



December 2, 2014

Paul Cho, P.G.
Water Resources Control Engineer
California Regional Water Quality Control Board, Site Cleanup Unit IV
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Subject: Request to permanently abandon non-essential wells and temporarily abandon wells that are specified in the Monitoring and Reporting Program for the Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP NO. 0286A, Site ID NO. 16638)

Dear Mr. Cho:

On October 14, 2014, the Source Group, Inc. (SGI) on behalf of the Defense Logistics Agency Energy (DLA Energy), submitted a *Work Plan for Well Abandonment* (Work Plan). On November 12, 2014 the Los Angeles Regional Water Quality Control Board (LARWQCB) responded with a review of the Work Plan and requested modifications.

The attached revised Work Plan incorporates the modifications requested.

It is understood, that the approval to excavate and treat via bioremediation has not yet been approved by the RWQCB. However, in the event on-site treatment is not permitted, the options of disposal or off-site treatment would still require excavation and in turn, require the wells to be removed. We would therefore like to request permission to commence with the well removal activity as described in the Work Plan.

We appreciate the LARWQCB considering this request and reviewing the associated Work Plan. If you have any questions, please call me at (562) 597-1055.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Ken E. Wall', is written over the word 'Sincerely,'.

Ken E. Wall
Senior Project Engineer
The Source Group, Inc

Ec: Mr. Everett Bole, DLA Energy

1962 Freeman Avenue
Signal Hill, California 90755

Telephone: (562) 597-1055
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Mr. Paul Cho

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Mr. Neil F. Irish, P.G., SGI
File: DFSP Norwalk – 04-NDLA-007

Enclosures:

Attachment A – Work Plan Well Abandonment - DFSP Norwalk

WORK PLAN FOR WELL ABANDONMENT

Defense Fuel Support Point Norwalk
15306 Norwalk Boulevard
Norwalk, CA 90650

04-NDLA-007

Prepared For:



Defense Logistics Agency
8725 John J. Kingman Avenue
Fort Belvoir, Virginia 22060-6222

Prepared By:



1962 Freeman Avenue
Signal Hill, California 90755

December 2, 2014

Prepared By:

A handwritten signature in blue ink, appearing to read "Ken Wall".

Ken Wall
Senior Project Engineer

Reviewed By:

A handwritten signature in black ink, appearing to read "Neil F. Irish".

Neil F. Irish, P.G. 5484
Principal Geologist



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1.0 INTRODUCTION

This *Work Plan for Well Removal* (Work Plan) was prepared by The Source Group, Inc. (SGI), on behalf of the Defense Logistics Agency Energy (DLA Energy). On November 12, 2014, modifications to this Work Plan were requested by the Regional Water Quality Control Board (RWQCB). The removal of these wells is necessary prior to the initiation of soil removal to be conducted in accordance with the *Soil Remedial Action Plan – DFSP Norwalk* that was submitted to the RWQCB for approval on November 30, 2014.

Well removal is required prior to proceeding with soil excavation and biotreatment at the Defense Fuel Supply Point Norwalk facility (DFSP Norwalk). A total of 42 wells need to be removed as they are within the excavation footprints throughout the site. Eight of the groundwater monitoring wells are included in the DLA Groundwater Monitoring and Reporting Program (MRP), and five wells are included in the Santa Fe Pacific Pipeline, L.P. (SFPP) MRP. Kinder Morgan Energy Partners, L.P. (KMEP) and their consultant CH2M Hill are responsible for implementing the SFPP MRP.

This Work Plan identifies all wells to be removed. A summary of the wells to be removed includes:

- 8 groundwater wells that are a part the DLA MRP
- 5 groundwater wells that are a part of the SFPP MRP
- 4 groundwater wells that not part of either DLA or SFPP MRP's.
- 1 groundwater extraction well that is part of the SFPP groundwater extraction/treatment system
- 1 groundwater well that is gauged annually
- 9 inactive sparging wells
- 14 inactive vapor extraction/monitoring wells

The second semi-annual groundwater gauging and monitoring event has been completed (October 27-October 29, 2014); thus, upon approval of this Work Plan by the RWQCB, the wells will be removed as proposed. Wells that need to be replaced will be constructed after excavation is complete. As such, those wells that are part of either the DLA Energy or SFPP MRP will either miss two semi-annual monitoring events.

