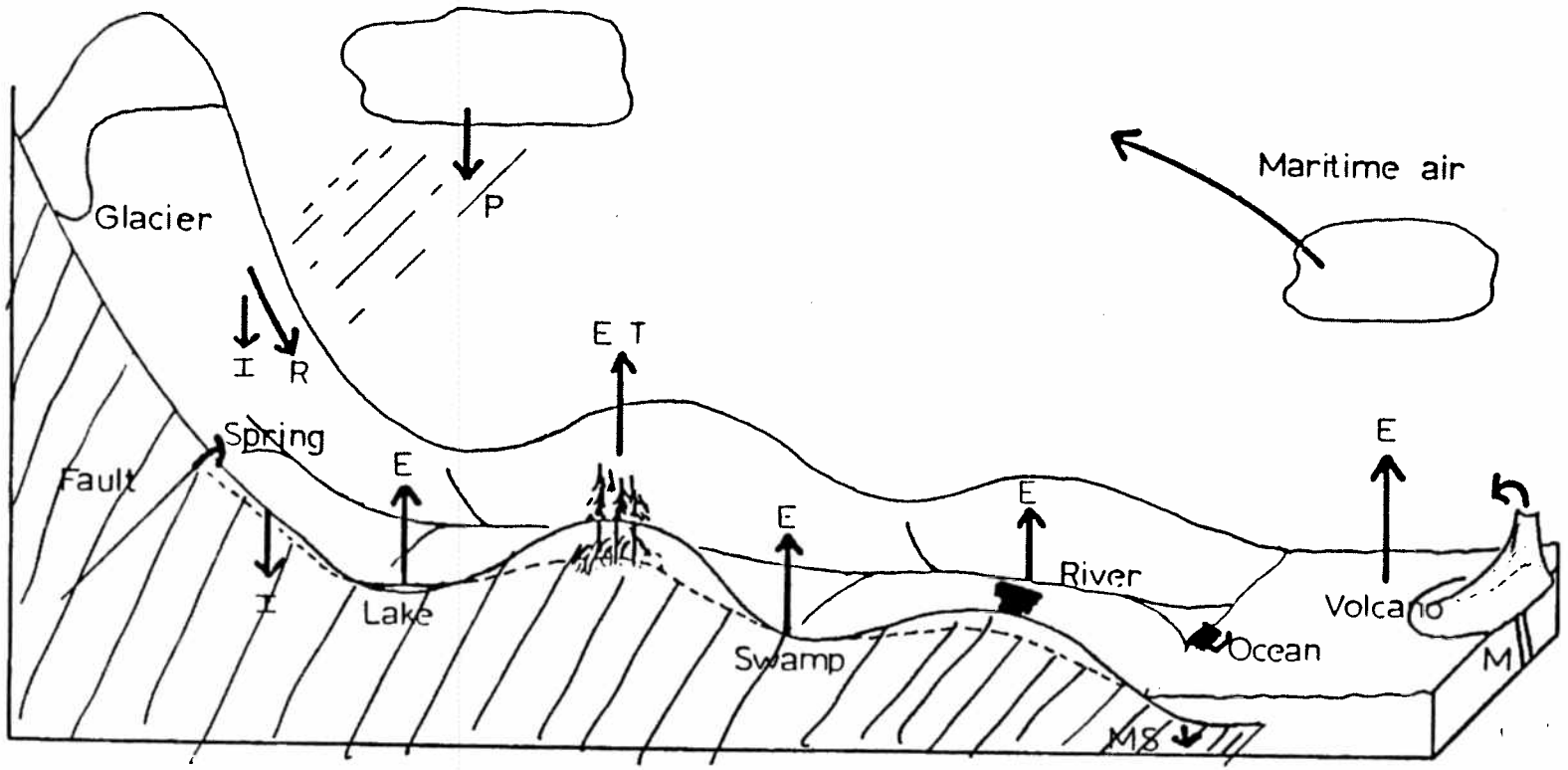
Ground Water and the Local Geologic Setting

- What is Ground Water
- Terms and Definitions
- Contamination Sources
- Monitoring Well Construction and Design
- Remediation Alternatives
- Norwalk DFSP Hydrogeology Overview
- LARWQCB Overview/ Plans and Regulations

