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NSA PANAMA CITY
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TECHNICAL MEMORANDUM REGARDING PATH FORWARD FOR SITE G300 AT NSA PANAMA CITY FL

1/3/2013

TETRA TECH INC

TETRA TECH

To: Project Team

From: Larry Smith

Subject: **Site G300**

Date: Jan 3, 2013

Overview:

- Contamination is from an over fill of a day tank in 1996.
- The contaminant is diesel fuel.
- The media of concern is soil and groundwater.
- The fuel has migrated beneath the foundation of G300 which is 24 inch thick concrete.
- SCTLs are in exceedance only near the water table.
- LUCs are established.

Goal: Monitor the Site which currently has an SRCR until SCTLs and GCTLs are below criteria.

Path forward: Review data as required by SRCR with aim of removing LUCs and site closure if possible when SCTLs and GCTLs meet criteria.

History: The Navy Experimental Diving Unit Ocean Simulation Facility is located at Building 300. A 2500 gallon UST was installed in 1970 about 50 feet south of Building G300. On September 7, 1996, the day tank used to store diesel fuel for an emergency generator located in Building 300, was overfilled during refueling. The day tank, which has a float level and is equipped with a piping system which returns excess fuel to the source tank, could not accommodate the seven gallon per minute delivery rate of the emergency generator fuel pump, which was operated in the manual mode during the refueling of the tank. As a result, fuel was displaced into the day tank vent pipe, which extends outside Building 300, at the southwest corner of the building, approximately 10 feet above the top of the day tank. Eventually, fuel reached the end of the vent pipe, spilling to the ground at the southwest corner of Building 300 (Commanding Officer, Navy Experimental Diving Unit, 1996).

During the refueling of the tank, the pump was left unattended. Approximately one hour after the pump had been left unattended, a diesel fuel spill was discovered on the floor beneath the day tank and the pump was deactivated. Less than two quarts of diesel fuel had spilled on the floor and the spill was immediately cleaned up with absorbent pads. At the time, personnel were not aware a spill had occurred outside of Building 300. The spill outside the building was discovered on September 16, 1996, by a Florida State inspector who was at the site to inspect an unused underground storage tank which was being removed and noticed the smell at the site of the spill (Commanding Officer, Navy Experimental Diving Unit, 1996).

The Navy estimates approximately 132 gallons were spilled during the refueling of the day tank on September 7, 1996. This estimate is based on review of inventory records and fuel

consumption rates for the outside diesel fuel tank from March 28, 1996 (Commanding Officer, Navy Experimental diving Unit, 1996).

The UST G300 was not regulated, therefore no structural integrity testing of the tank and lines was performed on the diesel UST system. At the time the UST was removed in September 1996, the tank was observed to be in good condition.

The outside spill was discovered on 16 September, 1996, by an inspector from the FDEP who was at the facility to oversee the removal of the unused UST. The FDEP inspector noticed the smell of diesel in the vicinity of the vent lines. An Interim Remedial Action (IRA) was initiated to remove the contaminated soil. While performing the IRA the consultant discovered what appears to be old contamination which could have been the result of previous overfills of the day tank or the former UST. (AOC 27 old CAP/Capnav.doc)

Synopsis of Site History:
1996
On September 20, 1996, Southern Earth Science Company of Panama City, Florida installed 17 soil borings to assess soil quality at the UST system tank field along the product line, and near the southwest corner of Building 300. Samples were collected from each of the borings for field screening with an organic vapor analyzer (OVA) The results of the field screening indicated "excessively contaminated soil," as defined by Chapter 62-770, FAC, at the southwest corner of Building 300. The soil contaminant plume was approximately 4 feet wide by 25 feet long and extended along the southwest corner of the building, sidewalk, and possibly under the building. In September 1997, an Initial Remedial Action (IRA) was performed to remove "excessively contaminated soil". During the IRA, soil excavation was halted after it became apparent the amount of "excessively contaminated soil" observed during the excavation, may have resulted from various generator day tank overfills.

During removal of the UST system, the US Navy Public Works Center (PWC) collected seven soil samples for hydrocarbon vapor screening using an organic vapor analyzer (OVA). The soil samples were collected at depths of 2 feet, 4 feet, and 8 feet bls from within the tank excavation. Soil vapor screening samples were collected from each side and the bottom of the tank excavation. Results of the soil screening identified no soil hydrocarbon vapors in soil samples collected from the vadose zone.

