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**FINAL
SAMPLING STRATEGY
FOR OU2, SITE 10, HOT SPOT NO. 2
MCAS CHERRY POINT, NORTH CAROLINA**

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FIGURE 1– PROPOSED SOIL SAMPLING LOCATIONS

FIGURE 2 – PROPOSED SCHEDULE

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1.0 BACKGROUND

The Marine Corps Air Station (MCAS) Cherry Point is located in southeastern Craven County, North Carolina, just north of the town of Havelock. The Air Station encompasses approximately 13,164 acres and is situated on a peninsula north of Core and Bogue Sounds and south of the Neuse River. It is bounded on the east by Hancock Creek, on the south by North Carolina Highway 101, on the west by an irregular boundary line approximately three-quarters of a mile west of Slocum Creek, and on the north by the Neuse River.

Historically, Site 10 is located in the Old Sanitary Landfill, west of Roosevelt Boulevard, south of the Sewage Treatment Plant (STP), north of the Auto Hobby Shop, and east of Slocum Creek. Site 10 is divided by Turkey Gut, a small perennial stream that flows northwest into Slocum Creek. The site consists of a sanitary landfill, former sludge impoundments, and a former drum storage area. The sanitary landfill comprises the largest portion of the site and covers approximately 40 acres. The Old Sanitary Landfill served as the primary disposal site at the Air Station from 1955 until the mid-1980. Contaminated material disposed of at the landfill included petroleum, oil, and lubricants (POLs) that were land applied, burned, stored in unlined pits, and buried. The southern portion of Site 10 was used for fire training exercises.

1.1 REMEDIAL TECHNOLOGY DEVELOPMENT SUMMARY

The OU2, Site 10 area was investigated and characterized between 1994 and 1996 and documented in the Remedial Investigation (RI), Operable Unit 2 (Brown & Root Environmental, March 1997). Based on the site characterization results, a Proposed Remedial Action Plan (PRAP) was prepared in July 1997 by Brown & Root. The PRAP contained a review of potential remedial technologies and recommended strategies leading to site closure. Brown & Root also released a Feasibility Study (FS) in July 1997.

The Record of Decision (ROD) for the site was signed in August 1999 requiring implementation of remediation measures to remove contaminants from site soils. The cleanup requirements stated in the ROD were based on soil sampling results that indicated elevated concentrations above North Carolina S-3 soil cleanup standards.

The major components of the remedy as presented in and required by the ROD are:

- Monitored natural attenuation of groundwater (utilizing long-term monitoring to evaluate the effectiveness of the natural attenuation process);
- Soil vapor extraction at major soil "hot spots" (secondary source areas to groundwater); and
- Institutional controls.

For purposes of achieving site closure, Hot Spots 1, 2, 3, and 4 were defined based on previous soil contamination studies. Based on data from previous site investigations and discussions with Environmental Protection Agency (EPA) and the North Carolina Department of Environment and Natural Resources (NCDENR), it was concluded the VOCs were present at concentrations in soils indicating secondary contamination potential to groundwater.

Subsequently, based on the site conditions observed during the Remedial Investigation (RI) and results of sampling performed during the RI, it was concluded that an SVE system would be the most effective remedial alternative for reducing levels of VOCs in soil to below regulatory limits.

A remedial system was installed as per the ROD to remediate VOCs in soil such that the potential for impacting groundwater resources would be minimized. The installation of the remedial system was documented in a Remedial Action Report (RAR) prepared by OHM/IT (December 2000), which describes the construction and installation of the soil vapor extraction system at the site.

1.2 SYSTEM OPERATION SUMMARY

The SVE system was installed by Shaw/OHM in December 1997 and operated by Shaw/OHM until September 2003, at which time TMS took over Site 10 operations. In July 2003, as a result of diminishing soil contamination, the system was deactivated at the direction of the Navy and with concurrence of the EPA and NCDENR. Once the system was shut down, TMS performed weekly visual inspections of the system. In January 2004, Shaw removed the SVE system blower. TMS discontinued the weekly visual inspections in April 2004. The remaining components of the SVE system remain at the site with the exception of the blower unit.