THE HYDROLOGIC CYCLE



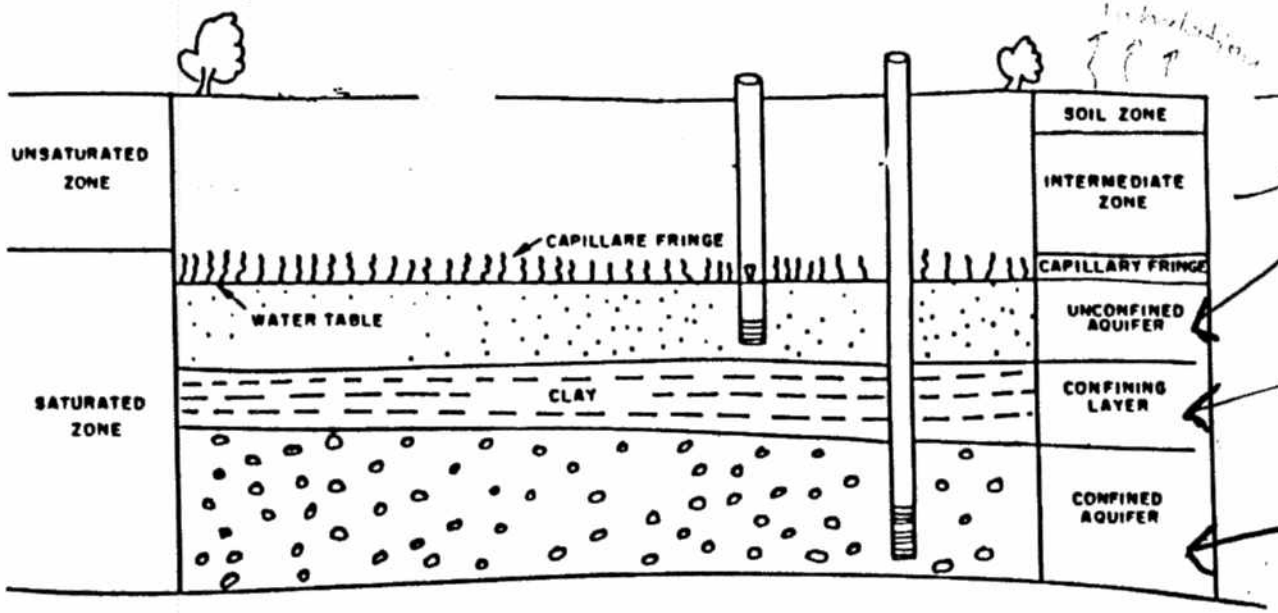
P Precipitation R Runoff E Evaporation
I Infiltration T Transpiration MS Marine sedimentation
M Magmatic water

SOME TERMS AND DEFINITIONS

- Formation
- Aquifer
  - unconfined
  - confined
  - artesian
- Aquitard
- Aquiclude
- Vadose Zone
- Capillary Fringe
- Saturated Zone
- LNAPLS
- DNAPLS
- Non NAPLS
- Radius of Influence

Roughly Equivalent to:

