US Army Corps of Engineers

Johnson Controls, Fullerton CA

Conceptual Site Model Presentation

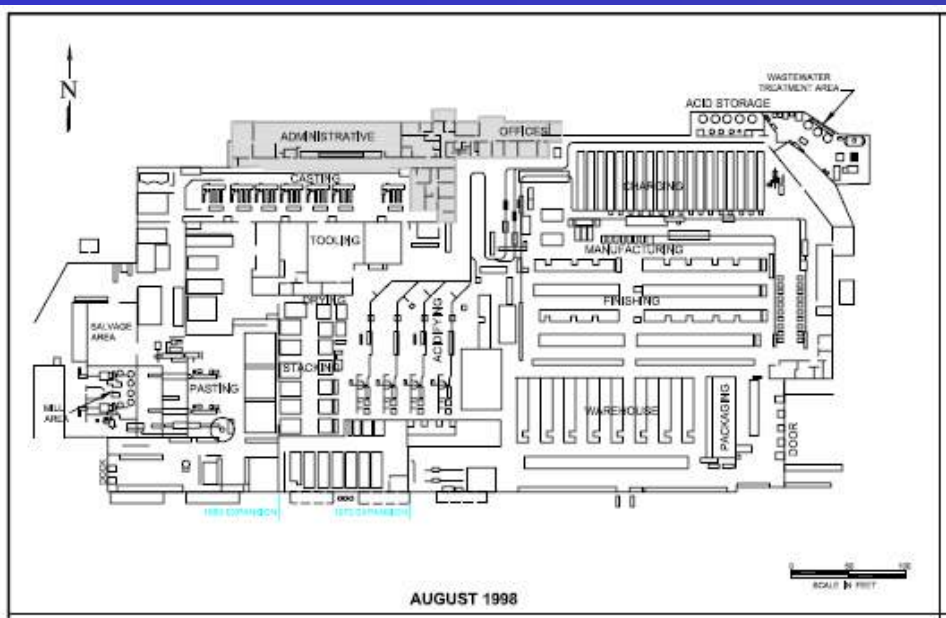
US Army Corps of Engineers

Facility History

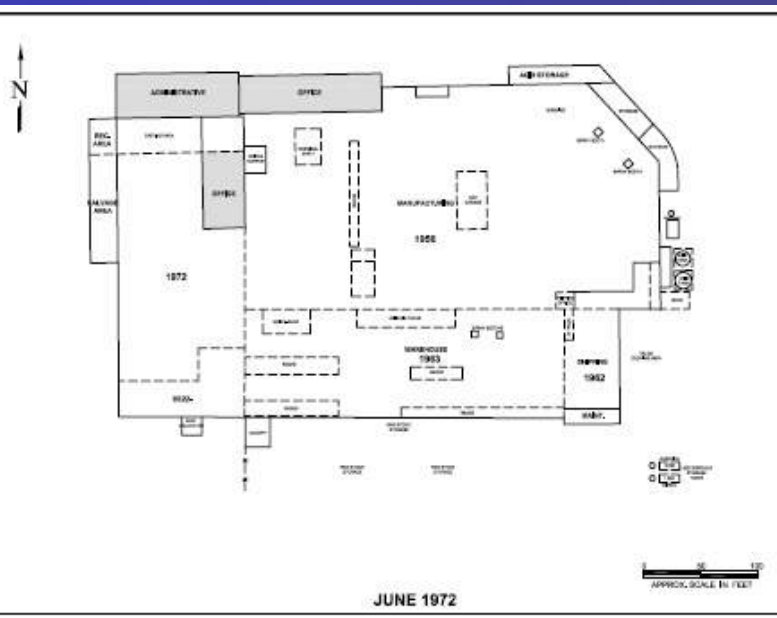
- Standard Products owned during initial development in 1956.
- Globe Union purchased in mid-1960s and expanded facility. Glob Union merged with Johnson Controls in 1978.
- Second expansion of facility in 1980.
- Site purchased by Lowe Enterprises and scheduled for redevelopment after hand over of clean site (completely demolished and remediated) from Johnson Controls

US Army Corps of Engineers

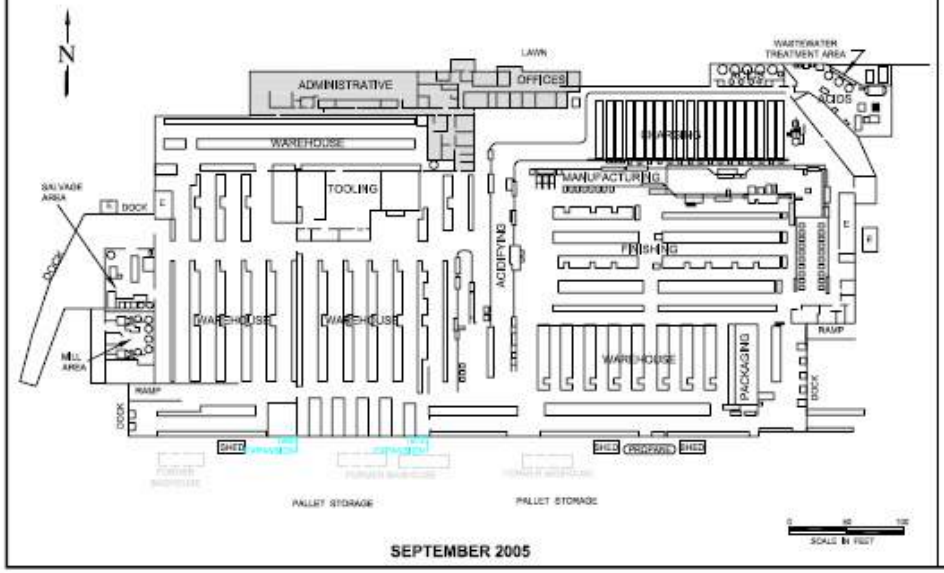
Site Development Over Time



AUGUST 1998



JUNE 1972



SEPTEMBER 2005

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Environmental Setting

- **Topography – flat, gentle regional slope to W and SW**
- **Climate**
- **Geology**
  - **Coastal Plain Basin filled with alluvium deposited by streams and sheet flow from erosion of surrounding hills/mountains.**
  - **Underlying soil in upper 20 feet is silt, clayey silt and sandy silt with layers of sand and clay**
- **Hydrology**
  - **Surface water drainage to north towards sewer line**
  - **Carbon creek nearest surface drainage (0.5 miles S of site)**
- **Hydrogeology**
  - **Principal aquifer 115- 125 feet bgs**
  - **GW flow is WNW**
  - **Orange County Water District observation well FM-5 – installed 1992 screened 121-141 feet bgs**
  - **Public Water Supply Well F-KIM1A – installed 2002 multiple screens from 500-1225 feet bgs**
- **Land Use –commercial light industrial**

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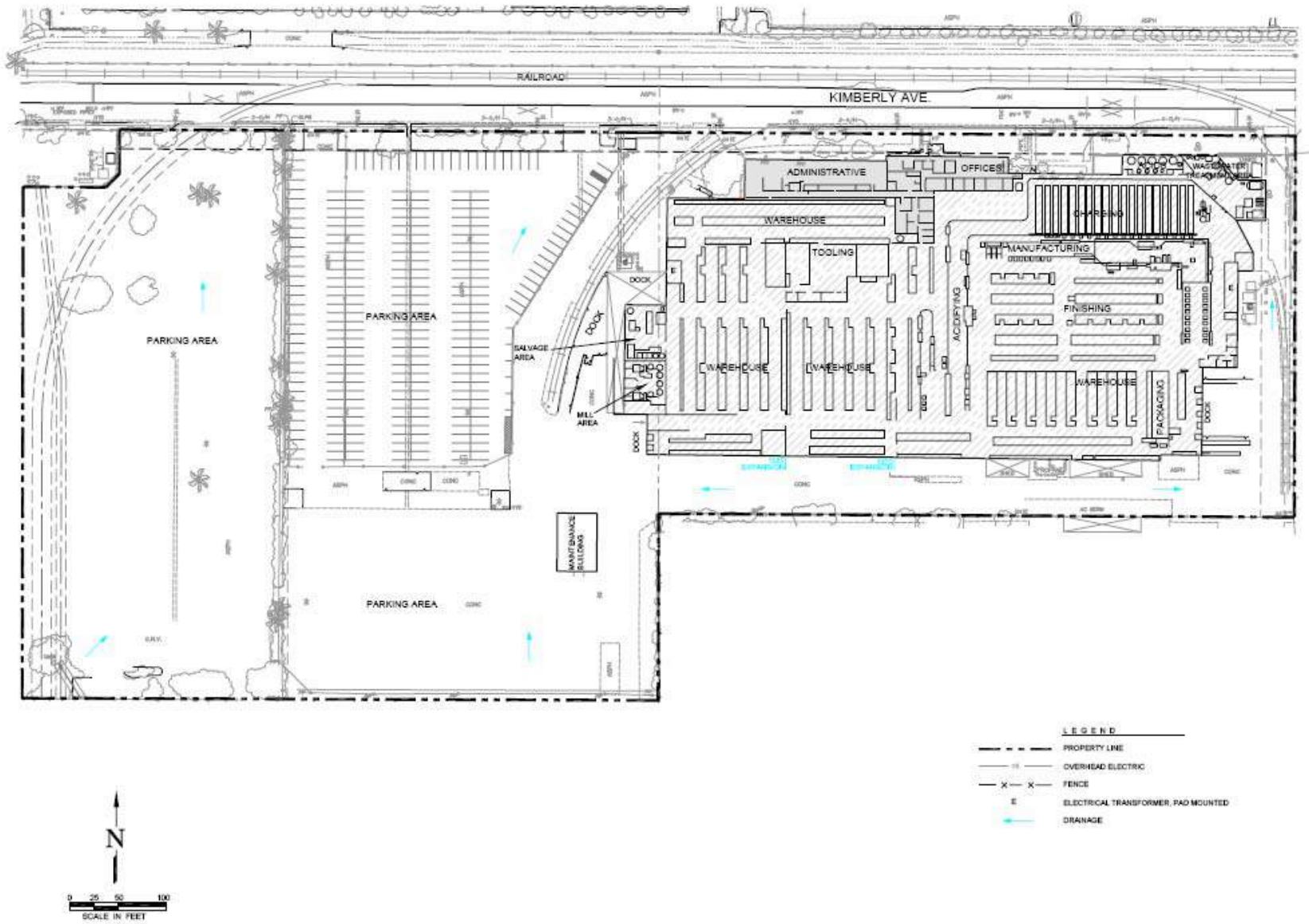

