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NAS CORPUS CHRISTI
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FINAL PHASE II SITE ASSESSMENT REPORT NALF CABINISS NAS CORPUS CHRISTI TX
9/16/1993
ENSAFE

**FINAL
PHASE II SITE ASSESSMENT
NALF CABINISS
NAS CORPUS CHRISTI, TEXAS**



Prepared for:

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1.0 INTRODUCTION

The following Phase II Environmental Assessment has been prepared by EnSafe/Allen and Hoshall (E/A&H) for the Southern Division Naval Facilities Engineering Command (SOUTHDIIV) as part of acquiring four parcels in the clear zone of Runway 31, NALF Cabiniss, Naval Air Station, Corpus Christi, Texas. This study is in response to an earlier Phase I investigation conducted by SOUTHDIIV which identified potential problems on the subject parcels. A general map of the site area is included as Figure 1.

1.1 Site Description and Background

The subject property consists of four parcels, identified as C-15, C-16, C-17, and C-18. All parcels were annexed into the City of Corpus Christi in 1989 as R1-B, Single Family Dwelling District, in accordance with city policy.

Parcel No. C-15

This approximately 4.7-acre parcel contains a two residences, one made of brick and one made of stone. It also has a garage reportedly used for automotive repair, a nearby hydraulic lift, and a trailer used as a horse stable. Approximately two-thirds of the property is used as a horse pasture/training area.

Parcel No. C-16

This approximately 2.3-acre parcel contains a concrete warehouse, two smaller storage buildings, and one above-ground storage tank. Two above-ground storage tanks have been removed from this parcel. One was a 5400-gallon fiberglass storage tank and its former location is currently devoid of vegetation. The other was a 500-gallon metal storage tank located next to the storage sheds. The warehouse appears to be used for selling prepackaged cleaning supplies and as a sales office. Approximately one-third of the property is being used for a farming operation,

Figure 1 Vicinity Map

including the remaining tank and the two storage buildings. Agricultural chemicals and petroleum products have been stored on the property.

The remaining property appears unused and is covered with native vegetation.

Parcel No. C-17

This approximately one acre parcel is a portion of a larger parcel where the owner lives. A 1,200-square foot barn on the land to be acquired is currently being used to store and mix pesticides before application. Other than the barn, the remainder of the property to be acquired consists of native vegetation.

Parcel No. C-18

This approximately 2.3-acre parcel contains a residence, an office building, and a garage occupying approximately one-half acre. The owner of the property operates two businesses selling polyethylene pipe from the office building and restoring old cars in the garage. The remaining portion is covered with native grasses. Several old car bodies are also present on the property.

1.2 Investigation Objectives

This investigation addressed potentially impacted areas in order to determine whether former activities on the subject property have adversely affected the soil quality around each parcel.

In order to accomplish this objective, the following tasks were implemented on all parcels:

- A total of 38 surface soil samples was collected with either a stainless-steel hand auger or a stainless-steel spoon.
- Each sample was analyzed in the field with a photoionization detector (PID) for organic vapor concentrations.
- All 38 samples were sent via overnight delivery for laboratory analysis.

2.0 FIELD INVESTIGATION

All sample locations were based on the probability of finding contamination within the soil because of physical evidence and migration potential at each parcel. This section describes the surface soil sampling activities at each parcel. Each sample is described by location and begins with the parcel number followed by the sample number (i.e., location 6 from Parcel 16 is described as sample 16-6). Appendix A is a photographic log of all sample locations.

2.1 Sample Locations

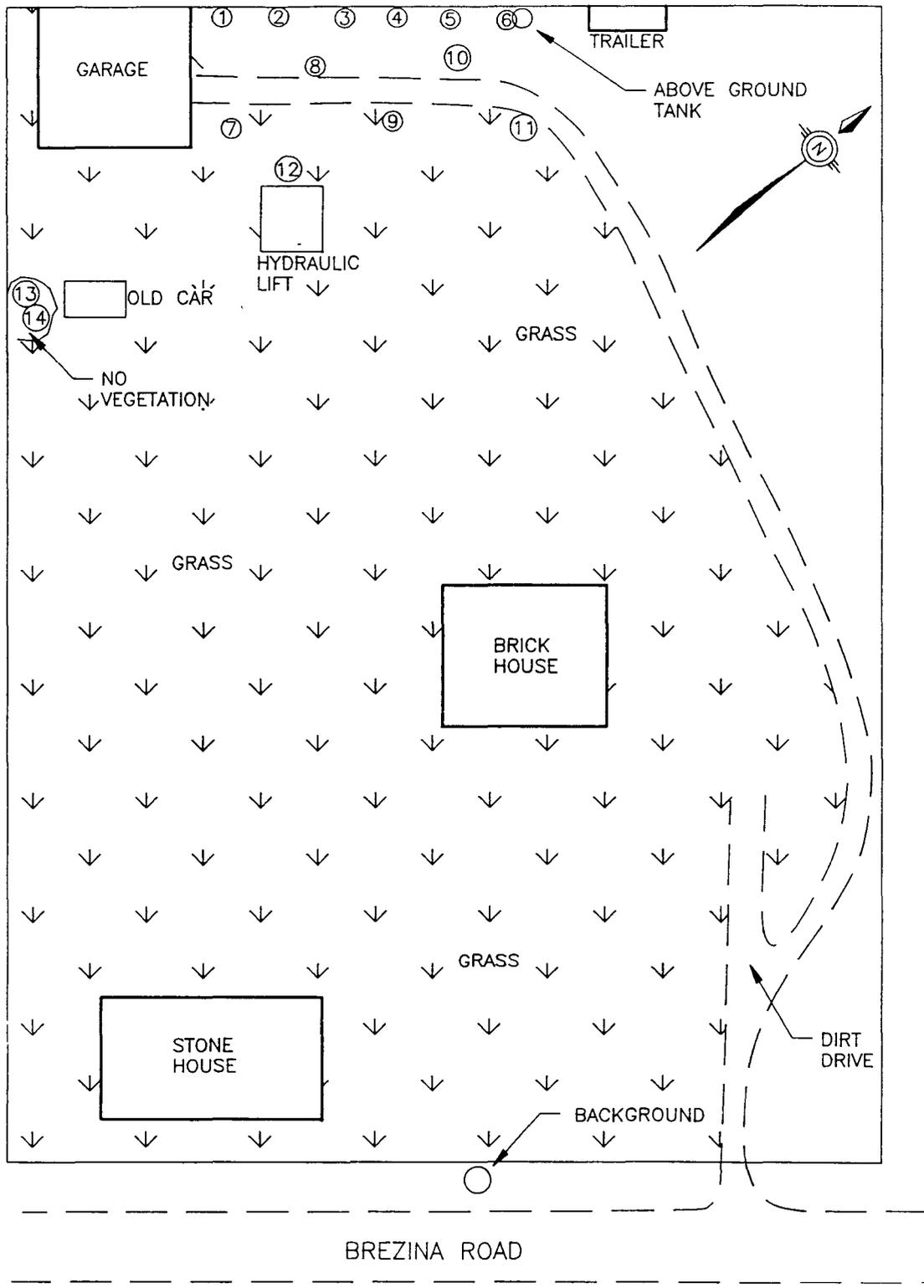
Parcel C-15

All surface soil samples at this parcel were collected with a stainless-steel hand auger (see Figure 2). Except for sample 15-5, all samples were analyzed for TPH (total petroleum hydrocarbons) and BTEX (benzene, toluene, ethylbenzene, and xylene). Samples 15-1 through 15-11 were collected adjacent to the garage in the back corner of the residential parcel where petroleum products have supposedly been disposed. Sample 15-12 was collected adjacent to the hydraulic lift. Samples 15-13 and 15-14 were collected next to an old car in an area uncharacteristically devoid of vegetation. A background sample collected near the front of the parcel between the fence and the small ditch adjacent to Brezina Road was submitted for total RCRA metals analysis.