1997
A temporary monitoring well was placed at the center of the UST excavation and groundwater samples were collected on March 25, 1997. Groundwater samples collected from the temporary monitoring well were analyzed using US Environmental Protection Agency (USEPA) Methods SW-846, 8260 and 8270. Results of the sampling reported no petroleum constituents above state target levels for storage tank closure. Groundwater concentrations of chloroform, bromodichloromethane, and dibromochloromethane were reported at levels below the State of Florida Drinking Water Standards.

An (IRA) was initiated to remove contaminated soil. A contamination assessment was conducted and a Contamination Assessment Report (CAR) submitted to the Florida Department of Environmental Protection (FDEP) in August 1997. The Site Assessment Report (SAR) Addendum recommending Natural Attenuation Monitoring was submitted to the FDEP in December 1998. The FDEP concurred with the recommendation in a Natural Attenuation Monitoring Plan Approval Order was issued on February 23, 1999.

1999
The first semi-annual monitoring event was conducted in June 1999. The second semi-annual monitoring event was conducted in November 1999. During the second semi-annual monitoring

event, diesel fuel was detected in the source monitoring well. As a result, the monitoring program was discontinued and interim diesel fuel recovery was initiated in April 2001.

2003

A Remedial Action Plan (RAP) was submitted to the FDEP on March 28, 2003. The RAP recommended Aggressive Fluid Vapor Recovery (AFVR) using a Navy owned trailer-mounted dual-phase extraction system to address the diesel fuel at Building G300. A RAP Approval Order was issued by the FDEP on May 29, 2003, concurring with the recommendations proposed in the RAP and directing the Navy to proceed with implementation of remedial action to address diesel fuel remaining at the site.

2004

Interim diesel fuel recovery was performed from July through September 2003 while waiting for funding to implement the RAP. A CTO to implement the RAP through an AFVR treatability study (TS) was awarded by the Navy in May 2004. The AFVR trailer refurbishment was completed in July 2004. The AFVR TS was initiated on August 17, 2004.

From August 17, 2004 to November 18, 2004, diesel fuel recovery and diesel fuel monitoring events were conducted on an alternating two week schedule. During the two events conducted in October 2004 (October 7 and October 21, 2004), the product thickness was less than 0.01 foot (ft) in monitoring well PCY-300-MW01 and no product was detected in any other monitoring well. During the two events conducted in November 2004, no product was detected in any monitoring well during the November 8, 2004 visit, and the product thickness was less than 0.01 ft during in PCY-300-MW01 during the November 18, 2004 visit. No product has been detected in any site monitoring well since the November 18, 2004 site visit. Therefore, the diesel fuel recovery events were discontinued in November 2004.

In accordance with the specifications provided in the RAP, if no diesel fuel is observed two months after an AVFR event, then Post-Active Monitoring per 62-770.750 Florida Administrative Code (F.A.C.) shall be implemented. Since no diesel fuel has been detected at the site since November 18, 2004, it has been agreed to discontinue the AFVR and implement post active remediation monitoring. A TS Evaluation Report recommending the implementation of a post active remediation monitoring program was submitted to the FDEP in May 2005.

2005

August 2005, 1st Quarter Groundwater Monitoring Report, based on 1 July sampling event recommending further monitoring as per TS Evaluation Report.
December 2005, 2nd Quarter Groundwater Monitoring Report based on 29 September sampling event recommending further monitoring as per TS Evaluation Report.

March 2005, 3rd Quarter Groundwater Monitoring Report based on 21 December 2005 sampling event recommending further monitoring as per TS Evaluation Report.

During the one year period, July 2005 to April 2006, four monitoring wells at G300 were sampled every three months or each quarter. Analytical data obtained during this period showed mixed results, described below. Groundwater contaminants were not detected in any of the quarterly sampling rounds at concentrations exceeding regulatory criteria in groundwater samples collected from monitoring well PCY-300-MW03.

During the 1st quarter groundwater sampling, one VOC, benzene, was detected in the groundwater sample from monitoring well PCY-300-MW01 at a concentration of 1.5 micrograms per liter (µg/L). This is greater than the benzene Groundwater Cleanup Target Level (GCTL) of 1.0 (µg/L). During subsequent sampling events, ethylbenzene was also detected above the

GCTL. Xylenes were also detected, but not above the GCTL. Additionally, during the next three sampling events polynuclear aromatic hydrocarbons (PAHs) Naphthalene, 1-Methylnaphthalene, and, 2-Methylnaphthalene exceeded their GCTLs (GCTL is 20 µg/L) in groundwater samples collected from PCY-300-MW01.

