



June 19, 2006

Commanding Officer
I&E/EMD/EQB (Attn.: Mr. Andrew Smith)
PSC Box 20004
Marine Corps Base
Camp Lejeune, North Carolina 28542-0004

**Re: FINAL – Annual Monitoring Report, AS-843
NCDENR Incident #21272
Gauging and Groundwater Sampling Event, July 2005 – May 2006
Marine Corps Air Station New River, Jacksonville, North Carolina**

Dear Mr. Smith:

Sovereign Consulting Inc. (Sovereign) is pleased to submit this monitoring report for gauging work performed at AS-843. Sovereign was authorized to perform this work by Naval Facilities Engineering Command Mid-Atlantic under Navy Contract N62470-04-D-0205, Task Order No. 0007. Gauging data and historical sampling results at the project site show groundwater contamination persists at low levels. This report presents the data collected during Sovereign's field activities October 2005 through April 2006.

Background

The subject site, NCDENR Incident # 21272, is located aboard Marine Corps Air Station (MCAS) New River in Jacksonville, North Carolina. The site is located in the central portion of the air station and functions as the airfield operations building. The site was identified in September 1992 as a result of tank removal actions. One 550-gallon diesel UST and one 1,000-gallon diesel UST were excavated and removed from the site. Various historical documents differ in reporting of the actual tank capacities. The removal report states that associated piping was either excavated or rendered unusable. The completed excavation measured approximately 14 feet by 14 feet and extended to a depth of approximately eight feet below land surface (BLS). Free product was observed during the removal action; therefore, soil samples were not submitted for laboratory analysis. It was uncertain from the report if the excavation was backfilled with clean soil or the native overburden.

A Three Well Site Check report was conducted at the site in June 1993. Three shallow, monitoring wells, MW-01, MW-02, and MW-03, were installed around the former USTs, outside the tank excavation. Analysis of vadose zone soil samples collected during installation of the wells indicated Total Petroleum Hydrocarbons (TPH) were not present at detectable concentrations. No measurable free product was observed in the wells. The only groundwater contaminants detected were naphthalene and bis(2-ethylhexyl)phthalate. The detections were above NCGWQSS. An additional well was installed in the former tank basin in 1995 to determine if product was still present in the excavation area and to analyze groundwater for the previously identified contaminants.

Diesel contamination was identified in soils and groundwater contaminants were identified above 2L standards in the immediate vicinity of the tanks. The report recommended quarterly monitoring of the wells.

Additional site assessments were done at the site to include soil sampling and risk characterization. LAW Engineering and Environmental Services, Inc. completed a Site Closure Report for the site and concluded AS-843 meets criteria to be a low risk site with an industrial/commercial land use classification. Supporting historical information is attached.

The site has been gauged and monitored by various environmental contractors since the site investigations. Monitoring well MW-05 (deep well) was installed in August 2000 as part of the monitoring programs. Free product was identified at the site in January 1998, October 2000, and November 2004.

EEI provided the most recent annual report, dated October 19, 2005, for the site. This report detailed gauging and sampling activities from November 2004 through August of 2005. The report indicated measurable free product only in November 2004. In addition, historical data showed soils were below Industrial/Commercial MSCCs, and groundwater contaminants were observed to be above the North Carolina groundwater quality standards (NCGWQSs), but below gross contaminant levels (GCLs).

The current monitoring program was initiated in October 2005 and includes quarterly gauging of the five site wells. Gauging was conducted by Sovereign in October 2005, January 2006, and April 2006. Methods and findings of the program are discussed below. Figures, tables, and historical data are included as attachments.

Field Activities and Discussion

Well gauging at the AS-843 site was conducted quarterly on the following dates: October 12, 2005, January 18, 2006, and April 3, 2006. For each gauging event, the five site monitoring wells (USTAS843-MW01 through USTAS843-MW05) were gauged. Well gauging was conducted using an interface probe to measure the depth to water and depth to product (if present).

During each gauging event, no measurable free product was observed; however, an oily sheen was noted in MW-04 during the January and April 2006 gauging events. An absorbent sock was installed in the well after the slight sheen was noted during the April 2006 gauging event.

