SGI environmental THE SOURCE GROUP, INC.

April 10, 2015

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: Response to March 4, 2015 Review of Field Sampling and Analysis Plan and Sampling Strategy at the Defense Fuel Support Point Norwalk
15306 Norwalk Boulevard, Norwalk, California
(SCP NO. 0286A, Site ID NO. 16638)

Dear Mr. Cho:

On January 7, 2015, the Los Angeles Regional Water Quality Control Board (LARWQCB) provided conditions (and related information requests) that the Defense Logistics Agency Energy (DLA Energy), and Source Group, Inc. (SGI), would be required to adhere to associated with the pending Waste Discharge Requirement (WDR) for excavation and soil treatment at Defense Fuel Support Point (DFSP) Norwalk. On March 4, 2015, additional provisions were requested. This letter and attachment provides a response to all remaining items provided in the March 4, 2015, RWQCB correspondence.

If there are any questions regarding the information provided please call me at (562) 597-1055.

Sincerely,

Neil F. Irish, P.G.
Project Manager
The Source Group, Inc

Ec: Mr. Everett Bole, DLA Energy
Mr. Ken Wall, SGI
File: DFSP Norwalk – 04-NDLA-007

Attachment: Field Sampling and Analysis Plan/Sampling Strategy

1962 Freeman Avenue
Signal Hill, California 90755

Telephone: (562) 597-1055
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FIELD SAMPLING AND ANALYSIS PLAN AND SAMPLING STRATEGY

Defense Fuel Support Point, Norwalk
Norwalk, California

04-NDLA-007

Prepared For:

Defense Logistic Agency - Energy
15306 Norwalk Blvd
Norwalk, California 90733

Prepared By:

THE SOURCE GROUP, INC.

1962 Freeman Avenue
Signal Hill, California 90755
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April 10, 2015

Prepared By:

Ken Wall
Senior Project Engineer

Reviewed By:

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Principal Geologist

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1.0 INTRODUCTION

On behalf of our client, Defense Logistics Agency - Energy (DLA Energy), The Source Group, Inc. (SGI) is submitting this Field Sampling and Analysis Plan and Sampling Strategy (FSAP). This document was requested by Los Angeles Regional Water Quality Control Board (LARWQCB), via correspondence dated January 7, 2015, which provided conditions and related information requests associated with the pending Waste Discharge Requirement (WDR) for excavation and soil treatment at the former Defense Fuel Support Point (DFSP) Norwalk facility (site). On March 4, 2015 the LARWQCB commented on this plan and requested modifications. This updated plan addresses those comments.

Petroleum contaminated soil is present at numerous locations throughout the 50 acre DFSP Norwalk facility. The objective of the planned remedial activities are to reduce the concentrations of petroleum hydrocarbons and related compounds that are present in vadose zone soil in order to facilitate site redevelopment and to accelerate the remediation of the underlying groundwater. To achieve this objective, contaminated soil will be excavated, treated on site using biologic methods, and reused as cleaned fill once cleanup targets have been met. Accordingly a large volume of clean, contaminated, and treated soil will be generated, handled, treated, and re-used on the site. Therefore, the purpose of this FSAP is to provide field sampling procedures and data gathering methods that will be used to support the removal actions at the site. This document also provides the confirmation sampling strategy for confirmation sampling of untreated and treated soil intended for reuse for backfill of the excavations.

This FSAP will be used by field personnel as a reference during sampling and analysis of soil. This includes soil segregated as assumed clean, after completion of treatment within a treatment stockpile, at the sidewalls and bottoms of completed excavations and, baseline characterization of treatment row setup and post closure of treatment cells.

The primary guidance and planning document, *Soil Management Plan: Treatment Cell Operation and Site Excavation*, provides all the necessary information associated with the excavation, soil treatment and treatment cell construction and maintenance.

For each excavation from which contaminated soil is removed for treatment, a letter report will be submitted to the LARWQCB. A diagram (Figure 1) will be prepared for each completed excavation. Included with this diagram will be all the supporting analytical data associated with excavation sidewalls and bottom and the source material for backfill.

2.0 SAMPLING OBJECTIVES

Sampling will generally be associated with seven activities:

- Baseline characterization and post-closure sampling of treatment cell areas;
- Pretreatment soil characterization and stockpile performance monitoring;
- Assumed clean soil confirmation sampling;
- Treated soil confirmation sampling;
- Exploratory trenching;
- Post-excavation confirmation soil sampling; and
- Waste profiling for off-site disposal.

2.1 Baseline Characterization and Post-Closure Sampling

Baseline samples will be collected from areas (historical basins) being used for soil treatment that are currently considered "clean". The objective is to generate a baseline characterization of surface soil conditions. This data will serve as a benchmark and will be compared against post-closure sampling and exploratory trench sampling of these same areas. The objective of the pre- and post-use soil sampling and analysis is to confirm and demonstrate that operation of the soil treatment cells has not adversely impacted surface soils. In the event there has been some impact the soil in those areas will either be treated onsite or disposed of offsite. The primary objective is to leave those areas used for treatment in good condition suitable to obtain a clean closure status.

2.2 Pretreatment Soil Characterization and Stockpile Performance Monitoring

Petroleum contaminated soil will be treated with a proprietary mixture of bacteria and surfactants to facilitate the bioremediation of the soil. F4 Remediation (F4) will be performing the soil treatment while SGI will provide project oversight and performance monitoring. Pretreatment soil sampling will be conducted to determine contaminant concentrations prior to amendment of soil with the F4 bacteria and surfactant mixture. The subsequent performance monitoring sampling will be compared to these initial concentrations to evaluate the performance of the treatment remedy specific to a treatment row within a treatment cell.

Subsequent performance monitoring results will be compared against previous results and will serve to project the timing of obtaining confirmation samples.

2.3 Assumed Clean Confirmation Soil Sampling

A substantial volume of clean over burden will be removed to reach impacted soils. Soil will be field screened via field observation and photo-ionization detector (PID) readings. If soil does not appear to be contaminated and PID readings are less than 50 parts per million (ppm), the soil will be staged in a "clean soil" staging area as identified on Figure 3. Confirmation samples will be

taken to confirm the soil is suitable for reuse. The discrete sample results for each discrete soil pile will be compiled and the 95% upper confidence level for each chemical of concern (COC) will be calculated and compared to the preapproved cleanup levels as identified in Table 1. Soil sampling frequency is discussed in Section 3.3.

