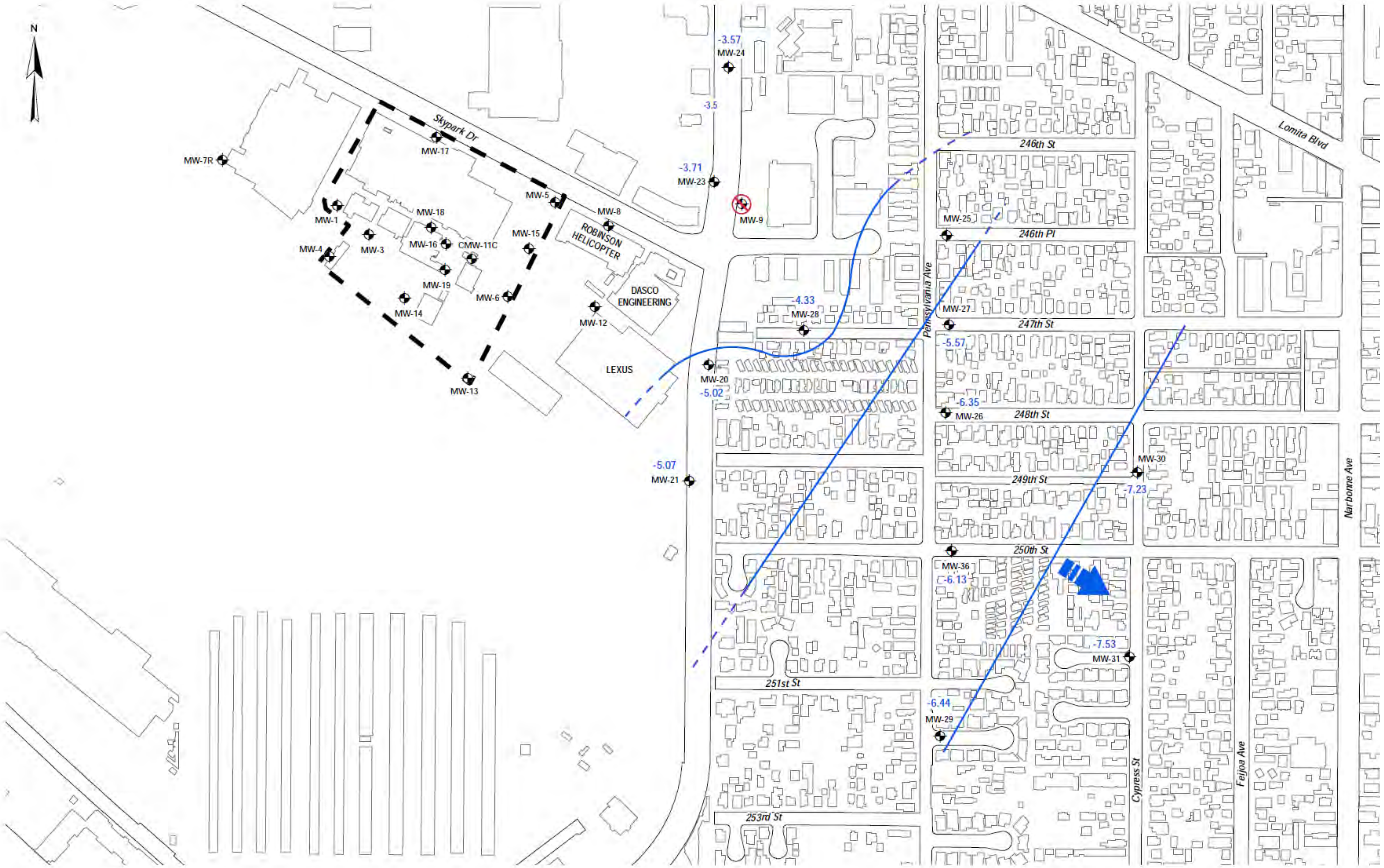
PROJECT: Hi-Shear

PROJECT NUMBER: S042.002.002

Plume Margin and High-Shear Remediation Areas

FIGURE 2

File: N:\GIS\Prj\S042.002_HiShear\MXDs\(20220111) Figure 2a - Plume Margin and High-Shear Remediation Areas.mxd 1/11/2022 Created by: MR Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Legend:

- Shallow Monitoring Well Location
- Abandoned Monitoring Well Location
- -5.07 Groundwater Elevation in Feet
- Groundwater Elevation Contour
- Groundwater Flow Direction

0 200 400 800
Scale in Feet

Note:

Figure provided by Genesis Engineering & Redevelopment Report dated 2021 February 18.

SAFETY FIRST	CLIENT: Rutan & Tucker	Shallow Hydraulic Head Contours
terraphase engineering	PROJECT: Hi-Shear	
	PROJECT NUMBER: S042.002.002	FIGURE 3

File: N:\GIS\Prj\S042.002_HiShear\MXDs\(20220112) Figure 4 - PCE and TCE Groundwater Concentrations.mxd 1/12/2022 Created by: MR Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 175 350 525 700 Feet

1 inch = 350 feet

N

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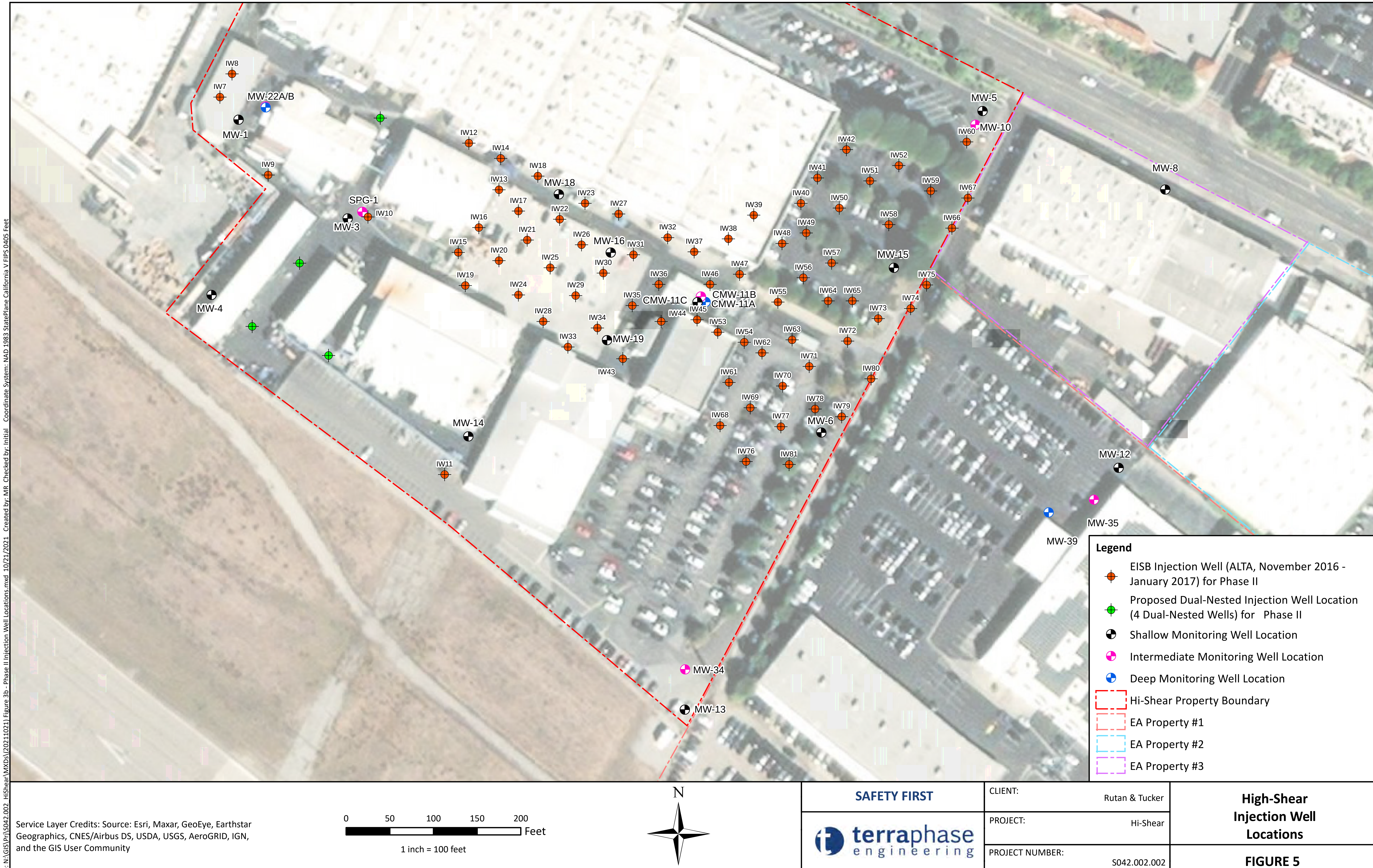
terraphase engineering

CLIENT:	Rutan & Tucker
PROJECT:	Hi-Shear
PROJECT NUMBER:	S042.002.002

PCE and TCE Groundwater Concentrations

FIGURE 4



File: N:\GIS\Prj\S042.002_HiShear\MXDs\(20211021) Figure 3b - Phase II Injection Well Locations.mxd 10/21/2021 Created by: MR Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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CLIENT:	Rutan & Tucker
PROJECT:	Hi-Shear
PROJECT NUMBER:	S042.002.002

High-Shear Injection Well Locations

FIGURE 5

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 50 100 150 200 Feet

1 inch = 100 feet

N

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CLIENT:	Rutan & Tucker
PROJECT:	Hi-Shear
PROJECT NUMBER:	S042.002.002

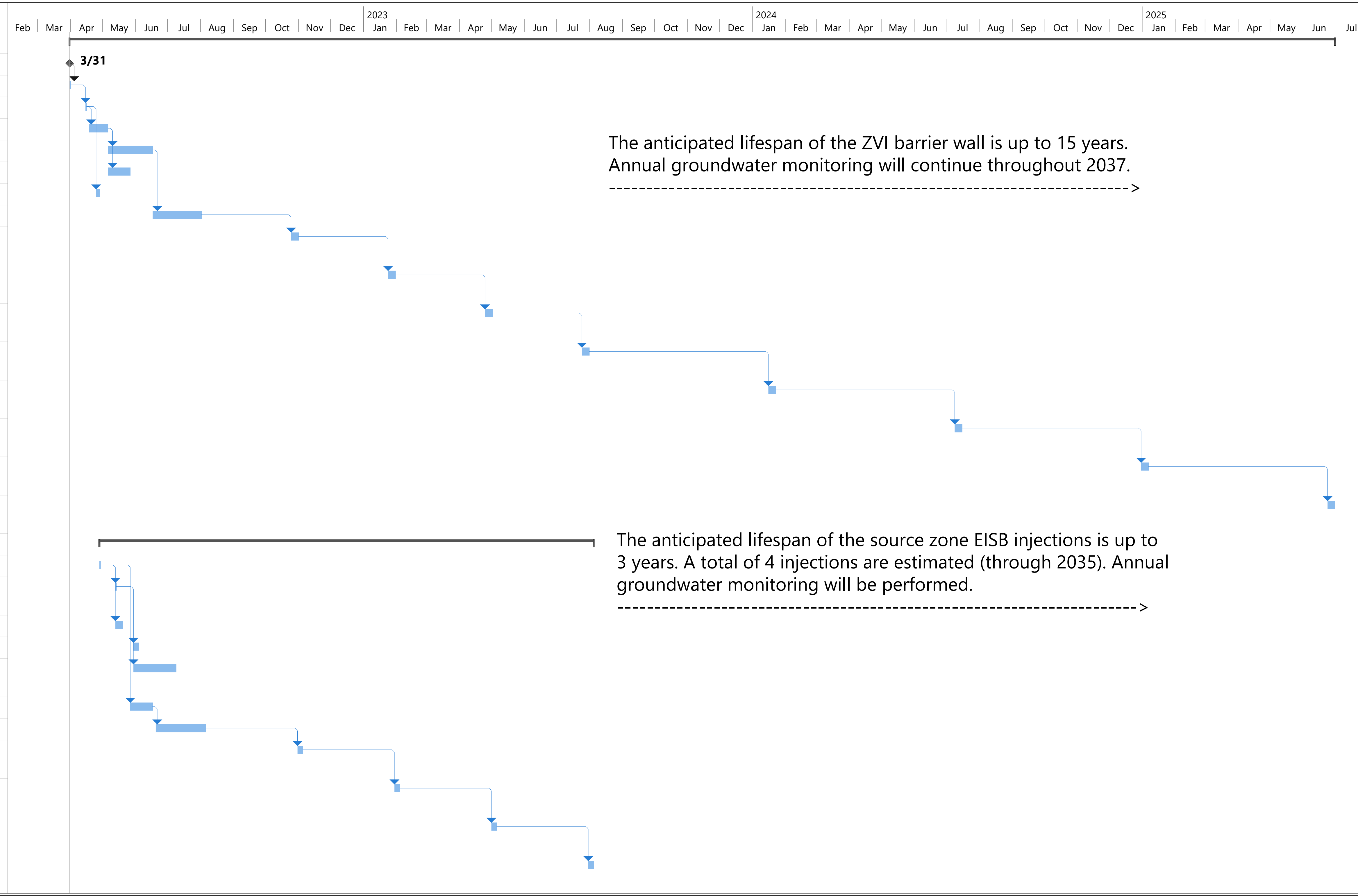
Plume Margin ZVI Barrier

FIGURE 6

File: N:\GIS\Prj\S042.002_HiShear\MXDs\(20220111) Figure 6 - Plume Margin ZVI Barrier.mxd 1/11/2022 Created by: MR Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

Figure 7 - Project Schedule
Groundwater Removal Action Workplan
Skypark Commercial and Lomita Properties

ID	Task Name	Duration	Start
1	**Plume Margin Barrier**	**848 days**	**Thu 3/31/22**
2	Water Board Approval	0 days	Thu 3/31/22
3	WDR Permit Application approval	1 day	Thu 3/31/22
4	Well installation permit approval	1 day	Fri 4/15/22
5	Contracting	14 days	Mon 4/18/22
6	Well Installation	6 wks	Fri 5/6/22
7	Obtain injection materials	3 wks	Fri 5/6/22
8	Baseline groundwater sampling	3 days	Mon 4/25/22
9	Injection	32 days	Fri 6/17/22
10	Quarterly Post-Injection groundwater monitoring 1	1 wk	Tue 10/25/22
11	Quarterly Post-Injection groundwater monitoring 2	1 wk	Tue 1/24/23
12	Quarterly Post-Injection groundwater monitoring 3	1 wk	Tue 4/25/23
13	Quarterly Post-Injection groundwater monitoring 4	1 wk	Tue 7/25/23
14	Semi-Annual Post-Injection groundwater monitoring 1	1 wk	Tue 1/16/24
15	Semi-Annual Post-Injection groundwater monitoring 2	1 wk	Tue 7/9/24
16	Semi-Annual Post-Injection groundwater monitoring 3	1 wk	Tue 12/31/24
17	Semi-Annual Post-Injection groundwater monitoring 4	1 wk	Tue 6/24/25
18	**Hi-Shear Source Injections**	**332 days**	**Thu 4/28/22**
19	Start Phase II	1 day	Thu 4/28/22
20	WDR Permit Application or Modification approval	1 day	Fri 5/13/22
21	Contracting	1 wk	Fri 5/13/22
22	Baseline GW sampling	1 wk	Mon 5/30/22
23	Redevelopment of existing injection wells	30 days	Mon 5/30/22
24	Obtain injection materials	3 wks	Fri 5/27/22
25	Injection*	7 wks	Mon 6/20/22
26	Quarterly Post-Injection groundwater monitoring 1	1 wk	Mon 10/31/22
27	Quarterly Post-Injection groundwater monitoring 2	1 wk	Mon 1/30/23
28	Quarterly Post-Injection groundwater monitoring 3	1 wk	Mon 5/1/23
29	Quarterly Post-Injection groundwater monitoring 4	1 wk	Mon 7/31/23



Project: Figure 7 - Project Sche
Date: Wed 1/12/22

Task		Summary		Inactive Milestone		Duration-only		Start-only		External Milestone		Manual Progress	
Split		Project Summary		Inactive Summary		Manual Summary Rollup		Finish-only		Deadline			
Milestone		Inactive Task		Manual Task		Manual Summary		External Tasks		Progress			

* A total of four (4) Injections will be performed through 2032. The timing of subsequent injection events will be based on the results of the last sampling event.

Appendix A

Groundwater Monitoring Well Data Tables (GE&R 2021)

GENESIS ENGINEERING & REDEVELOPMENT

Table 1

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report
Monitoring Well Construction Details

Well ID	Year Installed	Screened Interval (*feet bgs*)	Casing Diameter (*inches*)	TOC Elevation (*ft-amsl*)
Shallow Monitoring Wells				
MW-1	1991	90-115	2	84.64
MW-2	1991		Abandoned	
MW-3	1991	96-116	2	84.28
MW-4	1991	91-111	2	85.50
MW-5	1992	95-115	2	80.35
MW-6	1992	95-115	2	82.28
MW-7	1992		Abandoned	
MW-7R	2007	90-115	2	85.94
MW-8	1992	95-120	2	80.74
MW-9	1993		Abandoned	
CMW-11C	before 2003	110-115	2	82.50
MW-12	2001	90-115	2	82.36
MW-13	2009	90-115	4	87.78
MW-14	2009	85-110	4	85.40
MW-15	2009	85-110	4	81.24
MW-16	2009	85-110	4	83.25
MW-17	2009	85-110	4	82.14
MW-18	2009	88-113	4	82.74
MW-19	2009	85-110	4	83.74
MW-20	2015	79-109	4	79.49
MW-21	2015	84-114	4	82.60
MW-23	2015	78-108	4	77.9
MW-24	2015	80-110	4	78.82
MW-25	2016	77-107	4	72.69
MW-26	2016	80-110	4	76.07
MW-27	2016	80-110	4	73.85
MW-28	2016	79.5-109.5	4	75.88
MW-29	2019	91.5-105	2	90.44
MW-30	2019	80-95	2	74.76
MW-31	2019	91-101	2	80.78
MW-36	2019	85-100	2	81.42
Intermediate Monitoring Wells				
MW-10	1996	126-146	2	80.96
CMW-11B	before 2003	145-150	2	82.35
MW-22B	2015	182.5-187.5	2	84.41
SPG-1	1996	127-129	2	83.62
MW-34	2019	140-150	2	87.56
MW-35	2019	140-150	2	83.36
MW-40	2019	140-150	2	81.49
Deep Monitoring Wells				
CMW-11A	before 2003	280-285	2	82.42
MW-22A	2015	260-265	2	84.44
MW-39	2020	240-250	4	83.13

Notes:

- "feet bgs" - Feet below the ground surface
- "feet amsl" - Feet above mean sea level

GENESIS ENGINEERING & REDEVELOPMENT

Table 2

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (°C)
MW-1	82.17	3/26/07	120.00	92.10	-9.93	--	--	--	--	--	--
		10/26/07	120.00	91.65	-9.48	--	--	--	--	--	--
		2/20/08	120.00	91.27	-9.10	--	--	--	--	--	--
		7/18/08	120.00	91.08	-8.91	--	--	--	--	--	--
		10/31/08	120.00	91.05	-8.88	--	--	--	--	--	--
		2/23/09	113.06	90.87	-8.70	--	--	--	--	--	--
		8/18/09	113.06	91.04	-8.87	--	--	--	--	--	--
		11/20/09	113.06	91.27	-9.10	--	--	--	--	--	--
	84.64	3/31/10	113.27	90.80	-6.17	--	--	--	--	--	--
		8/4/10	113.15	90.80	-6.17	--	--	--	--	--	--
		11/17/10	113.15	90.69	-6.06	--	--	--	--	--	--
		3/30/11	113.76	90.83	-6.20	--	--	--	--	--	--
		8/17/11	113.38	90.39	-5.76	--	--	--	--	--	--
		12/20/11	113.19	90.63	-6.00	--	--	--	--	--	--
		3/27/12	113.35	90.80	-6.17	--	--	--	--	--	--
		7/27/12	113.28	90.90	-6.27	--	--	--	--	--	--
		11/1/12	113.28	90.96	-6.33	--	--	--	--	--	--
		3/26/13	113.10	90.92	-6.28	--	--	--	--	--	--
		7/23/13	113.43	91.17	-6.53	--	--	--	--	--	--
		12/4/13	113.22	91.07	-6.43	--	--	--	--	--	--
		3/19/14	113.34	90.98	-6.34	--	--	--	--	--	--
		8/7/14	113.19	90.63	-5.99	--	--	--	--	--	--
		12/9/14	113.18	90.63	-5.99	--	--	--	--	--	--
		3/25/15	113.20	90.48	-5.84	--	--	--	--	--	--
		7/29/15	113.33	90.66	-6.02	--	--	--	--	--	--
		11/23/15	113.30	90.71	-6.07	--	--	--	--	--	--
		3/28/16	112.88	90.67	-6.03	--	--	--	--	--	--
		7/28/16	113.37	90.45	-5.81	--	--	--	--	--	--
		11/16/16	113.09	90.20	-5.56	--	--	--	--	--	--
		3/20/17	113.02	89.81	-5.17	--	--	--	--	--	--
		7/20/17	113.08	89.48	-4.84	--	--	--	--	--	--
		11/16/17	113.11	89.20	-4.56	--	--	--	--	--	--
		3/15/18	113.21	88.75	-4.11	0.37	-3.5	48.3	1353	7.02	24.2
		8/15/18	128.50	88.50	-3.86	0.81	-66	13.2	1270	7.38	26.26
		7/31/19	113.17	87.91	-3.27	0.52	-13.4	180.00	1424	7.14	25.00
		12/19/19	113.50	87.41	-2.77	2.83	-49	338.00	1200	7.19	24.56

GENESIS ENGINEERING & REDEVELOPMENT

Table 2

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-3	81.81	3/26/07	116.00	91.97	-10.16	--	--	--	--	--	--
		10/26/07	116.00	91.68	-9.87	--	--	--	--	--	--
		2/20/08	116.00	91.15	-9.34	--	--	--	--	--	--
		7/18/08	116.00	90.84	-9.03	--	--	--	--	--	--
		10/31/08	116.00	90.80	-8.99	--	--	--	--	--	--
		2/23/09	114.57	90.74	-8.93	--	--	--	--	--	--
		8/18/09	114.57	91.03	-9.22	--	--	--	--	--	--
		11/20/09	114.57	91.31	-9.50	--	--	--	--	--	--
	84.28	4/1/10	114.57	90.81	-6.53	--	--	--	--	--	--
		8/4/10	114.60	90.72	-6.44	--	--	--	--	--	--
		11/17/10	114.60	90.61	-6.33	--	--	--	--	--	--
		3/30/11	114.60	90.94	-6.66	--	--	--	--	--	--
		8/16/11	114.60	90.28	-6.00	--	--	--	--	--	--
		12/19/11	114.57	90.85	-6.57	--	--	--	--	--	--
		3/27/12	114.57	90.76	-6.48	--	--	--	--	--	--
		7/26/12	114.57	90.71	-6.43	--	--	--	--	--	--
		11/1/12	114.57	90.89	-6.61	--	--	--	--	--	--
	84.28	3/26/13	114.57	90.85	-6.57	--	--	--	--	--	--
		7/23/13	114.57	91.12	-6.84	--	--	--	--	--	--
		12/4/13	114.57	91.05	-6.77	--	--	--	--	--	--
		3/19/14	114.57	90.91	-6.63	--	--	--	--	--	--
		8/7/14	114.57	90.72	-6.44	--	--	--	--	--	--
		12/9/14	114.57	90.56	-6.28	--	--	--	--	--	--
		3/25/15	114.37	90.46	-6.18	--	--	--	--	--	--
		7/29/15	114.57	90.54	-6.26	--	--	--	--	--	--
		11/20/15	114.31	90.55	-6.27	--	--	--	--	--	--
		3/29/16	114.31	90.61	-6.33	--	--	--	--	--	--
		7/29/16	114.31	90.39	-6.11	--	--	--	--	--	--
		11/17/16	114.18	90.24	-5.96	--	--	--	--	--	--
		3/20/17	110.15	89.59	-5.31	--	--	--	--	--	--
		7/21/17	110.05	89.87	-5.59	--	--	--	--	--	--
		11/17/17	110.05	89.14	-4.86	--	--	--	--	--	--
		3/15/18	110.00	88.65	-4.37	0.35	-30.0	14.6	1259	7.24	25.4
		8/15/18	110.00	88.45	-4.17	0.92	-22.0	1.7	1200	7.59	24.38
		7/31/19	109.10	87.83	-3.55	0.49	-22.1	14.8	1232	7.38	25.7
		12/20/19	--	87.51	-3.23	0.93	33.0	9.7	1030	7.44	21.69

GENESIS ENGINEERING & REDEVELOPMENT

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Hi-Shear Corporation
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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-4	83.03	3/26/07	111.00	93.00	-9.97	--	--	--	--	--	--
		10/26/07	111.00	92.49	-9.46	--	--	--	--	--	--
		2/20/08	111.00	92.22	-9.19	--	--	--	--	--	--
		7/18/08	111.00	91.94	-8.91	--	--	--	--	--	--
		10/31/08	111.00	91.27	-8.24	--	--	--	--	--	--
		2/23/09	110.03	91.77	-8.74	--	--	--	--	--	--
		8/18/09	110.03	91.95	-8.92	--	--	--	--	--	--
		11/20/09	110.03	92.23	-9.20	--	--	--	--	--	--
	85.49	3/31/10	109.77	91.72	-6.23	--	--	--	--	--	--
		8/4/10	109.89	91.55	-6.06	--	--	--	--	--	--
		11/18/10	109.89	91.81	-6.32	--	--	--	--	--	--
		3/30/11	110.07	91.76	-6.27	--	--	--	--	--	--
		8/17/11	110.05	91.36	-5.87	--	--	--	--	--	--
		12/20/11	109.95	91.44	-5.95	--	--	--	--	--	--
		3/27/12	109.96	91.71	-6.22	--	--	--	--	--	--
		7/26/12	110.05	91.72	-6.23	--	--	--	--	--	--
		11/2/12	110.05	91.78	-6.29	--	--	--	--	--	--
	85.50	3/26/13	109.81	91.82	-6.32	--	--	--	--	--	--
		7/23/13	109.95	92.00	-6.50	--	--	--	--	--	--
		12/5/13	109.87	92.07	-6.57	--	--	--	--	--	--
		3/19/14	110.21	91.86	-6.36	--	--	--	--	--	--
		8/7/14	110.17	91.61	-6.11	--	--	--	--	--	--
		12/9/14	109.95	91.47	-5.97	--	--	--	--	--	--
		3/25/15	110.13	91.32	-5.82	--	--	--	--	--	--
		7/29/15	109.95	91.61	-6.11	--	--	--	--	--	--
		11/23/15	109.28	91.82	-6.32	--	--	--	--	--	--
		3/28/16	110.00	91.48	-5.98	--	--	--	--	--	--
		7/29/16	110.00	91.28	-5.78	--	--	--	--	--	--
		11/17/16	110.07	91.21	-5.71	--	--	--	--	--	--
		3/20/17	109.62	90.71	-5.21	--	--	--	--	--	--
		7/21/17	NM	NM	NM	--	--	--	--	--	--
		11/16/17	109.79	90.11	-4.61	--	--	--	--	--	--
		3/15/18	109.70	89.77	-4.27	0.83	9.5	21.2	1225	7.19	24.4
		8/16/18	112.50	89.50	-4.00	1.32	88	16.9	1190	7.31	24.04
		7/30/19	109.81	88.80	-3.30	2.58	60.00	50.00	1260	7.31	24.9
		12/19/19	109.75	88.22	-2.72	3.04	85.00	131.00	1020	7.39	22.31

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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (°C)
MW-5	77.88	3/26/07	116.00	89.15	-11.27	--	--	--	--	--	--
		10/26/07	116.00	88.79	-10.91	--	--	--	--	--	--
		2/20/08	116.00	88.69	-10.81	--	--	--	--	--	--
		7/18/08	116.00	88.06	-10.18	--	--	--	--	--	--
		10/31/08	116.00	88.05	-10.17	--	--	--	--	--	--
		2/23/09	113.93	87.91	-10.03	--	--	--	--	--	--
		8/18/09	113.93	88.23	-10.35	--	--	--	--	--	--
		11/20/09	113.93	88.48	-10.60	--	--	--	--	--	--
	80.34	3/31/10	113.88	88.02	-7.68	--	--	--	--	--	--
		8/4/10	113.82	87.84	-7.50	--	--	--	--	--	--
		11/17/10	113.82	87.80	-7.46	--	--	--	--	--	--
		3/30/11	114.13	87.98	-7.64	--	--	--	--	--	--
		8/17/11	114.02	87.60	-7.26	--	--	--	--	--	--
		12/20/11	113.90	87.73	-7.39	--	--	--	--	--	--
		3/27/12	113.91	87.89	-7.55	--	--	--	--	--	--
		7/27/12	113.87	88.02	-7.68	--	--	--	--	--	--
		11/1/12	113.87	88.06	-7.72	--	--	--	--	--	--
	80.35	3/26/13	113.63	88.06	-7.71	--	--	--	--	--	--
		7/23/13	113.90	88.30	-7.95	--	--	--	--	--	--
		12/4/13	113.75	88.25	-7.90	--	--	--	--	--	--
		3/19/14	113.87	87.97	-7.62	--	--	--	--	--	--
		8/7/14	113.61	87.81	-7.46	--	--	--	--	--	--
		12/9/14	113.83	87.77	-7.42	--	--	--	--	--	--
		3/25/15	113.83	87.57	-7.22	--	--	--	--	--	--
		7/29/15	113.88	87.71	-7.36	--	--	--	--	--	--
		11/23/15	113.81	87.81	-7.46	--	--	--	--	--	--
		3/28/16	113.87	87.62	-7.27	--	--	--	--	--	--
		7/28/16	113.40	87.21	-6.86	--	--	--	--	--	--
		11/16/16	113.91	87.21	-6.86	--	--	--	--	--	--
		3/20/17	113.52	86.71	-6.36	--	--	--	--	--	--
		7/20/17	113.49	86.23	-5.88	--	--	--	--	--	--
		11/16/17	113.83	86.21	-5.86	--	--	--	--	--	--
		3/15/18	113.50	85.80	-5.45	0.65	91.6	301.2	1043	7.06	24.2
		8/15/18	113.91	85.73	-5.38	1.4	94	25.8	1040	7.45	24.51
		8/1/19	113.71	84.88	-4.53	0.78	60.6	118.6	1086	7.19	24.5
		12/18/19	113.55	84.25	-3.90	2.90	58.0	211	944	7.27	21.4