Sample 15-5 had the highest PID reading and was submitted for VOC (volatile organic compounds), SVOC (semi volatile organic compounds), total metals, TPH, and pesticide analysis as required in the plan of action.

Parcel C-16

Surface soil samples at this parcel were collected with a stainless-steel hand auger (see Figure 3). Samples 16-1 through 16-3 were collected adjacent to the two storage buildings and were analyzed for TPH, VOC, and pesticides. Samples 16-4 and 16-5 were collected next to the former location of the above-ground storage tank and were analyzed for TPH and BTEX.

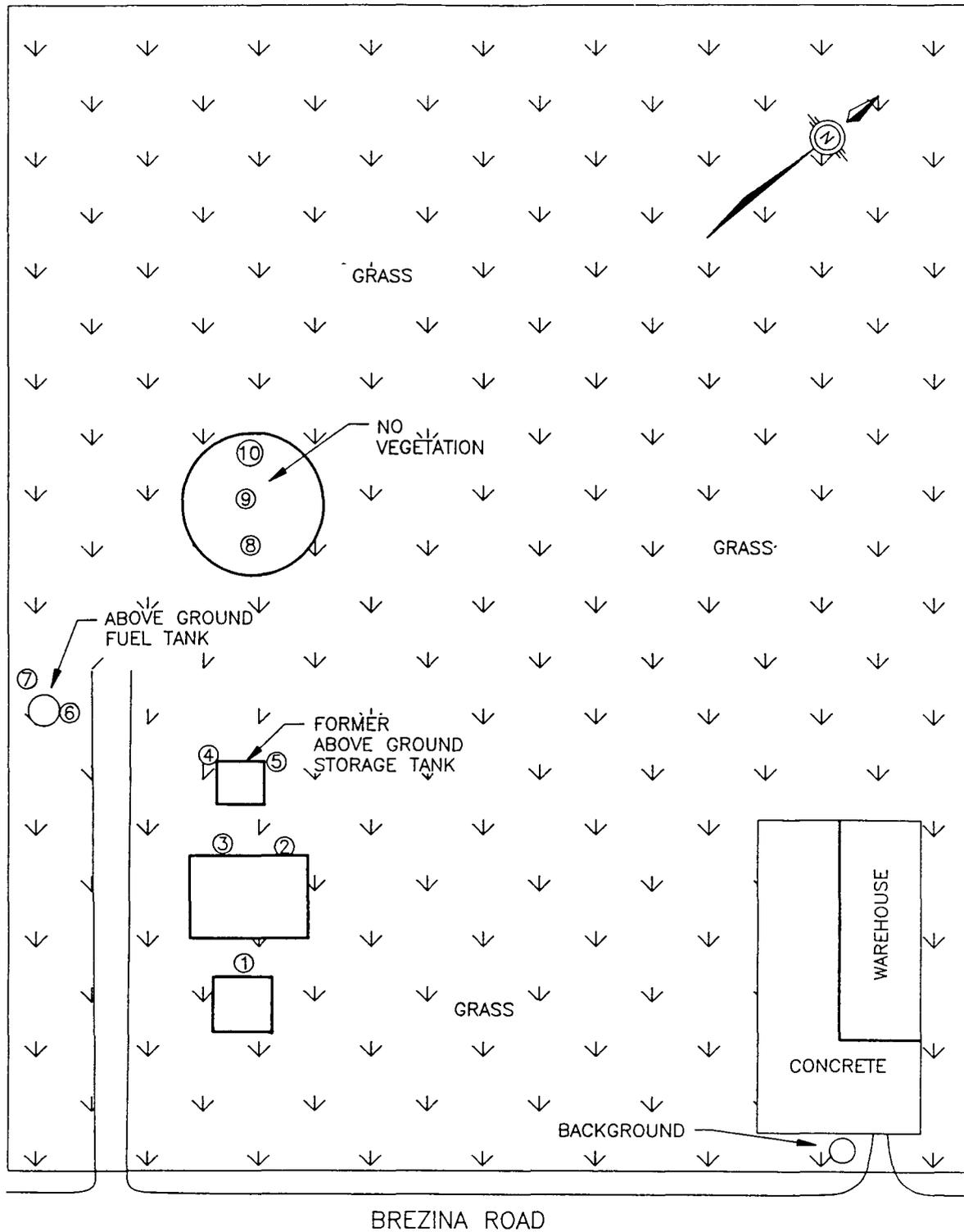


PHASE II INVESTIGATION
 NALF CABINISS
 NAS CORPUS CHRISTI
 CORPUS CHRISTI, TEXAS

FIGURE 2
 SITE MAP AND SAMPLE LOCATIONS
 PARCEL C-15

DATE: 07/15/93

DWG NAME: 065C-15



PHASE II INVESTIGATION
 NALF CABINISS
 NAS CORPUS CHRISTI
 CORPUS CHRISTI, TEXAS

FIGURE 3
 SITE MAP AND SAMPLE LOCATIONS
 PARCEL C-16

DATE: 07/15/93

DWG NAME: 065C-16

Samples 16-6 and 16-7 collected next to the above-ground fuel tank and were also analyzed for TPH and BTEX. Samples 16-8 through 16-10 were collected within an area uncharacteristically devoid of vegetation where it is believed the 5400-gallon fiberglass tank was located and were analyzed for TPH, VOC, and pesticide analysis. A background sample was collected adjacent to the driveway leading to the storage facility and was analyzed for total RCRA metals analysis.

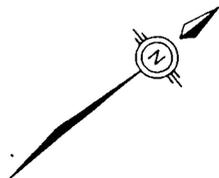
Parcel C-17

Surface soil samples 17-1 through 17-4 were collected with stainless-steel spoons and analyzed for pesticides (see Figure 4). One sample was collected from each side of the pesticide storage building.