2.4 Treated Soil Confirmation Sampling

Identical to the confirmation sampling of assumed clean soil, the treated soil must be sampled to ensure the soil meets the cleanup goal criteria. Initially more samples will be required of treated soil versus untreated soil. The objective is to ensure the treatment process has sufficiently treated all the soil within a given stockpile.

2.5 Exploratory Trenching

Exploratory Trenching will be conducted in select area throughout the site. See Figure 2 for the location and identity of the trenching. The objective of sampling the soil removed from these trenches is to verify the soil from 0 to 10 feet below ground surface (ft bgs), within those areas has not been impacted. In the event contamination is encountered it will be removed and treated onsite or disposed of offsite.

2.6 Post-Excavation Confirmation Soil Sampling

The objective of the post-excavation sidewall and bottom sampling is to either confirm the extent of contamination has been removed, and for excavations greater than 10 feet to document the condition of the sidewalls and bottoms of excavations prior to backfill.

2.7 Waste Profiling for Off-site Disposal

Some waste will be segregated for off-site disposal. Sampling will be required to generate a waste profile.

3.0 SAMPLE LOCATIONS AND FREQUENCY

This section discusses the locations and frequency of soil samples that will be collected for analytical testing. Table 2 provides data definition and identification structure for excavation identification, treatment row identification, stockpile identification and sample identification.

3.1 Baseline Characterization and Post-Closure Sampling

Prior to placing liners down for treatment rows within a treatment cell, baseline surface samples will be collected. After termination of use of the treatment cells/rows, post closure sampling will be conducted.

A grid of the cells and basins will be prepared to record the location of the baseline and post closure samples.

3.2 Pretreatment Soil Characterization and Stockpile Performance Monitoring

A typical stockpile of soil designated for treatment will contain 400 cubic yards. A composite sample of 4 random locations will be collected and analyzed. The soil will then be placed in a treatment row within the treatment area. The typical volume of a treatment row will be 750 cubic yards. After the soil is placed in a treatment row, 4 composite performance samples (4 locations for each composite sample) will be collected. The intervals will be dependent on various factors including results of baseline sampling and as progress is monitored, the frequency may be adjusted depending on rate of progress. Typically, performance monitoring samples will be collected every 30 days.

3.3 Stockpiled Soil Assumed Clean for On-Site Reuse

Discrete soil samples of assumed clean soil stockpiles will be collected for characterization in general conformance with the United States Environmental Protection Agency (USEPA) SW-846, "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*". The minimum number of discrete samples initially required is provided below:

Random sample points will be selected from locations on a three-dimensional grid. The length, width and height dimensions will be estimated and used to populate a spreadsheet to calculate the estimated volume. Figure 4 is a sample plot/spreadsheet of a stockpile. The number of samples to be collected for each stockpile will be determined by the total volume of the stockpile. The locations will be randomly selected as shown on Figure 4. Each stockpile considered for reuse will be sampled separately. Additional sample analyses may be required to meet the confidence levels specified in SW-846; therefore, archiving samples may be appropriate. Archived samples will be appropriately preserved and analyzed within the maximum holding time specified in SW-846.

The stockpiled soil documentation will include the following information:

- An estimate of the volume of the stockpile;

- Stockpile type (i.e., impacted soil, or non-impacted soil);
- A plot plan (Figure 3) detailing the stockpile and sample locations;
- A copy of all sample results, chain-of-custody documents, and Quality Assurance/Quality Control (QA/QC) supporting data; and
- A summary of the laboratory results for the stockpile sampling.

If a stockpile does not pass confirmation sampling, all or a portion of the stockpile will be routed for treatment. If a portion of a stockpile appears to be suitable for reuse that remaining volume will be resampled. The number of samples will be in accordance with the frequency specified in Table 1.

3.4 Treated Soil Confirmation Sampling

The typical stockpile row within a treatment cell will contain approximately 750 cubic yards. In accordance with current RWQCB requirements, 35 discrete samples will be collected for each 750 cubic yard stockpile. The results will be compiled to calculate the 95% upper confidence limit (UCL) for comparison to cleanup goals as specified in Table 1. Figure 5 represents the confirmation sampling grid of a typical stockpile. For the stockpile to be approved for reuse, the stockpiled soil documentation must include the following information:

- An estimate of the volume of the stockpile;
- Stockpile type (i.e., impacted soil, or non-impacted soil);
- The excavation ID
- A plot plan (Figure 3) detailing the stockpile and sample locations;
- A copy of all sample results, chain-of-custody documents, and QA/QC supporting data; and
- A summary of the laboratory results for the stockpile sampling.

3.5 Exploratory Trenching Sampling

Exploratory trenches will be sampled in areas where PID readings are greater than 50 parts per million (ppm) and where soil visually appears to be impacted. Up to 10 samples will be collected per basin as indicated on Figure 3.

3.6 Post-Excavation Confirmation Soil Sampling

Figure 3 identifies the location, identity and target depth interval of all individual excavations. Post-excavation confirmation soil sampling will be conducted after removal of impacted soil. Post-excavation sampling will be performed at the excavation floor and sidewalls to verify that sufficient soil has been removed to meet cleanup goals. Soil samples will be collected and submitted to the laboratory for analytical testing in accordance with Section 7 of this FSAP. If post-excavation soil sample results indicate the presence of COCs with concentrations greater than cleanup levels, then additional excavation may be performed with another round of soil confirmation sampling.

Once COC-impacted soil is removed, a sampling grid will be established for the excavation floor and sidewalls. For excavation floor sampling, the excavated areas will be divided into 50 by 50 foot sampling grids. Based on the floor square A discrete soil sample will be collected randomly within each grid cell from the excavation floor and submitted for analytical testing. For excavation sidewall sampling, a discrete soil sample will be obtained for every 25 linear feet of horizontal sidewall, or portion thereof, and every 3.0 feet of vertical sidewall, or portion thereof. Soil samples will be taken at a depth of approximately 6 inches to 1 foot into the exposed surface. Each soil sample will be analyzed for the constituents discussed in Section 7 of this FSAP.

3.7 Stockpiled Soil Designated for Off-Site Disposal

Soil stockpiled for off-site disposal is soil, based on visual inspection and field screening, impacted with COCs at excessive concentrations (consistency of sludge). If encountered, the soil may be segregated for off-site disposal. Soil samples will be collected for the purpose of waste profiling and the waste will be disposed of offsite. Waste will be transported to either Waste Management's Azusa's Land Reclamation Facility in Azusa, CA or the Waste Management Facility in McKittrick, CA or to the Soil Safe's Thermal Desorption facility in Adelanto, CA.