1.1 Objective of the Workplan

The objective of this Work Plan is to provide rationale and methods to be employed during the removal of select wells located at DFSP Norwalk. The removal of the wells identified in this Work Plan is necessitated due to the planned excavation and treatment of vadose zone, petroleum contaminated soil present at the Site. This Work Plan presents the well identities and their respective locations in relation to planned excavation areas. Figure 1 shows the location, status,

and ownership of the wells to be removed. Table 1 provides a tabulated summary of the wells to be removed and includes well locations, well type, and well construction details.

1.2 Site Location and Vicinity

The DFSP Norwalk facility is an approximately 50-acre facility that formerly included 12 aboveground storage tanks used for storage of jet propellant (JP) JP-4, JP-5, and JP-8. Aviation gasoline was reportedly distributed at the truck rack, but not stored in the above ground tanks. SFPP, an operating partner of KMEP, leases a 2-acre easement along the southern and eastern boundaries of DFSP for operation of its pipelines, which convey gasoline, diesel, and jet fuel. Within the southern easement lie three active pipelines, one of which is a 16-inch diameter pipeline, designated LS-1, that bends at the southeastern corner of the facility and continues northward within the eastern easement. An abandoned pipeline, likely owned or formerly operated by Golden West Pipeline, also runs along the eastern boundary of the site. The DLA has decommissioned the site, but SFPP pipelines continue to operate.

1.3 Background

Defense Fuel Support Point Norwalk is located at 15306 Norwalk Boulevard, in Norwalk, California. The real property is owned by the Air Force and controlled through the offices of March Air Reserve Base. The Defense Logistics Agency – Energy (DLA Energy) is responsible for environmental site restoration. The facility was formerly used to receive, store, and distribute military grade jet fuel. Active operations ceased in the 1990s and the tanks and above ground infrastructure were removed in 2012. As a result of fuel handling operations, soil and groundwater at the site have been contaminated with petroleum hydrocarbons.

In addition to soils contaminated by site fuel handling operations, an area of buried “oily sands” is present in the southwestern portion of the site. Previously, DLA-Energy successively petitioned the Los Angeles Regional Water Quality Control Board (RWQCB) for no-further action status of this material. At the time, it was demonstrated that in spite of high concentrations of petroleum hydrocarbons present in the oily sands (with concentrations in excess of 50,000 milligrams per kilogram – mg/kg), the hydrocarbons were not mobile or very volatile and thus did not represent a risk to site users or groundwater. However, the presence of the approximately 6,000 cubic yards of the material, at a depth as shallow as 3 feet below the surface, covering nearly an acre, will limit future site use and thus remediation of the oily sands is warranted and included in SGI’s plans for site restoration.

The remediation of soil and groundwater and the removal of light non-aqueous phase liquids (LNAPL, also referred to as free phase hydrocarbons or free product) has been on-going since 1994 and has resulted in the removal of the majority of the LNAPL from the shallow aquifer and the

removal and destruction of thousands of pounds of hydrocarbons present in soil and groundwater using extractive and *in situ* treatment methods.

However, a significant mass of hydrocarbons remains present in shallow and deep vadose zone soil. The presence of the hydrocarbons in the shallow soil limits the reuse of the site. The presence of hydrocarbons in the deeper soils provides a continuing source of groundwater contamination. To achieve the short-term goal of readying the site for redevelopment and re-use and to reach the ultimate goal of obtaining closure from the Regional Water Quality Control Board (RWQCB), Parsons prepared a *Conceptual Site Model and Remedial Action Evaluation for Soil, Groundwater, and LNAPL* (Remedial Plan; Parsons, 2013). In Parson's Conceptual Site Model plans were described to excavate the upper 10 feet of contaminated soil from the site. The current remediation follows the Parson's Remedial Plan, with the enhancement that deeper soil will also be excavated, and that excavated soil will be treated on site. Details of the proposed soil remediation are provided in the *Soil Remedial Action Plan – DFSP Norwalk*.

To execute the targeted excavation removal of a total of 42 wells is necessary as they are located within or in close proximity of the footprint of the planned excavations.

2.0 SITE GEOLOGY AND HYDROGEOLOGY

The *Conceptual Site Model and Remedial Action Evaluation for Soil, Groundwater and LNAPL* (Parsons, 2013), provides a detail description of the site geology and hydrogeology.

2.1 Site Geology

DFSP Norwalk is located between the Montebello Forebay and the Downey Plain in the Central Basin pressure area. Approximately 50 to 60 feet of alluvium (primarily sand, gravel, silt, and clay) cover the underlying Lakewood Formation in this area. Alluvial sediments exposed in the area of the site include mixtures and layers of sand, gravel, silt, and clay. The underlying Lakewood Formation consists of marine and continental gravel, sand, silt, and clay deposits, under which the the San Pedro Formation, approximately 300 feet below grade, consists of marine and continental gravel, sandy silt, silt, and clay deposits.