1.3 CHARACTERIZATION STUDY SUMMARY

Initial site characterization soil sampling was performed during the RI phase of the remediation process. Subsequent soil sampling conducted at the site was performed to evaluate the SVE effectiveness at achieving the required clean up goals. The criteria for determining system performance and effectiveness was determined to be the reduction of certain VOCs in soil below target cleanup levels in each of the four Hot Spot areas.

The *Long Term Remedial Action Plan, OU2 Site 10 Soils (LTRA)* (May 1999/Rev. February 2000, April 2002) document presents the soil sampling procedures to be followed for closure sampling at the Site 10 Hot Spot Areas. The LTRA indicates that soil samples are to be collected from each boring location at two-foot intervals (3-5, 5-7, 7-9, 9-11, 11-13, and 13-15) to a total depth of fifteen feet or until groundwater saturation is reached. Each interval is then composited and screened with a FID/PID for total VOC headspace analysis, and the sample exhibiting the highest headspace reading from each boring location is submitted for laboratory analysis.

Upon implementation of the SVE system, two rounds of confirmatory sampling were performed in order to evaluate the effectiveness of the SVE remediation. The first round of confirmatory soil sampling was performed in February and March of 2000. The system continued to operate through to the next round of soil sampling conducted in January 2003. These soil samples were collected at designated locations to evaluate system performance and evaluate remediation efficiency. Based on the review of the 2000 and 2003 reports associated with the soil sampling, it appears that the sampling was performed in accordance with LTRA.

In January 2004, soil samples were collected at Hot Spots 1, 2, 3, and 4 to quantify the contamination levels present in soils at these locations. The samples were collected in close proximity to previous soil sampling locations and in accordance with the LTRA. The results of the January 2004 sampling indicate increases in certain VOCs in Hot Spots 2 and 3, but no increases in Hot Spots 1 and 4. It was recommended that sampling continue in the "hot" areas of Hot Spots 2 and 3 and that the soil sampling be discontinued in areas where no contamination was detected. The recommendation was accepted, and two sample locations were added to Hot Spots 2 and 3, for a total of six sample locations for the next round of sampling.

Soil sampling and analysis was performed in April 2005 in accordance with the LTRA. The soil samples were collected at the locations within Hot Spots 2 and 3, as recommended in the *Technical Memorandum Report, OU-2 - Site 10, SVE System - Hot Spot Areas 1, 2, 3, and 4, January 2004 Soil Sampling,* dated April 2005 by Rhēa.

Sampling indicated a significant decrease in VOCs in Hot Spot 3, and a decrease in Hot Spot 2. Rhēa concluded in the *“Technical Memorandum Report, OU-2 - Site 10, SVE System - Hot Spot Areas 1, 2, 3, and 4, April 2005 Soil Sampling,”* dated August 2005, that sampling should continue at the three Hot Spot 2 sample locations at the same sample depths where the exceedances occurred (3 to 5 feet bgs), and that sampling be discontinued at Hot Spot 3.

Soil sampling and analysis were performed at Hot Spot 2 in January 2006 as recommended in the *“Technical Memorandum Report, OU-2 - Site 10, SVE System - Hot Spot Areas 1, 2, 3, and 4, April 2005 Soil Sampling,”* dated August 2005 by Rhēa. Three soil samples were collected and analyzed at Hot Spot 2 from the same locations and depths (3 to 5 feet bgs) as the 2005 sampling event. The results of the January 2006 sampling indicated that the detectable contaminant levels for the ROD Soil Performance Standards had decreased at Hot Spot 2 since the 2005 sampling event. Benzene exceeded the cleanup goal values in all three locations, and Vinyl Chloride exceeded the goals in HS2-SB11. No other contaminants exceeded the goals, so it was recommended that sampling continue in 2007, but that only Benzene and Vinyl Chloride be reported.