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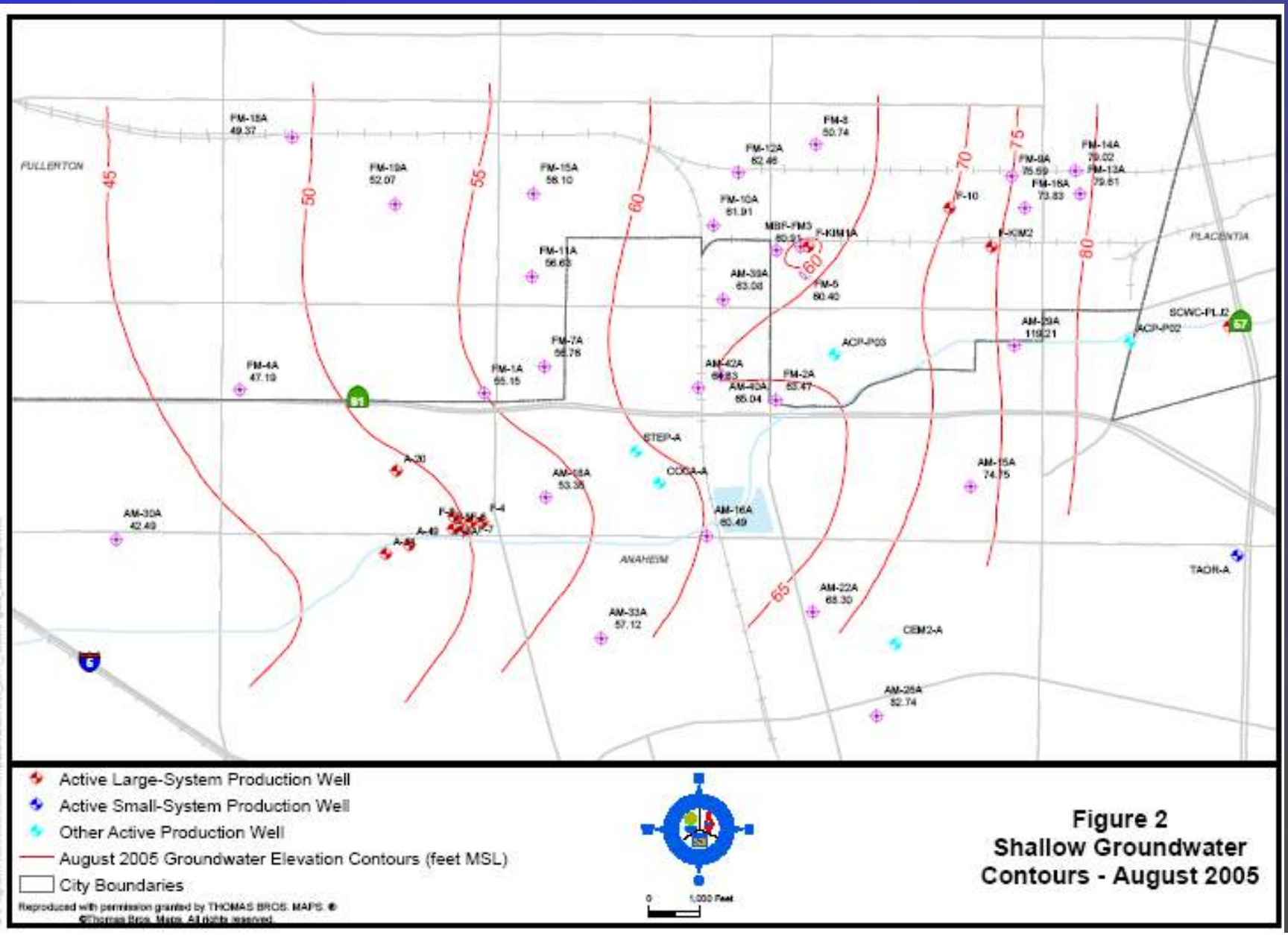

Figure 2
Shallow Groundwater Contours - August 2005

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Stakeholders

- DTSC – lead agency due to Tier 1 wastewater permit
- Johnson Controls (Entact)
- Lowe Enterprises
- Orange County Water District

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Environmental Issues

- Releases to surface soils from plant activities (mostly lead)
- Leaking fuels tanks releasing to soils and GW?
- Solvent releases from site activities and offsite activities

US Army Corps of Engineers

Receptor Conceptual Site Model

US Army Corps of Engineers

Site Investigations - Metals

- 2005
  - 64 borings sampled generally from 0.5 -1 and 2-2.5 feet bgs
  - submitted for Pb (6010)
  - samples collected deeper in production areas
- 2006
  - 31 additional borings sample from 2-2.5 feet bgs,
  - Submitted for Pb and pH (6010)
  - 8 locations submitted for CAM 17 metals based on the lead and pH results

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Lead Screening Criteria

Source	Concentration in mg/kg	Exposure Pathway
CAL EPA	150	Direct Contact residential
CAL EPA	800	Direct contact industrial
EPA Region 9 PRGs	750	Direct contact industrial

US Army Corps of Engineers

Distribution of Metals

- Isolated Pb hot spots appear to be correlated to activities at former casting (B12), former pasting (B6), acidifying area (D17)
- No evidence of obvious metals impact observed in soils
- No samples taken from area under acid tanks, former wastewater treatment area, and charging area – areas will be sampled after demolition

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Exceedences of Industrial Standard

Location	Depth bgs in feet	Conc. in ppm
B6 (former pasting, mill area)	3.5-4	1400
D17 (former acidifying, outside pre 1972)	0.5-1	360*
	2-2.5	910
B12 (former casting, outside pre 1972)	2-2.5	8400

Exceedences all bound with depth

* Above residential criteria only

US Army Corps of Engineers

Exceedences of Residential Standard

Location	Depth bgs in feet	Conc. in ppm
A3	0.5 – 1.0	170
	2-2.5	520
H39	2-2.5	210
G32	2-2.5	150
F29	0.5-1.0	150

US Army Corps of Engineers

pH results

- pH collected from 20 samples in 2006
  - ranged from 2.4 -10.7
  - lowest pH at SB79 , lead concentration = 3.4 ppm
  - Aside from SB 79 pH ranged from 7.5 – 10.7
  - Does not appear to correlate with metal hot spots in soil

US Army Corps of Engineers

Other metals

- SB79, SB84, SB85, SB92, SB94, SB95, SB98, SB106, B12, D17, and B6 submitted for CAM17 metals
- Results compared to background and Region 9 PRG Direct Contact values
- As only metal above background of 3.5 mg/kg

Boring	Depth in feet	Conc in ppm
B6	3.5-4	5.9
SB85	2-2.5	10.1
	4.5-5	4.1
SB92	2-2.5	21.2
SB106	2-2.5	4.0

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Proposed Interim Removals for Metals

Location	Depth of Excavation in feet	Metal of concern
B6	4.5	Pb, As
B12	3	Pb
D17	3	Pb
SB85	5	As
SB92	3	As

- Proposal missing As exceedence at SB106, not addressing residential exceedences for Pb
- Approx 320 CY likely to be removed