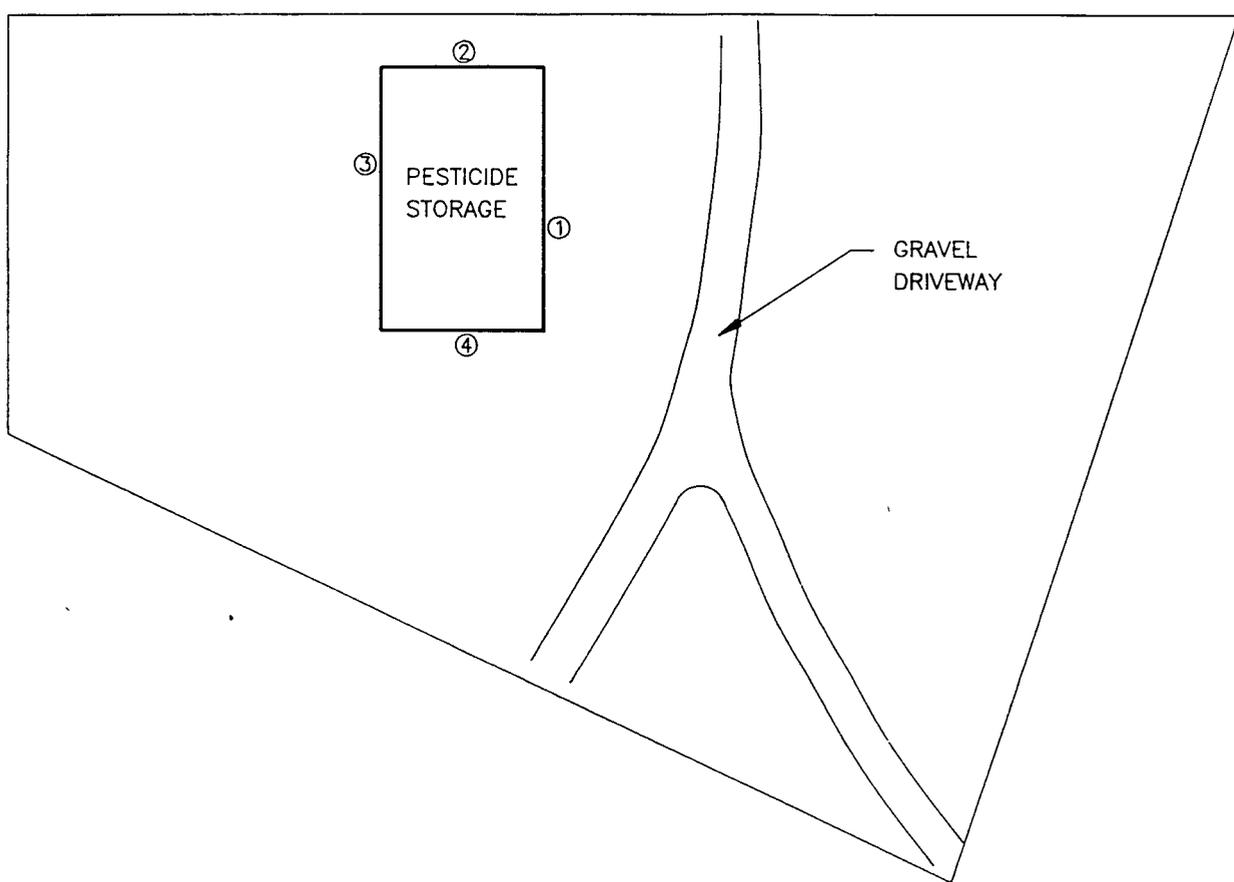
Parcel C-18

A total of 7 surface soil samples were collected with a stainless-steel hand auger (see Figure 5). Samples 18-1 and 18-2 were collected within the area of the old cars and were analyzed for TPH and BTEX. Sample 18-3, collected north of the asphalt road, was also analyzed for TPH and BTEX. Sample 18-4 was not collected. Samples 18-5 through 18-7 were collected north of the garage and were analyzed for TPH, VOC, and RCRA metals. Sample 18-8 was also collected north of the garage and was analyzed for RCRA metals and TCLP metals. A background sample was collected near the corner of the property adjacent to the residence on the parcel and was submitted for RCRA metals analysis.

Two samples were supposed to be collected from an oil-stained area in the center of the site. However, E/A&H personnel were unable to locate the oil stain. Sample 18-3 was collected from an area of dark soil in the presumed vicinity of the oil stain, but sample 18-4 was not collected at a lower depth because the presence of oil could not be confirmed.