Soil sampling and analysis were performed in November of 2006, which coincided with groundwater sampling performed at the site at the same time. Three soil samples were collected and analyzed at Hot Spot 2 from the same locations and depths (3 to 5 feet bgs) as the April 2005 and January 2006 sampling event. The November 2006 sampling and analysis conclusively found that Benzene exceeded the cleanup goal values in HS2-SB11 and Vinyl Chloride exceeded the goals in HS2-SB13. In HS2-SB13, Benzene was not detected in the primary sample with a detection limit slightly above the cleanup goals, but was detected in the duplicate sample below the cleanup goal. The detection limit for sample HS2-SB12 was 1170 ppb for both Benzene and Vinyl Chloride, several orders of magnitude greater than the cleanup goal. Since the laboratory only reported Benzene and Vinyl Chloride (as requested), Rhēa requested a report of all constituents for HS2-SB12. Constituents exceeding the cleanup goals in HS2-SB12 include Chlorobenzene, 1,4-Dichlorobenzene, cis-1,2-Dichloroethene, Ethylbenzene, Methylene Chloride, Naphthalene, and Trichloroethene. The detection limit of 159 ppb for Vinyl Chloride in HS2-SB11 was also much higher than the cleanup goal, but consistent with past analyses.

Based on the results observed in the OU2, Site 10, November 2006 soil sampling event and the fluctuations in VOC detection over the past sampling events, it was recommended that additional soil samples be collected around soil boring locations HS2-SB11, HS2-SB12, and HS2-SB13 at the same depth as these locations in the past (three to five feet) to determine the lateral extent of soil contamination. The following paragraphs detail the sampling strategy for delineating this area.

2.0 SITE 10 – HOT SPOT 2 SOIL SAMPLING

As agreed upon at the March 2007 Partnering Meeting, soil sampling will be conducted in the vicinity of Hot Spot No. 2 to delineate the impacted area. The information gathered from the soil sampling will be used by the Partnering Team to determine if a soil removal action should be considered to address Hot Spot No. 2. If the results do not allow for clear delineation the team will need to reconsider the data and determine the next actions required.

2.1 SAMPLE LAYOUT

Figure 1 shows the proposed sampling locations designed to delineate impacted soils at Site 10, Hot Spot No. 2, which includes collection of soil from 27 locations. Eleven samples, identified as Inner Sampling Points (ISPs), are located approximately ten feet from and surrounding the Long Term Monitoring (LTM) soil sampling locations HS2-SB13, HS2-SB12, and HS2-SB11. The remaining sixteen samples, identified as Outer Sampling Points (OSPs), are located along an outer perimeter approximately ten feet beyond the ISPs. The OSPs will only be analyzed in the event that the ISP laboratory results do not bound the impacted soil.

2.2 SOIL SAMPLING METHOD

The 27 delineation soil samples will be collected from Site 10 using a 4½ inside diameter (I.D.) hollow stem auger (HSA) and a standard 2-inch outside diameter (O.D.) split-barrel sampler. At each location, the split barrel sampler will be driven to obtain a representative sample from the 3 to 5 feet depth interval. Material from each one-foot interval (i.e., 3 to 4 feet, and 4 to 5 feet) will be screened using a Mini-RAE[®] PID to monitor the vapors emanating from the obtained soil. PID measurements will be logged in a field book or appropriate form. The sample interval indicating the highest organic vapor concentration at each location will be selected for laboratory analysis. If no organic vapors are detected from the sample location, the sample portion closest to 5 feet below the ground surface will be collected.

Work will be performed in accordance with Rhēa's Health and Safety Program. To minimize cross-contamination, sampling equipment will be decontaminated prior to initial use, and between sampling locations.

2.3 QUALITY CONTROL

Quality control samples will be collected in accordance with the updated “*Master Quality Assurance Plan*,” (AGVIQ/CH2MHILL) dated November 2004. Quality control samples include duplicates, matrix spike/matrix spike duplicate, trip blank, and equipment blank samples. One duplicate sample will be collected for every 10 samples submitted for laboratory analysis, while MS/MSD samples will be collected once for every 20 samples collected and submitted for laboratory analysis. Field equipment blanks will be collected at a frequency of one sample per day. In addition, an aqueous trip blank will be included with each sample shipment for VOC analysis.