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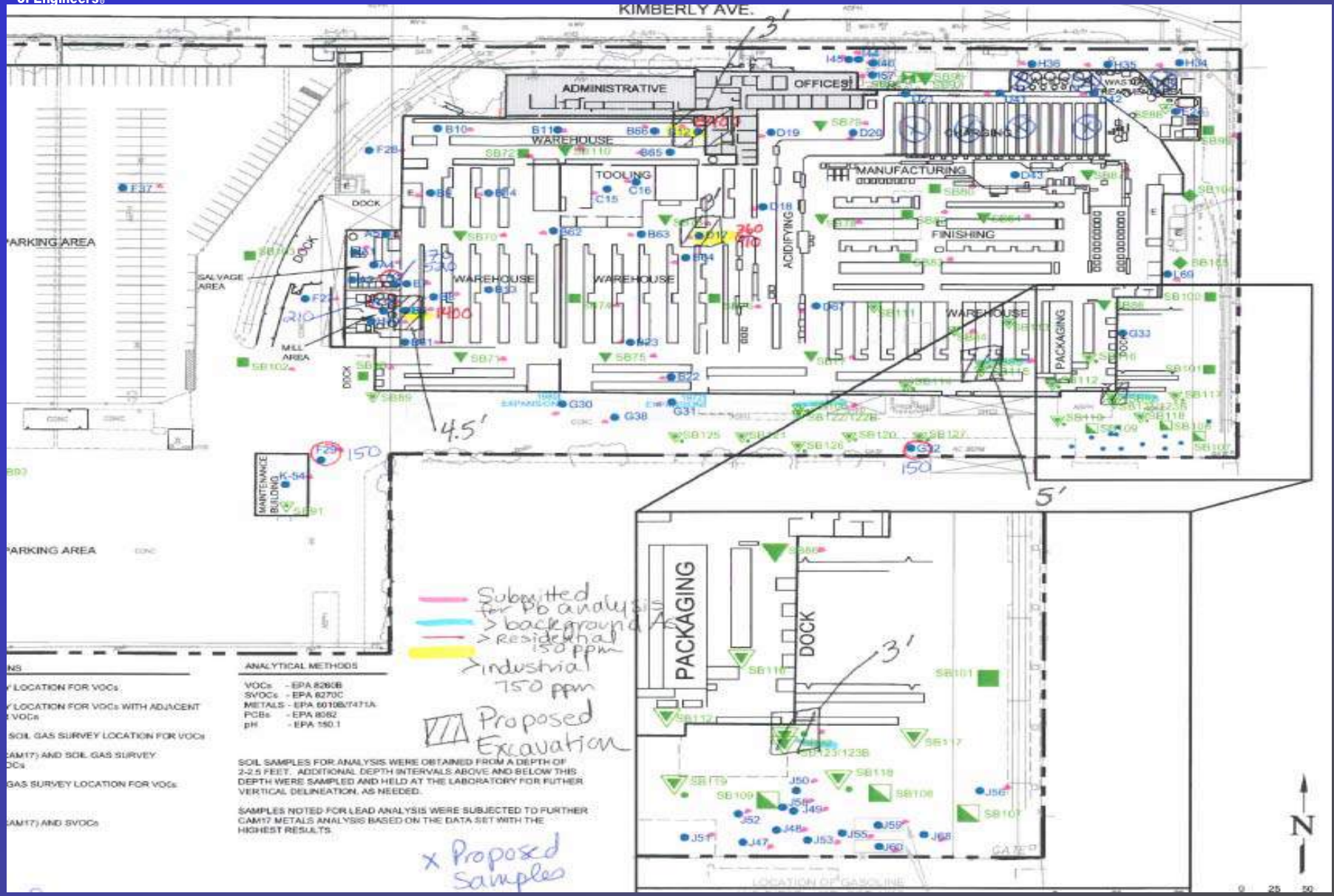

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Organics analysis

Location	Rationale
SB93, 94	SVOCs - Waste Storage in parking lot
SB91	SVOCs - Maintenance building, former UST
SB88	SVOCs - Near air compressor
SB107, 108, 109	SVOCs - Near UST
SB104, 105	PCBs near transformers

- Results were below detection limits

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TPH related issues

- 10,000 gal diesel UST and spills at maintenance building
- 6,000 gal gasoline UST and 1,000 gal diesel UST in southeast corner of property
- Former Waste water treatment area in front of building

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Maintenance Building

- 10,000 diesel UST removed from maintenance building in 1993
  - 34 tons of PCS removed, site closed with concurrence of City of Fullerton Fire Department Fire Prevention Bureau
- ASTs and floor spills observed in building, but concrete pad in place

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Maintenance Building TPH 2005 sampling

- F29 placed in former UST area – only drilled to 5 feet, no TPH samples
- K54 placed between service bays in building – sample from 2'submitted for TPH. Results ND
- SB91 – submitted for SVOCs only – results ND

US Army Corps of Engineers

Southeast UST area

- USTs reportedly removed in 1983, but no closure records available
- Soil borings J47-56, J58-60, and J68 drilled in UST area
  - J49 and 58 encountered obstruction and fill at 2 feet. Staining seen in J49
  - Diesel odor/staining in J47, 48, 53, and 60 from 10-15 feet bgs
  - Gasoline odor in J60 to 8 feet

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Sample Results near Southeast UST area

Location	Depth in feet	Conc in ppm
J47	14	DRO = 530
J49	2	DRO = 3500, GRO = 12
J53	12	DRO = 210
J60	2	DRO = 2000, GRO = 960, EX
	4	DRO = 2000, GRO = 470, EX

- Orange County Healthcare Agency screening criteria = 100 mg/kg for residential and 2,040 mg/kg for commercial/industrial

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Waste Water Treatment area

- In ground clarifier abandoned in place north of building in 1980s
- Upper portion of concrete reportedly removed and plumbing disconnected
- I46 and 57 located within former site (I44 and 45 mislocated)
- Obstruction encountered at 4.5 feet at I46
- TPH ND at maximum depth of 9 feet

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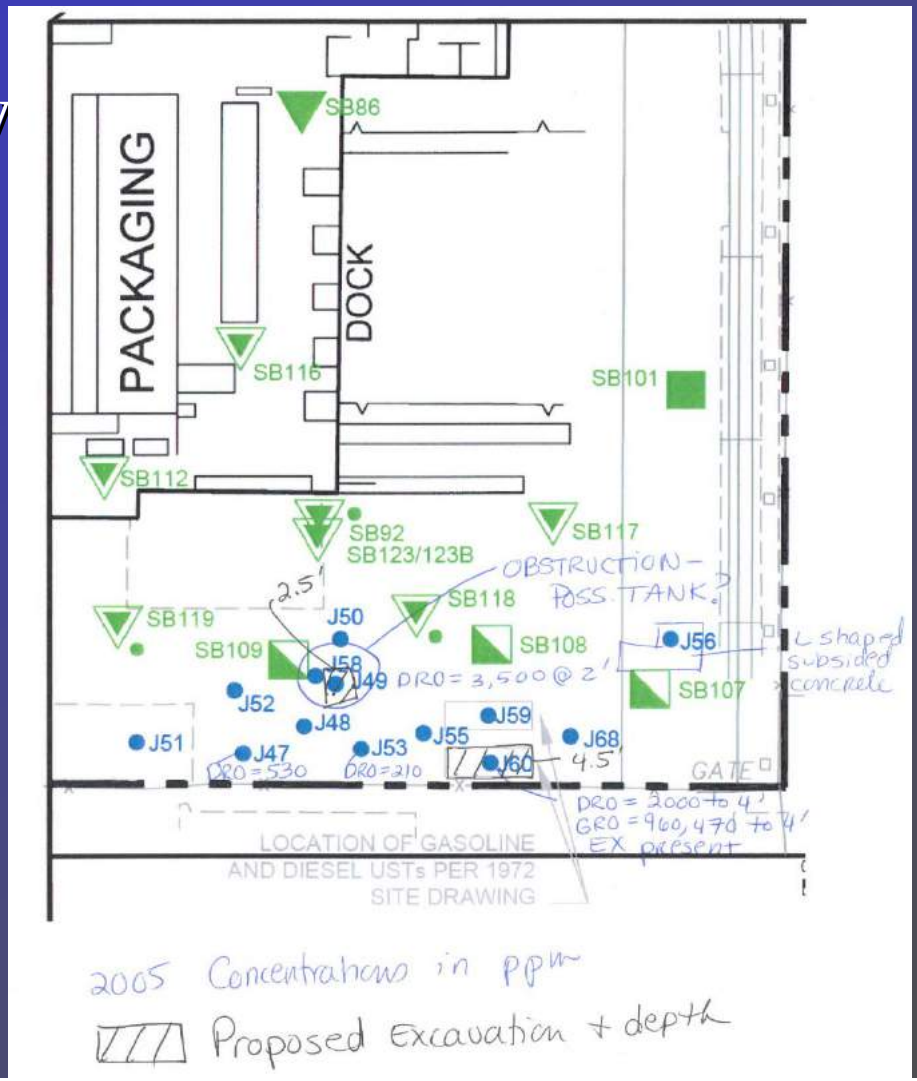
Proposed TPH removals

- Approx 25 CY likely to be removed
- What if tank is present?



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Volatile Organics Issue

- 2005 - 6 samples submitted for VOCs (8260)
- Results all ND

C15, 16	Tooling area
F29	Maintenance Area
I57	Former Waste water Treatment area
D67, L69	Storage areas

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2006 Volatile Organics Sampling

- Additional soil gas sampling requested by DTSC
- Semi permanent soil gas implants placed within soil borings to initial depths of 5’ by either:
  - 10” section of permeable screen connected to ¼”OD polyethylene tubing
  - ¼”OD polyethylene tubing perforated in last 6”
  - Screen interval filled in with sand overlying bentonite
- Soil gas sample location step outs based on initial readings (lateral and with depth)
- Collocated soil samples collected from samples with detected soil gas readings
- Samples analyzed by on-site laboratory

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Soil gas Screening criteria

- Screening criteria calculated using Office of Environmental Health Hazard Assessment values with attenuation factor, based on indoor air for commercial industrial use
- PCE and TCE soil gas < screening criteria

Compound	Value in ug/L
PCE	1.732
TCE	5.1
DCE	NA
Cis DCE	127.75
Toluene	1095
Xylenes	2550
TCF	NA