Benzo(a)anthracene was detected once at 0.2 µg/L (GCTL is 20 µg/L), in a sample collected from PCY-300-MW02 during the second quarter sampling. Benzo(a)anthracene and dibenzo(a,h)anthracene, were detected at 0.2 µg/L (GCTL is 20 µg/L) and indeno(1,2,3)pyrene was detected at 0.2 µg/L (GCTL is 0.2 µg/L), in a sample collected from PCY-300-MW04 during the second quarter sampling. No contaminants of concern (COCs) were above GCTLs in groundwater samples collected from PCY-300-MW04.

Samples collected during the 3rd quarter event showed that Volatile Organic Compounds (VOC), PAH and total recoverable petroleum hydrocarbons (TRPH) constituents were detected in the source monitoring well PCY-300-MW01 and in the perimeter monitoring well PCY-300-MW02. The VOC constituents, benzene, ethylbenzene and xylene were detected in monitoring well PCY-300-MW01 at concentration of 1.0 µg/L (GCTL is 1.0 µg/L), 24.0 µg/L (GCTL is 30 µg/L) and 3.0 l µg/L (GCTL is 20 µg/L), respectively. TRPH was detected at a concentration of 4.5 milligrams per liter (mg/L) (the GCTL is 5.0 mg/L).

2006

In May 2006, Annual Groundwater Monitoring Report based on 28 March 2006 sampling event was issued. During fourth quarter sampling event 0.33 ft product was detected in the source well. Due to the presence of free product in this well, PARM was no longer in effect at this site.

In response to this turn of events, data from previous investigations were reviewed. The selected path forward was to perform ten weeks of bailing groundwater from PCY-300-MW01 to draw free product to the well, if possible, and begin quarterly sampling to determine whether contamination is still present.

TtNUS recommended the site revert to a no further action with controls status as defined in the Petroleum Risk Based Action (RBCA) 62-770, F.A.C. Option IIA. This option stipulates that "free product may remain within the property boundary provided: 1.) Source removal is not feasible, and 2.) Institutional controls and, if required, engineering controls are used to protect human health, public safety, and the environment.

2007

On October 12, 2007, TtNUS personnel mobilized to Building G300 to conduct the first quarter monitoring event. Bailing, monitoring, and sampling activities were conducted for this field event and the subsequent nine events in accordance with the FDEP's Standard Operating Procedures for Field Activities (DEP-SOP-001/01). Upon completion of all ten field events, it was evident that free product was not detected in PCY-300-MW01.

Prior to the beginning of the monitoring activities, a Wellboom was placed in monitoring well PCY-300-MW01, where there had previously been free product. The Wellboom is essentially a sock filled with organic material that works by providing a nutrient material to bacteria that would, in turn, consume free product. The Wellboom is designed to promote rapid bio-degradation of the free product. When the Wellboom is depleted, it is replaced and this process is repeated until the free product has been consumed. The Wellboom was not effective. This may be due to sterile or bacteria-free groundwater conditions. There has been no significant change in dissolved contaminant concentrations in the groundwater.

2008

The water level data collected during four quarterly sampling events (February 13, 2008; June 11, 2008; November 23 & 25, 2008; and January 20, 2009) indicate groundwater flow in the Building G300 area is generally to the southeast towards St. Andrew Bay. This flow direction is consistent with previously reported groundwater flow data and basewide potentiometric surface maps.

The chemical contaminants detected in well PCY-300-MW01 are consistent with the presence of petroleum hydrocarbons and are concluded to be evidence of contamination from this free product. Concentrations of COCs above groundwater cleanup target levels (GCTLs), including polynuclear aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and total recoverable petroleum hydrocarbons (TRPHs) persist in PCY-300-MW01 and free product is frequently encountered in the well. Remedial action for this well included ten weeks of bailing in an attempt to remove free product and the subsequent installation of a Wellboom for approximately one quarter. The Wellboom was removed because its presence did not allow for accurate free product measurement and appeared to be ineffective. All other monitoring wells in the study area are free of detections or do not exceed FDEP regulatory criteria. The extent of petroleum related chemical contamination at unacceptable concentrations in groundwater appears to be limited in spatial extent to the area near PCY-300-MW01. Downgradient well PCY-300-MW02, located approximately 60 feet from PCY-300-MW01, has the second highest number of detections, but did not exceed regulatory criteria during the recently completed 4 quarterly monitoring rounds.