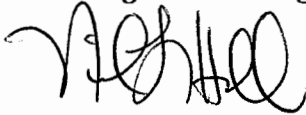
EEI provided the most recent annual report, dated October 19, 2005, for this site. This report detailed gauging and sampling activities from November 2004 through August 2005. Free product was detected during only the November 2005 event. Groundwater samples were collected, by EEI on August 31, 2005, from monitoring wells MW-1 through MW-5. The samples were analyzed by SGS/Paradigm Analytical Laboratories, Inc. for Aromatic and Halogenated VOCs by Method 602 and 601, SVOCs by Method 625; VPH by MADEP VPH; and EPH by MADEP EPH. Very low levels of groundwater contaminants were observed. While just above the North Carolina groundwater quality

standards (NCGWQSs), contaminant concentrations for benzene and naphthalene were well below gross contaminant levels (GCLs). MADEP constituents (C₉-C₂₂ aromatics) were just above the NCGWQS of 210 µg/L at a concentration of 300 µg/L. A GCL has not been established for the C₉-C₂₂ Aromatics Hydrocarbon fraction.

Summary and Conclusions

Sovereign did not detect measurable free product at the AS-843 site during the 2005-2006 monitoring period. Including EEI data, there have been six consecutive quarters without the presence of free product. Groundwater contamination exists above NCGWQSs; however, it does not approach applicable GCLs. Since a sheen was observed at the site (in MW-04) during the October and April gauging events, Sovereign recommends continuing gauging and sampling of wells USTAS843-MW01 through USTAS843-MW05 on a semi-annual and biennial basis, respectively. If you have further questions or need additional information, please feel free to contact us at your convenience.

Sincerely,
Sovereign Consulting Inc.



Nicole L. Hall, P.E.
Senior Engineer

Appendices: Table 1, Figures 1-5, and historical data

Cc: Mr. David. T. Cleland, P.G. (NAVFAC)
Mr. Chris Murray (Sovereign)



Table 1
Summary of Groundwater Gauging for 2005-2006

| Well ID | TOC Elevation (feet) | Depth to Water from TOC (feet) | | |
|----------------------------|----------------------------|--------------------------------|-----------|----------|
| | | 10/12/2005 | 1/18/2006 | 4/3/2006 |
| USTAS843-MW01 (Shallow) | 97.58 | 5.10 | 4.93 | 6.00 |
| USTAS843-MW02 (Shallow) | 98.01 | 4.61 | 4.13 | 4.63 |
| USTAS843-MW03 (Shallow) | 98.05 | 4.87 | 4.83 | 5.39 |
| USTAS843-MW04 (Shallow) | 97.87 | 2.15 | 2.35 | 4.21 |
| USTAS843-MW05 (Deep) | 97.72 | 5.22 | 5.22 | 5.68 |

Table 3
Groundwater Quality Analytical Data Over Time
Site AS-643

| EPA Method 602, 601, or 6210C (ug/L) | NGGWQS | GCL | MW-1 | | | | MW-2 | | | | MW-3 | | | | MW-4 | | | | MW-5 | | | | | | |
|---|--------|---------|-----------|--------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|----|
| | | | July 1993 | January 1998 | July 1998 | August 1998 | July 1993 | August 1993 | July 1998 | August 1998 | July 1993 | August 1993 | July 1998 | August 1998 | July 1998 | August 1998 | July 1998 | August 1998 | July 2000 | August 2000 | July 2002 | August 2002 | July 2005 | August 2005 | |
| Benzene | 1 | 5,000 | <0.2 | 1.24 | 1.66 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| n-Butylbenzene | 70 | 6,900 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| sec-Butylbenzene | 70 | 8,500 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| cis-1,2-Dichloroethene | 70 | 70,000 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Ethylbenzene | 29 | 29,000 | <0.8 | nr | nr | 1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Isopropylbenzene | 70 | 25,000 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Naphthalene | 21 | 15,500 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| n-Propylbenzene | 70 | 30,000 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Toluene | 1,000 | 257,500 | <0.5 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| 1,3,5-Trimethylbenzene | 350 | 25,000 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Total Xylenes | 530 | 87,500 | <1.7 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| EPA Method 625 (ug/L) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | 80 | 2,120 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Acenaphthylene | 210 | 1,965 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Anthracene | 2100 | 2,100 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Benzofluoranthene | 0.0479 | 22 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Benzokjfluoranthene | 0.479 | 0.47 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Benzofluoranthene | 0.0479 | 1.5 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Benzofluoranthene | 0.0479 | 3 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Bis(2-ethylhexyl)phthalate | 3 | 3,000 | <12 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Chrysene | 4.79 | 5 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Fluoranthene | 280 | 280 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Fluorene | 280 | 950 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Naphthalene | 21 | 15,500 | <12 | 2.7 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Phenanthrene | 210 | 410 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| Pyrene | 210 | 210 | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| TICs (total) | | | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr | nr |
| MADEP VPH + EPH (ug/L) | 4,200 | NE | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na |
| C ₉ -C ₁₀ Aliphatics | 42,000 | NE | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na |
| C ₁₉ -C ₂₈ Aliphatics | | | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na |
| C ₉ -C ₂₂ Aromatics | | | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na |