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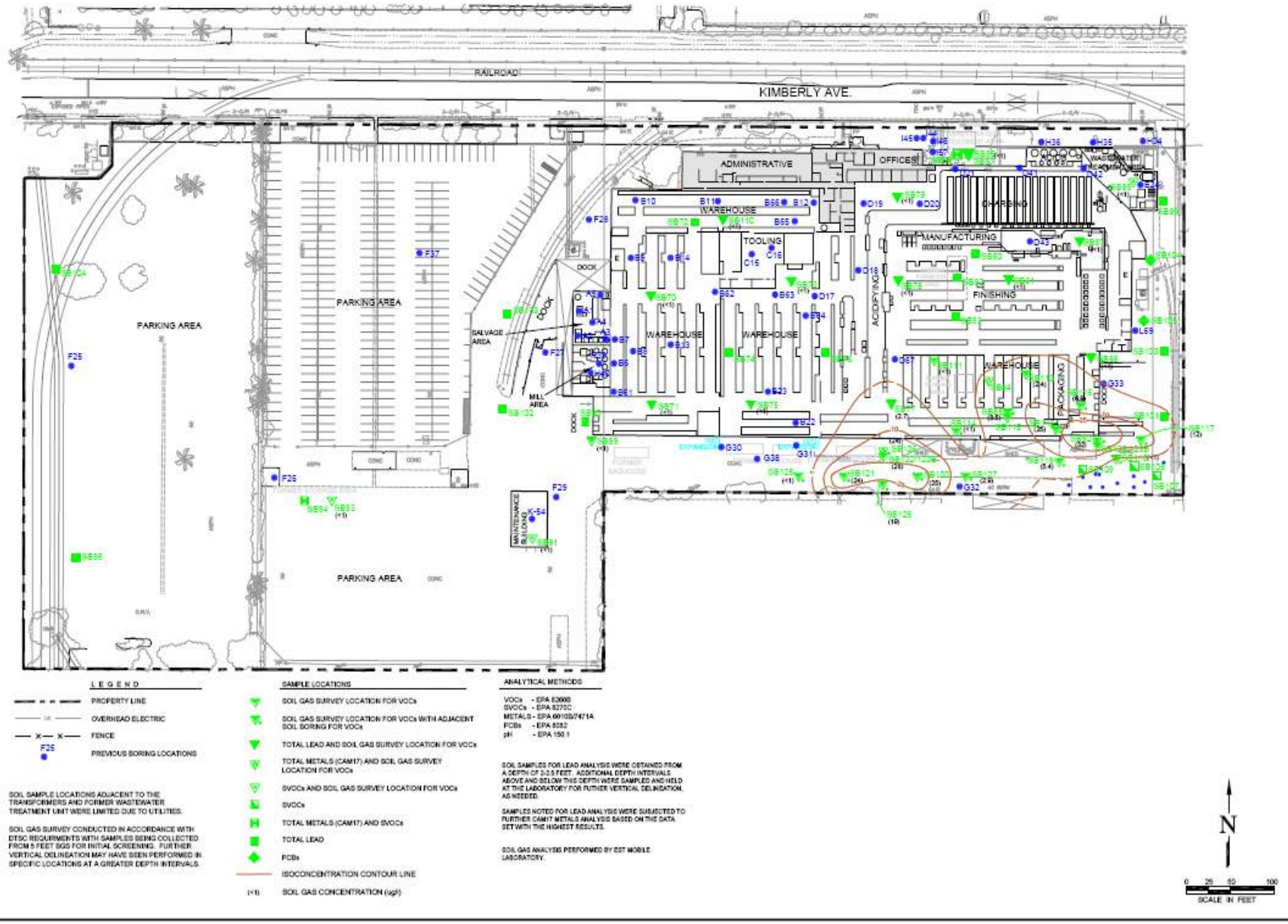
Soil Gas results

- PCE: Detected in 20 samples (1.1 - 100 ug/L) in SE corner
- TCE: Detected in 14 samples (1.1 - 33 ug/L) in SE corner
- DCE: Detected in 15 samples (1.2 - 170 ug/L) in SE corner
- Cis DCE: Detected in 7 samples (1 - 53 ug/L) in SE corner
- Toluene: Detected in 2 samples (1.2 -1.6 ug/L) in SE corner
- Xylenes: Detected in 12 samples (1.1 - 1.3 ug/L) throughout site
- TCF: Detected in 3 samples (4 - 78 ug/L) in SE corner of site
- PCE, TCE, DCE, and TCF detected at depths up to 50 feet



ENTACT

JOHNSON CONTROLS, INC.
FULLERTON CA

FIGURE 4-1

ISOCONCENTRATION MAP

PCE IN SOIL GAS AT 5 FEET DEPTH (ug/l)

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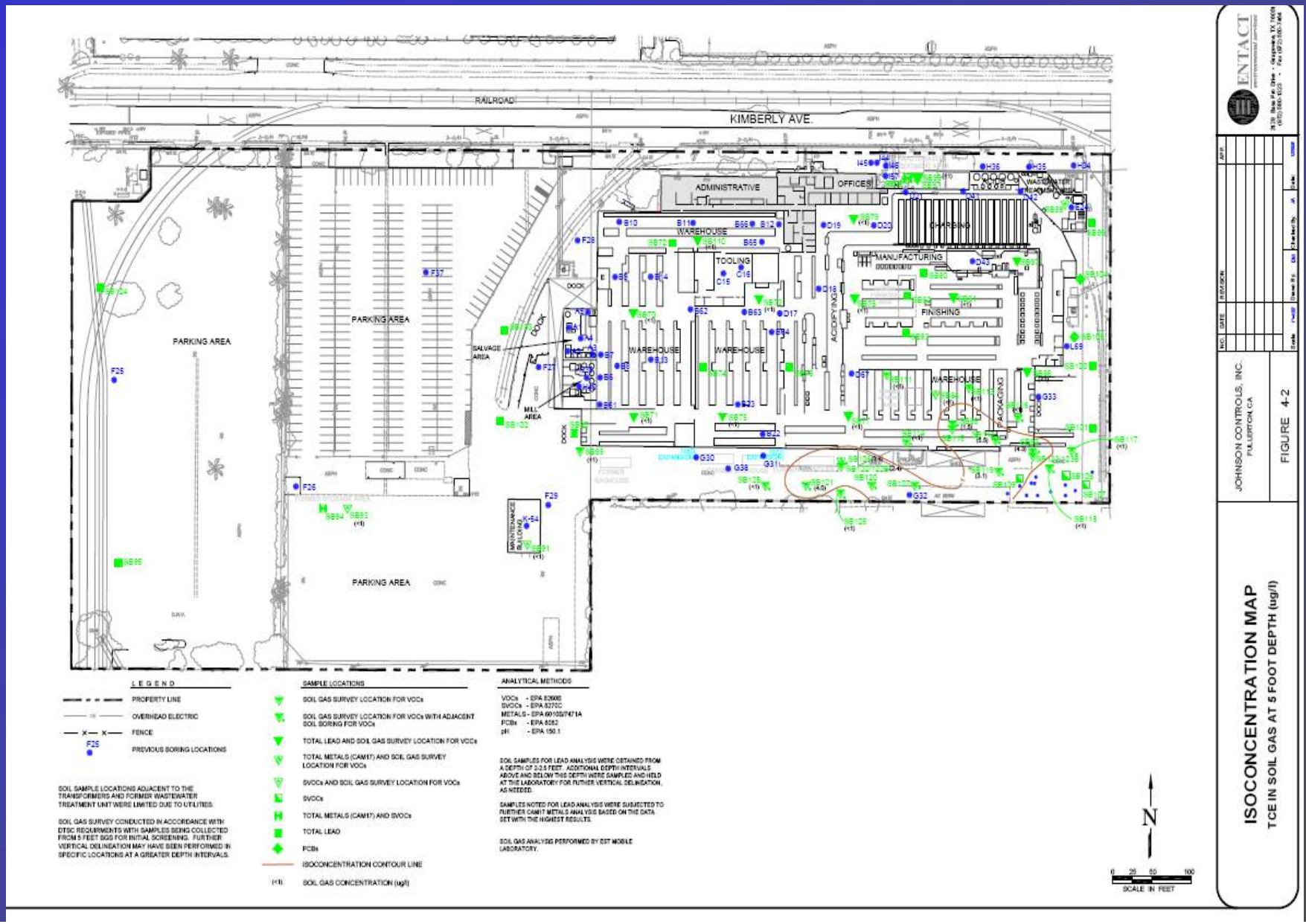

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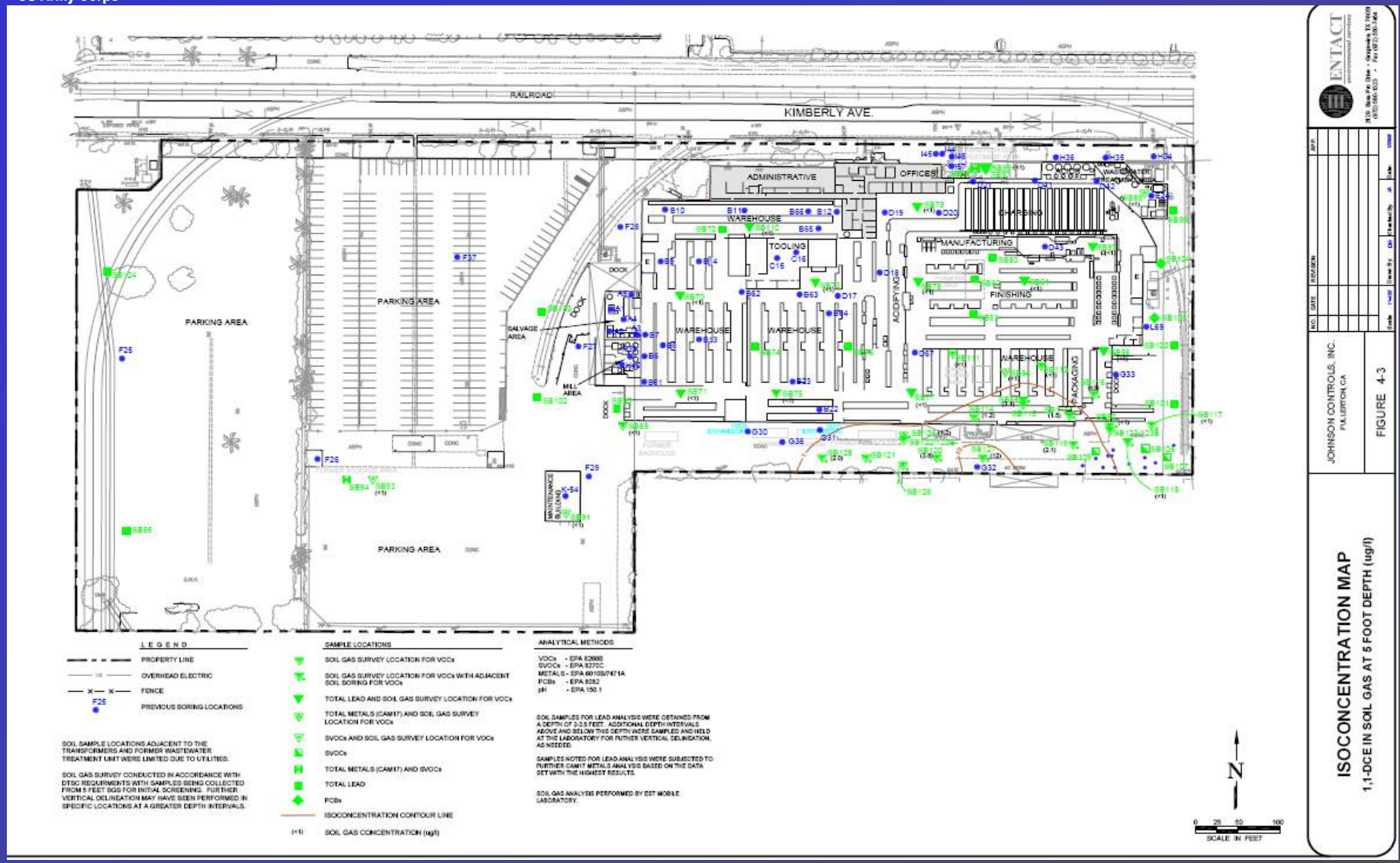