GENESIS ENGINEERING & REDEVELOPMENT

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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-6	79.64	3/26/07	114.00	90.84	-11.20	--	--	--	--	--	--
		10/26/07	114.00	90.34	-10.70	--	--	--	--	--	--
		2/20/08	114.00	90.15	-10.51	--	--	--	--	--	--
		7/25/08	114.00	89.68	-10.04	--	--	--	--	--	--
		10/31/08	114.00	NM	NM	--	--	--	--	--	--
		2/23/09	114.17	89.53	-9.89	--	--	--	--	--	--
		8/18/09	114.17	89.93	-10.29	--	--	--	--	--	--
		11/20/09	114.17	90.05	-10.41	--	--	--	--	--	--
	82.17	4/1/10	114.32	89.64	-7.47	--	--	--	--	--	--
		8/4/10	114.20	89.45	-7.28	--	--	--	--	--	--
		11/18/10	114.20	89.46	-7.29	--	--	--	--	--	--
		3/30/11	114.39	89.68	-7.51	--	--	--	--	--	--
		8/17/11	114.41	89.29	-7.12	--	--	--	--	--	--
		12/20/11	114.30	89.42	-7.25	--	--	--	--	--	--
		3/27/12	114.31	89.51	-7.34	--	--	--	--	--	--
		7/27/12	114.28	89.60	-7.43	--	--	--	--	--	--
		11/2/12	114.28	89.44	-7.27	--	--	--	--	--	--
	82.28	3/27/13	114.13	89.92	-7.73	--	--	--	--	--	--
		7/23/13	114.41	90.02	-7.83	--	--	--	--	--	--
		12/5/13	114.37	89.97	-7.78	--	--	--	--	--	--
		3/20/14	114.37	89.67	-7.48	--	--	--	--	--	--
		8/8/14	113.94	89.57	-7.38	--	--	--	--	--	--
		12/10/14	114.34	89.27	-7.08	--	--	--	--	--	--
		3/26/15	114.34	89.30	-7.11	--	--	--	--	--	--
		7/30/15	114.41	89.49	-7.30	--	--	--	--	--	--
		11/23/15	114.34	89.52	-7.33	--	--	--	--	--	--
		3/29/16	114.42	89.38	-7.19	--	--	--	--	--	--
		7/29/16	114.33	89.18	-6.99	--	--	--	--	--	--
		11/17/16	114.32	89.82	-7.63	--	--	--	--	--	--
		3/21/17	114.15	88.47	-6.19	--	--	--	--	--	--
		7/21/17	114.08	88.00	-5.72	--	--	--	--	--	--
		11/17/17	114.00	88.50	-6.22	--	--	--	--	--	--
		3/15/18	114.00	87.52	-5.24	0.64	102.9	402.6	1546	7.16	21.5
		8/13/18	114.45	87.48	-4.63	4.75	46.0	20.1	1550	7.28	27.09
		8/1/19	114.27	88.66	-6.38	1.60	-31.0	89.6	1269	7.15	29.1
		12/19/19	114.15	86.14	-3.86	1.77	-133.0	41.4	964	7.18	13.81

GENESIS ENGINEERING & REDEVELOPMENT

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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(μS/cm)*	pH	Temp (°C)
MW-7R	83.47	3/26/07	115.00	92.54	-9.07	--	--	--	--	--	--
		10/26/07	115.00	92.03	-8.56	--	--	--	--	--	--
		2/20/08	115.00	92.01	-8.54	--	--	--	--	--	--
		7/18/08	115.00	91.44	-7.97	--	--	--	--	--	--
		10/31/08	115.00	91.42	-7.95	--	--	--	--	--	--
	83.47	2/23/09	116.28	91.25	-7.78	--	--	--	--	--	--
		8/18/09	116.28	91.35	-7.88	--	--	--	--	--	--
		11/20/09	116.28	91.66	-8.19	--	--	--	--	--	--
	85.94	3/31/10	116.07	91.22	-5.28	--	--	--	--	--	--
		8/4/10	116.01	91.10	-5.16	--	--	--	--	--	--
		11/17/10	116.01	90.99	-5.05	--	--	--	--	--	--
		3/30/11	115.97	91.32	-5.38	--	--	--	--	--	--
		8/16/11	115.43	90.74	-4.80	--	--	--	--	--	--
		12/19/11	115.21	90.90	-4.96	--	--	--	--	--	--
		3/27/12	114.71	91.15	-5.21	--	--	--	--	--	--
		7/26/12	114.71	91.12	-5.18	--	--	--	--	--	--
		11/1/12	114.71	91.28	-5.34	--	--	--	--	--	--
		3/26/13	114.38	91.23	-5.29	--	--	--	--	--	--
		7/23/13	114.49	91.54	-5.60	--	--	--	--	--	--
		12/4/13	113.34	91.46	-5.52	--	--	--	--	--	--
		3/19/14	114.21	91.36	-5.42	--	--	--	--	--	--
		8/7/14	114.17	91.20	-5.26	--	--	--	--	--	--
		12/9/14	113.93	91.06	-5.12	--	--	--	--	--	--
		3/25/15	113.76	90.85	-4.91	--	--	--	--	--	--
		7/29/15	113.47	91.03	-5.09	--	--	--	--	--	--
		11/23/15	113.40	91.45	-5.51	--	--	--	--	--	--
		3/29/16	113.36	91.08	-5.14	--	--	--	--	--	--
		7/29/16	113.40	90.86	-4.92	--	--	--	--	--	--
		11/16/16	113.11	90.74	-4.80	--	--	--	--	--	--
		3/20/17	112.45	90.37	-4.43	--	--	--	--	--	--
		7/21/17	112.48	89.63	-3.69	--	--	--	--	--	--
		11/16/17	112.91	89.50	-3.56	--	--	--	--	--	--
		3/12/18	111.71	89.21	-3.27	2.30	80.3	22.1	1174	7.25	23.0
		8/13/18	111.95	89.19	-3.43	2.65	65	69	1120	7.59	24.9
		7/30/19	110.64	88.29	-2.35	2.37	98.5	145	1191	7.3	26.2
		12/19/19	110.35	87.88	-1.94	3.47	-41	312	1000	7.42	17.8

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Sample ID	TOC Elevation (ft amsl)	Date Measured	Depth to Bottom (feet bgs)	Depth to Water (feet bgs)	Hydraulic Head (feet amsl)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	SpC (µS/cm)	pH	Temp (°C)
MW-8	78.27	3/26/07	118.00	89.70	-11.43	--	--	--	--	--	--
		10/26/07	118.00	89.37	-11.10	--	--	--	--	--	--
		2/20/08	118.00	89.32	-11.05	--	--	--	--	--	--
		7/18/08	118.00	88.57	-10.30	--	--	--	--	--	--
		10/31/08	118.00	88.51	-10.24	--	--	--	--	--	--
		2/23/09	117.27	88.46	-10.19	--	--	--	--	--	--
		8/18/09	117.27	89.08	-10.81	--	--	--	--	--	--
		11/20/09	117.27	88.98	-10.71	--	--	--	--	--	--
	80.74	4/1/10	117.27	88.60	-7.86	--	--	--	--	--	--
		8/4/10	117.25	88.55	-7.81	--	--	--	--	--	--
		11/17/10	117.25	88.33	-7.59	--	--	--	--	--	--
		3/30/11	117.25	88.61	-7.87	--	--	--	--	--	--
		8/16/11	117.25	88.02	-7.28	--	--	--	--	--	--
		12/19/11	117.20	88.26	-7.52	--	--	--	--	--	--
		3/27/12	117.20	88.43	-7.69	--	--	--	--	--	--
		7/27/12	117.20	88.55	-7.81	--	--	--	--	--	--
		11/2/12	117.20	88.55	-7.81	--	--	--	--	--	--
		3/27/13	117.20	88.71	-7.97	--	--	--	--	--	--
		7/23/13	117.20	88.85	-8.11	--	--	--	--	--	--
		12/5/13	117.20	88.96	-8.22	--	--	--	--	--	--
		3/20/14	117.20	88.44	-7.70	--	--	--	--	--	--
		8/8/14	117.20	88.46	-7.72	--	--	--	--	--	--
		12/10/14	117.20	88.24	-7.50	--	--	--	--	--	--
		3/26/15	117.20	88.03	-7.29	--	--	--	--	--	--
		7/29/15	117.20	88.27	-7.53	--	--	--	--	--	--
		11/20/15	117.15	88.31	-7.57	--	--	--	--	--	--
		3/28/16	117.15	88.07	-7.33	--	--	--	--	--	--
		7/28/16	117.15	87.88	-7.14	--	--	--	--	--	--
		11/16/16	117.21	87.65	-6.91	--	--	--	--	--	--
		3/21/17	117.21	87.31	-6.57	--	--	--	--	--	--
		7/21/17	117.20	86.81	-6.07	--	--	--	--	--	--
		11/17/17	117.20	86.65	-5.91	--	--	--	--	--	--
		3/12/18	117.00	86.37	-5.63	0.45	-15.1	3.9	960	7.07	21.8
		8/13/18	117.45	86.22	-5.83	0.59	49.0	11.2	942	7.31	22.99
		7/30/19	114.66	85.44	-4.70	0.01	58.7	100.8	1043	7.13	24
		12/21/19	--	85.03	-4.29	0.57	42.0	83.6	774	7.27	16.15

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Second Semi-Annual 2020 Groundwater Monitoring Report

Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (°C)
MW-9	76.39	3/26/07	120.00	88.20	-11.81	--	--	--	--	--	--
		10/26/07	120.00	87.78	-11.39	--	--	--	--	--	--
		2/20/08	120.00	87.65	-11.26	--	--	--	--	--	--
		7/18/08	120.00	87.12	-10.73	--	--	--	--	--	--
		10/31/08	120.00	87.10	-10.71	--	--	--	--	--	--
		2/23/09	118.52	87.03	-10.64	--	--	--	--	--	--
		8/18/09	118.52	87.26	-10.87	--	--	--	--	--	--
		11/20/09	118.52	87.59	-11.20	--	--	--	--	--	--
	78.86	3/31/10	118.65	87.05	-8.19	--	--	--	--	--	--
		8/4/10	118.39	86.94	-8.08	--	--	--	--	--	--
		11/17/10	118.39	86.84	-7.98	--	--	--	--	--	--
		3/30/11	118.62	87.30	-8.44	--	--	--	--	--	--
		8/16/11	118.50	86.66	-7.80	--	--	--	--	--	--
		12/19/11	118.56	86.74	-7.88	--	--	--	--	--	--
		3/27/12	118.51	86.88	-8.02	--	--	--	--	--	--
		7/26/12	118.55	87.07	-8.21	--	--	--	--	--	--
		11/1/12	118.55	87.17	-8.31	--	--	--	--	--	--
		3/26/13	118.33	87.18	-8.32	--	--	--	--	--	--
		7/23/13	118.44	87.31	-8.45	--	--	--	--	--	--
		12/5/13	118.38	87.27	-8.41	--	--	--	--	--	--
		3/20/14	118.48	86.94	-8.08	--	--	--	--	--	--
		8/8/14	118.20	86.91	-8.05	--	--	--	--	--	--
		12/10/14	118.32	86.78	-7.92	--	--	--	--	--	--
		3/25/15	118.16	86.51	-7.65	--	--	--	--	--	--
		7/30/15	118.49	86.74	-7.88	--	--	--	--	--	--
		11/20/15	118.47	86.89	-8.03	--	--	--	--	--	--
		3/28/16	118.30	86.61	-7.75	--	--	--	--	--	--
		7/28/16	118.05	86.31	-7.45	--	--	--	--	--	--
		11/17/16	118.17	86.40	-7.54	--	--	--	--	--	--
		3/21/17	118.29	85.80	-6.94	--	--	--	--	--	--
		7/20/17	118.20	85.37	-6.51	--	--	--	--	--	--
		11/16/17	118.20	85.30	-6.44	--	--	--	--	--	--
		3/15/18	119.80	84.92	-6.06	0.54	93.3	196	1538	6.93	22.2
		8/14/18	118.42	84.69	-5.83	0.48	84	22.5	1570	7.27	24.57
		7/30/19	118.10	83.97	-5.11	2.36	152	147	1649	6.99	26
		12/17/19	119.10	83.54	-4.68	2.39	184	168	1410	7.15	15.62

GENESIS ENGINEERING & REDEVELOPMENT

Table 2

Hi-Shear Corporation
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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation (ft amsl)	Date Measured	Depth to Bottom (feet bgs)	Depth to Water (feet bgs)	Hydraulic Head (feet amsl)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	SpC (µS/cm)	pH	Temp (˚C)
MW-10	78.49	3/26/07	146.50	89.66	-11.17	--	--	--	--	--	--
		10/26/07	146.50	89.25	-10.76	--	--	--	--	--	--
		2/20/08	146.50	88.91	-10.42	--	--	--	--	--	--
		7/18/08	146.50	88.62	-10.13	--	--	--	--	--	--
		10/31/08	146.50	88.63	-10.14	--	--	--	--	--	--
		2/23/09	145.49	88.52	-10.03	--	--	--	--	--	--
		8/18/09	145.49	88.77	-10.28	--	--	--	--	--	--
		11/20/09	145.49	89.06	-10.57	--	--	--	--	--	--
	80.93	3/31/10	145.40	88.48	-7.55	--	--	--	--	--	--
		8/4/10	145.32	88.41	-7.48	--	--	--	--	--	--
		11/17/10	145.32	88.36	-7.43	--	--	--	--	--	--
		3/30/11	146.06	88.61	-7.68	--	--	--	--	--	--
		8/16/11	145.01	88.06	-7.13	--	--	--	--	--	--
		12/19/11	145.63	88.34	-7.41	--	--	--	--	--	--
		3/27/12	145.74	88.46	-7.53	--	--	--	--	--	--
		7/26/12	145.49	88.58	-7.65	--	--	--	--	--	--
		11/1/12	145.49	88.63	-7.70	--	--	--	--	--	--
	80.96	3/26/13	145.32	88.60	-7.64	--	--	--	--	--	--
		7/23/13	145.43	88.84	-7.88	--	--	--	--	--	--
		12/4/13	145.37	88.69	-7.73	--	--	--	--	--	--
		3/19/14	145.52	88.54	-7.58	--	--	--	--	--	--
		8/7/14	144.91	88.41	-7.45	--	--	--	--	--	--
		12/9/14	145.18	88.37	-7.41	--	--	--	--	--	--
		3/25/15	144.93	88.14	-7.18	--	--	--	--	--	--
		7/29/15	114.97	88.23	-7.27	--	--	--	--	--	--
		11/20/15	114.90	88.31	-7.35	--	--	--	--	--	--
		3/28/16	145.29	88.14	-7.18	--	--	--	--	--	--
		7/28/16	145.12	87.86	-6.90	--	--	--	--	--	--
		11/17/16	145.33	87.81	-6.85	--	--	--	--	--	--
		3/21/17	145.21	87.22	-6.26	--	--	--	--	--	--
		7/20/17	145.25	86.82	-5.86	--	--	--	--	--	--
		11/17/17	145.17	86.84	-5.88	--	--	--	--	--	--
		3/15/18	145.05	86.39	-5.43	0.70	61.6	39.6	1026	7.11	22.3
		8/15/18	146.50	86.26	-5.30	1.72	-45	8.3	966	7.45	23.32
		8/1/19	145.22	85.83	-4.87	0.87	52.9	23.8	1038	7.07	24.5
		12/19/19	146.19	84.89	-3.93	1.91	-69	35.5	887	7.13	19.49

GENESIS ENGINEERING & REDEVELOPMENT

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Sample ID	TOC Elevation (ft amsl)	Date Measured	Depth to Bottom (feet bgs)	Depth to Water (feet bgs)	Hydraulic Head (feet amsl)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	SpC (µS/cm)	pH	Temp (˚C)
CMW-11A	79.95	3/26/07	285.00	91.15	-11.20	--	--	--	--	--	--
		10/26/07	285.00	90.81	-10.86	--	--	--	--	--	--
		2/20/08	285.00	90.39	-10.44	--	--	--	--	--	--
		7/18/08	285.00	90.09	-10.14	--	--	--	--	--	--
		10/31/08	285.00	90.10	-10.15	--	--	--	--	--	--
		2/23/09	283.98	89.93	-9.98	--	--	--	--	--	--
		8/18/09	283.98	90.32	-10.37	--	--	--	--	--	--
		11/20/09	283.98	90.64	-10.69	--	--	--	--	--	--
	82.42	3/31/10	284.00	89.92	-7.50	--	--	--	--	--	--
		8/4/10	283.82	90.05	-7.63	--	--	--	--	--	--
		11/17/10	283.82	89.91	-7.49	--	--	--	--	--	--
		3/30/11	284.47	90.02	-7.60	--	--	--	--	--	--
		8/16/11	284.07	89.86	-7.44	--	--	--	--	--	--
		12/19/11	283.73	89.83	-7.41	--	--	--	--	--	--
		3/27/12	283.90	89.93	-7.51	--	--	--	--	--	--
		7/26/12	283.97	90.14	-7.72	--	--	--	--	--	--
		11/1/12	283.97	90.28	-7.86	--	--	--	--	--	--
		11/1/12	283.60	90.21	-7.79	--	--	--	--	--	--
		7/23/13	283.86	90.46	-8.04	--	--	--	--	--	--
		12/4/13	283.80	90.32	-7.90	--	--	--	--	--	--
		3/19/14	284.03	90.14	-7.72	--	--	--	--	--	--
		8/7/14	283.53	90.00	-7.58	--	--	--	--	--	--
		12/9/14	283.53	89.75	-7.33	--	--	--	--	--	--
		3/25/15	283.51	89.62	-7.20	--	--	--	--	--	--
		7/29/15	283.57	89.88	-7.46	--	--	--	--	--	--
		11/20/15	283.35	89.83	-7.41	--	--	--	--	--	--
		3/28/16	283.94	89.77	-7.35	--	--	--	--	--	--
		7/28/16	284.07	89.62	-7.20	--	--	--	--	--	--
		11/16/16	283.99	89.22	-6.80	--	--	--	--	--	--
		3/20/17	284.02	88.79	-6.37	--	--	--	--	--	--
		7/20/17	284.00	88.43	-6.01	--	--	--	--	--	--
		11/17/17	284.08	88.22	-5.80	--	--	--	--	--	--
		3/15/18	283.85	87.91	-5.49	0.53	-93.2	98.6	992	7.32	20.4
		8/16/18	287.81	87.95	-5.53	0.59	-122	2.3	902	7.40	24.7
		7/31/19	284.71	86.93	-4.51	0.73	-87.9	41.2	839	7.11	27.2
		12/20/19	283.81	86.42	-4.00	0.85	-183	12.5	738	7.18	22.1

GENESIS ENGINEERING & REDEVELOPMENT

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CMW-11B	79.88	3/26/07	150.00	90.75	-10.87	--	--	--	--	--	--
		10/26/07	150.00	90.33	-10.45	--	--	--	--	--	--
		2/20/08	150.00	89.90	-10.02	--	--	--	--	--	--
		7/18/08	150.00	89.83	-9.95	--	--	--	--	--	--
		10/31/08	150.00	89.69	-9.81	--	--	--	--	--	--
		2/23/09	149.19	89.61	-9.73	--	--	--	--	--	--
		8/18/09	149.19	89.94	-10.06	--	--	--	--	--	--
		11/20/09	149.19	90.12	-10.24	--	--	--	--	--	--
	82.35	3/31/10	149.19	89.50	-7.15	--	--	--	--	--	--
		8/4/10	149.20	89.55	-7.20	--	--	--	--	--	--
		11/17/10	149.20	89.51	-7.16	--	--	--	--	--	--
		3/30/11	149.20	89.71	-7.36	--	--	--	--	--	--
		8/16/11	149.20	88.98	-6.63	--	--	--	--	--	--
		12/19/11	149.21	89.46	-7.11	--	--	--	--	--	--
		3/27/12	149.21	89.60	-7.25	--	--	--	--	--	--
		7/26/12	149.21	89.60	-7.25	--	--	--	--	--	--
		11/1/12	149.21	89.74	-7.39	--	--	--	--	--	--
		3/26/13	149.21	89.70	-7.35	--	--	--	--	--	--
		7/23/13	149.21	90.05	-7.70	--	--	--	--	--	--
		12/4/13	149.21	89.92	-7.57	--	--	--	--	--	--
		3/19/14	149.21	89.74	-7.39	--	--	--	--	--	--
		8/7/14	149.21	91.17	-8.82	--	--	--	--	--	--
		12/9/14	149.21	89.46	-7.11	--	--	--	--	--	--
		3/25/15	149.27	89.29	-6.94	--	--	--	--	--	--
		7/29/15	149.27	89.37	-7.02	--	--	--	--	--	--
		11/20/15	149.21	89.44	-7.09	--	--	--	--	--	--
		3/28/16	149.21	89.37	-7.02	--	--	--	--	--	--
		7/28/16	149.21	89.13	-6.78	--	--	--	--	--	--
		11/16/16	149.21	88.71	-6.36	--	--	--	--	--	--
		3/20/17	149.21	88.36	-6.01	--	--	--	--	--	--
		7/20/17	149.21	87.94	-5.59	--	--	--	--	--	--
		11/17/17	149.23	87.79	-5.44	--	--	--	--	--	--
		3/15/18	149.23	NM	NM	0.38	-125.7	26.7	1004	7.19	23.7
		8/16/18	149.23	87.13	-4.78	0.50	-117	3.7	924	7.42	24.72
		8/1/19	124.30	86.50	-4.15	NM	NM	NM	NM	NM	NM
		12/20/19	--	86.13	-3.78	0.35	-73	25.2	881	6.59	21.77

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CMW-11C	80.03	3/26/07	115.00	90.90	-10.87	--	--	--	--	--	--
		10/26/07	115.00	90.48	-10.45	--	--	--	--	--	--
		2/20/08	115.00	90.02	-9.99	--	--	--	--	--	--
		7/18/08	115.00	89.87	-9.84	--	--	--	--	--	--
		10/31/08	115.00	89.75	-9.72	--	--	--	--	--	--
		2/23/09	115.04	89.67	-9.64	--	--	--	--	--	--
		8/18/09	115.04	90.85	-10.82	--	--	--	--	--	--
		11/20/09	115.04	90.27	-10.24	--	--	--	--	--	--
	82.50	4/1/10	115.04	89.75	-7.25	--	--	--	--	--	--
		8/4/10	115.11	89.73	-7.23	--	--	--	--	--	--
		11/17/10	115.11	89.58	-7.08	--	--	--	--	--	--
		3/30/11	115.11	89.86	-7.36	--	--	--	--	--	--
		8/16/11	115.11	89.25	-6.75	--	--	--	--	--	--
		12/19/11	115.13	89.58	-7.08	--	--	--	--	--	--
		3/27/12	115.13	89.71	-7.21	--	--	--	--	--	--
		7/26/12	115.13	89.72	-7.22	--	--	--	--	--	--
		11/1/12	115.13	89.84	-7.34	--	--	--	--	--	--
		3/26/13	115.13	89.82	-7.32	--	--	--	--	--	--
		7/23/13	115.13	90.13	-7.63	--	--	--	--	--	--
		12/4/13	115.13	90.02	-7.52	--	--	--	--	--	--
		3/19/14	115.13	89.82	-7.32	--	--	--	--	--	--
		8/7/14	115.13	89.70	-7.20	--	--	--	--	--	--
		12/9/14	115.13	89.62	-7.12	--	--	--	--	--	--
		3/25/15	113.13	89.41	-6.91	--	--	--	--	--	--
		7/29/15	113.13	89.47	-6.97	--	--	--	--	--	--
		11/20/15	113.01	89.57	-7.07	--	--	--	--	--	--
		3/28/16	113.01	89.46	-6.96	--	--	--	--	--	--
		7/28/16	113.01	89.32	-6.82	--	--	--	--	--	--
		11/16/16	113.01	88.89	-6.39	--	--	--	--	--	--
		3/20/17	113.01	88.47	-5.97	--	--	--	--	--	--
		7/20/17	113.09	88.14	-5.64	--	--	--	--	--	--
		11/17/17	113.06	87.96	-5.46	--	--	--	--	--	--
		3/15/18	113.00	87.55	-5.05	0.41	19.7	5.9	1236	7.28	23.6
		8/16/18	113.00	87.40	-4.90	0.59	-5	15.1	1170	7.64	24.62
		8/1/19	110.81	86.60	-4.10	0.15	-19.7	610.8	1205	7.35	25.2
		12/20/19	94.26	86.29	-3.79	1.61	-131	12.1	1070	7.48	22.12

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MW-12	79.93	3/26/07	115.00	91.27	-11.34	--	--	--	--	--	--
		10/26/07	115.00	90.83	-10.90	--	--	--	--	--	--
		2/20/08	115.00	90.45	-10.52	--	--	--	--	--	--
		7/18/08	115.00	90.06	-10.13	--	--	--	--	--	--
		10/31/08	115.00	90.11	-10.18	--	--	--	--	--	--
		2/23/09	113.41	90.06	-10.13	--	--	--	--	--	--
		8/18/09	113.41	90.36	-10.43	--	--	--	--	--	--
		11/20/09	113.41	90.59	-10.66	--	--	--	--	--	--
	82.40	4/1/10	113.36	90.22	-7.82	--	--	--	--	--	--
		8/5/10	113.23	90.00	-7.60	--	--	--	--	--	--
		11/18/10	113.23	89.99	-7.59	--	--	--	--	--	--
		3/30/11	113.47	90.17	-7.77	--	--	--	--	--	--
		8/17/11	113.45	89.77	-7.37	--	--	--	--	--	--
		12/20/11	113.24	89.85	-7.45	--	--	--	--	--	--
		3/27/12	113.36	90.04	-7.64	--	--	--	--	--	--
		7/27/12	113.38	90.07	-7.67	--	--	--	--	--	--
		11/2/12	113.38	90.23	-7.83	--	--	--	--	--	--
	82.45	3/27/13	113.22	90.21	-7.76	--	--	--	--	--	--
		7/23/13	113.37	90.43	-7.98	--	--	--	--	--	--
		12/5/13	113.27	90.38	-7.93	--	--	--	--	--	--
		3/20/14	113.30	90.06	-7.61	--	--	--	--	--	--
		8/8/14	113.02	90.05	-7.60	--	--	--	--	--	--
		12/10/14	113.36	89.83	-7.38	--	--	--	--	--	--
		3/26/15	113.33	89.68	-7.23	--	--	--	--	--	--
		7/30/15	113.46	89.86	-7.41	--	--	--	--	--	--
		11/20/15	113.28	89.82	-7.37	--	--	--	--	--	--
		3/28/16	113.35	89.69	-7.24	--	--	--	--	--	--
		7/28/16	113.20	89.42	-6.97	--	--	--	--	--	--
		11/17/16	113.32	89.41	-6.96	--	--	--	--	--	--
		3/21/17	113.01	88.86	-6.50	--	--	--	--	--	--
	82.36	7/21/17	113.06	88.44	-6.08	--	--	--	--	--	--
		11/17/17	113.00	88.41	-6.05	--	--	--	--	--	--
		3/14/18	113.00	88.02	-5.66	3.64	110.5	226.4	1415	6.96	23.5
		8/13/18	113.50	87.86	-4.97	3.02	65	44.1	1280	7.26	25.51
		7/30/19	112.79	86.96	-4.60	3.32	130	274	1376	7.08	27.9
		12/26/19	113.08	86.46	-4.10	2.58	19	502	1.9	7.17	26.33

GENESIS ENGINEERING & REDEVELOPMENT

Table 2

Hi-Shear Corporation
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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-13	87.78	4/1/10	107.20	95.25	-7.47	--	--	--	--	--	--
		8/5/10	107.11	95.28	-7.50	--	--	--	--	--	--
		11/18/10	107.11	94.31	-6.53	--	--	--	--	--	--
		3/30/11	107.69	95.26	-7.48	--	--	--	--	--	--
		8/17/11	107.18	94.91	-7.13	--	--	--	--	--	--
		12/20/11	107.03	95.04	-7.26	--	--	--	--	--	--
		3/27/12	107.12	95.22	-7.44	--	--	--	--	--	--
		7/27/12	107.18	95.25	-7.47	--	--	--	--	--	--
		11/2/12	107.18	95.48	-7.70	--	--	--	--	--	--
		3/27/13	106.83	95.29	-7.51	--	--	--	--	--	--
		7/23/13	107.17	95.52	-7.74	--	--	--	--	--	--
		12/5/13	107.08	95.65	-7.87	--	--	--	--	--	--
		3/20/14	107.03	95.30	-7.52	--	--	--	--	--	--
		8/8/14	106.22	95.19	-7.41	--	--	--	--	--	--
		12/10/14	107.01	95.10	-7.32	--	--	--	--	--	--
		3/26/15	106.94	94.86	-7.08	--	--	--	--	--	--
		7/30/15	107.15	95.03	-7.25	--	--	--	--	--	--
		11/23/15	107.12	95.12	-7.34	--	--	--	--	--	--
		3/29/16	107.05	94.96	-7.18	--	--	--	--	--	--
		7/29/16	107.12	94.76	-6.98	--	--	--	--	--	--
		11/16/16	107.16	94.51	-6.73	--	--	--	--	--	--
		3/21/17	107.07	94.05	-6.27	--	--	--	--	--	--
		7/21/17	107.02	93.68	-5.90	--	--	--	--	--	--
		11/16/17	108.11	93.51	-5.73	--	--	--	--	--	--
		3/15/18	106.85	93.15	-5.37	0.91	86.9	202.4	1371	7.08	23.6
		8/16/18	107.13	93.15	-5.37	1.01	61	18.6	1280	7.32	25.53
		8/1/19	106.91	92.25	-4.47	1.12	37.7	123	1385	7.21	26.3
		12/26/19	106.85	91.59	-3.81	5.44	108	586	1168	7.53	23.54