Lithologic logs of borings drilled during previous investigations indicate that sediments beneath the site consist of clayey silt, sandy silt, silty sand, fine to coarse-grained sand, and deeper coarse-grained sand with granitic cobbles. The top of a clay layer, preliminarily identified as the uppermost sediment layer of the Bellflower Aquitard, was encountered at a depth of approximately 55 to 65 feet during previous investigations.

2.2 Site Hydrogeology

A shallow semi-perched aquifer, consisting of silt and fine to coarse sand, exists in the alluvial sediments underlying the site. Groundwater from this semi-perched aquifer was reported between 24 and 34 feet between January and March 2010, and has been decreasing since 2010. The water level data indicate that static groundwater flow direction within this aquifer is generally toward the northwest, but is contained by the active groundwater extraction systems operating at the site. This shallow aquifer is approximately 30 to 35 feet thick based on the presence of the underlying Bellflower Aquiclude, a basal clay layer present at approximately 55 to 65 feet below grade. The Exposition Aquifer underlies the Bellflower Aquiclude. Groundwater depths within the Exposition Aquifer range between 49 and 56 feet below grade with an interpreted groundwater gradient to the southeast.

3.0 PROPOSED WELL REMOVAL

This work plan only addresses well removal. A separate work plan for well replacement will be submitted prior to installation of the replacement wells.

3.1 Scope of Work

The proposed well abandonment process includes the permitting, the surveying of the wells to be removed, the utility clearance and physical removal of the wells.

3.2 Well Construction Information

Due to the long history of site assessment and well installation episodes performed at the site and the number of consulting firms that have been involved, the majority of the historical hard copy information regarding the construction of the wells is not available. Tables 2 through 6 are lithology description tables for wells GMW-32, GMW-35, GMW-52, GW-5 and GW-14. Lithology data for the other wells has not been found. Other historical data and monitoring reports were reviewed to develop Table 1, which contains basic construction information such as total depth, diameter, etc. Prior to well destruction activities, wells will be visually inspected to verify well diameter and construction material and then gauged to verify that the depth of each wells is in agreement with the information summarized in Table 1.

If the field conditions of the well are not in agreement with the information in Table 1, the field geologist will contact the responsible Registered Geologist for instructions as to how to proceed (including verification that the geologist is working at the correct well location) and once confirmed, any modifications to the removal of the well (increasing the diameter of the auger used or extending the depth of the abandonment boring) will be communicated and documented.

3.3 Prefield Activities

SGI will perform the following permitting and preparation activities prior to removal of the wells:

- SGI and subcontractor personnel will be required to familiarize themselves with the existing DFSP Norwalk Health and Safety Plan (HASP), sign the HASP prior to working on site, and adhere to the provisions of the HASP during all aspects of field work. The HASP identifies the specific chemical compounds known to exist in the subsurface at the site. In addition, the HASP presents the chemical properties of the identified and typical compounds and identifies task-specific health and safety risks.
- Using a California Certified Surveyor, survey all groundwater wells that will be removed and subsequently are to be replaced after excavation is complete.

- SGI will coordinate with CH2M Hill as necessary for the removal of SPFF/KMEP wells.
- Notify the Regional Water Quality Control Board, Los Angeles Region (LARWQCB) and City of Norwalk a minimum of one week in advance of the planned field activities.
- Notify Underground Service Alert (USA). As required by USA, the well destruction locations will be called-in and marked-out in white paint at least two business days prior to drilling.
- Obtain the required well decommissioning permits from the Los Angeles County Department of Public Health (LADPH).
- Perform an underground utility check using a private utility locating subcontractor. SGI and the private utility locating subcontractor will meet with CH2M Hill (the consultant for SPFF/KMEP) mark-out the well locations and clear the well location areas of potential underground utilities. SGI and CH2M Hill will work closely together with respect to utility location as well as location of conveyance piping for SFPP/KMEP wells.

3.3.1 Field Activities

SGI will supervise the removal of all wells. A California registered Professional Geologist will be assigned to oversee proper well destruction. SGI will coordinate with KMEP's consultant CH2M Hill to ensure they are available to oversee the removal of the SFPP/KMEP wells.

Well destruction will be done in accordance with requirements as specified in *California Well Standards* (Bulletin 7-90); Chapter II, Standards, Sections 19; Requirements for Destroying Monitoring Wells and Exploration Wells and Section 23; Requirements for Destroying Wells.