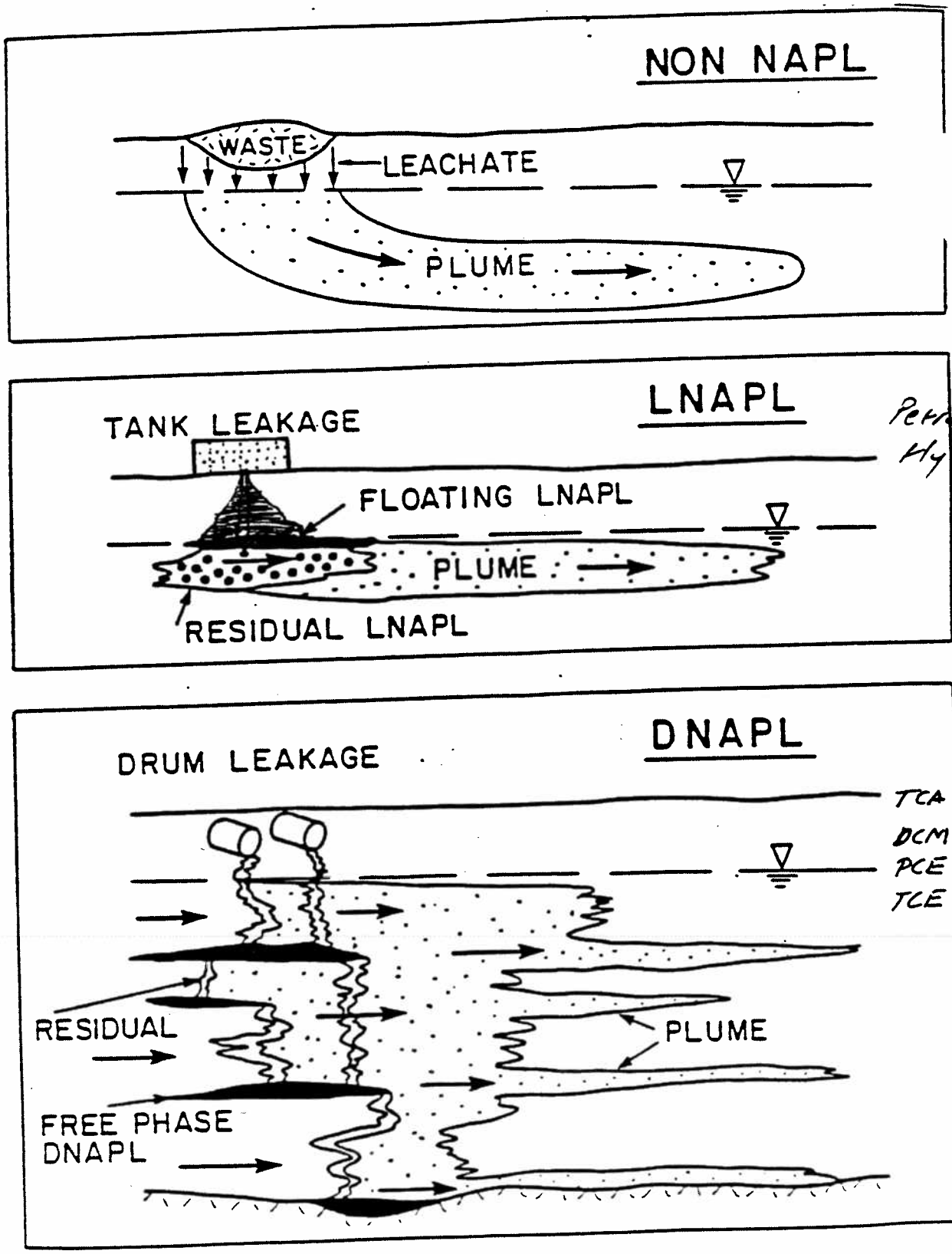
Vadose Zone



Shallow Aquifer

Bellflower Aquitard

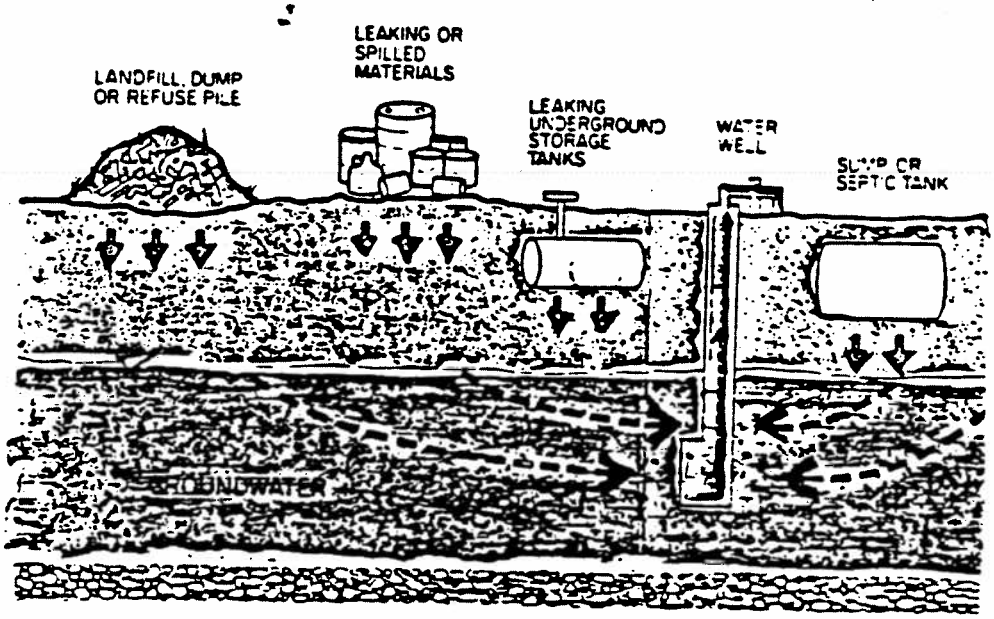
Exposition Aquifer



Three different conceptual models for groundwater contamination: (a) non-NAPL case; (b) LNAPL case; and (c) DNAPL case.