BREZINA ROAD

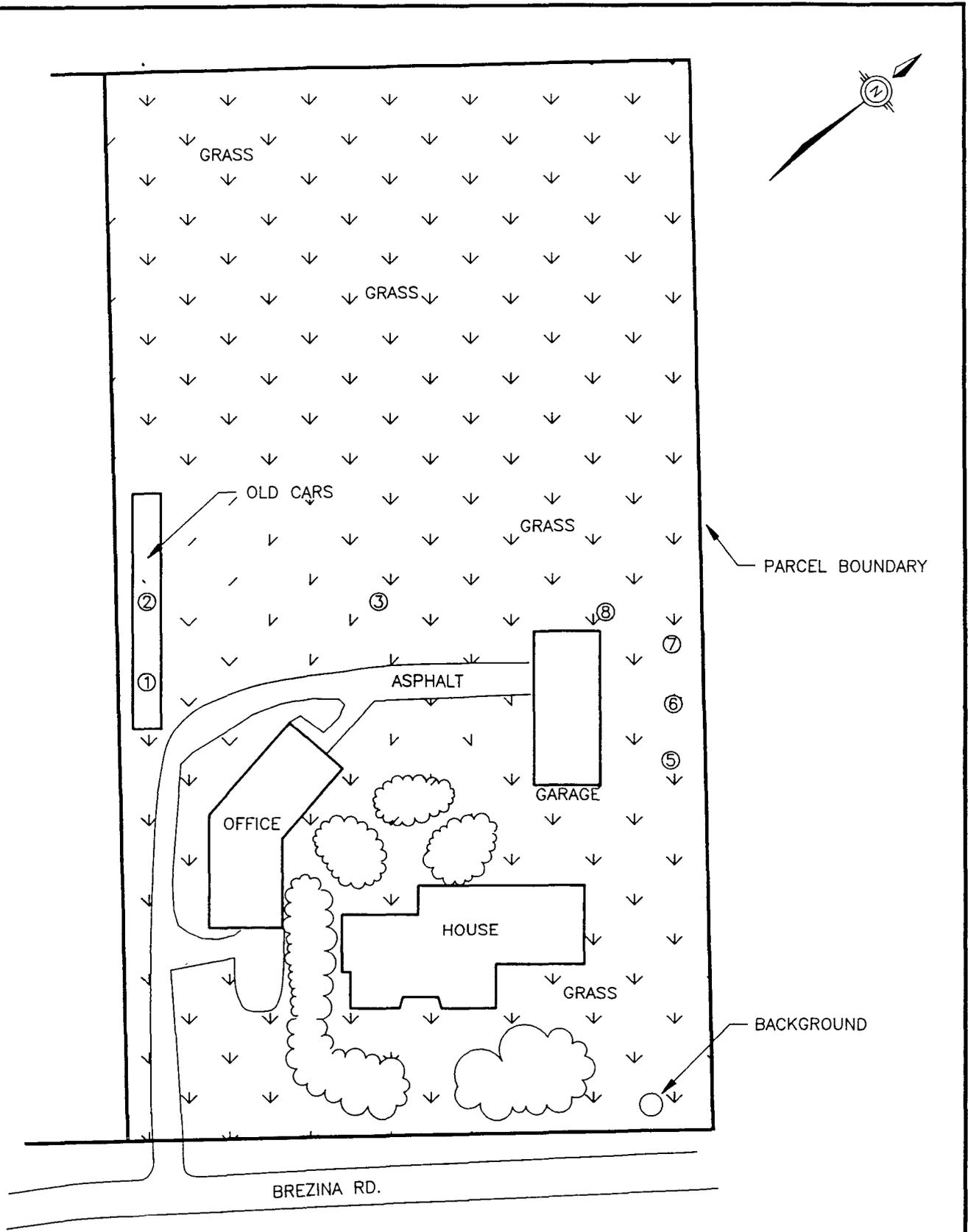


PHASE II INVESTIGATION
NALF CABINISS
NAS CORPUS CHRISTI
CORPUS CHRISTI, TEXAS

FIGURE 4
SITE MAP AND SAMPLE LOCATIONS
PARCEL C-17

DATE: 07/15/93

DWG NAME: 065C-17



PHASE II INVESTIGATION
 NALF CABINISS
 NAS CORPUS CHRISTI
 CORPUS CHRISTI, TEXAS

FIGURE 5
 SITE MAP AND SAMPLE LOCATIONS
 PARCEL C-18

DATE: 07/15/93

DWG NAME: 065C-18

2.2 General Sampling

One field blank (065FB) was submitted for VOC, SVOC, TPH, RCRA metals, and pesticide analysis. Trip and temperature blanks were placed in each cooler. All samples were shipped via overnight courier at 4° centigrade.

Headspace screening was performed on each soil sample to help determine which sample to submit to the laboratory for analysis. Samples were screened by placing the soils into sealable plastic bags, sealing the bags, and allowing the sample to equilibrate for approximately 15 minutes. The PID probe was then inserted into the soil headspace of each bag to measure any organic vapor concentrations which may be present within the soils.

2.3 Decontamination Procedures

To prevent possible cross contamination, all sampling equipment was decontaminated before each sampling activity using a four-step procedure: 1) Potable water rinse 2) Potable water rinse with Liquinox soap 3) Potable water rinse 4) Distilled water rinse.

2.4 Sample Shipment and Analysis

All soil samples were individually wrapped with bubble wrap, packed on ice, and shipped by overnight courier to the laboratory. Strict chain-of-custody procedures were adhered to during sample collection and shipment (see Appendix C). All samples were analyzed by PACE, Inc., Warrendale, PA.

3.0 ANALYTICAL RESULTS

Data validation and analytical results are included in Appendix B. Benchmarks used for all contaminants except TPH are background and values derived from the State of Texas Groundwater Protection Standard for Residential Use (GWP-Res.) found in 17TexReg 335.568 (Texas Risk Reduction Rules). Texas does not have specific soil quality criteria for TPH; however, 100 parts per million (ppm) is widely viewed as the appropriate benchmark for determining further action within soils. Sample locations having TPH in the soil at or above 100 ppm are described below.

Background concentrations are only relevant for heavy metals and were determined by calculating the mean concentration of the three background samples collected on all parcels. An abnormally high concentration of lead (68 ppm) was detected in the background sample from Parcel 18 and was not used in the background calculations.

3.1 Parcel C-15

TPH exceeded 100 ppm in samples 15-2 through 15-9, which were collected between the garage and the above-ground tank and the trailer. See Table 1 for results.

Table 1 Parcel 15 Samples at or Above 100 ppm TPH		
Location	Sample ID	TPH (ppm)
15-2	065HA15-2	190.00
15-3	065HA15-3	410.00
15-4	065HA15-4	450.00
15-5	065HA15-5	2300.00
15-6	065HA15-6	960.00
15-7	065HA15-7	1400.00
15-8	065HA15-8	130.00
15-9	065HA15-9	480.00

Sample 15-5 had concentrations of arsenic, cadmium, chromium, and lead at or above background and the GWP-Res. Arsenic was detected at 5 ppm, cadmium at 1.3 ppm, chromium at 16.0 ppm, and lead at 40.0 ppm. The GWP-Res. values for these metals in ppm are, respectively, 5.0, 0.5, 10.0, and 1.0. This sample was collected between samples 15-4 and 15-6 south of the above-ground tank and trailer.

The only other contaminant detected at this parcel was sample 15-5 with an estimated concentration of ethylbenzene at 0.7 ppb (parts per billion), below the GWP-Res. value of 70 ppm.

3.2 Parcel C-16

TPH exceeded 100 ppm at samples 16-2 and 16-4 through 16-10. These samples were collected from the northern most storage area, the former above ground storage tank location, the area adjacent to the fuel tank, and the area devoid of vegetation. See Table 2 for results.

Location	Sample ID	TPH (ppm)
16-2	065HA16-2	200.00
16-4	065HA16-4	410.00
16-5	065HA16-5	440.00
16-6	065HA16-6	5400.00
16-7	065HA16-7	450.00
16-8	065HA16-8	1400.00
16-9	065HA16-9	6100.00
16-10	065HA16-10	1300.00

Only the background sample from this parcel was analyzed for metals. Several samples at this parcel were also analyzed for VOCs, BTEX, and pesticides. Some of these compounds were detected, but all at concentrations below the GWP-Res. values

3.3 Parcel C-17

Samples from this parcel were analyzed for pesticides only. Several pesticides were detected, but none of the samples exceeded GWP-Res. values.

3.4 Parcel C-18

No VOC or BTEX compounds were detected at any sampling location. TPH exceeded 100 ppm in samples 18-3, 18-4, and 18-7 which were collected from north of the asphalt road and northeast of the garage. See Table 3 for results.

Table 3 Parcel 18 Samples at or Above 100 ppm TPH		
Location	Sample ID	TPH (ppm)
18-3	065HA18-3-1	130.0
18-5	065HA18-4	190.0
18-7	065HA18-6	300.0

Samples 18-5, 18-6, and 18-8 were all collected north of the garage and all contained metals above background and the GWP-Res. values. See Table 4 for results.

Table 4 Parcel 18 Samples at or Above Texas GWP-Res. Values and Background (ppm)				
Location	Sample ID	Barium	Chromium	Lead
18-5	065HA18-4	—	19.00	681.00
18-6	065HA18-5	—	—	13.00
18-8	065HA18-7	386.00	26.00	14.00

Note:
GWP-Res Values (ppm)
Barium 200.0
Chromium 10.0
Lead 1.0

4.0 RECOMMENDATIONS AND CONCLUSIONS

Data validation is included in Appendix B. Data from the TPH analysis have been estimated, but are still reliable enough to be used for this study. The pesticide analysis was determined to be of poor quality and may not reflect actual concentrations present. It is not possible to make any conclusions about the concentrations of pesticides in the soil. This poor pesticide data quality resulted from improper calibration of the analytical instruments.

Contamination at all parcels is suspected to have resulted from surface spills and surface dumping. At the sampling locations within parcels 15, 16, and 18 described below, additional sampling is recommended to determine the horizontal and vertical extent of contamination.

Parcel 15

High concentrations of TPH were found within the surface soil in samples 15-2 through 15-9. These samples were collected between the garage and the above ground tank and trailer.

Parcel 16

High concentrations of TPH were found in the soil in samples 16-2 and 16-4 through 16-10. These samples were collected adjacent to the storage buildings, next to the former location of the above ground storage tank, next to the above ground fuel tank, and the area devoid of vegetation where it is believed the 5400 gallon fiberglass tank was located.

Parcel 17

No pesticide samples showed contamination above the GWP-Res. values.