Prior to destruction wells will be gauged to confirm total depth. Wells completed in groundwater will be over-drilled using a hollow-stem auger. Vapor extraction wells that do not extend to groundwater, and thus did not require permitting at time of installation, will be removed as part of the soil excavation activities.

The field activities for wells to be destructed via drilling include:

- Drilling equipment and support truck will be mobilized to the site.
- All equipment will be decontaminated prior to and after use at each well location.
- Wells will be over-drilled to total borehole depth to remove casing and well material within the borehole. A grout consisting of 5% bentonite and 95% cement will be pumped into the borehole via a tremie pipe through the augers to properly backfill and seal the borehole.

Native soil will be placed from 5 feet bgs to the ground surface to restore the area to preexisting surface conditions.

- Soil cuttings and well materials generated during destruction will be containerized in roll-off bins; decontaminant rinse water will be contained in 55-gallon drums. A composite sample of the soil cuttings and decontaminant rinse water will be collected and sent to certified laboratory for waste disposal profiling purposes.

All waste will be disposed at an offsite, permitted facility. SGI will coordinate with the waste hauler to verify the laboratory parameters that need to be analyzed to meet waste profiling requirements.

3.4 Reporting

SGI, on behalf of DLA Energy, will submit a letter report that documents the completion of the work as described in this Work Plan. This report will include well destruction methods, a final tabulation of wells removed, copies of well decommissioning permits, and waste disposal manifests. The report will be submitted to the RWQCB and uploaded to RWQCB GeoTracker web site.

3.5 Schedule

3.5.1 Well Destruction

A firm start-date for removal of wells and the start of excavation has not been established. It is anticipated that activities will commence within 7 working days of approval of this Work Plan and as early as later in December 2014.

3.5.2 Well Replacement

Table 1 identifies all wells planned for replacement. A work plan for well installation will be provided to the LARWQCB by October 30, 2015.