2.4 SAMPLE COLLECTION PROCEDURES

Samples will be collected using a new sealed Encore[®] sampler or equivalent. The samples will be contained in sealed Encore[®] samplers, methanol preserved VOA vials, or equivalent. Sample containers will be properly labeled and cooled with ice for transport. Sampling personnel will wear a new pair of disposable gloves at each sampling location. Excess sample material will be returned to the borehole.

Sample containers will have blank labels, as supplied by the laboratory. Field personnel performing the sampling will fill out the labels at the time of sample collection. Information marked on the label will include:

- Sample identification;
- Collector's initials;
- Date of collection;
- Type of sample;
- Preservatives used; and
- Analyses to be performed.

The sample identification number will be of the following form:

Site name - Sample Location - Matrix liquid(L) or solid/soil(S) or gas(G)) –
sample number

For example, a sample collected from Site 10 may have the following identification number:

10-HS2-S-ISP2

Wastes (i.e., gloves, disposable sampling equipment, decontamination fluids) generated by sampling efforts will be collected and properly disposed of. Personal Protective Equipment (PPE) will be placed in heavy garbage bags and disposed of in a trash receptacle. Decontamination water will be disposed of in one of the POL Remediation Systems at MCAS Cherry Point.

2.5 LABORATORY ANALYSIS

Soil samples will be submitted to Accutest Laboratories, Inc. (Accutest) in Orlando, Florida for selected volatile organic compounds (VOCs) analysis using USEPA Method 8260. The laboratory will be instructed to perform the extraction for all samples, but only to analyze the ISPs. ISPs will be analyzed for the constituents exceeding the cleanup goals during the November 2006 sampling, including: Benzene, Vinyl Chloride, Chlorobenzene, 1,4-Dichlorobenzene, cis-1,2-Dichloroethene, Ethylbenzene, Methylene Chloride, Naphthalene, and Trichloroethene. In the event that the ISPs do not bound the impacted soil, the laboratory will be instructed to analyze the specified OSP samples required to bound the impacted soil. OSP samples will only be analyzed for the selected constituents that exceeded the cleanup goal in the adjacent ISP.

2.6 SAMPLE HANDLING

Handling of sample containers after completion of sampling will be minimized. Sample containers will be placed into shipping containers as soon as possible. Sample containers will be placed in plastic bags prior to placement into shipping containers. Packing will be provided between containers to avoid breakage. Shipping containers will be sealed with strapping tape to avoid tampering during transport to the laboratory. If shipped by common carrier, documentation (i.e., chain of custody [COC]) will be placed in a sealed plastic bag taped to the inside of the shipping containers.

Chemical samples will be maintained at approximately four degrees Celsius during shipping. Shipping containers will be insulated coolers and packed with wet ice (dry ice, blue ice, or chemical cooling packs will not be used). Chemical samples will be delivered or shipped to allow for receipt at the laboratory within 24 hours of packaging.

Samples will typically be considered non-hazardous substances and will be transported to the laboratory by commercial shippers (i.e., Federal Express, U.S. Mail, etc.). Shipping labels for non-hazardous substances will identify the samples as "soil/water/air samples."

2.7 SAMPLE CUSTODY

A COC record will be completed for each shipping container of samples. The COC record will typically be completed on a carbon-copy form provided by the laboratory. The record will, at a minimum, contain the following:

- Site name and address;
- Full name of sampler;
- Sample identification number for each sample;
- Date and time of collection for each sample;
- Sample matrix (liquid or solid);
- Number of containers for each sample;
- Description of sample location for each sample;
- Required analyses for each sample;
- Preservation for each sample, if required;
- Notation whether samples shipped on ice or not;
- Notation if sample is expected to be highly contaminated;
- Signature of person(s) involved in chain of possession; and
- Transfer date(s) and time(s) in chain of possession.

The preparer of the COC form, i.e., sampler, will retain a copy of the form and attach the form to daily field logs for the project.