Parcel 18

High concentrations of TPH were found in samples 18-3, 18-5 and 18-7 located north of the asphalt road and northeast of the garage. Samples 18-5, 18-6, and 18-8 also had elevated levels

of barium, chromium, and lead. These samples were collected from north of the asphalt and northeast of the garage.

APPENDIX A
PHOTOGRAPHIC LOG

PHOTOGRAPH LOG

Photograph #	Description
1	South side of small shed located on parcel C-16
2	North side of small shed located on parcel C-16
3	North side of large shed located on parcel C-16
4	Former AST location on parcel C-16
5	AST next to fence located on parcel C-16
6	Area of dead vegetation located on parcel C-16
7	Location of sample 18-1; near old cars on parcel C-18
8	Location of sample 18-2; near old cars on parcel C-18
9	Location of sample 18-3 near the asphalt
10	Location of samples 18-5,6,7; these samples are located near the fence on parcel C-18
11	Location of sample 18-8; parcel C-18 near the storage building
12	Location of samples 15-1 through 11, in corner of residential parcel C-15 near the garage
13	Location of samples 15-1 through 11, in corner of residential parcel C-15 near the garage
14	Location of sample 15-12, Parcel C-15 near outdoor hydraulic auto lift
15	Location of samples 15-13 and 14; area of no vegetation on parcel C-15
16	Pesticide shed located on parcel C-17

APPENDIX B
SOIL DATA VALIDATION AND ANALYTICAL RESULTS

1.0 DATA VALIDATION

Data validation has been performed for all analytical data collected from the Phase II investigation at NAS Corpus Christi, Texas. The analytical work was conducted by PACE Inc., Warrendale, PA. The analytical protocols were performed in accordance with the following documents.

- USEPA Contract Laboratory Program, *Statement of Work for Organic Analysis* (CLP SOW 3/90)
- USEPA Office of Solid Waste and Emergency Response, *SW846 Test Methods for Evaluating Solid Waste*, 3rd Edition (SW-846)
- USEPA *Methods for Chemical Analysis of Water and Waste*, EPA-600/4-79-020. Revised March 1983 (EPA-600)
- NEESA QA/QC guidelines as stated in the *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation and Restoration Program* (NEESA 20.2-047B).

A total of 38 soil samples and two water samples (a trip blank and a field blank) were received by the laboratory on 21 May 1993 in good condition with the proper custody documents and seals intact.

1.1 Data Quality

The analytical work for NAS Corpus Christi has been reviewed and validated with the appropriate data qualifiers based on data usability. In particular, certain pesticide compound results were qualified as unusable, and others were qualified as estimated. All results for the pesticides/PCBs analysis should be considered questionable due to significant QA concerns. In addition, results for the TPH analysis were qualified as estimated due to low MS/MSD recoveries.

1.2 Organic Analysis

Samples were submitted and analyzed for volatile organic compounds, semivolatile organic compounds, pesticides and polychlorinated biphenyls (PCBs) according to the CLP SOW 3/90. In addition, samples were submitted and analyzed for total petroleum hydrocarbons (TPH) according to EPA Method 418.1, and benzene, toluene, ethylbenzene, and xylene (BTEX) according to EPA Method 8020. Holding times from the time of sample collection until the time of sample extraction and/or analysis were found to be in compliance with QC requirements.

The EnSafe/Allen & Hoshall sampling team inadvertently wrote Method 8240 for BTEX analysis on the chain-of-custody accompanying the samples to the laboratory; however, the laboratory data report references Method 8020 as the method used to analyze the samples.

1.2.1 Calibration

Criteria for instrument calibration were established to ensure the production of acceptable qualitative and quantitative data. The initial calibration ensures the instrument capabilities prior to the analytical run and the continuing calibrations ensure the instrument capabilities throughout and at the end of each subsequent analytical run.

Historical performance data show that certain volatile and semivolatile compounds (called "poor responders"), show a poor response and/or erratic behavior. Therefore, no contractual requirements are provided for these compounds. For review and validation, however, all compounds were considered for qualification in the volatile and semivolatile analyses when the following criteria were not met:

- Initial/continuing calibration standard relative response factors (RRFs) for all target compounds and surrogates must be greater than or equal to 0.05.
- Percent relative standard deviation (RSD) of the RRFs must not exceed ± 30 percent in the initial calibration.

- Percent difference (%D) of the RRFs must not exceed ± 25 percent in the continuing calibration.

Methylene chloride, acetone, 2-butanone, and 2-hexanone were outside of %RSD criteria in the initial calibration for soil volatile analysis. Methylene chloride, acetone, and 2-butanone were also outside of %D criteria in the continuing calibrations for soil analysis. The following compounds were outside %RSD criteria for the soil semivolatile initial calibration: 2,4-dinitrophenol, 4-nitrophenol, and 3,3'-dichlorobenzidine. In the semivolatile continuing calibration for soils, 4-nitroaniline and 3,3'-dichlorobenzidine were just above %D criteria. All of the above compounds are among the "poor responders".

Chloromethane (a poor responder), chloroform, and bromoform were found to be outside the %D criteria for the continuing calibration in the volatile water analysis. Positive detections of chloroform and bromoform were qualified as estimated ("J" flagged) in the water sample 065FB.

In the pesticides analysis, compounds were considered for qualification when the following criteria were not met:

- %RSD of the calibration factors for the compounds aldrin, endrin, and 4,4'-DDT must not exceed ± 10 percent on the quantitation column for the initial calibration.
- %RSD for all remaining compounds must not exceed ± 20 percent on either column for the initial calibration.
- %D must not exceed ± 15 percent on the quantitation column or ± 20 percent on the confirmation column for the continuing calibrations.
- Percent recovery (%R) must be between 80 percent and 110 percent for the GPC calibration check analysis.
- Resolution of target compound peaks must be ≥ 60 percent.

Initial calibrations for the pesticides analyses were performed on June 19, 1993 (soil sample analysis) and June 23, 1993 (water sample analysis). On June 19, the RSD for endrin was 13.5 percent. Associated positive detections of this compound were qualified as estimated ("J" flagged). The calibration performed on June 23 yielded an RSD of 18.6 percent for aldrin and a RSD of 23.0 percent for endrin. In addition, five other target compounds had RSDs greater than 20.0 percent, and therefore out of contractual criteria. As a result, all results for samples analyzed within this calibration sequence were qualified as estimated ("J" or "UJ" flagged).

In the calibration performed on 19 June, 4,4'-DDE and dieldrin each had 0.0 percent resolution on the RTX-5 column. Endosulfan sulfate and methoxychlor both had 50.0 percent resolution on the RTX-1701 (confirmation) column. In the calibration performed on 23 June, 4,4'-DDE and dieldrin again had 0.0 percent resolution on the RTX-5 column. Endosulfan sulfate and methoxychlor both had 0.0 percent resolution on the RTX-1701 column. Associated results for these four compounds were qualified as unusable ("R" flagged). All other target compounds had 100 percent resolution.

Compounds that did not meet percent difference criteria in the continuing calibrations included alpha-BHC, beta-BHC, gamma-BHC, endrin, methoxychlor, 4,4'-DDT, heptachlor, dieldrin, 4,4'-DDE, and endrin ketone. Associated positive results for these compounds were qualified as estimated ("J" flagged).