GENESIS ENGINEERING & REDEVELOPMENT

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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-14	84.94	4/1/10	104.33	91.74	-6.80	--	--	--	--	--	--
		8/5/10	103.85	91.59	-6.65	--	--	--	--	--	--
		11/18/10	103.85	91.48	-6.54	--	--	--	--	--	--
		3/30/11	104.18	91.41	-6.47	--	--	--	--	--	--
		8/17/11	104.33	91.25	-6.31	--	--	--	--	--	--
		12/20/11	104.16	91.05	-6.11	--	--	--	--	--	--
		3/27/12	104.12	91.17	-6.23	--	--	--	--	--	--
		7/27/12	104.24	91.34	-6.40	--	--	--	--	--	--
		11/2/12	104.24	91.59	-6.65	--	--	--	--	--	--
		3/26/13	NM	NM	NM	NM	NM	NM	NM	NM	NM
		7/23/13	NM	NM	NM	NM	NM	NM	NM	NM	NM
		12/5/13	104.47	92.00	-7.06	--	--	--	--	--	--
		3/20/14	104.62	91.84	-6.90	--	--	--	--	--	--
		8/8/14	104.35	91.84	-6.90	--	--	--	--	--	--
		12/10/14	104.54	91.68	-6.74	--	--	--	--	--	--
		3/26/15	104.58	91.75	-6.81	--	--	--	--	--	--
		7/30/15	104.62	91.91	-6.97	--	--	--	--	--	--
		11/23/15	104.58	92.05	-7.11	--	--	--	--	--	--
	84.34	3/29/16	104.71	91.76	-6.82	--	--	--	--	--	--
		7/29/16	104.56	91.43	-6.49	--	--	--	--	--	--
		11/17/16	104.54	91.47	-6.53	--	--	--	--	--	--
	85.40	3/21/17	104.58	90.74	-5.34	--	--	--	--	--	--
		7/21/17	104.51	90.47	-5.07	--	--	--	--	--	--
		11/16/17	104.49	90.40	-5.00	--	--	--	--	--	--
		3/15/18	104.32	90.00	-4.60	0.55	34.3	48.6	1288	7.15	24.3
		8/16/18	104.72	90.00	-4.60	0.98	85	14.1	1190	7.42	26.34
		7/14/19	104.41	89.08	-3.68	1.36	60.8	24.5	1275	7.29	26.2
		12/20/19	104.37	88.68	-3.28	2.29	68	71.7	1090	7.35	19.48

GENESIS ENGINEERING & REDEVELOPMENT

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Hi-Shear Corporation
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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-15	81.24	4/1/10	103.81	88.76	-7.52	--	--	--	--	--	--
		8/5/10	103.55	88.65	-7.41	--	--	--	--	--	--
		11/18/10	103.55	88.47	-7.23	--	--	--	--	--	--
		3/30/11	103.51	88.75	-7.51	--	--	--	--	--	--
		8/17/11	103.95	88.38	-7.14	--	--	--	--	--	--
		12/20/11	103.72	88.50	-7.26	--	--	--	--	--	--
		3/27/12	103.71	88.72	-7.48	--	--	--	--	--	--
		7/27/12	103.75	88.77	-7.53	--	--	--	--	--	--
		11/2/12	103.75	88.81	-7.57	--	--	--	--	--	--
		3/27/13	103.92	88.92	-7.68	--	--	--	--	--	--
		7/23/13	103.70	89.11	-7.87	--	--	--	--	--	--
		12/5/13	103.60	88.95	-7.71	--	--	--	--	--	--
		3/20/14	103.42	88.68	-7.44	--	--	--	--	--	--
		8/8/14	103.40	88.62	-7.38	--	--	--	--	--	--
		12/10/14	103.42	88.61	-7.37	--	--	--	--	--	--
		3/26/15	103.55	88.32	-7.08	--	--	--	--	--	--
		7/29/15	103.19	88.42	-7.18	--	--	--	--	--	--
		11/23/15	103.19	88.58	-7.34	--	--	--	--	--	--
		3/29/16	103.50	88.34	-7.10	--	--	--	--	--	--
		7/29/16	103.51	88.11	-6.87	--	--	--	--	--	--
		11/17/16	103.43	87.98	-6.74	--	--	--	--	--	--
		3/21/17	103.49	87.38	-6.14	--	--	--	--	--	--
		7/21/17	103.52	87.00	-5.76	--	--	--	--	--	--
		11/17/17	103.45	87.50	-6.26	--	--	--	--	--	--
		3/12/18	103.20	86.56	-5.32	0.28	-152.2	111.2	1015	6.51	24.4
		8/13/18	103.62	86.44	-5.20	0.57	-134.0	49	1420	6.69	26.4
		8/1/19	103.32	85.66	-4.42	0.20	-111.0	47.00	1483	6.38	25.1
		12/18/19	103.31	85.06	-3.82	1.63	-199.0	104.00	1280	6.46	22.6

GENESIS ENGINEERING & REDEVELOPMENT

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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-16	82.91	4/1/10	106.90	89.97	-7.06	--	--	--	--	--	--
		8/5/10	106.79	89.85	-6.94	--	--	--	--	--	--
		11/18/10	106.79	89.66	-6.75	--	--	--	--	--	--
		3/30/11	107.15	89.78	-6.87	--	--	--	--	--	--
		8/17/11	107.18	89.74	-6.83	--	--	--	--	--	--
		12/20/11	106.95	89.61	-6.70	--	--	--	--	--	--
		3/27/12	106.95	89.83	-6.92	--	--	--	--	--	--
		7/27/12	107.07	89.91	-7.00	--	--	--	--	--	--
		11/2/12	107.07	89.99	-7.08	--	--	--	--	--	--
		3/27/13	106.57	90.16	-7.25	--	--	--	--	--	--
		7/23/13	106.82	90.22	-7.31	--	--	--	--	--	--
		12/5/13	106.85	90.19	-7.28	--	--	--	--	--	--
		3/20/14	106.90	89.81	-6.90	--	--	--	--	--	--
		8/8/14	100.90	89.84	-6.93	--	--	--	--	--	--
		12/10/14	106.90	89.65	-6.74	--	--	--	--	--	--
		3/26/15	106.88	89.48	-6.57	--	--	--	--	--	--
		7/30/15	107.12	88.06	-5.15	--	--	--	--	--	--
		11/20/15	106.89	89.66	-6.75	--	--	--	--	--	--
		3/28/16	106.86	89.91	-7.00	--	--	--	--	--	--
		7/28/16	109.01	89.69	-6.78	--	--	--	--	--	--
		11/17/16	107.12	89.62	-6.71	--	--	--	--	--	--
	83.25	3/21/17	107.04	88.25	-5.00	--	--	--	--	--	--
		7/21/17	107.08	88.61	-5.36	--	--	--	--	--	--
		11/17/17	107.15	89.00	-5.75	--	--	--	--	--	--
		3/15/18	107.01	88.07	-4.82	0.64	-94.9	23.1	1771	7.01	22.9
		8/16/18	107.28	88.01	-4.76	0.68	-9	26.7	1910	6.97	27.54
		7/31/19	110.10	87.15	-3.9	0.30	-24.1	21.5	1913	6.73	28.8
		12/19/19	106.88	86.62	-3.37	1.68	-182	779	1210	6.86	18.62

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Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(μS/cm)*	pH	Temp (°C)
MW-17	82.14										
		3/31/10	109.90	88.78	-6.64	--	--	--	--	--	--
		8/4/10	109.62	88.66	-6.52	--	--	--	--	--	--
		11/17/10	109.62	88.57	-6.43	--	--	--	--	--	--
		3/30/11	109.85	88.88	-6.74	--	--	--	--	--	--
		8/16/11	109.85	88.34	-6.20	--	--	--	--	--	--
		12/19/11	109.56	88.54	-6.40	--	--	--	--	--	--
		3/27/12	109.95	88.76	-6.62	--	--	--	--	--	--
		7/26/12	109.61	88.81	-6.67	--	--	--	--	--	--
		11/1/12	109.61	88.95	-6.81	--	--	--	--	--	--
		3/27/13	109.44	88.85	-6.71	--	--	--	--	--	--
		7/23/13	109.60	89.13	-6.99	--	--	--	--	--	--
		12/4/13	109.58	89.00	-6.86	--	--	--	--	--	--
		3/20/14	109.64	88.81	-6.67	--	--	--	--	--	--
		8/7/14	109.43	88.75	-6.61	--	--	--	--	--	--
		12/10/14	109.68	88.50	-6.36	--	--	--	--	--	--
		3/25/15	110.05	88.24	-6.10	--	--	--	--	--	--
		7/29/15	109.79	88.54	-6.40	--	--	--	--	--	--
		11/23/15	109.71	88.70	-6.56	--	--	--	--	--	--
		3/28/16	109.98	88.50	-6.36	--	--	--	--	--	--
		7/29/16	110.15	88.37	-6.23	--	--	--	--	--	--
		11/16/16	110.01	87.93	-5.79	--	--	--	--	--	--
		3/20/17	109.61	87.76	-5.62	--	--	--	--	--	--
		7/21/17	109.55	87.12	-4.98	--	--	--	--	--	--
		11/16/17	110.00	87.00	-4.86	--	--	--	--	--	--
		3/15/18	109.40	86.71	-4.57	5.87	169.3	8.1	1182	7.25	21.7
		8/15/18	110.02	86.55	-4.41	4.54	112	2.5	1070	7.62	23.38
		8/1/19	109.80	85.81	-3.67	6.79	132	31.8	1543	7.42	23.1
		12/19/19	109.63	85.31	-3.17	6.65	71	64.6	1130	7.49	16.04

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Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-18	82.74	3/31/10	100.94	89.60	-6.86	--	--	--	--	--	--
		8/5/10	100.98	89.45	-6.71	--	--	--	--	--	--
		11/18/10	100.98	89.28	-6.54	--	--	--	--	--	--
		3/30/11	101.73	89.45	-6.71	--	--	--	--	--	--
		8/17/11	101.23	89.12	-6.38	--	--	--	--	--	--
		12/20/11	101.19	89.23	-6.49	--	--	--	--	--	--
		3/27/12	101.21	89.52	-6.78	--	--	--	--	--	--
		7/27/12	101.18	89.74	-7	--	--	--	--	--	--
		11/2/12	101.18	89.53	-6.79	--	--	--	--	--	--
		3/27/13	100.85	89.93	-7.19	--	--	--	--	--	--
		7/23/13	101.16	89.95	-7.21	--	--	--	--	--	--
		12/4/13	101.07	89.77	-7.03	--	--	--	--	--	--
		3/20/14	101.04	89.48	-6.74	--	--	--	--	--	--
		8/8/14	100.90	89.40	-6.66	--	--	--	--	--	--
		12/10/14	101.21	89.24	-6.5	--	--	--	--	--	--
		3/26/15	101.01	88.95	-6.21	--	--	--	--	--	--
		7/29/15	101.17	89.32	-6.58	--	--	--	--	--	--
		11/23/15	101.01	89.58	-6.84	--	--	--	--	--	--
		3/28/16	101.09	89.12	-6.38	--	--	--	--	--	--
		7/29/16	101.12	88.96	-6.22	--	--	--	--	--	--
		11/17/16	100.94	88.97	-6.23	--	--	--	--	--	--
		3/21/17	100.69	88.21	-5.47	--	--	--	--	--	--
		7/21/17	100.65	87.82	-5.08	--	--	--	--	--	--
		11/17/17	100.54	87.91	-5.17	--	--	--	--	--	--
		3/15/18	100.99	87.45	-4.71	0.52	31.4	10.2	1528	7.14	22.4
		8/13/18	101.12	87.31	-4.57	3.70	86.00	4.3	1610	7.42	25.1
		7/31/19	100.74	86.53	-3.79	1.90	68.4	152	1608	7.22	25.9
		12/20/19	100.77	86.07	-3.33	2.73	-76	34.5	1360	7.30	20.2

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Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
MW-19	83.74										
		3/31/10	103.00	90.75	-7.01	--	--	--	--	--	--
		8/5/10	102.97	90.60	-6.86	--	--	--	--	--	--
		11/18/10	102.97	90.47	-6.73	--	--	--	--	--	--
		3/30/11	103.69	90.59	-6.85	--	--	--	--	--	--
		8/17/11	103.03	90.29	-6.55	--	--	--	--	--	--
		12/20/11	102.95	90.40	-6.66	--	--	--	--	--	--
		3/27/12	102.84	90.60	-6.86	--	--	--	--	--	--
		7/27/12	103.07	90.64	-6.90	--	--	--	--	--	--
		11/2/12	103.07	90.75	-7.01	--	--	--	--	--	--
		3/27/13	102.64	90.01	-6.27	--	--	--	--	--	--
		7/23/13	103.06	91.05	-7.31	--	--	--	--	--	--
		12/5/13	102.98	90.86	-7.12	--	--	--	--	--	--
		3/20/14	103.01	90.67	-6.93	--	--	--	--	--	--
		8/8/14	102.85	90.66	-6.92	--	--	--	--	--	--
		12/10/14	102.93	90.46	-6.72	--	--	--	--	--	--
		3/26/15	102.96	90.24	-6.50	--	--	--	--	--	--
		7/29/15	103.06	90.51	-6.77	--	--	--	--	--	--
		11/20/15	102.86	90.43	-6.69	--	--	--	--	--	--
		3/28/16	102.94	90.41	-6.67	--	--	--	--	--	--
		7/28/16	103.15	90.18	-6.44	--	--	--	--	--	--
		11/17/16	102.92	90.06	-6.32	--	--	--	--	--	--
		3/21/17	102.55	89.38	-5.64	--	--	--	--	--	--
		7/21/17	102.51	89.00	-5.26	--	--	--	--	--	--
		11/17/17	102.46	89.60	-5.86	--	--	--	--	--	--
		3/15/18	102.60	88.51	-4.77	0.82	109.5	61.1	1666	7.15	22.8
		8/16/18	103.01	88.50	-4.76	1.10	87	78.4	1790	7.5	25.85
		7/31/19	102.88	87.65	-3.91	1.00	38.2	171	2116	7.16	27.6
		12/20/19	102.68	87.19	-3.45	3.58	93	30.6	1780	7.2	19.09

GENESIS ENGINEERING & REDEVELOPMENT

Table 2

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(μS/cm)*	pH	Temp (˚C)
MW-20	79.49	7/30/15	108.35	87.86	-8.37	--	--	--	--	--	--
		11/20/15	108.35	88.31	-8.82	--	--	--	--	--	--
		3/28/16	108.38	87.63	-8.14	--	--	--	--	--	--
		7/28/16	107.80	87.40	-7.91	--	--	--	--	--	--
		11/16/16	NM	NM	NM	--	--	--	--	--	--
		3/20/17	NM	NM	NM	--	--	--	--	--	--
		7/20/17	107.91	86.45	-6.96	--	--	--	--	--	--
		11/16/17	108.34	86.27	-6.78	--	--	--	--	--	--
		3/15/18	108.00	86.00	-6.51	0.53	89.1	89.6	1435	7.31	21.5
		8/14/18	110.62	85.87	-6.38	0.6	23	164	1430	7.65	25.08
		12/12/18	108.55	85.76	-6.27	0.98	35	70.1	1420	7.55	23.15
		5/8/19	108.50	85.24	-5.75	0.92	-59	55.9	1370	8.64	21.48
		7/18/19	NM	NM	NM	NM	NM	NM	NM	NM	NM
		12/18/19	108.10	84.39	-4.90	1.66	102	203	1210	7.50	21.54
		8/4/20	108.04	83.42	-3.93	1.64	57	189	1600	7.38	1600
		11/10/20	108.17	84.51	-5.02	0.99	-7	61.1	1400	7.68	24.06
MW-21	82.60	7/30/15	114.20	91.08	-8.48	--	--	--	--	--	--
		11/20/15	114.18	91.11	-8.51	--	--	--	--	--	--
		3/28/16	114.17	90.81	-8.21	--	--	--	--	--	--
		7/28/16	114.20	90.62	-8.02	--	--	--	--	--	--
		11/16/16	NM	NM	NM	NM	NM	NM	NM	NM	NM
		3/20/17	NM	NM	NM	NM	NM	NM	NM	NM	NM
		7/20/17	114.10	89.64	-7.04	--	--	--	--	--	--
		11/16/17	114.13	89.44	-6.84	--	--	--	--	--	--
		3/15/18	114.00	89.20	-6.60	0.41	82.5	40.1	1595	7.13	22.1
		8/14/18	115.25	89.17	-6.57	0.88	65	95.1	1500	7.46	24.29
		12/12/18	114.40	89.08	-6.48	0.81	27	25.5	1510	7.43	22.86
		5/8/19	114.25	88.41	-5.81	0.0	31	194	1530	8.46	20.31
		7/18/19	114.10	88.25	-5.65	0.7	124	69.7	1540	7.21	24.2
		12/18/19	114.00	87.56	-4.96	1.1	47	143	1390	7.32	22.51
		8/4/20	114.04	86.52	-3.92	1.79	55	125	1630	7.31	23.01
		11/10/20	114.04	87.67	-5.07	1.74	54.3	54.3	1600	7.58	23.33

GENESIS ENGINEERING & REDEVELOPMENT

Table 2

Hi-Shear Corporation
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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (°C)
MW-22A	84.41	8/4/15	266.72	90.49	-6.08	--	--	--	--	--	--
		11/20/15	266.61	90.47	-6.06	--	--	--	--	--	--
		3/28/16	264.49	90.30	-5.89	--	--	--	--	--	--
		7/28/16	264.40	90.07	-5.66	--	--	--	--	--	--
		11/16/16	264.25	89.72	-5.31	--	--	--	--	--	--
		3/20/17	264.47	88.91	-4.50	--	--	--	--	--	--
		7/20/17	264.50	88.59	-4.18	--	--	--	--	--	--
		11/16/17	264.69	88.60	-4.19	--	--	--	--	--	--
		3/15/18	264.11	88.08	-3.67	0.46	-175.1	86.1	746	7.72	21.3
		8/15/18	264.62	88.25	-3.84	0.61	-136	6.8	699	7.76	26.84
		12/11/18	---	88.11	-3.70	0.54	-168	53.4	719	7.78	23.48
		5/9/19	264.30	87.62	-3.21	7.97	-145	17.1	651	8.91	21.42
		7/17/19	264.72	87.43	-3.02	0.24	123	176	740	7.39	26.7
		12/18/19	264.10	86.73	-2.32	0.65	-208	18.3	643	7.48	18.49
		6/9/20	264.41	85.94	-1.53	1.85	-215	>1000	719	7.78	27.36
		11/12/20	264.41	86.11	-1.70	1	-100	8.2	712	7.69	15.06
MW-22B	84.44	8/4/15	188.21	90.69	-6.25	--	--	--	--	--	--
		11/20/15	188.05	90.72	-6.28	--	--	--	--	--	--
		3/28/16	187.47	90.68	-6.24	--	--	--	--	--	--
		7/28/16	186.94	90.47	-6.03	--	--	--	--	--	--
		11/16/16	186.71	90.12	-5.68	--	--	--	--	--	--
		3/20/17	186.82	89.75	-5.31	--	--	--	--	--	--
		7/20/17	186.85	89.35	-4.91	--	--	--	--	--	--
		11/16/17	183.90	89.11	-4.67	--	--	--	--	--	--
		3/15/18	186.70	88.68	-4.24	0.43	-102.3	41.1	805	7.41	21.4
		8/15/18	186.03	88.60	-4.16	1.01	-87	45.1	751	7.67	24.8
		12/11/18	187.03	88.51	-4.07	0.67	-92	40.1	782	7.59	23.11
		5/9/19	187.00	88.02	-3.58	2.51	-93	7.4	699	8.73	21.33
		7/17/19	187.10	87.92	-3.48	0.71	9.6	167	743	7.39	29.7
		12/18/19	187.09	87.24	-2.80	2.12	-148	15.8	650	7.47	18.02
		6/9/20	187.96	86.51	-2.07	4.45	-74	17	730	7.57	28.63
		11/12/20	186.44	86.34	-1.90	1.59	-32	7.5	726	7.49	15.28

GENESIS ENGINEERING & REDEVELOPMENT

Table 2

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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation (ft amsl)	Date Measured	Depth to Bottom (feet bgs)	Depth to Water (feet bgs)	Hydraulic Head (feet amsl)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	SpC (µS/cm)	pH	Temp (°C)
MW-23	77.99	7/30/15	107.58	85.97	-7.98	--	--	--	--	--	--
		11/20/15	107.50	86.00	-8.01	--	--	--	--	--	--
	77.90	3/28/16	107.55	85.83	-7.93	--	--	--	--	--	--
		7/28/16	108.00	85.62	-7.72	--	--	--	--	--	--
		11/16/16	NM	NM	NM	NM	NM	NM	NM	NM	NM
		3/20/17	NM	NM	NM	NM	NM	NM	NM	NM	NM
		7/20/17	107.96	84.68	-6.78	--	--	--	--	--	--
		11/16/17	107.91	84.43	-6.53	--	--	--	--	--	--
		3/15/18	108.00	84.13	-6.23	1.49	93.4	111.6	1875	6.69	22.4
		8/14/18	107.72	83.92	-6.02	1.62	73	37.8	1750	7.05	24.42
		12/12/18	107.75	83.93	-6.03	1.8	106	37	1840	6.95	23.58
		5/8/19	107.45	83.36	-5.46	2	48	65.5	1820	7.83	20.69
		7/18/19	107.55	83.22	-5.32	2.99	155	63.9	1789	6.75	24.6
		12/18/19	107.35	82.77	-4.87	3.45	73	179	1600	6.92	19.18
		8/4/20	107.43	81.57	-3.67	2.24	29	36.5	1790	7.05	24.68
		11/10/20	107.35	81.61	-3.71	2.20	91	44.6	1810	6.93	23.44
MW-24	78.82	6/1/16	110.00	86.51	-7.69	--	--	--	--	--	--
		11/16/16	NM	NM	NM	NM	NM	NM	NM	NM	NM
		3/20/17	NM	NM	NM	NM	NM	NM	NM	NM	NM
		7/20/17	102.71	85.39	-6.57	--	--	--	--	--	--
		11/16/17	102.81	85.28	-6.46	--	--	--	--	--	--
		3/15/18	102.50	84.91	-6.09	0.36	-103.3	58.6	1780	6.75	22.7
		8/14/18	NM	84.76	-5.94	0.71	-102	17.2	1630	7.09	25.32
		5/8/19	NM	84.13	-5.31	NM	NM	NM	NM	NM	NM
		7/18/19	102.82	84.00	-5.18	NM	NM	NM	NM	NM	NM
		12/17/19	NM	83.52	-4.70	NM	NM	NM	NM	NM	NM
		8/4/20	NM	82.35	-3.53	NM	NM	NM	NM	NM	NM
		11/10/20	102.61	82.39	-3.57	NM	NM	NM	NM	NM	NM
MW-25	72.61	6/9/16	107.00	81.55	-8.94	--	--	--	--	--	--
		11/16/16	106.77	81.35	-8.74	--	--	--	--	--	--
		3/20/17	106.67	80.69	-8.08	--	--	--	--	--	--
		7/20/17	106.59	80.49	-7.88	--	--	--	--	--	--
		11/16/17	106.69	80.40	-7.79	--	--	--	--	--	--
		3/15/18	106.50	79.96	-7.35	0.43	33.2	165.5	1051	7.15	22.6
		8/14/18	106.71	79.82	-7.21	1.3	18	22.1	978	7.49	24.81
		12/11/18	106.73	79.68	-7.07	1.04	39	31.6	1040	7.33	23.83
		5/9/19	106.82	79.05	-6.44	0.00	-19	11.1	899	8.43	20.35
		7/17/19	106.68	78.98	-6.37	0.58	65.1	8.9	1017	7.17	24.8
		8/1/19	106.56	78.81	-6.20	NM	NM	NM	NM	NM	NM
		12/16/19	106.72	78.41	-5.80	5.62	13	49.9	917	7.32	20.53
		8/3/20	106.61	77.26	-4.65	1.14	-60	34.2	1060	7.16	27.94

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Sample ID	TOC Elevation (ft amsl)	Date Measured	Depth to Bottom (feet bgs)	Depth to Water (feet bgs)	Hydraulic Head (feet amsl)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	SpC (µS/cm)	pH	Temp (˚C)
MW-26	76.07	6/9/16	110.00	86.77	-10.70	--	--	--	--	--	--
		11/16/16	107.25	86.56	-10.49	--	--	--	--	--	--
		3/21/17	107.24	85.94	-9.87	--	--	--	--	--	--
		7/21/17	107.19	85.75	-9.68	--	--	--	--	--	--
		11/17/17	107.11	85.96	-9.89	--	--	--	--	--	--
		3/15/18	107.00	85.32	-9.25	0.39	-45.2	82.3	1540	7.41	22.2
		8/14/18	107.17	85.16	-9.09	0.47	-64	79.1	1490	7.70	23.62
		12/11/18	107.16	84.88	-8.81	1.14	-33	47.1	1500	7.60	23.61
		5/9/19	107.05	84.25	-8.18	3.99	-80	59.8	1490	8.68	20.66
		7/17/19	106.94	84.04	-7.97	1.17	54.3	81.4	1509	7.47	26.6
		8/1/19	107.12	83.99	-7.92	NM	NM	NM	NM	NM	NM
		12/16/19	107.05	83.69	-7.62	6.89	50	72.7	1330	7.82	22.73
		8/3/20	107.06	82.36	-6.29	1.24	-69	26.6	1570	7.36	26.85
		11/9/20	107.01	82.42	-6.35	2.42	-16	32.5	1460	7.65	22.94
MW-27	73.85	6/9/16	110.00	83.71	-9.86	--	--	--	--	--	--
		11/16/16	106.73	83.31	-9.46	--	--	--	--	--	--
		3/20/17	106.61	82.91	-9.06	--	--	--	--	--	--
		7/20/17	106.58	82.94	-9.09	--	--	--	--	--	--
		11/16/17	106.62	82.66	-8.81	--	--	--	--	--	--
		3/15/18	106.40	82.22	-8.37	0.52	-123.1	151.6	942	7.19	20.7
		8/14/18	106.67	82.09	-8.24	0.49	-43	59.4	1180	7.39	24.11
		12/11/18	106.71	81.95	-8.10	1.06	-94	86	821	7.34	23.28
		5/9/19	106.48	81.24	-7.39	0.00	-135	378	819	8.49	19.62
		7/17/19	112.55	81.14	-7.29	1.89	-67.1	516	925	7.23	22.6
		8/1/19	106.53	80.96	-7.11	NM	NM	NM	NM	NM	NM
		12/16/19	106.58	80.49	-6.64	2.72	-167	73.2	809	7.39	21.96
		8/3/20	106.36	79.37	-5.52	2.48	-179	121	995	7.15	25.79
		11/9/20	106.41	79.42	-5.57	3.25	-147	107	938	7.76	23.78
MW-28	75.88	6/9/16	110.00	84.40	-8.52	--	--	--	--	--	--
		11/17/16	107.35	84.18	-8.30	--	--	--	--	--	--
		3/21/17	107.29	83.75	-7.87	--	--	--	--	--	--
		7/21/17	107.23	83.31	-7.43	--	--	--	--	--	--
		11/17/17	107.18	83.69	-7.81	--	--	--	--	--	--
		3/15/18	107.45	82.91	-7.03	0.41	61.6	24.2	1776	7.14	22.7
		8/15/18	107.79	82.72	-6.84	0.85	55	50.1	1650	7.49	23.77
		12/11/18	107.81	82.64	-6.76	0.64	49	21.4	1760	7.32	23.4
		5/9/19	107.52	82.00	-6.12	2.30	-7	17.9	1720	8.41	21.01
		7/17/19	113.35	81.93	-6.05	1.29	133.1	68.4	1723	7.18	24.1
		8/1/19	107.55	81.74	-5.86	NM	NM	NM	NM	NM	NM
		12/16/19	107.49	81.34	-5.46	3.77	79	51.5	1550	7.30	20.64
		8/5/20	107.48	80.15	-4.27	1.46	62	102	1770	7.46	26.77
		11/9/20	107.39	80.21	-4.33	2.65	98	44	1760	7.55	23.67