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Johnson/Ettinger Modeling

- Conducted using site specific soil parameters, assumed excposure of 250 days/ year for 25 years
- Cumulative cancer risk 0.99 X 10^{-6}
- Hazard quotient below 1

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Soil samples for VOCs

- Associated soil results below direct contact screening criteria, except for:
- SB 119: PCE = 1,400 ug/kg at 9.5-10’ (criteria = 1,300 ug/kg)
- No correlation between soil gas and soil concentrations, however if soil was above direct contact, soil gas was detected

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Additional VOC sampling

- Additional soil and groundwater sampling conducted following initial soil gas investigation
  - 10 borings from 80-120’
  - 2 borings installed as wells in Southeast corner

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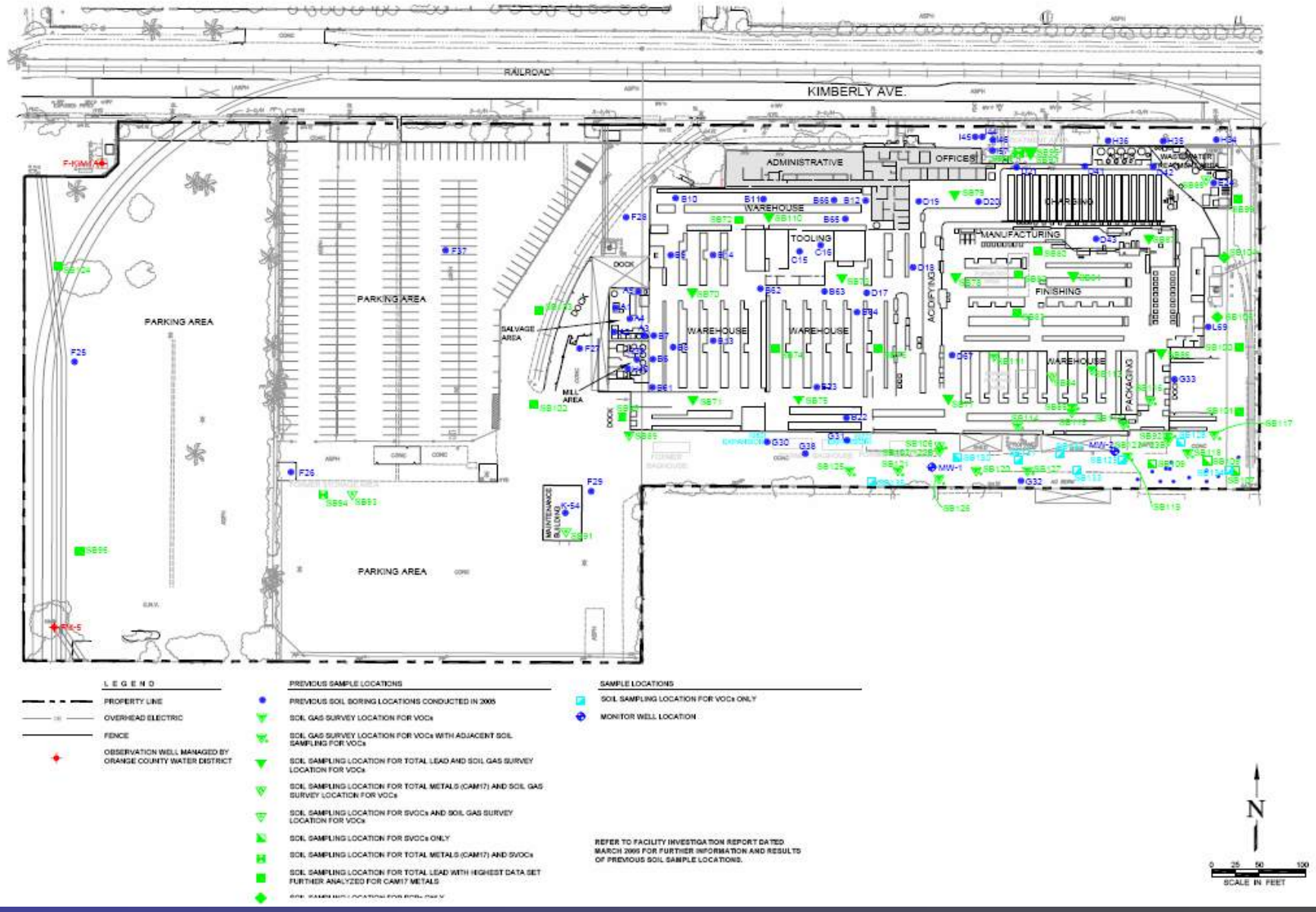
of



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Shallow (<10 ‘) soil sampling results

- Detected concentrations generally matched previous round, with hot spot around SB119 further delineated
- PCE: 4.8 -1500 ug/kg. Small area above direct contact screening level of 1,300 ug/kg (approx 3000 CY)
- All other VOCs below direct contact values
  - TCE: ND – 210 ug/kg
  - DCE: Only detected in SB 132, max 6.2 ug/kg
  - Cis-DCE: Detected in 3 borings, 6.1-28 ug/kg

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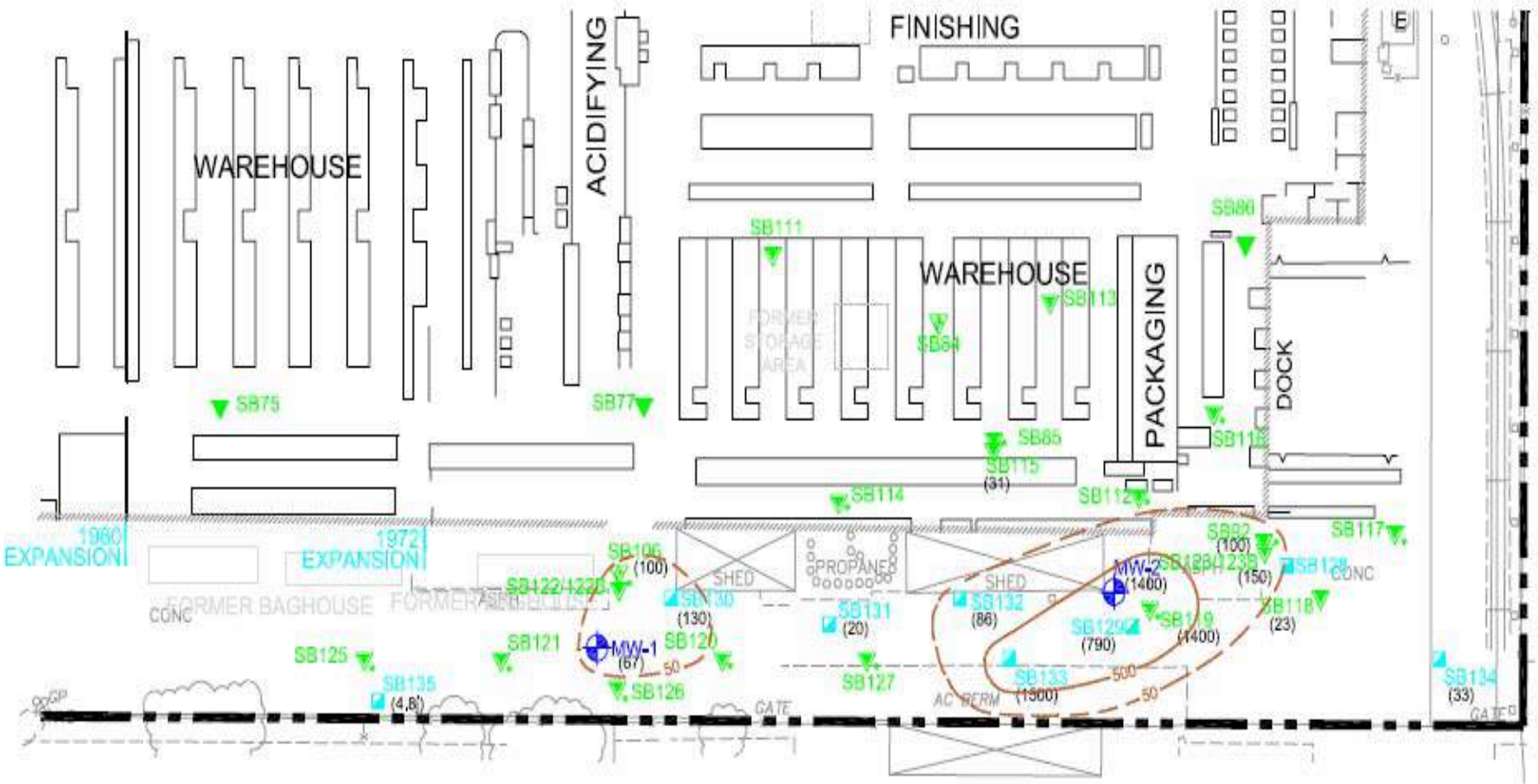