The percent recovery for aldrin on the GPC pesticide calibration check was 70 percent on the RTX-5 column and 68 percent on the RTX-1701 column. These recoveries are outside of QC limits. All aldrin sample results were qualified as estimated ("J" or "UJ" flagged).

In the water continuing calibration verification, Pesticide Evaluation Mixture 02 had a reported endrin breakdown of 23.0 percent. This is above the QC limit of 20.0 percent. There were no positive detections of endrin, endrin aldehyde, or endrin ketone in the water sample analyzed

after this calibration verification. Because no endrin or endrin breakdown product was detected, no qualification of the sample data was deemed necessary.

1.2.2 Precision

For each analytical method used to analyze environmental samples, there are variations in the reported results that may be due to the random differences in the handling and analysis of that matrix. These variations are referred to as the *precision* or the *reproducibility* of results. To demonstrate reproducibility, the CLP SOW specifies the addition of known quantities of several compounds to two separate aliquots of each sample matrix type. The "spiked" aliquots are referred to as the matrix spike (MS) and the matrix spike duplicate (MSD). These samples are then analyzed using the same preparation and analytical methods used for all samples of similar matrix types. These samples can be used to detect matrix effects in which other sample components interfere with the analysis of the contaminants.

MS/MSD results were found generally to be satisfactory in the water analyses and the soil volatile analysis, while the semivolatile and pesticide soil MS/MSD analyses indicated some difficulties. Sample 065HA15-5 was designated as the soil MS/MSD. In the semivolatile soil analysis the following compounds all exceeded the percent recovery (%R) criteria in both the MS and MSD analyses: phenol, 2-chlorophenol, pentachlorophenol, and pyrene. In particular, the pyrene recoveries equaled 359 percent and 500 percent, respectively. There were no positive detections of these compounds in sample 065HA15-5. According to CLP data validation guidelines, no action is taken on data based on MS/MSD results alone; however, these results are taken into consideration in conjunction with other QC criteria to determine if qualification of data is necessary.

Several complications arose in the pesticide MS/MSD analysis. During GPC cleanup of the sample extracts, an instrument column malfunction led to contamination of the method blank, laboratory control sample (LCS), and laboratory control sample duplicate (LCSD) with column packing material. When the malfunction was discovered, the run was aborted. At this time,

sample extract 065HA15-5 was loaded onto the instrument, and therefore was lost when the run was aborted.

As a result of the absence of original sample date for 065HA15-5, the MS/MSD results obtained using spiked aliquots of this sample were unusable. In addition, the MS and MSD analyses yielded inconsistent results, as the MS aliquot results displayed gamma-BHC, aldrin, and endrin recoveries below QC criteria. In contrast, all spiking compounds had recoveries substantially above the QC criteria in the MSD aliquot.

Two spike/duplicate pairs were analyzed in the TPH analysis: samples 065HA15-5 and 065HA18-6. Percent recoveries for the MS/MSD run using sample 065HA15-5 were 87 percent and 37 percent, resulting in an RPD of 80 percent. There was almost no recovery in the MS/MSD analysis of sample 065HA18-6. All TPH sample results were qualified as estimated ("J" or "UJ" flagged) and should be considered suspect due to the low spike recoveries and high RPDs.

MS/MSD and spike/duplicate analyses were found to be acceptable in the BTEX analysis.

1.2.3 Accuracy

Accuracy is the degree to which a given result agrees with the "true" value. To check the accuracy in a volatile, semivolatile or pesticide/PCB analysis, the CLP SOW requires the addition of known amounts of surrogate compounds (compounds which are not likely to be found in the actual samples) and internal standards. If upon analysis of the sample, the percent recovered for the surrogate compounds and/or internal standards are accurate (close to the known concentrations) as defined within the limits set by CLP, then the reported target compound concentrations are considered to be accurate.

Sample surrogate recoveries were determined to be acceptable for the volatile and semivolatile analyses. In the pesticide/PCB analysis, all of the samples had surrogate recoveries below QC advisory limits. As these QC limits are advisory only, no corrective action was taken by the

laboratory. In the BTEX analysis, sample 068HA15-9 exhibited a surrogate recovery below QC limits. BTEX results for this sample were qualified as estimated ("J" or "UJ" flagged).

Internal standard (IS) recoveries for the volatile analyses were within QC limits, except for sample 065HA16-9, which had a low area count for IS 3, chlorobenzene-d5. The sample was re-analyzed with similar results. Both analyses were reported and all target compounds quantitated using that standard were qualified as estimated ("J" and "UJ" flagged).

Internal standard recoveries in the semivolatile analyses were also acceptable with the exception of sample 065HA15-5, which had area counts for IS5 (chrysene-d12) slightly below QC limits, and IS6 (perylene-d12) drastically below QC limits. As this sample was utilized for the MS/MSD analysis, no reanalysis of the sample was done. The MS and MSD aliquots also displayed very poor internal standard performances, with the MS aliquot having four of six IS area counts above QC limits and an area count for IS6 far below QC limits. The MSD aliquot also had four area counts above QC limits and area counts for IS5 and IS6 far below QC limits. These internal standard recovery results, along with the MS/MSD and surrogate results for this sample, seem to indicate that the laboratory had difficulties with the analysis of this particular sample. The laboratory suggested matrix interference as the cause of the missed QC criteria. All target compounds quantitated using IS5 and IS6 were qualified as estimated ("J" or "UJ") in the original sample analysis.

The accuracy of the overall measurement system is also an indication of any bias that exists in the environmental laboratory and field sampling/analysis plan. Possible sources of error may be from the sampling process, field or laboratory contamination, preservation, handling and/or from the sample matrix itself. Methods used to determine field inaccuracies include trip blanks, field blanks, and equipment rinsate blanks.

Blanks assist in determining the presence and magnitude of any contamination resulting from the laboratory or field. If problems are found in any of the blanks, all associated data are evaluated to determine whether there is an inherent variability in the data, or if the problem is an isolated

occurrence and does not affect the data. The blanks analyzed include trip blanks, equipment rinsate blanks, field blanks and the laboratory method blanks.

Under CLP, contaminants detected in the method blanks are handled within the laboratory by qualifying all positive detections of the contaminants in the associated samples with a B-flag. The data validation procedures are also used to evaluate the contaminants by determining possible contamination sources using other QC samples. Detection of an analyte in a blank results in the elevation of the compound quantitation limit to the action level. The action level is the result of multiplying the blank contaminant compound concentration by 10 for common laboratory solvents or 5 for all other analytes. If an analyte is detected in a sample at a concentration lower than the action level, the analyte concentration in the sample is flagged as undetected.

Low levels of contamination were detected in the blanks associated with the volatile, semivolatile, and pesticides/PCBs analyses. Action levels were calculated according to the contamination and applied to the affected sample results, which were qualified as necessary. No contamination was detected in the laboratory blanks during the TPH and BTEX analyses.

1.2.4 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid. In all 40 samples analyzed for NAS Corpus Christi, only one pesticide sample analysis was not completed. As serious QA/QC deficiencies were discovered during data review, certain results in the pesticides were qualified as unusable. As a result, total project completeness goals were not although the data satisfactorily meet the 95 percent completeness level goal for the volatile, semivolatile, TPH, and BTEX analyses.