During the monitoring period, February 2008 to January 2009, four monitoring wells at Building G300 have been sampled, per event, on a quarterly basis. The four wells sampled in each round were selected from the following five wells: PCY-300-MW01, PCY-300-MW02, PCY-300-MW03, PCY-300-MW04 and PCY-300-MW05. Exceedances of FDEP criteria were reported from monitoring well PCY-300-MW01 exclusively, which was sampled in every round. In addition, water levels were measured in all five monitoring wells and nearby piezometers PZ01, PZ02 and PZ01. PCY-300-MW01 was only sampled during the first- and second-quarter events because the presence of free product in that well precluded sample collection during the third and fourth events.

June 16th, 2009 Annual Groundwater Report Recommendations

Over a 9 year period Site G300 has been assessed with the intent of developing a remedial action. The site is difficult to assess due to the ephemeral nature of the floating product and the difficulty of assessing the plume beneath the 4 foot thick foundation of the Site building. After reviewing the historical data the stake holders have concluded a typical RAP will not adequately address contamination and that Land Use Controls should be applied while the site receives limited but sufficient monitoring for the protection of human health and the environment in the future. This conclusion is based on decreasing volume of floating product detected in the source well combined with decreasing dissolved contamination trends as shown most recently over the last four quarters of groundwater analytical data.

For the reasons described above TtNUS recommends an end to the current monitoring program, but with continued monitoring as described below.

> Source removal is not feasible so land use controls (LUCs) to restrict digging and groundwater use should be established to protect human health, public safety, and the environment until "no further action" (NFA) status is granted.
>
> Until an NFA status has been reached, monitoring well PCY-300-MW01 should be monitored quarterly for floating product which, if detected, should be bailed weekly until the

product is gone. If these conditions would not be met, LUCs with conditions would be implemented.

In addition to monitoring for floating product the groundwater at the site should be monitored annually by sampling monitoring well PCY-300-MW01 and two existing downgradient monitoring wells (PCY-300-MW02, and PCY-300-MW05) for the PAH, VOC, and TRPH COCs.

After one year of monitoring, the free product survey and groundwater analytical results should be used to review the site status. Depending on the results, two possible options are anticipated as described below. The actual approach, however, would depend on site conditions at that time.

Option 1: Implement a LUC with conditions. If free product and groundwater contamination trends remain at current levels or decrease (free product seems to be disappearing and groundwater contaminants are near Groundwater Cleanup Target Levels or GCTLs) then a LUC with conditions will be issued for the site.

Option 2: Implement a Site Rehabilitation Completion Order (SRCO) without conditions depending on what the data support in accordance with FDEP criteria. If the data support the conclusion that free product is no longer at the site, contaminant concentrations in groundwater are below the respective GCTLs for the annual sampling event, and contaminant concentrations in groundwater are below the respective GCTLs in the following two quarterly sampling events (April and July 2010) then a Site Rehabilitation Completion Report (SRCR) will be submitted to the FDEP requesting an SCRO without conditions and the LUCs will be removed (please see Chapter 62-770.680 for details) If these conditions would not be met, LUCs with conditions would be implemented.

In addition to the above recommendations, to assess the impact of soil contaminants leaching to groundwater, collection of up to twelve confirmatory soil samples (two samples from each of 6 locations yet to be determined) is recommended (Figure 1). These soil sample locations will allow soil contaminant concentration comparisons of the source area to adjacent areas and will be used to establish the lateral extent of soil contamination. The soil samples will be analyzed for the PAHs, VOCs, and TRPHs. These data will be useful in supporting a FDEP 62-770 F.A.C. Risk Management Option IIC, "No further action with controls" scenario. Because the area adjacent to the building is small, this sampling density will provide ample opportunity for detecting contaminants in soil if any significant contamination is present. The soil and groundwater data together should provide a complete assessment of site conditions.

June 7, 2001: Annual Monitoring Report Conclusions

The following conclusions pertain specifically to the previous four quarterly monitoring events and generally to the historical data preceding the 2009-2010 year.