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Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (˚C)
SPG-1	81.15	3/26/07	129.0	90.95	-9.80	--	--	--	--	--	--
		10/26/07	129.0	90.86	-9.71	--	--	--	--	--	--
		2/20/08	129.0	90.29	-9.14	--	--	--	--	--	--
		7/18/08	129.0	90.25	-6.63	--	--	--	--	--	--
		10/31/08	129.0	90.21	-6.59	--	--	--	--	--	--
		2/23/09	132.35	89.97	-6.35	--	--	--	--	--	--
		8/18/09	132.35	90.25	-6.63	--	--	--	--	--	--
		11/20/09	132.35	90.41	-6.79	--	--	--	--	--	--
	83.62	3/31/10	132.40	90.00	-6.38	--	--	--	--	--	--
		8/4/10	132.31	90.01	-6.39	--	--	--	--	--	--
		11/17/10	132.31	89.88	-6.26	--	--	--	--	--	--
		3/30/11	132.85	90.26	-6.64	--	--	--	--	--	--
		8/16/11	132.85	89.63	-6.01	--	--	--	--	--	--
		12/19/11	132.34	89.83	-6.21	--	--	--	--	--	--
		3/27/12	132.36	89.95	-6.33	--	--	--	--	--	--
		7/26/12	132.43	90.08	-6.46	--	--	--	--	--	--
		11/1/12	132.43	90.21	-6.59	--	--	--	--	--	--
		3/26/13	132.09	90.21	-6.59	--	--	--	--	--	--
		7/23/13	132.31	90.47	-6.85	--	--	--	--	--	--
		12/4/13	132.27	90.36	-6.74	--	--	--	--	--	--
		3/19/14	132.32	90.21	-6.59	--	--	--	--	--	--
		8/7/14	132.08	90.00	-6.38	--	--	--	--	--	--
		12/9/14	132.25	89.96	-6.34	--	--	--	--	--	--
		3/25/15	132.12	89.71	-6.09	--	--	--	--	--	--
		7/29/15	132.21	89.91	-6.29	--	--	--	--	--	--
		11/23/15	132.18	90.00	-6.38	--	--	--	--	--	--
		3/28/16	131.92	89.85	-6.23	--	--	--	--	--	--
		7/28/16	132.24	89.70	-6.08	--	--	--	--	--	--
		11/16/16	132.18	89.34	-5.72	--	--	--	--	--	--
		3/20/17	131.90	89.10	-5.48	--	--	--	--	--	--
		7/20/17	131.94	88.63	-5.01	--	--	--	--	--	--
		11/16/17	133.00	88.45	-4.83	--	--	--	--	--	--
		3/14/18	131.81	87.90	-4.28	0.40	7.3	3.9	613	7.42	22.9
		8/15/18	132.02	87.91	-4.29	0.76	-26	1.5	1080	7.51	26.21
		7/31/19	131.85	87.11	-3.49	1.28	-23.3	122.00	1093	7.19	24.8
		12/19/19	131.77	86.54	-2.92	1.52	8	74.80	761	7.14	24.15
MW-29	90.44	12/17/19	104.68	97.82	-7.38	4.31	-184	>1000	1160	7.49	23.62
		8/3/20	104.59	96.80	-6.36	1.11	-203	>1000	1450	7.75	26.52
		11/11/20	104.51	96.88	-6.44	0.94	-149	109	1340	7.67	24.94
MW-30	74.76	12/20/19	95.10	82.82	-8.06	2.80	-165	>1000	1380	7.12	24.21
		8/3/20	105.95	81.91	-7.15	2.46	23	>1000	1680	7.07	27.4
		11/11/20	92.21	81.99	-7.23	1.02	11	283	1380	7.28	23.83

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Table 2

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Groundwater Elevations and Field Measurements

Sample ID	TOC Elevation *(ft amsl)*	Date Measured	Depth to Bottom *(feet bgs)*	Depth to Water *(feet bgs)*	Hydraulic Head *(feet amsl)*	DO *(mg/L)*	ORP *(mV)*	Turbidity *(NTU)*	SpC *(µS/cm)*	pH	Temp (°C)
MW-31	80.78	12/17/19	100.84	89.14	-8.36	4.54	-140	>1000	1480	7.12	25.83
		8/3/20	100.66	88.23	-7.45	2.66	-27	>1000	1620	7.19	26.67
		11/11/20	100.82	88.31	-7.53	1.90	47	99.9	1520	7.31	24.5
MW-34	87.56	12/26/19	149.94	90.84	-3.28	0.25	-178	335	704	7.4	23.02
		6/9/20	149.84	90.13	-2.57	0.86	-155	41.3	1040	7.26	29.7
		11/12/20	149.73	90.01	-2.45	1.17	-89	15.2	990	7.54	23.44
MW-35	83.36	6/9/20	147.59	86.29	-2.9	0.86	-155	41.3	1040	7.26	29.7
		11/11/20	147.09	86.13	-2.8	2.75	-150	164	999	7.84	22.28
MW-36	81.42	12/17/19	100.12	88.55	-7.13	0.92	-193	>1000	1060	7.39	25.84
		8/5/20	100.04	87.50	-6.08	1.67	-79	>1000	1160	7.66	25.25
		11/11/20	100.00	87.55	-6.13	0.65	-23	330	1120	7.51	24.11
MW-39	83.13	6/9/20	251.86	85.81	-2.68	5.05	-1	>1000	1110	7.39	31.98
		11/10/20	249.92	85.76	-2.63	1.80	3	2.5	1070	7.79	23.17
MW-40	81.49	12/17/19	148.31	89.32	-7.83	0.80	-95	725	844	7.45	23.84
		8/5/20	148.23	88.45	-6.96	1.19	-285	109	1380	7.1	22.23
		11/11/20	148.23	88.49	-7.00	0.96	-75	8.5	1050	7.37	22.56

Notes:

- "TOC" - top of casing
- "feet bgs" - Feet below the ground surface
- "feet amsl" - Feet above mean sea level
- "DO-" - Dissolved oxygen
- "ORP-" - Oxidation reductoin potential
- "SpC-" - Specific conductance
- "--" - not reported in tri-annual monitoring tables

GENESIS ENGINEERING & REDEVELOPMENT

Table 3

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-1	12/20/91	**1,500**	**2,500**	ND	ND	ND	-
	7/31/92	ND	**6,600**	ND	ND	ND	-
	10/21/92	ND	**2,100**	ND	ND	ND	-
	3/11/93	ND	**3,200**	ND	ND	ND	-
	7/8/93	ND	**5,100**	ND	ND	ND	-
	9/22/93	ND	**3,400**	ND	ND	ND	-
	11/16/93	**96**	**6,600**	ND	ND	ND	-
	3/10/94	ND	**2,300**	ND	ND	ND	-
	6/9/94	ND	**17,000**	ND	ND	ND	-
	9/8/94	ND	**7,600**	ND	ND	ND	-
	12/8/94	**130**	**3,700**	ND	ND	ND	-
	3/9/95	**170**	**5,500**	ND	ND	34	-
	6/6/95	**220**	**8,000**	2	ND	58	-
	9/21/95	**200**	**8,200**	ND	ND	31	-
	12/13/95	**180**	**5,400**	ND	ND	ND	-
	3/26/96	**310**	**7,600**	ND	ND	ND	-
	6/13/96	**170**	**4,200**	ND	ND	ND	-
	9/17/96	**240**	**6,000**	ND	ND	ND	-
	1/14/97	**340**	**9,200**	ND	ND	ND	-
	6/3/97	**310**	**7,200**	ND	ND	ND	-
	9/16/97	**300**	**6,900**	ND	ND	ND	-
	12/16/97	**290**	**6,400**	ND	ND	ND	-
	3/31/98	**310**	**7,900**	ND	ND	ND	-
	8/20/98	**240**	**5,400**	ND	ND	ND	-
	3/17/99	**370**	**11,000**	ND	ND	ND	-
	7/12/99	**740**	**23,000**	ND	ND	ND	-
	11/17/99	ND	**7,700**	ND	ND	ND	-
	2/29/00	ND	**16,000**	ND	ND	ND	-
	6/28/00	ND	**5,000**	ND	ND	ND	-
	10/20/00	**160**	**4,800**	ND	ND	ND	-
	2/21/01	**36**	**990**	ND	ND	ND	-
	6/26/01	**98**	**2,200**	ND	ND	21	-
	10/23/01	ND	**3,200**	ND	ND	ND	-
	2/26/02	ND	**2,800**	ND	ND	ND	-
	6/6/02	ND	**2,200**	ND	ND	ND	-
	10/10/02	ND	**1,400**	ND	ND	ND	-
	3/3/03	**62**	**1,400**	<5.0	<5.0	9.4	-
	7/24/03	**9.2**	**230**	<0.50	<0.50	2.5	-
	10/30/03	**20**	**390**	<0.50	<0.50	4.2	-
	2/23/04	**8.7**	**250**	<1.0	<1.0	3.0	-
	7/19/04	**13**	**370**	<0.50	<0.50	4.2	-
	10/28/04	**8.9**	**210**	<0.50	<0.50	2.2	-
	2/17/05	**8.8**	**240**	<0.50	<0.50	3.5	-
	7/28/05	**9.2**	**260**	<0.50	<0.50	<0.50	-
	10/10/05	1.7	**51**	<0.50	<0.50	1.0	-
	2/27/06	1.5	**39**	<0.50	<0.50	0.7	-
	7/25/06	4.7	**160**	<0.50	<0.50	<0.50	-
	10/27/06	2.6	**74**	<0.50	<0.50	1.2	-
	3/26/07	<0.50	**11**	<0.50	<0.50	<0.50	-
	7/30/07	3.8	**99**	<0.50	<0.50	0.82	-
	10/26/07	2.5	**76**	<0.50	<0.50	1.6	-
	2/20/08	1.2	**32**	<0.50	<0.50	0.7	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

Table 3

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	**TCE**	**cis-1,2-DCE**	**trans-1,2-DCE**	**1,1-DCE**	**Vinyl Chloride**
MW-1	7/18/08	1.0	**33**	<0.50	<0.50	0.8	-
	10/31/08	1.0	**31**	<0.50	<0.50	1.0	-
	2/23/09	1.2	**37**	<0.50	<0.50	1.4	-
	8/18/09	2.1	**57**	<0.50	<0.50	1.9	-
	11/20/09	2.2	**57**	<0.50	<0.50	2.1	-
	3/31/10	<1.0	**22**	<1.0	<1.0	<1.0	-
	8/4/10	<1.0	**19**	<1.0	<1.0	1.0	-
	11/17/10	<1.0	**12**	<1.0	<1.0	1.3	-
	3/30/11	<1.0	**6.5**	<1.0	<1.0	<1.0	-
	8/17/11	<1.0	**16**	<1.0	<1.0	1.1	-
	12/20/11	<1.0	**13**	<1.0	<1.0	1.0	-
	3/27/12	<1.0	**10**	<1.0	<1.0	<1.0	-
	7/27/12	<1.0	**13**	<1.0	<1.0	<1.0	-
	11/1/12	<1.0	**15**	<1.0	<1.0	<1.0	-
	3/26/13	<1.0	**11**	<1.0	<1.0	<1.0	-
	7/23/13	<1.0	**25**	<1.0	<1.0	<1.0	-
	12/4/13	<1.0	**18**	<1.0	<1.0	<1.0	-
	3/19/14	<1.0	4.0	<1.0	<1.0	<1.0	-
	8/7/14	1.3	**37**	<1.0	<1.0	1.4	-
	12/9/14	<1.0	3.9	<1.0	<1.0	<1.0	-
	3/25/15	<1.0	**10**	<1.0	<1.0	<1.0	-
	7/29/15	<1.0	**21**	<1.0	<1.0	<1.0	-
	11/23/15	<1.0	**20**	<1.0	<1.0	1.0	-
	3/28/16	<1.0	3.5	<1.0	<1.0	<1.0	-
	7/28/16	<1.0	4.6	<1.0	<1.0	<1.0	-
	11/16/16	1.9	**65**	1.3	<1.0	1.9	-
	3/20/17	<1.0	**4.8**	<1.0	<1.0	<1.0	-
	7/20/17	<1.0	**34**	<1.0	<1.0	1.4	-
	11/16/17	<1.0	**5.6**	<1.0	<1.0	<1.0	-
	3/14/18	<0.50	**15**	0.70	<0.50	0.66	<0.50
	8/15/18	1.2	**44**	2.4	<0.50	1.4	**2.3**
	DUP-3	1.5	**47**	2.3	<0.50	1.3	**2.1**
	7/31/19	<0.50	**23**	2.6	<0.50	0.81	**1.6**
	DUP-2	<0.50	**22**	2.5	<0.50	0.87	**1.4**
	12/19/19	<0.50	**22**	0.91	<0.50	0.72	<0.50
MW-3	12/20/91	**2,300**	**4,200**	ND	ND	170	-
	7/31/92	ND	**70,000**	ND	ND	ND	-
	10/21/92	ND	**23,000**	ND	ND	ND	-
	3/11/93	ND	**4,300**	ND	ND	ND	-
	7/8/93	ND	**1,600**	ND	ND	ND	-
	9/22/93	ND	**8,500**	ND	ND	ND	-
	11/16/93	ND	**42,000**	ND	ND	ND	-
	3/10/94	ND	**18,000**	ND	ND	ND	-
	6/9/94	ND	**190,000**	ND	ND	ND	-
	9/8/94	ND	**150,000**	ND	ND	ND	-
	12/8/94	**2,700**	**100,000**	ND	ND	360	-
	3/9/95	**370**	**14,000**	ND	ND	84	-
	6/6/95	**150**	**7,800**	3.0	1.0	89	-
	9/21/95	**33**	**5,200**	**18**	6.0	44	-
	12/13/95	**1,300**	**82,000**	ND	ND	ND	-
	3/26/96	**4,100**	**120,000**	ND	ND	ND	-
	6/13/96	ND	**120,000**	ND	ND	ND	-
	9/17/96	**1,800**	**68,000**	ND	ND	ND	-
	1/14/97	ND	**100,000**	ND	ND	ND	-
	6/3/97	ND	**110,000**	ND	ND	ND	-
	9/16/97	**3,100**	**98,000**	ND	ND	ND	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

Table 3

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-3	12/16/97	2,000	54,000	ND	ND	ND	-
	3/31/98	16,000	43,000	ND	ND	ND	-
	8/20/98	4,300	89,000	ND	ND	ND	-
	3/17/99	2,500	94,000	ND	ND	ND	-
	7/12/99	2,700	98,000	ND	ND	ND	-
	11/17/99	ND	81,000	ND	ND	ND	-
	2/29/00	ND	89,000	ND	ND	ND	-
	6/29/00	ND	75,000	ND	ND	ND	-
	10/20/00	ND	66,000	ND	ND	ND	-
	2/22/01	2,800	39,000	ND	ND	ND	-
	6/26/01	<1,200	25,000	ND	ND	ND	-
	10/23/01	<120	4,100	ND	ND	ND	-
	11/14/01	1,500	57,000	ND	ND	ND	-
	2/26/02	870	27,000	62	ND	200	-
	6/6/02	ND	21,000	ND	ND	ND	-
	10/10/02	ND	11,000	ND	ND	ND	-
	3/3/03	510	15,000	<50	<50	55	-
	7/24/03	140	4,200	6.5	<0.50	17	-
	10/30/03	610	16,000	19	<10	76	-
	2/23/04	61	1,700	<25	<25	<25	-
	7/20/04	270	11,000	6.9	<5.0	53	-
	10/28/04	150	2,200	<25	<25	<25	-
	2/17/05	380	11,000	11	<0.50	58	-
	7/28/05	380	13,000	<25	<25	<25	-
	10/10/05	39	1,200	<2.5	<2.5	6.0	-
	2/27/06	40	860	<5.0	<5.0	<5.0	-
	7/25/06	340	11,000	7.4	<5.0	58	-
	10/27/06	<50	2,900	<50	<50	<50	-
	3/26/07	28	750	<10	<10	<10	-
	7/30/07	270	8,800	11	<0.50	51	-
	10/26/07	120	4,400	4.3	<0.50	29	-
	2/20/08	51	1,200	<5.0	<5.0	5.4	-
	7/18/08	25	730	<5.0	<5.0	5.4	-
	10/31/08	76	2,500	3.4	<2.5	22	-
	2/23/09	120	4,000	<10	<10	32	-
	8/18/09	77	2,600	7.5	<0.50	24	-
	11/20/09	91	2,900	9.7	<0.50	27	-
	4/1/10	55	1,400	4.9	<1.0	15	-
	8/4/10	19	500	<5.0	<5.0	<5.0	-
	11/17/10	14	430	<5.0	<5.0	<5.0	-
	3/30/11	11	260	<2.0	<2.0	2.8	-
	8/16/11	32	910	<10	<10	<10	-
	12/19/11	27	730	<10	<10	<10	-
	3/27/12	18	580	7.0	<10	<10	-
	7/26/12	12	520	8.4	<10	<10	-
	11/1/12	19	560	14	<1.0	5.8	-
	3/26/13	15	620	14	<5.0	5.5	-
	7/23/13	20	580	16	<5.0	<10	-
	12/4/13	13	370	8.4	<5.0	<5.0	-
	3/19/14	9.0	270	6.9	<5.0	<5.0	-
	8/7/14	18	670	33	<5.0	5.2	-
	12/9/14	6.6	150	2.7	<2.0	<2.0	-
	3/25/15	9.6	320	11	<2.0	2.3	-
	MCL	5	5	6	10	6	0.5

GENESIS ENGINEERING & REDEVELOPMENT

Table 3

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-3	7/29/15	**18**	**440**	**24**	<2.0	3.5	-
	11/20/15	**14**	**420**	**23**	<5.0	<5.0	-
	3/29/16	**10**	**170**	4.2	<1.0	1.1	-
	7/29/16	**9.0**	**160**	3.2	<1.0	1.1	-
	11/17/16	**22**	**430**	**19**	<2.0	3.2	-
	3/20/17	**8.5**	**120**	**6.4**	<1.0	<1.0	-
	7/21/17	**7.2**	**140**	**6.5**	<1.0	1.1	-
	7/22/17	**7.2**	**141**	**7.5**	<1.1	1.1	-
	11/17/17	**6.9**	**100**	1.1	<1.0	<1.0	-
	3/14/18	**8.7**	**170**	3.0	<1.0	<1.0	<1.0
	DUP-4	**8.4**	**150**	2.9	<1.0	<1.0	<1.0
	8/15/18	**12.0**	**130**	6.6	<1.0	0.86	<1.0
	7/31/19	1.9	**45**	0.33 J	<0.50	<0.50	<0.50
	12/20/19	**5.2**	**90**	<0.50	<0.50	<0.50	<0.50
MW-4	12/20/91	**113**	**2,600**	ND	ND	ND	-
	7/31/92	ND	**1,600**	ND	ND	ND	-
	10/21/92	ND	**360**	ND	ND	ND	-
	3/11/93	ND	**580**	ND	ND	ND	-
	7/8/93	ND	**1,600**	ND	ND	ND	-
	9/22/93	ND	**590**	ND	ND	ND	-
	11/16/93	ND	**620**	ND	ND	ND	-
	3/10/94	ND	**1,900**	ND	ND	ND	-
	6/9/94	ND	**5,700**	ND	ND	ND	-
	9/8/94	ND	**18,000**	ND	ND	ND	-
	12/8/94	**71**	**2,200**	ND	ND	**8.0**	-
	3/9/95	**60**	**2,400**	ND	ND	**13**	-
	6/6/95	**85**	**2,000**	1	ND	**11**	-
	9/21/95	**87**	**1,200**	2	ND	**8.0**	-
	12/13/95	**140**	**5,100**	ND	ND	ND	-
	3/26/96	ND	**2,800**	ND	ND	ND	-
	6/13/96	**85**	**1,200**	ND	ND	ND	-
	9/17/96	**29**	**970**	ND	ND	ND	-
	1/14/97	ND	**4,100**	ND	ND	ND	-
	6/3/97	**50**	**1,600**	ND	ND	ND	-
	9/16/97	**58**	**1,700**	ND	ND	ND	-
	12/16/97	**72**	**1,700**	ND	ND	ND	-
	3/31/98	**47**	**1,400**	**79**	ND	ND	-
	8/20/98	ND	**1,200**	ND	ND	ND	-
	3/17/99	**56**	**2,000**	ND	ND	ND	-
	7/12/99	**72**	**2,900**	ND	ND	ND	-
	11/17/99	ND	**2,900**	ND	ND	ND	-
	2/28/00	**150**	**4,600**	ND	ND	ND	-
	6/28/00	**130**	**4,700**	ND	ND	ND	-
	10/20/00	ND	**2,700**	ND	ND	ND	-
	2/21/01	**28**	**1,200**	ND	ND	ND	-
	6/26/01	**51**	**1,700**	**25**	ND	ND	-
	10/23/01	**37**	**1,400**	ND	ND	ND	-
	2/26/02	**26**	**1,100**	**32**	ND	ND	-
	6/6/02	ND	**560**	ND	ND	ND	-
	10/10/02	ND	**560**	ND	ND	ND	-
	3/3/03	**19**	**770**	**22**	<5.0	5.0	-
	7/24/03	**14**	**560**	**15**	<0.50	4.0	-
	10/30/03	**29**	**760**	**25**	<2.5	<2.5	-
	2/23/04	**21**	**770**	**33**	<2.5	**6.8**	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

Table 3

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-4	7/19/04	29	1,100	41	<2.5	11	-
	10/28/04	40	1,000	54	<2.5	7.4	-
	2/17/05	32	1,100	73	<0.50	9.1	-
	7/28/05	22	830	66	<2.5	6.6	-
	10/10/05	41	1,400	120	<5.0	10.0	-
	2/27/06	36	940	77	<5.0	6.7	-
	7/25/06	33	1,100	110	<5.0	<5.0	-
	10/27/06	28	860	79	<5.0	6.2	-
	3/26/07	26	780	90	<2.5	7.6	-
	7/31/07	30	800	82	0.6	5.7	-
	10/26/07	23	860	82	1.0	5.5	-
	2/20/08	22	680	82	<2.5	4.8	-
	7/18/08	21	720	74	<2.5	5.0	-
	10/31/08	15	510	49	<2.5	4.0	-
	2/23/09	19	570	52	<2.5	4.6	-
	8/18/09	20	450	45	<0.50	3.6	-
	11/20/09	18	400	38	<0.50	3.2	-
	3/31/10	19	390	21	<2.0	2.1	-
	8/4/10	14	330	23	<2.0	<2.0	-
	11/18/10	12	290	17	<2.0	<2.0	-
	3/30/11	7.5	180	16	<2.0	<2.0	-
	8/17/11	8.9	190	12	<2.0	<2.0	-
	12/20/11	9.4	200	13	<2.0	<2.0	-
	3/27/12	9.1	170	11	<2.0	<2.0	-
	7/26/12	6.2	130	8.7	<2.0	<2.0	-
	11/2/12	6.2	130	13	<1.0	<1.0	-
	3/26/13	5.0	130	15	<1.0	<1.0	-
	7/23/13	3.9	110	16	<1.0	<1.0	-
	12/5/13	7.8	150	17	<1.0	<1.0	-
	3/19/14	5.1	120	19	<1.0	<1.0	-
	8/7/14	5.3	130	25	<2.0	<2.0	-
	12/9/14	6.1	130	24	<2.0	<2.0	-
	3/25/15	5.6	130	19	<2.0	<2.0	-
	7/29/15	9.7	190	31	<2.0	<2.0	-
	11/23/15	8.4	170	26	<1.0	<1.0	-
	3/28/16	10	140	26	<1.0	<1.0	-
	7/29/16	8.7	160	29	<1.0	<1.0	-
	11/17/16	10	150	28	<1.0	1.0	-
	3/20/17	9.7	150	29	<1.0	<1.0	-
	7/21/17	NS	NS	NS	NS	NS	-
	11/16/17	5.4	100	18	<1.0	<1.0	-
	3/15/18	3.9	83	13	<0.50	<0.50	<0.50
	DUP-5	4.4	91	14	<0.50	<0.50	<0.50
	8/16/18	5.9	99	18	<0.50	0.49 J	<0.50
	7/30/19	3.1	64	12	<0.50	0.26 J	<0.50
	12/19/19	3.9	62	13	<0.50	0.34 J	<0.50
MW-5	7/31/92	ND	3,400	ND	ND	ND	-
	10/21/92	ND	3,700	ND	ND	ND	-
	3/11/93	ND	4,800	ND	ND	ND	-
	7/8/93	ND	6,700	ND	ND	ND	-
	9/22/93	ND	6,400	ND	ND	ND	-
	11/16/93	ND	6,500	ND	ND	ND	-
	3/10/94	ND	6,300	ND	ND	ND	-
	6/9/94	ND	34,000	ND	ND	ND	-
	MCL	5	5	6	10	6	0.5

