

## Appendix A

### Well Construction Plans and Schematics



**Terminal Island Facility**

**SFI # 1**

**Section 8 - T5S - R13W**

**Slurry Injector**

Vertical Well

Lat: (NAD83)

33.74391 N

Long: (NAD83)

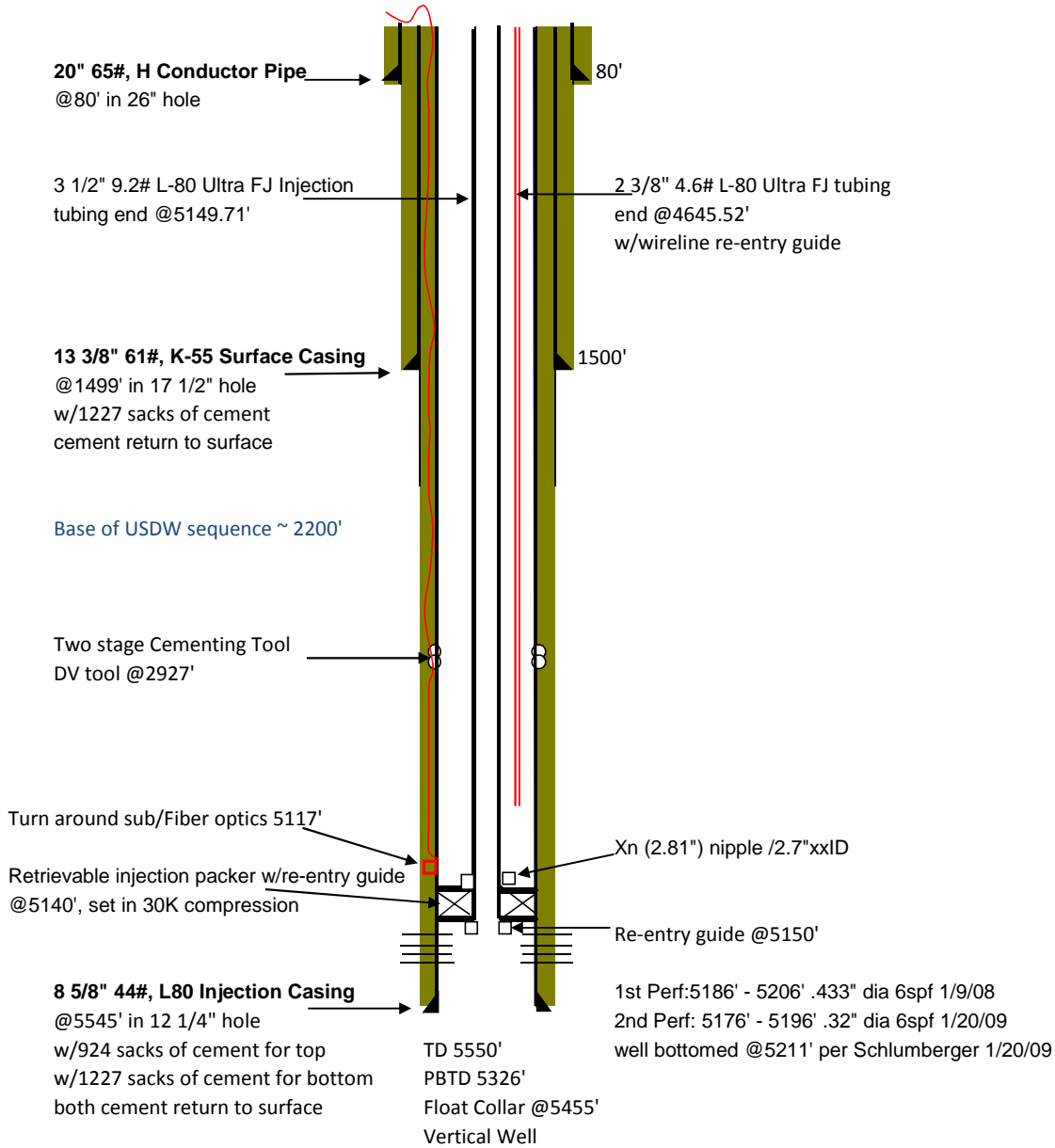
-118.26486 W

KB (above sea level)

31

GL (above sea level)