3.8 Disposition of Debris Encountered During Excavation

Debris may be encountered during removal of the impacted soil. Excavated inert debris will have loose soil removed prior to placement on to stockpiles. Debris will be segregated, stockpiled, and disposed off-site at a Class III landfill or recycled at a DLA Energy approved facility.

4.0 SAMPLE DESIGNATION

Samples sent to an analytical testing laboratory will be assigned a unique sample identification number according to the conventions described below. Sample numbers will be recorded in a dedicated field logbook, the excavation site plan, and on the chain-of-custody at the time of sample collection. A complete description of the sample, sample circumstances/conditions, date and time of sampling, and the location of the sample will be recorded in the dedicated field logbook.

4.1 Treatment Cell/Row Baseline and Post-Closure Sampling

Prior to placing liners down for treatment rows within a treatment cell, baseline surface samples will be taken. After termination of use of the treatment cells/rows, post closure sampling will be conducted. Each series of sampling will identified as follows.

1. Surface Baseline (from treatment cell/row area before liner installation) – SB Series; and
2. Post-Closure (from treatment cell/row after removal of liner) – PC Series.

Sample numbering will be the same as other series with identification numbers ranging from 0001 to 9999. A grid of the cells and basins will be prepared to record the location of the baseline and post closure samples.

4.2 Stockpile Soil Samples

Stockpile soil samples will be assigned a series sample type and a unique sample number. The five series sample types are:

1. Baseline Sample (contaminated soil going to treatment) - B series;
2. Performance Sample - P series;
3. Treated Soil Confirmation Sample – T series;
4. "Assumed " Clean Confirmation Sample - C series; and
5. Waste Profile Sample – W series.

The series sample type will be followed by 4 digits. As an example a Treated Soil Confirmation Sample would be identified as "T0003". The sample number will be logged with the information details of the origin of that sample. For each series of samples there will never be a duplicate number. Each series can have up to 9,999 unique sample numbers.

The chain-of-custody will identify the origin of the sample. See Table 2 for identification structure for the various soil segregation categories. For confirmation sampling based on a grid, a figure will be generated recording the sample number for the associated grid location.

4.3 Post-Excavation Confirmation Soil Samples

Post-excavation verification soil samples will be assigned a unique number that will indicate the Excavation Number, followed by "N," "S," "E," "W," or "F" (indicating the sample was collected from the north [N], south [S], east [E], or west [W] sidewall, or from the excavation floor [F]), and then a sequential number (if more than one sample is collected from a sidewall or from the excavation floor). For example, sample E2-F2 would identify the second sample collected from the floor of Excavation Number 2. The sample location, sample number and description will be documented in the dedicated field logbook.

Figure 3 provides the excavation numbers for all planned excavations. Figure 2 is a sample post excavation figure. The figure will show the location of the sidewall and bottom samples.

5.0 SAMPLING EQUIPMENT AND PROCEDURES

This section describes sampling equipment and procedures associated with post-excavation confirmation sampling and stockpile soil sampling. This section also includes a discussion of equipment blank sampling and decontamination procedures for sampling equipment.

5.1 Post-Excavation Confirmation Sampling

Confirmation soil samples associated with the remedial excavation(s) will be sampled in accordance with EPA method 5035.

5.2 Stockpile Soil Sampling for Soils Designated to Remain Onsite

Soil samples collected from stockpiles initially designated to remain onsite will be collected using a hand auger or trowel from predetermined sampling locations and depths. The hand auger or trowel will be decontaminated following procedures outlined in Section 5.4 at the start of sampling and between sampling locations. Stockpile soil samples will be removed from the hand auger and carefully placed in an 8-ounce glass jar. The samples will be placed in a cooler maintained at 4 degrees Celsius with ice. Sample labeling, delivery, and chain-of-custody documentation will be completed per Sections 6.1 through 6.3.

5.3 Stockpile Soil Sampling for Soils Designated to be Disposed of Offsite

Soil samples collected from stockpiles initially designated for off-site disposal will be collected as described in Section 5.2 of this FSAP.

5.4 Decontamination Procedures

Whenever possible, disposable sampling equipment will be used for this project. However, if non-disposable sampling equipment is used, it will be decontaminated to prevent cross contamination between samples. Sampling equipment will be decontaminated by washing with a non-phosphate detergent such as Liquinox™. Decontamination water will be collected and placed in a 55-gallon drum or wastewater holding tank. The following steps will be followed for decontamination of non-disposable sample equipment:

- Wash with a non-phosphate detergent and water solution. This step will remove visible contamination from the equipment. Fill a 5-gallon bucket approximately 3/4 full and dilute with a non-phosphate detergent as directed by the manufacturer. Use a dedicated long-handled brush to assist with cleaning.
- Rinse with potable water. This step will decrease the gross contamination and reduce the frequency of changing of the non-phosphate detergent and water solution. Fill a 5-gallon bucket, 3/4 full with water. Use a dedicated long-handled brush to assist with cleaning of equipment. Frequent changing of this water will increase its effectiveness.

- Rinse with de-ionized water. Fill a 5-gallon bucket approximately 3/4 full of water and use a dedicated long-handled brush to assist with cleaning. Periodic changing of this water is required.

6.0 SAMPLE LABELING, DELIVERY, AND CHAIN-OF-CUSTODY

This section describes how samples will be labeled, picked up, delivered, and tracked.

6.1 Sample Labeling

Sample labels will be completed using preprinted labels with indelible, black ink, and affixed to each sample container. No sample number within any sample series will be reused. If a sample number label is destroyed, the sample number will be logged and recorded as destroyed. Sample containers will be placed into resealable plastic bags to protect the sample from moisture during transportation to the laboratory. Each sample container will be labeled at a minimum with the following:

- Unique sample identification number;
- Sample collection date (month/day/year);
- Time of collection (24-hour clock);
- Project number (04-NDLA-007);
- Sampler initials;
- Analyses to be performed; and
- Preservation, if any.