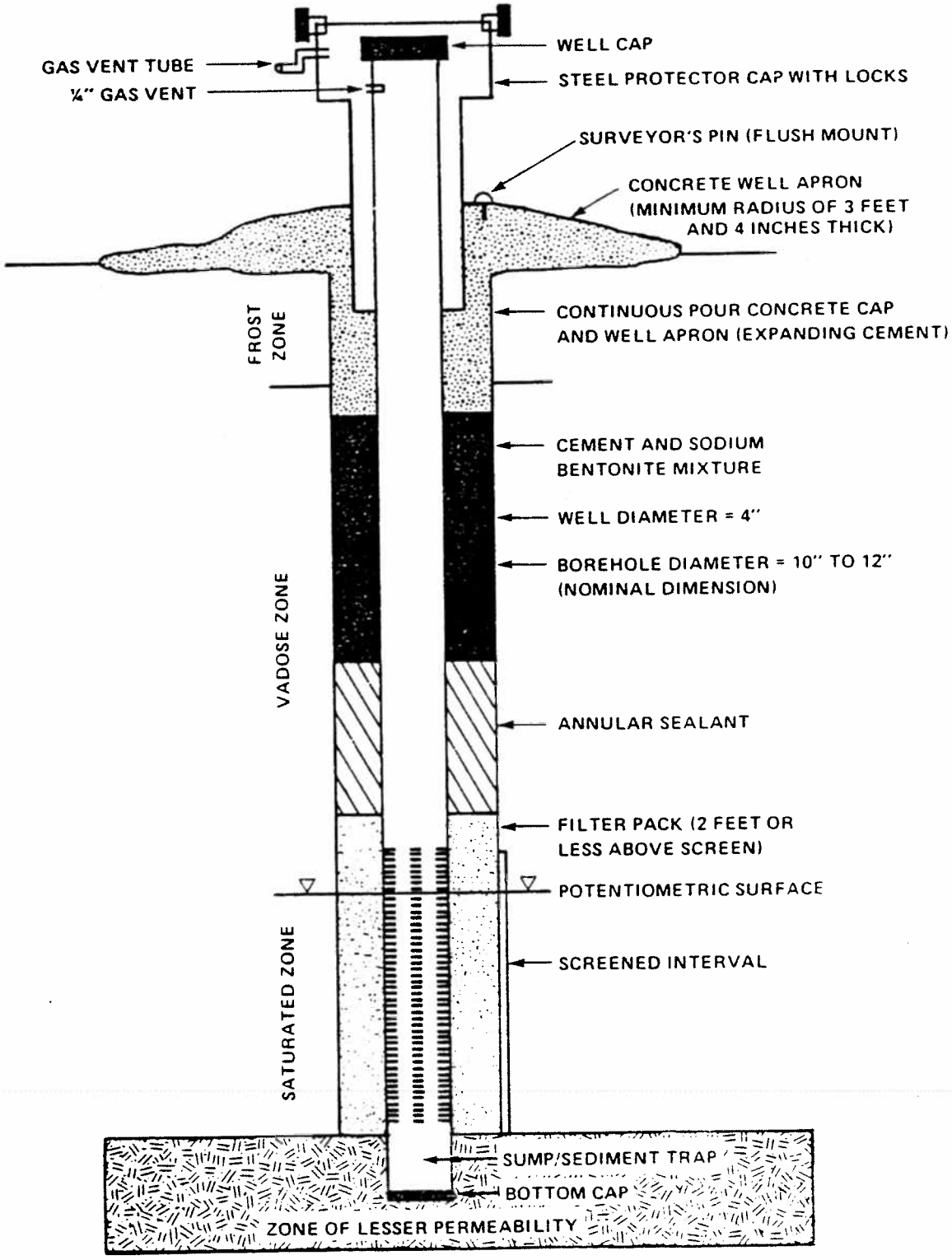
MAJOR CONTAMINANT SOURCES

* leaking underground storage tanks
* drum storage areas for chemical products and wastes
* industrial waste clarifiers
* degreasers utilizing chlorinated solvents
* septic tanks and cesspools
* leaking landfills
* sumps, pits and other waste disposal structures
* floor drains and leaking sewer lines
* poor housekeeping practices
* waste water and storm water runoff areas
* historical sources