J: Estimated concentration below reporting limits or estimated concentration for TIC quantitations
 B: compound detected in the laboratory blank
 nr: Not Analyzed, compound not quantitated in the analytic suite specified for the sample
 nd: Not Detected, compound not reported in source document summary table (either not analyzed or not detected)
 ne: Not Sampled
 na: Not Detected, compound quantitated and not detected; detection limit not specified in source document summary table
 4F: Not detected at the indicated detection limit
 Note: TIC analysis conducted, no TICs detected

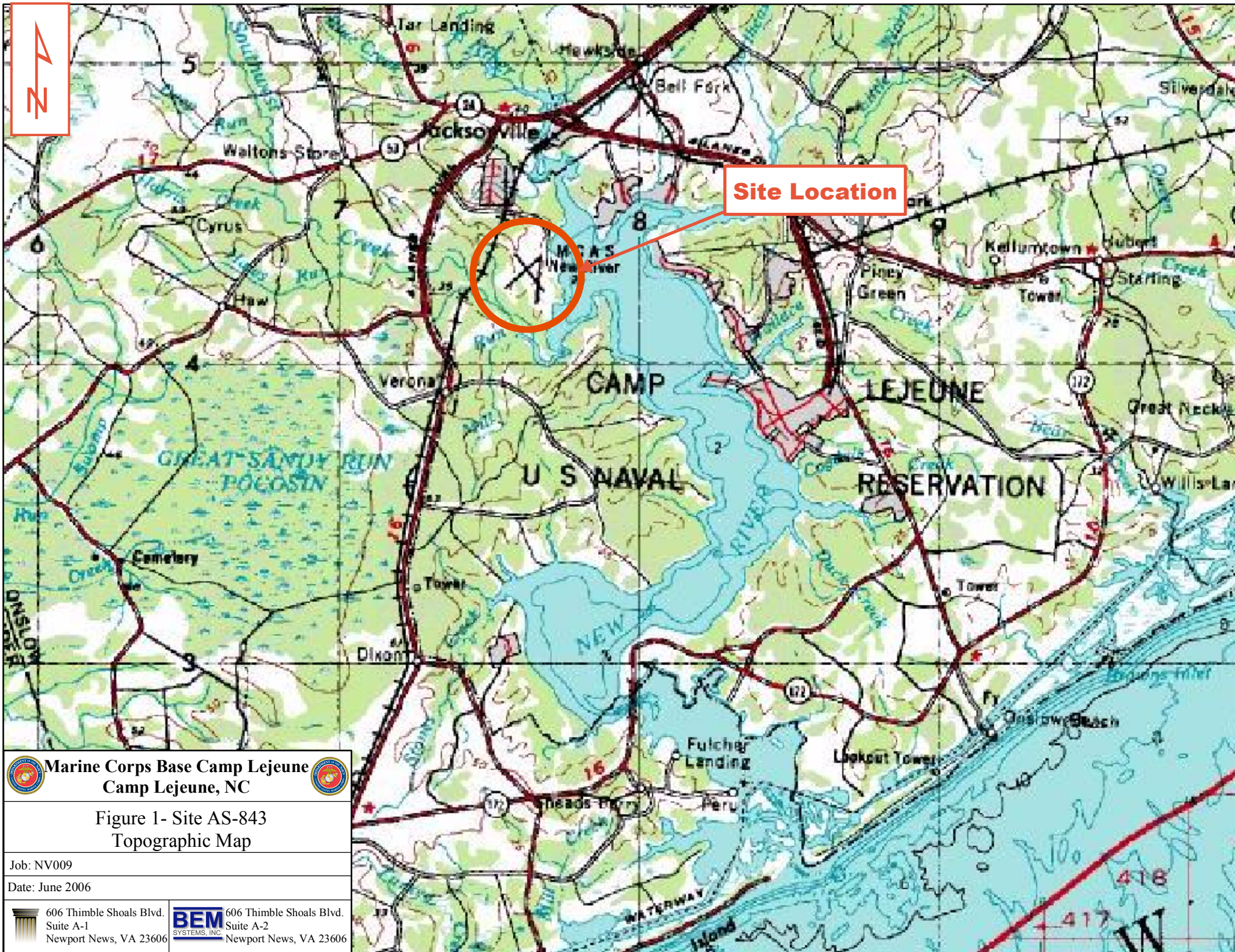
GCL: Gross Contamination Level
 NE: Not Established; a GCL has not been established for the analyte
 NGGWQS: North Carolina Groundwater Quality Standard
 TICs (total): Tentatively Identified Compound, sum of all TICs; all TIC concentrations are estimated
 ug/L: micrograms per liter