SOIL ISOCONCENTRATION MAP

PCE IN SOIL AT 9.5 - 10 FEET DEPTH (ug/kg)

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Deeper soil sampling results

- PCE: ND - 2,500 ppb
- TCE: ND - 220 ppb
- DCE: ND – 120 ppb
- Cis DCE: ND – 13
- Highest hits found in clayey materials
- Clayey materials does not appear to be an impermeable aquitard
- Low levels extend to 100’ bgs

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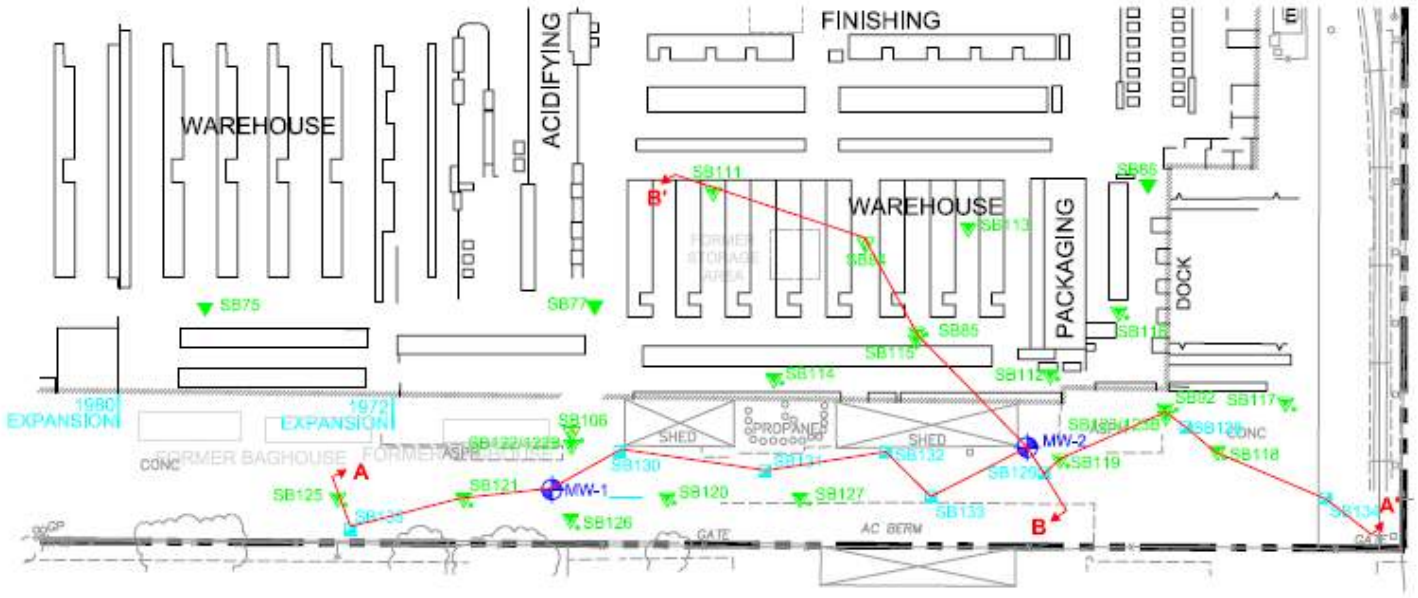


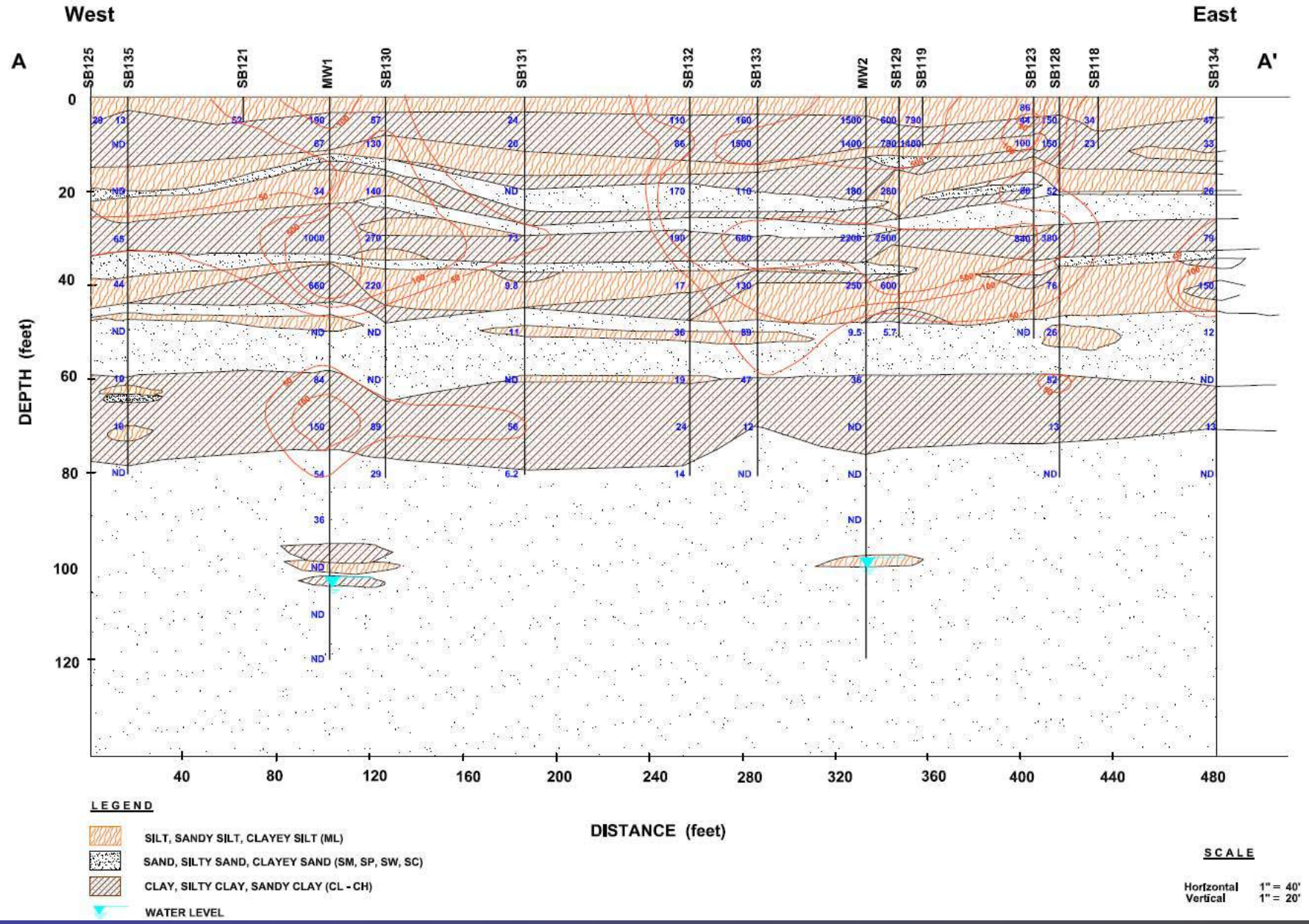
SAMPLE LOCATIONS

- MONITOR WELL LOCATION
- SOIL GAS SURVEY LOCATION FOR VOCs
- SOIL GAS SURVEY LOCATION FOR VOCs WITH ADJACENT SOIL BORING FOR VOCs
- TOTAL LEAD AND SOIL GAS SURVEY LOCATION FOR VOCs
- SOIL BORING LOCATION FOR VOCs
- TOTAL METALS (CAM17) AND SOIL GAS SURVEY LOCATION FOR VOCs
- CROSS SECTION CUT LINE

N

0 25 50

SCALE IN FEET


West
East
A
A'
SB125
SB135
SB121
MW1
SB130
SB131
SB132
SB133
MW2
SB129
SB119
SB123
SB128
SB118
SB134
DEPTH (feet)
0
20
40
60
80
100
120
40
80
120
160
200
240
280
320
360
400
440
480
DISTANCE (feet)
LEGEND
SILT, SANDY SILT, CLAYEY SILT (ML)
SAND, SILTY SAND, CLAYEY SAND (SM, SP, SW, SC)
CLAY, SILTY CLAY, SANDY CLAY (CL - CH)
WATER LEVEL
SCALE
Horizontal 1" = 40'
Vertical 1" = 20'

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Groundwater pathway

- Vadose zone leaching model (VLEACH) done to simulate vertical mobilization/migration to groundwater
  - 1-D finite difference
  - Allows for advection and diffusion
  - Degradation, production and dispersion neglected
  - PCE modeled using conditions at MW-1 and MW-2
  - Recharge rate varied from 0.025 - 0.5 ft/yr