10





**Terminal Island Facility**

SFI # 1

**Section 8 - T5S - R13W**

**Slurry Injector**

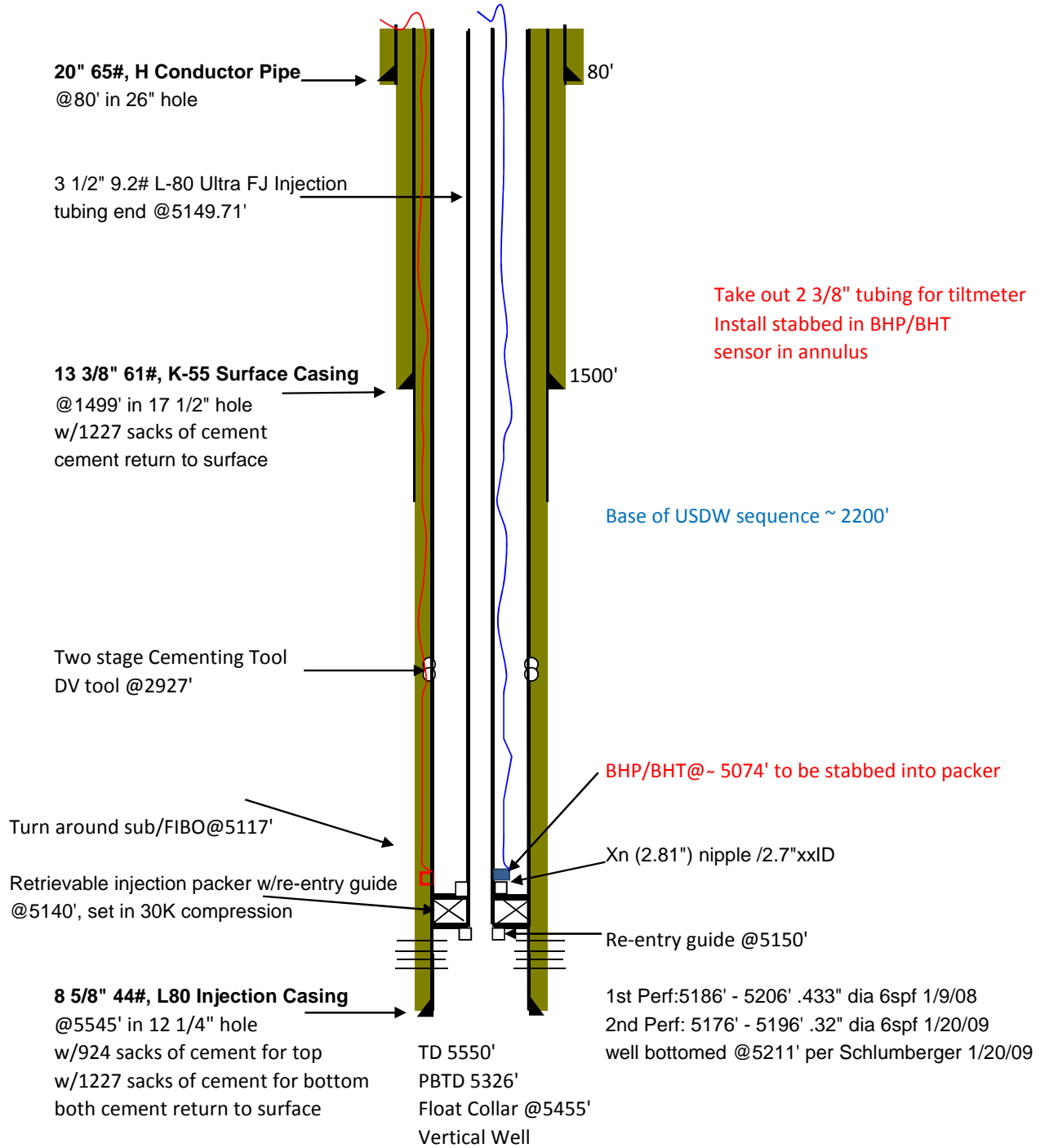
Vertical Well

Lat: (NAD83) 33.74391 N

Long: (NAD83) -118.26486 W

KB (above sea level) 31

GL (above sea level) 10

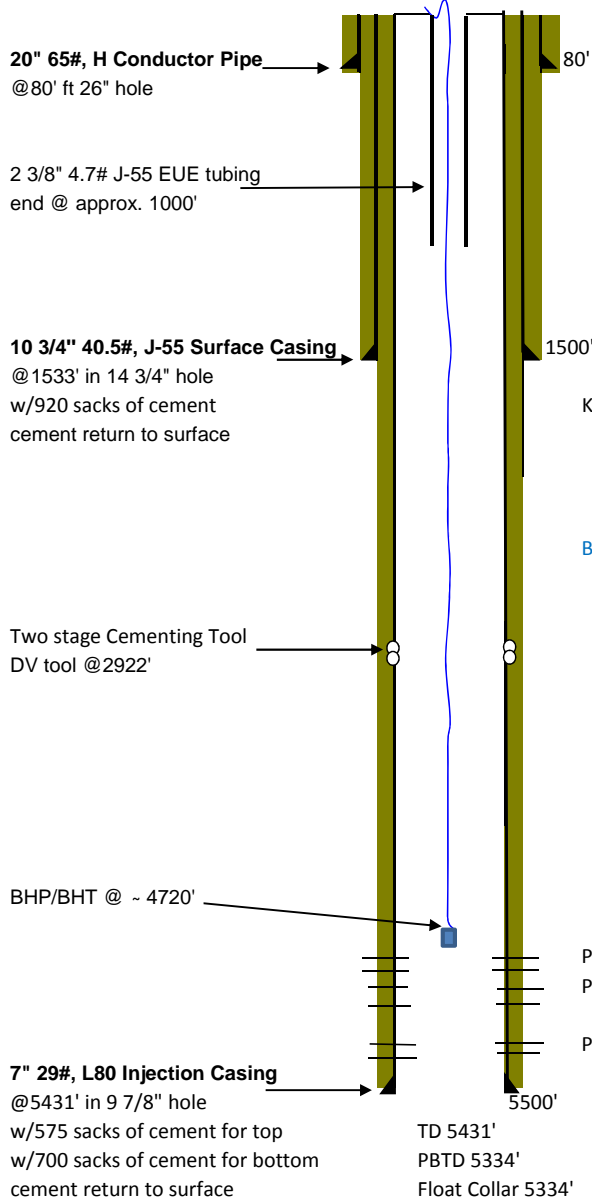




**Terminal Island Facility**  
**SFI # 2**

Kick Off @ 1600ft, max build angle 10 degree @ 1degree/100ft

**Section 8 - T5S - R13W**  
**Monitoring Well**



Surface:		Bottom:	
Lat: (NAD83)	33.7438942 N	Lat:	33.7452833 N
Long: (NAD83)	-118.26491 W	Long:	-118.26413 W
KB (above sea level)	31		
GL (above sea level)	10		

MD	TVD (from deviation survey)
1500	1499.8
1939	1938.5
2607	2597.5
3147	3129.7
3625	3600.9
4005	3976
4482	4446.5
4767	4726.8
4927	4884
5118	5071.3
5300	5250.3

Base of USDW sequence ~ 2200'

Perf:4730' to 4750' .49" dia 6spf 11/23/09  
 Perf:4755' to 4775' .49" dia 6spf 11/23/09  
 Perf:4982' to 5002' .49" dia 6spf 11/23/09

BH Location: 504.84°N & 238.66°E



**Terminal Island Facility**

**SFI # 3**

**Section 8 - T5S - R13W**

**Slurry Injector**

Deviated Well  
Surface:

Lat: (NAD83)

Long: (NAD83)

KOP 1600ft, build  
angle 1degree/100ft

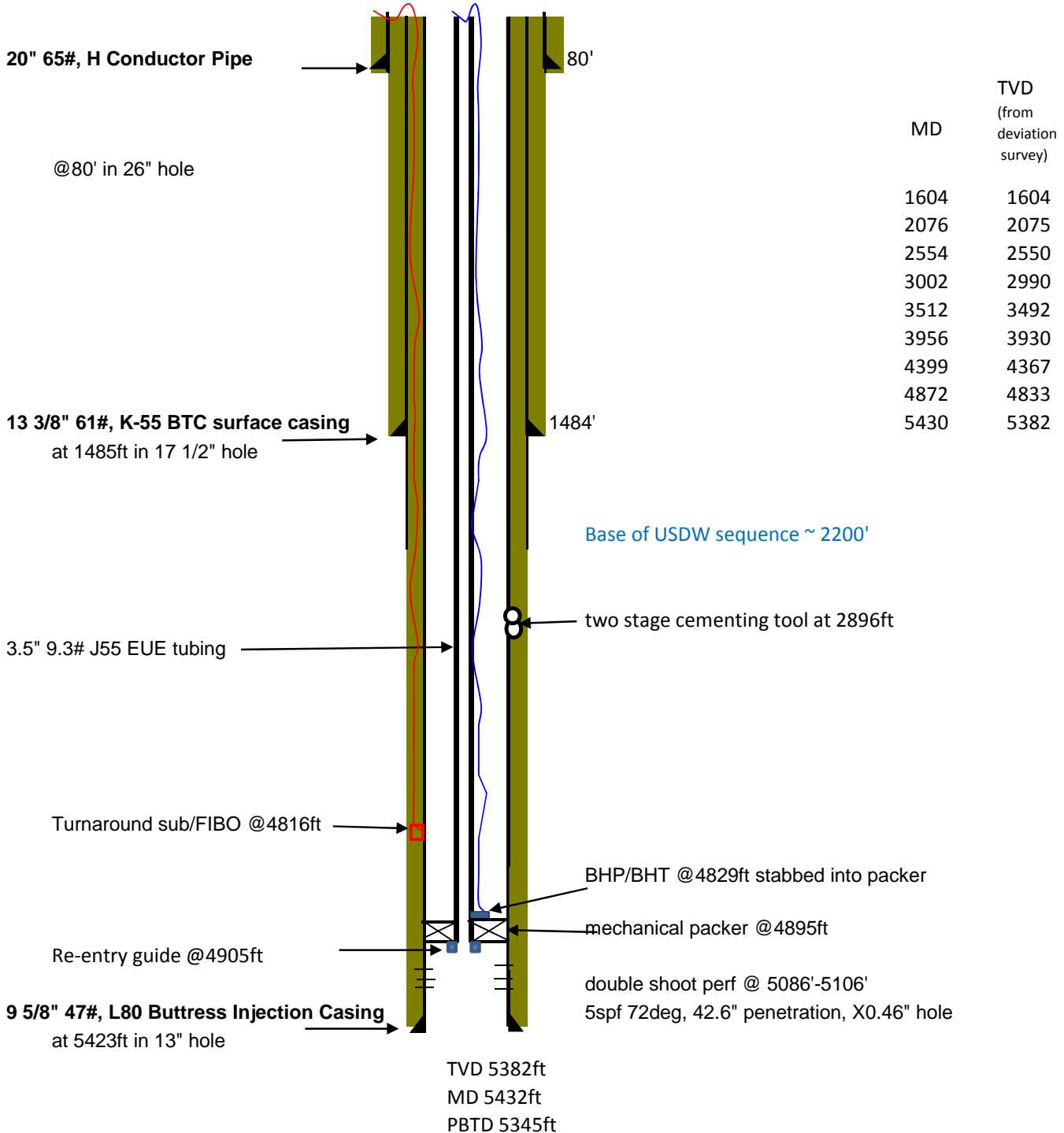
Bottom:

33.7440631

-118.262808

KB (above sea level) 30ft

GL (above sea level) 10ft





**Terminal Island Facility**  
**SFI#4 (aka DOE#2)**  
**Section 8 - T5S - R13W**  
**Monitoring Well**

Kick Off @3107ft

Surface:

Lat: (NAD83) 33.744032 N

Long: (NAD83) -118.26467 W

KB (above sea level)

GL (above sea level)

Bottom:

Lat: N

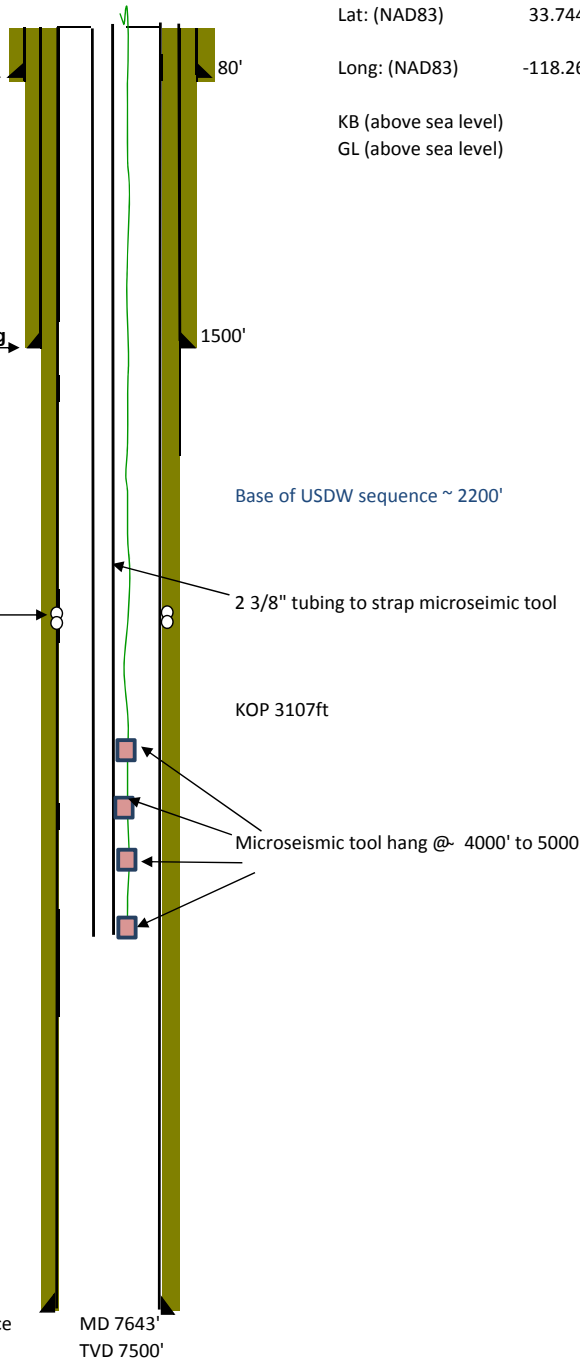
Long: W

**16" 65#, H Conductor Pipe**  
 in 22" hole, cmt to surface

**10 3/4" 40.5#, K-55 Surface Casing**  
 in 13 3/4" hole, cmt to surface

Two stage Cementing Tool  
 DV tool @\*\*\*\*\*

**7" 29#, L-80 Injection Casing**  
 @7500' in 9 7/8" hole, cmt to surface



Base of USDW sequence ~ 2200'

2 3/8" tubing to strap microseismic tool

KOP 3107ft

Microseismic tool hang @- 4000' to 5000'

MD 7643'  
 TVD 7500'



**Terminal Island Facility**

SFI # 1

**Section 8 - T5S - R13W**

Vertical Well

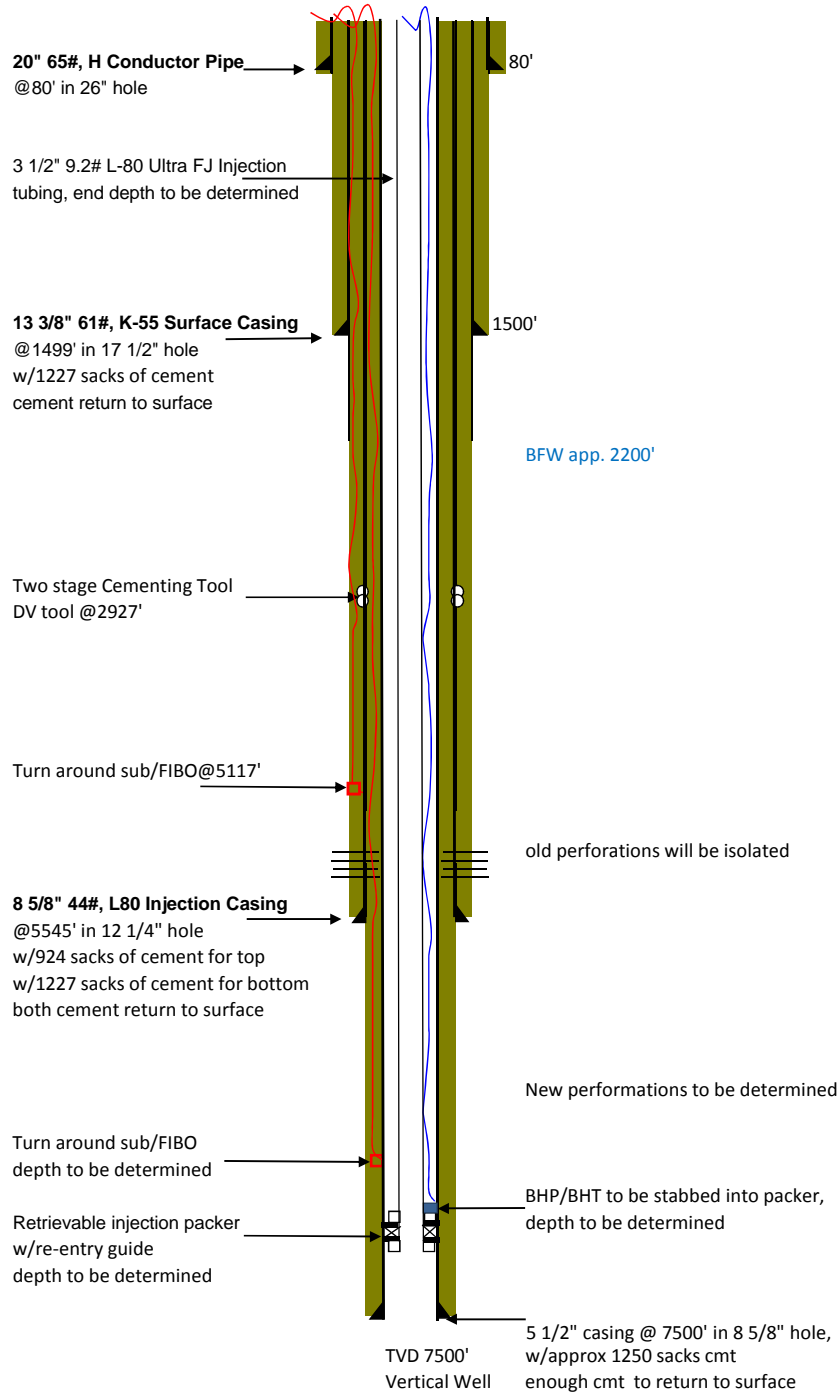
**Slurry Injector**

Lat: (NAD83)

33.74391 N

Long: (NAD83)