4.0 LIMITATIONS

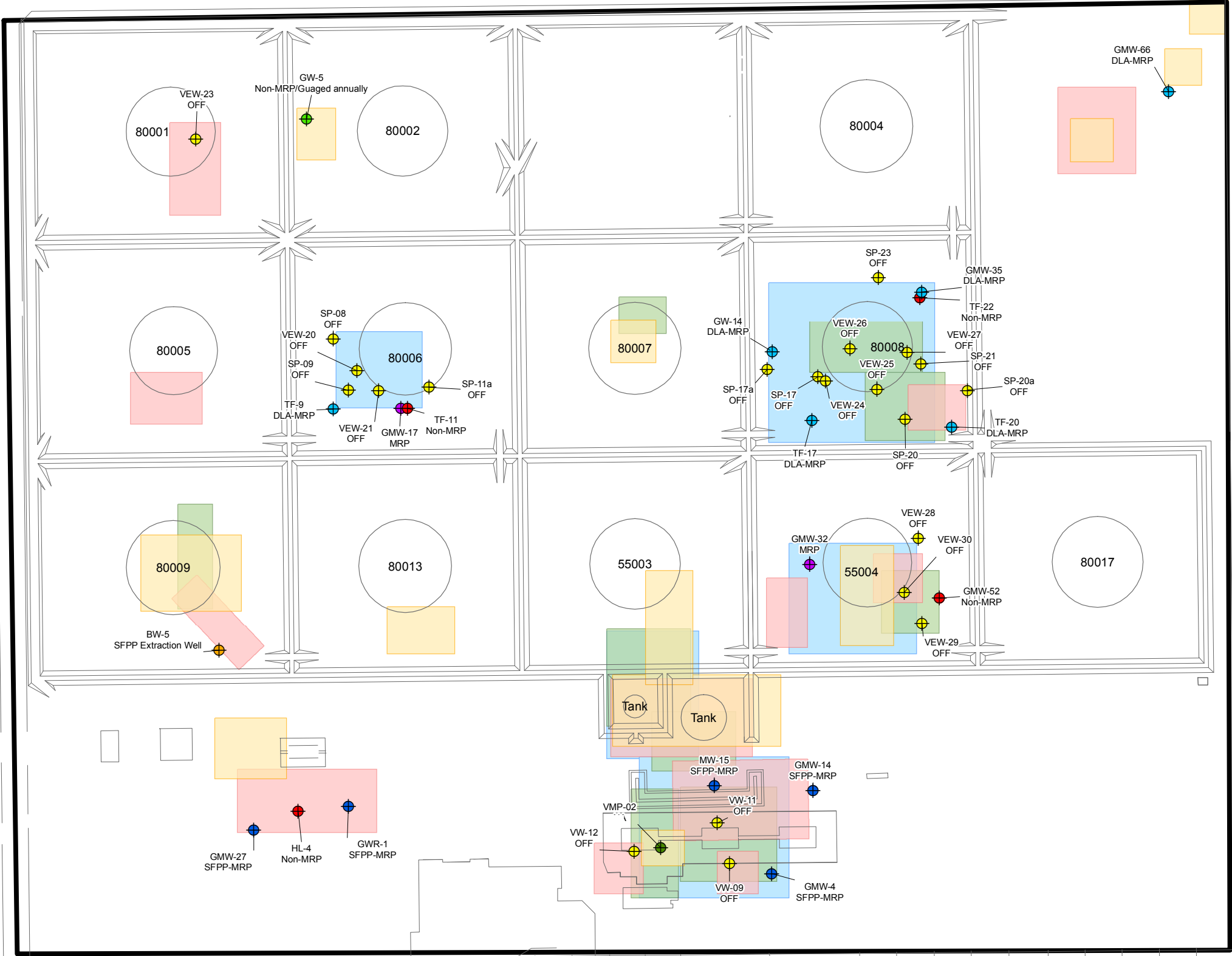
This Work Plan was prepared for the exclusive use of Defense Logistics Agency Energy (DLA Energy) for the express purpose of complying with regulatory directives for environmental investigation, in accordance with the scope of work, methodologies, and assumptions outlined in SGI's contract with DLA Energy and as applicable to the location of the proposed investigation. Any re-use of this work product, in whole or in part, for a different purpose, or by others must be approved by SGI and DLA Energy in writing. If any such unauthorized use occurs, it shall be at the user's sole risk without liability to SGI. To the extent that this plan is based on information provided to SGI by third parties, including DLA Energy, their direct-contractors, previous workers, and other stakeholders, SGI cannot guarantee the completeness or accuracy of this information, even where efforts were made to verify third-party information. SGI has exercised professional judgment to collect and present a scope of work and opinions of a scientific and technical nature. The opinions expressed are based on the conditions of the site existing at the time of this plan preparation, current regulatory requirements, and any specified assumptions. Findings or conclusions presented in this plan are intended to be taken in their entirety to assist DLA Energy and regulatory personnel in applying their own professional judgment in making decisions related to the property. SGI cannot provide conclusions on environmental conditions outside the completed scope of work. SGI cannot guarantee that future conditions will not change and affect the validity of the presented scope of work and any conclusions presented. No warranty or guarantee, whether expressed or implied, is made with respect to the data, observations, recommendations, and conclusions.

5.0 REFERENCES

Parsons, 2013 *Conceptual Site Model and Remedial Action Evaluation for Soil, Groundwater and LNAPL*. September 30.

California Department of Water Resources, California Well Standards (Bulletin 74-90)

FIGURES



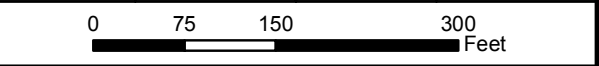
Legend

Wells to be Removed

- Status
- DLA-MRP
 - MRP
 - Non-MRP
 - Non-MRP/Guaged annually
 - OFF
 - SFPP Extraction Well
 - SFPP-MRP
 - NA
- Former Above Ground Storage Tanks
- Excavation 0-5ft
 - Excavation 5-10ft
 - Excavation 10-15ft
 - Excavation 15-25ft
 - DFSP Norwalk Border



DFSP Norwalk 15306 Norwalk Boulevard Norwalk, California			
Project Number:	Date:	Drawn By:	Approved By:
04-NDLA-007	10/14/2014	A. Czuba	K. Wall



