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MCRD PARRIS ISLAND
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EMAIL OF TRANSMITTAL AND U S EPA REGION IV COMMENTS ON VAPOR INTRUSION CONCEPTUAL SITE MODEL FOR SITE 45 DRY CLEANING FACILITY SPILL AREA MCRD PARRIS ISLAND SC
6/26/2009
U S EPA REGION IV

From:	Llamas.Lila@epamail.epa.gov
To:	Sladic, Mark
Cc:	Meredith Amick; Cook, Charles CIV NAVFAC SE; heber pittman; Annie Gerry; Zimmerman, Greg; Logan, Joe; mac mcrae; Kotun, Ronald; tim harrington (email) (timothy.j.harrington@usmc.mil); Llamas.Lila@epamail.epa.gov
Subject:	Re: Parris Island Site 45 Vapor Intrusion CSM
Date:	Friday, June 26, 2009 11:41:59 AM
Attachments:	Parris Island - VI CSM - June 09 - EPA Feedback.pdf

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Attached please find EPA's comments on the Site 45 VI CSM.

Thanks,
Lila

(See attached file: Parris Island - VI CSM - June 09 - EPA Feedback.pdf)

"Sladic, Mark" <Mark.Sladic@tetratech.com>
05/26/2009 03:18 PM

To
Annie Gerry <GerryAM@dhec.sc.gov>, "Cook, Charles CIV NAVFAC SE" <charles.cook2@navy.mil>, "David M. Scaturo (E-mail)" <scaturdm@dhec.sc.gov>, heber pittman <darrel.pittman@usmc.mil>, joe bowers <bowersjb@dhec.sc.gov>, Lila Llamas/R4/USEPA/US@EPA, mac mcrae <mmcrae@TechLawInc.com>, Meredith Amick <AmickMS@dhec.sc.gov>, Pat Franklin <pat.franklin@mail.com>, "Priscilla Wendt (E-mail)" <wendtp@dnr.sc.gov>, Stacey French <FRENCHSL@dhec.sc.gov>, "tim harrington (email) (timothy.j.harrington@usmc.mil)" <timothy.j.harrington@usmc.mil>, "Tom Dillon (E-mail)" <Tom.Dillon@noaa.gov>, "Zimmerman, Greg" <Greg.Zimmerman@tetratech.com>

cc
"Kotun, Ronald" <Ronald.Kotun@tetratech.com>, "Logan, Joe" <Joe.Logan@tetratech.com>

Subject
Parris Island Site 45 Vapor Intrusion CSM

Good afternoon. Per Charles' request, please see a draft Site 45 Conceptual Site Model (attached). The CSM will be one element in moving forward with sampling for VI at Site 45. CSM's are a necessary component of the UFP-SAPs. I believe that the Team asked for this as an informal interim deliverable. thanks.

Mark Sladic, P.E.| Project Manager
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[attachment "Parris Island - VI CSM.pdf" deleted by Lila Llamas/R4/USEPA/US]

VAPOR INTRUSION CONCEPTUAL SITE MODEL

Parris Island, South Carolina
Site 45

Source of Contamination

Prior to 2001, Site 45 was used as a MWR Dry Cleaning Facility. Four above ground storage tanks (ASTs) were situated along the northern side of the building. These tanks were put into place in 1988, following the removal of an underground storage system where hydrocarbon cleaning solvents were previously stored. The new storage tanks were positioned within a concrete catch basin used to contain any overflow during tank filling.

In March 1994, one of the tanks was overfilled with tetrachloroethylene (PCE). An unknown amount of the contaminant flowed into the concrete catch basin. The PCE overflow was not collected at that time, and heavy rainfall subsequently washed the contaminant onto the surrounding soil. Contaminated soils were excavated, and an interim remedial action was initiated.

In early 2001, the dry cleaning building, solvent tanks, and other related structures were demolished and removed from the site. Currently, the site is primarily a vacant lot covered with mowed grass with isolated shrubs and trees.

For the CERCLA RI groundwater investigations, a total of 72 temporary monitoring wells (for groundwater screening) were installed at 35 locations; 29 temporary wells were installed in the upper surficial aquifer, 29 temporary wells were installed in the lower surficial aquifer, and 14 temporary wells were installed in the deep monitored interval to refine plume definition previously provided from Phase 1 RI investigations. Permanent monitoring wells were installed in approximately half of the screening locations. Additional temporary and permanent monitoring wells have been installed to support various pilot tests. Soil samples were also collected at this site.

PCE and other chlorinated breakdown products of PCE, including trichloroethylene (TCE), dichloroethylene (DCE), and vinyl chloride (VC), were detected in surface and subsurface soil at concentrations that could potentially impact groundwater through leaching. Chlorinated hydrocarbons were also detected in groundwater at concentrations up to 2,000 times the Maximum Contaminant Levels (MCLs). Based on the groundwater monitoring well data, two source areas of the groundwater contamination are likely, one near the former above-ground storage tanks (north of the former dry cleaner building) and a smaller area southwest of the former dry cleaner building, likely having migrated via damaged sanitary sewers.

This southern chlorinated hydrocarbon plume was refined as part of an investigation conducted by the United States Geological Service (USGS). Temporary well data collected in June 2007 showed that the highest PCE concentrations and probable source

area of groundwater contamination were adjacent to the southeast corner of new dry cleaning facility. It is unlikely that operations at the new dry cleaning facility are the cause of the contamination because the new dry cleaning facility has never used PCE. A more likely source of contamination could be a sanitary sewer line that runs adjacent to the southeast corner of the new dry cleaning facility. The sanitary sewer line served the former dry cleaning facility, where multiple leaks of PCE were reported during the years of its operation. Routine dry cleaner operations would also introduce PCE into the sanitary sewer. The section of the former dry cleaner sanitary sewer passing the suspected source area immediately adjacent to the new dry cleaning facility has been replaced since closure of the former dry cleaning facility.