Bold type indicates analyte detection
 Shaded area in bold indicates analyte detection at a concentration above the NGGWQS
 Shaded area in bold italics indicates analyte detection at a concentration above the GCL

Table 1
Quarterly Gauging Data from November 2004 to August 2005
Site AS-843

| Location | Top of Casing Elevation (feet tbn) | Depth to Water (feet btoc) | | | |
|----------|------------------------------------|---|----------|----------|----------|
| | | 11/29/04 | 02/25/05 | 05/31/05 | 08/31/05 |
| MW-1 | 97.58 | 6.60 | 5.90 | 5.33 | 6.45 |
| MW-2 | 98.01 | 6.79 | 5.14 | 4.75 | 5.95 |
| MW-3 | 98.05 | 5.52 | 4.90 | 4.85 | 5.91 |
| MW-4 | 97.87 | 4.17 | 3.24 | 2.50 | 3.94 |
| MW-5 | 97.72 | 6.72 | 5.69 | 5.60 | 6.62 |
| | | Depth To Product (feet btoc) | | | |
| | | 11/29/04 | 02/25/05 | 05/31/05 | 08/31/05 |
| MW-1 | 97.58 | NP | NP | NP | NP |
| MW-2 | 98.01 | NP | NP | NP | NP |
| MW-3 | 98.05 | NP | NP | NP | NP |
| MW-4 | 97.87 | 4.13 | 3.24 | NP | NP |
| MW-5 | 97.72 | NP | NP | NP | NP |
| | | Product Thickness (feet) | | | |
| | | 11/29/04 | 02/25/05 | 05/31/05 | 08/31/05 |
| MW-1 | 97.58 | NP | NP | NP | NP |
| MW-2 | 98.01 | NP | NP | NP | NP |
| MW-3 | 98.05 | NP | NP | NP | NP |
| MW-4 | 97.87 | 0.04 | Sheen | NP | NP |
| MW-5 | 97.72 | NP | NP | NP | NP |
| | | Corrected Groundwater Elevation ⁽¹⁾ (feet tbn) | | | |
| | | 11/29/04 | 02/25/05 | 05/31/05 | 08/31/05 |
| MW-1 | 97.58 | 90.98 | 91.68 | 92.25 | 91.13 |
| MW-2 | 98.01 | 91.22 | 92.87 | 93.26 | 92.06 |
| MW-3 | 98.05 | 92.53 | 93.15 | 93.20 | 92.14 |
| MW-4 | 97.87 | 93.73 | 94.63 | 95.37 | 93.93 |
| MW-5 | 97.72 | 91.00 | 92.03 | 92.12 | 91.10 |



⁽¹⁾ Corrected Groundwater Elevation = Top of Casing Elevation - Depth to Water + 0.8 x Product Thickness
feet tbn - elevation in feet relative to temporary benchmark arbitrarily assigned an elevation of 100 feet
feet btoc - feet below top of casing
NP - Not Present - no measurable product detected
Sheen indicates non-measurable thickness of product (<0.01 foot)