The analytical results for soil samples collected at Building G300 on November 18, 2009 were compared to the appropriate Soil Cleanup Target Levels (SCTLs) and action levels. TPH exceeded SCTLs as shown in Table 3 and depicted in Figure 3 (Appendix C-1) in location one, depths 8 and 8.5 feet (samples SB001-8 and SB001-8.5) and location two at 8.5 feet (SB002-8.5). Soils at this depth are grading moist to wet and are likely impacted by contaminated groundwater rather than downward infiltration of contaminants from shallower depths where no exceedances of SCTLs were detected. No other analytes exceeded their respective SCTLs in any samples (Table 3, Appendix C-1).

Selected soil samples for which FDEP SCTLs were exceeded for TRPH were analyzed by the Total Petroleum Hydrocarbon Criteria Working Group Method (TPHCWG). Results of the

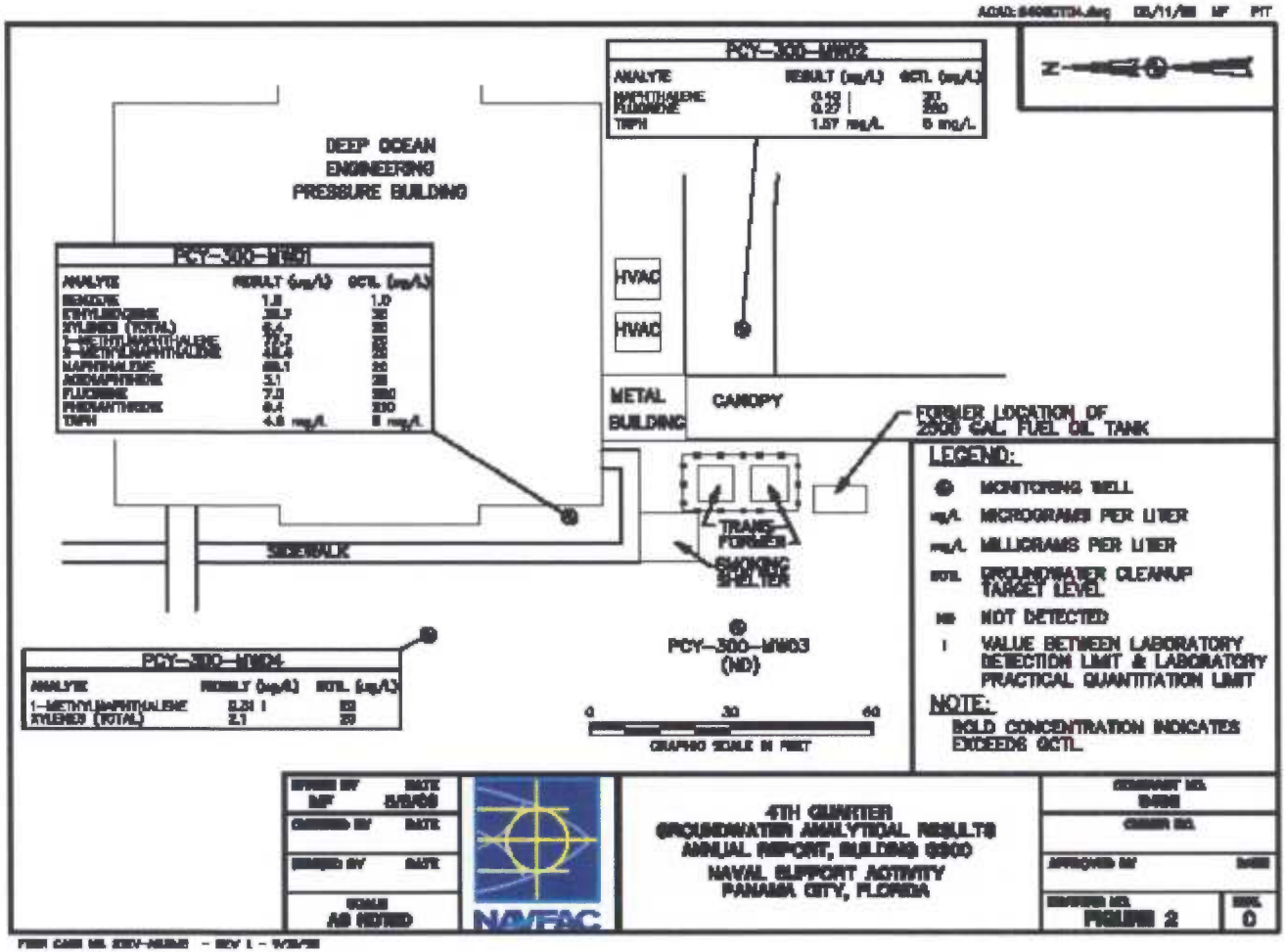
TPHCWG fractional speciation allow for direct comparison the FDEP SCTLs and are found in Table 4, Appendix B. All soil samples were less than FDEP SCTL residential criteria. Three TRPHs organic ranges exceeded FDEP SCTL industrial criteria in the sample collected from 8 feet below land surface: the C12-C16 aliphatics, C16-C21 and C21-C35 aromatics range were detected at 4800, 4000 and 2600 mg/kg exceeding the FDEP residential limit of 2900, 1500 and 1300 mg/kg respectively.