HOW WASTE DISPOSAL PRACTICES CAN CONTAMINATE THE GROUNDWATER SYSTEM

4a



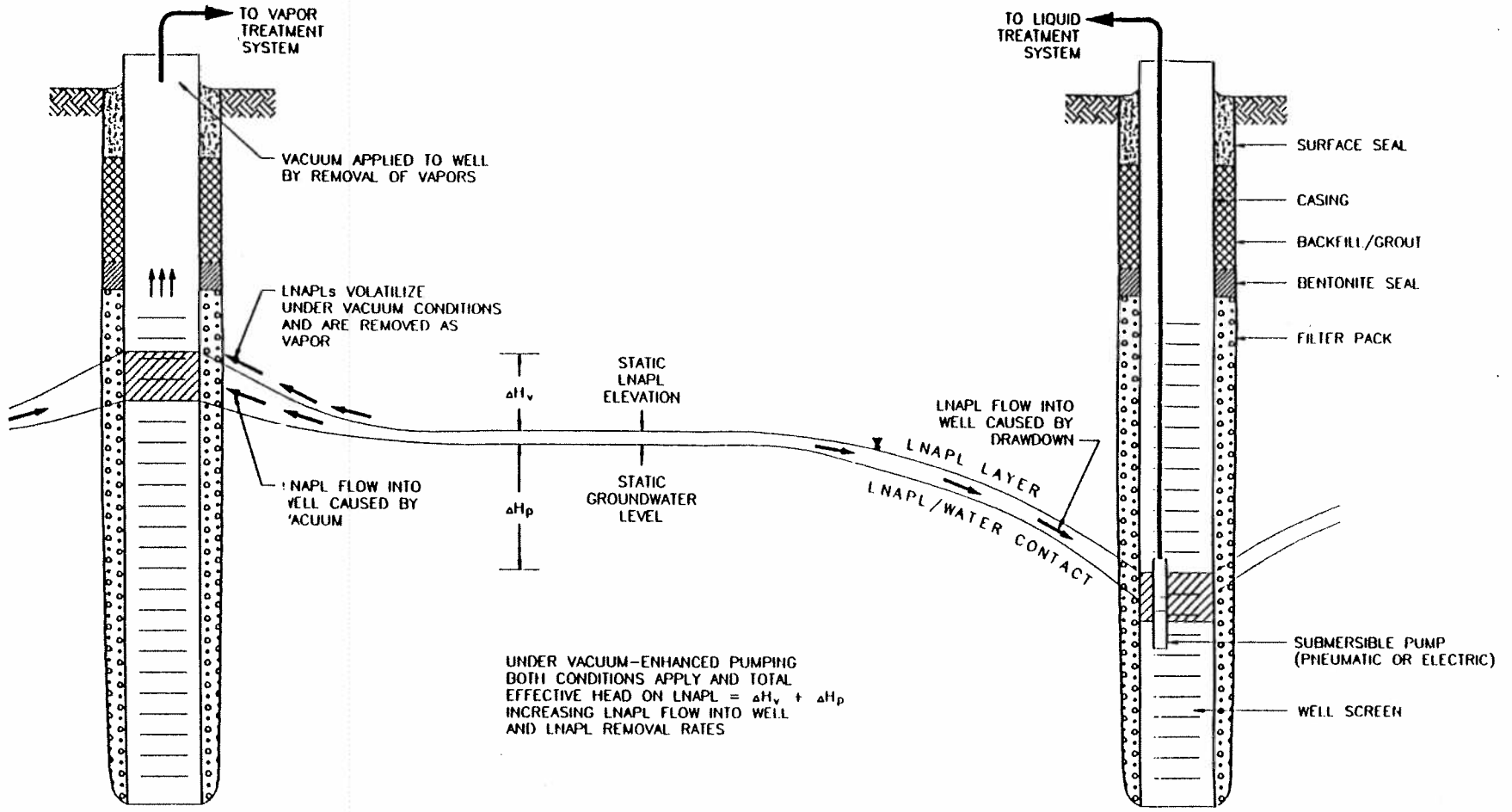
GENERAL MONITORING WELL – CROSS SECTION

Samples → GW vials + Hydropunch

REMEDIATION PROCEDURES

When Groundwater Contamination Has Been Detected, The Following Procedure Is Observed

- isolate/remove the source
- remove free-product, if any
- initiate soil/groundwater remediation



WELL CONTAINING LNAPL UNDER VACUUM CONDITIONS

WELL CONTAINING LNAPL UNDER PUMPING CONDITIONS

KEY

LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
ΔH_v	HEAD DIFFERENTIAL CAUSED BY APPLIED VACUUM
ΔH_p	HEAD DIFFERENTIAL CAUSED BY PUMPING AND ASSOCIATED DRAWDOWN OF LIQUID LEVEL IN EXTRACTION WELL

07/21/94

SCHEMATIC OF VACUUM-ENHANCED LNAPL REMOVAL

SANTA FE PACIFIC PIPELINE PARTNERS, L.P.
DESP NORWALK FACILITY

GEOMATRIX

Project No.	Figure
S1603.12	4

DFSP NORWALK HYDROGEOLOGY

- Located in the central portion of the Los Angeles Basin on the Downey Plain
- Underlain by:
  - recent alluvium (sand/silt/clay lenses to 50 ft. bgs)
  - Lakewood Formation (gravelly sands and silty sands - 200 ft. thick)
  - San Pedro Formation (clean granular sand and silty sand - 80 ft. thick)
- Groundwater is recharged through:
  - inflow from surrounding hills
  - percolation from streams and spreading operations
  - re-injection into deeper aquifers
- Water bearing units below the site include:
  - shallow, semi perched, aquifer
  - Exposition aquifer
  - Gage aquifer
  - Hollydale aquifer
  - Jefferson aquifer
  - Lynwood aquifer
  - Silverado aquifer
- Well inventory within a 2,000 ft. radius includes:
  - four drinking water wells (three standby, one active)