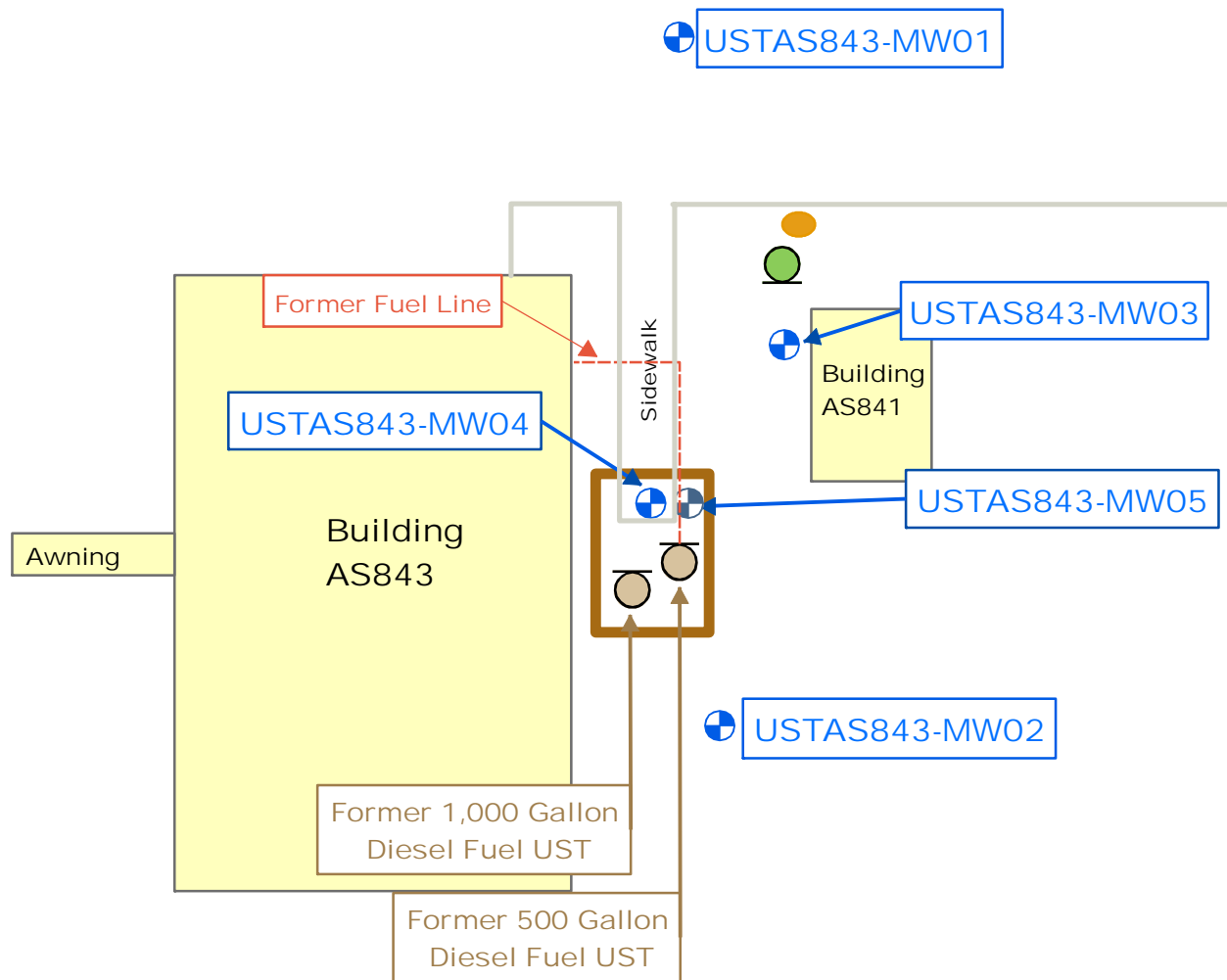



Marine Corps Base Camp Lejeune
 Camp Lejeune, NC

Figure 1- Site AS-843
 Topographic Map

Job: NV009
 Date: June 2006

| | |
|---|--|
|  606 Thimble Shoals Blvd. Suite A-1 Newport News, VA 23606 |  BEM SYSTEMS, INC. 606 Thimble Shoals Blvd. Suite A-2 Newport News, VA 23606 |
|---|--|



NOTE: Map Adapted From EEI 2005 AMR

Legend

- Shallow Monitoring Well
- Deep Monitoring Well
- UST
- Diesel Fuel AST
- Area of Petroleum Staining
- Existing Structure
- Former Excavation Area