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Cases modeled

- Case 1: Concentrations in 2 clay layers included using constant PCE values (59 and 69 feet bgs)
  - Max MW-1 Case 1A: 84 and 150 ppb
  - Max MW-2 Case 1A: 2200 and 36 ppb
- Case 2: Conc in clay and silty clay layers modeled at varying concentrations (4, 9, 19, 29, 59, and 69 feet bgs)
  - Max MW-1 Case 2A: 190, 67, 1000, 660, 84 and 150 ppb
  - Max MW-2 Case 2A: 1500, 1400, 180, 2200, 36 , and 3.8 ppb

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MW-1 modeling results

- Leachate concentrations below MCL
  - Case 1A: Max = 0.8 ppb at 100 year duration with recharge of 0.5 ft/yr
  - Case 2A: Max = 3.5 ppb at 100 year duration with recharge of 0.5 ft/yr

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MW-2 results

- Leachate above MCL in Case 1A and 2A
  - Case 1A: Max = 5.3 ppb at 100 year duration with recharge of 0.5 ft/yr
  - Case 2A: Max = 8.8 ppb at 100 year duration with recharge of 0.5 ft/yr

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On site GW sampling

- MW -1 and MW-2 installed underlying areas with higher soil contamination
  - MW-1 screened 99-119’ bgs
  - MW-2 screened 100-120’ bgs
- Groundwater flow generally W to NW on site
- Concentrations lower than detected in regional well FM-5

	PCE	TCE	DCE
MCL	5	5	7
MW-1	*10*	*33*	5.5
MW-2	3.7	*23*	*7.4*

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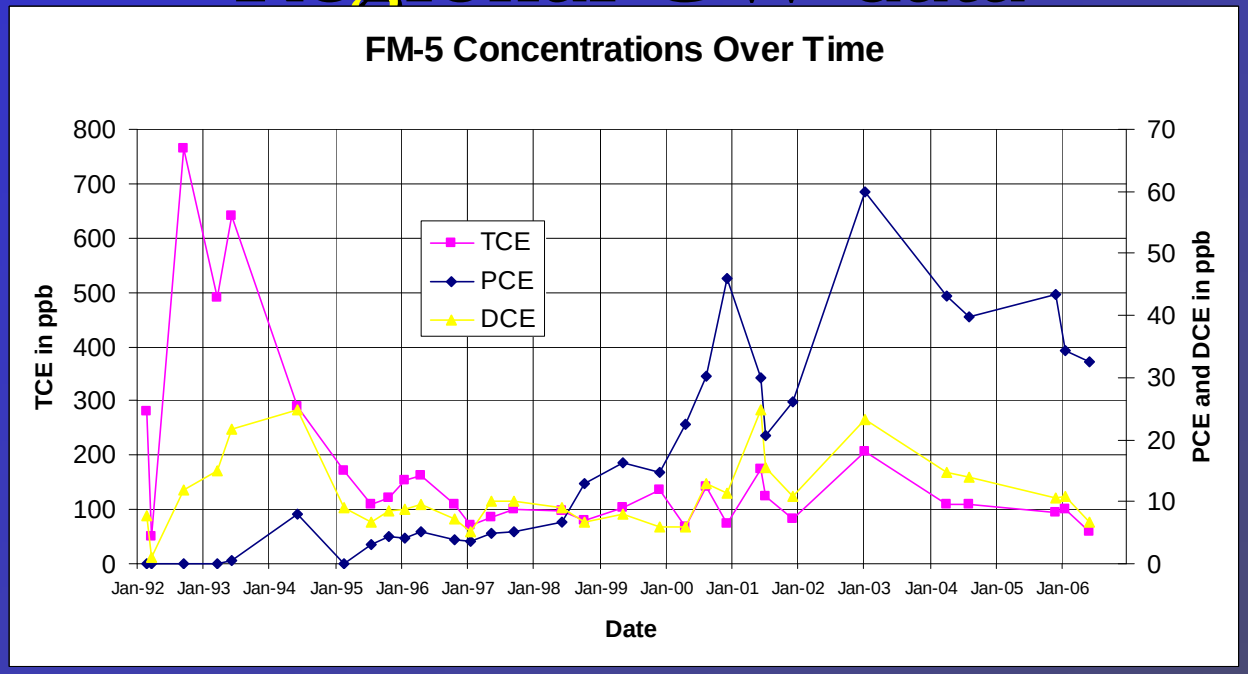
Regional GW data



- FM-5 (SW corner of site) sampled since installed in 1992
- Well screened at 121-141 feet bgs
- TCE, PCE, and DCE all above MCL (except DCE in latest sample)
- General increasing trend over time
- No data from F-KIM1A

US Army Corps of Engineers

Orange County Water District North Basin Groundwater Protection Project (NBGPP)

- Initiated in 2005 to contain movement of industrial contamination before it threatens additional parts of GW basin
- Installation of extraction and monitoring wells
- Purification plant and containment system recirculating in the shallow aquifer

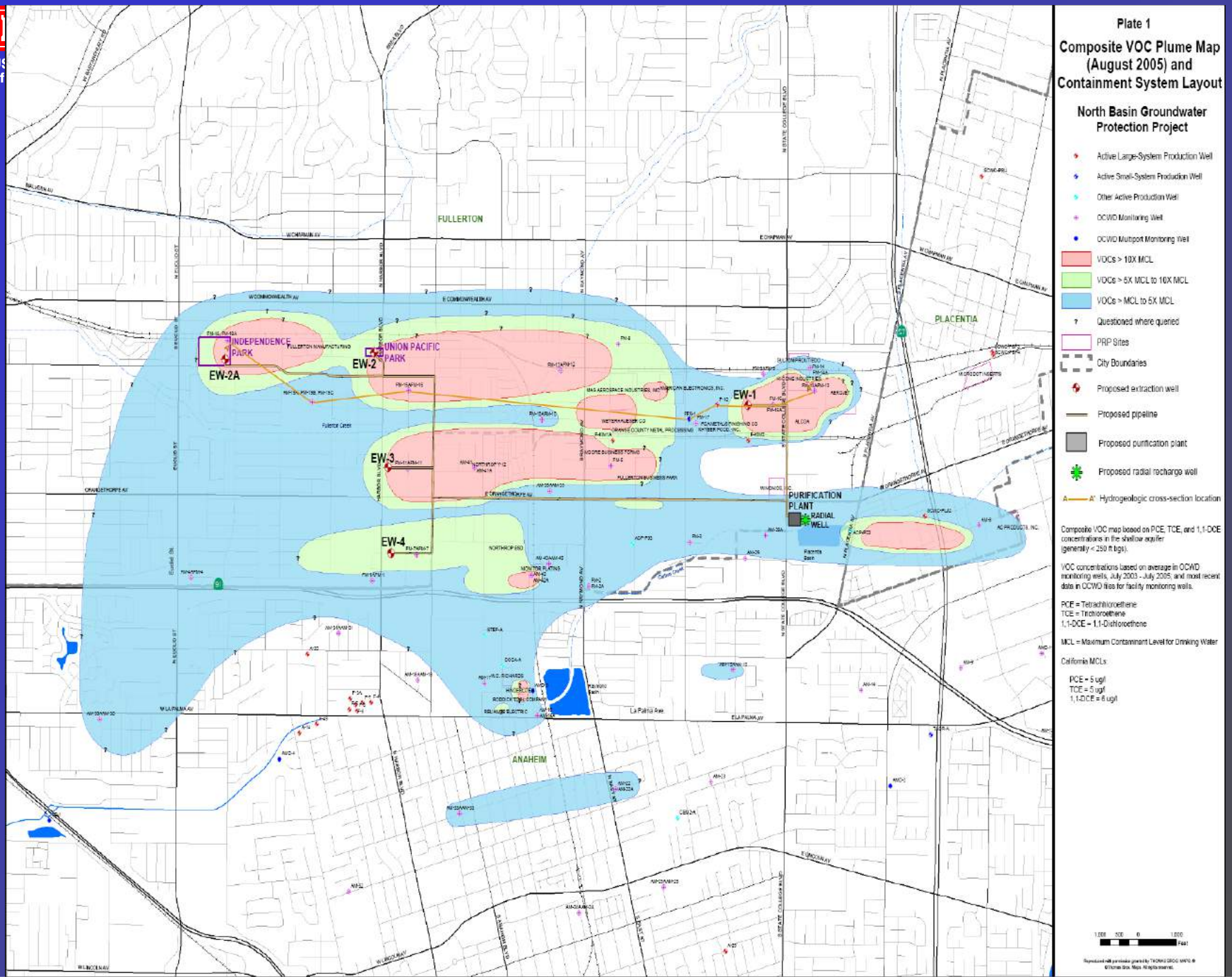
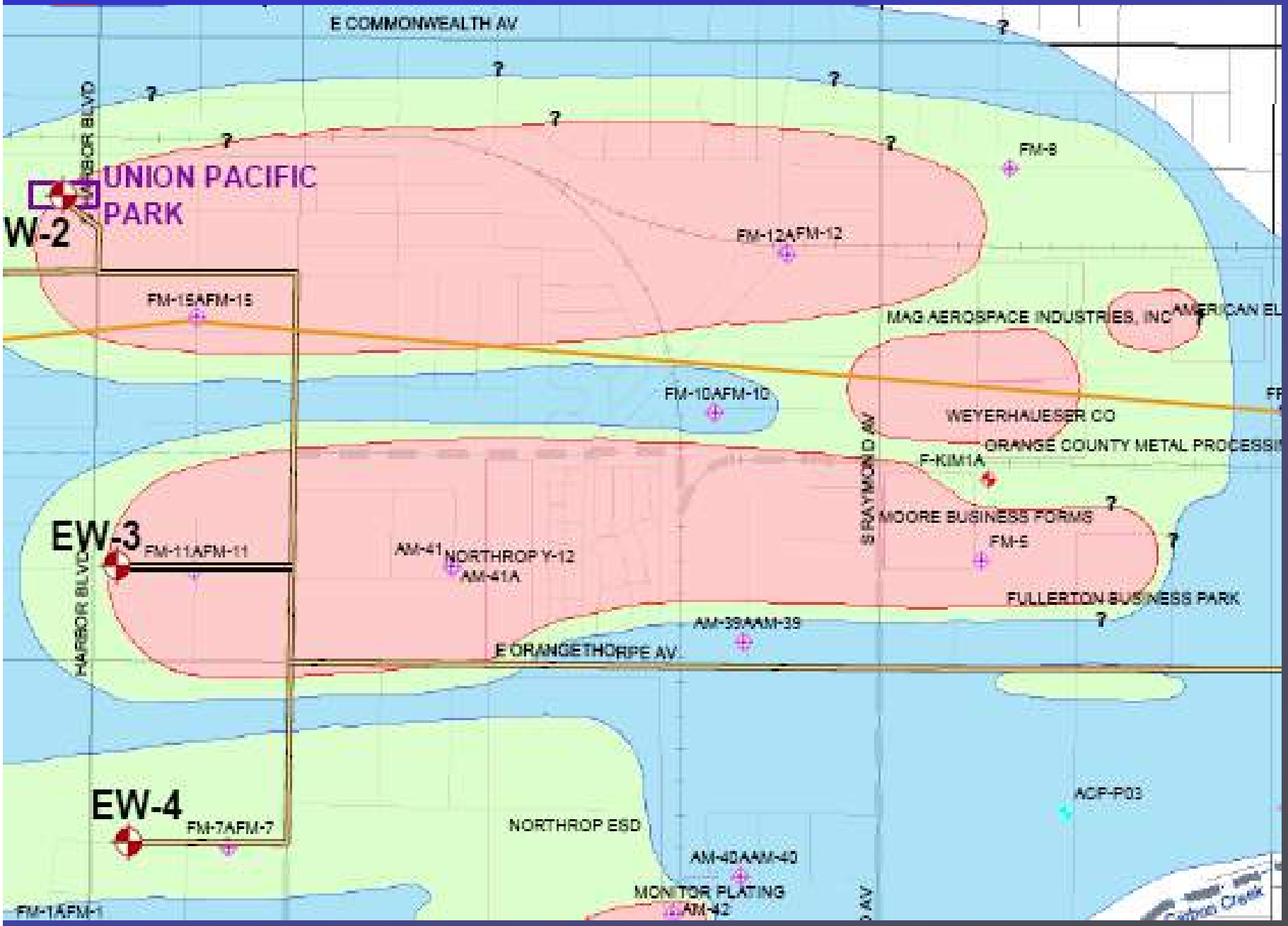