If the samples are shipped by common carrier, the COC form will be placed in a sealed plastic bag inside the shipping container and the shipping container secured with strapping tape and a custody seal. Thus, in the case of the common carrier, two signatures will occur on the final COC; one signature by the preparer of the form, and one signature of the sample custodian assigned by the laboratory. The sample custodian assigned by the laboratory will open the shipping container and will denote any breaks to the custody seal of the shipping container and/or damage to the shipping container or sample containers on the COC form. Analyses will not be completed if sample seals are compromised.

2.8 LABORATORY MANAGEMENT OF SAMPLES

The laboratory sample custodian will assign a laboratory number to each sample (to be denoted on the COC), log in the sample in the laboratory logbook, and store the sample in a secured storage room or cabinet until assigned to an analyst for analysis. The sample shall be stored at conditions (i.e. four degrees Celsius if appropriate, etc.) and for

maximum holding times identified by 40 CFR 136, as appropriate (USEPA "Guidelines Establishing Test Procedures For The Analysis Of Pollutants").

The custodian will immediately contact the person completing the COC in the event the seal on the shipping container is broken, any discrepancies exist between the COC and sample labels, or any sample container is damaged. Problems noted by the sample custodian will be resolved with the sampler before the sample is assigned for analysis. Once the sample is received by the analyst, that person is responsible for its care and custody and that person should be prepared to testify that the sample was in his/her possession, or secured in the laboratory at all times until the analysis was performed.

2.9 SAMPLE DISPOSAL

The laboratory will dispose of all samples in accordance with the requirements the USEPA. The laboratory will be responsible for determination of whether each individual sample is "hazardous" or "non-hazardous" based upon guidelines established in 40 CFR 260. If deemed a hazardous waste by the laboratory, the sample and sample container will be disposed of at a facility permitted in accordance with the requirements of 40 CFR 264. If deemed a non-hazardous waste by the laboratory, the sample and sample container will be disposed of as a solid waste at a facility permitted in accordance with 40 CFR 257.

3.0 REPORTING

Upon receipt of analytical data, a data summary report will be prepared to summarize the delineation activities at Hot Spot No. 2. This report will include a summary of the field activities and procedures, a discussion of analytical results, and conclusions and recommendations based on the analytical results.

