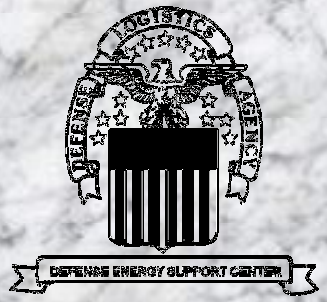
DESC Tank Farm Update



Tank Farm Update

- DESC to deactivate terminal within 90 days after completion/acquisition of alternate storage at Watson Station, Carson, CA
- Air Force Office of Legislative Affairs committed to work with Congresswoman Napolitano and staff for:
  - Demolition of tanks and piping
  - Property conveyance

Tank Farm Update, cont.

- Coordinate cleanup strategies, goals, and timeframes with Kinder Morgan
- Periodically update LARWQCB of remediation strategies

Norwalk Tank Farm Update

Defense Energy Support Center-

Los Angeles

Presented to the Norwalk Tank Farm

Restoration Advisory Board

October 28, 1999

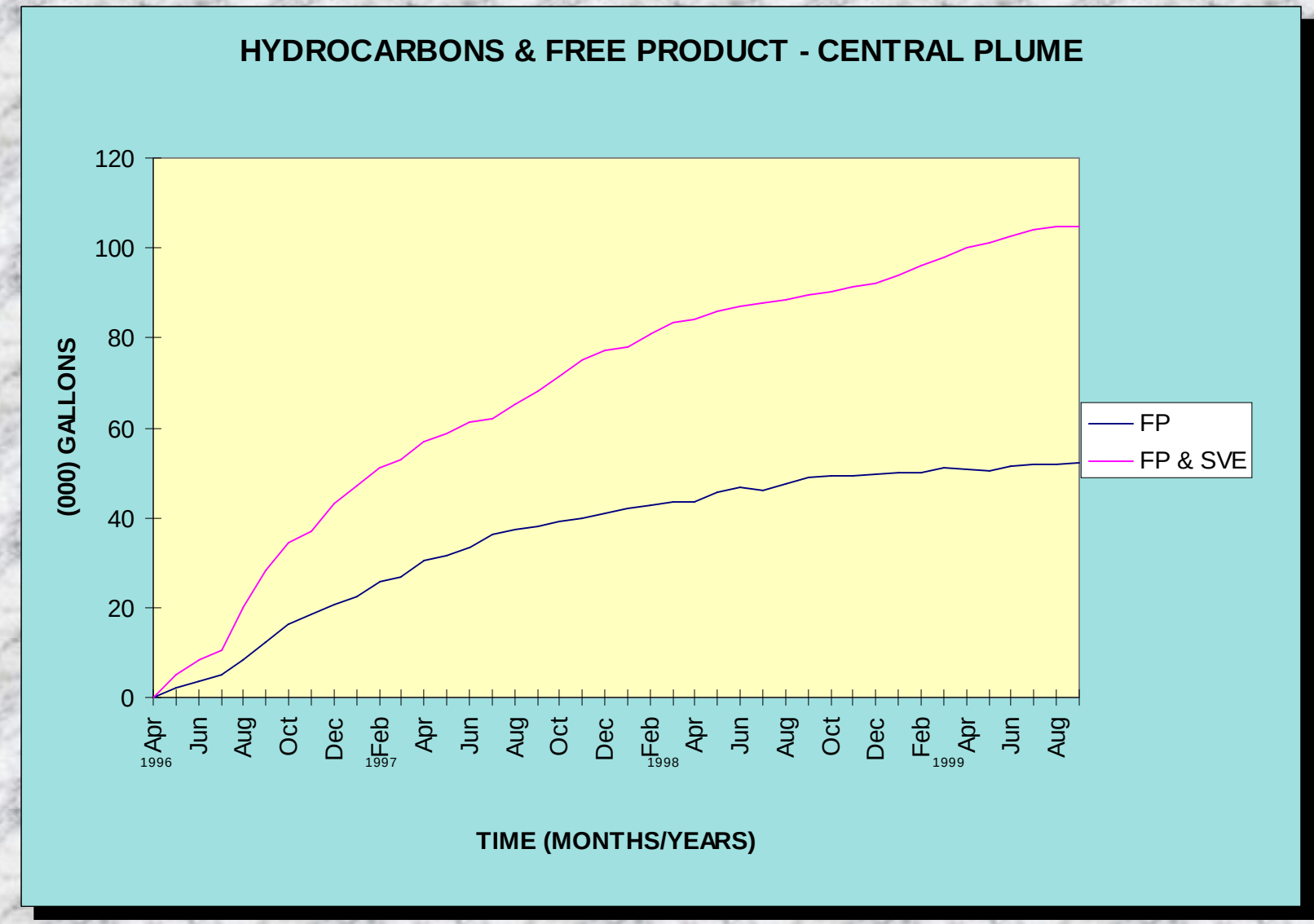
Presentation Overview

Topics to be Covered

- Central Plume Remediation
- Remediation System Enhancements
- Biosparge Operation