During low rainfall periods the site water table typically forms a nearly flat surface allowing for two interpretations of flow direction depending on very slight water table elevation differences. Groundwater flow direction is either to the southeast or southwest, both interpretations resulting in water flowing to local water bodies and past potential down gradient monitoring wells PCY-300-MW03 to the southwest or PCY-300-MW02 and PCY-300-MW05 to the southeast. To be protective of human health and the environment it should be assumed this water table condition will be consistent requiring the any additional monitoring to include these three wells.

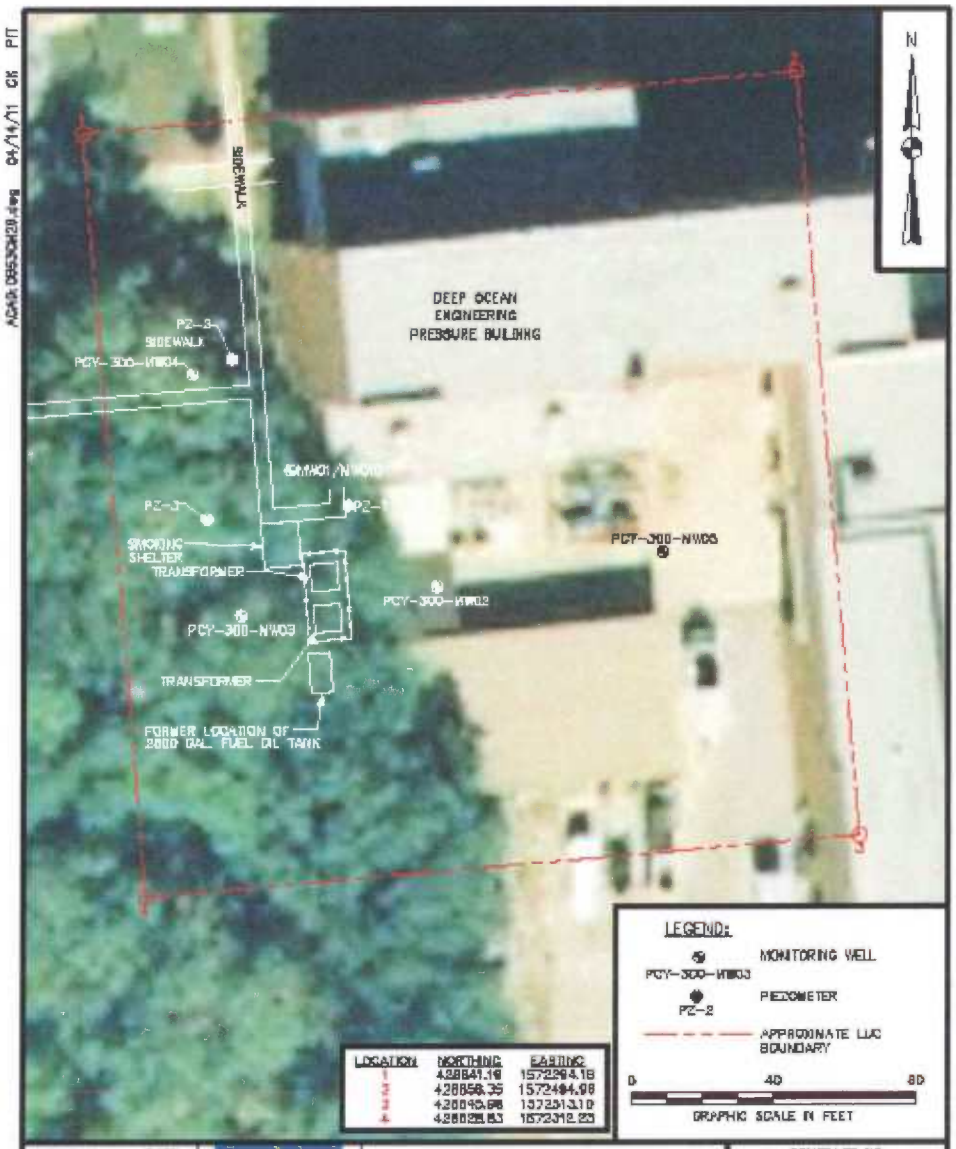
Comparing the recent historical groundwater data [(2008 to 2009) Appendix B] with the 4th Quarter groundwater sampling event, contaminant concentrations are low in samples collected from the source well PCY-300-MW01. The results are typically just above GCTLs when detected and on average only occur in the source well.