6.2 Sample Delivery

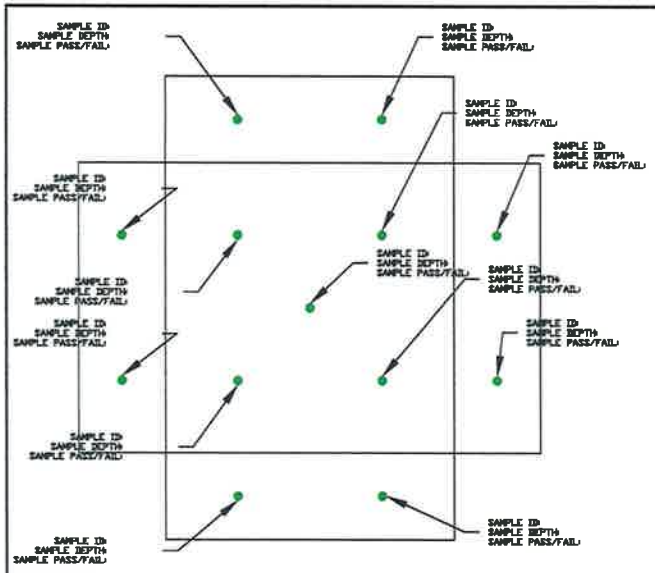
This section applies to samples that will be picked up by the analytical testing laboratory or samples delivered to the off-site analytical laboratory. Samples may be picked up in the field or at the Field Geologist/Engineer's office by the analytical testing laboratory. The samples will be maintained at 4° Celsius. The chain-of-custody documentation will be completed and signed by the laboratory-assigned courier. The samples may then be relinquished to the courier for transportation to the laboratory. Each cooler will contain a temperature blank. A temperature blank is a sample container filled with tap water and stored in the cooler during sample collection and transportation. The laboratory will record the temperature of the temperature blank immediately upon receipt of the samples.

6.3 Chain-of-Custody

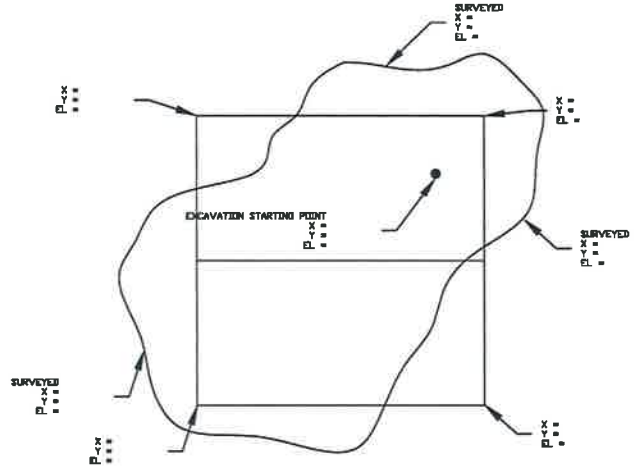
A chain-of-custody is a vital tool for tracking samples and is a written record of sample possession from the time the sample is collected until it is analyzed. The following will be recorded on the chain-of-custody forms:

- Project name;
- Project location;
- Project number;

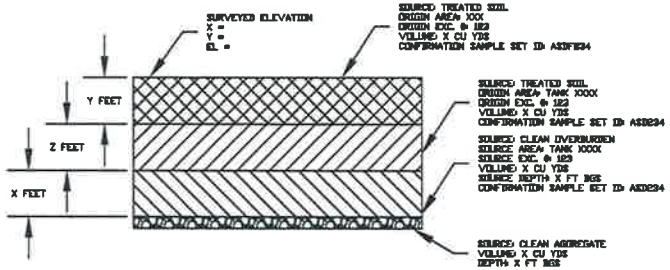
- Project contact;
- Client;
- Project Manager;
- Sample identification;
- Soil source identification (Table 1)
- Date and time sample was collected;
- Sample type (soil, wastewater etc.);
- Number of sample containers;
- Required analytical test methods;
- Remarks/observations specific to the sample;
- Number of samples to be relinquished to the analytical laboratory;
- Transfer signatures associated with relinquishing samples (the sampler will initiate the chain-of-custody procedure);
- Courier/laboratory representative signature (for commercial carrier, record air bill number);
- Date/time of custody transfers;
- Comments regarding the condition of the samples, (e.g. cooled with ice, etc.);
- Additional comments;
- Written request for electronic file for all samples analyzed;
- Information regarding sample storage/disposal;
- Turn-around-time requirement;
- Sampler signature; and
- Courier signature.