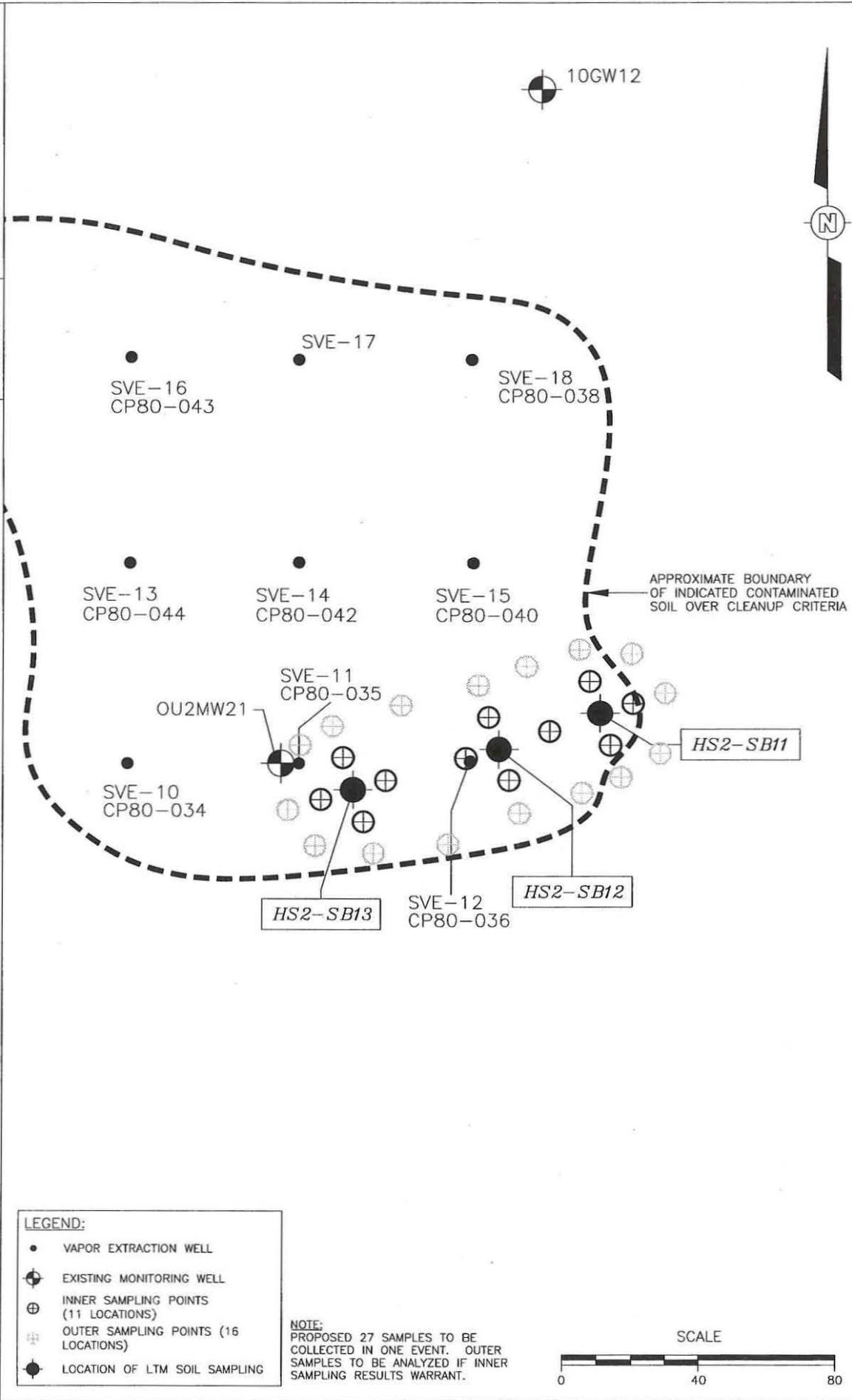
4.0 SCHEDULE

A project schedule is provided as Figure 2. It is anticipated that the sampling will take place in July, and the data review and reporting will be complete by mid-August 2007.

FIGURES

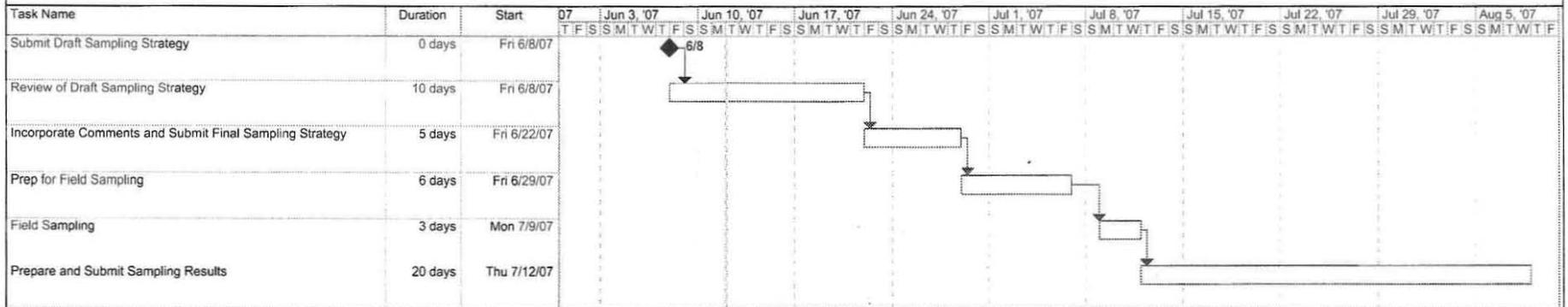
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DELIVERY ORDER NO. 0006		CONSTR. CONTRACT NO. N62470-04-D-5077		
NAVFAC DRAWING NO.		FIGURE 1		

Figure 2 - Proposed Schedule
Site 10 Delineation Sampling



Project: Draft Schedule
Date: Tue 6/12/07

Task Progress Summary External Tasks Deadline
 Split Milestone Project Summary External Milestone