GENESIS ENGINEERING & REDEVELOPMENT

Table 3

Hi-Shear Corporation
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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-5	9/8/94	ND	**10,000**	ND	ND	ND	-
	12/8/94	**120**	**8,100**	ND	ND	2.0	-
	3/9/95	**61**	**9,400**	ND	ND	**6.0**	-
	6/6/95	**96**	**4,200**	ND	ND	ND	-
	9/21/95	**100**	**10,000**	2.0	ND	**6.0**	-
	12/13/95	**160**	**9,700**	ND	ND	ND	-
	3/26/96	**190**	**10,000**	ND	ND	ND	-
	6/13/96	ND	**13,000**	ND	ND	ND	-
	9/17/96	**300**	**15,000**	ND	ND	ND	-
	1/14/97	ND	**14,000**	ND	ND	ND	-
	6/3/97	**470**	**17,000**	ND	ND	ND	-
	9/16/97	**270**	**8,100**	ND	ND	ND	-
	12/16/97	**270**	**10,000**	ND	ND	ND	-
	3/31/98	ND	**11,000**	ND	ND	ND	-
	8/20/98	ND	**12,000**	ND	ND	ND	-
	3/17/99	**180**	**6,000**	ND	ND	ND	-
	7/12/99	**190**	**7,000**	ND	ND	ND	-
	11/17/99	ND	**11,000**	ND	ND	ND	-
	2/29/00	ND	**4,500**	ND	ND	ND	-
	6/28/00	ND	**5,200**	ND	ND	ND	-
	10/20/00	ND	**4,400**	ND	ND	ND	-
	2/21/01	**91**	**2,800**	ND	ND	ND	-
	6/26/01	**160**	**5,900**	ND	ND	ND	-
	10/23/01	ND	**8,000**	ND	ND	ND	-
	2/26/02	ND	**3,300**	ND	ND	ND	-
	6/6/02	ND	**9,100**	ND	ND	ND	-
	10/10/02	**300**	**11,000**	ND	ND	ND	-
	3/3/03	**120**	**3,800**	**14**	<10	<10	-
	7/24/03	**220**	**10,000**	**8.2**	<0.50	**10**	-
	10/30/03	**220**	**9,400**	<25	<25	<25	-
	2/23/04	**230**	**8,800**	<25	<25	<25	-
	7/19/04	**240**	**13,000**	<25	<25	<25	-
	10/28/04	**340**	**14,000**	<25	<25	<25	-
	2/17/05	**260**	**14,000**	**10**	<0.50	**19**	-
	7/28/05	**380**	**23,000**	<25	<25	**28**	-
	10/10/05	**390**	**23,000**	<50	<50	<50	-
	2/27/06	**420**	**19,000**	<100	<100	<100	-
	7/25/06	**570**	**25,000**	**17**	<0.50	**36**	-
	10/27/06	**420**	**23,000**	<100	<100	<100	-
	3/26/07	**340**	**20,000**	<100	<100	<100	-
	7/30/07	**410**	**16,000**	**21**	0.6	**42**	-
	10/26/07	**330**	**19,000**	**21**	0.6	**48**	-
	2/20/08	**430**	**20,000**	<50	<50	<50	-
	7/18/08	**300**	**19,000**	<100	<100	<100	-
	10/31/08	**350**	**19,000**	<50	<50	<50	-
	2/23/09	**330**	**18,000**	<50	<50	<50	-
	8/18/09	**360**	**17,000**	**21**	0.5	**55**	-
	11/20/09	**370**	**16,000**	**18**	0.6	**49**	-
	3/31/10	**330**	**17,000**	<100	<100	<100	-
	8/4/10	**270**	**13,000**	<100	<100	<100	-
	11/17/10	**240**	**12,000**	<100	<100	<100	-
	3/30/11	**200**	**9,800**	<100	<100	<100	-
	8/17/11	**160**	**9,000**	<100	<100	<100	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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Hi-Shear Corporation
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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
	12/20/11	**240**	**10,000**	<100	<100	<100	-
	3/27/12	**180**	**7,800**	11	<100	**34**	-
	7/27/12	**100**	**6,600**	<50	<100	<50	-
	11/1/12	**110**	**5,300**	<25	<50	<25	-
	3/26/13	**49**	**2,100**	<10	<20	<10	-
	7/23/13	**140**	**5,800**	<10	<20	<10	-
	12/4/13	**95**	**5,000**	<50	<50	<50	-
	3/19/14	**100**	**5,100**	<50	<50	<50	-
	8/7/14	<50	**3,600**	<50	<50	<50	-
	12/9/14	**88**	**3,600**	<50	<50	<50	-
	3/25/15	**56**	**2,000**	<10	<20	<10	-
MW-5	7/29/15	**53**	**2,700**	<20	<20	<20	-
	11/23/15	**53**	**2,400**	<20	<20	<20	-
	3/28/16	**25**	**840**	<2.0	<2.0	5.0	-
	7/28/16	**14**	**380**	<2.0	<2.0	3.3	-
	11/16/16	**14**	**280**	<2.0	<2.0	2.9	-
	3/20/17	**7.8**	**200**	<2.0	<2.0	2.7	-
	7/20/17	**6.0**	**120**	<1.0	<1.0	1.7	-
	11/16/17	**8.5**	**150**	<1.0	<1.0	1.6	-
	3/12/18	**6.1**	**110**	<0.50	<0.50	0.98	<0.50
	8/15/18	**15.0**	**230**	0.51	<0.50	2.3	<0.50
	8/1/19	<5.0	**580**	<0.50	<0.50	3.0 J	<0.50
	12/18/19	**35**	**680**	1.9	<0.50	**7.6**	<0.50
	7/31/92	ND	**2,300**	ND	ND	ND	-
	10/21/92	ND	**2,600**	ND	ND	ND	-
	3/11/93	ND	**1,000**	ND	ND	ND	-
	7/8/93	ND	**770**	ND	ND	ND	-
	9/22/93	ND	**560**	ND	ND	ND	-
	11/16/93	**12**	**510**	ND	ND	ND	-
	3/10/94	ND	**580**	ND	ND	ND	-
	6/9/94	ND	**600**	ND	ND	ND	-
	9/8/94	ND	**9,800**	ND	ND	ND	-
	12/8/94	**30**	**1,100**	ND	ND	ND	-
	3/9/95	**26**	**590**	ND	ND	ND	-
	6/6/95	**15**	**270**	ND	ND	ND	-
	9/21/95	**42**	**920**	ND	ND	ND	-
	12/13/95	ND	**1,600**	ND	ND	ND	-
MW-6	3/26/96	ND	**1,100**	ND	ND	ND	-
	6/13/96	**200**	**1,600**	ND	ND	ND	-
	9/17/96	ND	**1,500**	ND	ND	ND	-
	1/14/97	**30**	**1,300**	ND	ND	ND	-
	6/3/97	ND	**2,300**	ND	ND	ND	-
	9/16/97	**87**	**3,500**	ND	ND	ND	-
	12/16/97	**100**	**3,900**	ND	ND	ND	-
	3/31/98	**100**	**3,800**	ND	ND	ND	-
	8/20/98	**51**	**3,000**	ND	ND	ND	-
	3/17/99	**71**	**2,500**	ND	ND	ND	-
	7/12/99	ND	**1,700**	ND	ND	ND	-
	11/17/99	**43**	**1,400**	ND	ND	ND	-
	2/28/00	ND	**800**	ND	ND	ND	-
	6/28/00	ND	**1,200**	ND	ND	ND	-
	10/20/00	ND	**1,300**	ND	ND	ND	-
	6/26/01	**55**	**2,200**	ND	ND	ND	-
	10/23/01	ND	**1,100**	ND	ND	ND	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-6	2/26/02	**70**	**1,400**	ND	ND	ND	-
	6/6/02	**82**	**2,200**	ND	ND	ND	-
	10/10/02	**85**	**1,800**	ND	ND	ND	-
	3/3/03	NS	NS	NS	NS	NS	-
	7/24/03	**29**	**1,300**	1.5	<0.50	<0.50	-
	10/30/03	NS	NS	NS	NS	NS	-
	2/23/04	NS	NS	NS	NS	NS	-
	7/19/04	**41**	**1,900**	<2.5	<2.5	3.5	-
	10/28/04	NS	NS	NS	NS	NS	-
	2/17/05	NS	NS	NS	NS	NS	-
	7/28/05	**25**	**930**	<5.0	<5.0	<5.0	-
	10/10/05	NS	NS	NS	NS	NS	-
	2/27/06	NS	NS	NS	NS	NS	-
	7/25/06	**36**	**1,200**	<0.50	<0.50	<0.50	-
	10/27/06	NS	NS	NS	NS	NS	-
	3/26/07	NS	NS	NS	NS	NS	-
	7/31/07	**19**	**410**	0.8	<0.50	0.8	-
	10/26/07	NS	NS	NS	NS	NS	-
	2/20/08	NS	NS	NS	NS	NS	-
	7/25/08	**44**	**1,000**	1.2	<0.50	4.5	-
	10/31/08	NS	NS	NS	NS	NS	-
	2/23/09	NS	NS	NS	NS	NS	-
	8/18/09	**12**	**840**	1.1	<0.50	2.3	-
	11/20/09	NS	NS	NS	NS	NS	-
	4/1/10	**19**	**1,500**	1.9	<1.0	3.8	-
	8/4/10	**35**	**2,300**	<10	<10	**12**	-
	11/18/10	**84**	**5,300**	<10	<10	**26**	-
	3/30/11	**110**	**6,800**	<50	<50	<50	-
	8/17/11	**210**	**7,300**	<50	<50	**120**	-
	12/20/11	**200**	**7,700**	<50	<50	<50	-
	3/27/12	**120**	**6,300**	<50	<50	<50	-
	7/27/12	**120**	**7,200**	<50	<50	<50	-
	11/2/12	**180**	**9,000**	<50	<50	**78**	-
	3/27/13	**170**	**8,600**	<50	<50	**110**	-
	7/23/13	**290**	**9,500**	<50	<50	**120**	-
	12/5/13	**290**	**12,000**	<50	<50	**110**	-
	3/20/14	**300**	**12,000**	<100	<100	**220**	-
	8/8/14	**270**	**7,100**	<100	<100	**210**	-
	12/10/14	**570**	**9,800**	<200	<200	**290**	-
	3/26/15	**610**	**9,000**	<200	<200	**360**	-
	7/30/15	**480**	**9,000**	<50	<50	**310**	-
	11/23/15	**790**	**11,000**	<100	<100	**340**	-
	3/29/16	**990**	**13,000**	<100	<100	**280**	-
	7/29/16	**390**	**17,000**	<100	<100	**150**	-
	11/17/16	**1,100**	**11,000**	<100	<100	**260**	-
	3/21/17	**660**	**9,900**	<100	<100	**280**	-
	7/21/17	**460**	**11,000**	<100	<100	**180**	-
	11/17/17	**710**	**12,000**	<100	<100	**200**	-
	3/15/18	**320**	**7,700**	<10	<10	**100**	<10
	8/13/18	**240**	**3,300**	**240**	<25	**100**	**33**
	8/1/19	**230**	**1,500**	**650**	4.9 J	**52**	**7.2**
	12/19/19	**220**	**550**	**730**	<12	**88**	**12**
MW-7	10/21/92	ND	2.2	ND	ND	ND	-
	3/11/93	ND	1.5	ND	ND	ND	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-7	7/8/93	ND	**6.2**	ND	ND	ND	-
	9/22/93	ND	**6.7**	ND	ND	ND	-
	11/16/93	ND	4.1	ND	ND	ND	-
	3/10/94	ND	**6.9**	ND	ND	ND	-
	6/9/94	ND	**13**	ND	ND	ND	-
	9/8/94	ND	**14**	ND	ND	ND	-
	12/8/94	ND	**6.0**	ND	ND	ND	-
	3/9/95	ND	**8.0**	ND	ND	ND	-
	6/6/95	ND	19	ND	ND	ND	-
	9/21/95	ND	3.0	ND	ND	ND	-
	12/13/95	ND	4.4	ND	ND	ND	-
	3/26/96	0.7	4.7	ND	ND	0.5	-
	6/13/96	ND	2.3	ND	ND	ND	-
	9/17/96	1.2	2.8	ND	ND	ND	-
	1/14/97	1.0	4.2	ND	ND	ND	-
	6/3/97	1.9	1.6	ND	ND	ND	-
	9/16/97	2.8	1.9	ND	ND	ND	-
	12/16/97	3.5	4.1	ND	ND	ND	-
	3/31/98	4.4	1.5	ND	ND	ND	-
	8/20/98	**5.4**	1.2	ND	ND	ND	-
	3/17/99	**6.9**	3.7	ND	ND	ND	-
	7/12/99	**6.7**	4.3	ND	ND	ND	-
	11/16/99	**5.9**	4.2	ND	ND	ND	-
	2/28/00	**19**	4.1	ND	ND	ND	-
	6/28/00	**15**	3.2	ND	ND	ND	-
	10/20/00	**19**	2.5	ND	ND	ND	-
	2/20/01	**10**	2.6	ND	ND	ND	-
	6/26/01	**21**	**5.5**	ND	ND	ND	-
	10/23/01	**16**	2.5	ND	ND	ND	-
	2/26/02	**23**	2.3	ND	ND	ND	-
	6/6/02	**37**	1.3	ND	ND	ND	-
	10/10/02	**38**	2.4	ND	ND	ND	-
	3/3/03	NS	NS	NS	NS	NS	-
	7/24/03	**82**	<0.50	<0.50	<0.50	<0.50	-
	10/30/03	NS	NS	NS	NS	NS	-
	2/23/04	**54**	0.9	<0.50	<0.50	<0.50	-
	7/19/04	**60**	1.0	<0.50	<0.50	<0.50	-
	10/28/04	NS	NS	NS	NS	NS	-
	2/17/05	NS	NS	NS	NS	NS	-
	7/28/05	**55**	<0.50	<0.50	<0.50	<0.50	-
	10/10/05	NS	NS	NS	NS	NS	-
	2/27/06	NS	NS	NS	NS	NS	-
MW-7R	3/26/07	**33**	0.9	<0.50	<0.50	<0.50	-
	7/30/07	**36**	0.7	<0.50	<0.50	<0.50	-
	10/26/07	NS	NS	NS	NS	NS	-
	2/20/08	NS	NS	NS	NS	NS	-
	7/18/08	**34**	<0.50	<0.50	<0.50	<0.50	-
	10/31/08	NS	NS	NS	NS	NS	-
	2/23/09	NS	NS	NS	NS	NS	-
	8/18/09	**54**	0.7	<0.50	<0.50	<0.50	-
	11/20/09	NS	NS	NS	NS	NS	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration *(µg/L)*					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-7R	3/31/10	**65**	<1.0	<1.0	<1.0	<1.0	-
	3/31/10	**65**	<1.0	<1.0	<1.0	<1.0	-
	8/4/10	**59**	<1.0	<1.0	<1.0	<1.0	-
	11/17/10	**38**	<1.0	<1.0	<1.0	<1.0	-
	3/30/11	**37**	<1.0	<1.0	<1.0	<1.0	-
	8/16/11	**43**	1.6	<1.0	<1.0	<1.0	-
	12/19/11	**52**	1.8	<1.0	<1.0	<1.0	-
	3/27/12	**53**	2.8	<1.0	<1.0	<1.0	-
	7/26/12	**42**	1.1	<1.0	<1.0	<1.0	-
	11/1/12	**43**	1.6	<1.0	<1.0	<1.0	-
	3/26/13	**42**	1.6	<1.0	<1.0	<1.0	-
	7/23/13	**53**	1.3	<1.0	<1.0	<1.0	-
	12/4/13	**33**	3.6	<1.0	<1.0	<1.0	-
	3/19/14	**27**	<1.0	<1.0	<1.0	<1.0	-
	8/7/14	**37**	<1.0	<1.0	<1.0	<1.0	-
	12/9/14	**33**	<1.0	<1.0	<1.0	<1.0	-
	3/25/15	**30**	<1.0	<1.0	<1.0	<1.0	-
	7/29/15	**68**	<1.0	<1.0	<1.0	<1.0	-
	11/23/15	**58**	<1.0	<1.0	<1.0	<1.0	-
	3/29/16	**79**	<1.0	<1.0	<1.0	<1.0	-
	7/29/16	**62**	2.9	<1.0	<1.0	<1.0	-
	11/16/16	**57**	<1.0	<1.0	<1.0	<1.0	-
	3/20/17	**67**	<1.0	<1.0	<1.0	<1.0	-
	7/21/17	**45**	<1.0	<1.0	<1.0	<1.0	-
	11/16/17	**77**	<1.0	<1.0	<1.0	<1.0	-
	3/12/18	**46**	<0.50	<0.50	<0.50	<0.50	<0.50
	8/13/18	**76**	0.48 **J**	<0.50	<0.50	<0.50	<0.50
	7/30/19	**71**	0.29 **J**	<0.50	<0.50	<0.50	<0.50
	12/19/19	**50**	<0.50	<0.50	<0.50	<0.50	<0.50
MW-8	3/11/93	ND	**2,500**	ND	ND	ND	-
	7/8/93	ND	**2,700**	ND	ND	ND	-
	9/22/93	ND	**2,800**	ND	ND	ND	-
	11/16/93	ND	**1,400**	ND	ND	ND	-
	3/10/94	ND	**760**	ND	ND	ND	-
	6/9/94	ND	**1,500**	ND	ND	ND	-
	9/8/94	ND	**7,900**	ND	ND	ND	-
	12/8/94	**15**	**1,100**	ND	ND	ND	-
	3/9/95	**7**	**850**	ND	ND	1.0	-
	6/6/95	**9**	**630**	ND	ND	ND	-
	9/21/95	**13**	**820**	ND	ND	ND	-
	12/13/95	ND	**1,600**	ND	ND	ND	-
	3/26/96	ND	**2,300**	ND	ND	ND	-
	6/13/96	ND	**2,800**	ND	ND	ND	-
	9/17/96	ND	**2,300**	ND	ND	ND	-
	1/14/97	ND	**4,200**	ND	ND	ND	-
	6/3/97	ND	**5,500**	ND	ND	ND	-
	9/16/97	ND	**7,200**	ND	ND	ND	-
	12/16/97	ND	**8,100**	ND	ND	ND	-
	3/31/98	**140**	**7,900**	ND	ND	ND	-
	8/20/98	ND	**6,500**	ND	ND	ND	-
	3/17/99	**140**	**7,800**	ND	ND	ND	-
	7/12/99	**130**	**9,100**	ND	ND	ND	-
	11/17/99	ND	**7,000**	ND	ND	ND	-
	2/28/00	ND	**11,000**	ND	ND	ND	-
	6/28/00	ND	**12,000**	ND	ND	ND	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-8	10/20/00	ND	**13,000**	ND	ND	ND	-
	2/21/01	ND	**14,000**	ND	ND	ND	-
	6/26/01	**210**	**16,000**	ND	ND	ND	-
	10/23/01	ND	**21,000**	ND	ND	ND	-
	11/14/01	ND	**20,000**	ND	ND	ND	-
	2/26/02	ND	**19,000**	ND	ND	ND	-
	6/6/02	ND	**8,600**	ND	ND	ND	-
	10/10/02	**520**	**19,000**	ND	ND	ND	-
	3/3/03	**580**	**20,000**	<50	<50	<50	-
	7/24/03	**400**	**25,000**	20.0	<0.50	3.2	-
	10/30/03	**590**	**23,000**	<50	<50	<50	-
	2/23/04	**560**	**26,000**	<50	<50	<50	-
	7/20/04	**580**	**39,000**	<50	<50	<50	-
	10/28/04	**760**	**31,000**	<50	<50	<50	-
	2/18/05	**790**	**42,000**	**42**	1.0	**7.4**	-
	7/28/05	**610**	**66,000**	<100	<100	<100	-
	10/10/05	**600**	**59,000**	<100	<100	<100	-
	2/27/06	**680**	**58,000**	<250	<250	<250	-
	7/25/06	**770**	**76,000**	**26**	1.3	**8.4**	-
	10/27/06	**520**	**58,000**	<250	<250	<250	-
	3/26/07	**620**	**62,000**	<250	<250	<250	-
	7/31/07	**600**	**49,000**	**41**	1.2	**11**	-
	10/26/07	**550**	**56,000**	**33**	1.0	**11**	-
	2/20/08	**590**	**59,000**	<250	<250	<250	-
	7/18/08	**520**	**63,000**	<250	<250	<250	-
	10/31/08	**560**	**47,000**	<250	<250	<250	-
	2/23/09	**670**	**45,000**	<250	<250	<250	-
	8/18/09	**790**	**38,000**	**26**	0.8	**20**	-
	11/20/09	**830**	**42,000**	**31**	0.9	**20**	-
	4/1/10	**730**	**41,000**	**38**	<20	**29**	-
	8/4/10	**810**	**41,000**	<250	<250	<250	-
	11/17/10	**620**	**37,000**	<250	<250	<250	-
	3/30/11	**720**	**44,000**	<250	<250	<250	-
	8/16/11	**600**	**35,000**	<250	<250	<250	-
	12/19/11	**1,200**	**38,000**	<250	<250	<250	-
	3/27/12	**610**	**37,000**	<250	<250	<250	-
	7/27/12	**440**	**32,000**	<200	<200	<200	-
	11/2/12	**620**	**39,000**	<200	<200	<200	-
	3/27/13	**530**	**41,000**	<250	<250	<250	-
	7/23/13	**530**	**41,000**	<250	<250	<250	-
	12/5/13	**560**	**38,000**	<250	<250	<250	-
	3/20/14	<500	**39,000**	<500	<500	<500	-
	8/8/14	<500	**28,000**	<500	<500	<500	-
	12/10/14	<500	**31,000**	<500	<500	<500	-
	3/26/15	<500	**27,000**	<500	<500	<500	-
	7/29/15	**630**	**27,000**	<250	<250	<250	-
	11/20/15	**340**	**21,000**	<250	<250	<250	-
	3/28/16	**320**	**13,000**	**10**	<10	**32**	-
	7/28/16	**170**	**5,700**	<50	<50	<50	-
	11/16/16	**120**	**1,800**	<10	<10	<10	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-8	3/21/17	**53**	**900**	<10	<10	<10	-
	7/21/17	**43**	**520**	<5.0	<5.0	<5.0	-
	11/17/17	**49**	**510**	<5.0	<5.0	<5.0	-
	3/12/18	**39**	**460**	4.7	7.6	0.80	<0.50
	8/13/18	**54**	**460**	5.5	13.0	1.2	0.14 **J**
	7/30/19	**45**	**1,600**	**6.2**	6.5	**8.4**	<5.0
	12/21/19	**70**	**5,000**	**21**	3.9	**47**	**0.85**
MW-9	11/16/93	ND	**5.0**	ND	ND	ND	-
	11/16/93	NA	**6.3**	ND	ND	NA	-
	3/10/94	ND	**5.4**	ND	ND	ND	-
	6/9/94	ND	**8.3**	ND	ND	ND	-
	9/8/94	ND	**13**	ND	ND	ND	-
	12/8/94	ND	4.0	ND	ND	ND	-
	3/9/95	ND	**9.0**	ND	ND	ND	-
	6/6/95	ND	**179**	ND	ND	ND	-
	9/21/95	ND	**4.0**	ND	ND	ND	-
	12/13/95	ND	**13**	ND	ND	ND	-
	3/26/96	ND	**13**	ND	ND	ND	-
	6/13/96	ND	**18**	ND	ND	ND	-
	9/17/96	ND	**8.0**	ND	ND	ND	-
	1/14/97	ND	**13**	ND	ND	ND	-
	6/3/97	ND	**15**	ND	ND	ND	-
	9/16/97	ND	**9.7**	ND	ND	ND	-
	12/16/97	ND	**14**	ND	ND	ND	-
	3/31/98	ND	**13**	ND	ND	ND	-
	8/20/98	ND	**8.0**	ND	ND	ND	-
	3/17/99	ND	**7.3**	ND	ND	ND	-
	7/12/99	ND	**6.2**	ND	ND	ND	-
	11/16/99	ND	**7.3**	ND	ND	ND	-
	2/28/00	ND	**5.6**	ND	ND	ND	-
	6/28/00	ND	**5.3**	1.8	ND	ND	-
	10/20/00	2.3	**6.2**	ND	ND	ND	-
	2/20/01	ND	3.1	ND	ND	ND	-
	6/26/01	ND	**5.8**	ND	ND	ND	-
	10/23/01	ND	3.2	ND	ND	ND	-
	10/23/01	ND	3.2	ND	ND	ND	-
	2/26/02	ND	**7.8**	ND	ND	ND	-
	6/6/02	ND	**6.2**	ND	ND	ND	-
	10/10/02	ND	**9.9**	ND	ND	ND	-
	3/3/03	<0.50	**12**	<0.50	<0.50	<0.50	-
	7/24/03	<0.50	**11**	<0.50	<0.50	<0.50	-
	10/30/03	<0.50	**11**	<0.50	<0.50	<0.50	-
	2/23/04	<0.50	**9.1**	<0.50	<0.50	<0.50	-
	7/19/04	<0.50	**12**	<0.50	<0.50	<0.50	-
	10/28/04	<0.50	**12**	<0.50	<0.50	<0.50	-
	2/17/05	<0.50	**12**	<0.50	<0.50	<0.50	-
	7/28/05	<0.50	**11**	<0.50	<0.50	<0.50	-
	10/10/05	<0.50	**12**	<0.50	<0.50	<0.50	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-9	2/27/06	<0.50	**11**	<0.50	<0.50	<0.50	-
	7/25/06	<0.50	**12**	<0.50	<0.50	<0.50	-
	10/27/06	<0.50	**13**	<0.50	<0.50	<0.50	-
	3/26/07	<0.50	**12**	<0.50	<0.50	<0.50	-
	7/30/07	<0.50	**12**	<0.50	<0.50	<0.50	-
	10/26/07	<0.50	**14**	<0.50	<0.50	<0.50	-
	2/20/08	<0.50	**13**	<0.50	<0.50	<0.50	-
	7/18/08	<0.50	**15**	<0.50	<0.50	<0.50	-
	10/31/08	<0.50	**15**	<0.50	<0.50	<0.50	-
	2/23/09	<0.50	**17**	<0.50	<0.50	<0.50	-
	8/18/09	<0.50	**16**	<0.50	<0.50	<0.50	-
	11/20/09	0.5	**17**	<0.50	<0.50	<0.50	-
	3/31/10	<1.0	**23**	<1.0	<1.0	<1.0	-
	8/4/10	<1.0	**25**	<1.0	<1.0	<1.0	-
	11/17/10	<1.0	**29**	<1.0	<1.0	<1.0	-
	3/30/11	<1.0	**40**	<1.0	<1.0	<1.0	-
	8/16/11	<1.0	**42**	<1.0	<1.0	<1.0	-
	12/19/11	1.7	**63**	<1.0	<1.0	<1.0	-
	3/27/12	<1.0	**74**	<1.0	<1.0	<1.0	-
	7/26/12	<1.0	**130**	<1.0	<1.0	<1.0	-
	11/1/12	<1.0	**230**	1.8	<1.0	<1.0	-
	3/26/13	<1.0	**350**	2.0	<1.0	<1.0	-
	7/23/13	<1.0	**440**	2.8	<1.0	<1.0	-
	12/5/13	<2.0	**430**	2.6	<2.0	<2.0	-
	3/20/14	<5.0	**540**	<5.0	<5.0	<5.0	-
	8/8/14	<5.0	**640**	<5.0	<5.0	<5.0	-
	12/10/14	<5.0	**960**	<5.0	<5.0	<5.0	-
	3/25/15	<5.0	**1,000**	<5.0	<5.0	<5.0	-
	7/30/15	<10	**1,200**	<10	<10	<10	-
	11/20/15	<10	**1,200**	<10	<10	<10	-
	3/28/16	2.1	**1,000**	4.9	2.3	<1.0	-
	7/28/16	<10	**970**	<10	<10	<10	-
	11/17/16	**18**	**1,100**	<10	<10	<10	-
	3/21/17	<10	**1,000**	<10	<10	<10	-
	7/20/17	**5.8**	**1,500**	**6.4**	<5.0	<5.0	-
	11/16/17	<10	**1,200**	<10	<10	<10	-
	3/15/18	**5.3**	**1,300**	<5.0	<5.0	<5.0	<5.0
	8/14/18	**8.6**	**570**	**6.2**	4.0	0.72	<5.0
	7/30/19	**12**	**1,200**	3.6	2.4	0.55	<0.5
	DUP-1	**13**	**1,300**	3.7	2.5	0.64	<0.5
	12/17/19	**9.4**	**840**	2.4	1.4	0.55	<0.50
MW-10	1/14/97	**21**	**1,000**	ND	ND	ND	-
	6/3/97	**27**	**980**	ND	ND	ND	-
	9/16/97	**57**	**1,900**	ND	ND	ND	-
	12/16/97	**82**	**2,200**	ND	ND	ND	-
	3/31/98	**51**	**2,000**	ND	ND	ND	-
	8/20/98	**37**	**760**	ND	ND	ND	-
	3/17/99	**69**	**810**	ND	ND	ND	-
	7/12/99	**38**	**560**	ND	ND	ND	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-10	11/16/99	**40**	**600**	ND	ND	ND	-
	2/28/00	**33**	**290**	ND	ND	ND	-
	6/28/00	**19**	**140**	ND	ND	ND	-
	10/20/00	**15**	**79**	ND	ND	ND	-
	2/21/01	**10**	**58**	ND	ND	ND	-
	6/26/01	4.2	**37**	ND	ND	ND	-
	10/23/01	**7.2**	**44**	ND	ND	ND	-
	2/26/02	**8.5**	**58**	ND	ND	ND	-
	6/6/02	**7.1**	**43**	ND	ND	ND	-
	10/10/02	**9.9**	**63**	ND	ND	ND	-
	3/3/03	NS	NS	NS	NS	NS	-
	7/24/03	<0.50	**5.4**	<0.50	<0.50	<0.50	-
	10/30/03	NS	NS	NS	NS	NS	-
	2/23/04	NS	NS	NS	NS	NS	-
	7/19/04	0.7	**5.8**	<0.50	<0.50	<0.50	-
	10/28/04	NS	NS	NS	NS	NS	-
	2/17/05	NS	NS	NS	NS	NS	-
	7/28/05	<0.50	3.3	<0.50	<0.50	<0.50	-
	10/10/05	NS	NS	NS	NS	NS	-
	2/27/06	NS	NS	NS	NS	NS	-
	7/25/06	<0.50	2.9	<0.50	<0.50	<0.50	-
	10/27/06	NS	NS	NS	NS	NS	-
	3/26/07	NS	NS	NS	NS	NS	-
	7/30/07	0.9	**8.2**	<0.50	<0.50	<0.50	-
	10/26/07	NS	NS	NS	NS	NS	-
	2/20/08	NS	NS	NS	NS	NS	-
	7/18/08	<0.50	**5.5**	<0.50	<0.50	<0.50	-
	10/31/08	NS	NS	NS	NS	NS	-
	2/23/09	NS	NS	NS	NS	NS	-
	8/18/09	0.7	**6.6**	<0.50	<0.50	<0.50	-
	11/20/09	NS	NS	NS	NS	NS	-
	3/31/10	<1.0	**6.8**	<1.0	<1.0	<1.0	-
	8/4/10	<1.0	**6.6**	<1.0	<1.0	<1.0	-
	11/17/10	<1.0	**5.5**	<1.0	<1.0	<1.0	-
	3/30/11	<1.0	**24**	<1.0	<1.0	<1.0	-
	8/16/11	<1.0	**8.4**	<1.0	<1.0	<1.0	-
	12/19/11	<1.0	3.1	<1.0	<1.0	<1.0	-
	3/27/12	<1.0	4.8	<1.0	<1.0	<1.0	-
	7/26/12	<1.0	**7.4**	<1.0	<1.0	<1.0	-
	11/1/12	1.8	**61**	<1.0	<1.0	1.2	-
	3/26/13	2.5	**170**	<1.0	<1.0	1.7	-
	7/23/13	<1.0	**20**	<1.0	<1.0	<1.0	-
	12/4/13	<1.0	**6.2**	<1.0	<1.0	<1.0	-
	3/19/14	<1.0	2.9	<1.0	<1.0	<1.0	-
	8/7/14	<1.0	**7.8**	<1.0	<1.0	<1.0	-
	12/9/14	1.1	**10**	<1.0	<1.0	<1.0	-
	3/25/15	<1.0	2.9	<1.0	<1.0	<1.0	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-10	7/29/15	**9.2**	**500**	1.1	<1.0	5.0	-
	11/20/15	**43**	**2,500**	<1.0	<1.0	**15**	-
	3/28/16	**26**	**1,200**	<2.0	<2.0	**6.2**	-
	7/28/16	1.5	**42**	<1.0	<1.0	<1.0	-
	11/17/16	<1.0	**7.2**	<1.0	<1.0	<1.0	-
	3/21/17	<1.0	4.4	<1.0	<1.0	<1.0	-
	7/20/17	<1.0	**15**	<1.0	<1.0	<1.0	-
	11/17/17	<1.0	4.6	<1.0	<1.0	<1.0	-
	3/15/18	<0.50	4.9	<0.50	<0.50	<0.50	<0.50
	8/15/2018	0.36 **J**	5.4	0.4 **J**	<0.50	<0.50	<0.50
	8/1/2019	<0.50	**14**	5.4	<0.50	0.23 J	<0.50
	12/19/2019	<0.50	**13**	2.5	<0.50	<0.50	<0.50
CMW-11A	6/26/01	ND	**25**	ND	ND	ND	-
	7/17/01	ND	**26**	ND	ND	ND	-
	10/23/01	ND	**68**	ND	ND	ND	-
	2/26/02	ND	**2,300**	ND	ND	ND	-
	3/15/02	ND	**150**	ND	ND	ND	-
	4/3/02	ND	4.2	ND	ND	ND	-
	6/6/02	ND	<0.50	ND	ND	ND	-
	10/10/02	ND	<0.50	ND	ND	ND	-
	3/3/03	NS	NS	NS	NS	NS	-
	7/24/03	<0.50	<0.50	<0.50	<0.50	<0.50	-
	10/30/03	NS	NS	NS	NS	NS	-
	2/23/04	NS	NS	NS	NS	NS	-
	7/20/04	<0.50	<0.50	<0.50	<0.50	<0.50	-
	10/28/04	NS	NS	NS	NS	NS	-
	2/17/05	NS	NS	NS	NS	NS	-
	7/28/05	<0.50	<0.50	<0.50	<0.50	<0.50	-
	10/10/05	NS	NS	NS	NS	NS	-
	2/27/06	NS	NS	NS	NS	NS	-
	7/25/06	<0.50	<0.50	<0.50	<0.50	<0.50	-
	10/27/06	NS	NS	NS	NS	NS	-
	3/26/07	NS	NS	NS	NS	NS	-
	7/30/07	<0.50	<0.50	<0.50	<0.50	<0.50	-
	10/26/07	NS	NS	NS	NS	NS	-
	2/20/08	NS	NS	NS	NS	NS	-
	7/18/08	<0.50	<0.50	<0.50	<0.50	<0.50	-
	10/31/08	NS	NS	NS	NS	NS	-
	2/23/09	NS	NS	NS	NS	NS	-
	8/18/09	<0.50	<0.50	<0.50	<0.50	<0.50	-
	11/20/09	NS	NS	NS	NS	NS	-
	3/31/10	<1.0	<1.0	<1.0	<1.0	<1.0	-
	8/4/10	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/17/10	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/30/11	<1.0	<1.0	<1.0	<1.0	<1.0	-
	8/16/11	<1.0	<1.0	<1.0	<1.0	<1.0	-
	12/19/11	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/27/12	<1.0	<1.0	<1.0	<1.0	<1.0	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
CMW-11A	7/26/12	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/1/12	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/1/12	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/23/13	<1.0	<1.0	<1.0	<1.0	<1.0	-
	12/4/13	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/19/14	<1.0	<1.0	<1.0	<1.0	<1.0	-
	8/7/14	<1.0	<1.0	<1.0	<1.0	<1.0	-
	12/9/14	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/25/15	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/29/15	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/20/15	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/28/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/28/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/16/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/20/17	<1.0	<1.0	5.6	<1.0	<1.0	-
	11/17/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/15/18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	8/16/18	<0.50	<0.50	0.87	<0.50	<0.50	<0.50
	7/31/19	<0.50	4.3	0.91	<0.50	<0.50	0.41 J
	12/20/19	<0.50	0.66	0.63	<0.50	<0.50	0.32 J
CMW-11B	6/26/01	ND	**34**	ND	ND	ND	-
	7/17/01	1.1	**19**	ND	ND	ND	-
	10/23/01	ND	**23**	ND	ND	ND	-
	2/26/02	ND	**19**	ND	ND	ND	-
	4/3/02	ND	3.4	ND	ND	ND	-
	6/6/02	ND	**5.3**	ND	ND	ND	-
	10/10/02	ND	3.4	ND	ND	ND	-
	3/3/03	0.9	**36**	<0.50	<0.50	<0.50	-
	7/24/03	**140**	**220**	<0.50	<0.50	<0.50	-
	10/30/03	**160**	**250**	<0.50	<0.50	<0.50	-
	2/23/04	**110**	**230**	1.8	<0.50	<0.50	-
	7/20/04	**210**	**440**	**49**	<0.50	<0.50	-
	10/28/04	**130**	**300**	**9.6**	<1.0	<1.0	-
	2/17/05	**270**	**510**	**16**	<0.50	<0.50	-
	7/28/05	**110**	**300**	**17**	<1.0	<1.0	-
	10/10/05	**92**	**250**	**15**	<0.50	<0.50	-
	2/27/06	**90**	**170**	**8.8**	<1.0	<1.0	-
	7/25/06	**89**	**230**	**20**	<0.50	<0.50	-
	10/27/06	**82**	**170**	**11**	<1.0	<1.0	-
	3/26/07	**78**	**210**	**13**	<0.50	<0.50	-
	7/30/07	**130**	**410**	**37**	<0.50	<0.50	-
	10/26/07	**94**	**190**	**15**	<0.50	<0.50	-
	2/20/08	**94**	**240**	**19**	<0.50	<0.50	-
	7/18/08	**60**	**160**	**15**	<1.0	<1.0	-
	10/31/08	**39**	**86**	**11**	<0.50	<0.50	-
	2/23/09	**34**	**75**	**18**	<0.50	<0.50	-
	8/18/09	**120**	**450**	**110**	0.5	<0.50	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
CMW-11B	11/20/09	**52**	**100**	**16**	<0.50	<0.50	-
	3/31/10	**110**	**250**	**28**	<2.0	<2.0	-
	8/4/10	**85**	**180**	**28**	<2.0	<2.0	-
	11/17/10	**22**	**62**	**17**	<1.0	<1.0	-
	3/30/11	**48**	**130**	**22**	<1.0	<1.0	-
	8/16/11	**76**	**230**	**50**	<1.0	<1.0	-
	12/19/11	**70**	**210**	**32**	<1.0	<1.0	-
	3/27/12	**50**	**120**	**18**	<1.0	<1.0	-
	7/26/12	**39**	**110**	**19**	<1.0	<1.0	-
	11/1/12	**49**	**130**	**28**	<1.0	<1.0	-
	3/26/13	**31**	**71**	**25**	<1.0	<1.0	-
	7/23/13	**50**	**150**	**140**	1.9	<1.0	-
	12/4/13	**50**	**150**	**22**	<1.0	<1.0	-
	3/19/14	**10**	**25**	**16**	<1.0	<1.0	-
	8/7/14	**42**	**130**	**26**	<1.0	<1.0	-
	12/9/14	**23**	**49**	**16**	<1.0	<1.0	-
	3/25/15	**26**	**64**	**10**	<1.0	<1.0	-
	7/29/15	**55**	**120**	**23**	<1.0	<1.0	-
	11/20/15	**40**	**97**	**23**	<1.0	<1.0	-
	3/28/16	**56**	**130**	**31**	<1.0	<1.0	-
	7/28/16	**48**	**96**	**19**	<1.0	<1.0	-
	11/16/16	**51**	**100**	**22**	<1.0	<1.0	-
	3/20/17	**79**	**150**	**40**	<1.0	<1.0	-
	7/20/17	**93**	**220**	**72**	<1.0	<1.0	-
	11/17/17	**40**	**64**	**19**	<1.0	<1.0	-
	3/15/18	**88**	**270**	**120**	2.8	<2.5	<2.5
	8/16/18	**30**	**79**	**82**	0.93	1.3	<0.50
	12/20/19	**120**	**320**	**140**	2.1 J	<1.0	**2.8**
CMW-11C	6/26/01	**540**	**22,000**	ND	ND	ND	-
	10/23/01	ND	**33,000**	ND	ND	ND	-
	11/14/01	ND	**36,000**	ND	ND	ND	-
	2/26/02	ND	**40,000**	ND	ND	ND	-
	6/6/02	ND	**50,000**	ND	ND	ND	-
	10/10/02	**1,600**	**69,000**	ND	ND	ND	-
	3/3/03	**1,300**	**64,000**	<250	<250	**280**	-
	7/24/03	**1,600**	**99,000**	**34**	<0.50	**380**	-
	10/30/03	**2,500**	**85,000**	<250	<250	<250	-
	2/23/04	**2,300**	**93,000**	<250	<250	<250	-
	7/20/04	**1,100**	**54,000**	<250	<250	**400**	-
	10/28/04	**2,500**	**67,000**	<100	<100	**360**	-
	2/18/05	**2,400**	**71,000**	**36**	0.99	**420**	-
	7/28/05	**1,300**	**51,000**	<100	<100	**250**	-
	10/10/05	**1,100**	**46,000**	<250	<250	<250	-
	2/27/06	**1,100**	**42,000**	<250	<250	<250	-
	7/25/06	**790**	**43,000**	<25	<25	**150**	-
	10/27/06	**740**	**42,000**	<250	<250	<250	-
	3/26/07	**720**	**38,000**	<250	<250	<250	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L) PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
CMW-11C	7/31/07	**730**	**29,000**	**26**	0.61	**140**	-
	10/26/07	**600**	**38,000**	**33**	0.75	**190**	-
	2/20/08	**760**	**32,000**	<100	<100	**130**	-
	7/18/08	**530**	**29,000**	<100	<100	**130**	-
	10/31/08	**590**	**26,000**	<100	<100	<100	-
	2/23/09	**590**	**26,000**	<100	<100	**110**	-
	8/18/09	**550**	**23,000**	**25**	<0.50	**130**	-
	11/20/09	**490**	**22,000**	**25**	<0.50	**140**	-
	4/1/10	**560**	**22,000**	<100	<100	**180**	-
	8/4/10	**700**	**33,000**	<200	<200	<200	-
	11/17/10	**420**	**24,000**	<200	<200	<200	-
	3/30/11	**700**	**26,000**	<200	<200	<200	-
	8/16/11	**370**	**21,000**	<200	<200	<200	-
	12/19/11	**580**	**26,000**	<200	<200	<200	-
	3/27/12	**420**	**20,000**	<200	<200	<200	-
	7/26/12	**320**	**17,000**	<200	<200	<200	-
	11/1/12	**440**	**22,000**	<200	<200	<200	-
	3/26/13	**400**	**19,000**	<200	<200	<200	-
	7/23/13	**490**	**19,000**	<200	<200	<200	-
	12/4/13	**360**	**18,000**	<200	<200	<200	-
	3/19/14	**360**	**19,000**	<200	<200	<200	-
	8/7/14	**420**	**17,000**	<250	<250	<250	-
	12/9/14	**480**	**18,000**	<250	<250	<250	-
	3/25/15	**390**	**16,000**	<250	<250	<250	-
	7/29/15	**510**	**20,000**	<200	<200	<200	-
	11/20/15	**380**	**17,000**	<100	<100	**140**	-
	3/28/16	**410**	**13,000**	**27**	<10	**93**	-
	7/28/16	**390**	**13,000**	<100	<100	<100	-
	11/16/16	**320**	**9,300**	<100	<100	<100	-
	3/20/17	**260**	**6,300**	<50	<50	<50	-
	7/20/17	**180**	**4,700**	<50	<50	<50	-
	11/17/17	**150**	**3,300**	<25	<25	<25	-
	3/15/18	**100**	**2,900**	**16**	<10	**21**	<10
	8/16/18	**48**	**830**	**14**	0.22 **J**	**13**	<0.50
	DUP-4	**47**	**860**	**15**	0.16 **J**	**13**	<0.50
	8/1/19	**59**	**660**	**53**	<2.5	2.4 J	**2.6**
	12/20/19	**27**	**320**	**370**	<10	3.0	**87**
MW-12	6/26/01	**1,000**	**2,900**	**110**	ND	ND	-
	10/23/01	**1,500**	**4,300**	ND	ND	ND	-
	2/26/02	**2,000**	**5,300**	**210**	ND	ND	-
	6/6/02	**1,800**	**4,400**	**170**	ND	ND	-
	10/10/02	**680**	**2,600**	ND	ND	ND	-
	3/3/03	**2,200**	**4,600**	**220**	<12	**75**	-
	7/24/03	**2,400**	**5,900**	**130**	<0.50	**25**	-
	10/30/03	**2,500**	**5,800**	**150**	<10	<10	-
	2/23/04	**2,300**	**6,800**	**160**	<10	**34**	-
	7/19/04	**1,600**	**11,000**	**59**	<10	**21**	-
	10/28/04	**1,000**	**9,500**	**33**	<25	<25	-
	2/18/05	**370**	**9,000**	**19**	<0.50	**7.7**	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-12	7/28/05	400	9,900	<25	<25	<25	-
	10/10/05	350	10,000	<25	<25	<25	-
	2/27/06	370	8,800	<25	<25	<25	-
	7/25/06	550	11,000	16	<0.50	6.4	-
	10/27/06	280	11,000	<50	<50	<50	-
	3/26/07	150	8,100	<50	<50	<50	-
	7/31/07	160	7,200	8.9	0.55	4.1	-
	10/26/07	230	10,000	13	0.77	6.4	-
	2/20/08	280	11,000	<50	<50	<50	-
	7/18/08	320	13,000	<50	<50	<50	-
	10/31/08	620	12,000	58	<50	<50	-
	2/23/09	990	12,000	84	<50	<50	-
	8/18/09	1,400	10,000	160	2.0	61	-
	11/20/09	2,100	8,500	210	2.2	70	-
	4/1/10	2,500	8,800	240	<50	99	-
	8/5/10	2,200	6,700	210	<50	87	-
	11/18/10	2,200	8,800	180	<50	84	-
	3/30/11	1,400	7,700	140	<50	63	-
	8/17/11	930	14,000	69	<50	65	-
	12/20/11	710	17,000	<100	<100	<100	-
	3/27/12	330	18,000	<100	<100	<100	-
	7/27/12	220	16,000	<100	<100	<100	-
	11/2/12	260	16,000	<200	<200	<200	-
	3/27/13	260	16,000	<50	<50	<50	-
	7/23/13	250	15,000	<50	<50	<50	-
	12/5/13	190	13,000	<100	<100	<100	-
	3/20/14	<200	12,000	<200	<200	<200	-
	8/8/14	290	7,000	<200	<200	<200	-
	12/10/14	540	9,400	<200	<200	<200	-
	3/26/15	470	9,300	<200	<200	<200	-
	7/30/15	410	13,000	<50	<50	<50	-
	11/20/15	310	13,000	<100	<100	<100	-
	3/28/16	300	15,000	<20	<20	30	-
	7/28/16	340	18,000	<100	<100	<100	-
	11/17/16	430	18,000	<200	<200	<200	-
	3/21/17	310	18,000	<100	<100	<100	-
	7/21/17	350	17,000	<100	<100	<100	-
	11/17/17	440	19,000	<100	<100	<100	-
	3/14/18	360	18,000	17	<10	17	<10
	8/13/18	220	15,000	23	1.0	48	<0.50
	7/30/19	200	7,500	11	<5.0	14	<5.0
	12/26/19	100	10,000	12	1.9	38	<0.50
MW-13	4/1/10	330	470	1.7	<1.0	630	-
	8/5/10	360	510	<5.0	<5.0	750	-
	11/18/10	320	530	<5.0	<5.0	760	-
	3/30/11	230	430	<5.0	<5.0	740	-
	8/17/11	320	480	<5.0	<5.0	890	-
	12/20/11	420	490	<5.0	<5.0	970	-
	MCL	5	5	6	10	6	0.5