Contaminant Fate and Transport

The horizontal and vertical extents of chlorinated VOC-contaminated groundwater stemming from the former dry cleaning facility are adequately defined. The plume is approximately 240 feet long and up to140 feet wide (less than 1 acre). The plume extends from approximately the northwestern corner of the former dry cleaning building to near the former temporary lodging. Further eastward migration is apparently slowed by the presence of a north-to-south storm sewer which may be acting as a conduit to intercept the plume. The contaminant plume is consistent with groundwater flow that is to the south-southeast. Based on approximately 5 years of data, significant plume migration is not apparent.

The vertical extent of the groundwater contaminant plume extends from the water table (approximately 4 to 5 feet below ground surface) to a low permeability layer located at a depth of approximately 18 to 22 feet below ground surface. Chlorinated VOCs were detected in the groundwater below this low permeability layer but not at concentrations that exceed drinking water standards.

The data also indicate that the VOCs are naturally degrading at the site. Modeling efforts conducted as part of a natural attenuation evaluation indicated that contaminant migration could have a maximum range of 500 feet to more than 1000 feet beyond the source area. Migration time corresponding to these distances range from 30 to 100 years. Without source control, more than 260 years may be required before the contaminants attenuate to below measurable levels.

Chlorinated VOCs originating near the southeast corner of the new dry cleaning facility moved southeastward through the aquifer. The presence of degradation byproducts indicates that reductive chlorination conditions are favorable. VC concentration are greater in the central part of the southern plume than near the source area, indicating that dechlorination activity takes place along the flow path rather than just at the source area.

Vapor Intrusion Pathway

Current data indicate that chlorinated hydrocarbons in the groundwater are migrating in a southeast direction, away from the new dry cleaner building. Although this building is upgradient, the proximity, combined with high concentrations, can result in the presence of groundwater contaminants beneath the new dry cleaner building. Groundwater contaminants beneath this building can volatilize upward through pore spaces in the soil column into the building foundation. The chlorinated hydrocarbons could infiltrate the foundation slab through cracks or through preferential pathways such as sewer lines. Once in the building, the contaminants can diffuse in the building air directly or aided by the ventilation system, thus resulting in inhalation of chlorinated hydrocarbons by employees within the building.

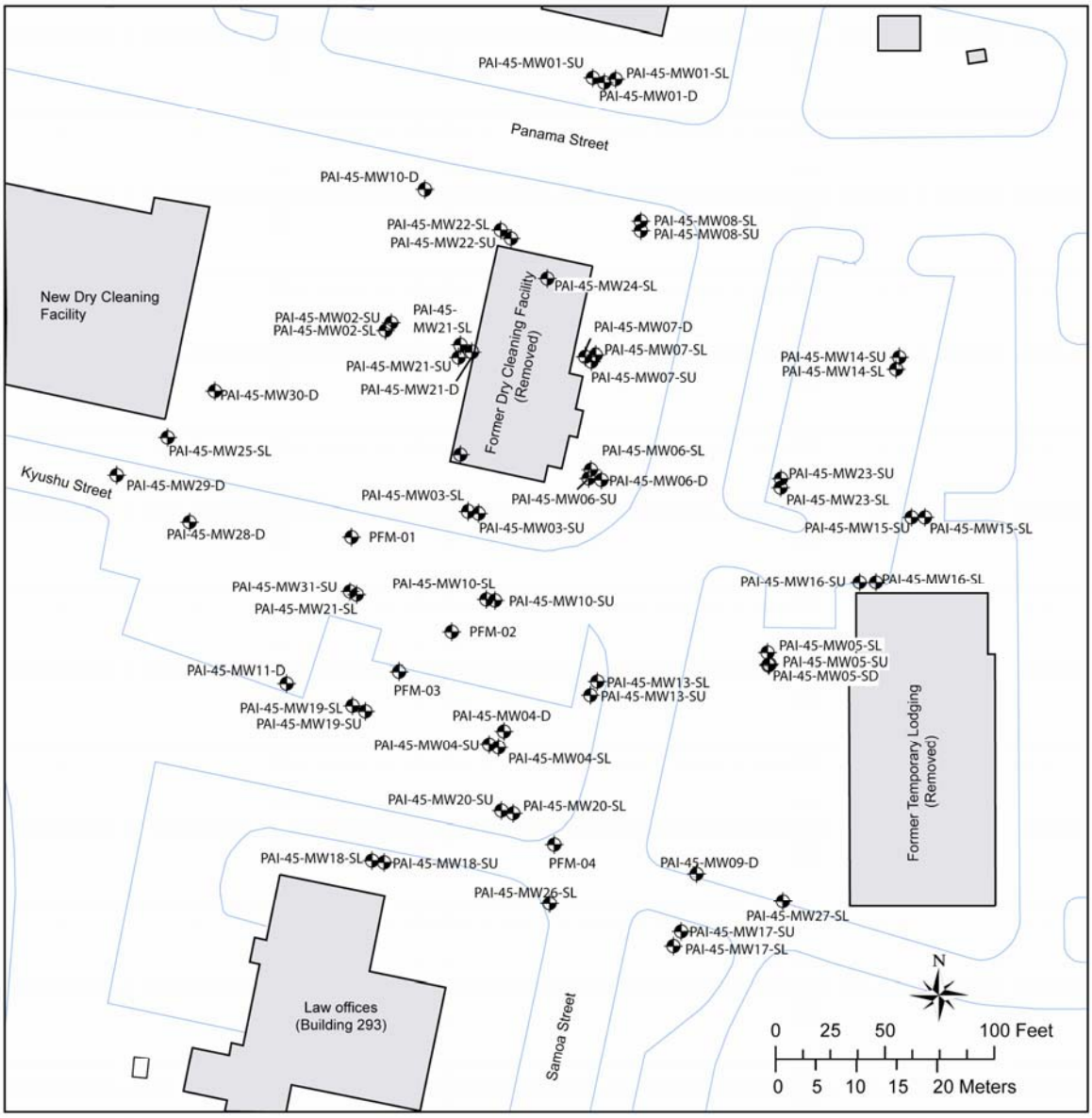
Studies have shown that an overlying aquifer can greatly impede or prevent volatile organic compounds in deeper groundwater from reaching the unsaturated zone. Therefore, the primary focus of this vapor intrusion conceptual site model should ~~only~~ be the shallow aquifer. (At Site 45, shallower surficial aquifer groundwater contamination concentrations are generally lower than deeper groundwater surficial aquifer contaminant concentrations.)