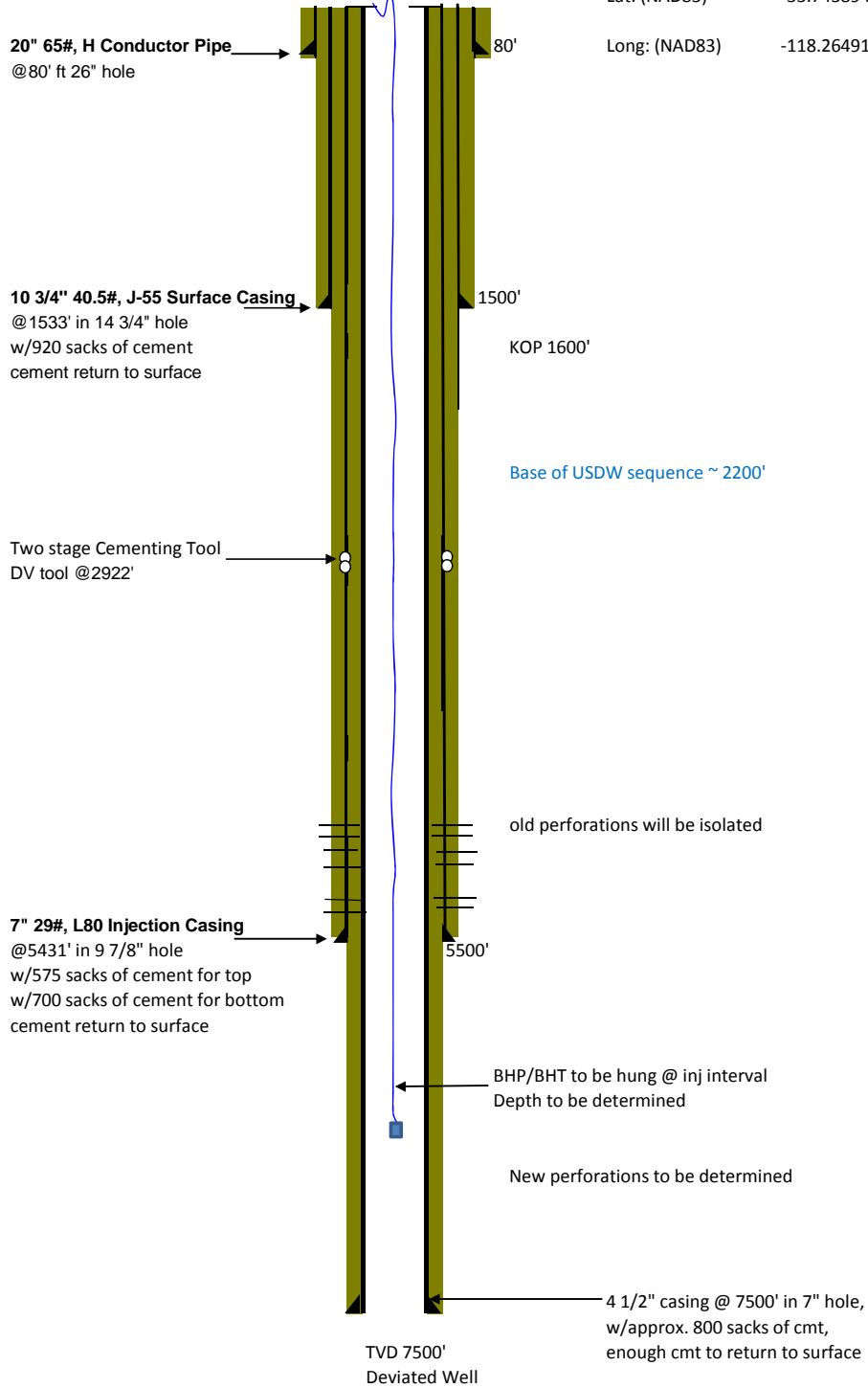
-118.26486 W





Terminal Island Facility  
 SFI # 2  
 Section 8 - T5S - R13W  
 Monitoring Well

Surface:		Bottom:
Lat: (NAD83)	33.743894 N	To be determined
Long: (NAD83)	-118.26491 W	To be determined







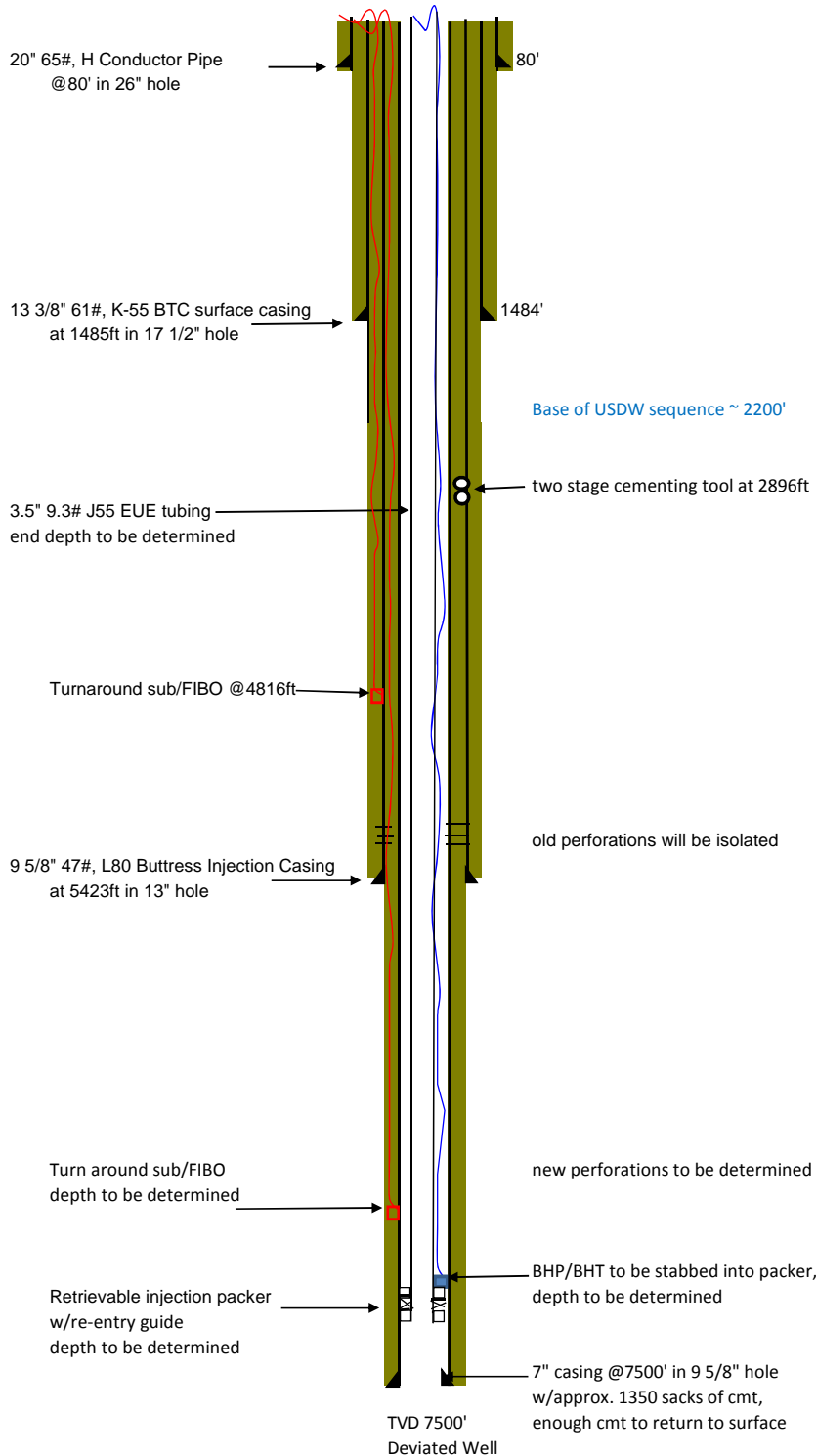
Terminal Island Facility

SFI # 3

Section 8 - T5S - R13W

Slurry Injector

Surface:		Bottom:
Lat: (NAD83)	33.7440075 N	To be determined
Long: (NAD83)	-118.264663 W	To be determined



## Appendix B

Sample- Weekly Progress Summary Report

## **May 27, 2013 Operations Summary for TIRE Project**

The past week May 20 through May 26, GeoEnvironment Technologies (GET) injected at varying rates from 124,338 to 245,930gpd total volumes. We present in Table 1 a summary of the injection operations for the month of May to-date. In Figure 1, the weekly plot of wellhead pressure (WHP), calculated bottom-hole pressure (BHPcalc), casing pressure (Pcas) and injection rate data for the past week is shown. Also, Figure 2 provides a comparison of the bottom-hole pressure at SFI#3 in relation to the SFI#1 well-head pressure - please note the bottom-hole pressure gage in SFI#2 is tentatively scheduled for re-deployment in late May or early June depending on the manufacturers repair turnaround.