Plate 1
Composite VOC Plume Map (August 2005) and Containment System Layout
North Basin Groundwater Protection Project
Active Large-System Production Well
Active Small-System Production Well
Other Active Production Well
OCWD Monitoring Well
OCWD Multiport Monitoring Well
VOCs > 10X MCL
VOCs > 5X MCL to 10X MCL
VOCs > MCL to 5X MCL
Questioned where queried
PRP Sites
City Boundaries
Proposed extraction well
Proposed pipeline
Proposed purification plant
Proposed radial recharge well
A—A' Hydrogeologic cross-section location
Composite VOC map based on PCE, TCE, and 1,1-DCE concentrations in the shallow aquifer (generally < 250 ft bgs).
VOC concentrations based on average in OCWD monitoring wells, July 2003 - July 2005, and most recent data in OCWD files for facility monitoring wells.
PCE = Tetrachloroethene
TCE = Trichloroethene
1,1-DCE = 1,1-Dichloroethene
MCL = Maximum Contaminant Level for Drinking Water
California MCLs:
PCE = 5 ug/l
TCE = 5 ug/l
1,1-DCE = 6 ug/l
1,000 500 0 1,000
Feet
FULLERTON
PLACENTIA
ANAHEIM
INDEPENDENCE PARK
UNION PACIFIC PARK
EW-2A
EW-2
EW-1
EW-3
EW-4
PURIFICATION PLANT
RADIAL WELL


E COMMONWEALTH AV
HARBOR BLVD
UNION PACIFIC PARK
W-2
FM-8
FM-12AFM-12
FM-15AFM-15
MAG AEROSPACE INDUSTRIES, INC
FM-10AFM-10
WEYERHAUESER CO
ORANGE COUNTY METAL PROCESSI
F-KIM1A
MOORE BUSINESS FORMS
FM-5
EW-3
FM-11AFM-11
AM-41
NORTHROP Y-12
AM-41A
FULLERTON BUSINESS PARK
AM-39/AM-39
E ORANGETHORPE AV
ACP-P03
EW-4
FM-7AFM-7
NORTHROP ESD
AM-40/AM-40
MONITOR PLATING
AM-42
FM-1AFM-1

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Info on Fullerton Business Park

US Army Corps of Engineers

OC WA plan for addressing regional plume

US Army Corps of Engineers

Property Transfer

- Johnson Controls Shut down operations and demolish site
- Sample following demo in waste treatment area
- Conduct remediation
- Turn over clean, dirt site to Lowe
- Lowe develops site in two phases

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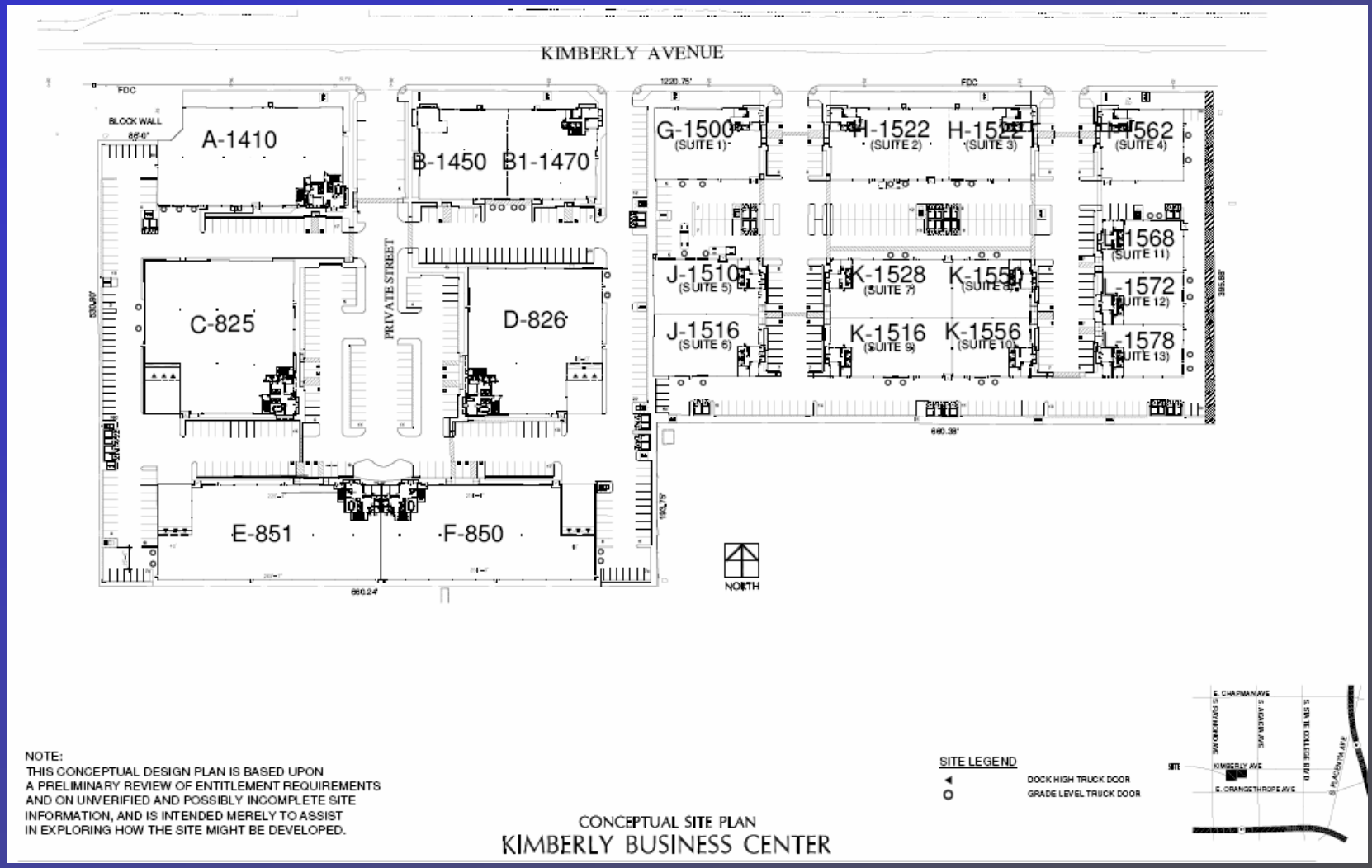
Future Site Development



NOTE:
THIS CONCEPTUAL DESIGN PLAN IS BASED UPON A PRELIMINARY REVIEW OF ENTITLEMENT REQUIREMENTS AND ON UNVERIFIED AND POSSIBLY INCOMPLETE SITE INFORMATION, AND IS INTENDED MERELY TO ASSIST IN EXPLORING HOW THE SITE MIGHT BE DEVELOPED.

SITE LEGEND

◄ DOCK HIGH TRUCK DOOR

○ GRADE LEVEL TRUCK DOOR

CONCEPTUAL SITE PLAN
KIMBERLY BUSINESS CENTER