Enroute to this building, chlorinated hydrocarbons are volatilizing upward through the soil column and are being released into the ambient air. Once in the ambient air, the contaminants' impact would become negligible because of dilution.

To assess the indoor air exposure pathway, site- and building-specific information should be collected to avoid the use of default information in any fate and transport models. This information includes the size and volume of the building, the type of construction (e.g., presence of a vapor barrier), depth of construction, thickness of floor, air turnover rates, occupant activities, and depth to groundwater. Specific information regarding soil characteristics (bulk density, total porosity, water filled porosity, and Soil Conservation Srvice soil typ.) and groundwater characteristics (temperature) should also be determined.

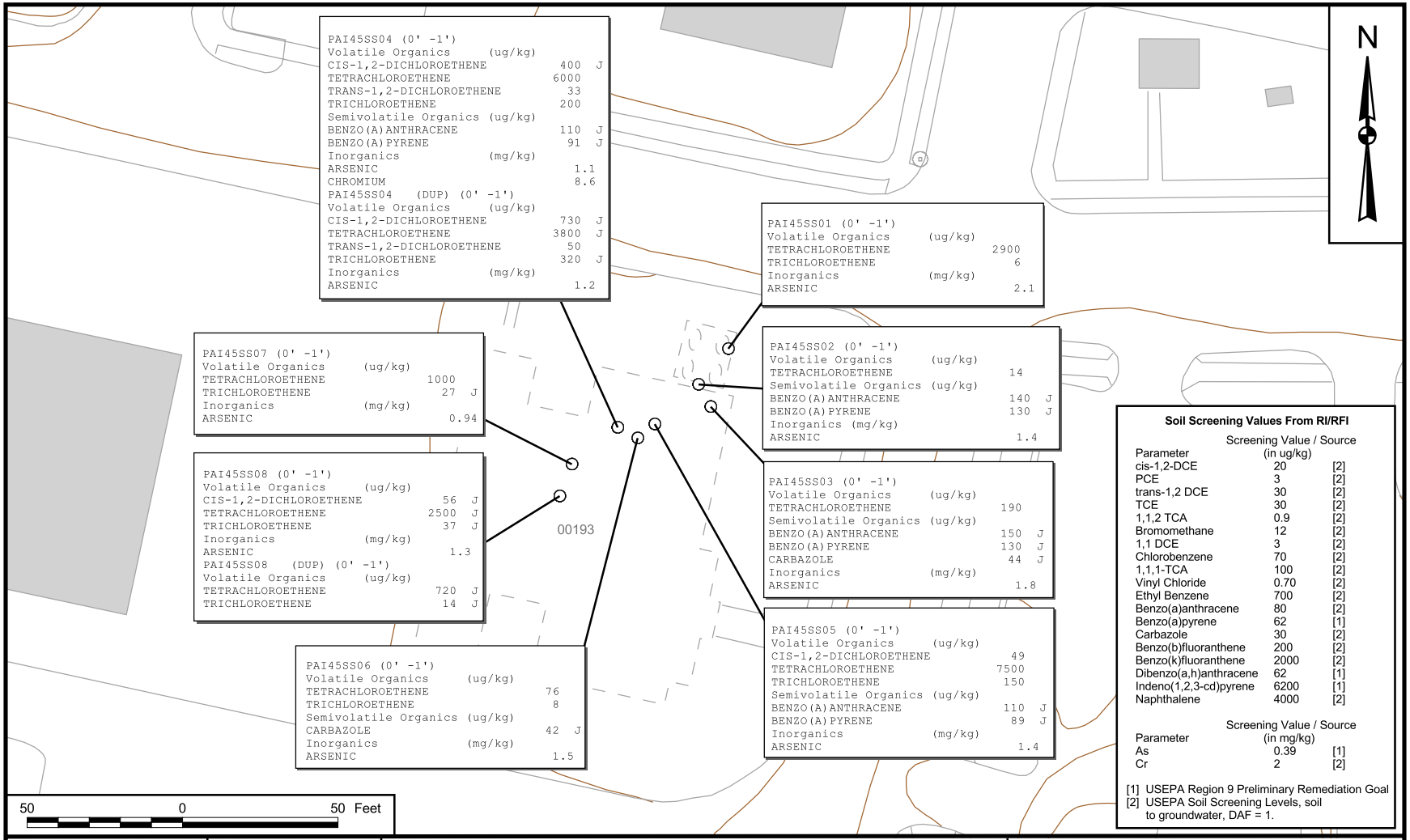
Occupant activities are most likely limited to traditional worker activities. Appropriate exposure assumptions would be determined to assess this pathway. Only the inhalation pathway would be evaluated. An inventory of actual work history, using employee records, could be used to determine length of service for the exposure duration in lieu of using the default exposure duration of 25 years.