Central Plume Remediation

- System Performance Since April 1996
  - Approx. 104,840 Gallons Recovered and Destroyed
  - Approx. 85,000 Gallons Biodegraded
  - 19.6M Gallons of Water Treated
  - 608 Gallons of Dissolved Phase Recovered
  - Approx. 200,000 Gallons Remain in Subsurface


HYDROCARBONS & FREE PRODUCT - CENTRAL PLUME
(000) GALLONS
120
100
80
60
40
20
0
Apr
Jun
Aug
Oct
Dec
Feb
Apr
Jun
Aug
Oct
Dec
Feb
Apr
Jun
Aug
Oct
Dec
Feb
Apr
Jun
Aug
1996
1997
1998
1999
TIME (MONTHS/YEARS)
FP
FP & SVE

Remediation System Enhancements

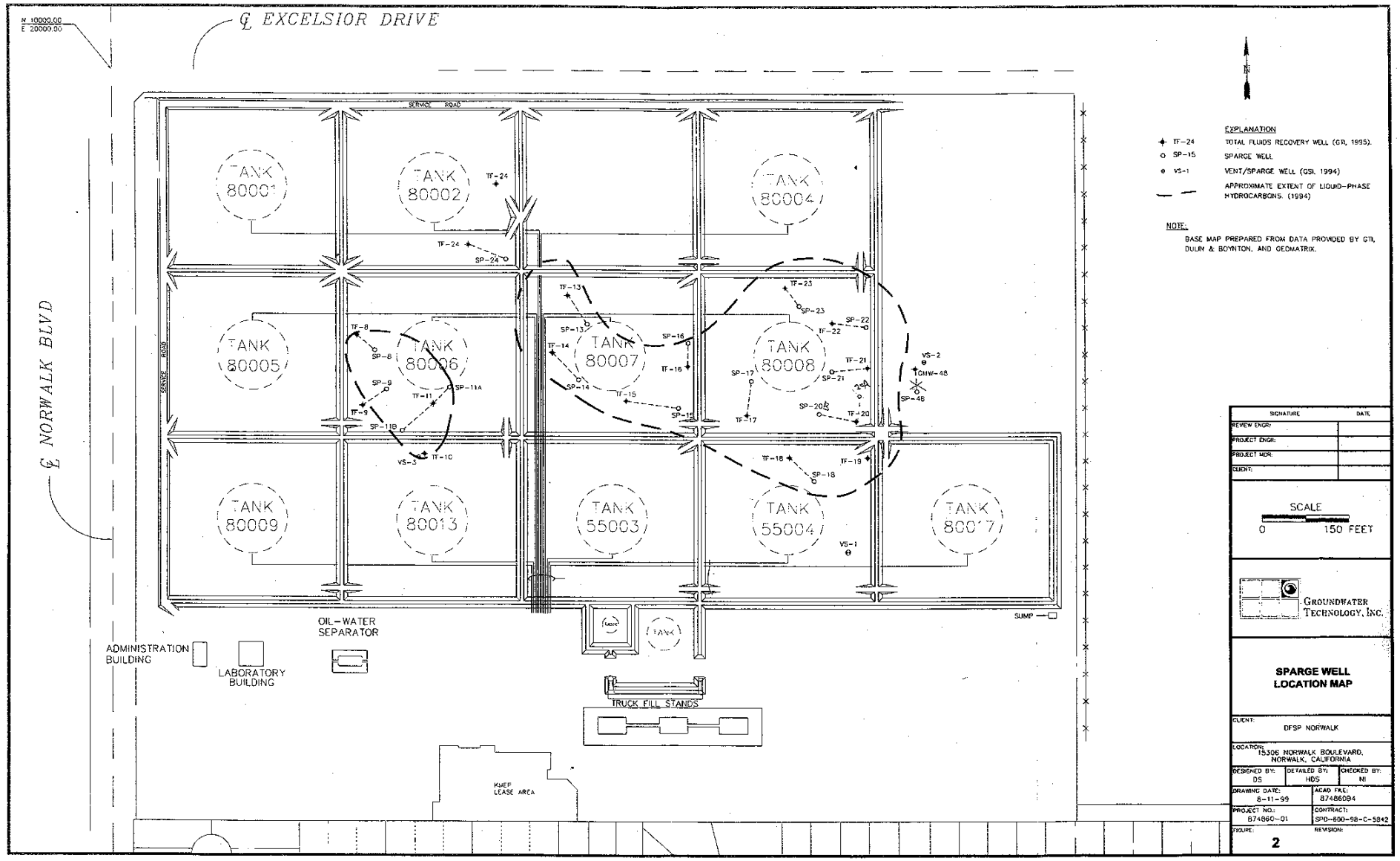
- Rehabilitate 4 horizontal vapor extraction wells
- Lower recovery pumps in recovery wells (8)
- Increase pumping rate to counter rising water table and increase rate of remediation
- Modify pumps and piping in treatment compound to accommodate higher, more continuous water throughput