RECOMMENDATIONS

Recently contaminant concentrations in PCY-300-MW01 have only slightly exceeded the GCTL for TRPH. Additional active remediation is technically infeasible due to the contaminants location beneath and adjacent to the deep ocean engineering buildings three foot thick slab foundation. Soil contamination to a depth of approximately 6 feet below land surface was free of FDEP SCTL exceedances. Deeper soils associated with surficial groundwater contamination were found to exceed SCTLs. Considering these factors, remediation would not likely remove all residual contamination or be cost effective. Based on the results of all previous monitoring events, and a review of the historical data for this site, Tetra Tech recommends that a Site Rehabilitation Closure Report be submitted to FDEP requesting a Site Rehabilitation Closure Order to formally close Site G300 with land use controls to protect receptors from the groundwater contaminants. It is also proposed that monitoring wells PCY-300-001, PCY-300-002, PCY-300-003, and PCY-300-005 be sampled for TRPH and PAHs on a Bi-Annual (once every two years) basis for four years. At the five year LUC review, the data can be evaluated to determine the path forward. Appendix E details how these recommendations or selected measures will be implemented, maintained, and monitored.



PCY-300-MW02
ANALYTE
RESULT (ug/L)
GCTL (ug/L)
NAPHTHALENE
FLUORENE
TRPH
1.57 mg/L
5 mg/L
DEEP OCEAN
ENGINEERING
PRESSURE BUILDING
PCY-300-MW01
ANALYTE
RESULT (ug/L)
GCTL (ug/L)
BENZENE
ETHYLBENZENE
XYLENES (TOTAL)
1-METHYLNAPHTHALENE
2-METHYLNAPHTHALENE
NAPHTHALENE
ACENAPHTHENE
FLUORENE
PHENANTHRENE
TRPH
HVAC
HVAC
METAL
BUILDING
CANOPY
FORMER LOCATION OF
2500 GAL. FUEL OIL TANK
SIDEWALK
TRANS-
FORMER
SMOKING
SHELTER
PCY-300-MW03
(ND)
PCY-300-MW04
ANALYTE
RESULT (ug/L)
GCTL (ug/L)
1-METHYLNAPHTHALENE
XYLENES (TOTAL)
0
30
60
GRAPHIC SCALE IN FEET
LEGEND:
MONITORING WELL
ug/L MICROGRAMS PER LITER
mg/L MILLIGRAMS PER LITER
GCTL GROUNDWATER CLEANUP TARGET LEVEL
ND NOT DETECTED
I VALUE BETWEEN LABORATORY DETECTION LIMIT & LABORATORY PRACTICAL QUANTITATION LIMIT
NOTE:
BOLD CONCENTRATION INDICATES EXCEEDS GCTL.
DRAWN BY
DATE
CHECKED BY
DATE
DESIGNED BY
DATE
SCALE
AS NOTED
NAVFAC
4TH QUARTER
GROUNDWATER ANALYTICAL RESULTS
ANNUAL REPORT, BUILDING G300
NAVAL SUPPORT ACTIVITY
PANAMA CITY, FLORIDA
CONTRACT NO.
CHECK NO.
APPROVED BY
DRAWING NO.
FIGURE 2
REV.
0