From USGS



EXPLANATION

PAI-45-MW21-SL
Monitoring well and identifier



Soil Screening Values From RI/RFI

Parameter	Screening Value / Source (in ug/kg)	
cis-1,2-DCE	20	[2]
PCE	3	[2]
trans-1,2 DCE	30	[2]
TCE	30	[2]
1,1,2 TCA	0.9	[2]
Bromomethane	12	[2]
1,1 DCE	3	[2]
Chlorobenzene	70	[2]
1,1,1-TCA	100	[2]
Vinyl Chloride	0.70	[2]
Ethyl Benzene	700	[2]
Benzo(a)anthracene	80	[2]
Benzo(a)pyrene	62	[1]
Carbazole	30	[2]
Benzo(b)fluoranthene	200	[2]
Benzo(k)fluoranthene	2000	[2]
Dibenzo(a,h)anthracene	62	[1]
Indeno(1,2,3-cd)pyrene	6200	[1]
Naphthalene	4000	[2]

Parameter	Screening Value / Source (in mg/kg)	
As	0.39	[1]
Cr	2	[2]

[1] USEPA Region 9 Preliminary Remediation Goal
[2] USEPA Soil Screening Levels, soil to groundwater, DAF = 1.

DRAWN BY	DATE
S. STROZ	09/04/08
CHECKED BY	DATE
J. LOGAN	12/01/08

COST/SCHEDULE-AREA

SCALE
AS NOTED

NAVFAC

SCREENING CRITERIA EXCEEDANCES IN SURFACE SOIL
SITE 45 - FORMER MWR DRY CLEANING FACILITY
FEASIBILITY STUDY
MCRD PARRIS ISLAND
PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NUMBER
N5260

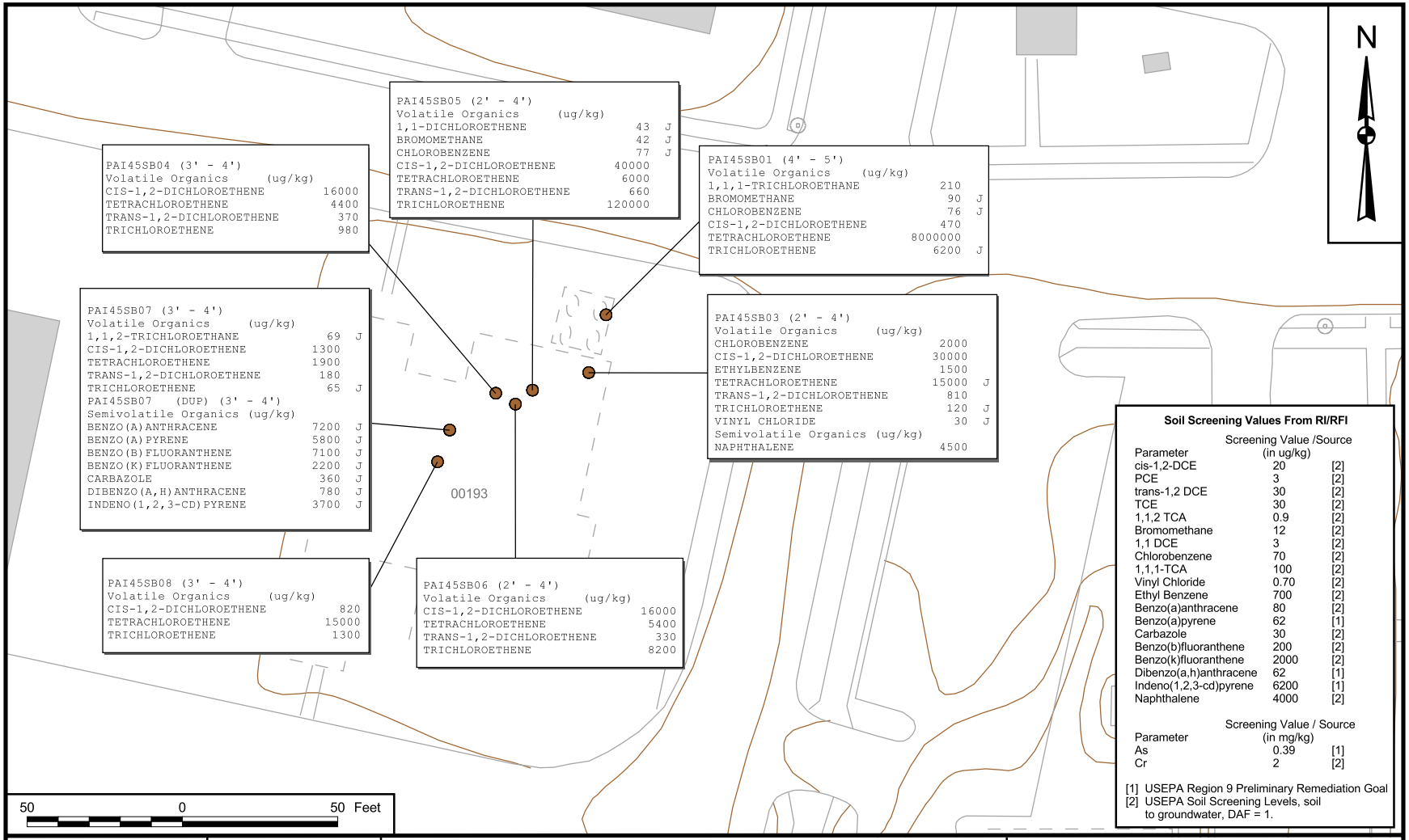
APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 1 - 6