Remediation System Enhancements (cont.)

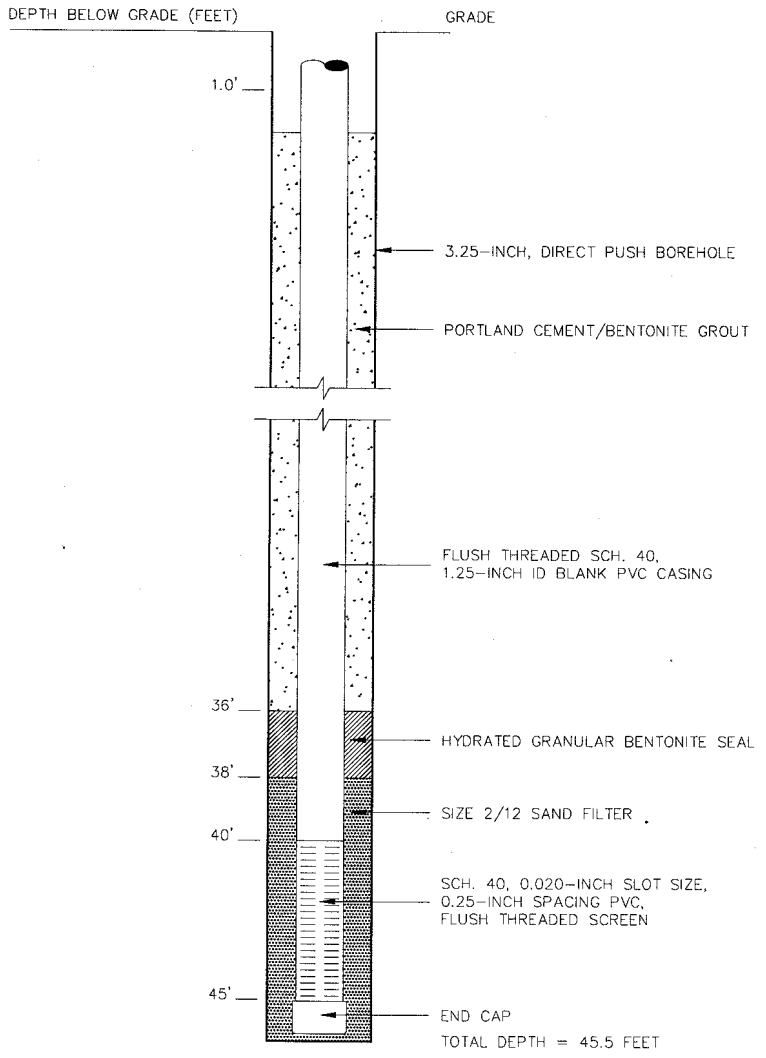
- Install biosparge system
  - Increase dissolved oxygen in groundwater
  - Increase biodegradation
  - Increase volatilization of hydrocarbons in the saturated zone
  - Mobilize hydrocarbons below the water table to enhance free product recovery