1.2.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. To ensure comparability, all samples were collected using EPA

Region IV SOPs and were analyzed according to CLP protocols or EPA methods, as appropriate.

1.3 Inorganic Analysis

The samples were analyzed for RCRA metals in accordance with the EPA SW-846 6010/7000 series methods. Soil sample 065HA18-7 was extracted according to the TCLP (EPA SW-846 Method 1311) and analyzed for RCRA metals. All sample results were reported according to NEESA Level C guidelines.

1.3.1 Holding Times

All samples were received by the laboratory in good condition with the proper custody documents and seals intact. From the date of collection to the date of sample digestion/preparation, sample holding times were found to be within technical QC requirements.

1.3.2 Calibration

The purpose of the initial and continuing calibration is to ensure that the instrument is capable of acceptable and quantitative performance at the beginning of and throughout each analytical run. Initial and continuing calibrations were performed for the inorganics analysis within QC criteria.

1.3.3 Blanks

Blank results are used to determine the presence and magnitude of any contamination problems. In review of the data, no contamination was detected. Analysis of blanks was found to meet compliance QC requirements.

1.3.4 Laboratory Control Sample Analysis

The laboratory control sample (LCS) analysis serves as a monitor of efficiency and overall performance in all steps of analysis, including the digestion procedures. Laboratory control sample analysis results were found to be within QC criteria.

1.3.5 Duplicate/Spike

Duplicate samples are used to determine the precision of analytical methods for each parameter. The spiked samples are designed to provide information about the effects of the sample matrix on the digestion and measurement methodology. Duplicate analysis results were found to be within QC criteria. The soil spike recovery of selenium was found to be 1 percent below QC criteria. All other spike recoveries were within QC limits. Qualification of the data was not judged to be necessary.

1.4 Data Assessment

The analytical work has been validated and the analytical data are usable as qualified for the Phase II Assessment at NAS Corpus Christi, except for the pesticide/PCB analysis data. The pesticide/PCB results are considered suspect due to serious deficiencies in the calibration process, consistently low surrogate recoveries, and the lack of a usable MS/MSD analysis. In addition, laboratory instrument failure led to the samples being processed under different conditions than the method blank and LCS/LCS duplicate samples, leading to possible bias in those QC samples. Through the validation process, several results have been qualified as unusable or estimated; however, even unqualified pesticide/PCB results should be considered questionable.

Low recoveries in the TPH MS/MSD analysis led to the qualification of all TPH results as estimated. Although the laboratory control spike and laboratory control spike duplicate (LCS/LCSD) analyses were within QC criteria, the laboratory did not demonstrate the ability to obtain precise TPH results from the sample matrix. All TPH results should be considered suspect.

1.5 Data Validation Worksheets

The following sections include the validated analytical data and the data validation worksheets filled out during the evaluation of the analytical data. The worksheets were created based on EPA Region I *Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses* (November 1, 1988). These worksheets are intended to provide valid documentation

of the laboratory data evaluation and validation procedures. On some sheets, the validation procedures will be equivalent to the Standard Operating Procedures provided by the CLP *National Functional Guidelines for Organic and Inorganic Data Review*. Other sheets will cover areas which are more subjective due to the complexities of the analytical method and will provide documentation on the actions taken by the data evaluator.

The cover sheet, (Data Quality Objectives Summary Form) outlines the project objectives, followed by the organic and inorganic worksheets. The organic and inorganic worksheet packets will be followed with a data assessment form.

The analytical data will be presented in summary form and lists only the positively detected compounds and qualified data critical to the reader.

1.6 Data Qualifier Definitions

The following briefly explains the data qualifiers as a result of the validation process:

- U** — The compound was analyzed for, but was not detected above the reported sample quantitation limit.

- J** — The compound was positively detected; however, the reported concentration is considered to approximate the concentration within the sample.

- UJ** — The compound was not detected above the reported sample quantitation limit; however, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample.

- R** — The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the compound cannot be verified.

APPENDIX C
SAMPLE CHAIN OF CUSTODY FORMS



CHAIN OF CUSTODY RECORD

5724 SUMMER TREES DR. MEMPHIS, TN 38134 (901)372-7962

CLIENT 80 ~~ADRIANO~~ CLEAN
ADDRESS _____
PROJECT NAME/NUMBER ND065-CO102
MEDIA STATUS: (A, B, OR C) _____

PROJECT MANAGER J. Bennett
TELEPHONE NO. 901-372-7962
FAX NO. 901-372-2454
SAMPLERS: (SIGNATURE) J. Bennett

NO. OF CONTAINERS	ANALYSIS REQUIRED						
	TPH (41P.1)	PCPA Metals (500P)	TC-LP Metals	BTEX (8240)	CLP VOC'S	CLP SVOC'S	CLP Pesticides

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION		ANALYSIS REQUIRED							REMARKS			
					TEMP.	CHEMICAL	NO. OF CONTAINERS	TPH (41P.1)	PCPA Metals (500P)	TC-LP Metals	BTEX (8240)	CLP VOC'S	CLP SVOC'S		CLP Pesticides		
065HA15-1	5/20/93	0800	Soil	4oz + 8oz Clear	4°C	None	2	X			X						GN GC
065HA15-2		0815					2	X			X						
065HA15-3		0825					2	X			X						
065HA15-4		0835					2	X			X						
065HA15-5		0840					5	X	X		X	X	X				Run MS/MSD *262-265-GC
065HA15-6		0850					2	X			X						GN GC
065HA15-7		0900					2	X			X						
065HA15-8		0915					2	X			X						
065HA15-9		0920					2	X			X						
065HA15-10		0925					2	X			X						

69.8
40.1
11.0

RELINQUISHED BY: <u>J. Bennett</u> SIGNATURE _____ PRINTED <u>J. Bennett</u> COMPANY <u>Ensafe</u> REASON <u>Shipment</u>	DATE <u>5/20</u> TIME <u>1600</u>	RELINQUISHED BY: _____ SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____	RELINQUISHED BY: _____ SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____	RELINQUISHED BY: _____ SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____
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METHOD OF SHIPMENT: FED EX COMMENTS: * Run MS/MSD on sample
SHIPMENT NO. _____ 065HA15-5
SPECIAL INSTRUCTION: _____

AFTER ANALYSIS, SAMPLES ARE TO BE:
 DISPOSED OF (ADDITIONAL FEE)
 STORED (90 DAYS MAX)
 STORED OVER 90 DAYS (ADDITIONAL FEE)
 RETURNED TO CUSTOMER

Rec. Jeff Bennett
DATE 5/21/93 9:30



CHAIN OF CUSTODY RECORD

5724 SUMMER TREES DR. MEMPHIS, TN. 38134 (901)372-7962

CLIENT CLEAN
ADDRESS _____
PROJECT NAME/NUMBER NE065-00102
MEDIA STATUS: (A, B, OR C) _____

PROJECT MANAGER Jeff Bennett
TELEPHONE NO. 901-372-7962
FAX. NO. 901-372-2454
SAMPLERS: (SIGNATURE) Jeff Bennett

NO. OF CONTAINERS	ANALYSIS REQUIRED						REMARKS
	TDH (4IP.1)	PCE Metals (5000/7000)	TCP Metals	BTX (P240)	CLP VOC's	CLP SVOC's	