REV 0

P:\GIS\PARRISISLAND_MCRD\APR\SWMU45_WORKPLAN.APR REVISED SURFACE SOIL TAG LAYOUT 12/01/08 JEE



DRAWN BY	DATE
S. STROZ	09/04/08
CHECKED BY	DATE
J. LOGAN	12/04/08

COST/SCHEDULE-AREA

SCALE
AS NOTED

NAVFAC

SCREENING CRITERIA EXCEEDANCES IN SUBSURFACE SOIL
SITE 45 - FORMER MWR DRY CLEANING FACILITY
FEASIBILITY STUDY
MCRD PARRIS ISLAND
PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NUMBER
N5260

APPROVED BY ___ DATE ___

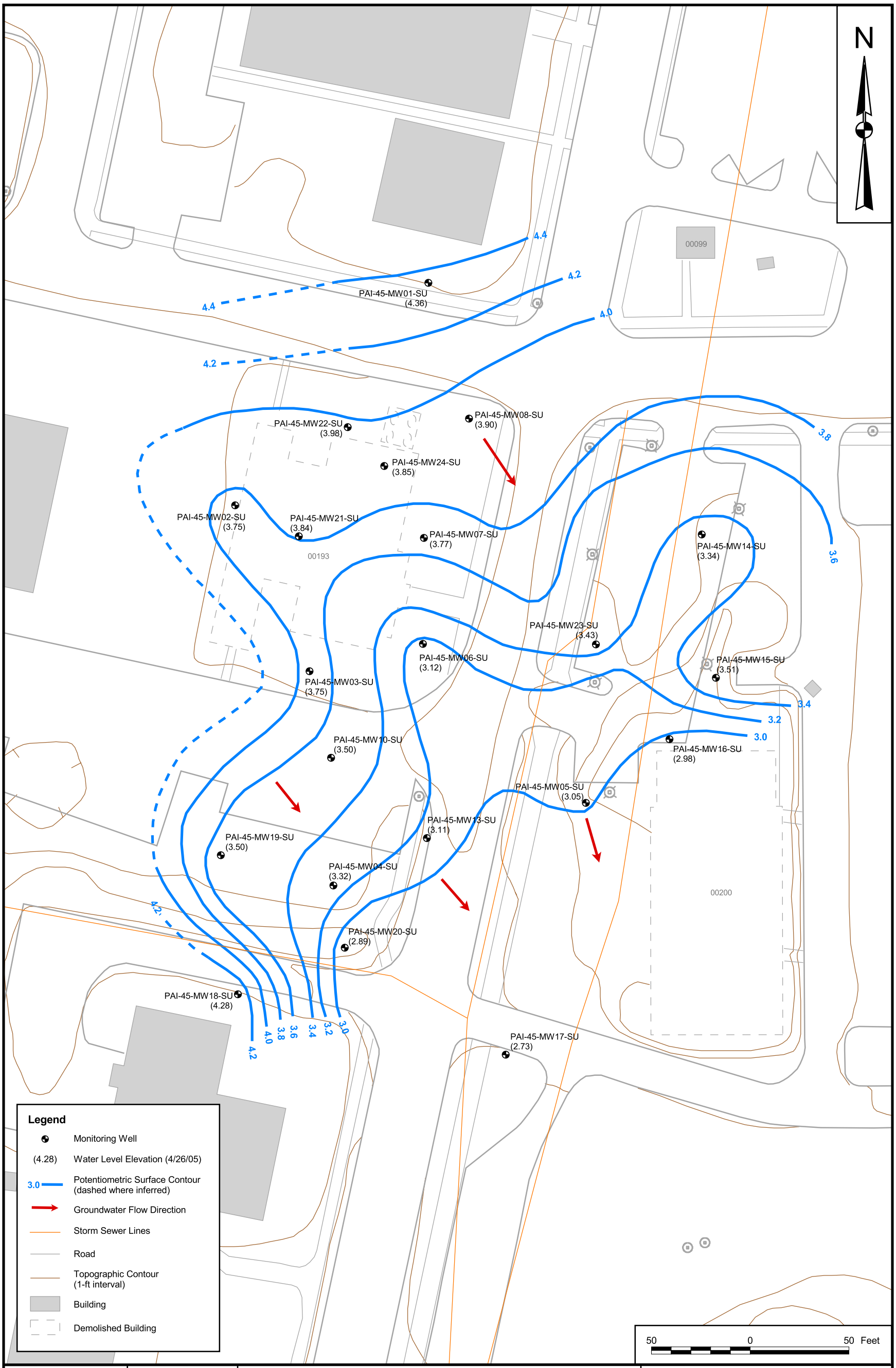
APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 1 - 7