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Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-13	3/27/12	**250**	**410**	<5.0	<5.0	**450**	-
	7/27/12	**190**	**370**	<5.0	<5.0	**360**	-
	11/2/12	**270**	**420**	<5.0	<5.0	**480**	-
	3/27/13	**330**	**420**	<5.0	<5.0	**710**	-
	7/23/13	**310**	**410**	<5.0	<5.0	**410**	-
	12/5/13	**230**	**370**	<5.0	<5.0	**300**	-
	3/20/14	**220**	**380**	<10	<10	**500**	-
	8/8/14	**190**	**300**	<5.0	<5.0	**410**	-
	12/10/14	**280**	**360**	<5.0	<5.0	**380**	-
	3/26/15	**230**	**330**	<5.0	<5.0	**440**	-
	7/30/15	**260**	**330**	<2.5	<2.5	**290**	-
	11/23/15	**370**	**400**	<5.0	<5.0	**540**	-
	3/29/16	**380**	**400**	<5.0	<5.0	**510**	-
	7/29/16	**330**	**410**	<5.0	<5.0	**610**	-
	11/16/16	**360**	**360**	<2.0	<2.0	**530**	-
	3/21/17	**220**	**300**	<5.0	<5.0	**510**	-
	7/21/17	**230**	**300**	<5.0	<5.0	**480**	-
	11/16/17	**330**	**330**	<2.0	<2.0	**420**	-
	3/14/18	**300**	**290**	<10	<10	**650**	<10
	8/16/18	**260**	**150**	1.1	0.18 **J**	**260**	<0.50
	8/1/19	**570**	**260**	<5.0	<5.0	**410**	<5.0
	12/26/19	**190**	**130**	1.1	<0.50	**180**	<0.50
MW-14	4/1/10	**140**	**3,000**	<20	<20	**20**	-
	8/5/10	**110**	**2,500**	<10	<10	**22**	-
	11/18/10	**110**	**2,400**	<20	<20	**23**	-
	3/30/11	**53**	**1,400**	<20	<20	<20	-
	8/17/11	**99**	**1,900**	<20	<20	**22**	-
	12/20/11	**99**	**1,700**	<20	<20	<20	-
	3/27/12	**63**	**1,400**	<20	<20	<20	-
	7/27/12	**45**	**1,000**	<10	<10	<10	-
	11/2/12	**57**	**1,100**	<10	<10	**13**	-
	3/26/13	NS	NS	NS	NS	NS	-
	7/23/13	NS	NS	NS	NS	NS	-
	12/5/13	**34**	**470**	<5.0	<5.0	<5.0	-
	3/20/14	**39**	**610**	<10	<10	<10	-
	8/8/14	**45**	**650**	**12**	<10	**14**	-
	12/10/14	**63**	**460**	<10	<10	**13**	-
	3/26/15	**48**	**560**	<10	<10	<10	-
	7/30/15	**50**	**570**	**10**	<5.0	<5.0	-
	11/23/15	**54**	**640**	**11**	<5.0	<5.0	-
	3/29/16	**56**	**510**	**13**	<5.0	<5.0	-
	7/29/16	**40**	**530**	**16**	<5.0	<5.0	-
	11/17/16	**74**	**620**	**13**	<5.0	<5.0	-
	3/21/17	**33**	**550**	**23**	<5.0	<5.0	-
	7/21/17	**33**	**580**	**18**	<5.0	<5.0	-
	11/16/17	**41**	**540**	**13**	<5.0	<5.0	-
	3/15/18	**31**	**600**	**15**	<5.0	<5.0	<5.0
	8/16/18	**42**	**230**	**12**	<0.50	1.8	<0.50
	7/31/19	**38**	**340**	**11**	<1.0	2.0	<1.0
	12/20/19	**21**	**330**	**7.6**	<1.0	1.8	<1.0
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

Table 3

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-15	4/1/10	**950**	**55,000**	<500	<500	<500	<250
	8/5/10	**1,100**	**53,000**	<500	<500	<500	<250
	11/18/10	**1,200**	**56,000**	<500	<500	<500	<250
	3/30/11	**1,100**	**53,000**	<500	<500	<500	<250
	8/17/11	**1,300**	**56,000**	<500	<500	<500	<250
	12/20/11	**1,000**	**42,000**	<500	<500	<500	<250
	3/27/12	**780**	**40,000**	<500	<500	<500	<250
	7/27/12	**600**	**35,000**	<250	<250	<250	<120
	11/2/12	**890**	**40,000**	<250	<250	**270**	<120
	3/27/13	**780**	**40,000**	<250	<250	**170**	<120
	7/23/13	**810**	**42,000**	<250	<250	**330**	<120
	12/5/13	**780**	**36,000**	<250	<250	<250	<120
	3/20/14	**780**	**39,000**	**3,300**	<500	**500**	<250
	8/8/14	**540**	**34,000**	<500	<500	<500	<250
	12/10/14	**940**	**41,000**	**530**	<500	<500	<250
	3/26/15	**790**	**39,000**	**1,700**	<500	<500	<250
	7/29/15	**1,000**	**50,000**	**1,000**	<500	<500	<250
	11/23/15	**750**	**37,000**	**4,200**	<200	**340**	<100
	3/29/16	**960**	**32,000**	**6,000**	<200	**270**	**260**
	7/29/16	**730**	**33,000**	**6,200**	<200	**360**	**660**
	11/17/16	**760**	**24,000**	**8,400**	<200	**290**	**350**
	3/21/17	**52**	**2,100**	**2,700**	<20	**42**	**590**
	7/21/17	**26**	**290**	**1,100**	<10	<10	**220**
	11/17/17	<25	**290**	**3,700**	<25	<25	**1,000**
	3/12/18	1.3	**12**	**980**	3.4	3.5	**360**
	DUP-1	1.4	**11**	**980**	3.5	3.5	**370**
	8/13/18	**32**	**43**	**1,400**	5.0 **J**	15	**250**
	DUP-1	**29**	**75**	**1,400**	4.9 **J**	15	**260**
	8/1/19	**17**	**21**	**410**	3.7 J	3.1	**100**
	12/18/19	**79**	**22**	**270**	3.0 **J**	2.3	**100**
MW-16	4/1/10	**660**	**20,000**	<100	<100	**190**	-
	8/5/10	**470**	**24,000**	<200	<200	<200	-
	11/18/10	**890**	**37,000**	<250	<250	<250	-
	3/30/11	**950**	**42,000**	<250	<250	**310**	-
	8/17/11	**1,000**	**47,000**	<250	<250	**360**	-
	12/20/11	**860**	**33,000**	<250	<250	<250	-
	3/27/12	**500**	**25,000**	<250	<250	<250	-
	7/27/12	**320**	**18,000**	<200	<200	<200	-
	11/2/12	**610**	**27,000**	<200	<200	<200	-
	3/27/13	**450**	**24,000**	<100	<100	**170**	-
	7/23/13	**570**	**29,000**	<100	<100	**220**	-
	12/5/13	**550**	**24,000**	<200	<200	<200	-
	3/20/14	<200	**9,200**	<200	<200	<200	-
	8/8/14	**360**	**20,000**	<200	<200	<200	-
	12/10/14	**420**	**16,000**	<200	<200	<200	-
	3/26/15	**290**	**13,000**	<200	<200	<200	-
	7/30/15	**380**	**14,000**	<100	<100	**100**	-
	11/20/15	**340**	**15,000**	<100	<100	**120**	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

GENESIS ENGINEERING & REDEVELOPMENT

Table 3

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	**TCE**	**cis-1,2-DCE**	**trans-1,2-DCE**	**1,1-DCE**	**Vinyl Chloride**
MW-16	3/28/16	**370**	**14,000**	<200	<200	**110**	-
	7/28/16	**320**	**13,000**	<100	<100	<100	-
	11/17/16	**690**	**18,000**	<100	<100	**150**	-
	3/21/17	**450**	**19,000**	<100	<100	**170**	-
	7/21/17	**350**	**15,000**	<100	<100	**120**	-
	11/17/17	**500**	**17,000**	**2,800**	<100	**130**	-
	3/15/18	**220**	**15,000**	**940**	<10	**77**	**110**
	8/16/18	**36**	**780**	**2,300**	17	**24**	**160**
	7/31/19	**48**	**2,400**	**910**	5.3	**18**	**240**
	12/19/19	2	**15**	**44**	0.85	0.29 **J**	**9.2**
	DUP-3	1.9	**15**	**41**	0.81	0.34 **J**	**9.2**
MW-17	3/31/10	**16**	**110**	<1.0	<1.0	<1.0	-
	8/4/10	**14**	**83**	<1.0	<1.0	<1.0	-
	11/17/10	**8.8**	**74**	<1.0	<1.0	<1.0	-
	3/30/11	**10**	**100**	<1.0	<1.0	<1.0	-
	8/16/11	**11**	**92**	<1.0	<1.0	<1.0	-
	12/19/11	**12**	**98**	<1.0	<1.0	<1.0	-
	3/27/12	**11**	**87**	<1.0	<1.0	<1.0	-
	7/26/12	**7.1**	**95**	<1.0	<1.0	<1.0	-
	11/1/12	**7.6**	**71**	<1.0	<1.0	<1.0	-
	3/27/13	**7.6**	**68**	<1.0	<1.0	<1.0	-
	7/23/13	**7.4**	**53**	<1.0	<1.0	<1.0	-
	12/4/13	**5.2**	**49**	<1.0	<1.0	<1.0	-
	3/20/14	3.6	**28**	<1.0	<1.0	<1.0	-
	8/7/14	4.0	**23**	<1.0	<1.0	<1.0	-
	12/10/14	3.0	**19**	<1.0	<1.0	<1.0	-
	3/25/15	2.3	**11**	<1.0	<1.0	<1.0	-
	7/29/15	3.6	**17**	<1.0	<1.0	<1.0	-
	11/23/15	3.5	**17**	<1.0	<1.0	<1.0	-
	3/28/16	4.1	**20**	<1.0	<1.0	<1.0	-
	7/29/16	2.9	**27**	<1.0	<1.0	<1.0	-
	11/16/16	2.8	**23**	<1.0	<1.0	<1.0	-
	3/20/17	4.5	**31**	<1.0	<1.0	<1.0	-
	7/21/17	1.6	**12**	<1.0	<1.0	<1.0	-
	11/16/17	**14**	**20**	<1.0	<1.0	1.5	-
	3/14/18	0.92	4.4	<0.50	<0.50	<0.50	<0.50
	DUP-2	0.87	4.4	<0.50	<0.50	<0.50	<0.50
	8/15/18	1.1	**13**	<0.50	<0.50	<0.50	<0.50
	8/1/19	<0.50	**6.3**	<0.50	<0.50	<0.50	<0.50
	DUP-3	<0.50	**6.3**	<0.50	<0.50	<0.50	<0.50
	12/19/19	<0.50	**8.4**	<0.50	<0.50	<0.50	<0.50
MW-18	3/31/10	**1,200**	**45,000**	<200	<200	**470**	-
	8/5/10	**1,100**	**54,000**	<500	<500	<500	-
	11/18/10	**1,700**	**61,000**	<500	<500	<500	-
	3/30/11	**1,300**	**52,000**	<500	<500	<500	-
	8/17/11	**1,700**	**77,000**	<500	<500	580	-
	12/20/11	**1,600**	**56,000**	<500	<500	<500	-
	3/27/12	**1,200**	**59,000**	<500	<500	<500	-
	7/27/12	**980**	**52,000**	<500	<500	<500	-
	11/2/12	**1,300**	**54,000**	<500	<500	<500	-
	3/27/13	**1,200**	**54,000**	<500	<500	<500	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-18	7/23/13	1,300	54,000	<500	<500	<500	-
	12/4/13	1,000	48,000	<500	<500	<500	-
	3/20/14	1,000	52,000	<500	<500	600	-
	8/8/14	<1,000	45,000	<1,000	<1,000	<1,000	-
	12/10/14	1,300	55,000	<1,000	<1,000	<1,000	-
	3/26/15	1,200	57,000	<500	<500	500	-
	7/29/15	1,500	62,000	<500	<500	<500	-
	11/23/15	1,400	53,000	<500	<500	540	-
	3/28/16	1,000	46,000	<100	<100	330	-
	7/29/16	860	36,000	<250	<250	380	-
	11/17/16	1,300	37,000	<250	<250	340	-
	3/21/17	490	20,000	<200	<200	220	-
	7/21/17	530	19,000	<200	<200	<200	-
	11/17/17	570	19,000	<100	<100	140	-
	3/15/18	320	20,000	27	<10	100	<10
	8/13/18	600	20,000	46	0.74	140	<0.50
	7/31/19	360	10,000	31	0.46 J	90	<0.50
	12/20/19	250	5,100	34	0.34 J	1.3	<0.50
MW-19	3/31/10	740	23,000	<100	<100	250	-
	8/5/10	480	19,000	<200	<200	<200	-
	11/18/10	570	20,000	<250	<250	250	-
	3/30/11	440	15,000	<250	<250	<200	-
	8/17/11	390	12,000	<100	<100	210	-
	12/20/11	480	12,000	<100	<100	210	-
	3/27/12	340	11,000	<100	<100	180	-
	7/27/12	200	6,600	<100	<100	160	-
	11/2/12	260	6,800	<50	<50	230	-
	3/27/13	280	7,600	<50	<50	290	-
	7/23/13	310	6,500	<50	<50	220	-
	12/5/13	250	8,100	<50	<50	160	-
	3/20/14	250	9,100	<100	<100	230	-
	8/8/14	190	6,000	<100	<100	150	-
	12/10/14	220	6,900	<100	<100	110	-
	3/26/15	240	7,100	<100	<100	110	-
	7/29/15	300	8,000	<50	<50	86	-
	11/20/15	220	7,600	<50	<50	89	-
	3/28/16	230	8,000	<10	<10	58	-
	7/28/16	270	9,200	<50	<50	72	-
	11/17/16	470	10,000	<100	<100	<100	-
	3/21/17	230	8,600	<50	<50	68	-
	7/21/17	240	6,000	<50	<50	60	-
	11/17/17	260	7,600	<50	<50	<50	-
	3/15/18	280	10,000	<10	<10	55	<10
	8/16/18	160	1,800	17	0.34 J	57	2.5
	7/31/19	350	4,100	33	0.23 J	46	1.7
	12/20/19	200	1,600	31	0.25 J	29	1.5
MW-20	7/30/15	530	2,400	19	15	230	-
	11/20/15	410	2,200	24	20	250	-
	3/28/16	390	2,200	27	28	240	-
	7/28/16	79	2,700	<20	<20	<20	-
	11/16/16	NS	NS	NS	NS	NS	-
	3/20/17	NS	NS	NS	NS	NS	-
	7/20/17	510	3,400	53	100	250	-
	11/16/17	500	2,800	36	71	160	-
	3/13/18	260	2,800	62	110	140	<10
	8/14/18	230	1,500	55	93	63	<0.50
	12/12/18	290	2,000	55	97	91	<0.50
	5/8/19	340	2,500	69	140	100	<0.50
	12/18/19	220	1,600	65	130	95	<0.50
	8/4/20	330	2,100	61	100	82	<0.12
	DUP-2	330	2,100	63	100	88	<0.12
	11/10/20	433	2,450	61.7	124	144	<0.234
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-21	7/30/15	**8.8**	3.1	<1.0	<1.0	**18**	-
	11/20/15	**7.4**	3.3	<1.0	<1.0	**21**	-
	3/28/16	**11**	3.5	<1.0	<1.0	**23**	-
	7/28/16	**11**	4.9	<1.0	<1.0	**25**	-
	11/16/16	NS	NS	NS	NS	NS	-
	3/20/17	NS	NS	NS	NS	NS	-
	7/20/17	**12**	4.0	<1.0	<1.0	**27**	-
	11/16/17	**14**	3.8	<1.0	<1.0	**20**	-
	3/13/18	**8.7**	4.3	<0.50	<0.50	**22**	<0.50
	8/14/18	**31**	**13**	<0.50	<0.50	**16**	<0.50
	12/12/18	**55**	**25**	<0.50	<0.50	**16**	<0.50
	DUP-2	**54**	**23**	<0.50	<0.50	**16**	<0.50
	5/8/19	**72**	**24**	<0.50	<0.50	**16**	<0.50
	7/18/19	**220**	**34**	<0.50	<0.50	**18**	<0.50
	DUP-2	**240**	**35**	<0.50	<0.50	**18**	<0.50
	12/18/19	**41**	**15**	<0.50	<0.50	**18**	<0.50
	8/4/20	**35**	**8.9**	<0.085	<0.15	**17**	<0.12
	11/10/20	**26.8**	**6.30**	<0.126	<0.149	**22.8**	<0.234
MW-22A	8/4/15	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/20/15	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/28/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/28/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/16/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/16/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/15/18	<0.50	0.50	<0.50	<0.50	<0.50	<0.50
	8/15/18	<0.50	<0.50	0.28	<0.50 **J**	<0.50	<0.50
	12/11/18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	5/9/19	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/17/19	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/18/19	<0.50	0.22 J	<0.50	<0.50	<0.50	<0.50
	6/7/20	<0.13	<0.085	<0.085	<0.15	<0.18	<0.12
	11/12/20	<0.300	<0.190	<0.126	<0.149	<0.188	<0.234
MW-22B	8/4/15	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/20/15	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/28/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/28/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/16/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/16/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/15/18	<0.50	<0.5	<0.50	<0.50	<0.50	<0.50
	8/15/18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/11/18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	5/9/19	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/17/19	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/18/19	<0.50	0.16 J	<0.50	<0.50	<0.50	<0.50
	6/7/20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/12/20	<0.300	<0.190	<0.126	<0.149	<0.188	<0.234
	DUP-4	<0.300	<0.190	<0.126	<0.149	<0.188	<0.234
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-23	7/30/15	1.7	**19**	<1.0	<1.0	<1.0	-
	11/20/15	<1.0	**19**	<1.0	<1.0	<1.0	-
	3/28/16	<1.0	**22**	<1.0	<1.0	<1.0	-
	7/28/16	<1.0	**22**	<1.0	<1.0	<1.0	-
	11/16/16	NS	NS	NS	NS	NS	-
	3/20/17	NS	NS	NS	NS	NS	-
	7/20/17	1.1	**26**	<1.0	<1.0	<1.0	-
	7/20/17	1.1	**26**	<1.0	<1.0	<1.0	-
	11/16/17	1.0	**40**	<1.0	<1.0	<1.0	-
	3/13/18	1.2	**52**	<0.50	<0.50	<0.50	<0.50
	8/14/18	1.3	**34**	<0.50	<0.50	<0.50	<0.50
	12/12/18	1.4	**32**	<0.50	<0.50	<0.50	<0.50
	5/8/19	0.52	**36**	<0.50	<0.50	<0.50	<0.50
	DUP-1	<2.5	**31**	<2.5	<2.5	<2.5	<2.5
	7/18/19	<0.50	**27**	<0.50	<0.50	<0.50	<0.50
	12/18/19	0.92	**26**	<0.50	<0.50	<0.50	<0.50
	8/4/20	1.7	**25**	<0.085	<0.15	<0.18	<0.12
	11/10/20	1.34	**32.5**	0.138	0.183	<0.188	<0.234
MW-24	6/1/16	<25	<25	<25	<25	<25	-
	11/16/16	NS	NS	NS	NS	NS	-
	3/20/17	NS	NS	NS	NS	NS	-
	3/21/17	NS	NS	NS	NS	NS	-
	7/20/17	<25	<25	<25	<25	<25	-
	11/16/17	<20	<20	<20	<20	<20	-
	3/13/18	<10	<10	<10	<10	<10	<10
	8/14/18	<12	110	<12	<12	<12	<12
	DUP-2	<12	20	<12	<12	<12	<12
	8/4/20	<0.13	<0.085	<0.085	<0.15	<0.18	<0.12
	11/10/20	0.363	<0.190	<0.126	<0.149	<0.188	<0.234
MW-25	6/9/16	<25	1.6	<0.50	<0.50	<0.50	-
	11/16/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/16/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/13/18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	8/14/18	<0.50	1.2	0.22 **J**	<0.50	<0.50	<0.50
	12/11/18	<0.50	0.13 **J**	0.23 **J**	<0.50	<0.50	<0.50
	5/9/19	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	DUP-2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/17/19	<0.50	0.17 J	0.28 J	<0.50	<0.50	<0.50
	12/16/19	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	8/3/20	<0.13	<0.085	<0.085	<0.15	<0.18	<0.12
	DUP-1	<0.13	<0.085	<0.085	<0.15	<0.18	<0.12
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