COMPLETED EXCAVATION DIAGRAM
EXPLODED PLAN VIEW



COMPLETED EXCAVATION DIAGRAM
PLAN VIEW



FINAL BACKFILL DIAGRAM
PLAN VIEW

EXCAVATION SUMMARY

LOCATION: TANK XXX
ID: ASDF234
START DATE: XX/XX/XX
COMPLETION DATE: XX/XX/XX

PLANNED DEPTH: XX FT BGS
FINAL DEPTH: XX BGS

ESTIMATED VOLUME: XX CU YDS
ACTUAL VOLUME: XX CU YDS

PERIMETER LENGTH: XX FT
BOTTOM AREA: XX SQ FT

REQUIRED NUMBER OF BOTTOM SAMPLES: XX
REQUIRED NUMBER OF SIDEWALL SAMPLES: XX

LEGEND

- SOIL SAMPLE LOCATION
- TREATED SOIL
- TREATED SOIL
- CLEAN OVERBURDEN SOIL
- CLEAN AGGREGATE

DEFENSE FUEL SUPPORT POINT NORWALK
15306 NORWALK BOULEVARD
NORWALK, CA 90650

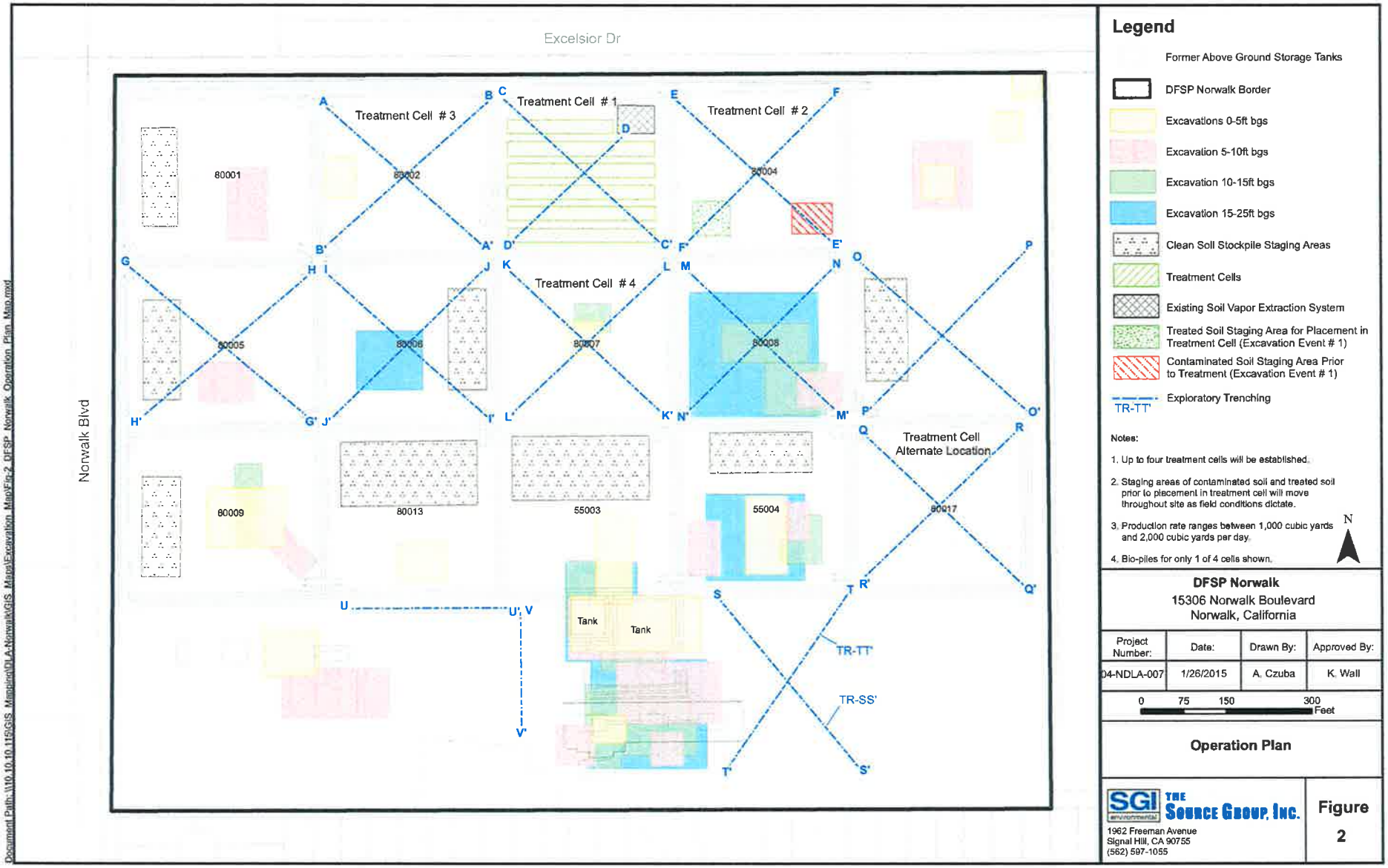
PROJECT NO.	DATE	DRAWN BY:	APP. BY:
04-NDLA-007	01/08/15	AD	KW

NOT TO SCALE

EXCAVATION DETAILS
EXCAVATION ID: XXX

SGI environmental
THE SOURCE GROUP, INC.
1962 FREEMAN AVENUE
SIGNAL HILL, CA 90755

FIGURE
X



Legend

- Former Above Ground Storage Tanks
- DFSP Norwalk Border
- Excavations 0-5ft bgs
- Excavation 5-10ft bgs
- Excavation 10-15ft bgs
- Excavation 15-25ft bgs
- Clean Soil Stockpile Staging Areas
- Treatment Cells
- Existing Soil Vapor Extraction System
- Treated Soil Staging Area for Placement in Treatment Cell (Excavation Event # 1)
- Contaminated Soil Staging Area Prior to Treatment (Excavation Event # 1)
- TR-TT' Exploratory Trenching

Notes:

1. Up to four treatment cells will be established.
2. Staging areas of contaminated soil and treated soil prior to placement in treatment cell will move throughout site as field conditions dictate.
3. Production rate ranges between 1,000 cubic yards and 2,000 cubic yards per day.
4. Bio-piles for only 1 of 4 cells shown.

N

DFSP Norwalk
15306 Norwalk Boulevard
Norwalk, California

Project Number:	Date:	Drawn By:	Approved By:
04-NDLA-007	1/26/2015	A. Czuba	K. Wall

0 75 150 300 Feet

Operation Plan

SGI environmental
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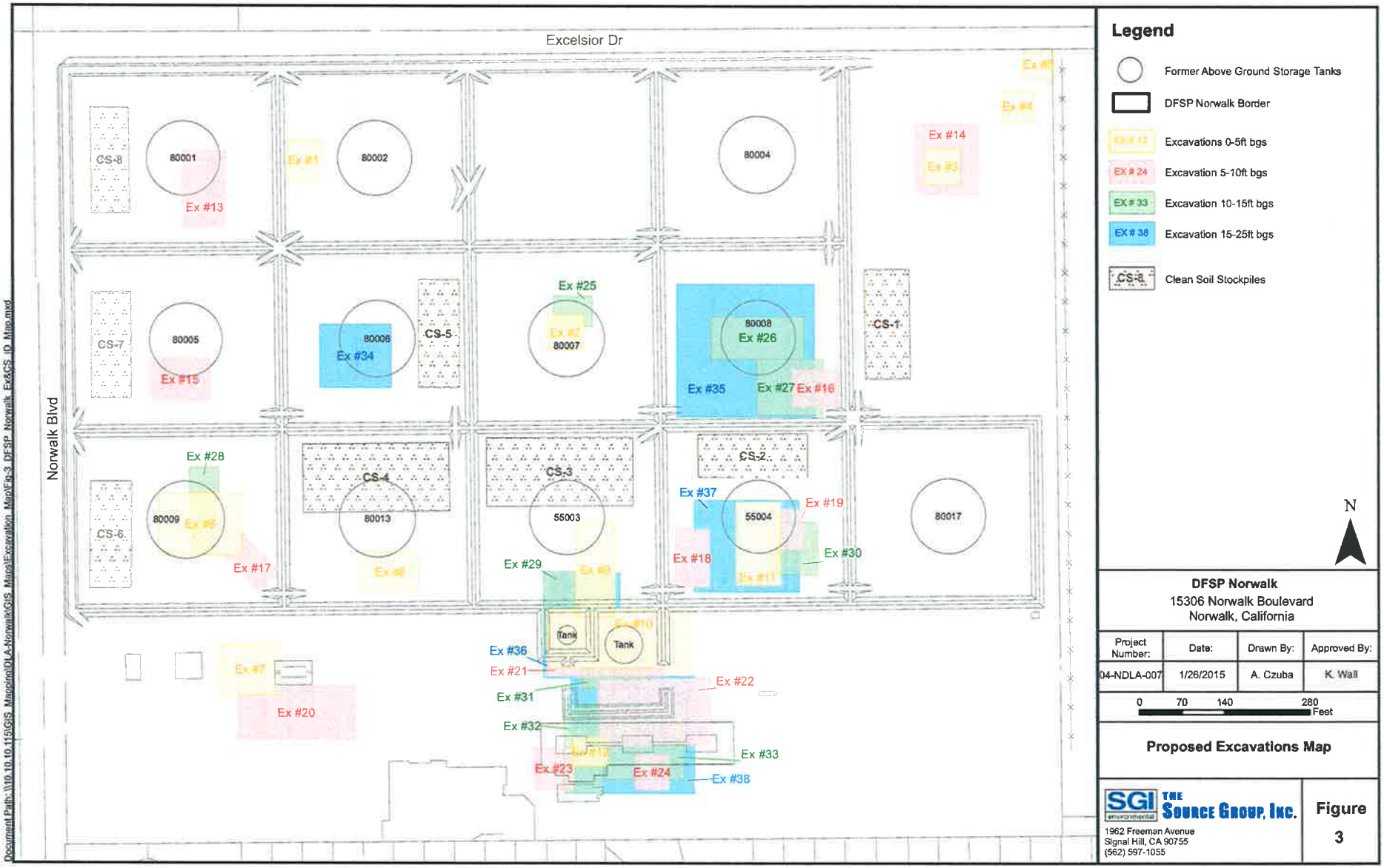
Signal Hill, CA 90755
(562) 597-1055