REV 0

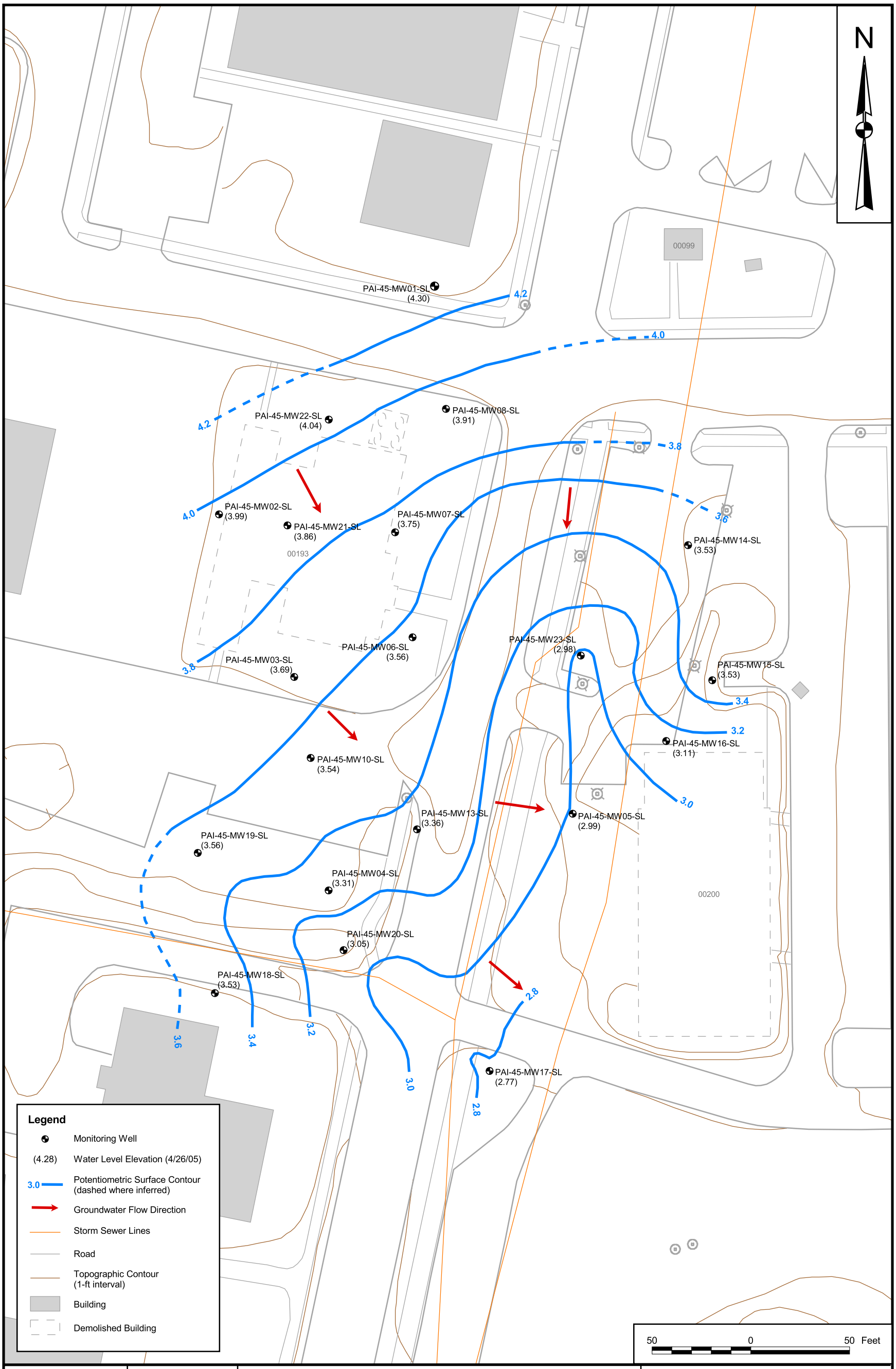
P:\GIS\PARRISISLAND_MCRD\APR\SWMU45_WORKPLAN.APR REVISED SUBSURFACE SOIL TAG LAYOUT 12/04/08 JEE