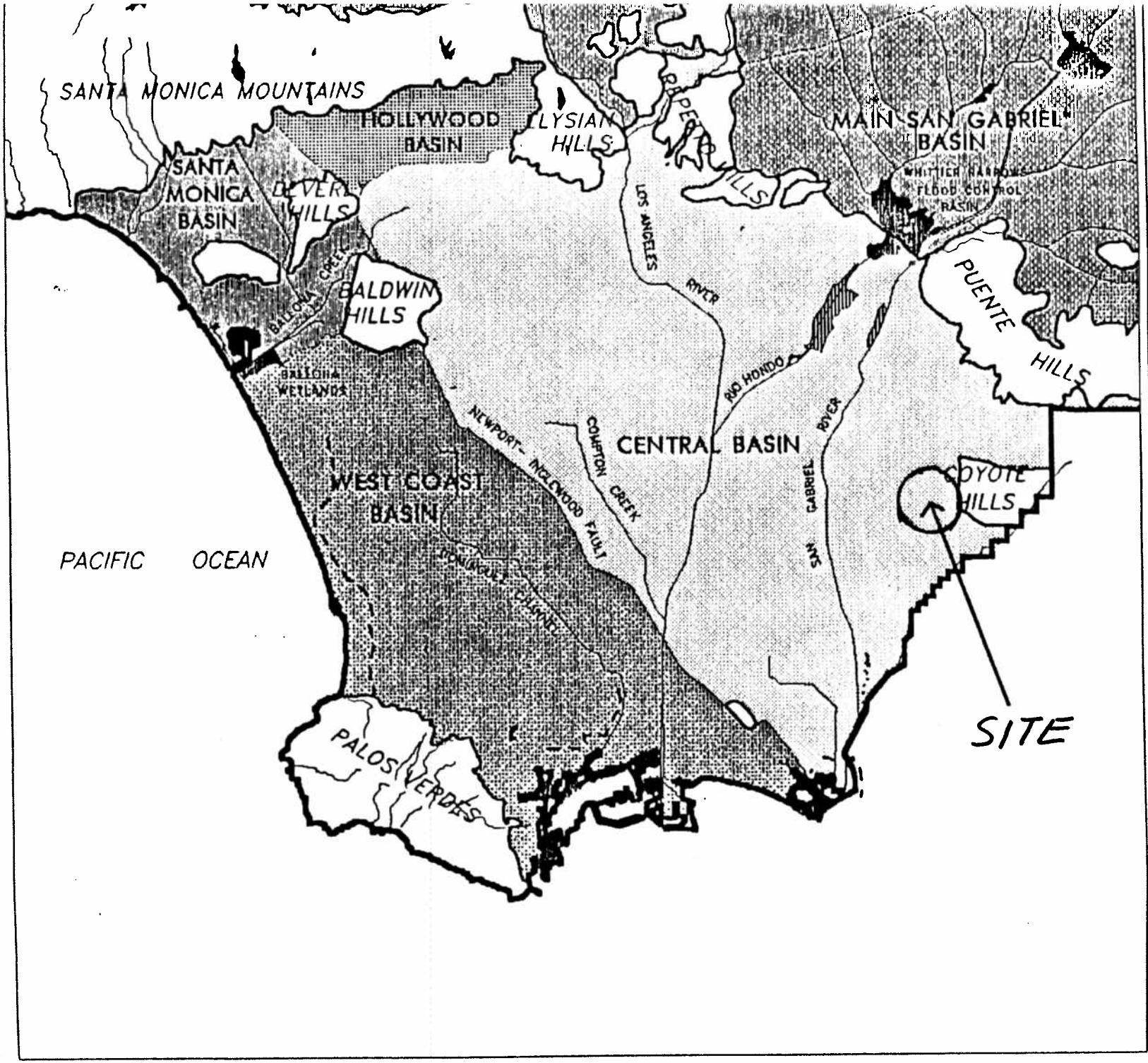


FIGURE 2-15

LOS ANGELES COASTAL GROUNDWATER BASINS

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD LOS ANGELES REGION (4)