The key events for this period are:

1. Geologic formation injectivity and bottom-hole pressure response remain consistent.
2. Last week, the TIRE Site's average daily digested sludge received (from TIWRP) was 181,979gallons per day – excluding flows received on Friday due to the SRT.
3. Wet cake loads from HTP were scheduled Monday through Thursday – 4 loads per day; no loads are scheduled for Friday. All scheduled loads were delivered and taken. Last week's average daily HTP biosolids injected was 100tons per day over the 4 days loads were delivered, excluding Friday due to the SRT.
4. Last week the injection equipment operated without interruption.
5. On Thursday, a contractor was on site to install a temporary BHP/BHT sensor in SFI#1 in anticipation of Friday's SRT.
6. On Friday, the monthly Step-Rate Test was performed.

TIRE Site objectives for the near future are:

- Continue injection of TITP digested sludge daily Monday thru Friday – GET anticipates taking TIWRP digested sludge in the range of 175,000 to 195,000 gallons per day Monday thru Thursday and 130,000 to 150,000 gallons on Friday.
- Continue HTP wet cake deliveries – GET plans on taking 4 truckloads per day Monday thru Thursday.
- A City maintenance training session will be held this Friday, 5/31, for training on injection pump repair/maintenance.

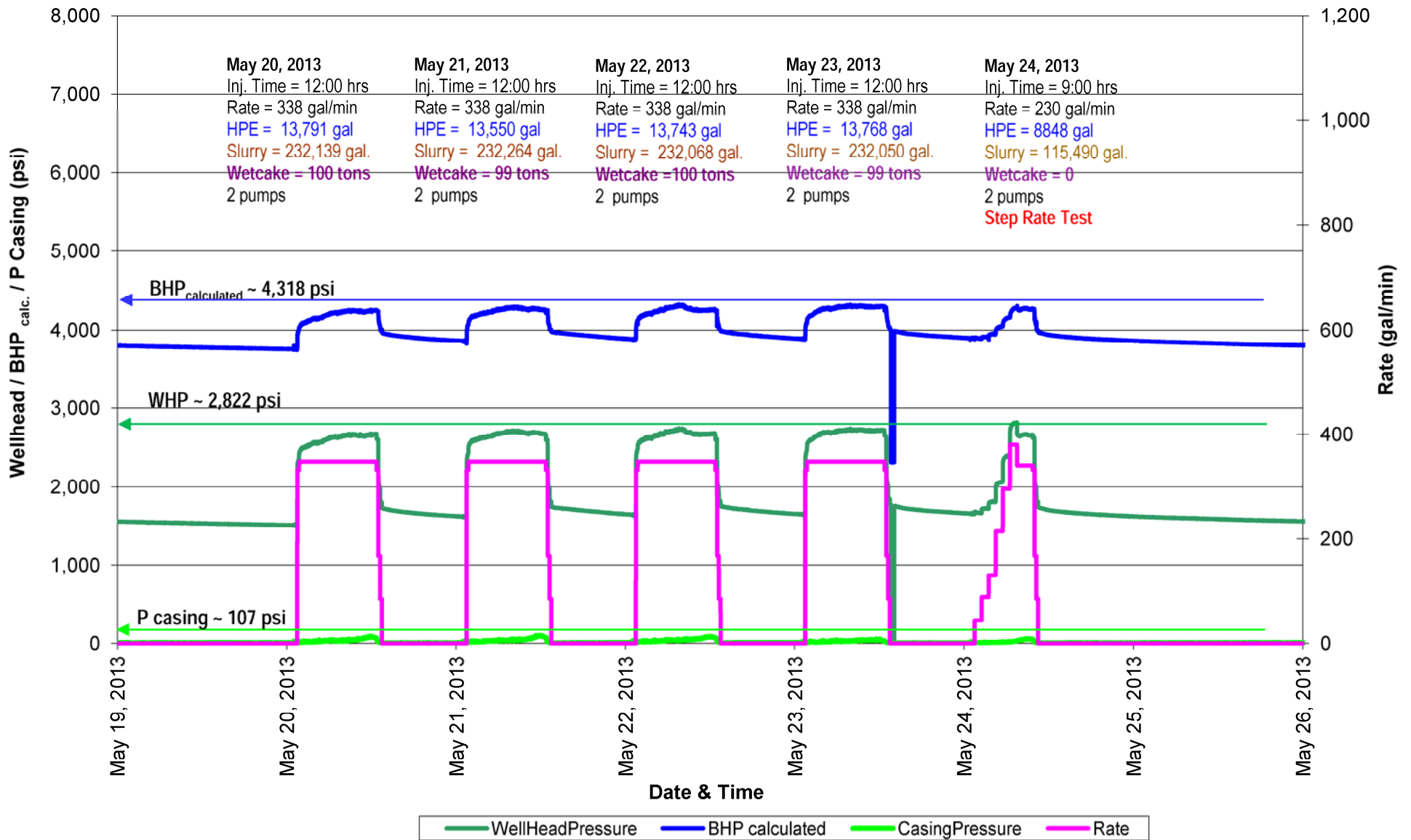
Date	Daily Injection Duration (hrs:min:ss)	Max Pump WHP (psi)	Avg. Total Flowrate (gpm)	Total Vol Pumped (gallons)	Total Vol Pumped (bbls)	Daily HPE for Pump Warm-up/ Step-down (gallons)	Daily Intake Line Flush HPE (gallons)	Daily Intake Line Flush Brine (gallons)	Daily digested Sludge (gallons)	Sludge ton equivalent (UStons)	WetCake delivered (UStons)	Daily Total Slurry* (gallons)	Weight % Wetcake of Total Slurry (%)	Calculated Volume % Dry Solids of Total Slurry (%)	Volume % Dry Solids measured at 6am of Tire Slurry (%)	Max E. Gauge WHP (psi)	Max E. Gauge BHP (psi)	Input to Tank (gallons)	Return to Drain (gallons)	Daily facility power consumption (kWh):
05/01/13	12:00:00	2,550	338	246,182	5,861	13,703		2,338	182,477	49	98	232,478	10.18%	4.42%		2,713		243,994		6,254
05/02/13	12:15:00	2,575	330	249,207	5,934	14,873		2,923	183,972	49	100	234,335	10.25%	4.44%	5.37%	2,725		251,034		6,332
05/03/13	9:00:00	2,525	335	182,827	4,353	13,769		2,595	153,535	41	0	169,057		1.82%		2,701		183,738		4,251
05/04/13	Shut-in																			
05/05/13	Shut-in																			
05/06/13	12:00:00	2,500	338	246,032	5,858	13,696		2,671	182,915	49	98	232,336	10.21%	4.43%		2,673		244,759		6,368
05/07/13	12:00:00	2,525	338	245,761	5,851	13,764		2,749	182,734	49	99	231,996	10.26%	4.45%	5.50%	2,705		245,761		6,181
05/08/13	12:00:00	2,550	338	246,375	5,866	13,789		2,787	182,795	49	99	232,586	10.30%	4.46%		2,738		245,644		6,230
05/09/13	12:00:00	2,525	338	246,246	5,863	13,750		2,532	182,761	49	99	232,496	10.24%	4.44%	6.02%	2,719		245,515		6,201
05/10/13	9:00:00	2,475	335	182,598	4,348	13,880		2,614	153,732	41	0	168,718		1.82%		2,671		184,606		4,203
05/11/13	Shut-in																			
05/12/13	Shut-in																			
05/13/13	12:00:00	2,475	338	246,359	5,866	13,791		3,142	182,676	49	100	232,568	10.32%	4.46%		2,677		246,182		6,371
05/14/13	12:00:00	2,525	338	246,189	5,862	13,728		2,681	182,559	49	99	232,461	10.31%	4.46%	5.74%	2,719		245,639		6,156
05/15/13	12:00:00	2,550	338	246,321	5,865	13,807		2,393	182,888	49	100	232,514	10.31%	4.46%		2,725		247,232		6,151
05/16/13	12:00:00	2,550	338	246,164	5,861	13,596		2,262	182,902	49	99	232,568	10.22%	4.43%	5.66%	2,737		246,164		6,178
05/17/13	9:10:00	2,500	335	186,227	4,434	12,029		2,540	152,386	41	0	174,198		1.75%		2,691		185,316		4,335
05/18/13	Shut-in																			
05/19/13	Shut-in																			
05/20/13	12:00:00	2,450	338	245,930	5,855	13,791		2,441	182,693	49	100	232,139	10.40%	4.49%		2,672		243,738		6,357
05/21/13	12:00:00	2,500	338	245,814	5,853	13,550		2,972	182,792	49	99	232,264	10.32%	4.46%	5.54%	2,716		247,641		6,214
05/22/13	12:00:00	2,525	338	245,811	5,853	13,743		2,455	182,815	49	100	232,068	10.36%	4.48%		2,740		245,445		6,190
05/23/13	12:00:00	2,550	338	245,818	5,853	13,768		2,743	179,616	48	99	232,050	10.29%	4.43%	5.24%	2,731		244,356		6,177
05/24/13	9:00:00	2,600	230	124,338	2,960	8,848		2,568	103,336	28	0	115,490		1.79%		2,811		124,888		2,897
05/25/13	Shut-in																			
05/26/13	Shut-in																			