Well Removal Map

1962 Freeman Avenue
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(562) 597-1055

Figure

1

TABLES

Table 1
Well Removal List

Area	Well	X_NAD83	Y_NAD83	Installation Date	Casing Elevation (ft msl) ₁	Total Depth (ft bgs) ₂	Diameter	Screen Interval (ft bgs)	Remediation Well Function	Well Operation Status at End of Third Quarter 2014	Well Removal Excavation-EX Over Drill - OD	Well to be Replaced (Y/N)
AST 80001	VEW-23	6539807.906460	1783947.298930	8/3/04	76.2	25	2	15 - 25	SVE	OFF	EX	N
AST 80002	GW-5	6539957.6500000	1783975.1900000	6/15/95	77.09/76.99	63	1 and 4	25.5 - 60.5	GWE	Non-MRP/Guaged annually	OD	Y
AST 80006	SP-08	6539993.895040	1783677.726310		76.3	50	2	48 - 50	Biosparge	OFF	OD	N
	SP-09	6540014.181510	1783607.946410		76	50	2	48 - 50	Biosparge	OFF	OD	N
	SP-11a	6540123.480130	1783611.811410		76	50	2	48 - 50	Biosparge	OFF	OD	N
	VEW-20	6540025.893090	1783634.686940	8/2/04	75.95	25	2	15 - 25	SVE	OFF	EX	N
	VEW-21	6540055.112380	1783607.510690	8/2/04	75.75	25	2	15 - 25	SVE	OFF	EX	N
	GMW-17	6540085.3900000	1783583.5700000	8/1/91	74.66	50	4	25 - 50	GWE	DLA-MRP	OD	Y
	TF-9	6539993.8596000	1783582.5945000	9/22/95	75.27	63	4	25-60	GWE	DLA-MRP	OD	Y
	TF-11	6540094.4800000	1783583.6400000	9/27/95	74.95/74.4	63	1.5 and 4	25 - 60	TFE,GWE	Non-MRP	OD	Y
AST 80008	SP-17	6540649.382330	1783626.260590		77.5	50	2	48 - 50	Biosparge	OFF	OD	N
	SP-17a	6540580.951360	1783635.946750		77.2	50	2	48 - 50	Biosparge	OFF	OD	N
	SP-20	6540767.172840	1783568.341780		76.9	50	2	48 - 50	Biosparge	OFF	OD	N
	SP-20a	6540851.669870	1783607.369480		76.4	50	2	48 - 50	Biosparge	OFF	OD	N
	SP-21	6540788.834370	1783644.171330		77.3	50	2	48 - 50	Biosparge	OFF	OD	N
	SP-23	6540731.467490	1783759.927570		77.2	50	2	48 - 50	Biosparge	OFF	OD	N
	VEW-24	6540659.780070	1783620.527260	8/2/04	76.13	25	2	15 - 25	SVE	OFF	EX	N
	VEW-25	6540729.265700	1783609.096120	8/2/04	76.14	25	2	15 - 25	SVE	OFF	EX	N
	VEW-26	6540693.062160	1783664.737530	8/4/04	77.5	25	2	15 - 25	SVE	OFF	EX	N
	VEW-27	6540770.526010	1783659.597290	8/4/04	77.07	25	2	15 - 25	SVE	OFF	EX	N
	TF-17	6540641.1000000	1783567.3100000	9/29/95	74.88	63	2	25 - 60	TFE, GWE	DLA-MRP	OD	Y
	TF-20	6540830.1100000	1783558.3300000	10/3/95	75.59	63	2	25 - 60	TFE,GWE	DLA-MRP	OD	Y
	TF-22	6540787.3500000	1783732.7900000	10/2/95	74.76	63	2	25 - 60	TFE, GWE	Non-MRP	OD	Y
	GW-14	6540587.7000000	1783659.9000000	4/26/07	76.54	67	1	25 - 65	GWE	DLA-MRP	OD	Y
	GMW-35	6540789.6895000	1783741.2268000	6/4/93	76.12	50	4	20 - 50	GWE	DLA-MRP	OD	Y