P:\GIS\PARRISISLAND_MCRD\APR\SWMU45_WORKPLAN.APR POTENTIO - UPPER SURFICIAL LAYOUT - B 12/02/08 JEE



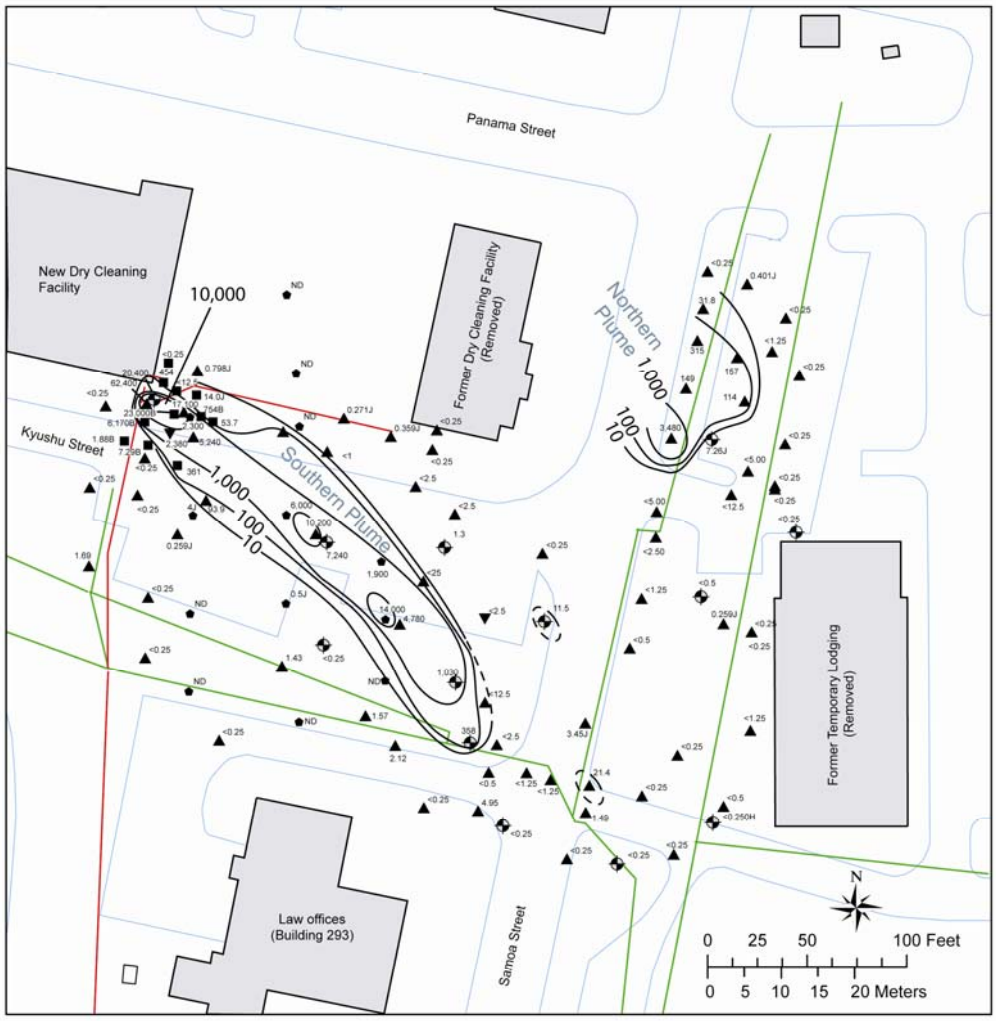
DRAWN BY C. SPEHAR	DATE 08/08/05	POTENTIOMETRIC CONTOURS - UPPER SURFICIAL WELLS (APRIL 26, 2005) SITE 45 - FORMER MWR DRY CLEANING FACILITY FEASIBILITY STUDY MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NUMBER N5260
CHECKED BY J. LOGAN	DATE 12/02/08		APPROVED BY ___ DATE ___
COST/SCHEDULE-AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-3 REV 0

P:\GIS\PARRISISLAND_MCRD\APR\SWMU45_WORKPLAN.APR POTENTIO - LOWER SURFICIAL LAYOUT - B 12/02/08 JEE



DRAWN BY C. SPEHAR	DATE 08/08/05	POTENTIOMETRIC CONTOURS - LOWER SURFICIAL WELLS (APRIL 26, 2005) SITE 45 - FORMER MWR DRY CLEANING FACILITY FEASIBILITY STUDY MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NUMBER N5260
CHECKED BY J. LOGAN	DATE 12/02/08		APPROVED BY ___ DATE ___
COST/SCHEDULE-AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1 - 4 REV 0

From USGS (PCE)



Monitoring well, June 2008

USGS Temporary well, March 2008

USGS Temporary well, August 2007

USGS Temporary well, June 2007

Tetra Tech NUS Temporary well, 2006 (Mark Sladic, Tetra Tech NUS,written commun., 2007)

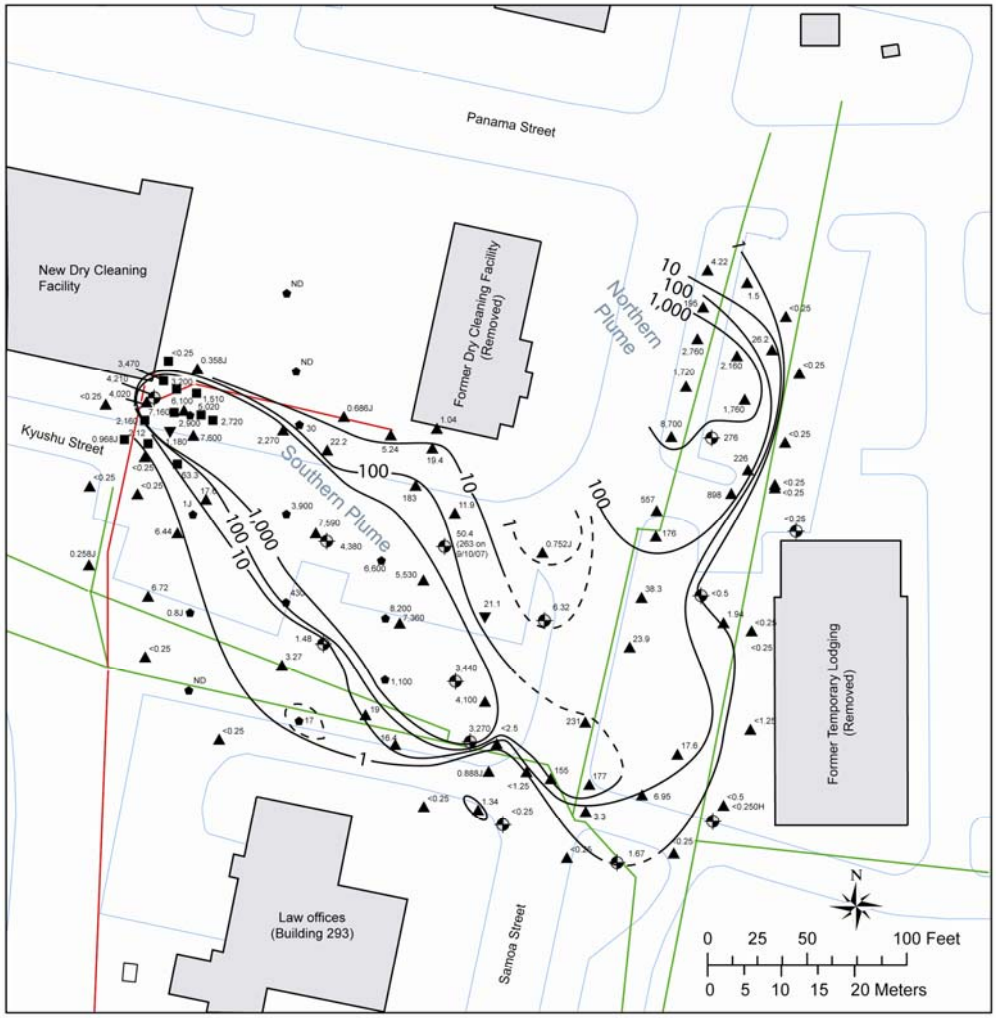
<0.25 Concentration of tetrachloroethene, in micrograms per liter. [<, less than; J, estimated; H, analyzed out of holding time; ND, not detected at unstated detection limit]