**Table 1 - Injection Summary for May 2013**

**Injection Summary Legend:**

- Total Vol Pumped (gallons)** = Total number of pump strokes \* stroke volume
- Total Vol Pumped (bbls)** = Total Vol pumped (gallons) / 42
- Daily Total HPE (gallons)** = Number of pump strokes when HPE is running \* stroke volume
- Daily Total Brine (gallons)** weekly CLA data
- Daily digested Sludge (gallons)** weekly CLA data
- Sludge ton equivalent (UStons)** = daily digested sludge(gallons) \* 26.8(UStons) / 100000(gallons)
- WetCake delivered (UStons)** = sum of wetcake loads delivered
- Daily Total Slurry\* (gallons)** = Number of pump strokes when Slurry is injected \* stroke volume (includes daily digested sludge, brine flush and wet cake material)
- Weight % Wetcake of Total Slurry (%)** = wetcake(UStons) \* 2000 (lb/USton) / (8.3 (lb/gallon) \* Slurry(gallons))
- Calculated Volume % Dry Solids of Total Slurry (%)** = [28% \* wetcake(USton) \* 2000 (lb/USton)/8.3 (lb/gallon) + 2% \* Digested Sludge(gallons)]/total Slurry (gallons)
- Measured Volume % Dry Solids of TIRE Slurry (%)** weekly CLA data – lab results from mix tank sampling

**SFI Well #01 : Injection  
May 19 - May 26, 2013**



**Figure 1 – WHP, BHPest, and Casing Pressure Data for Week of May 19 thru May 26, 2013**

**Pressure Comparison Plot : SFI #01 / SFI #02 / SFI #03**  
**Date : May 19 - May 26, 2013**



**Figure 2 – SFI#2 and SFI#3 Bottom-Hole Pressure Data for Week of May 19 thru May 26, 2013**

## Appendix C

Injection Operations Data (July 2008 through December 2012)

In November 2006, the City of Los Angeles received an U.S. EPA Underground Injection Control (UIC) demonstration permit for the Terminal Island Renewable Energy Project. The demonstration project the first of its kind in the United States places biosolids into depleted subsurface geological formations where the earth's high temperature would biodegrade the organic compounds to generate methane gas that can ultimately be used to produce an environmentally safe renewable energy. The demonstration project site consists of one injection well SFI#1, one monitoring well (SFI#2), and (2) 500 hP pumps that were placed in operation July 2008. During the start-up phase brine and high pressure effluent was tested and injected into the deep subsurface. The first injection of bio-slurry material occurred in September 2008.

In June 2010, the construction of well SFI#3 was completed and the project changed to current operations: 1 injection well, 2 monitoring wells and 2 pumps injecting an average of 150 tons per day of bio-slurry material. Standard operating inject is approximately 12 hours per day, 5 days a week with 2 days of shut-in over the weekend. As of December 2012 the project has injected more than 220 million gallons of slurry diverting more than 97,000 tons of biosolids from land application, eliminating approximately 540,000 miles of heavy truck traffic, and consequently, a reduction of 12 tons of Nitrogen Oxide (NO<sub>x</sub>) and 11.2 tons of Carbon Monoxide (CO). The project has also sequestered more than 15,000 metric tons of Carbon Dioxide (CO<sub>2</sub>) thus reducing greenhouse emissions. Gas samples taken periodically have shown an increase in methane production, but not sufficient amount available to extract for use a renewable energy. The tables below summarize the injection operations from July 2008 to December 2012.

#### 2008 Injection Data

Date	Daily Injection Duration (hrs:min)	Max Pump WHP (psi)	Avg. Flowrate (gpm)	Total Vol Pumped (gallons)	HPE (gallons)	Brine (gallons)	Digested Sludge (UStons)	Biosolids (UStons)	Total Bio-Slurry (gallons)	Volume of Bio-Slurry (%)
Jul 2008	112:41	166	166	23,345	N/R	N/R	N/R	N/R	N/R	N/R
Aug 2008	143:40	2,300	151	1,168,889	84,449	391,782	185	N/R	N/R	N/R
Sep 2008	171:33	2,500	288	1,825,042	189,196	204,716	384	152	N/R	N/R
Oct 2008	203:45	2,700	253	2,010,892	302,806	0	458	628	N/R	N/R
Nov 2008	151:15	2,800	292	1,783,536	221,848	85,441	396	866	N/R	N/R
Dec 2008	17:30	2,200	117	119,378	11,149	0	28	0	108,229	N/R
<b>2008 Totals</b>				<b>6,931,082</b>	<b>809,448</b>	<b>681,939</b>	<b>1,450</b>	<b>1,646</b>	<b>108,229</b>	

**N/R** = Not Reported

**Brine** - water that has a quantity of salt, especially sodium chloride, dissolved in it and is the discharge from the advanced water treatment system

**HPE** - High Pressure Effluent , is tertiary treated effluent used for in-house treatment plant usage such as tank wash outs, cooling water, etc.

**Digested Sludge** - anaerobically digested solids that have gone through treatment process

**Biosolids**- nutrient-rich organic materials resulting from the treatment and processing of wastewater residuals. When treated and processed, these residuals can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth.

**Thickened Waste Activated Sludge** - thickened solids recovered from secondary activated sludge system of a wastewater treatment process

**Bio-slurry**- mixture of wastewater treatment fluids and residuals including brine, high pressure effluent, digested sludge, thickened waste active sludge, and biosolids



## 2009 Injection Data

Date	Daily Injection Duration (hrs:min)	Max Pump WHP (psi)	Avg. Flowrate (gpm)	Total Vol Pumped (gallons)	HPE (gallons)	Brine (gallons)	Digested Sludge (UStons)	Biosolids (UStons)	Total Bio-Slurry (gallons)	Volume of Bio-Slurry (%)
Jan 2009	219:15	2,800	164	2,452,433	166,543	0	585	N/R	22	N/R
Feb 2009	224:45	2,550	258	3,448,612	223,064	0	780	748	3,225,548	1.96
Mar 2009	245:00	2,609	227	3,380,520	296,606	4,268	651	1,308	3,079,646	4.31
Apr 2009	248:45	2,800	267	2,248,930	151,763	0	406	939	2,097,167	4.65
May 2009	246:00	2,700	180	2,634,519	127,750	0	525	636	2,506,768	3.38
Jun 2009	228:30	2,469	247	2,581,722	212,088	68,694	547	40	2,369,634	1.77
Jul 2009	280:00	2,200	253	4,022,190	270,806	87,706	885	0	3,751,384	1.76
Aug 2009	242:00	2,100	246	3,641,967	257,399	71,110	819	0	3,384,569	1.80
Sep 2009	255:15	2,150	248	3,650,303	259,617	61,771	812	0	3,390,686	1.88
Oct 2009	253:00	2,200	238	3,610,954	294,283	57,170	790	0	3,316,671	
Nov 2009	221:30	220	241	3,180,086	239,265	78,173	696	0	2,940,821	1.76
Dec 2009	240:00	2,200	240	3,563,616	311,550	55,035	788	0	3,252,066	1.79
<b>2009 Totals</b>				<b>38,415,852</b>	<b>2,810,734</b>	<b>483,927</b>	<b>8,283</b>	<b>3,671</b>	<b>33,314,982</b>	