Figure 2

Document Path: \\10.10.10.115\GIS_Mapping\NDLA-Norwalk\GIS_Maps\Excavation_Map\Fig-2_DFSP_Norwalk_Operation_Plan_Map.mxd



Legend

- Former Above Ground Storage Tanks
- DFSP Norwalk Border
- Excavations 0-5ft bgs
- Excavation 5-10ft bgs
- Excavation 10-15ft bgs
- Excavation 15-25ft bgs
- Clean Soil Stockpiles

N

DFSP Norwalk
15306 Norwalk Boulevard
Norwalk, California

Project Number:	Date:	Drawn By:	Approved By:
04-NDLA-007	1/26/2015	A. Czuba	K. Wall

0 70 140 280 Feet

Proposed Excavations Map

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(562) 597-1055

Figure 3

Figure -4
Confirmation Sampling Grid for Assumed Clean Stockpiles

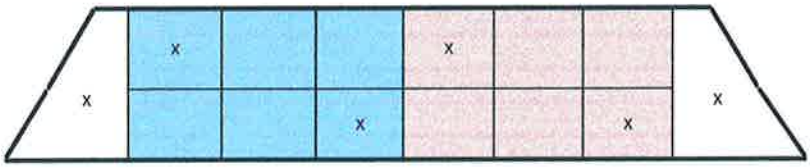
Stockpile ID:	05056002
Source:	Excavation 05
Interval:	0 to 5
Ordinal Date:	60
Lot:	2

Volume of a Rectangular Trapezodial Trough
V=(H/3) [WL + sqrt(Wlab) + ab

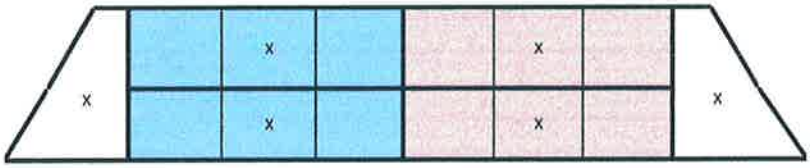
Hieght	h	8	Confirmation Samples Req	14
Width of Bottom	W	20		
Length of bottom	L	100		
Width of top	a	4		
Length of top	b	84		
	V	9003	sq ft	
	Cu yards	333		
	Tons	533		

Spacing

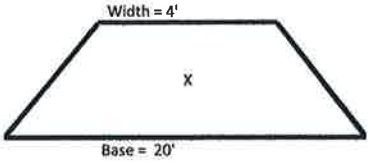
Side 1



Side 2



End 1



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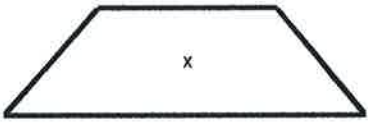


Figure 5
Confirmation Sampling Grid for Treated Stockpiles

Treatment Row ID:
Date:

Volume of a Rectangular Trapezodial Trough
V=(H/3) [WL + sqrt(Wlab) + ab

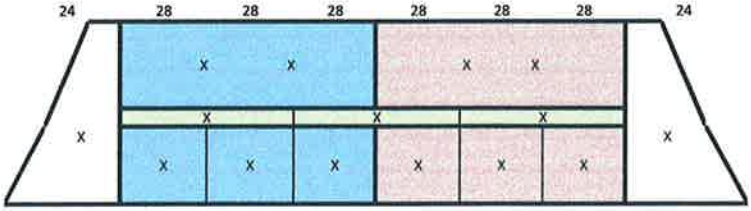
Hieght	h	8
Width of Bottom	W	20
Length of bottom	L	215
Width of top	a	4
Length of top	b	199
	V	20042.6667 sq ft
	Cu yards	742.320988
	Tons	1187.71358

Confirmation Samples Req 35

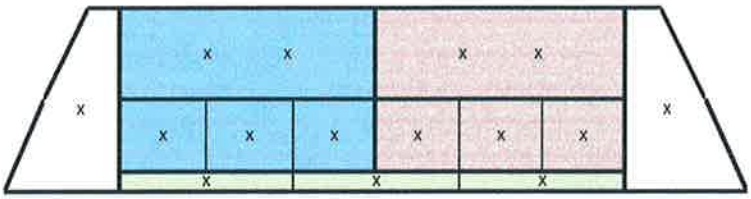
Note: Samples in green will be obtained from middle of pile via access through side or top