Biosparge System Operation

- 16 wells (Tank 80006, 80007 & 80008 areas)
- 45 feet deep
- Pulsating airflow (2 hours on, 2 hours off)
  - Oscillate water to increase groundwater contact with injected air
  - Mitigate air channeling (flow of air) through preferential pathways


N 10000.00
E 20000.00
℄ EXCELSIOR DRIVE
℄ NORWALK BLVD
SERVICE ROAD
SERVICE ROAD
TANK 80001
TANK 80002
TANK 80004
TANK 80005
TANK 80006
TANK 80007
TANK 80008
TANK 80009
TANK 80013
TANK 55003
TANK 55004
TANK 80017
TF-24
SP-24
TF-13
SP-13
TF-14
SP-14
SP-16
TF-16
TF-15
SP-15
TF-23
SP-23
SP-22
TF-22
TF-21
SP-21
VS-2
TMW-48
SP-48
SP-17
TF-17
SP-20
TF-20
TF-8
SP-8
SP-9
TF-9
TF-11
SP-11A
SP-11B
VS-3
TF-10
TF-18
SP-18
TF-19
VS-1
OIL-WATER SEPARATOR
SUMP
TANK
TANK
TRUCK FILL STANDS
ADMINISTRATION BUILDING
LABORATORY BUILDING
KMEP LEASE AREA
N
EXPLANATION
TF-24 TOTAL FLUIDS RECOVERY WELL (GTI, 1995).
SP-15 SPARGE WELL
VS-1 VENT/SPARGE WELL (GSI, 1994)
APPROXIMATE EXTENT OF LIQUID-PHASE HYDROCARBONS. (1994)
NOTE:
BASE MAP PREPARED FROM DATA PROVIDED BY GTI, DUNN & BOYNTON, AND GEOMATRIX.
SIGNATURE
DATE
REVIEW ENGR:
PROJECT ENGR:
PROJECT MGR:
CLIENT:
SCALE
0
150 FEET
GROUNDWATER TECHNOLOGY, INC.
SPARGE WELL LOCATION MAP
CLIENT:
DFSP NORWALK
LOCATION:
15306 NORWALK BOULEVARD, NORWALK, CALIFORNIA
DESIGNED BY:
DS
DETAILED BY:
HDS
CHECKED BY:
NI
DRAWING DATE:
8-11-99
ACAD FILE:
87486084
PROJECT NO.:
874860-01
CONTRACT:
SPD-600-98-C-5842
FIGURE:
2
REVISION:

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
H. DA SILVA 8-17-99	--	--	874860-A1



"DRAWING NOT TO SCALE"

GROUNDWATER TECHNOLOGY, INC.