1 inch = approximately 20 feet



**Marine Corps Base Camp Lejeune
Camp Lejeune, NC**



Figure 2- Site Map With
Monitoring Well Locations

Project No. NV007

Date: June 2006



606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606

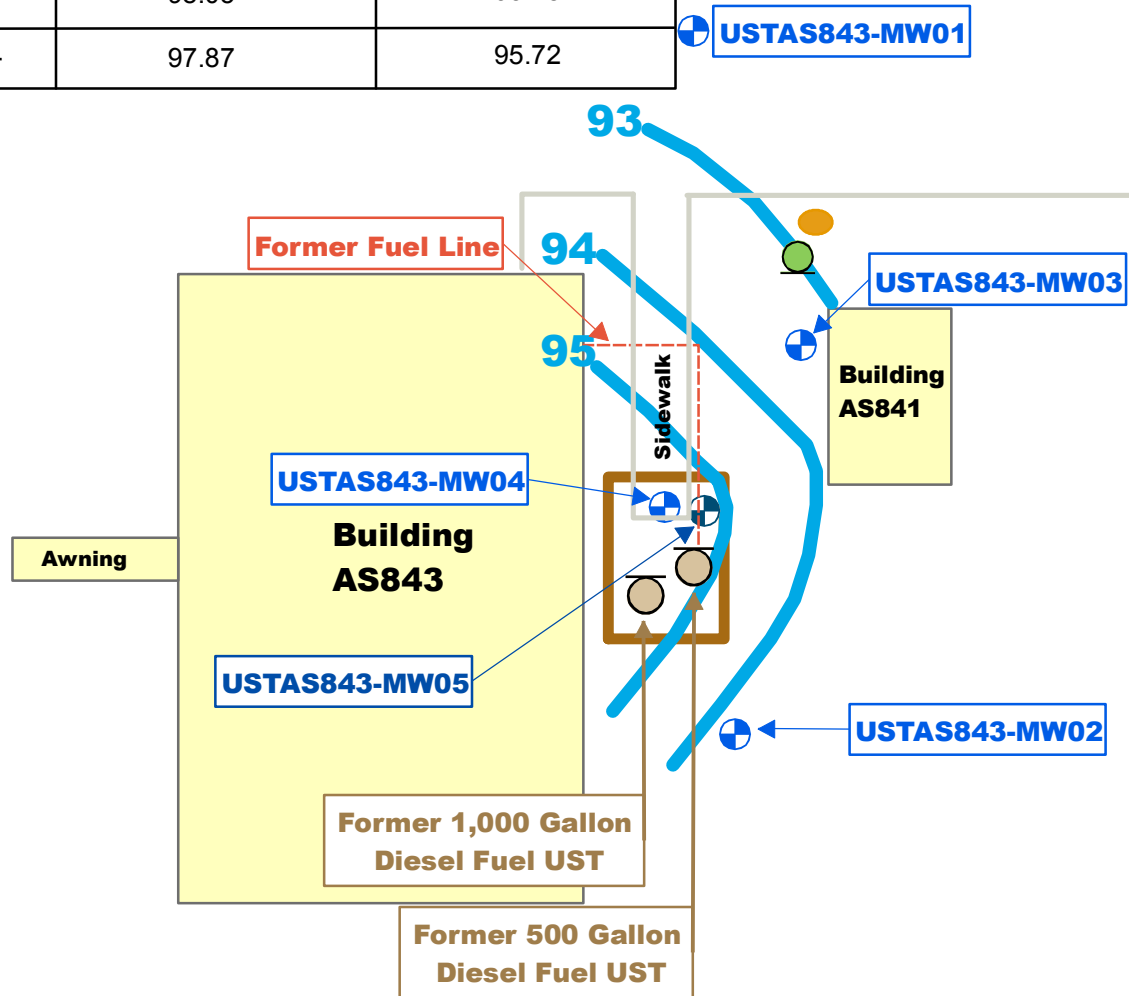


606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

October 2005 Groundwater Elevations

Site AS-843

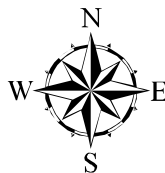
| Monitoring Well | Top of Casing Elevation (Feet) | Groundwater Elevation (Feet) |
|-----------------|--------------------------------|------------------------------|
| USTAS843-MW01 | 97.58 | 92.48 |
| USTAS843-MW02 | 98.01 | 93.40 |
| USTAS843-MW03 | 98.05 | 93.18 |
| USTAS843-MW04 | 97.87 | 95.72 |



NOTE:Map Adapted From EEI 2005 AMR

Legend

- Shallow Monitoring Well
- Deep Monitoring Well
- UST
- Diesel Fuel AST
- Area of Petroleum Staining
- Existing Structure
- Former Excavation Area