	Spacing
H=5	342
H=3	400

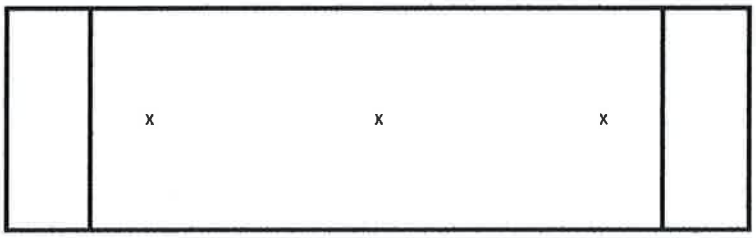
Side 1



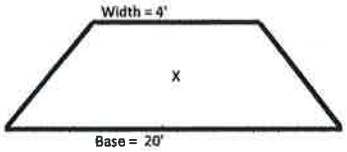
Side 2



Top



End 1



End 2

TABLES

Table 1

TABLE 5-2
Soil Cleanup Goals
DFSP Norwalk Site, Norwalk California

Depth Below Ground Surface	(feet below ground surface)					
	0.5	5	10	15	20	25
Depth to Groundwater	25.5	21	16	11	6	1
Constituent	Soil Cleanup Goal (mg/kg)					
TPH as Gasoline (C4-C12)	500	500	100	100	100	100
TPH as JP-5 (C8-C17)	500	500	100	100	100	100
TPH as Diesel (C5-C25)	1,000	1,000	100	100	100	100
Benzene	0.015	0.013	0.012	0.013	0.011	0.012
Toluene	0.614	0.440	0.391	0.423	0.356	0.367
Ethylbenzene	2.07	1.44	1.19	1.33	1.07	1.10
Xylenes	5.55	3.77	3.09	3.47	2.76	2.84
1,1,2,2-Tetrachloroethane	0.0023	0.0020	0.0015	0.0012	0.0006	0.0002
1,1,2-Trichloroethane	0.0032	0.0029	0.0023	0.0020	0.0012	0.0008
1,2,3-Trichlorobenzene	0.0740	0.0634	0.0467	0.0356	0.0162	0.0034
1,2,3-Trichloropropane	8.74E-07	7.66E-07	5.87E-07	4.79E-07	2.56E-07	1.23E-07
1,2,4-Trimethylbenzene	2.10	1.80	1.34	1.03	0.478	0.120
1,2-Dibromo-3-chloropropane	2.50E-04	2.19E-04	1.68E-04	1.37E-04	7.31E-05	3.52E-05
1,2-Dibromoethane	3.05E-06	2.78E-06	2.27E-06	2.04E-06	1.30E-06	9.60E-07
1,2-Dichloroethane	1.06E-04	1.04E-04	9.37E-05	9.60E-05	7.29E-05	6.92E-05
1,3,5-Trimethylbenzene	2.06	1.77	1.31	1.01	0.470	0.118
2-Butanone	0.557	0.607	0.617	0.713	0.612	0.661
2-Chlorotoluene	0.558	0.481	0.358	0.278	0.132	0.039
2-Hexanone	0.0073	0.0072	0.0065	0.0066	0.0050	0.0047
4-Chlorotoluene	0.547	0.472	0.351	0.273	0.130	0.038
Acetone	0.994	1.17	1.28	1.57	1.42	1.60
Bromomethane	0.0015	0.0014	0.0013	0.0013	0.0010	0.0010
Carbon disulfide	0.049	0.046	0.039	0.038	0.026	0.023
Chlorobenzene	0.119	0.104	0.079	0.063	0.032	0.013
Chloroethane (Ethyl Chloride)	2.23	2.47	2.55	2.98	2.59	2.83
Chloroform	7.38E-05	6.82E-05	5.67E-05	5.25E-05	3.48E-05	2.75E-05
Dichlorodifluoromethane	0.984	0.868	0.672	0.559	0.309	0.167
Diisopropyl Ether (DIPE)	0.449	0.424	0.364	0.350	0.246	0.212
Isopropylbenzene	5.56	4.78	3.53	2.71	1.26	0.303
Methylene Chloride	7.78E-04	7.99E-04	7.61E-04	8.27E-04	6.69E-04	6.82E-04
Methyl-t-Butyl Ether (MTBE)	9.07E-04	9.10E-04	8.43E-04	8.89E-04	6.97E-04	6.86E-04
Naphthalene	0.270	0.231	0.170	0.130	0.059	0.012
n-Butylbenzene	3.97	3.40	2.50	1.91	0.867	0.179
n-Propylbenzene	2.18	1.87	1.39	1.06	0.489	0.114
p-Isopropyltoluene	2.82	2.42	1.79	1.37	0.636	0.154
sec-Butylbenzene	2.59	2.22	1.64	1.26	0.576	0.129
Styrene	0.463	0.399	0.296	0.229	0.108	0.030
Tert-Butyl Alcohol (TBA)	0.0010	0.0012	0.0013	0.0016	0.0014	0.0016
tert-Butylbenzene	2.07	1.78	1.32	1.01	0.465	0.110
Trichloroethene	0.0070	0.0061	0.0047	0.0038	0.0020	0.0009