Table 1
Well Removal List

Area	Well	X_NAD83	Y_NAD83	Installation Date	Casing Elevation (ft msl) ₁	Total Depth (ft bgs) ₂	Diameter	Screen Interval (ft bgs)	Remediation Well Function	Well Operation Status at End of Third Quarter 2014	Well Removal Excavation-EX Over Drill - OD	Well to be Replaced (Y/N)
AST 80009	BW-5	6539839.4900000	1783256.4900000	5/23/96	73.59	52.5	5	27 - 45.5	GWE	SFPP Extraction Well	OD	Y
AST 55004	VEW-28	6540785.313520	1783407.829640	8/3/04	75.67	25	2	25-Oct	SVE	OFF	EX	N
	VEW-29	6540790.195020	1783293.055780	8/3/04	75.25	25	2	10 - 25	SVE	OFF	EX	N
	VEW-30	6540766.427630	1783335.000850	8/3/04	75.65	25	2	10 - 25	SVE	OFF	EX	N
	GMW-32	6540002.7200000	1782960.1800000	8/2/91	74.62	50	4	20 - 50	GWE	MRP	OD	Y
	GMW-52	6540814.0800000	1783326.8600000	12/19/94	75.03	41.5	4	15 - 40	GWE	Non-MRP	OD	Y
South West corner	GWR-1	6540014.4900000	1783045.7000000	7/11/91	77.4	50	4	25 - 50	GWE	SFPP_MRP	OD	Y
	GMW-27	6539886.1600000	1783013.7300000	1/10/92	74.41	50	4	25 - 50	GWE	SFPP_MRP	OD	Y
	HL-4	6540033.2400000	1783194.1300000	10/16/86	75.75	39	4	18 - 38.5	GWE	Non-MRP	OD	Y
South Central	VMP-2	6540436.781430	1782989.560610		75.2		1			OFF	EX	N
	VW-09	6540530.082700	1782968.315380	3/15/91	75.77	30	3	05-29	SVE	OFF	EX	N
	VW-11	6540513.577930	1783023.238880	3/23/04	75.55	25	2	20 - 25	SVE	OFF	EX	N
	VW-12	6540400.957250	1782984.608740	3/23/04	75.79	30.5	2	15 - 30	SVE	OFF	EX	N
	MW-15	6540509.2806000	1783073.6266000	8/7/1990	76.99	50	4	18-48	GWE	SFPP_MRP	OD	Y
	GMW-4	6540586.6700000	1782954.4400000	5/21/91	75.45	50	4	20-50	GWE	SFPP_MRP	OD	Y
	GMW-14	6540642.7844000	1783066.7785000	7/10/91	74.2	50	4	20 - 50	GWE	SFPP_MRP	OD	Y
North East	GMW-66	6541123.6475000	1784012.1225000	9/8/09	77	40.5	4	20-40	GWE	DLA-MRP	OD	Y

Table 2
GMW-32 Lithology

Site ID GMW-32

Depth to top	Depth to bas	keyword	description
0	-5	SP	Poorly graded sand light gray 100% fine sand moist hydrocarbon odor
-5	-7	ML	Silt dark gray 100% Silt moist hydrocarbon odor
-7	-10	SM	Silty Sand dark gray 80% fine sand 20% silt moist hydrocarbon odor
-10	-15	SP	Poorly graded sand light gray 100% fine sand moist hydrocarbon odor
-15	-20	SP	Poorly graded sand gray 95% fine sand 5% silt moist hydrocarbon odor
-20	-25	SM	Silty Sand gray 80% micaceous fine sand 20% silt trace of clay moist no hydrocarbon odor
-25	-30	ML	Silt gray 100% Silt saturated with water no hydrocarbon odor
-30	-35	SP	Poorly graded sand gray 95% fine sand 5% silt saturated with water no hydrocarbon odor
-35	-40	SP	Poorly graded sand as above
-40	-45	SP	Poorly graded sand as above
-45	-50	SP	Poorly graded sand Based on observation from returns

Table 3
GMW-35 Lithology

Site ID	GMW-35		
Depth to top	Depth to bas	keyword	description
0	-3	SM	Silty Sand brown 70% fine sand 30% silt moist no hydrocarbon odor
-3	-5	SP	Poorly graded sand brown 100% fine sand moist no hydrocarbon odor
-5	-10	ML	Sandy silt brown 60% silt 40% fine sand moist no hydrocarbon odor
-10	-15	ML	silt with sand brown 80% silt 20% fine sand
-15	-16	SM	silty sand brown 85% fine sand 15% silt moist no hydrocarbon odor
-16	-20	ML	silt brown 100% silt trace of fine sand
-20	-21	SP	poorly graded sand gray 100% fine sand moist no hydrocarbon odor
-20	-25	ML	silt dark gray 90% silt 10% fine sand
-25	-26	CL	lean clay dark gray 85% clay 15% silt moist no hydrocarbon odor
-26	-30	CL	lean clay dark gray 95% clay trace of fine sand
-30	-31	ML	silt dark gray 100% silt trace of clay wet strong hydrocarbon odor
-31	-35	SP	poorly graded sand gray 100% fine sand trace of silt saturated with water moderate hydrocarbon odor
-35	-40	SP	poorly graded sand as above no hydrocarbon odor
-40	-45	SP	poorly graded sand as above
-45	-50	SP	poorly graded sand gray 100% fine sand trace of silt saturated with water no hydrocarbon odor