1 inch = approximately 20 feet



Marine Corps Base Camp Lejeune
Camp Lejeune, NC



Figure 3- AS-843 Site Map With Shallow
Groundwater Elevations For October 2005

Project No. NV007

Date: June 2006



606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606

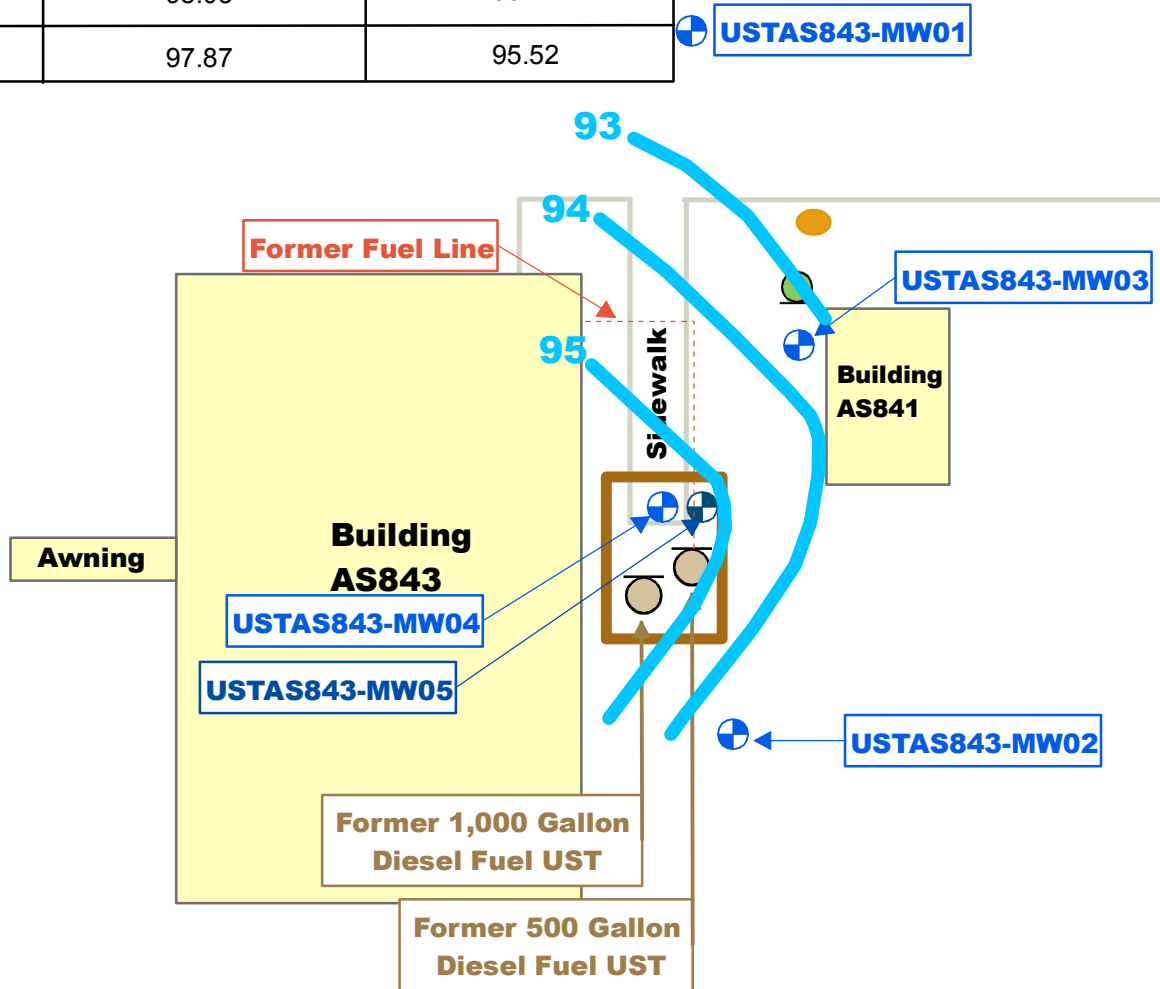


606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

January 2006 Groundwater Elevations

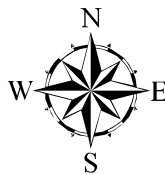
Site AS-843

| Monitoring Well | Top of Casing Elevation (Feet) | Groundwater Elevation (Feet) |
|-----------------|--------------------------------|------------------------------|
| USTAS843-MW01 | 97.58 | 92.65 |
| USTAS843-MW02 | 98.01 | 93.88 |
| USTAS843-MW03 | 98.05 | 93.22 |
| USTAS843-MW04 | 97.87 | 95.52 |



Legend

- Shallow Monitoring Well
- Deep Monitoring Well
- UST
- Diesel Fuel AST
- Area of Petroleum Staining
- Existing Structure
- Former Excavation Area



1 inch = approximately 20 feet



Marine Corps Base Camp Lejeune
Camp Lejeune, NC



Figure 4- AS-843 Site Map With Shallow Groundwater Elevations For January 2006

Project No. NV007

Date: June 2006



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Suite A-1
Newport News, VA 23606