**N/R** = Not Reported

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**Thickened Waste Activated Sludge** - thickened solids recovered from secondary activated sludge system of a wastewater treatment process

**Bio-slurry**- mixture of wastewater treatment fluids and residuals including brine, high pressure effluent, digested sludge, thickened waste active sludge, and biosolids

### 2010 Injection Data

Date	Daily Injection Duration (hrs:min)	Max Pump WHP (psi)	Avg. Flowrate (gpm)	Total Vol Pumped (gallons)	HPE (gallons)	Brine (gallons)	Digested Sludge (UStons)	Biosolids (UStons)	Total Bio-Slurry (gallons)	Volume of Bio-Slurry (%)
Jan 2010	216:45	2,850	242	3,128,911	247,540	45,534	679	0	2,881,237	1.75
Feb 2010	228:00	2,300	246	3,388,137	236,077	36,672	697	354	3,152,060	2.68
Mar 2010	264:15	2,650	292	4,633,063	497,865	148,220	803	1,513	4,038,327	3.73
Apr 2010	256:15	2,650	324	4,879,385	394,871	87,230	1,006	534	4,484,514	2.30
May 2010	245:45	2,650	314	4,582,275	325,003	40,655	863	1,436	4,257,271	2.95
Jun 2010	262:30	2,700	317	4,988,125	321,255	91,678	934	2,042	4,666,870	4.32
Jul 2010	303:45	2,650	317	5,787,705	376,608	62,405	1,154	1,907	5,411,097	4.08
Aug 2010	300:25	2,600	326	5,879,683	311,477	43,555	991	2,994	5,568,206	4.93
Sep 2010	290:51	2,700	330	5,782,413	377,167	71,591	1,072	2,645	5,405,246	4.32
Oct 2010	263:40	2,750	330	5,228,488	303,953	52,834	951	2,716	4,924,535	5.06
Nov 2010	267:00	2,800	358	5,781,986	322,530	58,068	976	2,817	5,459,456	4.76
Dec 2010	298:35	2,800	331	6,018,990	359,769	61,749	1,143	2,429	5,659,221	4.38
<b>2010 Totals</b>				<b>60,079,162</b>	<b>4,074,116</b>	<b>800,192</b>	<b>11,270</b>	<b>21,388</b>	<b>55,908,041</b>	

**N/R** = Not Reported

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**Biosolids**- nutrient-rich organic materials resulting from the treatment and processing of wastewater residuals. When treated and processed, these residuals can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth.

**Thickened Waste Activated Sludge** - thickened solids recovered from secondary activated sludge system of a wastewater treatment process

**Bio-slurry**- mixture of wastewater treatment fluids and residuals including brine, high pressure effluent, digested sludge, thickened waste active sludge, and biosolids

### 2011 Injection Data

Date	Daily Injection Duration (hrs:min)	Max Pump WHP (psi)	Avg. Flowrate (gpm)	Total Vol Pumped (gallons)	HPE (gallons)	Brine (gallons)	Digested Sludge (USTons)	Biosolids (USTons)	Total Bio-Slurry (gallons)	Volume of Bio-Slurry (%)
Jan 2011	283:52	2,725	330	5,765,852	425,864	63,664	1,073	2,432	5,339,988	4.58
Feb 2011	275:14	2,750	332	5,496,402	280,875	63,173	1,130	1,790	5,215,527	3.84
Mar 2011	292:20	2,850	332	5,826,038	331,962	67,811	1,070	3,226	5,494,076	5.44
Apr 2011	255:20	2,850	332	5,101,700	298,113	52,694	914	2,789	4,803,587	5.33
May 2011	266:13	2,750	333	5,313,429	316,159	54,185	938	2,967	4,997,270	5.29
Jun 2011	272:41	2,700	331	5,454,078	336,763	54,446	908	3,316	5,117,315	5.65
Jul 2011	259:30	2,700	314	4,914,583	284,490	50,263	795	3,748	4,630,094	20.32
Aug 2011	250:46	2,600	319	4,896,898	366,198	49,452	933	2,034	4,530,699	4.48
Sep 2011	271:30	2,600	323	5,325,817	329,236	52,007	998	2,478	4,996,581	4.73
Oct 2011	267:42	2,600	326	5,247,222	283,176	53,990	981	2,678	4,964,046	5.07
Nov 2011	283:35	2,550	333	5,682,664	294,793	62,305	1,172	1,565	5,387,871	3.56
Dec 2011	273:11	2,500	341	5,631,566	308,607	58,754	1,082	2,454	5,322,959	4.61
<b>2011 Totals</b>				<b>64,656,249</b>	<b>3,856,235</b>	<b>682,744</b>	<b>11,995</b>	<b>31,477</b>	<b>60,800,013</b>	

**N/R** = Not Reported

**Brine** - water that has a quantity of salt, especially sodium chloride, dissolved in it and is the discharge from the advanced water treatment system

**HPE** - High Pressure Effluent , is tertiary treated effluent used for in-house treatment plant usage such as tank wash outs, cooling water, etc.

**Digested Sludge** - anaerobically digested solids that have gone through treatment process

**Biosolids**- nutrient-rich organic materials resulting from the treatment and processing of wastewater residuals. When treated and processed, these residuals can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth.

**Thickened Waste Activated Sludge** - thickened solids recovered from secondary activated sludge system of a wastewater treatment process

**Bio-slurry**- mixture of wastewater treatment fluids and residuals including brine, high pressure effluent, digested sludge, thickened waste active sludge, and biosolids

### 2012 Injection Data

Date	Daily Injection Duration (hrs:min)	Max Pump WHP (psi)	Avg. Flowrate (gpm)	Total Vol Pumped (gallons)	HPE (gallons)	Brine (gallons)	Digested Sludge (UStons)	Biosolids (UStons)	Total Bio-Slurry (gallons)	Volume of Bio-Slurry (%)
Jan 2012	283:52	2,725	330	5,765,851	425,864	63,664	1,073	2,432	5,339,988	4.58
Feb 2012	275:14	2,750	332	5,496,402	280,875	63,173	1,130	1,688	5,215,527	3.84
Mar 2012	256:55	2,750	331	5,159,255	292,321	60,317	907	2,911	4,866,935	5.32
Apr 2012	254:37	2,725	330	5,072,584	282,805	51,116	1,020	1,838	4,789,780	4.14
May 2012	271:50	2,675	333	5,463,198	318,435	62,632	1,107	1,914	5,144,763	4.10
Jun 2012	246:33	2,675	332	4,938,838	319,110	52,903	967	1,865	4,619,728	4.26
Jul 2012	258:44	2,650	334	5,235,168	298,220	57,620	1,021	2,280	4,936,948	4.58
Aug 2012	269:50	2,600	333	5,446,215	323,074	70,657	1,081	2,191	5,123,141	4.40
Sep 2012	233:33	2,625	333	4,698,614	267,045	57,343	941	1,834	4,431,570	4.35
Oct 2012	273:53	2,625	335	5,528,473	305,510	58,394	1,154	1,657	5,222,964	3.76
Nov 2012	249:55	2,700	330	5,017,510	317,396	60,466	1,003	1,855	4,700,114	4.17
Dec 2012	243:00	2,675	333	4,904,009	270,076	55,610	991	1,654	4,633,933	3.94
<b>2012 Totals</b>				<b>62,726,118</b>	<b>3,700,730</b>	<b>713,895</b>	<b>12,393</b>	<b>24,118</b>	<b>59,025,389</b>	

**N/R** = Not Reported

**Brine** - water that has a quantity of salt, especially sodium chloride, dissolved in it and is the discharge from the advanced water treatment system

**HPE** - High Pressure Effluent , is tertiary treated effluent used for in-house treatment plant usage such as tank wash outs, cooling water, etc.