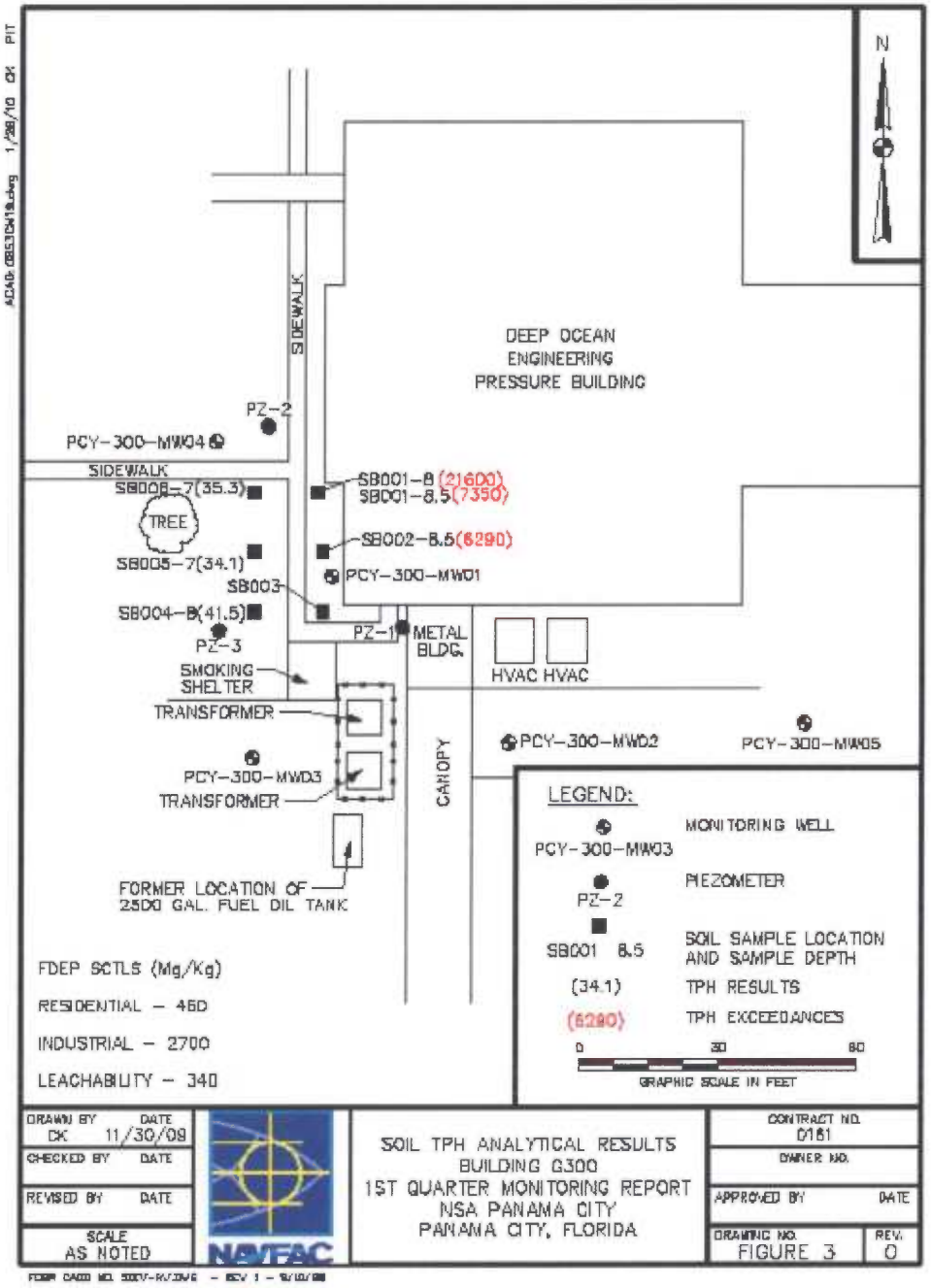


LOCATION	NORTHING	EASTING
1	428841.19	1572294.18
2	428858.35	1572494.98
3	428845.98	1572313.10
4	428828.83	1572312.23

DRAWN BY CK	DATE 03/01/10	LUC BOUNDARY BUILDING C300 ANNUAL MONITORING REPORT NSA PANAMA CITY PANAMA CITY, FLORIDA	CONTRACT NO. 0161
CHECKED BY	DATE		OWNER NO.
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4 / REV. 0

NAVFAC

FORM CADD NO. SDIV-AV.DWG - REV 1 - 8/10/98



DRAWN BY CK DATE 11/30/09	NAVFAC	SOIL TPH ANALYTICAL RESULTS BUILDING G300 1ST QUARTER MONITORING REPORT NSA PANAMA CITY PANAMA CITY, FLORIDA	CONTRACT NO. 0161
CHECKED BY DATE			OWNER NO.
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3 REV. 0