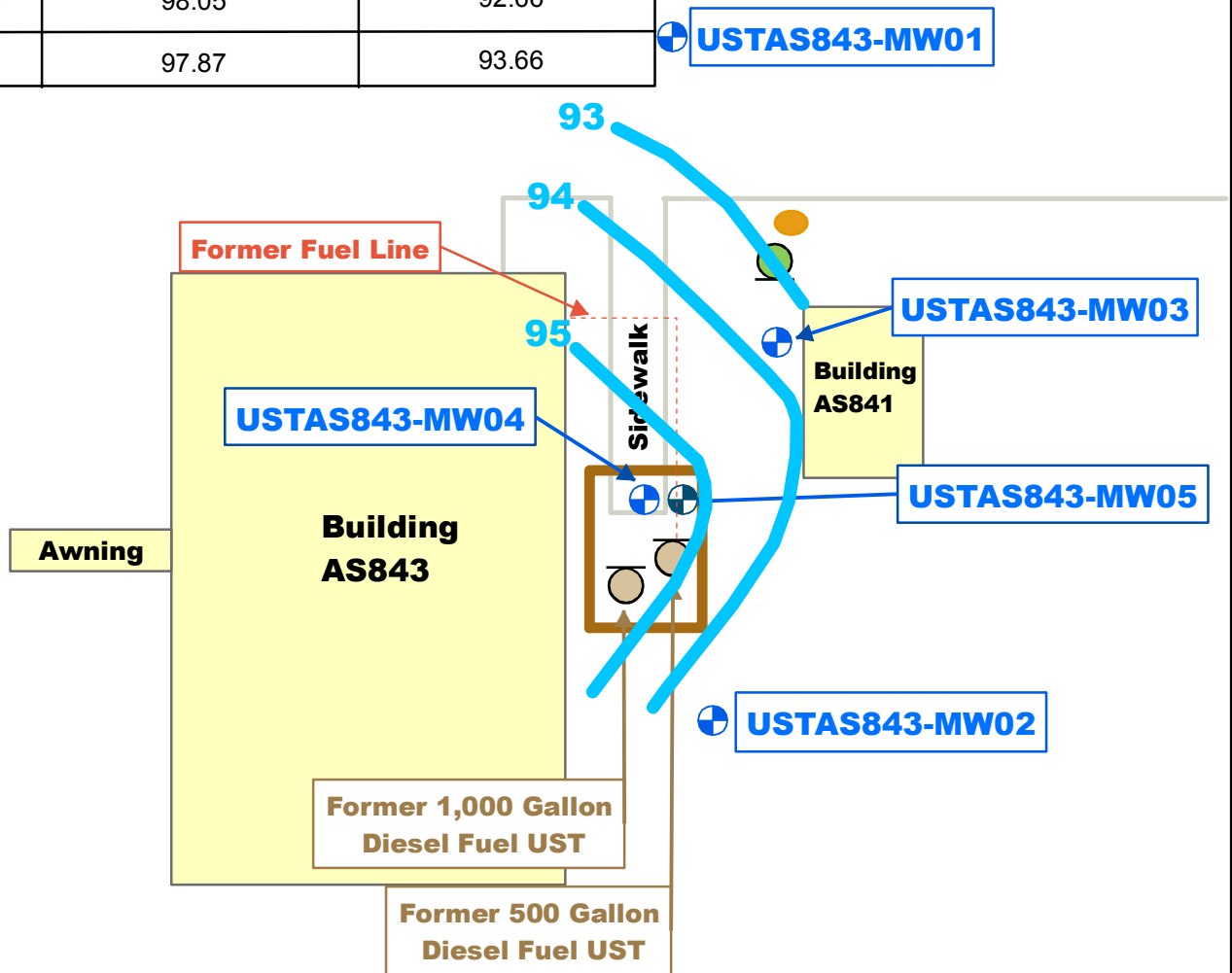


606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

April 2006 Groundwater Elevations

Site AS-843

| Monitoring Well | Top of Casing Elevation (Feet) | Groundwater Elevation (Feet) |
|-----------------|--------------------------------|------------------------------|
| USTAS843-MW01 | 97.58 | 91.58 |
| USTAS843-MW02 | 98.01 | 93.38 |
| USTAS843-MW03 | 98.05 | 92.66 |
| USTAS843-MW04 | 97.87 | 93.66 |



NOTE: Map Adapted From EEI 2005 AMR

Legend

- Shallow Monitoring Well
- Deep Monitoring Well
- UST
- Diesel Fuel AST
- Area of Petroleum Staining
- Existing Structure
- Former Excavation Area



1 inch = approximately 20 feet



Marine Corps Base Camp Lejeune
Camp Lejeune, NC



Figure 5- AS-843 Site Map With Shallow
Groundwater Elevations For April 2006

Project No. NV007

Date: June 2006



606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606



606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606