—10– – Line of equal tetrachloroethene concentration, in micrograms per liter. Interval variable as shown. Dashed where uncertain.

Storm sewer

Sanitary sewer

From USGS TCE



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Tetra Tech NUS Temporary well, 2006 (Mark Sladic, Tetra Tech NUS,written commun., 2007)

<0.25 Concentration of trichloroethene, in micrograms per liter. [<, less than; J, estimated; H, analyzed out of holding time; ND, not detected at unstated detection limit]

—10– – Line of equal trichloroethene concentration, in micrograms per liter. Interval variable as shown. Dashed where uncertain.

Storm sewer

Sanitary sewer

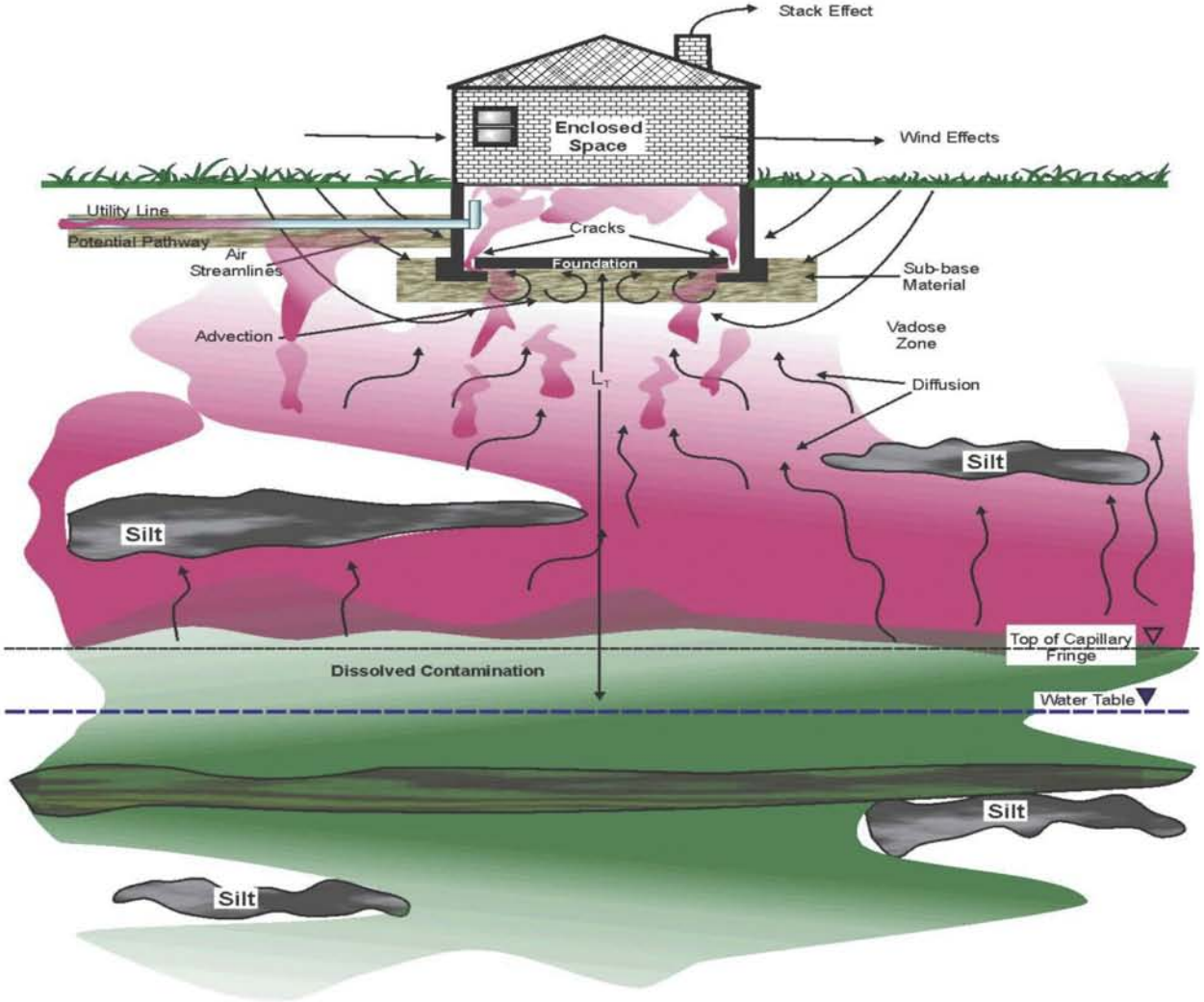

Figure B-1. Example of Conceptual Site Model cross section diagram illustrating potential subsurface vapor intrusion pathways