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION		NO. OF CONTAINERS	ANALYSIS REQUIRED						REMARKS	
					TEMP.	CHEMICAL		TDH (4IP.1)	PCE Metals (5000/7000)	TCP Metals	BTX (P240)	CLP VOC's	CLP SVOC's		CLP Pesticides
065HA15-11	5-20-93	0928	Soil	4oz + 8oz Clear	4°C	None	2	X		X					GN GC
065HA15-12		0955					2	X		X					—
065HA15-13		0940					2	X		X					—
065HA15-14		0944					2	X		X					—
065HA15B4		0944					1		X						GN
065HA16-1		10:45					3	X		X		X			GN, G-S, GC
065HA16-2		1055					3	X		X		X			↓
065HA16-3		1100					3	X		X		X			↓
065HA16-4		1105					2	X		X					GN GC
065HA16-5		1112					2	X		X					↓

12.8
13.6
14.8

RELINQUISHED BY: SIGNATURE <u>Jeff Bennett</u> PRINTED <u>JEFF Bennett</u> COMPANY <u>EnSafe</u> REASON <u>Shipment</u>	DATE <u>5/20</u> TIME <u>1600</u>	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____
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METHOD OF SHIPMENT: <u>FED EX</u> SHIPMENT NO. _____ SPECIAL INSTRUCTION: _____	COMMENTS: _____ _____ _____	AFTER ANALYSIS, SAMPLES ARE TO BE: <input checked="" type="checkbox"/> DISPOSED OF (ADDITIONAL FEE) <input type="checkbox"/> STORED (90 DAYS MAX) <input type="checkbox"/> STORED OVER 90 DAYS (ADDITIONAL FEE) <input type="checkbox"/> RETURNED TO CUSTOMER
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Rec Joe Lafever
DATE 5/21/93 9:30

80000



CHAIN OF CUSTODY RECORD

PAGE 3 OF 4

5724 SUMMER TREES DR. MEMPHIS, TN 38134 (901)372-7962

CLIENT CLEAN
 ADDRESS _____
 PROJECT NAME/NUMBER N0065-C0102
 MEDIA STATUS: (A, B, OR C) _____

PROJECT MANAGER Jeff Bennett
 TELEPHONE NO. 901-372-7962
 FAX NO. 901-372-2454
 SAMPLERS: (SIGNATURE) Jeff Bennett

NO. OF CONTAINERS	ANALYSIS REQUIRED						REMARKS
	TPH (41P.1)	PCPN (41P.2)	TRCP (41P.3)	BTX (P.240)	CLP VOC'S	CLP SVOC'S	

315.2
 316.0
 317.9
 318.7

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION		NO. OF CONTAINERS	TPH (41P.1)	PCPN (41P.2)	TRCP (41P.3)	BTX (P.240)	CLP VOC'S	CLP SVOC'S	REMARKS
					TEMP.	CHEMICAL								
065HA16-6	5-20-93	1120	Soil	4oz + 8oz Clear	4°C	None	2	X			X			GN, GC
065HA16-7		1125					2	X		X				↓
065HA16-8		1125					3	X			X	X		GN, GS, GC
065HA16-9		1140					3	X			X	X		↓
065HA16-10		1143					3	X			X	X		↓
065HA16B6		1150					1	X						GN
065HA18-1		1245					2	X		X				GN, GC
065HA18-2		1245					2	X		X				GN, GC
065HA18-3-1		1300					2	X		X				GN, GC
065HA18-4		1315					3	X	X			X		2 GN, GC

RELINQUISHED BY: SIGNATURE <u>Jeff Bennett</u> PRINTED <u>Jeff Bennett</u> COMPANY <u>En Safe</u> REASON <u>Shipment</u>	DATE <u>5/20</u> TIME <u>1600</u>	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE TIME	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE TIME	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE TIME
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METHOD OF SHIPMENT: _____
 SHIPMENT NO. _____
 SPECIAL INSTRUCTION: _____

COMMENTS: _____

AFTER ANALYSIS, SAMPLES ARE TO BE:
 DISPOSED OF (ADDITIONAL FEE)
 STORED (90 DAYS MAX)
 STORED OVER 90 DAYS (ADDITIONAL FEE)
 RETURNED TO CUSTOMER

Rec by Jeff Bennett
 DATE 5/21/93 9:30

0000



CHAIN OF CUSTODY RECORD

PAGE 4 OF 4

5724 SUMMER TREES DR. MEMPHIS, TN 38134 (901) 372-7962

CLIENT CLEAN PROJECT MANAGER Jeff Bennett
 ADDRESS _____ TELEPHONE NO. 901-312-7962
 PROJECT NAME/NUMBER N0065-C0102 FAX NO. 901-372-8454
 MEDIA STATUS: (A, B, OR C) _____ SAMPLERS: (SIGNATURE) Jeff Bennett

NO. OF CONTAINERS	ANALYSIS REQUIRED							REMARKS
	TPH (CLP.1)	PCPA Metals (5000)	TECP Metals (5000)	BTX (P246)	CLP VOC'S	CLP SVOC'S	CLP Pesticides	

'319.5
'320.9

'326.7
'322.5
'323.3
'324.1
'325.0
'326.8

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION		NO. OF CONTAINERS	ANALYSIS REQUIRED							REMARKS	
					TEMP.	CHEMICAL		TPH (CLP.1)	PCPA Metals (5000)	TECP Metals (5000)	BTX (P246)	CLP VOC'S	CLP SVOC'S	CLP Pesticides		
065HA18-5	5/20/93	1315	Soil	4oz + 8oz Clear	4°C	None	3	X	X			X				2 GN GC
065HA18-6		1320					3	X	X			X				2 GN GC
065HA18-7		1315	↓	8oz Clear			2	X	X							2 GN —
065HA18BQ		1330		8oz Clear			1	X								GN —
065HA17-1		1400					1						X			GS
065HA17-2		1400					1						X			GS
065HA17-3		1405					1						X			GS
065HA17-4		1405	↓	↓		↓	1						X			GS
065FB		1215	H ₂ O	4oz, 8oz, 40ml Clear		HCl-VoAs	7	X	X			X	X	X		No Preservation except VOA's
Trip Blanks			"	40ml VOA	↓	HCl	6					X				One Trip Blank / 48pt cooler (2)

RELINQUISHED BY: SIGNATURE <u>Jeff Bennett</u> PRINTED <u>Jeff Bennett</u> COMPANY <u>En Safe</u> REASON <u>Shipment</u>	DATE <u>5/20</u> TIME <u>1600</u>	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____	RELINQUISHED BY: SIGNATURE _____ PRINTED _____ COMPANY _____ REASON _____	DATE _____ TIME _____
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METHOD OF SHIPMENT: FEDEX COMMENTS: _____
 SHIPMENT NO. _____
 SPECIAL INSTRUCTION: _____
 AFTER ANALYSIS, SAMPLES ARE TO BE:
 DISPOSED OF (ADDITIONAL FEE)
 STORED (90 DAYS MAX)
 STORED OVER 90 DAYS (ADDITIONAL FEE)
 RETURNED TO CUSTOMER

rec Joe Jafar
DATE 5/21/93 9:30

6-6V.