Notes:
mg/kg = milligram per kilogram
NA = not applicable

Table 2
Data Definition Table

Excavation ID	Valid Value	Notes
Series	EX	
Excavation number	1 though 38	See Figure 2 for Excavation ID location
Trench ID	Valid Value	Notes
Series	TR	
Trench designation	AA, BB, CC, DD, EE, FF, GG, HH, JJ, KK, LL, MM	See Figure 3 for Trenching ID location
Example	TR-AA	Trench AA
Assumed Clean Stock Pile	Valid Value	Notes
Series	C	
Excavation Number	See excation ID table	
Julian date	01 through 365	
Stockpile Number	SP01, SP02 ...	
Example	C-E01-30-SP02	Assumed Clean stockpile from excavation 01, excavated on January 30, second stock pile removed
Soil Stockpile going to Treatment	Valid Value	Notes
Series	T	
Excavation Number	See ecavation ID table	See Figure 2 for Excavation ID location
Julian Date	01 through 365	
Lot Number	01, 02 ...	
Example	T-E15-90-L03	Stockpile going to treatment from Excavation 15, from 10 foot interval on March 1, 3rd stockpile removed
Treatment Pile Identification	Valid Value	Notes
Treatment Cell Area	See Area Names List below	
Row	A-F	
Sequence	01, 02 etc.	Each time a row is used the sequence increments
Example	80008-B-02	Treatment cell area 80008, Row B, 2nd pile treated in this row
Sample Types	Valid Value	Notes
Baseline Sample of Contaminated Soil	B00001 through B99999	**These numbers do NOT start over between excavations or treatment rows. Once a number is used it is NEVER repeated.**
Performance Sample	P00001 through P99999	
Confirmation Sample of Treated Soil	T00001 through T99999	
Confirmation Sample of Assumed Clean Soil	C00001 through C99999	
Waste Profile Sample	W00001 through W9999	
Trench Exploratory Samples	Valid Value	Notes
Trench ID	TR-XX	See Trench ID
Sample sequence number	000 - 999	Location and depth of sample to be identified on grid/figure.
Example (Sample Number)	TR-AA-005	
Excavation Sidewall Sample	Valid Value	Notes
Series	EX	
Excavation ID	01 through 37	
Orientation	N, S, E W, F	North, South, East West, Floor
Number of Sample taken from the orientation	1,2,3,44 etc.	
Example	EX-01-N2	Second sidewall sample from north side of excavation 01.
Clean Soil Storage Areas	Valid Value	Notes
Series	CS	
Area ID	1 through XX	
Example	CS-1	Clean storage area 1
Area Designations	Valid Value	Notes
Powerine -Treatment Cell #1	Powerine	Powerine Basin (SVE and GWTS)
80002 - Treatment Cell #3	80002	Historical tank basin 80002
80004 - Treatment Cell #2	80004	Historical tank basin 80004
80007 - Treatment Cell #4	80007	Historical tank basin 80007
80017 - Treatment Cell #5	80017	Historical tank basin 80017
80001	80001	Historical tank basin 80001
80005	80005	Historical tank basin 80005
80006	80006	Historical tank basin 80006
80008	80008	Historical tank basin 80008
80009	80009	Historical tank basin 80009
80013	80013	Historical tank basin 80013
5503	5503	Historical tank basin 55003
5504	5504	Historical tank basin 55004
South-West	South-West	Excavation cluster in southwest area
South-Central	South-Central	Excavation cluster in south central area
North-East	North-East	Excavation cluster in north east area (next to Holifield park)

Table 3:
Protocol to Estimate the minimum number of samples: Test Methods for Evaluation Solid Waste, Physical/Chemical methods, SW-846, U.S. Environmental Protection Agency (EPA SW-846)

Stockpile Size Unit=cubic yards 9cy)	Sampling Frequency
<500	1 sample for every 25 cy (e.g., 20 samples for a 500 cy stockpile)
500 to < 1,000	20 samples plus 1 sample for every 100 cy in excess of the initial 500 cy (e.g., 25 samples for 1,0000 cy stockpile)
1,000 to 10,000	25 samples plus 1 sample for every 500 cy in excess of the initial 1,000(e.g., 43 samples for a 10,0000 cy stockpile)
>10,000	43 samples plus 1 for every 5,000 cy in excess of the initial 10,000 cy (e.g., 61 samples for a 100,000 cy stockpile)

Table 4
Analytical Test Methods, Sample Container, Preservation, and Holding Time Requirements
Defense Fuel Support Point
Norwalk, California

Water				
Parameter	**Preservative**	**Holding Time**	**EPA Method #**	**Container**
VOCs	4°C; HCL; no HS	14 days	Former 8010 List by 8260B or 8260B+gasoline	3 x 40ml glass vials
TPH-gasoline	4°C; HCL; no HS	14 days	EPA 8015B gasoline range	2 x 40ml glass vials
TPH-Diesel	4°C	7 days (extraction), 40 days (analysis)	EPA 8015B diesel range	1L amber glass
Soil				
Parameter	**Preservative**	**Holding Time**	**EPA Method #**	**Container**
VOCs	4°C	14 days	Former 8010 List by 8260B or 8260B + gasoline	brass or butyrate tube/4 oz. wide mouth glass jar
TPH-Diesel	4°C	14 days (extraction), 40 days (analysis)	8015B diesel extractable	brass or butyrate tube/4 oz. wide mouth glass jar
TPH-gasoline	4°C	14 days	8260B + gasoline	brass or butyrate tube/4 oz. wide mouth glass jar
Metals	None	6 months	6010B	250 ml jar
Hazardous Waste Characterization for Toxicity - Samples for STLC/TCLP Extraction				
Parameter	**Preservative**	**Holding Time (from field collection to extraction)**	**EPA Method #**	**Container**
VOCs	None	14 days	8010 List by 8260B	3 x 40ml glass vials
Mercury	HNO3, pH<2	28 days	7470A / 7471A	16 oz plastic
Metals except Mercury	HNO3, pH<2	180 days	6010B	16 oz plastic

Legend:

VOCs = Volatile organic compounds
TPH = Total petroleum hydrocarbons
HS = Headspace
HCL = Hydrochloric Acid

Figure 6 - Moisture Calculation

Parameters	Value	Units
Soil Classification	Sandy Loam	
Cubic Yard Soil - Dry	1	cu yrd
Tons per yard	1.3	tons
Weight (mass) of of water per gallon	8.33	lbs/gal
Mass per ton	2000	lbs
Typical Treatement Pile Volume	750	cu yards
Mass of water per cubic foot	62.43	lbs/cu ft
Cubic feet per yard	27	cu ft/cu yard
Mass of water per cubic yard	1685.61	lbs/ cu yard
Rate of flow	10	gpm

Parameter	Low	Units	High	Units
Field Capacity (FC)	40%		85%	
Tensiometer	*40	centibars	*30	centibars
% Water by Volume	15%		19%	
Volume of Water per Cubic yard Soil	0.15	cu yard	0.19	cu yard
Mass of Water per Cubic yard soil	252.80	lbs	320.30	lbs
% Water by weight	13%		16%	
Gallons of water per yard	30.4	gal per cu yard	38.4	gal per cu yard

1% pt Increase in FC per yard	Value	Units/Equivalent
Volume of water	0.00375	cu yard
Mass of water per cubic yard	6.3	lbs
= gallons of water per cu yard	0.76	gal per cu yard
1% pt increase in FC per 750 cu yards	569.12	gal
Moisture delivery time	56.91	minutes
1% Increase In FC	=	.375% increase in Soil Moisture By Volume
1 pt increase in pressure (centibar)	=	4.5 FC pts (%) decrease in soil moisture
1 pt increase in pressure (centibar)	=	.4% decrease in soil moisture in volume
1 pt increase in pressure		

1% increase in soil moisture	Value	Unit
= Volume of water	0.013	yrds
= Gallons of water	2.62	gal

*** Pressure increases as soil dries**

Source: Natural Resources Conservation Service
Government Agency