Table 3

Hi-Shear Corporation
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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
MW-26	6/9/16	<25	**494**	**515**	**384**	4.0	-
	11/16/16	<1.0	**520**	**520**	**460**	3.3	-
	3/21/17	<5.0	**420**	**600**	**490**	<5.0	-
	7/21/17	<2.0	**250**	**260**	**250**	<2.0	-
	11/17/17	<5.0	**400**	**470**	**400**	<5.0	-
	3/13/18	<5.0	**390**	**550**	**630**	<5.0	<5.0
	DUP-3	<5.0	**400**	**550**	**640**	<5.0	<5.0
	8/14/18	<0.50	**110**	**150**	**100**	<0.50	<0.50
	12/11/18	<0.50	**260**	**320**	**320**	2.7	0.14 **J**
	DUP-1	<0.50	**250**	**300**	**310**	2.6	0.13 **J**
	5/9/19	<0.50	**250**	**430**	**390**	2.8	0.14 J
	7/17/19	<0.50	**230**	**410**	**370**	2.7	<0.50
	12/16/19	<0.50	**140**	**480**	**290**	1.4	0.15 J
	DUP-1	0.27 J	**140**	**480**	**260**	1.0	0.14 J
	8/3/20	0.22	**91**	**240**	**200**	1.5	<0.12
	11/9/20	<0.300	**105**	**287**	**248**	0.105	<0.234
MW-27	6/9/16	<0.50	1.0	<0.50	<0.50	<0.50	-
	11/16/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/16/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	3/13/18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	8/14/18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/11/18	<0.50	0.19 **J**	<0.50	<0.50	<0.50	<0.50
	5/9/19	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/17/19	<0.50	0.19 J	<0.50	<0.50	<0.50	<0.50
	DUP-1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/16/19	<0.50	0.20 J	<0.50	<0.50	<0.50	<0.50
	8/3/20	<0.13	<0.085	<0.085	<0.15	<0.18	<0.12
	11/9/20	<0.300	3.20	0.413	<0.149	<0.188	<0.234
MW-28	6/9/16	**32**	**1,090**	**145**	9.1	5.7	-
	11/17/16	**55**	**1,500**	**130**	**12**	<10	-
	3/21/17	**34**	**1,300**	**150**	**21**	<10	-
	7/21/17	**42**	**1,200**	**130**	**10**	<10	-
	11/17/17	**55**	**1,400**	**160**	<10	<10	-
	3/13/18	**46**	**1,500**	**190**	**14**	**8.7**	<5.0
	8/15/18	**75**	**840**	**97**	**9.4 J**	**5.5**	<0.50
	12/11/18	**64**	**890**	**120**	**11**	**5.7**	<0.50
	5/9/19	**68**	**1,200**	**120**	**26**	3.7 J	<0.50
	7/17/19	**40**	**900**	**100**	**19**	3.3 J	<5.0
	12/16/19	**49**	**990**	**100**	**22**	4.6	<0.50
	8/4/20	**49**	**880**	**80**	7.2	2.7	<0.12
	11/9/20	**63.9**	**812**	**79.3**	6.32	4.0	<0.234
	DUP-1	**59.9**	**755**	**76.0**	6.03	3.6	<0.234
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

GENESIS ENGINEERING & REDEVELOPMENT

Table 3

Hi-Shear Corporation
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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
SPG-1	6/3/97	**30**	**350**	ND	ND	ND	-
	9/16/97	**2,600**	**97,000**	ND	ND	ND	-
	12/16/97	**2,200**	**56,000**	ND	ND	ND	-
	3/31/98	**200**	**9,500**	ND	ND	ND	-
	8/20/98	**700**	**20,000**	ND	ND	ND	-
	3/17/99	**520**	**19,000**	ND	ND	ND	-
	7/12/99	**1,500**	**41,000**	**900**	ND	ND	-
	11/17/99	ND	**65,000**	**4,100**	ND	ND	-
	2/29/00	ND	**43,000**	**3,500**	ND	ND	-
	6/29/00	ND	**73,000**	ND	ND	ND	-
	10/20/00	**2,600**	**78,000**	ND	ND	ND	-
	2/22/01	**2,300**	**34,000**	**1,000**	ND	ND	-
	6/26/01	ND	**15,000**	ND	ND	ND	-
	10/23/01	ND	**20,000**	**3,300**	ND	ND	-
	2/26/02	ND	**17,000**	**4,200**	ND	**4,200**	-
	2/26/02	ND	**17,000**	ND	ND	**3,600**	-
	6/6/02	**36**	**670**	**45**	ND	ND	-
	10/10/02	1.0	**19**	5.0	ND	ND	-
	3/3/03	NS	NS	NS	NS	NS	-
	7/24/03	<0.50	1.1	**17**	<0.50	<0.50	-
	10/30/03	NS	NS	NS	NS	NS	-
	2/23/04	NS	NS	NS	NS	NS	-
	7/19/04	<0.50	<0.50	2.0	<0.50	<0.50	-
	10/28/04	NS	NS	NS	NS	NS	-
	2/17/05	NS	NS	NS	NS	NS	-
	7/28/05	<0.50	<0.50	1.0	<0.50	<0.50	-
	10/10/05	NS	NS	NS	NS	NS	-
	2/27/06	NS	NS	NS	NS	NS	-
	7/25/06	<0.50	<0.50	<0.50	<0.50	<0.50	-
	10/27/06	NS	NS	NS	NS	NS	-
	3/26/07	NS	NS	NS	NS	NS	-
	7/30/07	**110**	**350**	**240**	0.65	**11**	-
	10/26/07	NS	NS	NS	NS	NS	-
	2/20/08	NS	NS	NS	NS	NS	-
	7/18/08	0.5	1.9	0.9	<0.50	<0.50	-
	10/31/08	NS	NS	NS	NS	NS	-
	2/23/09	NS	NS	NS	NS	NS	-
	8/18/09	<0.50	1.6	<0.50	<0.50	<0.50	-
	11/20/09	NS	NS	NS	NS	NS	-
	3/31/10	<1.0	<1.0	<1.0	<1.0	<1.0	-
	8/4/10	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/17/10	<1.0	1.1	<1.0	<1.0	<1.0	-
	3/30/11	1.4	**5.9**	<1.0	<1.0	<1.0	-
	8/16/11	<1.0	<1.0	<1.0	<1.0	<1.0	-
	12/19/11	<1.0	3.2	<1.0	<1.0	<1.0	-
	3/27/12	<1.0	**7.2**	1.0	<1.0	<1.0	-
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

GENESIS ENGINEERING & REDEVELOPMENT

Table 3

Hi-Shear Corporation
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VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
SPG-1	7/26/12	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/1/12	<1.0	1.3	<1.0	<1.0	<1.0	-
	3/26/13	<1.0	3.5	<1.0	<1.0	<1.0	-
	7/23/13	<1.0	<1.0	<1.0	<1.0	<1.0	-
	12/4/13	<1.0	2.4	**7.8**	<1.0	<1.0	-
	3/19/14	<1.0	2.2	<1.0	<1.0	<1.0	-
	8/7/14	<1.0	2.7	<1.0	<1.0	<1.0	-
	12/9/14	<1.0	**12**	<1.0	<1.0	<1.0	-
	3/25/15	<1.0	1.4	<1.0	<1.0	<1.0	-
	7/29/15	<1.0	**6**	<1.0	<1.0	<1.0	-
	11/23/15	<1.0	3.2	<1.0	<1.0	<1.0	-
	3/28/16	<1.0	4.6	<1.0	<1.0	<1.0	-
	7/28/16	<1.0	<1.0	<1.0	<1.0	<1.0	-
	11/16/16	<1.0	1.8	**28**	<1.0	<1.0	-
	3/20/17	<1.0	<1.0	<1.0	<1.0	<1.0	-
	7/20/17	<1.0	<1.0	4.7	<1.0	<1.0	-
	11/16/17	<1.0	3.4	<1.0	<1.0	<1.0	-
	3/14/18	<0.50	**6.0**	<0.50	<0.50	<0.50	<0.50
	8/15/18	0.37 **J**	2.8	0.64	<0.50	<0.50	<0.50
	7/31/19	0.48 J	**9.1**	2.1	<0.50	<0.50	<0.50
	12/19/19	**11**	**57**	**8.1**	<0.50	<0.50	**0.53**
MW-29	12/17/19	<0.50	0.13 J	<0.50	<0.50	<0.50	<0.50
	8/3/20	<0.13	<0.085	<0.085	<0.15	<0.18	<0.12
	11/11/20	<0.300	<0.190	<0.126	<0.149	<0.188	<0.234
MW-30	12/20/19	<0.50	0.98	3.0	1.7	<0.50	<0.50
	8/3/20	<0.13	<0.085	2.2	1.4	<0.18	<0.12
	11/11/20	<0.300	0.309	2.5	1.83	<0.188	<0.234
MW-31	12/17/19	<0.50	0.11 J	<0.50	<0.50	<0.50	<0.50
	DUP-2	<0.50	0.12 J	<0.50	<0.50	<0.50	<0.50
	8/3/20	<0.13	<0.085	<0.085	<0.15	<0.18	<0.12
	11/11/20	<0.300	<0.190	<0.126	<0.149	<0.188	<0.234
MW-34	12/26/19	0.84	1.0	0.15 J	0.22 J	0.83	<0.50
	DUP-4	0.79	0.95	0.16 J	0.22 J	0.77	<0.50
	6/7/20	1.2	1.2	<0.085	0.18J	**6.4**	<0.12
	11/12/20	0.720	0.319	0.209	0.196	1.03	<0.234
MW-35	3/13/20	<0.50	**5,890**	**1,230**	**3,400**	**42.6**	<0.50
	6/7/20	<0.13	**3,100**	**610**	**1,700**	0.47	<0.12
	11/11/20	<0.300	**1,180**	**287**	**932**	**13.7**	<0.234
	DUP-3	<0.300	**1,180**	**296**	**949**	**13.5**	<0.234
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

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GENESIS ENGINEERING & REDEVELOPMENT

Table 3

Hi-Shear Corporation
Second Semi-Annual 2020 Groundwater Monitoring Report

VOC Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)					
		PCE	**TCE**	**cis-1,2-DCE**	**trans-1,2-DCE**	**1,1-DCE**	**Vinyl Chloride**
MW-36	12/17/19	<0.50	1.4	2.4	1.7	1.3	<0.50
	8/5/20	<0.13	2.3	2.9	2.0	0.99	<0.12
	11/11/20	<0.300	1.79	2.70	2.75	1.03	<0.234
MW-39	6/7/20	<0.13	**11**	**12**	3.6	<0.18	<0.12
	DUP-1	<0.13	**10**	**12**	3.4	<0.18	<0.12
	11/10/20	0.385	0.707	**5.90**	0.154	<0.188	<0.234
	DUP-2	<0.300	0.632	**5.81**	0.163	<0.188	<0.234
MW-40	12/17/19	<0.50	<0.50	2.8	0.16 J	<0.50	<0.50
	8/5/20	<0.13	<0.085	3.6	<0.15	<0.18	<0.12
	DUP-3	<0.13	<0.085	3.0	<0.15	<0.18	<0.12
	11/11/20	<0.300	<0.190	4.85	0.687	<0.188	<0.234
	MCL	**5**	**5**	**6**	**10**	**6**	**0.5**

NOTES:

- "feet bgs" - feet below ground surface
- "PCE" - tetrachloroethene
- "TCE" - trichloroethene
- "cis-1,2-DCE" - cis-1,2-dichloroethene
- "MCL" - State Water Resources Control Board Maximum Contaminant Level (Feb. 2015)
- "NS" - monitoring well not sampled
- "trans-1,2-DCE" - trans-1,2-dichloroethene
- "**Bold**" - concentration exceeds the residential screening level
- "NA" - not applicable
- "J" - Estimated Value (CLP Flag)
- "--" - not reported in tri-annual monitoring tables

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)	
		Perchlorate	1,4-Dioxane
MW-1	7/24/03	<2.0	3.7
	2/23/04	<2.0	<2.0
	7/19/04	3.0	4.9
	3/31/10	<2.0	<2.0
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	<1.0
	8/17/11	<2.0	<1.0
	12/20/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/27/12	<2.0	<1.0
	11/1/12	<2.0	2.8
	3/26/13	<2.0	1.6
	7/23/13	<2.0	3.9
	12/4/13	<2.0	<1.0
	3/19/14	<2.0	<1.0
	8/7/14	<2.0	12.0
	12/9/14	<2.0	<1.0
	3/25/15	<2.0	1.7
	7/29/15	<2.0	5.0
	11/23/15	<2.0	5.6
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	1.0
	11/16/16	<2.0	31
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	20
	11/16/17	<2.0	2.1
	3/14/18	<2.0	2.2
	8/15/18	<4.0	36
	7/31/19	<4.0	12
	DUP-2	<4.0	16
	12/19/19	<4.0	3.6
MW-3	7/24/03	2.2	8.3
	2/23/04	<2.0	<2.0
	7/19/04	<2.0	8.6
	3/31/10	<2.0	<10
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	<1.0
	8/17/11	<2.0	<1.0
	12/20/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/27/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	3/26/13	<2.0	<1.0
	7/23/13	<2.0	<1.0
	12/4/13	<2.0	<1.0
	3/19/14	<2.0	<1.0
	8/7/14	<2.0	3.2
	12/9/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/29/15	<2.0	3.7
	11/23/15	<2.0	5.3
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/16/16	3.5	3.5
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/14/18	<2.0	<2.0
	8/15/18	<4.0	<1.0
	7/31/19	<4.0	<1.0
	12/20/19	<4.0	<1.0
	MCL	**6**	**NA**

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)	
		Perchlorate	1,4-Dioxane
MW-4	3/31/10	**340**	22
	8/4/10	2.0	23
	11/17/10	**160**	14
	3/30/11	**220**	22
	8/17/11	**190**	<1.0
	12/20/11	**160**	16
	3/27/12	**120**	22
	7/27/12	**140**	18
	11/1/12	**170**	22
	3/26/13	**180**	18
	7/23/13	**240**	18
	12/4/13	**27**	27
	3/19/14	**260**	29
	8/7/14	**260**	29
	12/9/14	**250**	30
	3/25/15	**250**	31
	7/29/15	**250**	22
	11/23/15	**200**	23
	3/28/16	**240**	24
	7/28/16	**250**	20
	11/16/16	**200**	20
	3/20/17	**260**	20
	7/20/17	NS	NS
	11/16/17	**130**	15
	3/15/18	**56**	7.1
	8/16/18	**100**	6.5
	7/30/19	**63**	4.6
	12/19/19	**53**	6.5
MW-5	3/31/10	5.2	<200
	8/4/10	5.4	<2.0
	11/17/10	5.6	<2.0
	3/30/11	4.6	<1.0
	8/17/11	5.3	<1.0
	12/20/11	2.9	<1.0
	3/27/12	2.7	<1.0
	7/27/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	3/26/13	<2.0	<1.0
	7/23/13	<2.0	<1.0
	12/4/13	2.1	<0.95
	3/19/14	2.3	<1.0
	8/7/14	3.0	<1.0
	12/9/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/29/15	<2.0	<1.0
	11/23/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/16/16	<2.0	<1.0
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/12/18	<2.0	<2.0
	8/15/18	<4.0	<1.0
	8/1/19	<4.0	<1.0
	12/18/19	<4.0	<1.0
	MCL	**6**	**NA**

Table 4

Hi-Shear Corporation
cond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)	
		Perchlorate	1,4-Dioxane
MW-6	3/31/10	**81**	<2.0
	8/4/10	**150**	7.4
	11/17/10	**230**	4.9
	3/30/11	**200**	20
	8/17/11	**190**	13
	12/20/11	**170**	16
	3/27/12	**160**	23
	7/27/12	**220**	18
	11/1/12	**180**	16
	3/26/13	**180**	7.8
	7/23/13	**190**	12
	12/4/13	**220**	15
	3/19/14	**180**	15
	8/7/14	**180**	11
	12/9/14	**170**	13
	3/25/15	**160**	12
	7/29/15	**140**	9.2
	11/23/15	**150**	12
	3/28/16	**170**	12
	7/28/16	**240**	19
	11/16/16	**180**	13
	3/20/17	**170**	11
	7/20/17	**160**	13
	11/16/17	**150**	10
	3/15/18	**53**	5.6
	8/13/18	**73**	7.5 **J**
	8/1/19	**13**	3.2
	12/19/19	3.7	1.6
MW-7	7/24/03	<2.0	<2.0
	2/23/04	<2.0	<2.0
	7/19/04	<2.0	<2.0
MW-7R	3/31/10	<2.0	<2.0
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	<1.0
	12/19/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/26/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	3/26/13	<2.0	<1.0
	7/23/13	<2.0	<1.0
	12/4/13	<2.0	<1.0
	3/19/14	<2.0	<1.0
	8/7/14	<2.0	<1.0
	12/9/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/29/15	<2.0	<1.0
	11/23/15	<2.0	<1.0
	3/29/16	<2.0	<1.0
	7/29/16	<2.0	<1.0
	11/16/16	<2.0	<1.0
	3/20/17	<2.0	<1.0
	7/21/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/12/18	<2.0	<2.0
	8/13/18	<4.0	<2.0
	7/30/19	<4.0	<1.0
	12/19/19	1.1	<1.0
	MCL	**6**	**NA**

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)	
		Perchlorate	1,4-Dioxane
MW-8	4/1/10	**7.5**	<1,000
	8/4/10	**8.7**	4.4
	11/17/10	**8.9**	7.8
	3/30/11	**7.7**	30
	8/16/11	**7.4**	40
	12/19/11	4.9	14
	3/27/12	5.6	51
	7/27/12	5.8	30
	11/2/12	4.0	71
	3/27/13	**6.3**	9.6
	7/23/13	**6.3**	9.6
	12/5/13	**6.2**	49
	3/20/14	4.2	26
	8/8/14	4.0	32
	12/10/14	2.9	26
	3/26/15	3.7	24
	7/29/15	2.2	20
	11/20/15	<2.0	19
	3/28/16	<2.0	11
	7/28/16	<2.0	4.0
	11/16/16	<2.0	1.4
	3/21/17	<2.0	<1.0
	7/21/17	<2.0	<1.0
	11/17/17	<2.0	<1.0
	3/12/18	<2.0	<2.0
	8/14/18	<4.0	<1.0
	7/30/19	<4.0	<1.0
	12/21/19	2.7	<2.0
MW-9	3/31/10	<2.0	<2.0
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	<1.0
	8/16/11	<2.0	<1.0
	12/19/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/26/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	3/26/13	<2.0	<1.0
	7/23/13	2.5	<1.0
	12/5/13	<2.0	<0.95
	3/20/14	<2.0	<1.0
	8/8/14	<2.0	<1.0
	12/10/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/30/15	<2.0	<1.0
	11/20/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/17/16	<2.0	<1.0
	3/21/17	2.5	<1.0
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/13/18	<2.0	<2.0
	8/14/18	2.1 J	<5.0
	7/30/19	2.4 J	<1.0
	DUP-1	2.2 J	<1.0
	12/17/19	2.6 J	<5.0
	MCL	**6**	**NA**

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
cond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)	
		Perchlorate	1,4-Dioxane
MW-10	3/31/10	<2.0	<2.0
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	<1.0
	8/16/11	<2.0	<1.0
	12/19/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/26/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	3/26/13	<2.0	1.2
	7/23/13	<2.0	<1.0
	12/4/13	<2.0	<1.0
	3/19/14	<2.0	16
	8/7/14	<2.0	<1.0
	12/9/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/29/15	<2.0	<1.0
	11/20/15	<2.0	4.0
	3/28/16	<2.0	1.5
	7/28/16	<2.0	<1.0
	11/17/16	<2.0	<1.0
	3/21/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/17/17	<2.0	<1.0
	3/12/18	<2.0	<2.0
	8/15/18	<4.0	<1.0
	8/1/19	<4.0	<1.0
	12/19/19	<4.0	<1.0
CMW-11A	3/31/10	<2.0	<2.0
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	<1.0
	8/16/11	<2.0	<1.0
	12/19/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/26/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	7/23/13	<2.0	<1.0
	12/4/13	<2.0	<1.0
	3/19/14	<2.0	<1.0
	8/7/14	<2.0	<1.0
	12/9/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/29/15	<2.0	<1.0
	11/20/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/16/16	<2.0	<1.0
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/17/17	<2.0	<1.0
	3/14/18	<2.0	<2.0
	8/16/18	<4.0	<1.0
	7/31/19	<4.0	<1.0
	12/20/19	<4.0	<1.0
	MCL	**6**	**NA**

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)	
		Perchlorate	1,4-Dioxane
CMW-11B	7/24/03	<2.0	<2.0
	3/31/10	<2.0	<4.0
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	<1.0
	8/16/11	<2.0	<1.0
	12/19/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/26/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	7/23/13	<2.0	<1.0
	12/4/13	<2.0	<1.0
	3/19/14	<2.0	<1.0
	8/7/14	<2.0	<1.0
	12/9/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/29/15	<2.0	<1.0
	11/20/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/16/16	<2.0	<1.0
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/17/17	<2.0	<1.0
	3/14/18	<2.0	<2.0
	8/16/18	<4.0	<1.0
	12/20/19	<4.0	<1.0
CMW-11C	2/23/04	**7.7**	<2.0
	7/20/04	**6.9**	<2.0
	4/1/10	<2.0	<500
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	8.4
	8/16/11	<2.0	12
	12/19/11	<2.0	5.2
	3/27/12	<2.0	20
	7/26/12	<2.0	11
	11/1/12	<2.0	4.8
	3/26/13	<2.0	4.9
	7/23/13	<2.0	6.1
	12/4/13	2.5	30
	3/19/14	<2.0	15
	8/7/14	<2.0	20
	12/9/14	2.9	18
	3/25/15	2.9	20
	7/29/15	<2.0	21
	11/20/15	2.7	29
	3/28/16	<2.0	28
	7/28/16	2.6	25
	11/16/16	<2.0	25
	3/20/17	<2.0	25
	7/20/17	<2.0	15
	11/17/17	<2.0	15
	3/14/18	<2.0	14
	8/16/18	<4.0	11
	8/1/19	<4.0	2.3
	12/20/19	<4.0	<1.0
	MCL	**6**	**NA**

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)	
		Perchlorate	1,4-Dioxane
MW-12	4/1/10	**11**	<100
	8/5/10	**15**	4.2
	11/18/10	**18**	<2.0
	3/30/11	**18**	6.7
	8/17/11	**25**	5.6
	12/20/11	**33**	13
	3/27/12	**37**	19
	7/27/12	**43**	12
	11/2/12	**31**	24
	3/27/13	**31**	8.6
	7/23/13	**37**	13
	12/5/13	**28**	14
	3/20/14	**21**	25
	8/8/14	**20**	12
	12/10/14	**19**	14
	3/26/15	**17**	15
	7/30/15	**16**	9.2
	11/20/15	**20**	14
	3/28/16	**22**	12
	7/28/16	**26**	9.3
	11/17/16	**22**	8.9
	3/21/17	**30**	9.3
	7/21/17	**30**	8.0
	11/17/17	**33**	11
	3/14/18	**24**	10
	8/13/18	**26**	19 **J**
	7/30/19	**36**	9.5
	12/26/19	**38**	<10
MW-13	4/1/10	**6.7**	<2.0
	8/5/10	**9.2**	<2.0
	11/18/10	**10**	<2.0
	3/30/11	**9.0**	<1.0
	8/17/11	**7.9**	<1.0
	12/20/11	**6.2**	<1.0
	3/27/12	5.1	<1.0
	7/27/12	**6.6**	<1.0
	11/2/12	4.9	<1.0
	3/27/13	**6.4**	<1.0
	7/23/13	**7.4**	<1.0
	12/5/13	**7.8**	<0.95
	3/20/14	**6.4**	<1.0
	8/8/14	**9.6**	<1.0
	12/10/14	**7.7**	<1.0
	3/26/15	**8.0**	<1.0
	7/30/15	**6.3**	<1.0
	11/23/15	**8.7**	<1.0
	3/29/16	**6.4**	<1.0
	7/29/16	**7.7**	<1.0
	11/16/16	**6.2**	<1.0
	3/21/17	**6.0**	<1.0
	7/21/17	**6.0**	<1.0
	11/16/17	5.0	<1.0
	3/14/18	<2.0	<2.0
	8/16/18	5.0	<1.0
	8/1/19	5.8	<1.0
	12/26/19	4.6	<1.0
	MCL	**6**	**NA**

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration *(µg/L)*	
		Perchlorate	1,4-Dioxane
MW-14	4/1/10	**100**	<50
	8/5/10	**100**	23
	11/18/10	**99**	16
	3/30/11	**36**	11
	8/17/11	**83**	19
	12/20/11	**70**	17
	3/27/12	**75**	24
	7/27/12	**79**	12
	11/2/12	**76**	20
	3/26/13	NS	NS
	7/23/13	NS	NS
	12/5/13	**51**	10
	3/20/14	**72**	11
	8/8/14	**150**	21
	12/10/14	**98**	12
	3/26/15	**120**	12
	7/30/15	**140**	11
	11/23/15	**160**	17
	3/29/16	**190**	19
	7/29/16	**250**	16
	11/17/16	**170**	20
	3/21/17	**250**	24
	7/21/17	**180**	22
	11/16/17	**130**	20
	3/15/18	**75**	15
	8/16/18	**26**	4.5
	7/31/19	**110**	12
	12/20/19	**68**	4.5
MW-15	4/1/10	**7.4**	<1,000
	8/5/10	**10**	13
	11/18/10	**9.8**	6.0
	3/30/11	**7.6**	14
	8/17/11	**7.7**	5.4
	12/20/11	4.6	9.9
	3/27/12	4.9	27
	7/27/12	3.9	15
	11/2/12	4.6	33
	3/27/13	5.2	5.6
	7/23/13	**7.4**	8.4
	12/5/13	4.3	48
	3/20/14	2.5	23
	8/8/14	5.6	40
	12/10/14	5.3	29
	3/26/15	5.9	25
	7/29/15	**6.3**	25
	11/23/15	5.1	23
	3/29/16	2.3	19
	7/29/16	3.3	21
	11/17/16	<2.0	13
	3/21/17	<2.0	9.3
	7/21/17	<2.0	3.8
	11/17/17	<2.0	12
	3/15/18	<2.0	18.0
	8/13/18	1.2 J	11
	8/1/19	<4.0	10
	12/18/19	<4.0	12
	MCL	**6**	**NA**