Table 4
GMW-52 Lithology

Site ID GMW-52

Depth to top	Depth to base	keyword	description
0	-5	SM	silty sand brown 60% fine sand 30% silt medium sand no odor moist
-5	-10	SP	poorly graded sand light gray brown 60% fine sand 30% medium sand 15% coarse sand no odor slightly moist loose
-10	-15	ML	sandy silt with thin beds of olive gray 60% silt 35% fine sand 15% clay strong hydrocarbon odor moist medium stiff
-15	-20	SP	poorly graded sand light gray 95% fine subangular quartz sand 5% silt moderated hydrocarbon odor slightly moist medium dense
-20	-25	SM	silty sand light olive gray 85% fine sand 15% silt faint hydrocarbon odor moist medium dense
-25	-30	SM	silty sand gray 60% fine sand 30% silt 5% clay no hydrocarbon odor water saturated medium dense micaceous quartz sand very fine grained
-30	-35	SP	poorly graded sand with silt gray 90% fine sand 10% silt no odor water saturated medium dense
-35	-40	SP	poorly graded sand gray 90% fine sand 5% medium sand 50% silt no odor medium dense water saturated

Table 5
GW-5 Lithology

Site ID GW-5

Depth to top	Depth to base	keyword	description
0	-4	SM	silty sand brown 80% fine sand 15% silt 5% clay moist micaceous no odor
-4	-5.5	SM	silty sand brown with gray discoloration and iron oxide staining. 80% fine sand 20% silt moist micaceous no odor
-5.5	-8	ML	silt with sand brown 70% silt 20% very fine sand 10% clay moist no odor
-8	-10.5	SP	poorly graded sand with silt brown 90% fine sand 10% silt moist micaceous no odor
-10.5	-15	SP	poorly graded sand gray to light brown 100% fine sand trace silt moist micaceous dense no odor
-15	-20	SP	poorly graded sand
-20	-23	SP	poorly graded sand as above except medium dense
-23	-25	ML	silt with sand gray with iron oxide staining 80% silt 15% fine sand 5% clay moist micaceous no odor
-25	-30	SM	silty sand brown 85% fine sand 15% silt moist micaceous dense no odor
-30	-36	SM	silty sand brownish gray with iron oxide staining 80% fine sand 40% silt very moist medium dense no odor
-36	-36.5	ML	silt gray 90% silt 10% clay water saturated no odor
-36.5	-38	SM	
-38	-41	SP	poorly graded sand gray 100% fine sand trace silt water saturated no odor interbedded poorly graded sand silty sand and silt
-41	-41.5	SM	
-41.5	-42	ML	
-42	-43	SP	
-43	-45	ML	elastic silt gray with black discoloration and organics 60% silt 40% clay wet very stiff no odor
-45	-48	SP	
-48	-51	MH	
-51	-53	ML	
-53	-56.5	MH	elastic silt gray with black discoloration 60% silt 40% clay wet stiff slight organic odor
-56.5	-58	SM	
-58	-63	MH	elastic silt gray 70% silt 30% clay moist no odor logged from soil cuttings only slough recovered in sampler

Table 6
GW-14 Lithology

Site ID GW-14

Depth to top	Depth to bas	keyword	description
0	-0.3	ASPHALT	olive brown silty sand moist no chemical/pet hyd staining or odor
-0.3	-4	COARSE SAND	lt. brown fine sand with trace of medium to coarse sand damp friable medium dense
-4	-10	SANDY SILT	olive brown f-sandy silt moist micaceous v. stiff
-10	-15	SILTY SAND	olive brown moist. medium dense- 15.5 olive brown sand to f. sand silt moist micaceous common feo straining v stiff- 16.7 light olive brown f. sand moist friable common feo straininf medium dense
-15	-20	SILTY SAND	light olive brown silty f sand moist slight pet. Hyd odor no apparent staining med dense
-20	-25	SAND/MED. S	grey wet possible staining strong petroleum hydrocarbon odor dense
-25	-30	SILTY SAND	dark grey saturate slight pet. hyd odor apparent staining v stiff
-30	-35	SAND	dark grey f. sand saturated no apparernt staining slight pet. hyd odor med. Dense
-35	-40	SAND	dark grey f. sand saturated no apparernt staining slight pet. hyd odor med. Dense
-40	-45	SAND	dark grey f. sand saturated no apparernt staining slight pet. hyd odor med. Dense
-45	-50	SAND	dark grey f. sand saturated no apparernt staining slight pet. hyd odor med. Dense
-50	-55	SAND	dark grey f. sand saturated no apparernt staining slight pet. hyd odor med. Dense
-55	-60	SAND	