DFSP NORWALK
15306 NORWALK BLVD.
NORWALK, CALIFORNIA

FIGURE 3
BIOSPARGE WELL DESIGN

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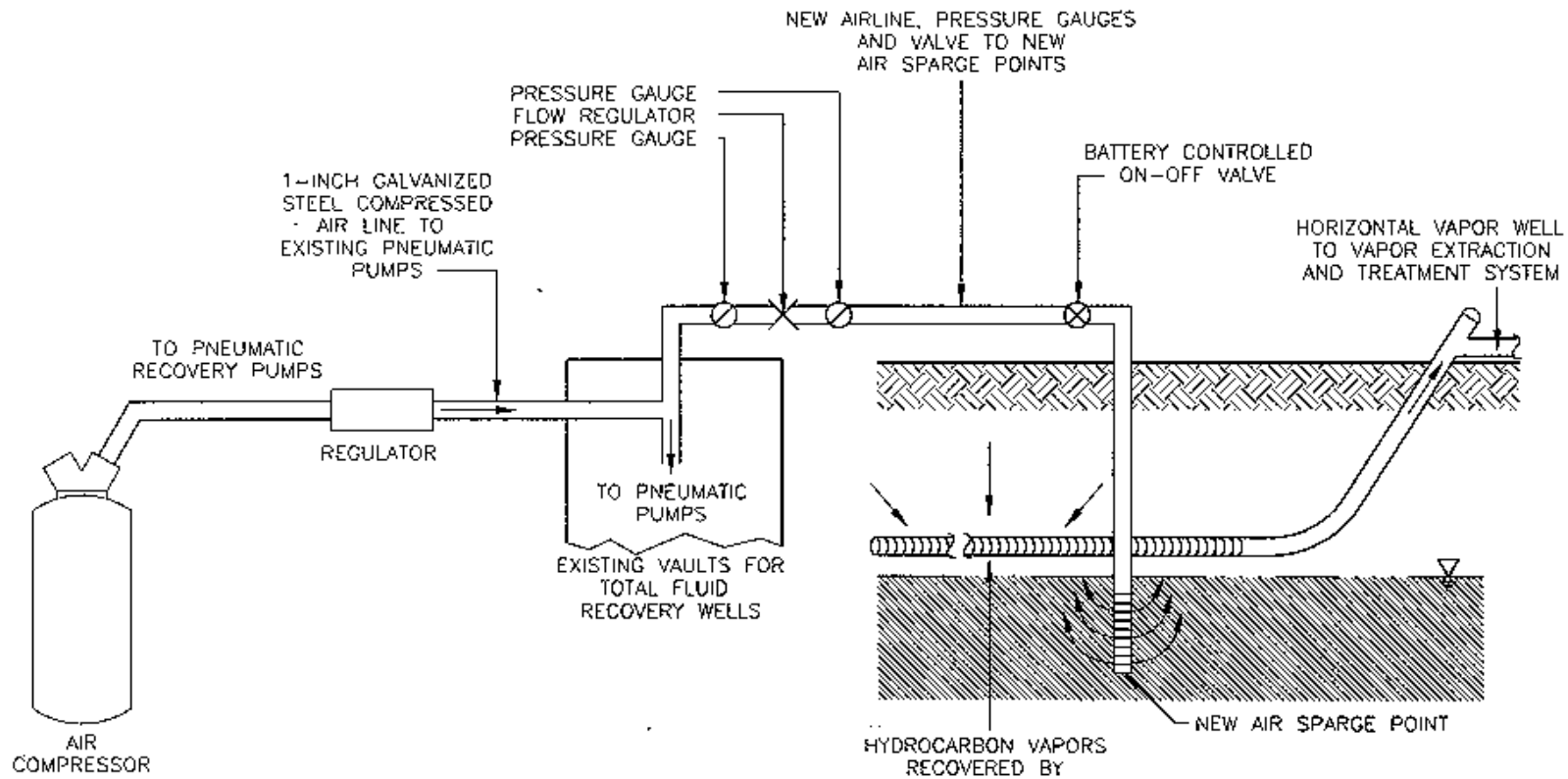
H. DA SILVA	8-12-99						



"DRAWING NOT TO SCALE"

GROUNDWATER TECHNOLOGY, INC.

FIGURE 4

SCHEMATIC DESIGN OF BIOSPARGE SYSTEM

DFSP NORWALK
NORWALK, CALIFORNIA