REGIONAL BOUNDARY

STREAMS

SPREADING GROUNDS

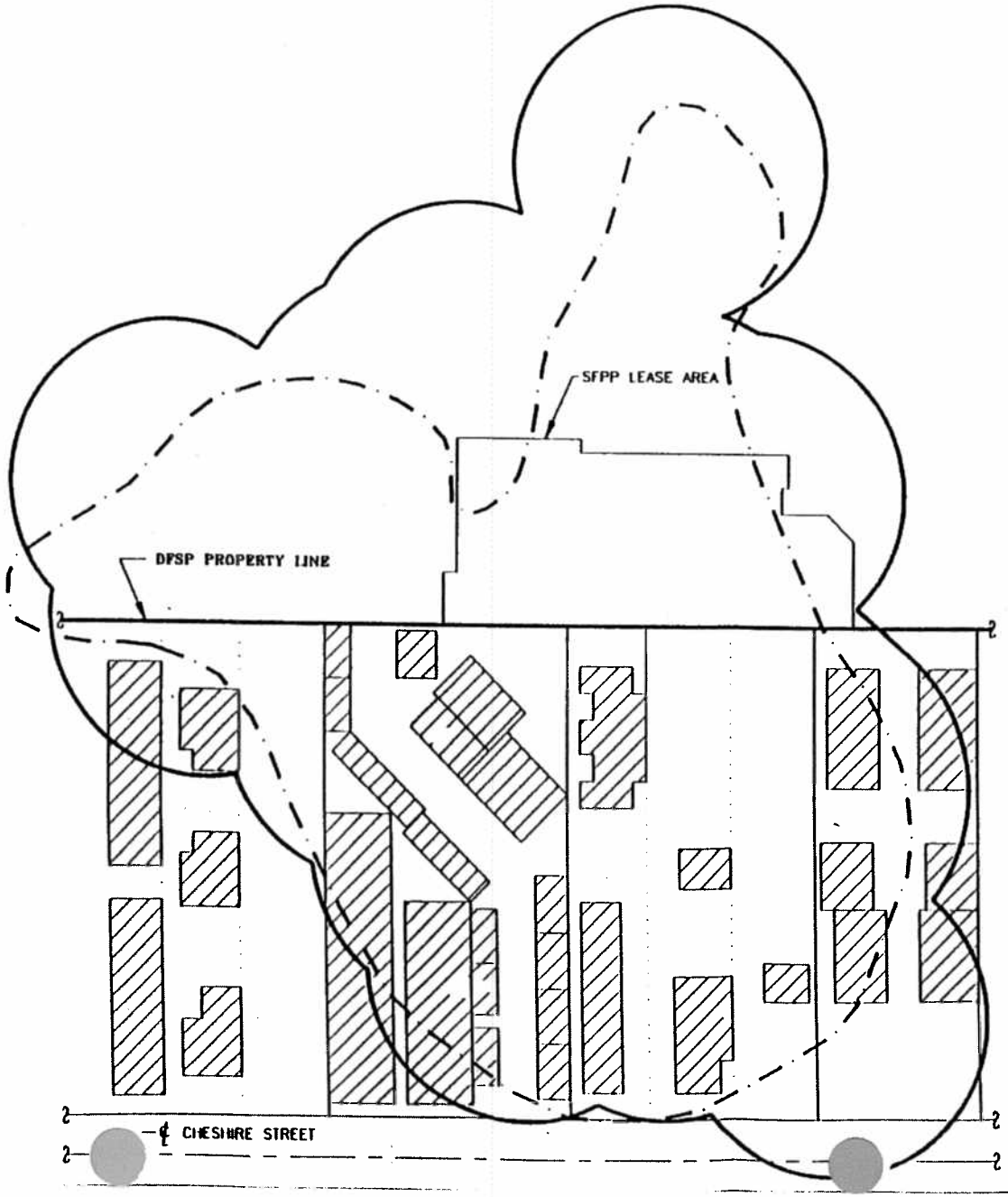
BARRIER INJECTION WELLS

*THE MAIN SAN GABRIEL BASIN IS A PART OF THE SAN GABRIEL VALLEY GROUNDWATER BASINS.

N

Miles

0 2 4



KEY

- LIMITS OF LIQUID PHASE HYDOCARBONS ESTIMATED BY GTI
- COMBINED AREA OF INFLUENCE OF LNAPL RECOVERY SYSTEM
- OFF-SITE STRUCTURE

0 60'

APPROXIMATE SCALE (FEET)