**Digested Sludge** - anaerobically digested solids that have gone through treatment process

**Biosolids**- nutrient-rich organic materials resulting from the treatment and processing of wastewater residuals. When treated and processed, these residuals can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth.

**Thickened Waste Activated Sludge** - thickened solids recovered from secondary activated sludge system of a wastewater treatment process

**Bio-slurry**- mixture of wastewater treatment fluids and residuals including brine, high pressure effluent, digested sludge, thickened waste active sludge, and biosolids

## Appendix D

### Operation Scenarios for Field Experiment

## **OPERATIONAL SCENARIOS FOR FIELD EXPERIMENT**

EPA will grant authorization to alternately inject into Wells SFI-1 and SFI-3 after the requirements of Part II, Section C.6. of this permit have been met and Well SFI-4 has been drilled and constructed.

This permit allows for converting SFI-3 from a monitoring well to an injection well following drilling, construction and evaluation of SFI-4.

This permit allows for injecting in both Wells SFI-1 and SFI-3, but solely on an alternating basis, i.e. one well injecting and one well monitoring at any given time. Injection into SFI-3 will be authorized when specific operational scenarios and triggers are met.

### **Scenario A: Inject into SFI-3**

1. SFI-4 has been drilled and approved for monitoring operations. Conduct a Step Rate Test (SRT) in Well SFI-3 to determine if approved permitted injection zone contains suitable injectivity characteristics.
2. If the SRT performed on SFI-3 yields good results (good injectivity characteristics at approved permitted zone), commence injections operations in well SFI-3 and cease injection operations in SFI-1.
  - a. If item 2 above occurs the relaxation period for SFI-1 will commence for a period of approximately six months.
  - b. If item 2 above does not occur based on the SRT results indicating unfavorable injectivity characteristics at the approved permitted injection zone, recomplete SFI-3 into suitable higher sand. Conduct a SRT after recompletion of SFI-3 to determine if the new higher sand is suitable for injection.
3. SFI-1 pressure will be monitored for 6 months during this time the bottom-hole fall-off pressure will be charted to ensure the Bottom-Hole Pressure (BHP) falls to less than 3200psi. (See attached daily fall-off well head pressure plot for SFI-1)
4. Install a BHP/BHT sensor similar in SFI-1 similar to configuration in SFI-3.

### **Scenario B. Alternating well injection: SFI-1 and SFI-3**

1. Begin alternating well injection into SFI-1 and SFI-3 based on the following:
  - a. SFI-4 has been drilled and approved for monitoring operations. Evaluate data from drilling SFI-4 to determine suitable injection zone location (higher or lower)
  - b. SFI-1 relaxation criteria has been achieved and BHP/BHT sensor has been installed

## APPENDIX E REPORTING FORMS

Forms can also be obtained on the web at

<http://water.epa.gov/type/groundwater/uic/reportingforms.cfm>

The forms that need to be obtained are:

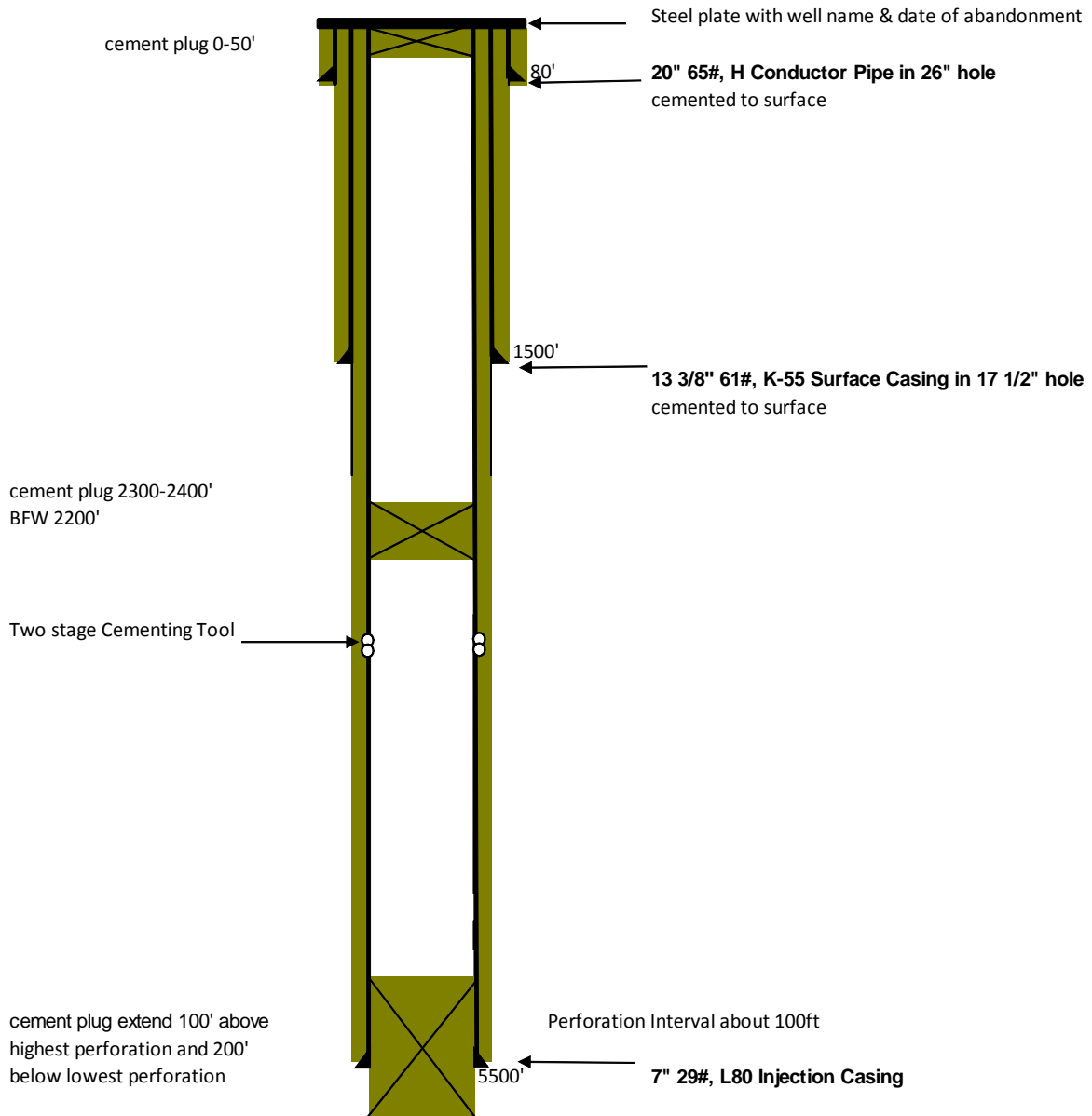
7520-6  
7520-7  
7520-8  
7520-9  
7520-11  
7520-12  
7520-14  
7520-16

## Appendix F

### Plugging and Abandonment Plan



## WELL PLUGGING AND ABANDONMENT SCHEMATIC



All cement plugs shall meet EPA and DOGGR P&A standards, cement plugs shall have max liquid permeability of 0.1md and attain compressive strength of  $\geq 1000$ lb psi within 24 hours. All cement test data will be submitted to EPA and DOGGR and conducted according to DOGGR guidelines. Space between cement plugs will be filled with drilling mud with corrosion inhibitor added, consistent with DOGGR requirements and field practices.