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)	
		Perchlorate	**1,4-Dioxane**
MW-16	8/16/18	**15**	31
	7/31/19	**14**	34
	12/19/19	<4.0	1.9
	DUP-3	<4.0	3.1
MW-17	3/31/10	<2.0	<2.0
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	2.1	<1.0
	8/16/11	2.5	<1.0
	12/19/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/26/12	<2.0	<1.0
	11/1/12	<2.0	1.8
	3/27/13	<2.0	<1.0
	7/23/13	<2.0	<1.0
	12/4/13	2.1	<1.0
	3/20/14	2.2	<1.0
	8/7/14	<2.0	<1.0
	12/10/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/29/15	<2.0	<1.0
	11/23/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/29/16	2.9	<1.0
	11/16/16	3.9	<1.0
	3/20/17	<2.0	<1.0
	7/21/17	2.7	<1.0
	11/16/17	4.5	<1.0
	3/14/18	3.3	<2.0
	8/15/18	5.4	<1.0
	8/1/19	**11**	<1.0
	DUP-3	**11**	<1.0
	12/19/19	**10**	<1.0
	MCL	**6**	**NA**

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
:cond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)	
		Perchlorate	1,4-Dioxane
MW-18	3/31/10	**16**	<500
	8/5/10	**20**	19
	11/18/10	**18**	17
	3/30/11	**19**	60
	8/17/11	**21**	28
	12/20/11	**14**	65
	3/27/12	**12**	190
	7/27/12	**16**	100
	11/2/12	**14**	180
	3/27/13	**15**	22
	7/23/13	**16**	11
	12/4/13	**10**	100
	3/20/14	**14**	98
	8/8/14	**18**	150
	12/10/14	**12**	93
	3/26/15	**15**	130
	7/29/15	**14**	110
	11/23/15	**13**	120
	3/28/16	**11**	74
	7/29/16	**10**	60
	11/17/16	**12**	80
	3/21/17	**8.0**	39
	7/21/17	**12**	50
	11/17/17	**7.5**	46
	3/15/18	4.5	20
	8/13/18	**16**	88
	7/31/19	**6.4**	19
	12/20/19	4.6	20
MW-19	3/31/10	**32**	<500
	8/5/10	**44**	2.4
	11/18/10	**34**	<2.0
	3/30/11	**17**	2.1
	8/17/11	**23**	2.4
	12/20/11	**24**	2.6
	3/27/12	**40**	5.0
	7/27/12	**45**	4.7
	11/2/12	**35**	4.7
	3/27/13	**32**	2.1
	7/23/13	**48**	4.7
	12/5/13	**27**	12
	3/20/14	**23**	10
	8/8/14	**25**	13
	12/10/14	**10**	6.8
	3/26/15	**13**	7.6
	7/29/15	**7.7**	7.3
	11/20/15	**6.5**	10
	3/28/16	3.7	10
	7/28/16	4.0	11
	11/17/16	**9.3**	19
	3/21/17	**8.9**	19
	7/21/17	**18**	32
	11/17/17	**12**	21
	3/15/18	**8.7**	25
	8/16/18	**15**	60
	7/31/19	**13**	43
	12/20/19	**11**	86
	MCL	**6**	**NA**

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (µg/L)	
		Perchlorate	1,4-Dioxane
MW-20	7/30/15	**6.3**	<1.0
	11/20/15	**9.6**	1.4
	3/28/16	**9.4**	1.3
	7/28/16	**10**	1.6
	11/16/16	NS	NS
	3/20/17	NS	NS
	7/20/17	**10**	3.6
	11/16/17	**10**	4.6
	3/13/18	**8.4**	3.1
	8/14/18	**9.4**	2.2
	12/12/18	**8.8**	1.6
	5/8/19	**8.9**	1.5
	12/18/19	**8.7**	<5.0
	8/4/20	**10**	<1.6
	DUP-2	**9.4**	<1.6
	11/10/20	**12.6**	4.47
MW-21	7/30/15	**26**	<1.0
	11/20/15	**30**	1.5
	3/28/16	**29**	1.1
	7/28/16	**30**	1.5
	11/16/16	NS	NS
	3/20/17	NS	NS
	7/20/17	**26**	<1.0
	11/16/17	**24**	<1.0
	3/13/18	**7.5**	<2.0
	8/14/18	**18**	1.1
	12/12/18	**15**	<1.0
	5/8/19	**18**	<1.0
	7/18/19	**19**	<1.0
	DUP-2	**19**	<1.0
	12/18/19	**17**	<1.0
	8/4/20	**19**	<0.16
	11/10/20	**17.2**	1.09
MW-22A	8/4/15	<2.0	<1.0
	11/20/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/16/16	<2.0	<1.0
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/15/18	<2.0	<2.0
	8/15/18	<4.0	<1.0
	12/11/18	<4.0	<1.0
	5/9/19	<4.0	<1.0
	7/17/19	<4.0	<1.0
	12/18/19	<4.0	<1.0
	6/7/20	<0.76	<0.16
	11/12/20	4.41	<0.0447
MW-22B	8/4/15	<2.0	<1.0
	11/20/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/16/16	<2.0	<1.0
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/15/18	<2.0	<2.0
	8/15/18	<4.0	<1.0
	12/11/18	<4.0	<1.0
	5/9/19	1.2 J	<1.0
	7/17/19	<4.0	<1.0
	12/18/19	<4.0	<1.0
	6/7/20	<0.76	<0.14
	11/12/20	<0.300	<0.0447
	DUP-4	<0.300	0.207
	MCL	**6**	**NA**

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)	
		Perchlorate	1,4-Dioxane
MW-23	7/30/15	<2.0	<1.0
	11/20/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/16/16	NS	NS
	3/20/17	NS	NS
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/13/18	<2.0	<2.0
	8/14/18	<4.0	<1.0
	12/12/18	<4.0	<1.0
	5/8/19	<4.0	<1.0
	DUP-1	0.88 J	<1.0
	7/18/19	<4.0	<1.0
	12/18/19	<4.0	<1.0
	8/4/20	<0.81	<0.16
	11/10/20	<0.300	<0.0447
MW-24	6/1/16	<2.0	<0.25
	11/16/16	NS	NS
	3/20/17	NS	NS
	7/20/17	<4.0	<1.0
	11/16/17	<2.0	<1.0
	3/13/18	<2.0	<2.0
	8/14/18	<4.0	<5.0
	8/4/20	0.87J	<1.6
	11/10/20	<0.300	<0.0447
MW-25	6/9/16	<2.0	<0.25
	11/16/16	<2.0	<1.0
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/13/18	4.5	<2.0
	8/14/18	<4.0	<1.0
	12/11/18	<4.0	<1.0
	5/9/19	<4.0	<1.0
	DUP-2	<4.0	<1.0
	7/17/19	<4.0	<1.0
	12/16/19	<4.0	<1.0
	8/3/20	<0.81	<0.16
	DUP-1	<0.81	<0.16
MW-26	6/9/16	<2.0	3.3
	11/16/16	<2.0	3.5
	3/21/17	<2.0	2.2
	7/21/17	3.4	1.2
	11/17/17	<2.0	2.3
	3/13/18	<2.0	<2.0
	8/14/18	2.5 **J**	1.5
	12/11/18	<4.0	<1.0
	5/9/19	0.77 J	1.7
	7/17/19	<4.0	1.2
	12/16/19	0.83 J	<1.0
	DUP-1	<4.0	<1.0
	8/3/20	1.8	<0.16
	11/9/20	<0.300	1.71
	MCL	**6**	**NA**

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)	
		Perchlorate	1,4-Dioxane
MW-27	6/9/16	<2.0	<0.25
	11/16/16	<2.0	<1.0
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/13/18	<2.0	<2.0
	8/14/18	<4.0	<1.0
	12/11/18	<4.0	<1.0
	5/9/19	<4.0	<1.0
	7/17/19	<4.0	<1.0
	DUP-1	<4.0	<1.0
	12/16/19	<4.0	<1.0
	8/3/20	<0.81	<0.16
	11/9/20	<0.300	0.337
MW-28	6/9/16	5.8	1.4
	11/17/16	5.1	<1.0
	3/21/17	**6.1**	1.2
	7/21/17	**6.3**	1.3
	11/17/17	**6.0**	2.2
	3/13/18	4.4	<2.0
	8/15/18	4.1	<1.0
	12/11/18	4.4	<1.0
	5/9/19	4.6	<1.0
	7/17/19	5.3	<1.0
	12/16/19	4.6	<5.0
	8/4/20	4.5	<1.6
	11/9/20	**5.84**	1.44
	DUP-1	3.24	1.55
SPG-1	3/31/10	<2.0	<2.0
	8/4/10	<2.0	<2.0
	11/17/10	<2.0	<2.0
	3/30/11	<2.0	<1.0
	8/16/11	<2.0	<1.0
	12/19/11	<2.0	<1.0
	3/27/12	<2.0	<1.0
	7/26/12	<2.0	<1.0
	11/1/12	<2.0	<1.0
	3/26/13	<2.0	<1.0
	7/23/13	<2.0	<1.0
	12/4/13	<2.0	<1.0
	3/19/14	<2.0	<1.0
	8/7/14	<2.0	<1.0
	12/9/14	<2.0	<1.0
	3/25/15	<2.0	<1.0
	7/29/15	<2.0	<1.0
	11/23/15	<2.0	<1.0
	3/28/16	<2.0	<1.0
	7/28/16	<2.0	<1.0
	11/16/16	<10	<1.0
	3/20/17	<2.0	<1.0
	7/20/17	<2.0	<1.0
	11/16/17	<2.0	<1.0
	3/14/18	<2.0	<2.0
	8/15/18	<4.0	<1.0
	7/31/19	<4.0	<1.0
	12/19/19	<4.0	2.7
	MCL	**6**	**NA**

GENESIS ENGINEERING & REDEVELOPMENT

Table 4

Hi-Shear Corporation
:ond Semi-Annual 2020 Groundwater Monitoring Rep

1,4-Dioxane, and Perchlorate
Concentrations in Groundwater

Sample ID	Sampling Date	Concentration (*µg/L*)	
		Perchlorate	1,4-Dioxane
MW-29	12/17/19	<4.0	<1.0
	8/3/20	<0.81	<0.16
	11/11/20	<0.300	0.367
MW-30	12/20/19	<4.0	<1.0
	8/3/20	<0.81	<0.16
	11/11/20	<0.300	0.192
MW-31	12/17/19	2.2 J	<1.0
	DUP-2	1.7 J	<1.0
	8/3/20	2.1	<0.16
	11/11/20	2.04	<0.0447
MW-34	12/26/19	<4.0	<1.0
	DUP-4	<4.0	<1.0
	6/7/20	<0.76	<0.16
	11/12/20	<0.300	0.306
MW-35	6/7/20	<0.76	<1.4
	11/11/20	<0.300	0.459
	DUP-3	<0.300	0.483
MW-36	12/17/19	<4.0	<1.0
	8/5/20	<0.81	<0.16
	11/11/20	<0.300	0.296
MW-39	6/9/20	<0.76	<0.16
	DUP-1	<0.76	<0.16
	11/10/20	<0.300	0.486
	DUP-2	<0.300	0.354
MW-40	12/17/19	<4.0	<1.0
	8/5/20	0.98J	<0.16
	DUP-3	1.2J	<0.16
	11/11/20	<0.300	<0.0447
	MCL	**6**	**NA**

NOTES:

- "**MCL**" - SWRCB Maximum Contaminant Level (Jan. 2016)
- "**Bold**"- concentration exceeds the residential screening level
- "NS" - monitoring well not sampled
- "NA" - not applicable
- "J" - Estimated Value (CLP Flag)

GROUNDWATER REMOVAL ACTION WORKPLAN (RAW)
SKYPARK COMMERCIAL AND LOMITA PROPERTIES
24701 – 24777 Crenshaw Boulevard and 2530, 2540, and 2600 Skypark Drive, Torrance
and East of Crenshaw Boulevard Property in Lomita, California

Appendix B

LactOil® Product Sheet and Safety Data Sheet, and DHC Product Sheet

Appendix B

Interpretation of Pressure Logs

Interpretation of Pressure Logs

FRx, Inc.
P.O. Box 498292
Cincinnati, OH
45249-8292

(513) 469 6040 fax (513) 469 6041
www.frx-inc.com

Justification and Overall Approach: Fracturing of solids results from application of fluid pressure in a manner to exceed the strength of the solid. The particular pressure required to nucleate a fracture depends upon the property of the materials and the geometry of the surface upon which the pressure is applied. Typically, increasingly less pressure is required to propagate, or extend, the fracture after nucleation. The developing pressure trend during propagation can be measured and recorded, forming a pressure log. Logs can be analyzed within the concepts of fracture mechanics to estimate fracture characteristics such as extent and aperture. This note presents simple equations that can be used in spreadsheet applications to analyze pressure logs.

Background and Context: Many phenomena can be involved in the creation of a fracture suitable for remediation of contaminated soil. The mechanics may include elastic deformation, energy dissipation near the fracturing tip, viscous flow in the fracture gap, leak-off into the solid, capillarity and fluid lag behind the fracture tip, fluid transport of granular solids, and in situ stress distribution. Heterogeneity and anisotropy can further compound analysis. Comprehensive numerical models can offer varying degrees of integrated evaluation provided adequate supporting data are available. In the absence of data or computational resources, closed-form solutions are available to characterize special, or limiting, cases. These methods can be encoded on spreadsheets. The interpretation processes discussed herein use such an approach.

Fractures subject to interpretation by these methods are assumed to exist as circular (or mildly elliptical), planar, singular features that propagate in a uniform formation that can be characterized by an elastic bulk modulus and a fracture toughness – or, more precisely, a Type I stress intensity. Preliminarily, leak-off needs to be considered as insignificant, although it can be incorporated in hind-sight. As shown by Germanovich and Murdoch, viscous flow effects are important for only a very small fraction of a second for typical environmental fractures. Similarly, they show that the time during which capillarity and fluid lag may have effect also is short, so these mechanisms can be disregarded.

The interpretation methods described herein can provide only a rudimentary assessment of proppant distribution. Specifically, the methods estimate a fracture aperture profile (variation of fracture aperture from maximum at the center to zero at the tip) which can be used to infer that proppant of a certain diameter, e.g. d_p, cannot be carried to the tip and must be lodged no farther from the center than where aperture is d_p. As shown by Richardson et al., proppant distribution in shallow fractures can be much more complex.

The exact shape and location of strongly elliptical and acentric fracture forms, such as documented by Murdoch and Slack for shallow fractures created in glacial soils, cannot be predicted by closed-form solutions. Nonetheless, the interpretation methods can be applied to such fractures, and useful and seemingly appropriate descriptive parameters have been obtained. Furthermore, the orientation of the fracture plane (whether horizontal or vertical) can, at best, be inferred from a consideration of whether the estimated extent can exist within the subsurface without intersecting the ground surface. For example, if the interpretation estimates a fracture radius of 10 m at a depth of 5 m, then the fracture cannot be vertical because a goodly portion of it would have to be above ground surface.

Geological considerations at the length scale of fracture extent and depth can advise the expected variation among geotechnical parameters extracted using the interpretation processes discussed herein. In particular, sequence stratigraphy can explain either variability among fractures or justify choosing a set of representative values for a set (or sets) of fractures.

Quantitative Models: Linear elastic failure mechanics considers the coupling between elastic deformation and energy dissipation at the fracture tip. The governing equations can be presented in an algebraic closed-form. Two sets of equations have been developed: a set for "deep" fractures and a set for "shallow" fractures. Deep and shallow are defined by the ratio of extent (or radius) to depth. Experts offer various values ranging between ½ and 2 as the defining threshold.

The fundamental characteristic that defines shallow fractures is the flexion (or bending) of the overburden. As described in texts of structural mechanics (e.g. Love or Timoshenko) a circular plate fixed at is edge and subjected to uniform pressure on one side will deform – or bulge – in a predictable 4th order shape. The mathematical expression is quite tractable and is applicable for ratios of deformation:thickness that span much more than our experience in creating fractures for environmental purposes.

Murdoch compiled the flexion expression with volumetric considerations and the accepted expression for mode I stress intensity to form temporal equations for fracturing pressure, fracture extent, and maximum fracture aperture. The expression for pressure is of interest in interpretation of pressure logs, while the remaining two can be used to estimate form characteristics for the fracture. Assuming a steady injection rate, the equations are simple functions of time.

$$P = \sqrt{\frac{32\pi}{6^{\frac{3}{2}}}} \quad d^{3/4} \left(\frac{Kic^3}{E'}\right)^{1/2} \frac{1}{Q^{1/2}} \quad \frac{1}{t^{1/2}}$$

$$a = \sqrt[8]{\frac{24}{\pi^2}} \quad d^{3/8} \quad \frac{Q^{1/4}}{\left(\frac{Kic}{E'}\right)^{1/4}} \quad t^{1/4}$$

$$\delta_0 = \sqrt{\frac{9}{2\pi 6^{\frac{1}{2}}}} \quad d^{-3/4} \left(\frac{Kic}{E'}\right)^{1/2} \quad Q^{1/2} \quad t^{1/2}$$

$$\delta = \delta_0 \, (1 - ({}^{r}/_{a})^2)^2$$

in which *P* is the fracturing pressure at the fracture tip, *a* is the fracture extent (or radius), δ_0 is the maximum fracture aperture (at the center), δ is the aperture at a position, *r*, along the fracture, *d* is the depth, *Kic* is the Type I stress intensity factor, *E'* is the bulk modulus modulated by Poisson's ratio, i.e. $E'=E/(1-\nu^2)$, *Q* is the volumetric injection rate, which assumed to be constant, and *t* is elapsed time of injection.

The shape of a deep fracture is essentially a bubble – an oblate spheroid. A similar set of expressions can be developed utilizing the configuration described, perhaps first, by Perkins and Kern and later reprised by Germanovich and Murdoch.

$$P = \sqrt[5]{\frac{\pi^3}{12}} \left(\frac{Kic^6}{E'}\right)^{1/5} \frac{1}{Q^{1/5}} \quad \frac{1}{t^{1/5}}$$

$$a = \sqrt[5]{\frac{9}{64\pi}} \quad \frac{Q^{2/5}}{\left(\frac{Kic}{E'}\right)^{2/5}} \quad t^{2/5}$$

$$\delta_0 = \sqrt[5]{\frac{384}{\pi^3}} \quad \left(\frac{Kic}{E'}\right)^{4/5} \quad Q^{1/5} \quad t^{1/5}$$

$$\delta = \delta_0 \left(1 - \left({}^{r}/_{a}\right)^2\right)^{1/2}$$

For both the shallow and deep case, the expression for temporal development of pressure has the form of $P = c\, t^{-1/n}$. Thus plots of P^{-n} vs. t should be linear with slope that is related to the geotechnical parameters K_{ic} and E' (as well as Q and d) according to the equations above. Further note that the geotechnical parameters appear in a specific ratio of $(K_{ic}^{n+1}/E')^{1/n}$, and so fractures created in identical geology but with different rates and different depth should be comparable.

Utilization of Quantitative Models: Pressure data recorded in a pressure log typically are collected at some point along the injection system between the pump face and the well head. The equations above are framed in the context of the pressure at the fracture tip, so an accounting needs to be made of the friction losses in the injection equipment as well as head differences along the well. The instantaneous shut-in pressure (ISIP) provides an assessment of friction due to flow of the fracture fluid through hose and casing. Slurry composition data can justify head corrections.

The consequence of ignoring head loss can be estimated with a bit of calculus. If the pressure is function of time, $P[t]$ and the pressure difference from the measuring point to the fracture tip a constant P_b, then the following expressions can be written for the observed pressure, P_{obsrv}, and manipulation of it for the shallow (left) or deep (right) case.

$$P_{obsrv} = P[t] + P_b$$

$$\frac{dP_{obsrv}^{-n}}{dt} = -2\frac{\frac{dP[t]}{dt}}{(P_b + P[t])^3} \quad or \quad -5\frac{\frac{dP[t]}{dt}}{(P_b + P[t])^6}$$

$$f_{correction} = \frac{\frac{dP[t]^{-n}}{dt}}{\frac{dP_{obsrv}^{-n}}{dt}} = \left(1 + \frac{P_b}{P[t]}\right)^3 \quad or \quad \left(1 + \frac{P_b}{P[t]}\right)^6$$

This last expression represents a correction factor (denoted $f_{correction}$) that needs to be applied to slope values obtained using just observed pressure. While third and sixth order polynomials do grow quickly, a more muted effect occurs when the role of the correction factor is considered in operations that extract K_{IC} and *E'* as independent variables. Extraction of K_{IC} and *E'* typically is done by comparing the ratio K_{IC}/E', which is obtained by analysis of radial extent or aperture, to the ratio obtained by pressure log analysis.

$$K_{IC} = \left(\frac{K_{IC}^{n+1} / E'}{K_{IC} / E'} \right)^{1/n} \propto \left(\frac{1}{K_{IC} / E'} \right)^{1/n} \left(\frac{1}{f_{correction} \quad \frac{dP_{obsrv}^{-n}}{dt}} \right)^{1/n} \quad for\ n = 2\ or\ 5$$

As indicated in this last expression, the third and sixth order polynomials are attenuated to order -3/2 and -6/5 for computation of K_{IC} from slopes of observed pressure logs. These expressions vary slowly. For example, if the head loss is less than the fracture pressure, the true values of K_{IC} are no smaller than 50% of what might be calculated. Notably, experience has taught that the variation of K_{IC} among fractures created at similar depths and adjacent locations may vary by more than a factor of two. So, consideration of head loss may be rigorous but might not be practical.

Presuming that a pressure log can be loaded readily into a spreadsheet, subsequent columns can be generated in the spreadsheet to correct injection pressure to fracturing pressure, display $1/P^2$, and display $1/P^5$. Plots of these new columns can be examined for linear features within the timeframe of the fracturing event. Plot functions or worksheet functions inherent in the spreadsheet application can be used to extract the coefficients and data quality parameters, e.g. r^2, of the linear best fit for the appropriate intervals of data. The slope from the best fits can be manipulated to provide the specific ratios of stress intensity factor to modulus.

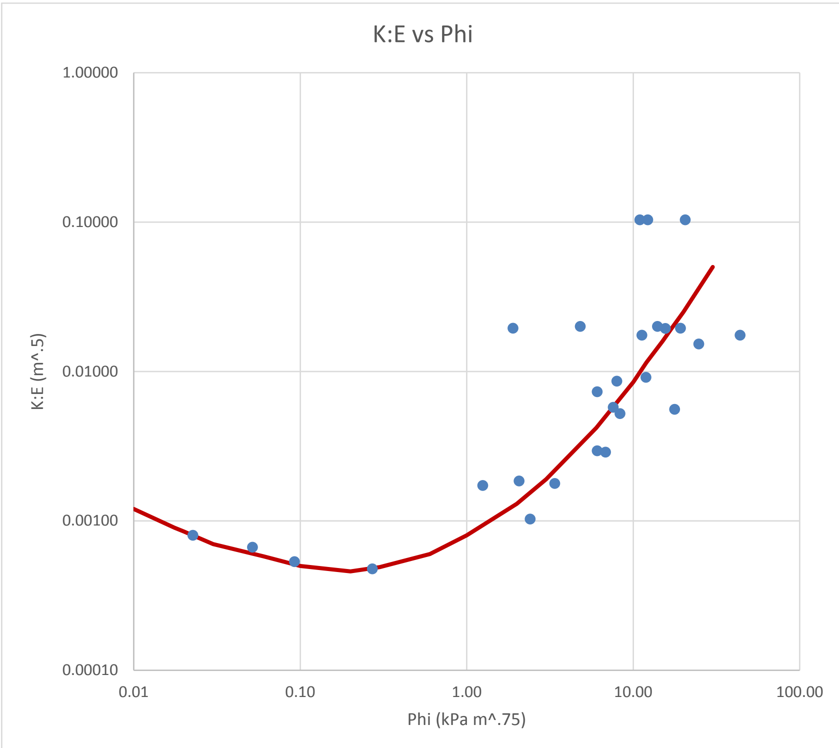
The quality of the best fits should be considered. Data fit well by $1/P^2$ probably will not exhibit an ideal correlation coefficient when viewed as $1/P^5$. Also, the specific ratios of stress intensity factor to modulus should be within the range of expected values. The better quality model should be utilized.

Estimation of Form Characteristics: The expressions for extent and maximum aperture utilize a different ratio of stress intensity factor to modulus. For both shallow and deep fractures, these form parameters depend upon the ratio *Kic/E'*. The ratio of *Kic/E'* cannot be extracted from $(Kic/E')^{1/n}$, nor can independent estimates of *Kic* or *E'* be made without further information.

If reliable values of extent or aperture are available from either coring, archeological style excavation, or surface deformation analysis (e.g. uplift), then independent values of *Kic/E'* can be developed for the fracture and discreet values of *Kic* and *E'* can be defined as discussed above. Then the form expressions for the fracture can be evaluated.

In the absence of additional data, the specific ratios of stress intensity factor to modulus can be compared to a library of values that has been accumulated for sites where reliable form characteristic data exist. The library shows a correlation between the specific ratios of stress intensity factor to modulus and the ratio *Kic/E′* for sites in several geologic settings. While some scatter can be expected, the correlation does provide an estimate of *Kic/E′* that will permit definition of *Kic* and *E′* for a fracture and thus enable calculation of extent and aperture using the equations above.

The Library of Fracture Parameters: The following chart presents values of *Kic/E′* correlated to $(Kic^3/E')^{½}$ that have been developed from work done at sixteen sites across North America and northern Europe. Most of the values of *Kic/E′* were developed from uplift and core data while the values of $(Kic^3/E')^{½}$ follow from pressure log analysis. Literature publications of discreet values of *Kic* and *E′* also are included. The several pairs of data are shown as blue dots. The red line is a heuristic trend used to define a most-likely variation among the data.



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Appendix C

Well Construction Diagram “Existing” Injection Wells on Hi-Shear Property

ALTA ENVIRONMENTAL
3777 Long Beach Blvd., Annex Bldg.
Long Beach, California 90807
P: (562) 495-5777 ◆ F: (562) 495-5877
www.altaenviron.com

DUAL-NESTED INJECTION WELL CONSTRUCTION DIAGRAM

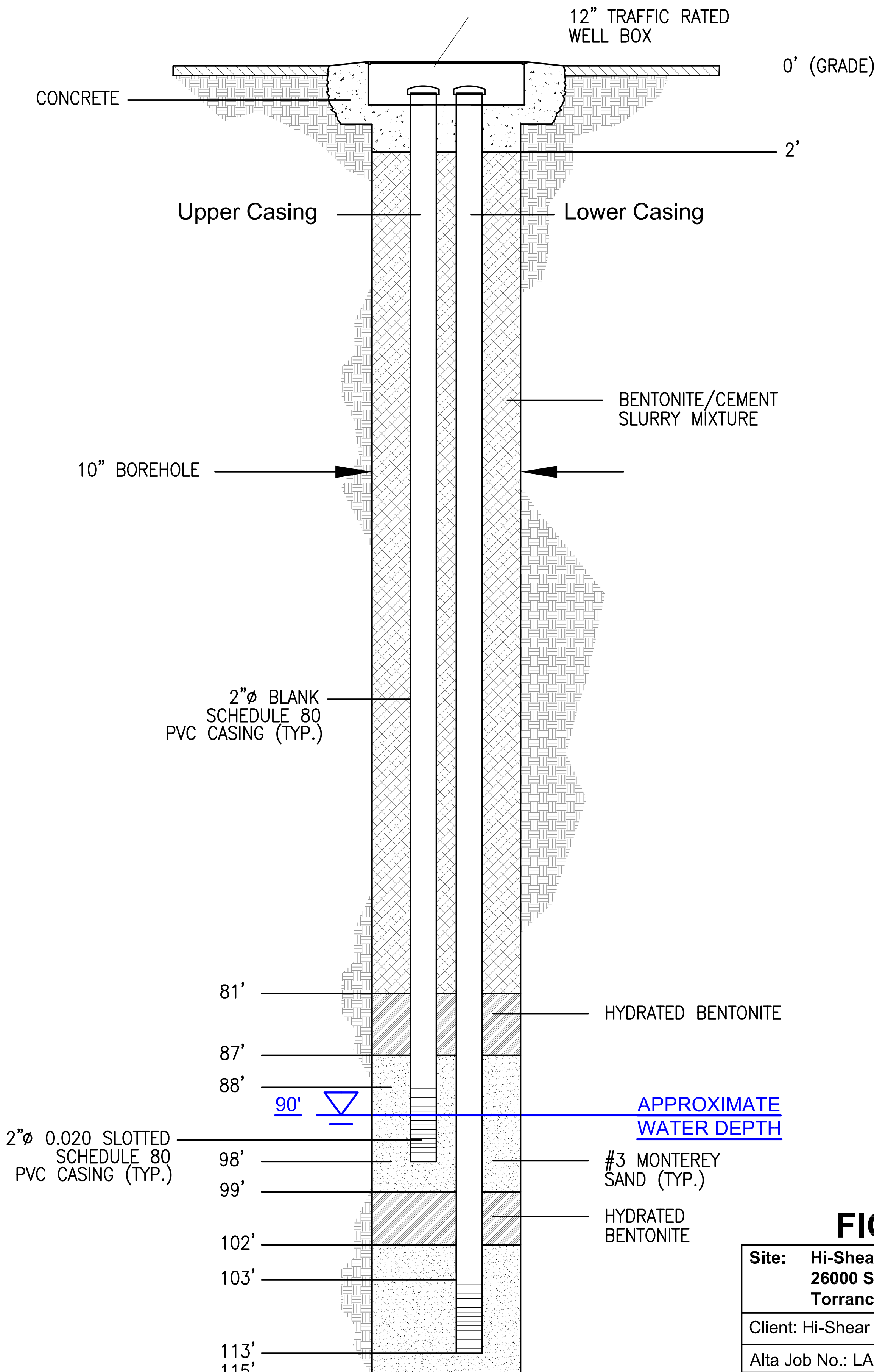

FIGURE 6

Site:	**Hi-Shear Corporation** **26000 Skypark Drive** **Torrance, California**
Client: Hi-Shear Corporation	
Alta Job No.: LAP-16-5889	
Drawn By: KAD	Apprv. By: SR
Scale: Not to Scale	Date: April, 2016