08/12/94

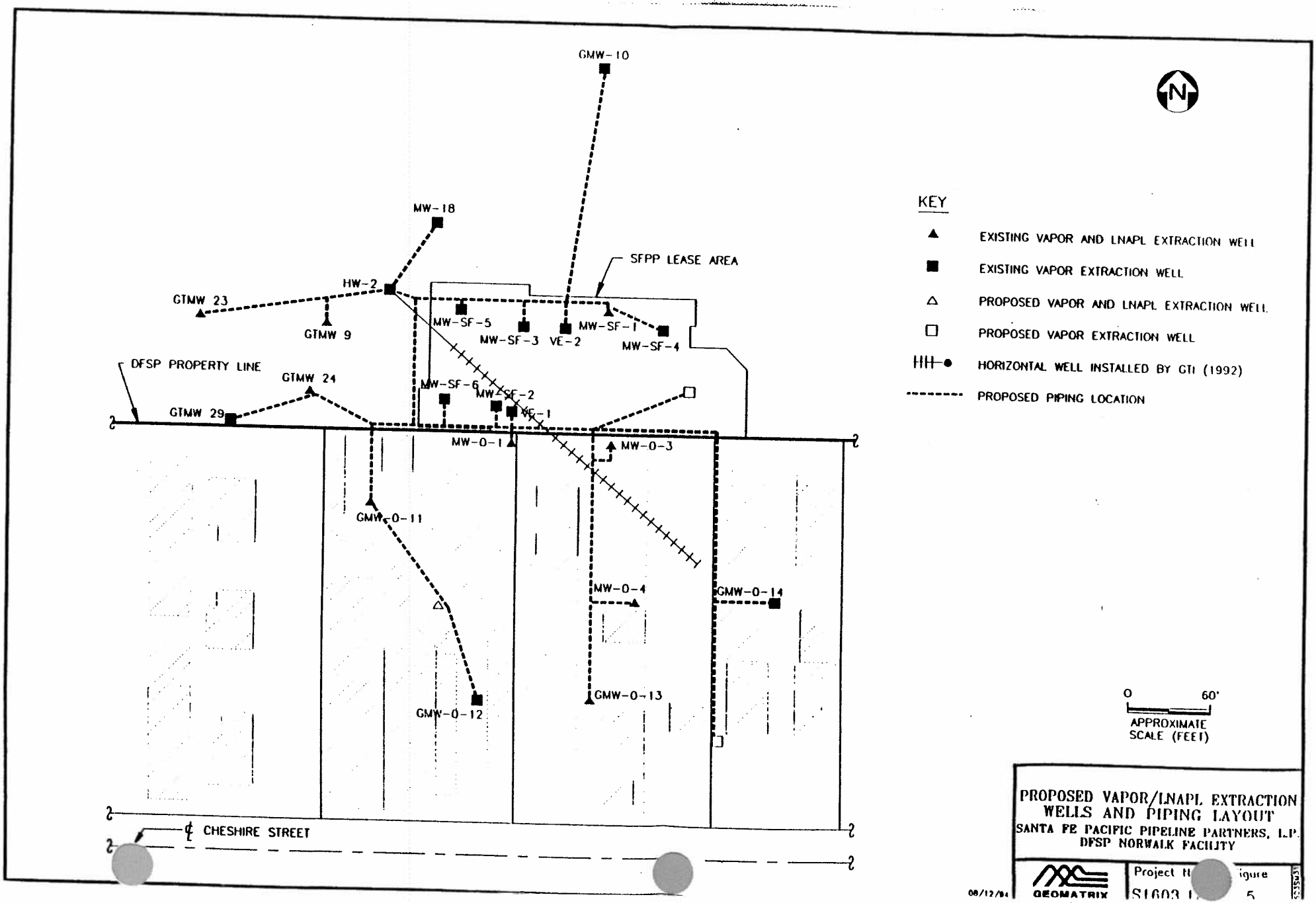
LNAPL PLUME AND ESTIMATED AREA OF INFLUENCE OF LNAPL RECOVERY SYSTEM

SANTA FE PACIFIC PIPELINE PARTNERS, L.P.
DFSP NORWALK FACILITY

GEOMATRIX

Project No. S1603.12

Figure 3



PROPOSED VAPOR/LNAPL EXTRACTION WELLS AND PIPING LAYOUT

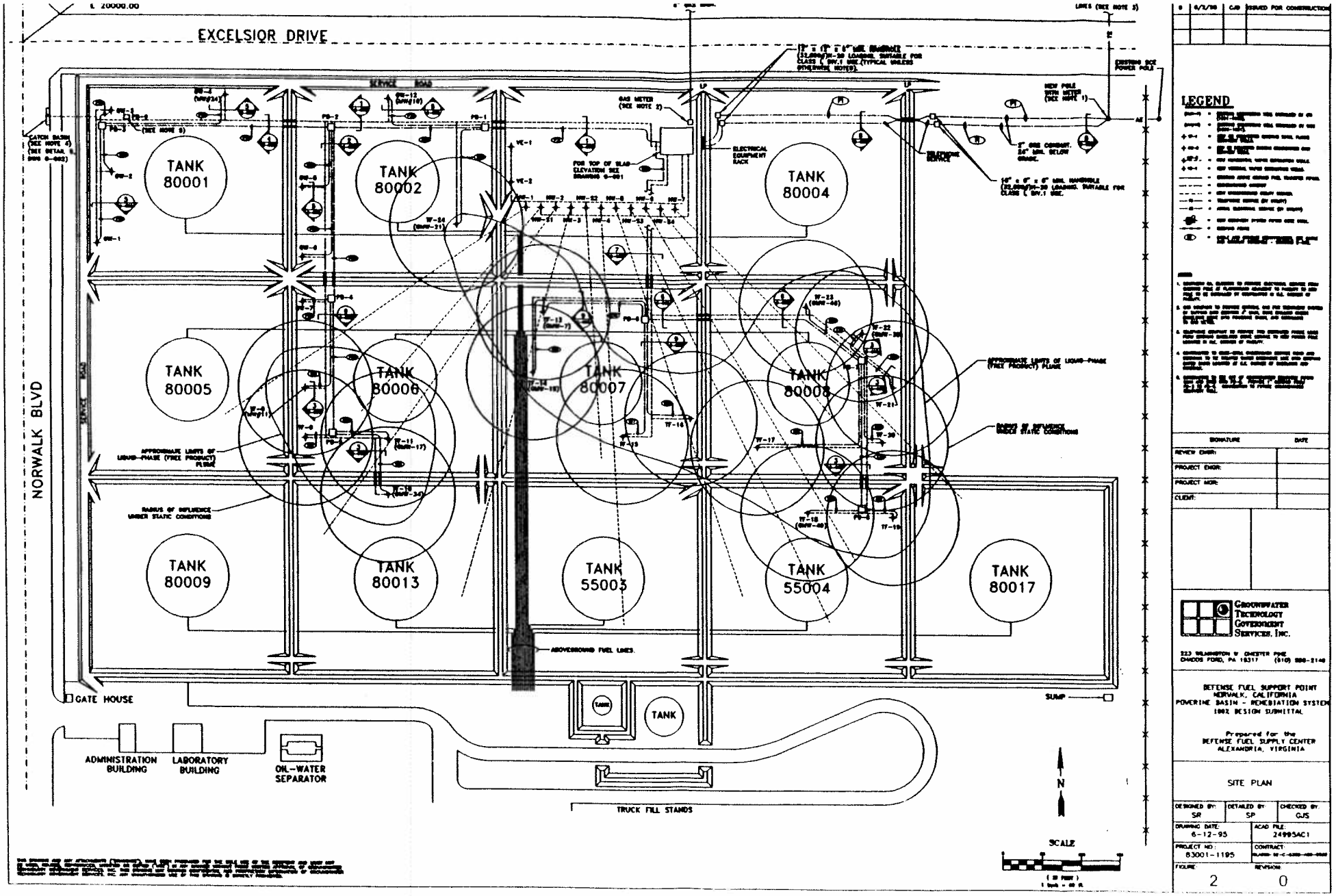
SANTA FE PACIFIC PIPELINE PARTNERS, L.P.
DFSP NORWALK FACILITY

GEOMATRIX

Project N... S1603 1...

...igure 5

08/12/94



0	6/1/95	CJB	ISSUED FOR CONSTRUCTION

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY GOVERNMENT SERVICES, INC.

323 WILMINGTON W. CHESTER PIKE
CHADDS FORD, PA 19317 (610) 558-2140

DEFENSE FUEL SUPPORT POINT
NORWALK, CALIFORNIA
POWERINE BASIN - REMEDIATION SYSTEM
100% DESIGN SUBMITTAL

Prepared for the
DEFENSE FUEL SUPPLY CENTER
ALEXANDRIA, VIRGINIA

SITE PLAN

DESIGNED BY:	DETAILED BY:	CHECKED BY:
SR	SP	GJS

DRAWING DATE: 6-12-95	ACAD FILE: 24995AC1
PROJECT NO: 63001-1195	CONTRACT:
FIGURE: 2	REVISION: 0